# RADIO TEST SET

# MAINTENANCE MANUAL

# 2965, 2965A, 2966A
# 2967 & 2968

## Volume One



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# About this manual

This manual provides servicing information to component level for the 2965, 2965A, 2966A, 2967 and 2968 Radio Test Sets. It is contained in two volumes.

## Intended audience

The book is intended for qualified service engineers and assumes a knowledge of the test set to a level covered in the Operating Manual 46882-159 (2965) or 46882-274T (2965A, 2966A, 2967, 2968).

## Structure

**VOLUME ONE**

**Chapter 1 Technical description**

This includes block diagrams and detailed board circuit descriptions.

**Chapter 2 Maintenance**

Refer to this chapter for board and unit access, service policy and routine safety testing and inspection.

**Chapter 3 Adjustment and calibration**

Refer to this chapter for information on user calibrations, software calibrations and hardware adjustments.

**Chapter 4 Self-calibration information**

Contains listings of the various self-calibration programs provided with the test set.

**Chapter 5 Fault diagnosis**

Contains a quick fault-finding guide and information about the HELP SET-UP diagnostics.

**Chapter 6 Replaceable parts**

Contains lists of board component parts and a section on miscellaneous mechanical parts.

**VOLUME TWO**

**Chapter 7 Servicing diagrams**

Contains interconnection drawings, board circuits and board component layout drawings.

## Associated publications

For an up-to-date list of associated publications, refer to the associated Operating Manual.

# Volume one
# Contents

# Precautions

**WARNING** **CAUTION** **Note**

These terms have specific meanings in this manual:-

**WARNING** **Information to prevent personal injury.**

**CAUTION** **Information to prevent damage to the equipment.**

**Note** **Important general information.**

## Hazard symbols

The meanings of hazard symbols appearing on the equipment are as follows:-

| Symbol | Description |
|---|---|
|  | General hazard |
|  | Dangerous voltage |
|  | Toxic hazard |
|  | Hot surface |
|  | Static-sensitive components |

## General conditions of use

This product is designed and tested to comply with the requirements of IEC/EN61010-1 'Safety requirements for electrical equipment for measurement, control and laboratory use', for Class I**,** portable equipment and is for use in a pollution degree 2 environment. The equipment is designed to operate from an installation category II supply.

Earlier models were also provided with a DC supply voltage input. These models were additionally designed to operate from an installation category I supply.

Prior to 1st December 1998, some models were declared to meet the requirements of HD401 (IEC Publication 348 'Safety requirements for electronic measuring apparatus'). This standard was superseded by IEC/EN61010-1 after this date.

Equipment should be protected from the ingress of liquids and precipitation such as rain, snow, etc. When moving the equipment from a cold to a hot environment, it is important to allow the temperature of the equipment to stabilise before it is connected to the supply to avoid condensation forming. The equipment must only be operated within the environmental conditions specified in Chapter 1 'Performance data' in the Operating/Instruction manual, otherwise the protection provided by the equipment may be impaired.

This product is not approved for use in hazardous atmospheres or medical applications. If the equipment is to be used in a safety-related application, e.g. avionics or military applications, the suitability of the product must be assessed and approved for use by a competent person.

**WARNING**

## Electrical hazards

### AC supply voltage

This equipment conforms with IEC Safety Class 1, meaning that it is provided with a protective grounding lead. To maintain this protection, the supply lead must always be connected to the source of supply via a socket with a grounded contact.

Be aware that the supply filter contains capacitors that may remain charged after the equipment is disconnected from the supply. Although the stored energy is within the approved safety requirements, a slight shock may be felt if the plug pins are touched immediately after removal.

#### Fuses

Note that there are supply fuses in both the live and neutral wires of the supply lead. If only one of these fuses should rupture, certain parts of the equipment could remain at supply potential.

#### Removal of covers

Disconnect the supply before removing the covers so as to avoid the risk of exposing high voltage parts. If any internal adjustment or servicing has to be carried out with the supply on, it must only be performed by a skilled person who is aware of the hazard involved.

**WARNING**

## Tilt facility

When the equipment is in the tilt position, it is advisable, for stability reasons, not to stack other equipments on top of it.

**WARNING**

## Toxic hazards

Some of the components used in this equipment may include resins and other materials which give off toxic fumes if incinerated. Take appropriate precautions, therefore, in the disposal of these items.

**WARNING**

## Beryllia

Beryllia (beryllium oxide) is used in the construction of the following components in this equipment:

IC10 on AF5

This material, when in the form of fine dust or vapour and inhaled into the lungs, can cause a respiratory disease. In its solid form, as used here, it can be handled quite safely although it is prudent to avoid handling conditions which promote dust formation by surface abrasion.

Because of this hazard, you are advised to be very careful in removing and disposing of these components. Do not put them in the general industrial or domestic waste or despatch them by post. They should be separately and securely packed and clearly identified to show the nature of the hazard and then disposed of in a safe manner by an authorized toxic waste contractor.

**WARNING**

## Lithium

A Lithium battery (or a Lithium battery contained within an IC) is used in the following components in this equipment:

See page 6-300
IC8, IC9, IC44 on A6

Lithium batteries present two types of hazards:

As Lithium is a toxic substance, the battery should in no circumstances be crushed, incinerated or disposed of in normal waste.

Do not attempt to recharge this type of battery. Do not short circuit or force discharge since this might cause the battery to vent, overheat or explode.

**WARNING**

## Beryllium copper

Some mechanical components within this instrument are manufactured from beryllium copper. This is an alloy with a beryllium content of approximately 5%. It represents no risk in normal use.

The material should not be machined, welded or subjected to any process where heat is involved.

It must be disposed of as “special waste”.

It must NOT be disposed of by incineration.

**WARNING**

## Cathode ray tube

Handling should only be carried out by experienced personnel.

### High voltage

A high voltage charge may exist between the external conductive coating on the glass envelope and the final anode contact for some time after power has been removed. Contact with the very high voltages and low currents employed, whilst presenting a risk of ventricular fibrillation in some people, may also cause an involuntary reaction which could result in damage and hence implosion of the tube. Before handling the tube, the anode must be shorted to the external conductive coating via a 10 kΩ resistor to discharge the high voltage.

### Implosion

This cathode ray tube (CRT) is a high-vacuum tube which has a high level of stored potential energy. To reduce the risk from an implosion, avoid stressing (particularly around the neck), surface abrasion, or scratching the tube, as such damage can result in serious weakening of the glass envelope, leading to explosive fragmentation of the glass. Personal protective equipment including eye protection must be worn when handling cathode ray tubes due to the risk of spontaneous or delayed implosion. Only approved shipping cartons should be used during storage or transportation. CRTs should not be handled by the neck.

### Toxic materials

Cathode ray tubes may contain very small amounts of toxic materials. If a tube is broken, avoid inhaling, ingesting or contact with the dust. A defective tube should be disposed of in a safe manner by an authorized waste contractor.

**WARNING**

## Hot surfaces

Take care when touching the RF input N-type connector after the application of high levels of continuous power. If 50 W is exceeded for a prolonged period, the temperature of the connector can become excessive.

**WARNING**

## Fire hazard

Make sure that only fuses of the correct rating and type are used for replacement.

If an integrally fused plug is used on the supply lead, ensure that the fuse rating is commensurate with the current requirements of this equipment. See under 'Performance data' in Chapter 1 in the Operating/Instruction manual for power requirements.

**CAUTION**

## Static-sensitive components

The presence of static-sensitive components is indicated in the equipment by yellow disks, flags or labels bearing the symbol  . Certain handling precautions should be observed to prevent these components being permanently damaged by static charges or fast surges:-

1. If a printed board containing static-sensitive components (as indicated by warning disk or flag) is removed, it must be temporarily stored in a conductive plastic bag.
2. If a static-sensitive component is to be removed or replaced, the following anti-static equipment should be used:-
   - A **work bench** with a grounded conductive surface.
   - **Metallic tools** grounded either permanently or by repeated discharges.
   - A **low-voltage** grounded soldering iron.
   - A **grounded wrist strap** and a conductive **grounded seat cover** for the operator whose outer clothing should not be of man-made fibre.
3. As a general precaution, avoid touching the leads of a static-sensitive component. When handling a new one, leave it in its conducting mount until it is required for use.
4. If using a freezer aerosol in fault finding, take care not to spray programmable ICs as this may affect their contents.

**CAUTION**

## Input overload

On the RF N-type connector, the input power should not exceed 150 W.

On the RF TNC connector, the input power should not exceed 1 W.

# Précautions

**WARNING** **CAUTION** **Note**

Les termes suivants ont, dans ce manuel, des significations particulières:

**WARNING** contient des informations pour éviter toute blessure au personnel.

**CAUTION** contient des informations pour éviter les dommages aux équipements.

**Note** contient d'importantes informations d'ordre général.

## Symboles signalant un risque

La signification des symboles liés à cet équipement est la suivante:

| Symbole | Nature du risque |
|---|---|
|  | Risques généraux |
|  | Tension dangereuse |
|  | Danger produits toxiques |
|  | Surfaces chaudes |

## Conditions générales d'utilisation

Ce produit a été conçu et testé pour être conforme aux exigences des normes CEI/EN61010-1 "Règles de sécurité pour appareils électriques de mesurage, de régulation et de laboratoire", pour des équipements Classe I, portables et pour une utilisation dans un environnement de pollution de niveau 2. Cet équipement est conçu pour fonctionner à partir d'une alimentation de catégorie II.

Les premières versions étaient proposées avec une entrée alimentation tension continue. Ces modèles pouvaient aussi être alimentés à partir d'une installation de catégorie I.

Antérieurement au 1er décembre 1998, quelques modèles étaient conformes à la norme HD 401 (Publication CEI 348 'Norme de sécurité pour les appareils de mesure électroniques'). Après cette date, cette norme a été remplacée par la norme.

Cet équipement doit être protégé de l'introduction de liquides ainsi que des précipitations d'eau, de neige, etc... Lorsqu'on transporte cet équipement d'un environnement chaud vers un environnement froid, il est important de laisser l'équipement se stabiliser en température avant de le connecter à une alimentation afin d'éviter toute formation de condensation. L'appareil doit être utilisé uniquement dans le cadre des conditions d'environnement spécifiées au chapitre 1 "Performance data" du manuel d'utilisation, toute autre utilisation peut endommager les systèmes de protection.

Ce produit n'est pas garanti pour fonctionner dans des atmosphères dangereuses ou pour un usage médical. Si l'équipement doit être utilisé pour des applications en relation avec la sécurité, par exemple des applications militaires ou aéronautiques, la compatibilité du produit doit être établie et approuvée par une personne compétente.

**WARNING**

## Sécurité électrique (tension d'alimentation alternative)

Cet appareil est protégé conformément à la norme CEI de sécurité Classe 1, c'est-à-dire que sa prise secteur comporte un fil de protection à la terre. Pour maintenir cette protection, le câble d'alimentation doit toujours être branché à la source d'alimentation par l'intermédiaire d'une prise comportant une borne de terre.

Notez que les filtres d'alimentation contiennent des condensateurs qui peuvent encore être chargés lorsque l'appareil est débranché. Bien que l'énergie contenue soit conforme aux exigences de sécurité, il est possible de ressentir un léger choc si l'on touche les bornes sitôt après débranchement.

### Fusibles

Notez qu'il y a deux fusibles, l'un pour la phase et l'autre pour le neutre du câble d'alimentation. Si un seul fusible est coupé, certaines parties de l'appareil peuvent rester au potentiel d'alimentation.

### Retrait des couvercles

L'appareil doit être débranché avant de retirer les couvercles afin d'éviter tout contact avec les éléments haute tension. Si toutefois un réglage interne ou une réparation nécessitent la présence de l'alimentation, ils devront être effectués par une personne qualifiée et avisée des risques encourus.

**WARNING**

## Position inclinée

Lorsque l'appareil est dans une position inclinée, il est recommandé, pour des raisons de stabilité, de ne pas y empiler d'autres appareils.

**WARNING**

## Danger produits toxiques

Certains composants utilisés dans cet appareil peuvent contenir des résines et d'autres matières qui dégagent des fumées toxiques lors de leur incinération. Les précautions d'usages doivent donc être prises lorsqu'on se débarrasse de ce type de composant.

**WARNING**

## Le Béryllia

Le Béryllia (oxyde de Béryllium) entre dans la composition des composants suivants:

IC10 sur AF5

Cette matière peut, lorsqu'elle est inhalée sous forme de vapeur ou de fine poussière, être la cause de maladies respiratoires. Sous sa forme solide, comme c'est le cas ici, cette matière peut être manipulée sans risque, bien qu'il soit conseillé d'éviter toute manipulation pouvant entraîner la formation de poussière par abrasion de la surface.

Il est donc conseillé, pour éviter ce risque, de prendre les précautions requises pour retirer ces composants et s'en débarrasser. Ne les jetez pas avec les déchets industriels ou domestiques ou ne les envoyez pas par la poste. Il faut les emballer séparément et solidement et bien indiquer la nature du risque avant de les céder, avec précautions, à une entreprise spécialisée dans le traitement de déchets toxiques.

**WARNING**

## Lithium

Une pile au Lithium ou un CI contenant une pile au Lithium est utilisé dans les composants suivants:

Voir page 6-300
IC8, IC9, IC44 sur A6

Les piles au lithium présentent deux types de danger:

Le Lithium étant une substance toxique, il ne faut en aucun cas l'écraser, l'incinérer ou le jeter avec des déchets normaux.

N'essayez pas de recharger ce type de pile. Ne court-circuitez pas ou ne forcez pas la décharge de la pile car cela pourrait causer une fuite, une surchauffe ou une explosion.

**WARNING**

## Bronze au béryllium

Dans cet équipement,certaines pièces mécaniques sont à base de bronze au béryllium. Il s'agit d'un alliage dans lequel le pourcentage de béryllium ne dépasse pas 5%. Il ne présente aucun danger en utilisation normale.

Toutefois, cet alliage ne doit pas être travaillé, soudé ou soumis à un processus qui implique l'utilisation d'une source de chaleur.

En cas de destruction, il sera entreposé dans un container spécial. IL ne devra pas être détruit par incinération

**WARNING**

## Tube cathodique

La manipulation ne doit se faire que par du personnel qualifié.

### Haute tension

Une charge haute tension peut exister entre le revêtement de protection conducteur de l'enveloppe de verre et le contact de l'anode terminale pendant un certain temps après suppression de l'alimentation. Le contact avec les très hautes tensions et faibles courants employés peut d'une part présenter un risque de fibrillation cardiaque chez certaines personnes et d'autre part causer une réaction involontaire pouvant entraîner une détérioration voire une explosion avec les dommages conséquents. Avant toute manipulation du tube, veillez à relier l'anode au revêtement conducteur externe par l'intermédiaire d'une résistance 10kohms afin de décharger la haute tension.

### Implosion

Le tube cathodique (CRT) possède une haute densité de vide et ainsi un niveau d'energie potentiel stocké très important. Pour réduire le risque d'implosion, il faut éviter toute contrainte, notamment sur le col du tube, toute abrasion ou rayure de la surface pouvant résulter en une fragilisation de l'enveloppe de verre et entraîner une explosion par fragmentation. La manipulation de tels tubes nécessite le port d'équipements de protection incluant des lunettes de protection à cause du risque d'implosion spontané ou retardé. Le transport ou le stockage doivent se faire dans des emballages carton approuvés. Les tubes ne doivent au aucun cas être manipulés par le col.

### Matières toxiques

Les tubes cathodiques peuvent contenir de petites quantités de matières toxiques. Lorsqu'un tube est endommagé, évitez tout contact, inhalation ou ingestion de poussière. Les tubes défectueux doivent être traîtés avec les précautions d'usage et à l'aide d'un contractant habilité.

**WARNING**

## Surfaces chaudes

Faire attention, lors de la manipulation d’un connecteur “N”, après l’injection de haute puissance en continu sur l’entrée RF de ce connecteur.  Si une puissance supérieure à 50 W est envoyée pendant une longue durée, la température du connecteur peut être très élevée.

**WARNING**

## Risque lié au feu

Lors du remplacement des fusibles vérifiez l’exactitude de leur type et de leur valeur.

Si le câble d’alimentation comporte une prise avec fusible intégré, assurez vous que sa valeur est compatible avec les besoins en courant de l’appareil.

# Vorsichtsmaßnahmen

**WARNING** **CAUTION** **Note**

Diese Hinweise haben eine bestimmte Bedeutung in diesem Handbuch:

**WARNING** dienen zur Vermeidung von Verletzungsrisiken.

**CAUTION** dienen dem Schutz der Geräte.

**Note** enthalten wichtige Informationen.

## Gefahrensymbole

Die Gefahrensymbole auf den Geräten sind wie folgt:

| Symbol | Gefahrenart |
|---|---|
|  | Allgemeine Gefahr |
|  | Gefährliche Spannung |
|  | Warnung vor giftigen Substanzen |
|  | Heiße Oberfläche |

## Allgemeine Hinweise zur Verwendung

Dieses Produkt wurde entsprechend den Anforderungen von IEC/EN61010-1 “Sicherheitsanforderungen für elektrische Ausrüstung für Meßaufgaben, Steuerung und Laborbedarf”, Klasse I, transportabel zur Verwendung in einer Grad 2 verunreinigten Umgebung, entwickelt und getestet. Dieses Gerät ist für Netzversorgung Klasse II zugelassen.

Frühere Modelle wurden auch mit einer DC Stromversorgung geliefert. Bei diesen Geräten wurde zusätzlich die Versorgung von einer Kategorie I Quelle vorgesehen.

Bis zum 1. Dezember 1998 wurde für einige Geräte eine Übereinstimmung mit den Erfordernissen von HD401 (IEC Veröffentlichung 348 "Sicherheitsanforderungen für elektronische Meßgeräte") erklärt. Dieser Standard wurde nach diesem Datum durch die IEC/EN61010 1 ersetzt.

Das Gerät sollte vor dem Eindringen von Flüssigkeiten sowie vor Regen, Schnee etc. geschützt werden. Bei Standortänderung von kalter in wärmere Umgebung sollte das Gerät wegen der Kondensation erst nach Anpassung an die wärmere Umgebung mit dem Netz verbunden werden. Das Gerät darf nur in Umgebungsbedingungen wie in Kapitel 1 "Leistungsdaten (Performance data)" der Bedienungsanleitung beschrieben, betrieben werden; ansonsten wird der vom Gerät vorgesehene Schutz des Anwenders beeinträchtigt.

Dieses Produkt ist nicht für den Einsatz in gefährlicher Umgebung (z.B. Ex-Bereich) und für medizinische Anwendungen geprüft. Sollte das Gerät für den Einsatz in sicherheitsrelevanten Anwendungen wie z.B. im Flugverkehr oder bei militaerischen Anwendungen vorgesehen sein, so ist dieser von einer für diesen Bereich zuständigen Person zu beurteilen und genehmigen.

**WARNING**

## Elektrische Schläge (Wechselspannungsversorgung)

Das Gerät entspricht IEC Sicherheitsklasse 1 mit einem Schutzleiter nach Erde. Das Netzkabel muß stets an eine Steckdose mit Erdkontakt angeschlossen werden.

Filterkondensatoren in der internen Spannungsversorgung können auch nach Unterbrechung der Spannungszuführung noch geladen sein. Obwohl die darin gespeicherte Energie innerhalb der Sicherheitsmargen liegt, kann ein leichter Spannungsschlag bei Berührung kurz nach der Unterbrechung erfolgen.

### Sicherungen

Es ist zu beachten, daß es Sicherungen in beiden (spannunsführenden und neutralen) Zuleitungen gibt. Wenn nur eine von diesen Sicherungen schmilzt, so bleiben einige Geräteteile immer noch auf Spannungspotential.

### Abnahme von Abdeckungen

Die Spannungsversorgung muß vor Abnahme von Gehäuseabdeckungen unterbrochen sein, damit hochspannungsführende Teile gefahrlos zugänglich sind. Falls Abgleiche oder Servicearbeiten unter Spannung notwendig werden, dürfen solche Arbeiten nur von fachkundigem Personal durchgeführt werden, das die Gefahren kennt.

**WARNING**

## Schrägstellung

Bei Schrägstellung des Geräts sollten aus Stabilitätsgründen keine anderen Geräte darauf gestellt werden.

**WARNING**

## Warnung vor giftigen Substanzen

In einigen Bauelementen dieses Geräts können Epoxyharze oder andere Materialien enthalten sein, die im Brandfall giftige Gase erzeugen. Bei der Entsorgung müssen deshalb entsprechende Vorsichtsmaßnahmen getroffen werden.

**WARNING**

## Beryllium Oxid

Beryllium Oxid wird in den folgenden Bauelementen dieses Geräts verwendet:

IC10 auf AF5

Als Staub inhaliert kann Beryllium zu Schädigungen der Atemwege führen. In fester Form kann es ohne Gefahr gehandhabt werden, wobei Staubabrieb vermieden werden sollte.

Wegen dieser Gefahren dürfen diese Bauelemente nur mit der entsprechenden Vorsicht ausgebaut und entsorgt werden. Sie dürfen nicht mit Industrie oder Hausmüll vermengt oder per Post versandt werden. Sie müssen separat verpackt und entsprechend der Gefährdung markiert werden. Die Entsorgung muß über einen autorisierten Fachbetrieb erfolgen.

**WARNING**

## Lithium

Eine Lithium Batterie oder eine Lithium Batterie innerhalb eines IC wird in den folgenden Bauelementen dieses Geräts verwendet:

Siehe Seite 6-300
IC8, IC9, IC44 auf A6

Lithiumzellen bergen folgende Gefahren:

Da Lithium giftig ist, darf die Batterie niemals geöffnet, zerstört oder verbrannt und mit normalem Müll entsorgt werden.

Die Batterie darf nicht aufgeladen werden. Kurzschließen der Batterie kann zu Überhitzung, Öffnung der Explosion führen.

**WARNING**

## Beryllium Kupfer

In diesem Gerät sind einige mechanische Komponenten aus Berylium Kupfer gefertigt. Dies ist eine Verbindung welche aus einem Berylliumanteil von ca. 5 % besteht. Bei normaler Verwendung besteht kein Gesundheitsrisiko.

Das Metall darf nicht bearbeitet, geschweißt oder sonstiger Wärmebehandlung ausgesetzt werden.

Es muß als Sondermüll entsorgt werden.

Es darf nicht durch Verbrennung entsorgt werden.

**WARNING**

## Kathodenstrahlröhren

Die Handhabung darf nur von qualifiziertem Personal durchgeführt werden.

### Hochspannung

Zwischen der leitenden Umhüllung der Bildröhre und dem hinteren Anodenkontakt kann auch einige Zeit nach Abklemmen der Versorgungsspannung noch Hochspannung anliegen. Die Berührung von Hochspannung, auch bei niedrigen Strömen kann bei manchem Personen zu ventrikulärem Herzkammerflimmern und unbeabsichtigten Reaktionen, wie der Beschädigung und Implosion der Bildröhre und hieraus zu Verletzungsgefahr führen.

### Implosion

Diese Kathodenstrahlröhre (CRT) ist eine hochevakuierte Glasröhre mit hohem Anteil an gespeicherter Energie. Zur Vermeidung des Risikos von Implosion sind Belastung, (insbesondere am Röhrenhals), Abschabungen und Kratzer welche eine Schwächung des Materials zur Folge haben und zu einer explosionsartigen Zersplitterung führen können unbedingt zu vermeiden. Wegen des Risikos der spontanen oder auch verzögerten Implosion ist bei Handhabung der Röhre unbedingt entsprechende Schutzkleidung und Augenschutz zu tragen. Für Transport oder Lagerzwecke ist unbedingt eine geeignete Verpackung zu verwenden. Bildröhren dürfen nicht am Röhrenhals gehalten werden.

### Giftige Substanzen

Bildröhren enthalten sehr kleine Anteile an giftigen Substanzen. Sollte eine Bildröhre zerbrochen sein, ist das Einatmen, Einnehmen oder Berühren des Staubes zu vermeiden. Eine zerstörte Bildröhre sollte auf sichere Weise und nur durch eine geeignete Entsorgungsfirma entsorgt werden.

**WARNING**

## Heiße Oberfläche

Vorsicht bei Berührung der HF Eingangsbuchse Typ N nach Einspeisen hoher Dauerleistung. Falls über längere Zeit 50 Watt überschritten wird, kann die Temperatur der Buchse über Normal steigen.

**WARNING**

## Feuergefahr

Es dürfen nur Ersatzsicherungen vom gleichen Typ mit den korrekten Spezifikationen entsprechend der Stromaufnahme des Gerätes verwendet werden.

# Precauzioni

**WARNING** **CAUTION** **Note**

Questi termini vengono utilizzati in questo manuale con significati specifici:

**WARNING** riportano informazioni atte ad evitare possibili pericoli alla persona.

**CAUTION** riportano informazioni per evitare possibili pericoli all'apparecchiatura.

**Note** riportano importanti informazioni di carattere generale.

## Simboli di pericolo

Significato dei simboli di pericolo utilizzati nell'apparato:

| Simbolo | Tipo di pericolo |
|---|---|
|  | Pericolo generico |
|  | Tensione pericolosa |
|  | Pericolo sostanze tossiche |
|  | Superfici ad alta temperatura |

## Condizioni generali d'uso

Questo prodotto è stato progettato e collaudato per rispondere ai requisiti della direttiva IEC/EN61010-1 'Safety requirements for electrical equipment for measurement, control and laboratory use' per apparati di classe I, portatili e per l'uso in un ambiente inquinato di grado 2. L'apparato è stato progettato per essere alimentato da un alimentatore di categoria II.

Precedenti modelli erano anche dotati di un ingresso per alimentazione in C-C. Questi modelli erano inoltre progettati per operare con una alimentazione di installazione di categoria I.

Prima del 1 Dicembre 1998, qualche modello veniva dichiarato corrispondente alle normative HD401 (IEC Pubblicazione 348 "Requisiti di sicurezza per apparati di misura elettronici"). Questo standard è stato sostituito da IEC/EN61010 dopo questa data.

Lo strumento deve essere protetto dal possibile ingresso di liquidi quali, ad es., acqua, pioggia, neve, ecc. Qualora lo strumento venga portato da un ambiente freddo ad uno caldo, è importante lasciare che la temperatura all'interno dello strumento si stabilizzi prima di alimentarlo per evitare formazione di condense. Lo strumento deve essere utilizzato esclusivamente nelle condizioni ambientali descritte nel capitolo 1 'Performance data' del manuale operativo.

Questo prodotto non è stato approvato per essere usato in ambienti pericolosi o applicazioni medicali. Se lo strumento deve essere usato per applicazioni particolari collegate alla sicurezza (per esempio applicazioni militari o avioniche), occorre che una persona o un istituto competente ne certifichi l'uso.

**WARNING**

## Pericoli da elettricità (alimentazione c.a.)

Quest ’apparato è provvisto del collegamento di protezione di terra e rispetta le norme di sicurezza IEC, classe 1. Per mantenere questa protezione è necessario che il cavo, la spina e la presa d’alimentazione siano tutti provvisti di terra.

Il circuito d’alimentazione contiene dei filtri i cui condensatori possono restare carichi anche dopo aver rimosso l’alimentazione. Sebbene l’energia immagazzinata è entro i limiti di sicurezza, purtuttavia una leggera scossa può essere avvertita toccando i capi della spina subito dopo averla rimossa.

### Fusibili

Notare che entrambi i capi del cavo d’alimentazione sono provvisti di fusibili. In caso di rottura di uno solo dei due fusibili, alcune parti dello strumento potrebbero restare sotto tensione.

### Rimozione dei coperchi

Prima di rimuovere i coperchi occorre scollegare la spina d’alimentazione onde evitare il rischio di esposizione di parti ad alta tensione. Eventuali operazioni di manutenzione che richiedono la presenza dell’alimentazione dovranno essere eseguite solo da parte di personale specializzato ed a conoscenza dei pericoli coinvolti.

**WARNING**

## Posizionamento inclinato

Quando lo strumento è in posizione inclinata è raccomandato, per motivi di stabilità, non sovrapporre altri strumenti.

**WARNING**

## Pericolo sostanze tossiche

Alcuni dei componenti usati in questo strumento possono contenere resine o altri materiali che, se bruciati, possono emettere fumi tossici. Prendere quindi le opportune precauzioni nell’uso di tali parti.

**WARNING**

## Berillio

Berillio (ossido di berillio) è utilizzato nella costruzione dei seguenti componenti di quest’apparato:

IC10, schema AF5

Questo materiale, se inalato sotto forma di polvere fine o vapore, può causare malattie respiratorie. Allo stato solido, come è usato qui, può essere maneggiato con sufficiente sicurezza anche se è prudente evitare condizioni che provochino la formazione di polveri tramite abrasioni superficiali.

A cause di questi pericoli occorre essere molto prudenti nella rimozione e nella locazione di questi componenti. Questi non devono essere gettati tra i rifiuti domestici o industriali né. vanno spediti per posta. Essi devono essere impacchettati separatamente ed in modo sicuro e devono indicare chiaramente la natura del pericolo e quindi affidate a personale autorizzato.

**WARNING**

## Litio

Batteria al litio o integrati contenenti batterie al litio sono usati nei seguenti componenti:

Vedi pag. 6-300
IC8, IC9, IC44, schema A6

Le pile al litio presentano due pericoli:

Poiché il litio è una sostanza tossica, la batteria non deve mai essere rotta, bruciata o gettata tra I rifiuti normali.

Questo tipo di batteria non deve mai essere sottoposta a ricarica né va cortocircuitata o sottoposta a scarica violenta in quanto ciò potrebbe comportare fumi surriscaldamento o esplosione.

**WARNING**

## Rame berillio

Alcuni componenti meccanici in questo strumento sono realizzati in rame berillio. Si tratta di una lega con contenuto di berillio di circa il 5%, che non presenta alcun rischio in usi normali.

Questo materiale non deve essere lavorato, saldato o subire qualsiasi processo che coinvolge alte temperature.

Deve essere eliminato come "rifiuto speciale". Non deve essere eliminato tramite "inceneritore".

**WARNING**

## Tubo a raggi catodici

Il tubo a raggi catodici dovrebbe essere maneggiato solo da personale esperto.

### Alta tensione

Una differenza di potenziale elevata tra il rivestimento conduttivo esterno che avvolge il vetro del tubo ed il contatto finale dell'anodo può permanere per diverso tempo dopo aver rimosso l'alimentazione. Il contatto con parti caratterizzate da elevate differenze di potenziale e da deboli correnti può, da un lato causare fibrillazione ventricolare in alcune persone, dall'altro causare reazioni involontarie che potrebbero danneggiare o anche causare l'implosione del tubo e conseguenti ferite. Prima di maneggiare il tubo è bene corto-circuitare l'anodo con il rivestimento conduttivo esterno tramite una resistenza di 10 kΩ onde scaricare la differenza di potenziale..

### Implosione

Questo tubo a raggi catodici è un tubo sotto vuoto spinto con un'elevata energia potenziale immagazzinata. Per ridurre il rischio di implosione evitare qualsiasi sforzo sul tubo (particolarmente intorno al collo), abrasioni superficiali o graffi in quanto tali azioni possono ridurre seriamente la resistenza del tubo e quindi comportare l'esplosione e la frammentazione del vetro. Quando si maneggia un tubo a raggi catodici occorre indossare protezioni personali, incluso le protezioni per gli occhi, a causa del rischio di implosione spontanea o ritardata. Solo cartoni di tipo approvato possono essere usati per il trasporto o l'immagazzinamento. I tubi a raggi catodici non devono mai essere maneggiati dal collo.

### Materiali tossici

I tubi a raggi catodici possono contenere delle piccole quantità di sostanze tossiche. Se il tubo viene rotto, occorre evitare inalazione, ingestione o contatto con la polvere. Un tubo difettoso va eliminato solo tramite società di rifiuti autorizzate.

**WARNING**

## Superfici ad alta temperatura

Fare attenzione nel toccare il connettore d'ingresso di tipo N dopo aver applicato una potenza elevata e continua. Una potenza superiore a 50 W per tempi prolungati può portare il connettore ad una temperatura molto elevata.

**WARNING**

## Pericolo d'incendio

Assicurarsi che, in caso di sostituzione, vengano utilizzati solo fusibili della portata e del tipo prescritti.

Se viene usata una spina con fusibili, assicurarsi che questi siano di portata adeguata ai requisiti di alimentazione richiesti dallo strumento.

# Precauciones

**WARNING** **CAUTION** **Note**

Estos términos tienen significados específicos en este manual:

**WARNING** contienen información referente a prevención de daños personales.

**CAUTION** contienen información referente a prevención de daños en equipos.

**Note** contienen información general importante.

## Símbolos de peligro

Los significados de los símbolos de peligro que aparecen en los equipos son los siguientes:

| Símbolo | Naturaleza del peligro |
|---|---|
|  | Peligro general |
|  | Voltaje peligroso |
|  | Aviso de toxicidad |
|  | Superficies a altas temperaturas |

## Condiciones generales de uso

Este producto ha sido diseñado y probado para cumplir los requerimientos de la normativa IEC/EN61010-1 “Requerimientos de la normativa para equipos eléctricos de medida, control y uso en laboratorio”, para equipos clase I, portátiles y para uso en un ambiente con un grado de contaminación 2. El equipo ha sido diseñado para funcionar sobre una instalación de alimentación de categorías II.

Los modelos más antiguos disponían también de una entrada de alimentación por CC. Adicionalmente, estos modelos estaban diseñados para funcionar alimentados con una fuente de Categoría de Instalación I.

Con anterioridad al 1 de Diciembre de 1998, algunos modelos fueron declarados conformes con los requisitos de HD401 (Publicación 348 del IEC, 'Requisitos de seguridad para aparatos de medida electrónicos'). Después de esa fecha, dicha normativa fue superada por la IEC/EN61010 1".

Debe protegerse el equipo de la entrada de líquidos y precipitaciones como nieve, lluvia, etc. Cuando se traslada el equipo de entorno frío a un entorno caliente, es importante aguardar la estabilización el equipo para evitar la condensación. Sólo debe utilizarse el aparato en las condiciones ambientales especificadas en el capítulo 1 “Especificaciones” o “Performance data” del Manual de Instrucciones/Manual de Operación/Funcionamiento.

Este producto no ha sido aprobado para su utilización en entornos peligrosos o en aplicaciones médicas. Si se va a utilizar el equipo en una aplicación con implicaciones en cuanto a seguridad, como por ejemplo aplicaciones de aviónica o militares, es preciso que un experto competente en materia de seguridad apruebe su uso.

**WARNING**

## Nivel peligroso de electricidad (tensión de red)

Este equipo cumple las normas IEC Seguridad Clase 1, lo que significa que va provisto de un cable de protección de masa. Para mantener esta protección, el cable de alimentación de red debe de conectarse siempre a una clavija con terminal de masa.

Tenga en cuenta que el filtro de red contiene condensadores que pueden almacenar carga una vez desconectado el equipo. Aunque la energía almacenada está dentro de los requisitos de seguridad, pudiera sentirse una ligera descarga al tocar la clavija de alimentación inmediatamente después de su desconexión de red.

### Fusibles

Se hace notar que el Equipo está dotado de fusibles tanto en el activo como el neutro de alimentación. Si sólo uno de estos fusibles fundiera, existen partes del equipo que pudieran permanecer a tensión de red.

### Para retirar las tapas

Desconectar de red antes de retirar las tapas para evitar el riesgo que supone tener accesibles aquellas partes del equipo expuestas a alta tensión. Aquellas operaciones que requieran tener alimentación con las tapas abiertas para mantenimiento o ajuste deben de ser realizadas por personal cualificado, que esté al tanto de los riesgos implicados.

**WARNING**

## Tener en cuenta con el equipo inclinado

Si utiliza el equipo en posición inclinada, se recomienda, por razones de estabilidad, no apilar otros equipos encima de él.

**WARNING**

## Aviso de toxicidad

Alguno de los componentes utilizados en este equipo pudieran incluir resinas u otro tipo de materiales que al arder produjeran sustancias tóxicas, Por tanto, tome las debidas precauciones en la manipulación de esas piezas.

**WARNING**

## Berilio

Berilio (óxido de berilio), se ha utilizado en la fabricación de los siguientes componentes del equipo:

IC10 en AF5

La inhalación de este material, en forma de polvo fino o vapor, entrando en los pulmones, puede ser causa de enfermedades respiratorias. En forma sólida, como se utiliza en este caso, puede manipularse con bastante seguridad, aunque se recomienda no manejarlo en aquellas condiciones que pudieran favorecer la aparición de polvo por abrasión de la superficie.

Por todo lo anterior, se recomienda tener el máximo cuidado al reemplazar o deshacerse de estos componentes, no tirándolos en basuras industriales o domésticas y no utilizar el correo para su envío. Deben, ser empaquetados de forma segura y separada, y el paquete debidamente etiquetado e identificado, señalando claramente la naturaleza del riesgo y ponerlo a disposición de un destructor autorizado de productos tóxicos.

**WARNING**

## Litio

Baterías de Litio o circuitos integrados que contienen baterías de Litio, se utilizan en los siguientes componentes del equipo:

Ver pagina 6-300
IC8, IC9, IC44 en A6

Las baterías de Litio presentan dos tipos de riesgo para lo que se recomiendan las siguientes precauciones:

Debido a que el Litio es una substancia tóxica, en ninguna circunstancia deberá ser aplastada, incinerada o desechada con basura normal.

No intente recargar este tipo de batería. No cortocircuito o fuerce la descarga ya que esto podría motivar la destrucción, sobrecalentamiento o explosión de la batería.

**WARNING**

## Berilio-cobre

Algunos componentes mecánicos contenidos en este instrumento incorporan berilio-cobre en su proceso de fabricación. Se trata de una aleación con un contenido aproximado de berilio del 5%, lo que no representa ningún riesgo durante su uso normal.

El material no debe ser manipulado, soldado, ni sometido a ningún proceso que implique la aplicación de calor.

Para su eliminación debe tratarse como un "residuo especial". El material NO DEBE eliminarse mediante incineración.

**WARNING**

## Tubo de rayos catódicos TRC

Su manejo deberá efectuarlo personal experto.

### Alta Tensión

Tras desconectar la alimentación es posible que se retenga durante un tiempo carga eléctrica entre el conductor exterior de la funda de vidrio del tubo y el contacto final del ánodo. El contacto con las altas tensiones y bajas corrientes empleadas, aunque presenta cierto riesgo de fibrilación ventricular en algunas personas, puede causar también una reacción involuntaria que pudiera tener como resultado la rotura y explosión del tubo con sus lesiones asociadas. Antes de manejar el tubo, el ánodo debe descargarse hacia del conductor externo a través de una resistencia de descarga de 10kΩ para descargar la alta tensión.

### Explosión

Este tubo de rayos catódicos (TRC) es un tubo de alto vacío con alto nivel de energía potencial almacenada. Para reducir el riesgo de explosión evitar presionar (especialmente alrededor de la nuez), lijar la superficie o rayar el tubo, dando lugar a la fragmentación explosiva del vidrio. Debe llevarse equipo de protección de seguridad que incluya protección en los ojos cuando se manejen tubos de rayos catódicos, debido al riesgo de explosión espontánea o retardada. Para el transporte y almacenaje sólo deberán emplearse embalajes apropiados. Los tubos no deben manejarse por la nuez.

### Materiales tóxicos

Los tubos de rayos catódicos pueden contener pequeñas cantidades de materiales tóxicos. Debe deshacerse de un tubo defectuoso de forma segura mediante una empresa autorizada para la recogida de residuos.

**WARNING**

## Superficies a altas temperaturas

Tenga cuidado al tocar el conector de entrada RF tipo N tras la aplicación continuada de altos niveles de potencia. La temperatura del conector puede llegar a ser excesiva si se sobrepasan 50 W durante un periodo prolongado de tiempo.

**WARNING**

## Peligro de incendio

Asegúrese de utilizar sólo fusibles del tipo y valores especificados como repuesto.

Si se utiliza una clavija con fusible incorporado, asegúrese de que los valores del fusible corresponden a los requeridos por el equipo.

# Chapter 1
# TECHNICAL DESCRIPTION

## Contents

## List of figures



## Overall block diagrams

Block diagrams are provided in Fig. 1-1 (2965); Figs. 1-2 and 1-3 (2965A, 2966A, 2968); Fig 1-4 and 1-5 (2967); so that the individual board descriptions in this chapter can be related to the system architecture.

## Circuit diagrams and component layouts

Circuit diagram and component layouts for all of the printed circuit boards described in this chapter will be found in Volume 2.

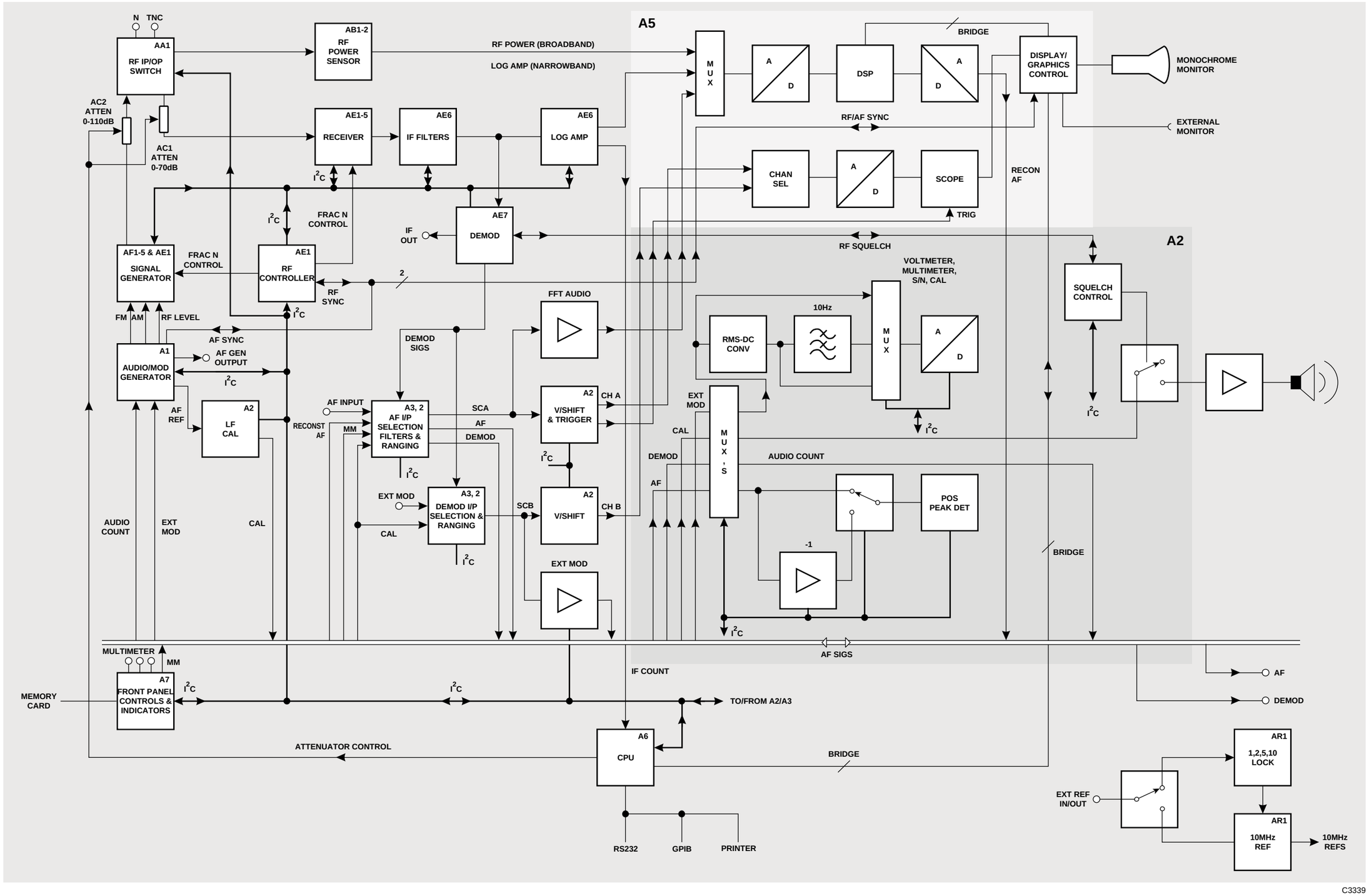



*Fig. 1-1 2965 - overall block diagram*

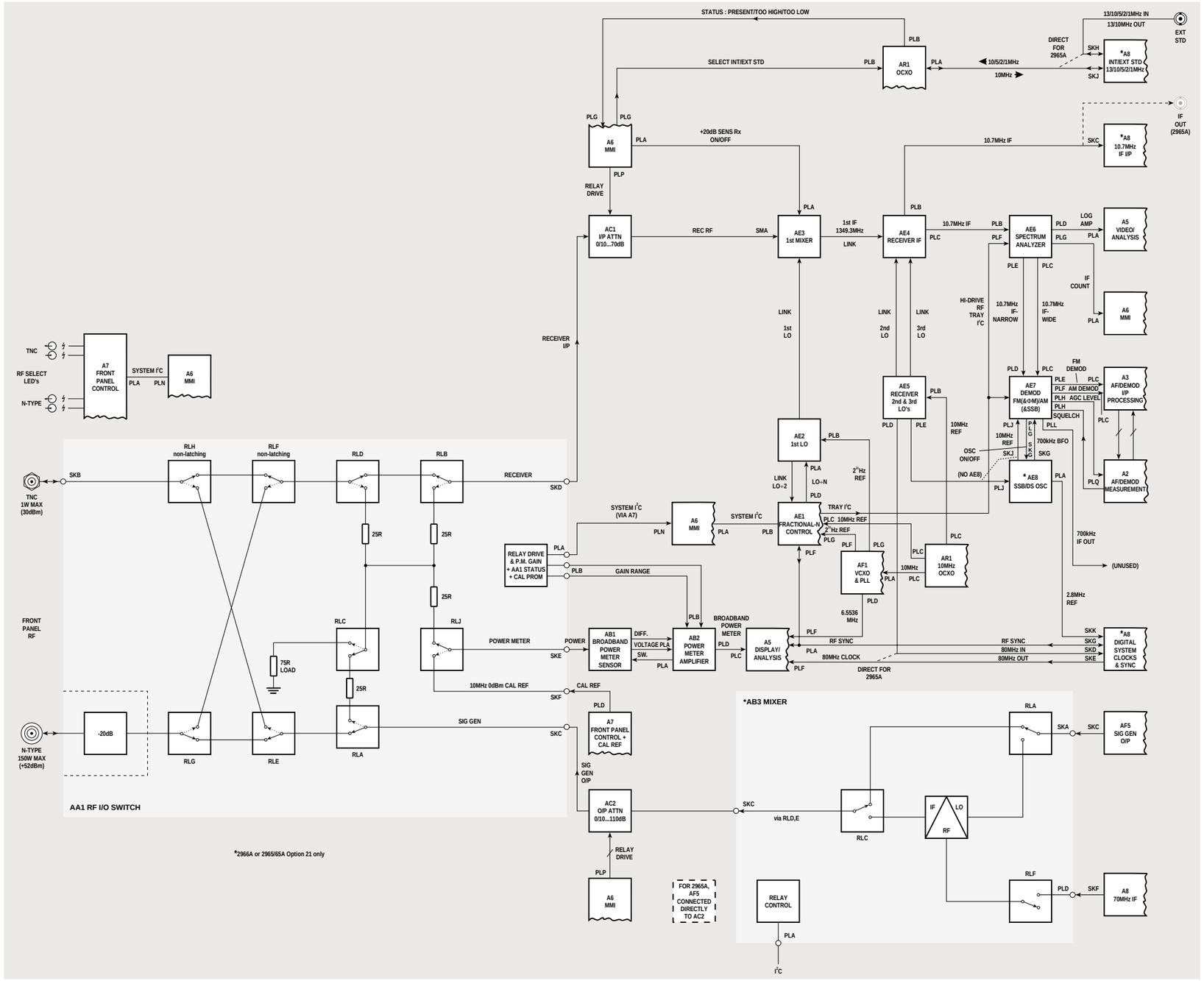
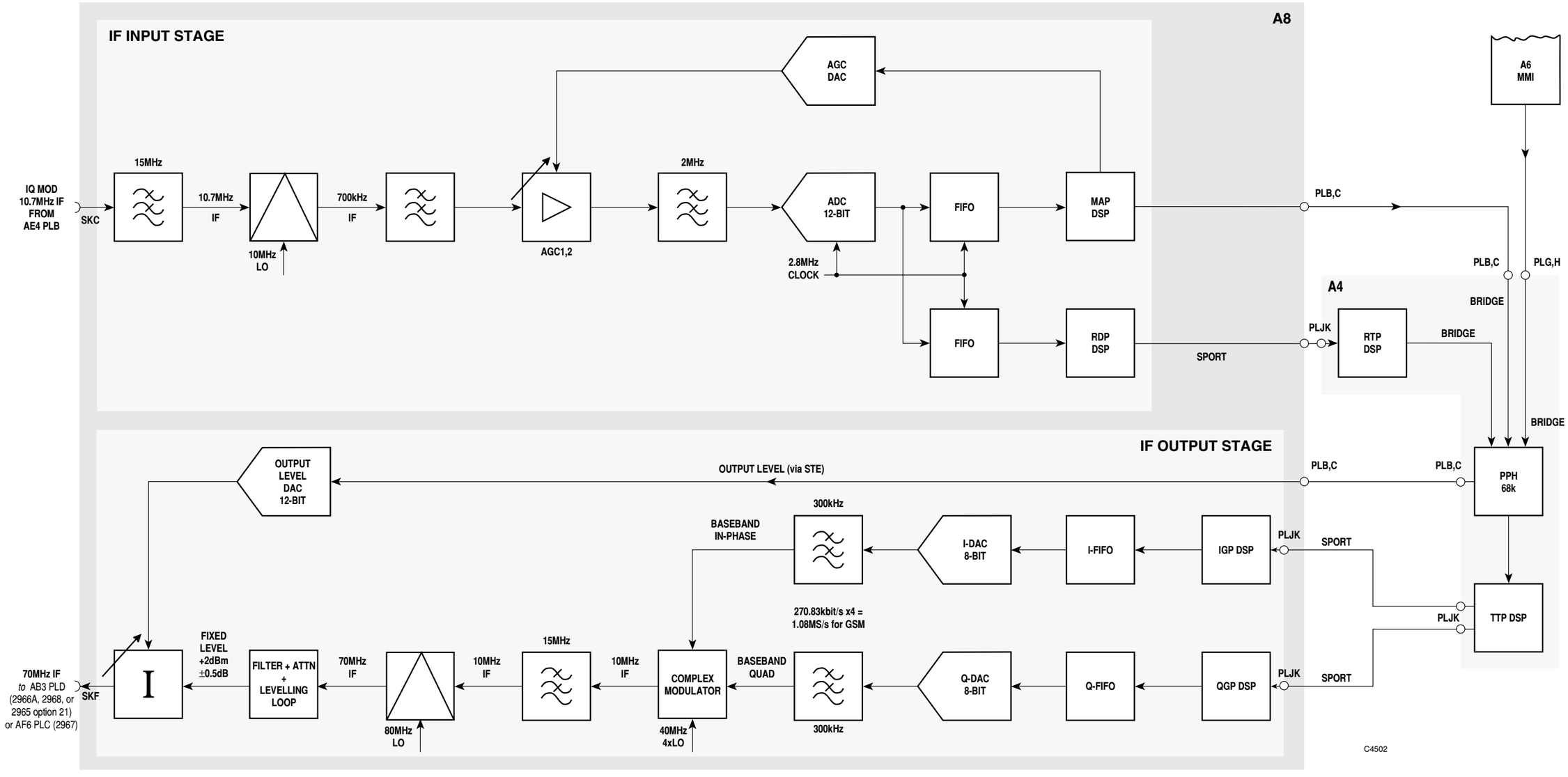



*Fig. 1-2 2965A/66A/68 block diagram - RF I/O switching, receiver chain, mixer*

## 2965 - overall block diagram




MAP = MODULATION ANALYSIS PROCESSOR
RDP = REAL-TIME DEMODULATION PROCESSOR
RTP = RECEIVE TRAFFIC PROCESSOR
PPH = PROTOCOL PROCESSOR/HOST
TTP = TRANSMIT TRAFFIC PROCESSOR
IGP = IN-PHASE MOD GEN PROCESSOR
QGP = QUADRATURE MOD GEN PROCESSOR

*Fig. 1-3 2966A/2967/2968 and 2965A option 21, block diagram, digital systems IQ modulation & analysis*

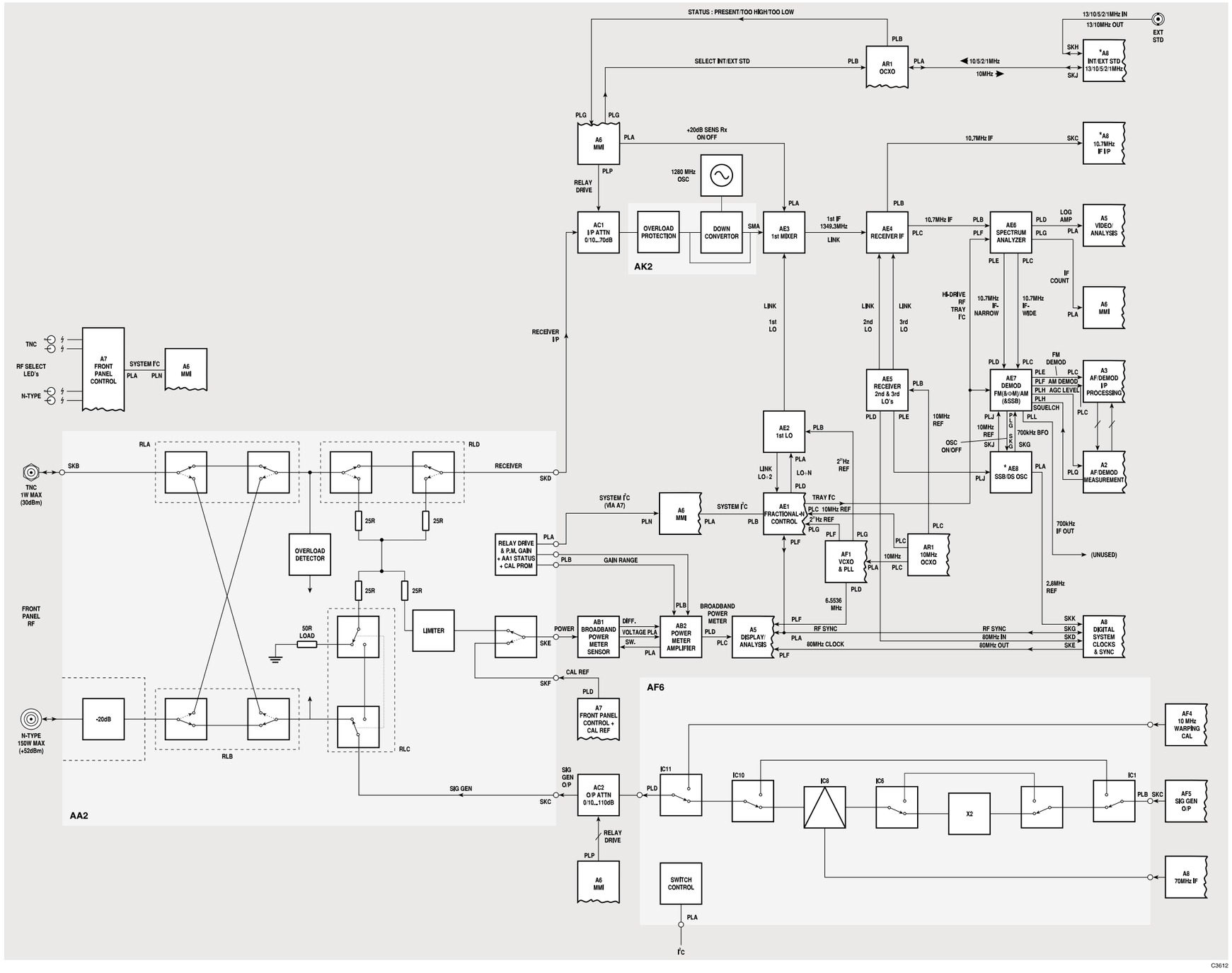



*Fig. 1-4 2967 block diagram - RF I/O switching, receiver chain, mixer*

## 2965A/66A/67/68 Block diagram - Digital systems

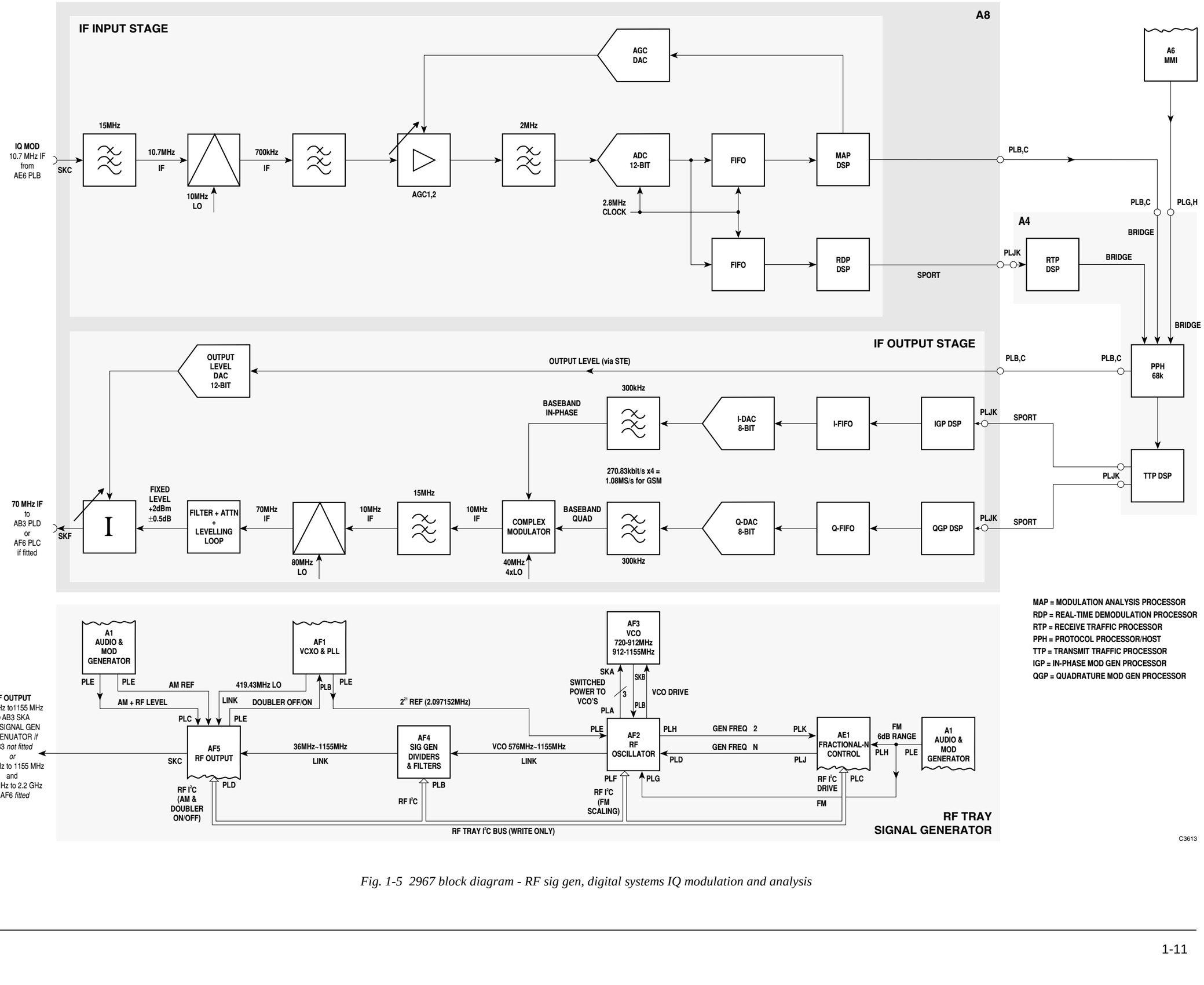



*Fig. 1-5 2967 block diagram - RF sig gen, digital systems IQ modulation and analysis*

**2967 Block diagram - Digital systems**

# Introduction

## Type differences

### 2965

The 2965 provides test facilities for mobile radios up to 1.05 GHz and mobile telephone testing test facilities for most analogue systems. The facilities available on any particular instrument vary according to the options supplied with it.

### 2965A

The 2965A provides test facilities generally similar to the 2965 from which it is derived, but contains many differences to the mechanical design and the electronic hardware and software. It forms the basic platform for the 2966A, 2967 and 2968.

### 2966A

The 2966A provides test facilities for mobile radios up to 1.05 GHz and digital test facilities for some systems such as GSM 900.

### 2967

The 2967 provides test facilities for mobile radios up to 2.0 GHz and digital test facilities up to 2 GHz for systems such as GSM 900, GSM1800 and GSM1900.

### 2968

The 2968 provides test facilities for mobile radios up to 1.05 GHz and digital test facilities for mobiles and base stations on the TETRA system.

## Power sources

When first produced, the 2965 series of instruments were fitted with AC/DC power supplies. Later instruments are fitted with AC only power supplies.

# Overall assembly

## Make-up

The composition of a particular instrument will depend on the instrument type and in some cases on the provision of some optional facilities.

The overall block diagrams provide information as to the make-up of particular types. In Chapter 2, Table 2-1 lists board types and shows which instrument types they are found in.

Also in Chapter 2, Figures 2-1, 2-2 and 2-3 show the location of boards and modules within the different Test Set types.

The active elements of the 2965 series instruments are contained on several printed circuit boards, which are themselves included in sub-assemblies. The board designations give an indication as to their function and to the sub-assembly where they are located.

### A

Modules or boards with A designations provide audio processing, audio filtering, data processing and management, or control functions.

### AA

Modules or boards with AA designations are input and output switching modules.

### AB

AB modules are located at the front of the instrument, beneath A7. Different instrument types and options require different combinations of AB modules.

AB1 Power sensor module is a 'plug in' component of AB2.

AB2 Power meter board.

AB3 RF mixer module, which mixes the digital systems IF signal with the RF generator signal to produce the digital RF signal.

AB4 Warp test oscillator. Provides reference signals to facilitate warp testing to digital mobiles.

### AE

Modules or boards with designations AE make up the RF receiver.

### AF

Modules or boards with designations AF make up the RF signal generator.

### AR

Designations AR are given to modules or boards such as the OXCO, PSU distribution and 10 MHz buffer. These units are fitted to the rear panel assembly.

### Display

The display of the MMI is a monochrome monitor with a green fluorescence. The CRT and PCB form a complete assembly.

### Front panel

The front panel has an integrated PCB and button assembly. The rotary control potentiometers, the variable rotary control assembly and multimeter terminals are fitted as individual components to the panel. The BNC connectors on the front of the instrument are fitted to the front panel but the N type RF connector is part of the main assembly and protrudes through the panel.

### Rear panel

The rear panel forms a sub-assembly with the PSU module. The AR boards are also fitted to this assembly (see above).

## AR1, AR1/2 10 MHz OCXO board

The following description applies to both the AR1 and AR1/2 boards. Where there are differences in component references, the AR1 references are shown in brackets.

The board provides the master 10 MHz reference frequency for the Test Set. The reference can be entirely internal or be locked to an external standard.

Under control of the A6 processor board, the OCXO board can do the following:

- Generate a 10 MHz reference signal to external equipment via the REF IN/OUT socket PLA.
- Phase lock its operation to a 1, 2, 5 or 10 MHz external reference on the same connector.

XL1 is an oven-controlled crystal oscillator (OCXO) which generates a 10 MHz TTL output. The output is buffered to provide the four outputs 10 MHz A to D. The signal on pin 6 of IC10(c) (pin 8 of IC2(d)) is rectified by D7 (D6) to provide a monitor signal on pin 12 of IC5(d) (IC8(d)). This signal is compared with the reference voltage on pin 13 provided by a potential divider; the resultant INT OK output on pin 14 is used on the main processor board A6 to indicate operation of the OCXO.

Signal REFOUT from the A6 processor board is used to connect the OCXO output to the external equipment, or connect an incoming external reference frequency to a phase lock loop circuit. When the REFOUT signal is logic high, switch IC1(a) is set to connect PLA to the paralleled outputs of IC3(a) and (b). These buffer the output of the OCXO to enable the internal reference to drive a 50 Ω load. With REFOUT at logic low, the external reference on PLA is connected to buffer IC2(c).

The frequency of the OCXO can be adjusted over a small range by setting the voltage on the control input, pin 5. During the internal frequency standard mode of operation, the control voltage is provided by potentiometer R4 routed via switch IC1(b). R3 and diode D3 supply a stable reference voltage to R4. IC1(b) is controlled by the signal EXT REF from A6 processor board, which is low for internal reference operation.

When EXT REF is selected, the OCXO frequency is locked to the external reference by switching the control voltage line to the output of a sampling phase detector. The phase detector comprises sampler FET TR2, hold capacitor C11, buffer IC6(a) and the loop filter IC6(b) with associated components. The output of the loop filter is fed via D5, used to prevent negative voltages being applied to the OCXO, to the control voltage switch IC1(b). One input to the sampling FET TR2 is the OCXO signal, buffered by IC2(b) and divided by 10 by IC4(a). The resultant 1 MHz square wave is integrated by R12 and C10 to provide a triangular waveform. The second input to the sampler is the gate drive for the FET. This is derived from the external reference coming from switch IC1(a). The external reference is buffered by IC2(c) and divided by 10 in IC4(b). This divided signal is then used to drive monostable formed by IC5. R9 and C9 define the pulse width of the monostable. The narrow pulse from the output of IC5(d) drives the base of level shift transistor TR1 which then provides gate drive for the FET.

The divided external reference is detected by D4 to provide a voltage that is compared by IC8(a) to the 1.1 V reference voltage on pin 2. The output of IC8(a) comparator provides signal EXT PRES which is used by A6 processor to indicate presence of the external reference.

The internal tuning voltage from R4 is also fed to amplifiers IC6(c) and (d). The outputs from these ICs are two voltages that window the internal setting. When switched to external reference, these voltages are compared with the tuning voltage from the phase lock loop by IC8(b) and (c). The outputs of these provide signals EXT HI L and EXT LO L to A6 which indicate that the external reference signal is too high or too low in frequency.

# AR2 PSU distribution board

AR2 board provides distribution of all power supplies from the PSU to the various boards in the Test Set. All supplies to the RF tray have extra LC filters to reduce noise.

TR1 and TR2 form the front panel supply LED driver. The input is the 11 to 32 V input voltage from the DC-DC part of the PSU. TR1 with voltage reference D2 acts as a constant current source of around 20 mA to drive the LED. TR2 is used as a switch that turns off the LED when the DC input voltage is less than 10 V.

Power down of the PSU is monitored on A6 processor board via the POWDWN(L) signal.

In the event of an over-temperature condition being detected within the PSU, A6 is notified via the OVTEMP(L) signal.

The 125 kHz signal from A6 processor board is passed via this board to the PSU for synchronization.

# AR4 10 MHz oscillator buffer board

The AR4 board is used in the 2967 Test Set only. It extends power supplies from the PSU distribution board AR2 to the various boards in the RF tray.

It also provides two 10 MHz outputs from the master 10 MHz reference frequency generated by the AR1 or AR1/2 board. IC1 buffers the incoming 10 MHz reference frequency and provides outputs to the A3 (audio processor) and AK1 (down converter oscillator) boards.

# A1, A1/2 Audio generator board

## Introduction

The main function of the A1 or A1/2 board is to provide a set of audio outputs at the AF GEN socket on the Test Set front panel, and a set of modulation outputs to the RF circuits. It also has a frequency measuring capability.

At the heart of the A1 board circuitry is a digital signal processor (DSP). This is configured to simultaneously synthesize three audio frequencies on the audio channel digital-to-analog converter (DAC) and three modulation frequencies on the modulation channel DAC. The frequency range of these signals is 1 Hz to 20 Hz in 0.1 Hz steps. The DSP is also configured to provide sinewaves at frequencies up to 100 kHz via a function generator channel. An AF SYNC line serves as a single bidirectional control line between this DSP and that on the A5 display board.

Overall control of the DSP and of switching, etc., is achieved by means of a microcontroller (µC). Communication between µC and DSP is via a bridge circuit. The µC acts as a command decoder and overall AF synthesizer organiser. It receives high level commands from the CPU on the A6 board via the $I^2C$ interface and executes them by configuring the DSP, signal routeing and attenuator settings. The µC also controls a frequency counter and sends results back to the A6 board via the $I^2C$ interface.

## Microcontroller, memory and addressing (sheet 1)

The bidirectional $I^2C$ data and clock lines to µC IC3 are on PLA 12/14. Data buffer IC7 strobes the µC data lines D0-D7 from the address/data bus AD0-AD7. Address latch IC8 latches the low order address lines from the address/data bus and IC9(a), IC9(b) buffer the high order address lines.

IC10 is an EPROM (Erasable Programmable Read-Only Memory) which holds the program code for the µC. It also contains the boot code for the DSP. Selection of IC10 is by BMS(L) when booting the DSP and µC line PSEN when accessed by the µC in normal operation.

A 32K × 8-bit RAM, IC11, is used for temporary data storage, reading of the RAM being accomplished using A15 for chip select and the µC read signal, RDUC(L), gated with reset hold, RST_HOLD. Writes also use A15, together with write access using the µC write signal WR_UC(L).

Address decoders IC12 and IC13 provide clocks or select lines for the routeing switch latches, SWADDn, the audio counter, ACADDn, the modulation scaling DAC, DACADDn, the µC side of the µC to DSP bridge, BSUC(L), and an interrupt request line, INT2, to the DSP. The µC has three external interrupt sources: $I^2C$, audio counter interrupt ACSTAT and INT from the DSP. D-type flip-flop IC1 converts the narrow pulse of the interrupt to a steady state, ensuring its visibility to the µC.

## Bridge (sheet 2)

The µC sends data to the DSP by writing data on D0 to D7 to IC17 and reads data from the DSP via IC18. Similarly, when the DSP reads the bridge, it enables the output of IC17 and writes to the bridge by latching data into IC18 via DSP data bus lines DD0 to DD7.

The bridge is defined as an external data location in the DSP software and is connected to D8 to D15 of the multiplexed data and program memory data bus of the DSP. All DSP data reads on the A1 board are confined to eight bits via DD0 to DD7. For speed, the top eight bits of the DSP's 16-bit external data bus are forced low when data is read by the DSP, this being implemented by the read strobe RDDSP(L) enabling the outputs of IC19 on to DD8 to DD15.

Handshaking between DSP and µC is done with four bridge status flags, TXRDY2, RXRDY1, TXRDY1 and RXRDY2.

RXRDY2 indicates to the µC if there is information on the bridge for it to read. When the µC reads the bridge, it is reset.

TXRDY1 is used by the µC to determine if the DSP has read the data which it had previously sent to the bridge, thus enabling it to send another byte. It is set when the DSP reads the bridge.

Flags RXRDY1 and TXRDY2 serve the same purpose for the DSP when reading and writing to the bridge.

The DSP reads bridge flag status by examining the contents of its bridge status buffer IC20. The µC checks bridge flag status via port 1 (see sheet 1).

## Digital signal processor (sheet 3)

DSP IC30 is the waveform and signalling generator processor. On board reset it boots up with a monitor program which it retains while the board is powered up, further functions being loaded via the bridge. Two serial signals are produced on its serial output DT1. Digital filter IC39 works in conjunction with IC37 left/right strobe to provide selection and conditioning of audio signals DL and DR to the dual serial DAC IC47 (sheet 4) which drives the audio and modulation channels (generators 0-3).

The DSP also communicates with parallel DAC IC40 (sheet 4), used for the function generator channel (generator 4), by writing data to latches IC34 and IC35, data being latched into the ICs using the select line from IC32 and DSP write line WRDSP(L).

The clock generator IC26(a) divides the 20 MHz system clock on PLB pin 3 down to 10 MHz to provide the processor clocks for the DSP, µC and audio counter. The second clock generator, IC38(a), IC38(b) and IC26(b), divide the 20 MHz by 6 to provide a 1.667 MHz clock for digital filter IC39.

PLB pin 5 carries the AF SYNC line between the DSPs on A1 and A5 boards. Both processors can read the line or pull it low. This line is generally used during SYSTEMS testing.

## DACs and filters (sheet 4)

There are two reconstruction DACs shown on this sheet of the circuit. IC47 is a dual serial DAC driven by IC39 (sheet 3) outputs DL and DR. Bit data on DL and DR is clocked into IC47 with the CLK signal and latched with WS. The two outputs of IC47 feed the audio and modulation channels via similar Sallen and Key implementations of Butterworth 2nd order 20 kHz low-pass filters IC48, IC49 and associated components. These filters smooth the fast transitions of the DAC, ensuring that no energy is seen outside the required DC to 20 kHz range. The maximum output level of both filters is 3 V peak.

Parallel DAC IC40 supplies the function generator channel. IC41 and IC42 act as a 4th order Sallen and Key 100 kHz low-pass filter. Data for the DAC comes from the DSP via latches IC34 and IC35 (sheet 3).

Voltage reference IC43 and buffer IC44 provide a low drift and level accurate +5 V voltage reference VREF for use by IC40 and the AM and RF level circuit on sheet 6.

## Audio out path (sheet 5)

Audio generator and function generator signals are selected by IC50(a)/(e), level controlled and buffered to provide the audio out signal to the AF GEN terminal on the front panel.

The output level control is selected by IC52 which selects the appropriate tap on the potential divider R33 to R38. IC52 is controlled from data bus D0 to D7 bus via IC73 (sheet 7) latched by the active low SWADD3 control signal. Attenuation factors are 1, 5, 50, 500 and 5000.

Output buffer circuits comprise a unity gain buffer IC74(a)/IC53 together with output protection circuits. The configuration can drive a 5 V RMS signal into a 50 Ω load at 100 kHz. IC53 is a buffer capable of driving over 90 mA in either direction. This is placed within a closed loop circuit with unity gain, the other components being the output protection circuit and operational amplifier IC74(a) C33 and the combination of R47, R48 and C16 provide compensation for driving capacitive loads.

Output protection is based around two MOSFETs TR2 and TR4, used for their low ON resistance, and is designed to protect the audio output for peak levels of ±10 V or greater up to a maximum of 50 V. A positive peak detector is used to switch TR4 off and a negative peak detector to switch TR2 off. Zener diodes D11 and D12 clamp the maximum voltage at pin 8 of IC74(a) to ±10 V.

## Modulation and calibration paths (sheet 6)

The AM path consists of switch IC54/55 followed by half of dual DAC IC57. The AM drive to the RF tray is made up of two signals, AMREF taken from the output of the switch and AM&RFLEV taken from the DAC output.

When AM is turned off and the RF power level is above +7 dBm (on TNC port only), the +5 V reference VREF is fed into summing amplifier IC56(a) via resistor R55. Below +7 dBm, the path through R56 is used. The resultant output from IC56(a) is inverted by IC56(b) and fed to the first levelling loop on AF5 via PLE pin 5. IC56(a) output is also fed to half 'B' of dual 12-bit DAC IC57, whose current output is converted to a voltage by IC58(b). The output from IC58(b) becomes the AM&RFLEV signal, which is fed to the second levelling loop on AF5. By changing the DAC setting this levelling loop controls the RF power level from the Test Set. IC57 is controlled by the μC using select line DACADD3, address lines A0 to A1 which select which input register is to be accessed, write line WRUC(L) and DACADD2 which is used to load the DAC registers from the input registers.

For the situation where AM is on, the MOD_GEN or FUNC_GEN signals are routed through switch IC54/55 to the summing amplifier and are superimposed on the reference signal. In this case the reference is only fed via R56 and the maximum RF power limited to +7 dBm. The modulation depth is set by the signal level from the generator in use. As the RF power level is changed with DAC IC57, the modulation on the AM&RFLEV signal is kept at the same relative proportion to the DC level.

Frequency and phase modulation is generated by IC61 to IC63 and output to AF2 via PLE pin 7. Selection of the modulation source is by switch IC61 and summing amplifier IC62(a). For FM the resultant modulation signal on TP9 is switched via IC63 pins 14 and 15 to R75 and inverted by IC62(b). In the case of PM the signal is passed via IC63 pins 2 and 3 to a differentiator formed by IC62(b) and passive components R74, C50 and R76. When FM and PM are turned off the input to IC62(b) is grounded via pins 10 and 11. The output of IC62(b) is the FM&PM signal fed to AF2. Scaling of the FM or PM modulation is by varying the output level from the modulation generator in use and scaling DACs on AF2.

Where external modulation is required, the signal from the A2 board is applied to the second half of DAC IC57 via PLD pin 5. The DAC then scales the external modulation signal to obtain the desired modulation level for the particular modulation type chosen. The output of the DAC is fed to the modulation source switches ICs 54, 55 and 61.

Analog 8 to 1 multiplexer IC59 selects the source for the AFREF signal on PLE pin 5 under control of the DC4 to DC7 bus from IC73 latched by the SWADD3 control signal. The AFREF signal is fed to audio processor board A2 for use during automatic calibration.

Control of selection switches ICs 54, 55, 61 and 63 is by control lines SW0 to SWC12, which are generated on sheet 7; a particular switch element is selected by setting the control line low.

## Audio counter and switch control (sheet 7)

PAL IC66, which contains audio counter control logic, and programmable interval timer IC67, together with D-type IC65 form the audio counter. It is sourced from the A2 board and produces a frequency count output to the µC on the data bus.

The audio counter consists of three blocks; an 82C54 triple counter, a state machine and interface logic. It is designed to measure the TTL signal from A2 on PLF over the frequency range 0.1 Hz to 500 kHz. The accuracy of the counter depends on the measurement time which is controlled by software on the µC.

The state machine incorporated in PAL IC66 effectively controls two counters. Counter 0/1 is configured as a 32-bit counter assigned to counting the 5 MHz reference frequency from IC65(b). Counter 2 counts the number of AF cycles over which the measurement is taken. Using the results in these counters the input frequency is calculated by the µC. IC67 contains the three counters.

The SWADD1 and SWADD2 control signals from sheet 1, via inverters IC69 and IC70, latch the D0 to D7 bus to generate the switch control signals SWCn. SWC0 to SWC5 select the DSP generated signal source for the amplitude modulation (sheet 6). SWC6 to SWC9 select the DSP generated signal source for the frequency and phase modulation (sheet 6). SWC10 to SWC12 configure IC62(b) (sheet 6) for FM, PM or no modulation.

The SWADD3 control signal latches the D0 to D7 bus to provide the DC0 to DC7 bus. Bits DC0 to DC3 set the AUDIO OUT attenuator (sheet 5), while bits DC4 to DC7 select the appropriate source for the AFREF signal (sheet 6).

## Reset sequence and booting of DSP (sheets 1 to 3)

The system reset signal SYSRES(L) on PLA pin 16 is used to reset the two processors on A1. This line is driven low during power up, and at any other time when a reset is called, by the processor on A6 board. When SYSRES(L) is low both the µC and the DSP are held in reset and D-type flip-flop IC1(a) is preset. The Q and not Q outputs of IC1(a) generate the reset hold signals RST_HOLD and RT_HOLD(L) respectively, RST_HOLD being used to hold the µC in reset.

On SYSRES(L) going high the DSP is allowed to run initially loading its boot code from EPROM IC10. During this time the RT_HOLD(L) signal enables buffers IC23 and IC24 placing the DSP addressing data on to the µC address bus and therefore IC10 EPROM. The data is read from the EPROM, enabled by the DSP signal BMS(L), to the DSP via the bridge data latch IC17. The latch section of IC17 is held in a transparent state by the RST_HOLD signal via OR gate IC15(c) and its output enable on pin 1 is driven from the DSP read signal RDDSP(L) via OR gate IC21(a).

When the DSP has finished loading the boot code it will start to run the boot program. The boot program writes to the µC reset address which uses select line RSTADD. The combination of the active low RSTADD and DSP write line WRDSP(L), gated together with IC2(a), resets flip-flop IC1(a), releasing the DSP boot state. The µC then begins to run its own code.

# A2, A2/2 Audio processor board

## Scope vertical shift (sheet 1)

The A channel signal SC A on PLA pin 3 comes from either the demodulated AM or FM signals or the AF input via analog processing circuits on the A3 board. IC1(a) inverts the signal. IC1(b) sums this signal with a +5 V reference and a software controlled level from DAC IC2(a). The latter is controlled by the microprocessor on the A6 board via the A2 board $I^2C$ bus interface circuits on sheet 5. The DAC is set to a value derived from the position of the front panel SCOPE VERTICAL SHIFT control. IC1(b) output is the CH A signal fed to the A5 display board.

SC B, the B channel input, comes from the front panel EXT MOD input via the external modulation circuits on the A3 audio processor board. Summing circuits and their inputs are similar to those of channel A, the output of IC9(b) being the CH B signal to the A5 board.

## FFT audio source (sheet 1)

Input SC A is also used to derive the FFT AUDIO signal to A5. IC5(b) is used to buffer and scale the SC A signal to provide the FFT AUDIO signal to the DSP input selector on the A5 board.

## Zero crossing detector (sheet 1)

Switch IC4 selects either SC A or SC B according to the state of SCTRIG A which is one of the $I^2C$ controlled signals on control bus 1. The zero crossing circuit ensures that the EXT TRIG signal for the display always occurs at the same phase reference point.

IC5(a) provides a buffered signal to limiter R13 and dual diode D1. The limited signal is then passed through amplifier IC6 to the comparator IC7 providing a logic level output which switches at each zero crossing transition. Inverter IC8(a) buffers the signal before it is fed to A5 display board as EXT TRIG.

## Reference generator (sheet 1)

This circuit generates a programmable calibration signal CAL from multiplexer IC14 for use on the A2 and A3 boards. The CAL signal source is selected, under $I^2C$ control, from either AF REF, −5 V REF, +1 V REF, +5 V REF or SQUELCH.

AF REF is derived from the A1 audio generator board and can be audio signals or DC levels. The −5 V REF is the master voltage reference generated by the highly accurate positive voltage reference IC10 and amplifier IC11 configured to provide a negative voltage output. The negative reference from IC11 is then buffered by IC12 before use.

The other two fixed references, +1 V REF and +5 V REF, are derived from the −5 V REF. Inverting amplifier IC13, with a gain of −0.2, generates the +1 V REF while the second inverting amplifier IC15, with a gain of −1, generates the +5 V REF. The SQUELCH signal comes from the squelch control circuit, derived in turn from the AGC voltage generated on the demodulation board AE7.

The reference 4 V REF for the digital oscilloscope ADC on A5 is also derived from the −5 V REF. The −5 V REF is first scaled by DAC IC20(a) before being summed with itself in IC21(b). The output from IC21(b) includes an emitter follower TR1 to provide the greater current capability required by the ADC on A5. Therefore, under $I^2C$ control of IC20(a), the oscilloscope ADC reference may be altered between approximately 3.5 V and 4.5 V, enabling the oscilloscope scaling to be adjusted easily.

## External modulation scaling (sheet 1)

SC B signal is the source for the EXT MOD signal used as a voltage reference to the parallel DAC on the A1 board used for external modulation scaling (see A1 board description). The EXT MOD signal may be used to generate the AM, FM and PM modulation in the signal generator. The SC B signal is scaled by potential divider R37 to R39, the scaling being selected by IC17 when the appropriate control signal is made active low under software control. IC18(a) amplifies the resultant signal by approximately 16 times to give gains between 7.8 and 16. Unity gain IC18 inverts the signal to IC19. Under software control, switch IC19 selects either an inverted or non-inverted EXT MOD signal.

## Output buffers (sheet 2)

The input signals AF and DEMOD both come from filter circuits on the A3 board (sheets 3 and 4 respectively). The AF signal is buffered by IC30 to provide the AF OUT signal to the rear panel. The rear panel DEMOD output is buffered by IC31(b), software selecting, by switch IC32, either the non-inverted direct signal or the inverted signal from IC31(a).

## Peak detector and RMS-DC signal selection (sheet 2)

Signals AF and DEMOD, together with CAL and EXT MOD from sheet 1 form the inputs to software controlled switches IC22 and IC23. IC23 selects one of these inputs and applies it to the peak detector circuit, described later.

IC22 selects the input required for the RMS-DC converter or that required to be applied directly to the ADC during calibration.

## RMS-DC converter and low-pass filters (sheet 2)

The input to IC27, the RMS-DC converter, is fed from switch IC22 via a frequency response correction circuit comprising IC26, R53, C13 and C45. These provide a slowly increasing gain with frequency to compensate for losses in the RMS-DC converter.

The output from the RMS-DC converter is passed through a 20 Hz low-pass filter for further processing by the ADC.

## A to D conversion (sheet 2)

IC36 selects the input signal to the ADC under software control.

The six inputs to IC36 are:-

- RMS-DC converter input
- RMS-DC converter output, filtered
- RMS-DC converter output, unfiltered
- 10 Hz filter output
- CAL (calibration signal)
- Analog ground

IC37 buffers the signal from the switch as well as offsetting it so that the bipolar input becomes unipolar as required by the ADC IC38. The digital output from the ADC can be read by the processor on A6 via the $I^2C$ interface circuits on sheet 5.

## Squelch control (sheet 3)

The squelch control circuit allows the loudspeaker output to be muted when there is not enough RF power available at the receiver. The AGC line from AE7, which is at around +10 V for no signal and becomes closer to zero as power increases, is first attenuated by R96/R97 before being compared with a programmable reference in IC39(b). The reference generated by DAC IC54 may be set under processor control via the $I^2C$ interface. R95 converts the current output of the DAC to a voltage.

The comparator switches FET TR2 on when its output is positive and off when negative. TR2 acts as a switch which changes the attenuation provided in the loudspeaker amplifier chain by R69/R72 from around 23 dB to greater than 60 dB when TR2 is turned on. Thus when the receiver input is above the threshold set by the DAC the loudspeaker is enabled.

## Loudspeaker and audio count signal selection (sheet 3)

Software controlled switches IC24 and IC25 select one of signals AF, DEMOD, CAL or EXTMOD according to the codes on the SPK n and CNT n lines as set by A6 processor via $I^2C$. IC24 and IC25 outputs are then fed to the loudspeaker and audio count paths respectively.

## Volume control and loudspeaker amplifier (sheet 3)

The audio output from selector switch IC24 is used as the reference on multiplying DAC IC20(b). The output from current to voltage converter IC39(a) is then a voltage that is proportional to the DAC reference input. This provides a volume control for the loudspeaker that may be set under software control.

After passing through the attenuator formed by R69 etc. (see above, under squelch control), the signal is amplified by IC40, which provides enough power to drive a loudspeaker. As IC40 only uses the positive 12 V supply, the signal input is biased to around +6 V by R70 and R71.

## Zero crossing detector (sheet 3)

The audio signal selected for counting is fed through the zero crossing detector formed by IC41 to IC8(b) before being passed as a logic level signal to audio generator board A1 where the counter circuit is located. This zero crossing detector works in exactly the same way as that used for the scope trigger on sheet 1.

## Peak detector (sheet 4)

The PK_SIG signal from the signal selection circuit (sheet 2) is buffered by unity gain amplifier IC56 before passing to IC57 which may be configured to be inverting or non-inverting with a gain of 1. Switch IC59 provides the required switching under software control.

Positive peak detection of the signal on IC57 output is accomplished using the tracking ADC formed by comparator IC58, control circuit IC49(b)/IC60, counters IC61 to IC63 and DAC IC64. The resulting 12-bit digital peak value is available on control bus 2 when read from data buffers IC65 and IC66 under the control of the PK_RD_L signal. When the current generated through R123 by the input signal is equal but of opposite polarity to that supplied by DAC IC64, the comparator output line CNT_EN_L is logic low, which tells the control circuit to clock the counters. The 12-bit code from the counters is used to set the DAC so that its output will climb to match that through R123 when the comparator output will change and counting stops. Thus for slow moving inputs the peak detector will follow the input signal but for higher frequency inputs the counters will be clocked for short periods at the peaks of the signal until the true peak value has been obtained.

## $I^2C$ interface (sheet 5)

The A6 CPU board reads/writes to this board via the $I^2C$ bus. $I^2C$ bus data is interfaced to the board control buses and decoders by IC44 to IC48. IC49(a), IC50 and IC51 are 2-to-4-bit decoders which decode the data into EMOD*n* (external modulation scaling), RMS*n* (RMS measurement input), PEAK*n* (peak measurement input), SPK*n* (loudspeaker input) and CNT*n* (count input) control signals. IC67 provides write enables for DACs IC2, IC20 and IC54 (via data latch IC55). The exact functions of all of these control signals are detailed below.

**External modulation gain**

| Control Line (active low) | Gain Setting |
|---|---|
| EMOD_0 | 16.133 |
| EMOD_1 | 12.758 |
| EMOD_ | 10.164 |
| EMOD_3 | 7.813 |

**RMS-DC input selection**

| Control Line (active low) | Input Selected |
|---|---|
| RMS_0 | AF |
| RMS_1 | DEMOD |
| RMS_2 | CAL |
| RMS_3 | EXTMOD |

**Peak detector input selection**

| Control Line (active low) | Input Selected |
|---|---|
| PEAK_0 | AF |
| PEAK_1 | DEMOD |
| PEAK_2 | CAL |
| PEAK_3 | EXTMOD |

**Loudspeaker input selection**

| Control Line (active low) | Input Selected |
|---|---|
| SPK_0 | AF |
| SPK_1 | DEMOD |
| SPK_2 | CAL |
| SPK_3 | EXTMOD |

**Audio counter input selection**

| Control Line (active low) | Input Selected |
|---|---|
| CNT_0 | AF |
| CNT_1 | DEMOD |
| CNT_2 | CAL |
| CNT_3 | EXTMOD |

### IC46 outputs

| Control Line | Function |
|---|---|
| PKDETINV | Inverts peak detector input signal when high |
| DEMINV_L | Inverts DEMOD OUT signal when low |
| A/D_0 | Selects ADC input signal (see below) |
| A/D_1 | Selects ADC input signal (see below) |
| A/D_2 | Selects ADC input signal (see below) |
| SQ_ON | Squelch status read - high when squelched |
| ADD_EN_L | IC67 address decoder enabled when low |
| B/A_L | Selects A or B parts of DAC's IC2 and IC20 (A when low) |

### ADC input selection

| A/D_2 | A/D_1 | A/D_0 | Input Selected |
|---|---|---|---|
| Low | Low | Low | RMS-DC input |
| Low | Low | High | Filtered RMS-DC output |
| Low | High | Low | Un-filtered RMS-DC output |
| Low | High | High | Filtered RMS-DC input |
| High | Low | Low | Ground |
| High | Low | High | Ground |
| High | High | Low | CAL |
| High | High | High | Ground |

The data bus consists of lines D0 through D11 together with BUSY_L. The lower eight bits are used for both reads of the ADC value and peak detector together with writes to dual DAC's IC2/IC20 and latch IC55. D8 to D11 are only used for reads of the ADC and peak detector whilst BUSY_L monitors the state of the ADC.

The address decoding for the programmable DAC's, peak detector control, and ADC reads is performed by a 3-to-8-bit decoder IC67 which takes its inputs, A0-A2, from IC48 together with enable line ADD_EN_L from IC46. Outputs are active low.

### Address decoding

| A2 | A1 | A0 | Signal | Function |
|---|---|---|---|---|
| Low | Low | Low | VSHIFT_L | Vertical shift DAC IC2 write enable. |
| Low | Low | High | AD_RD_L | ADC read enable and trigger. |
| Low | High | Low | REFVOL_L | Scope ref. and volume DAC IC20 write enable. |
| Low | High | High | PK_RES_L | Peak detector reset. |
| High | Low | Low | PK_RD_L | Peak detector read enable. |
| High | Low | High | SQU_L | Squelch DAC latch IC55 write enable. |
| High | High | Low | | Not used. |
| High | High | High | | Not used. |

## Supply regulators (sheet 5)

Positive and negative regulators, IC52 and IC53 respectively, provide clean 5 V supplies to both A2 and A3 audio processor boards.

# A3, A3/1 Audio processor board

## AF input and scope gain (sheet 1)

This is the high impedance input for the front panel AF INPUT socket. AC or DC input coupling is selected by IC7, controlled by AF_DC_L. 600 Ω input load impedance R200-203 is selected by RLB, controlled by AF600R_L.

RLE, controlled by AF_MEASURE_L, allows the following circuitry to be connected to either the AF input or to the calibration signal CAL. Relay RLA, control line AF_IP, then passes the CAL or AF_IN signal to either the 0.9 dB or –40.9 dB input attenuators. The two attenuators are formed by R30/R31 and R32/R33 together with their associated compensation capacitors. (R30/R31 = -0.9 dB)

MOSFET's TR1 and TR2 select the outputs of the two attenuators to feed the scaled input signal to the input buffer/amplifier IC8. The transistors are controlled by AFATT0 and AFATT0_L respectively. IC8 has a gain of 2.77 and can have its output offset controlled via the gain set resistors by 12-bit DAC IC9. See the information on input offset compensation DACs for sheet 6 with regard to $I^2C$ control of this DAC.

The output from IC8 feeds the AF input selector (see below) and the AF scope gain input attenuator. The AF scope gain is set by two ×10 amplifiers, IC11/IC13, and two attenuators whose value is set by switches IC10 and IC12. Gains selectable by control lines AF_SCGN0-2 are ×100, ×40, ×20, ×10, ×4, ×2 and ×1.

## AF input selector and path gain (sheet 1)

Under software control, IC1 (sheet 1) selects the AF input from one of the following:-

- RECONST AF from the reconstruction filter circuit on the A5 display board.
- AS F PWR, the forward power reading signal from the rear panel ACCESSORY socket.
- AS R PWR, the reverse power reading signal from the rear panel ACCESSORY socket.
- MM, the multimeter signal from the A7 front panel interface board.
- CAL from the A2 board.
- A signal derived from the AF INPUT circuits (see next section).

After buffering by unity gain amplifier IC2, the selected signal is amplified by IC4 and IC6. The overall gain is set to ×1, ×10 or ×100 by switches IC3 and IC5. Each amplifier has a gain of 10 while the switches set the overall gain by selecting the appropriate outputs from attenuators R15-R17 and R21-R23. The output from IC6 provides the AFFILTIN signal to the AF filter circuits on sheet 3.

## Demodulation input selector (sheet 2)

The DEMOD AM and DEMOD FM input signals are from the AE7 board. The FM signal is buffered by the unity gain amplifier IC14(a), and splits to provide FM, and PM via the PM integrator circuit IC14(b).

Under software control, switch IC15 selects either AM, FM PM or CAL. The unity gain amplifier IC16 (IC16a on A3/1) buffers the signal to provide the DMFILTIN signal to the demodulation programmable gain and filter circuits (sheet 4).

## External modulation input and gain circuits (sheet 2)

The external modulation input circuit works in exactly the same way as the AF input on sheet 1 (see above). In this case, the component functions are as follows:-

- AC/DC input switching, IC17, controlled by EM_DC_L.
- 600 Ω input load, R204-207, switched by RLD, controlled by EM600R_L.
- 0.9/40.9 dB attenuator input switching, RLC and RLF, controlled by EM_IP and EM_MEASURE_L respectively.
- 0.9/40.9 dB input attenuators, R65/66 and R67/68 respectively.
- Input attenuator selection, TR3 and TR4, controlled by EMATT0 and EMATT0_L.
- Buffer/amplifier, IC18.
- Offset correction DAC, IC19.

The external modulation gain is set by two ×10 amplifiers, IC22/IC24, and two attenuators whose value is set by switches IC21 and IC23. Gains selectable by control lines EM_GN0-2 are ×100, ×40, ×20, ×10, ×4, ×2 and ×1.

The output from IC24 provides the SC_B_OUT signal to A2 audio processor board.

## AF filters (sheet 3)

Switch IC27 together with the ÷3 attenuator R92/93 provides the final gain setting stage for the AF signal.

The rest of sheet 3 shows all front panel selectable audio filters. The functions of each device are explained and then the routeing through the filter stages detailed for each filter type.

- IC25, ×2.828 amplifier used when no filtering required.

**A3**

- IC28, SC11310, programmable gain/loss IC used to compensate for gain errors in the filters.

**A3/1**

- IC86 is a unity gain buffer feeding IC28, AD7537 dual multiplying D/A converter to provide gain/loss compensation for gain errors in the filters. IC80 and IC81 convert the current outputs of IC28a and IC28b to voltage outputs. IC82 is a ×16 amplifier.

**Both boards**

- IC29, MAX270, programmable dual continuous low-pass filter used for all low-pass filters and anti-alias input filter for switch-capacitor blocks.
- IC26, ×2 amplifier.
- IC30, MAX260, programmable dual switched-capacitor filter used for psophometric filters.
- IC32, MAX260, programmable dual switched capacitor filter used for band-pass, 300 Hz low-pass, and psophometric filters.
- IC35, ×1.3 or ×−3.01 amplifier dependent on configuration.
- IC36, MAX270, programmable dual continuous low-pass filter used for post filtering of switch-capacitor blocks.
- IC38, ×2.828 amplifier with offset adjustable by dual 8-bit DAC IC39. Feeds AF signal to A2 audio processor board.

The clocks for the switched-capacitor filters, AFCLK1-3, are generated by IC76 on sheet 6.

The following table details the paths through switches IC31, IC33, IC34 and IC37 together with the gain/loss setting of IC28 for each front panel filter selection.

**A3**

| Filter | IC28 | IC31 | IC33 | IC34 | IC37 |
|---|---|---|---|---|---|
| None | –25.0 dB | Not used | Not used | Not used | pins 2 to 3 |
| 20 kHz LP | 9.1 dB | Not used | Not used | Not used | pins 15 to 14 |
| 300Hz LP | 1.0 dB | pins 10 to 11 | pins 10 to 11 | pins 10 to 11 | pins 10 to 11 |
| Bandpass | –1.5 dB | pins 7 to 6 | pins 10 to 11 | pins 7 to 6 | pins 10 to 11 |
| CCITT | 20.1 dB | pins 15 to 14 | pins 15 to 14 | pins 15 to 14 | pins 10 to 11 |
| C-MESS | 18.3 dB | pins 15 to 14 | pins 15 to 14 | pins 15 to 14 | pins 10 to 11 |
| 2 kHz LP | 9.1 dB | Not used | Not used | Not used | pins 15 to 14 |

**Note:** The 2 kHz low-pass filter is used only during multimeter operation.

**A3/1**

| Filter | IC28a<br>IC28b | IC31 | IC33 | IC34 | IC37 |
|---|---|---|---|---|---|
| None | –24.5 dB | Not used | Not used | Not used | pins 2 to 3 |
| 20 kHz LP | –7.5 dB | Not used | Not used | Not used | pins 15 to 14 |
| 300Hz LP | –11.5 dB | pins 10 to 11 | pins 10 to 11 | pins 10 to 11 | pins 10 to 11 |
| Bandpass | –12.8 dB | pins 7 to 6 | pins 10 to 11 | pins 7 to 6 | pins 10 to 11 |
| CCITT | –2.0 dB | pins 15 to 14 | pins 15 to 14 | pins 15 to 14 | pins 10 to 11 |
| C-MESS | –2.9 dB | pins 15 to 14 | pins 15 to 14 | pins 15 to 14 | pins 10 to 11 |
| 2 kHz LP | –7.5 dB | Not used | Not used | Not used | pins 15 to 14 |

**Note:** The 2 kHz low-pass filter is used only during multimeter operation.

**Both boards**

Control of the filter integrated circuits is shown later in the sections on $I^2C$ control.

## Demodulation filters (sheet 4)

**A3**

IC42 provides switching of the ×1 or ×0.5 attenuation from the potential divider R120/R121. IC43 is a programmable gain/loss circuit providing ±25.5 dB gain/loss in 0.1 dB steps. These two gain control elements, together with the FM gain setting on AE7 provide all of the range selection for demodulation measurements as well as correcting the gain through the filters.

**A3/1**

IC42 provides switching of the ×1 or ×0.5 attenuation from the potential divider R120/R121. IC16b is a unity gain unity gain buffer feeding IC43, AD7537 dual multiplying D/A converter, to provide gain/loss in 0.1 dB steps. IC83 and IC84 convert the current output to voltage. IC85 is a ×16 amplifier. These components, together with IC42 and the FM setting on AE7, provide all of the range selection for demodulation measurements as well as correcting the gain through the filters.

**Both boards**

The rest of sheet 4 shows the front panel selectable demodulation filters. The functions of each device will be explained and then the routeing through the filter stages detailed for each filter type.

- IC44, MAX270, programmable dual continuous low-pass filter used for all lowpass filters and anti-alias input filter for switch-capacitor blocks.
- IC41, ×2 amplifier.

- IC45, MAX260, programmable dual switched-capacitor filter used for psophometric filters.
- IC47, MAX260, programmable dual switched capacitor filter used for band-pass, 300 Hz low-pass, and psophometric filters.
- IC50, ×1.3 or ×–2.488 amplifier dependent on configuration.
- IC51, MAX270, programmable dual continuous low-pass filter used for post filtering of switch-capacitor blocks.

The clocks for the switched-capacitor filters, DMCLK1-3, are generated by IC77 on sheet 6.

IC53 is a ×2 amplifier with offset adjustable by dual 8-bit DAC IC54. It feeds the DEMOD signal to the scope attenuator and A2 audio processor board.

The following table details the paths through switches IC46, IC48, IC49 and IC52, together with the gain/loss setting of IC43 for each front panel filter selection when using the 100 kHz FM range.

**A3**

| Filter | IC43 | IC46 | IC48 | IC49 | IC52 |
|---|---|---|---|---|---|
| None | –9.0 dB | Not used | Not used | Not used | pins 2 to 3 |
| 20 kHz LP | –9.0 dB | Not used | Not used | Not used | pins 15 to 14 |
| 300Hz LP | –17.0 dB | pins 10 to 11 | pins 10 to 11 | pins 10 to 11 | pins 10 to 11 |
| Bandpass | –17.8 dB | pins 7 to 6 | pins 10 to 11 | pins 7 to 6 | pins 10 to 11 |
| CCITT | 2.0 dB | pins 15 to 14 | pins 15 to 14 | pins 15 to 14 | pins 10 to 11 |
| C-MESS | 0.9 dB | pins 15 to 14 | pins 15 to 14 | pins 15 to 14 | pins 10 to 11 |
| 5 kHz LP | –9.0 dB | Not used | Not used | Not used | pins 15 to 14 |

**A3/1**

| Filter | IC43a IC43b | IC46 | IC48 | IC49 | IC52 |
|---|---|---|---|---|---|
| None | –16.5 dB | Not used | Not used | Not used | pins 2 to 3 |
| 20 kHz LP | –16.5 dB | Not used | Not used | Not used | pins 15 to 14 |
| 300Hz LP | –20.5 dB | pins 10 to 11 | pins 10 to 11 | pins 10 to 11 | pins 10 to 11 |
| Bandpass | –20.9 dB | pins 7 to 6 | pins 10 to 11 | pins 7 to 6 | pins 10 to 11 |
| CCITT | –11.0 dB | pins 15 to 14 | pins 15 to 14 | pins 15 to 14 | pins 10 to 11 |
| C-MESS | –11.6 dB | pins 15 to 14 | pins 15 to 14 | pins 15 to 14 | pins 10 to 11 |
| 5 kHz LP | –16.5 dB | Not used | Not used | Not used | pins 15 to 14 |

**Both boards**

Control of the filter integrated circuits is shown later in the sections on $I^2C$ control.

## Demod scope attenuator (sheet 4)

The demod scope attenuator circuit takes the output from the filters and scales it as required for the demodulation analyzer and oscilloscope. IC56 switch selects the required output from the attenuator chain and feeds it to ×2.5 amplifier IC57. Overall gains of the demod scope attenuator that may be set by control lines DM_SCGN0-3 are ×2.5, ×1.5, ×1.25 or ×0.75. The SC_A_OUT signal to audio processor board A2 is then selected from either the output of IC57 or the AF_SCOPE signal from sheet 1.

## $I^2C$ control circuits (sheet 5)

Expander chips IC59 and IC61 to IC63 decode the $I^2C$ bus inputs from the A6 board CPU. IC59 provides discrete control signals (unbuffered and buffered) and also the inputs to relay drivers TR5 to TR7. IC61 and buffer IC78 provide data bus outputs D0-7 to sheet 6 circuits.

IC62 provides the LATCHSEL signals to the data latches on sheet 6, and two relay current drives AF and EM_MEASURE to input switching relays on sheets 1 and 2 respectively.

The low order bits from IC63 provide write select signals to the filter programming and offset compensation circuits on sheet 6, via chip select decoder IC75. High order bits provide three additional discrete control signals.

Counter IC65 produces a 1 MHz signal to the A2 board, derived from the 10 MHz D reference clock signal from AR1. A buffered version of the 10 MHz D reference, from IC65 input, is used by the programmable filter clocks circuit on sheet 6.

The functions of the outputs of the $I^2C$ interface ICs are as follows. Note that the control line status is after the buffering.

### IC59 generated control lines

| Control Line | Function |
|---|---|
| AF_DC_L | Sets AF input to DC coupled when low |
| EM_DC_L | Sets external modulation input to DC coupled when low |
| AF600R_L | Selects 600 Ω load on AF input when low |
| EM600R_L | Selects 600 Ω load on external modulation input when low |
| AF_IP | Switches AF input to –40.9 dB attenuator when high |
| EM_IP | Switches external modulation input to –40.9 dB attenuator when high |
| AFATT0 | Uses output of –0.9 dB. AF attenuator used when +ve |
| AFATT0_L | Uses output of –40.9 dB. AF attenuator used when +ve |
| EMATT0 | Uses output of –0.9 dB. External modulation attenuator used when +ve |
| EMATT0_L | Uses output of –40.9 dB. External modulation attenuator used when +ve |

### IC62 generated control lines

| Control Line | Function |
|---|---|
| A0, A1 | Address lines used on sheet 6 |
| CSA to CSD | LATCHSEL latch enable lines to sheet 6 (data latched on ↓ edge) |
| AF_MEASURE_L | AF input set to front panel when low |
| EM_MEASURE_L | External modulation input set to front panel when low |

### IC63 generated control lines

| Control Line | Function |
|---|---|
| C0 to C4 | WR_SEL bus used to drive write select decoder IC75 |
| SYN_CLKS | Pulsed low to synchronize filter clock generators IC76/77 |
| DMFILGN0 | Sets demod prog gain input to 0.5 when high |
| DM_SCGN4 | Selects demod output for SC_A output when high |

## $I^2C$ control circuits (sheet 6)

Information on the data bus D0-7 is latched under the control of CSA to CSD chip select signals into data latches IC66, IC67, IC69, and IC72 respectively. Depending on the type of device being driven by these latched outputs, some extra decoding is provided by 2 to 4 line decoders IC68, IC70, IC71, IC73 and IC74. These decoded lines provide the control signals for the path selection and gain switches on sheets 1 to 4.

Input/output offset compensation is provided by DACs IC9/IC19, for input offset, and IC39/IC54, for output, as described previously under the appropriate sheet (1, 2, 3 or 4). The active low write enables for these DACs are generated by decoder IC75, the appropriate section of the DAC latch being selected using the address lines A0 and A1.

The AF filters on sheet 3 and demodulation filters on sheet 4 have been described previously. They are loaded with the appropriate parameters by the filter programming logic. Write enables are provided by 4 to 16 line decoder IC75 for the AF filter devices IC28 to IC36 and demodulation filter devices IC43 to IC51.

IC76 and IC77 are programmable dividers that generate the clocks required for the programmable filter circuits on sheets 3 and 4 from the 10 MHz system clock. The required division parameters are latched by AFDIV WR and DMDIV WR signals respectively.

The following tables show the functions of the control signals generated on sheet 6. Where necessary, these are after any further decoding.

### IC66 generated control lines

| Control Line | Function |
|---|---|
| AF_SCGN0-2 | Sets AF scope gain (see below) |
| AF_SEL_0-3 | Selects AF input (see below) |
| AFATT1, AFATT2 | Sets AF path gain (see below) |

### AF scope gain control

| AF_SCGN2 | AF_SCGN1 | AF_SCGN0 | AF Scope Gain |
|---|---|---|---|
| Low | Low | Low | ×100 |
| Low | Low | High | ×40 |
| Low | High | Low | ×20 |
| Low | High | High | ×10 |
| High | Low | Low | ×10 |
| High | Low | High | ×4 |
| High | High | Low | ×2 |
| High | High | High | ×1 |

### AF input selection

| AF_SEL_2 | AF_SEL_1 | AF_SEL_0 | Input Selected | Function | Scaling |
|---|---|---|---|---|---|
| Low | Low | Low | RECON_AF | Reconstructed AF from A5 | ×0.212 |
| Low | Low | High | AS_F_PWR | Accessory forward power | ×0.168 |
| Low | High | Low | AS_R_PWR | Accessory reverse power | ×0.168 |
| Low | High | High | MMIN | Multimeter - range 1 | ×0.500 |
| High | Low | Low | MMIN | Multimeter - range 2 | ×0.083 |
| High | Low | High | CAL | Calibration | ×1 |
| High | High | Low | IC8 pin 6 | AF input - front panel | ×1 |
| High | High | High | Ground | Calibration | ×1 |

### AF path gain control

| AFATT2 | AFATT1 | AF Path Gain |
|---|---|---|
| Low | Low | ×100 |
| Low | High | ×10 |
| High | Low | ×10 |
| High | High | ×1 |

### IC67/68 derived control lines

| Control Line | Function |
|---|---|
| EM_GN_0-2 | Sets external modulation path gain (see below) |
| DM_SEL_0-3 | Selects demodulation input (see below) |
| AFFILGN0 | Sets final AF path gain (Low = ×0.333, High = ×1) |
| AFFILS0-3 | Sets AF filter path through IC31 (see below) |

### External modulation path gain control

| EM_GN2 | EM_GN1 | EM_GN0 | Ext Mod Path Gain |
|---|---|---|---|
| Low | Low | Low | ×100 |
| Low | Low | High | ×40 |
| Low | High | Low | ×20 |
| Low | High | High | ×10 |
| High | Low | Low | ×10 |
| High | Low | High | ×4 |
| High | High | Low | ×2 |
| High | High | High | ×1 |

### Demodulation input selection

| DM_SEL_3 | DM_SEL_2 | DM_SEL_1 | DM_SEL_0 | Input | IC67 Q4 | IC67 Q3 |
|---|---|---|---|---|---|---|
| High | High | High | Low | CAL | Low | Low |
| High | High | Low | High | Phase Mod | Low | High |
| High | Low | High | High | FM | High | Low |
| Low | High | High | High | AM | High | High |

### AF filter IC31 path control

| AFFILS3 | AFFILS2 | AFFILS1 | AFFILS0 | IC31 path | IC67 Q7 | IC67 Q6 |
|---|---|---|---|---|---|---|
| High | High | High | Low | pin 7 to 6 | Low | Low |
| High | High | Low | High | pin 10 to 11 | Low | High |
| High | Low | High | High | pin 15 to 14 | High | Low |
| Low | High | High | High | pin 2 to 3 | High | High |

Refer to *AF filters* section on page 1-26 for use.

### IC69/70/71 derived control lines

| Control Line | Function |
|---|---|
| AFFILS4-7 | Sets AF filter path through IC33 (see below) |
| AFFILS8-11 | Sets AF filter path through IC34 (see below) |
| AFFILS12-15 | Sets AF filter path through IC37 (see below) |
| DMFILS0-3 | Sets Demod filter path through IC46 (see below) |

### AF filter IC33 path control

| AFFILS7 | AFFILS6 | AFFILS5 | AFFILS4 | IC33 Path | IC69 Q1 | IC69 Q0 |
|---|---|---|---|---|---|---|
| High | High | High | Low | pin 7 to 6 | Low | Low |
| High | High | Low | High | pin 10 to 11 | Low | High |
| High | Low | High | High | pin 15 to 14 | High | Low |
| Low | High | High | High | pin 2 to 3 | High | High |

Refer to *AF filters* section on page 1-26 for use.

### AF filter IC34 path control

| AFFILS11 | AFFILS10 | AFFILS9 | AFFILS8 | IC34 Path | IC69 Q3 | IC69 Q2 |
|---|---|---|---|---|---|---|
| High | High | High | Low | pin 7 to 6 | Low | Low |
| High | High | Low | High | pin 10 to 11 | Low | High |
| High | Low | High | High | pin 15 to 14 | High | Low |
| Low | High | High | High | pin 2 to 3 | High | High |

Refer to *AF filters* section on page 1-26 for use.

### AF filter IC37 path control

| AFFILS15 | AFFILS14 | AFFILS13 | AFFILS12 | IC37 Path | IC69 Q5 | IC69 Q4 |
|---|---|---|---|---|---|---|
| High | High | High | Low | pin 7 to 6 | Low | Low |
| High | High | Low | High | pin 10 to 11 | Low | High |
| High | Low | High | High | pin 15 to 14 | High | Low |
| Low | High | High | High | pin 2 to 3 | High | High |

Refer to *AF filters* section on page 1-26 for use.

### Demodulation filter IC46 path control

| DMFILS3 | DMFILS2 | DMFILS1 | DMFILS0 | IC46 Path | IC69 Q7 | IC69 Q6 |
|---|---|---|---|---|---|---|
| High | High | High | Low | pin 7 to 6 | Low | Low |
| High | High | Low | High | pin 10 to 11 | Low | High |
| High | Low | High | High | pin 15 to 14 | High | Low |
| Low | High | High | High | pin 2 to 3 | High | High |

Refer to *Demodulation filters* section on page 1-27 for use.

**IC72/73/74 derived control lines**

| Control Line | Function |
|---|---|
| DMFILS4-7 | Sets Demod filter path through IC48 (see below) |
| DMFILS8-11 | Sets Demod filter path through IC49 (see below) |
| DMFILS12-15 | Sets Demod filter path through IC52 (see below) |
| DMSCGN0-3 | Sets Demod scope attenuator gain (see below) |

**Demodulation filter IC48 path control**

| DMFILS7 | DMFILS6 | DMFILS5 | DMFILS4 | IC48 Path | IC72 Q1 | IC72 Q0 |
|---|---|---|---|---|---|---|
| High | High | High | Low | pin 7 to 6 | Low | Low |
| High | High | Low | High | pin 10 to 11 | Low | High |
| High | Low | High | High | pin 15 to 14 | High | Low |
| Low | High | High | High | pin 2 to 3 | High | High |

Refer to *Demodulation filters* section on page 1-27 for use.

**Demodulation filter IC49 path control**

| DMFILS11 | DMFILS10 | DMFILS9 | DMFILS8 | IC46 Path | IC72 Q3 | IC67 Q2 |
|---|---|---|---|---|---|---|
| High | High | High | Low | pin 7 to 6 | Low | Low |
| High | High | Low | High | pin 10 to 11 | Low | High |
| High | Low | High | High | pin 15 to 14 | High | Low |
| Low | High | High | High | pin 2 to 3 | High | High |

Refer to *Demodulation filters* section on page 1-27 for use.

**Demodulation filter IC52 path control**

| DMFILS15 | DMFILS14 | DMFILS13 | DMFILS12 | IC52 Path | IC72 Q5 | IC72 Q4 |
|---|---|---|---|---|---|---|
| High | High | High | Low | pin 7 to 6 | Low | Low |
| High | High | Low | High | pin 10 to 11 | Low | High |
| High | Low | High | High | pin 15 to 14 | High | Low |
| Low | High | High | High | pin 2 to 3 | High | High |

Refer to *Demodulation filters* section on page 1-27 for use.

**Demod scope attenuator gain setting**

| DM_SCGN3 | DM_SCGN2 | DM_SCGN1 | DM_SCGN0 | Gain | IC72 Q7 | IC72 Q6 |
|---|---|---|---|---|---|---|
| High | High | High | Low | ×2.5 | Low | Low |
| High | High | Low | High | ×1.5 | Low | High |
| High | Low | High | High | ×1.25 | High | Low |
| Low | High | High | High | ×0.75 | High | High |

## AF, demodulation, and multimeter ranging on A2, A3, and A7

This section shows the setting of the various paths on audio processor boards A2, A3 and A7 for the ranging of the bar charts, oscilloscope and FFT analysis screens for AF, demodulation and multimeter measurements. Note that these are the hardware ranges and not necessarily those being displayed on the screen. Entering the measurement enable diagnostic screen will allow the hardware and software ranges to be tied together for testing.

### AF voltmeter barcharts

| Range Max | A3 AF Input Attenuator | A3 AF Path Gain | A3 Final AF Gain (IC27) |
|---|---|---|---|
| 1 mV | –0.9 dB | ×100 | ×1 |
| 3 mV | –0.9 dB | ×100 | ×0.333 |
| 10 mV | –0.9 dB | ×10 | ×1 |
| 30 mV | –0.9 dB | ×10 | ×0.333 |
| 100 mV | –0.9 dB | ×1 | ×1 |
| 300 mV | –0.9 dB | ×1 | ×0.333 |
| 1 V | –40.9 dB | ×10 | ×1 |
| 3 V | –40.9 dB | ×10 | ×0.333 |
| 10 V | –40.9 dB | ×1 | ×1 |
| 30 V | –40.9 dB | ×1 | ×0.333 |

### AF oscilloscope/FFT

| Scope Range /div | A3 AF Input Attenuator | A3 AF Scope Gain | Used for FFT Range |
|---|---|---|---|
| 2 mV | –0.9 dB | ×100 | ---- |
| 5 mV | –0.9 dB | ×40 | 10 mV |
| 10 mV | –0.9 dB | ×20 | 20 mV |
| 20 mV | –0.9 dB | ×10 | 50 mV |
| 50 mV | –0.9 dB | ×4 | 100 mV |
| 100 mV | –0.9 dB | ×2 | 200 mV |
| 200 mV | –0.9 dB | ×1 | 500 mV |
| 500 mV | –40.9 dB | ×40 | 1 V |
| 1 V | –40.9 dB | ×20 | 2 V |
| 2 V | –40.9 dB | ×10 | 5 V |
| 5 V | –40.9 dB | ×4 | 10 V |
| 10 V | –40.9 dB | ×2 | 20 V |

### Multimeter

| Range | A7 Diff Amp Gain | A7 Current Source | A3 AF Input Select Gain | A3 AF Path Gain | A3 Final AF Gain (IC27) |
|---|---|---|---|---|---|
| 300 mV | ×1 | ---- | ×0.083 | ×10 | ×1 |
| 3 V | ×1 | ---- | ×0.083 | ×1 | ×1 |
| 30 V | ×0.01 | ---- | ×0.083 | ×10 | ×1 |
| 300 V | ×0.01 | ---- | ×0.083 | ×1 | ×1 |
| 700 V | ×0.01 | ---- | ×0.083 | ×1 | ×0.333 |
| 1 A | ×1 | ---- | ×0.5 | ×100 | ×0.333 |
| 10 A | ×1 | ---- | ×0.5 | ×10 | ×0.333 |
| 100 Ω | ×1 | 500 μA | ×0.5 | ×10 | ×1 |
| 1 kΩ | ×1 | 500 μA | ×0.5 | ×1 | ×1 |
| 10 kΩ | ×1 | 50 μA | ×0.5 | ×1 | ×1 |
| 100 kΩ | ×1 | 5 μA | ×0.5 | ×1 | ×1 |
| 1 MΩ | ×1 | 0.5 μA | ×0.5 | ×1 | ×1 |

### Demodulation bar charts

| Modulation type | Range | AE7 FM Gain | A3 Demod Attenuator (IC42) | A3 Gain/Loss Setting |
|---|---|---|---|---|
| FM | 1 kHz | ×10 | ×1 | +1.4 dB |
| | 3 kHz | ×10 | ×1 | +1.4 dB |
| | 10 kHz | ×10 | ×1 | –9.0 dB |
| | 30 kHz | ×1 | ×1 | +1.4 dB |
| | 100 kHz | ×1 | ×1 | –9.0 dB |
| | 300 kHz | ×1 | ×0.5 | –12.6 dB |
| AM | 10% | ---- | ×1 | +3.0 dB |
| | 30% | ---- | ×1 | –6.5 dB |
| | 100% | ---- | ×0.5 | –11.0 dB |
| SSB | AM 100% | ---- | ×0.5 | –11.0 dB |
| Phase | 1 rad | ×10 | ×1 | +5.1 dB |
| | 3 rad | ×10 | ×1 | –4.5 dB |
| | 10 rad | ×1 | ×1 | +5.1 dB |
| | 30 rad | ×1 | ×1 | –4.5 dB |

**Note:** The gain/loss settings are for no filter.
1 kHz FM range uses the same hardware range as the 3 kHz range.

### Demodulation A3 gain/loss setting in dB for filters

| Modulation Type | Range | No filter | 5, 20 kHz low-pass | 300 Hz low-pass | Bandpass | C-MESS. | CCITT |
|---|---|---|---|---|---|---|---|
| FM | 1 kHz | +1.4 | +1.4 | –6.6 | –7.4 | +11.3 | +12.4 |
| | 3 kHz | +1.4 | +1.4 | –6.6 | –7.4 | +11.3 | +12.4 |
| | 10 kHz | –9.0 | –9.0 | –17.0 | –17.8 | +0.9 | +2.0 |
| | 30 kHz | +1.4 | +1.4 | –6.6 | –7.4 | +11.3 | +12.4 |
| | 100 kHz | –9.0 | –9.0 | –17.0 | –17.8 | +0.9 | +2.0 |
| | 300 kHz | –12.6 | –12.6 | –20.6 | –21.4 | –2.7 | –1.6 |
| AM | 10% | +3.0 | +3.0 | –5.0 | –5.8 | +12.9 | +14.0 |
| | 30% | –6.5 | –6.5 | –14.5 | –15.3 | +3.4 | +4.5 |
| | 100% | –11.0 | –11.0 | –19.0 | –19.8 | –1.1 | 0.0 |
| SSB | AM 100% | ---- | –11.0 | ---- | ---- | ---- | ---- |
| Phase | 1 rad | +5.1 | +5.1 | –3.0 | –3.8 | +14.9 | +16.0 |
| | 3 rad | –4.5 | –4.5 | –12.6 | –13.4 | +5.3 | +6.4 |
| | 10 rad | +5.1 | +5.1 | –3.0 | –3.8 | +14.9 | +16.0 |
| | 30 rad | –4.5 | –4.5 | –12.6 | –13.4 | +5.3 | +6.4 |

**Note:** SSB uses 20 kHz low-pass filter only.

### AF A3 gain/loss setting in dB for filters

| Filter | Gain/Loss Setting |
|---|---|
| None | –25.0 dB |
| 20 kHz low-pass | +9.1 dB |
| 300 Hz low-pass | +1.0 dB |
| Band-pass | –1.5 dB |
| C-MESS. | +18.3 dB |
| CCITT | +20.1 dB |
| 2 kHz low-pass | +9.1 dB |

### Demodulation oscilloscope

| Mod Type | Range per Div. | AE7 FM Gain | A3 Demod Attenuator (IC42) | A3 Gain/Loss Setting | A3 Scope Attenuator | Used for FFT Range |
|---|---|---|---|---|---|---|
| FM | 500 Hz | ×10 | ×1 | +1.4 dB | ×1.5 | 1 kHz |
| | 1 kHz | ×10 | ×1 | –9.0 dB | ×2.5 | 2 kHz |
| | 2 kHz | ×10 | ×1 | –9.0 dB | ×1.25 | 5 kHz |
| | 5 kHz | ×1 | ×1 | +1.4 dB | ×1.5 | 10 kHz |
| | 10 kHz | ×1 | ×1 | –9.0 dB | ×2.5 | 20 kHz |
| | 20 kHz | ×1 | ×1 | –9.0 dB | ×1.25 | 50 kHz |
| | 50 kHz | ×1 | ×0.5 | –12.6 dB | ×1.5 | 100 kHz |
| | ---- | ×1 | ×0.5 | –12.6 dB | ×0.75 | 200 kHz |
| AM | ---- | ---- | ×1 | +3.0 dB | ×2.5 | 5% |
| | ---- | ---- | ×1 | +3.0 dB | ×1.25 | 10% |
| | 5% | ---- | ×1 | –6.5 dB | ×1.5 | 20% |
| | 10% | ---- | ×0.5 | –11.0 dB | ×2.5 | 50% |
| | 20% | ---- | ×0.5 | –11.0 dB | ×1.25 | 100% |
| Phase | 0.5 rad | ×10 | ×1 | –4.5 dB | ×1.5 | 1 rad |
| | 1 rad | ×1 | ×1 | +5.1 dB | ×2.5 | 2 rad |
| | 2 rad | ×1 | ×1 | +5.1 dB | ×1.25 | 5 rad |
| | 5 rad | ×1 | ×1 | –4.5 dB | ×1.5 | 10 rad |
| | ---- | ×1 | ×1 | –4.5 dB | ×0.75 | 20 rad |

**Note:** The gain/loss settings are for no filter.

# A4 PPH, RTP and TTP board

## Introduction

A4, A8 and AB3 together provide the circuits required by the 2966A and 2968 digital systems. The A4 board has on it the Protocol Processor/Host (PPH), Transmit Traffic Processor (TTP) and Receive Traffic Processor (RTP).

### Protocol processor/host (PPH)

This subsection describes the functioning of the PPH part of A4. The PPH performs several functions:-

1. Reset and boot-up of the various Digital Signal Processors (DSPs) used on A4 and A8.
2. Configuration of the Field Programmable Gate Arrays (FPGAs) used on A4 and A8.
3. Communication with A6, the main processor, and the various other DSPs on A4 and A8. This allows measurement modes to be set up and measurement results to be displayed.

A block diagram of the PPH is shown in Fig. 1-6. This shows the essential sub-systems that form the complete system. Referring to Fig. 1-6, the processor used is a 68000 microprocessor that is clocked at 10 MHz by a clock source on A8. It is interfaced to the sub-systems described below.

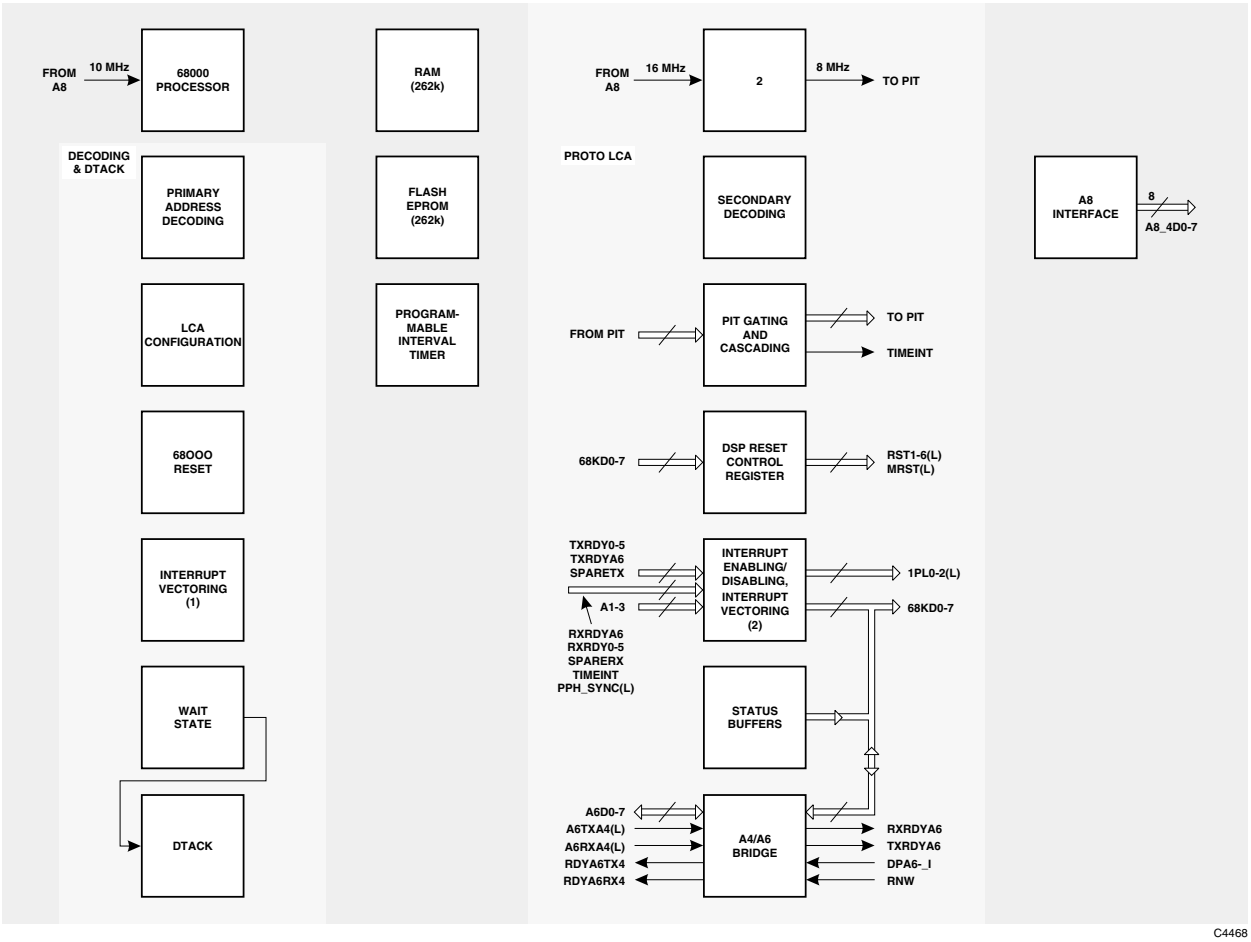



*Fig. 1-6 Block diagram of PPH*

### A4 memory

The 68000 addresses 256K of static RAM and 256K of Flash EPROM. The Flash EPROM memory capacity is expandable to 1 Mbyte.

### Decoding and DTACK

The block labelled DECODING AND DTACK is contained in an EPLD. It performs the main address decoding. The decodes produced are described in the *Software interface* section of this technical description - see page 1-47.

The DTACK (Data Transfer Acknowledge) logic provides a data transfer acknowledge signal to the 68000 for each transfer to/from a valid peripheral. Most of the peripherals can be accessed without the need for the WAIT STATE block.

In the case of relatively slow peripherals, such as the Programmable Interval Timer (PIT) and when configuring Logic Cell Arrays (LCAs), the DTACK(L) signal is delayed by the WAIT STATE block, producing two wait state periods.

The INTERRUPT VECTORING (1) block initiates an interrupt acknowledge sequence by decoding signals FCO-2 from the 68000. It responds by asserting INTVEC(L). This signal drives further interrupt logic inside the PROTO LCA, producing an interrupt vector on 68KD0-7, and DTACK(L) is asserted.

The EPLD also contains certain miscellaneous functions, 68K RESET and LCA CONFIGURATION. The 68K RESET block produces open-collector signals HALT(L) and RESET(L) in response to the SYSRES(L) signal from A6.

The LCA CONFIGURATION block is used so that the 68000 can transfer the configuration patterns for the various XILINX FPGAs or LCAs contained on boards A4 and A8. These devices are SRAM-based and need configuring at power-up. The PROTO LCA contained on this board and the FIFO LCA on A8 are configured with the aid of this block.

### Programmable interval timer (PIT)

This is used to generate periodic interrupts.

### PROTO LCA

Various pieces of "glue logic" are contained in this block. It is implemented in a XILINX XC3030 device which contains 100 CLBs (Configurable Logic Blocks) and 80 IOBs (Input/Output Blocks).

## Transmit traffic processor (TTP) and receive traffic processor (RTP)

The TTP maintains the BCCH and TCH frame structures. Layer 2 messages received from the PPH via the bridge interface are inserted in the appropriate elements of the frame structure. In response to interrupts from the STE, the TTP performs the required bit shuffling and convolutional coding to create the data bits for a single TDMA burst; these are fed to the IGP (page 1-85) and QGP (page 1-85) via the SPORT loop, where the bits are modulated on the RF carrier.

The RTP receives demodulated data bits from the RDP (page 1-86) over the SPORT loop on a burst by burst basis. Reversing the TTP's bit shuffling and convolutional coding, the RTP recreates the Layer 2 signalling streams, which are then passed to the PPH via the bridge interface. The RTP also handles data comparisons for BER and RBER testing, passing error reports to the PPH, again via the bridge interface.

# Circuit description

## System reset (sheet 1)

The 68000 is reset by asserting its HALT(L) and RESET(L) lines simultaneously. These two lines are bidirectional and must therefore be driven by open-collector sources. The reset function is implemented inside IC6.

The DSCRES(L) input of IC6 is driven by the SYSRES(L) system reset line produced by A6. IC6 produces two open-collector outputs, RES68K_L and HALT68K_L, as defined by the equations in lines 397 to 401 of the ABEL4 listing (page 1-55).

## Address decoding (sheets 1 and 2)

Address decoding is described in the ABEL4 listing. This is supplemented by the notes below.

### ROM decodes

128K Flash EPROMs are fitted in positions IC4 and IC9.

PLAQ (sheet 1) is provided to enable external EPROMs to be accessed. The external EPROMs will contain Flash programming, boot-up and diagnostic code. This allows totally blank Flash EPROMs to be fitted in positions IC4 and IC8. The Flash programming algorithms can then be written to the boot sectors (800000h to 8007FFh) along with the vector table addresses and any other necessary boot code. The EPROMs can then be fully programmed in the Test Set.

IC6 produces upper and lower Chip Select signals for the Flash EPROMs; ROMUCS(L) and ROMLCS(L) respectively. It also produces ROMOE(L), which drives the OE(L) pins of the Flash EPROMs. The 68000 read/write signal RNW drives the WE(L) pins of the EPROMs. The Flash EPROMs are erased and programmed on a byte-wide basis.

| Operating mode | CE(L) | OE(L) | WE(L) |
|---|---|---|---|
| Read | L | L | H |
| Program | L | H | L |
| 5 V chip erase | L | H | L |

To program or erase the Flash EPROM, it is necessary to write to EPROM address 2AAAh. This address corresponds to 68000 address 805554,5h, which during normal use lies within the write-protected boot sector. IC30 and IC31(a) provide the additional address decoding needed for address 805554,5h via the signal DEC_2AAA(L), which drives IC6 pin 13.

The EXTROM_EN(L) input of IC6 is driven by PLAQ pin 49. When a boot card is fitted to PLAQ, PLAQ pin 49 is grounded, which causes the external ROM on the boot board to be accessed by the decode output EXTROMCS(L) instead of the Flash EPROMs for a read address range of 0 to 0FFFFFh. The boot board provides a power on reset for the 68000 via PLAQ pin 27 which drives the DSCRES(L) input of IC6.

The implementation of the ROM decoding is detailed in lines 215 to 249 and 314 to 325 of the ABEL4 listing (page 1-55).

### RAM decodes

Two RAM Chip Selects are produced; RAMU_L drives the CS1(L) input of IC9, the upper byte RAM and RAML_L drives the CS1(L) input of IC5, the lower byte RAM. The present total RAM size is 256 kbytes, this is expandable to 1 Mbytes by fitting 512K RAMs, R106 and R127 to 129.

The equations and declarations for these decodes are shown in lines 252-256 and 326-327 of the ABEL4 listing (page 1-55). The upper/lower decodes are obtained by qualifying with UDS_L and LDS_L respectively.

### Bridge decodes

IC6 produces a general bridge decode signal named BRIDGE(L). This is active for separate read and write addresses as described in lines 259-263 and 329 of the ABEL4 listing (page 1-55). BRIDGE(L) enables the decoder IC26, which decodes address signals A1-3, producing seven bridge decodes. The decoder signals RTPBRI(L) and TTPBRI(L) drive bridges shown on sheet 3 and sheet 4 respectively. A4A6BRI(L) drives the PROTO LCA on sheet 2.

The other bridge decodes drive bridges on A8 and are connected via PLC. An A8 enable signal, A8EN_L, is produced which is active when one of the above decodes is active. It is also active when the STE LCA contained on A8 is addressed. This enable signal is described in line 331 of the ABEL4 listing (page 1-55). A8EN_L drives the G(L) pin bus transceiver, IC3, which interfaces A4 68KD0-7 to A8_4D0-7.

#### PROTOLCARD(L)

This decode is a read decode which drives the PROTOLCARD (L) input of IC7, as detailed in lines 270 and 330 of the ABEL4 listing (page 1-55). Address lines A1-3 from IC2 also drive IC7.

#### PROTOLCAWR(L)

This decode is a write decode which drives the PROTOLCAWR(L) input of IC7 where further decoding is performed as above. This decode is also used to configure the PROTO LCA and is detailed in lines 265-268 and 334 of the ABEL4 listing (page 1-55).

#### STECS(L)

This decode is a read/write decode which drives the STE LCA on A8. See lines 276-277 and 338 of the ABEL4 listing (page 1-55) for details. Address lines A1-5, buffered by IC23(d)-(g) and IC31(b), drive A8. The decode and the buffered address lines are decoded further inside the STE LCA.

#### PITCS(L)

PITCS(L), PITWR(L) and PITRD(L) are produced as shown in lines 284-5 and 340-2 of the ABEL4 listing (page 1-55). These signals drive the CS(L), WR(L) and RD(L) inputs respectively of the 82C54 PIT. The RD(L) and WR(L) signals are produced by feeding back the PITCS(L) output into the EPLD and gating with RNW. This ensures that the gated signals go low after PITCS(L) goes low.

## Latched decodes (sheets 1 and 2)

The decoder EPLD PROTODEC, IC6, produces the following decodes:-

#### PROTORES(L)

This output drives the RESET pin of the PROTO LCA (and the PROG(L) pins of the XC4000 LCAs on A8 via signal PRES(L) ). The reset must be sustained for at least 6 µs and so is latched. It is also open-collector so that an external reset from a XILINX Xchecker cable can be used when debugging.

The decoded address PROTOCLK clocks a D-type flip-flop, whose D input is driven by 68KD0. The flip-flop Q output is inverted and drives the .oe pin of a tri-state output buffer whose input is grounded. Thus the output PROTORES_L is open-collector. Writing a low into PROTOCLK bit 0 grounds PRES(L), writing a high causes PRES(L) to be pulled high by R205. See lines 274 and 344-356 of the ABEL4 listing (page 1-55).

At power up, PROTORES(L) is initialised as high by the SYSRES(L) signal from A6.

#### PROTODNP(L)

This signal drives the DNP pin of IC7. It is also connected to the DNP lines of the other LCAs on A8 that are part of the configuration daisy chain. It is latched and open-collector, as for PROTORES(L), and is implemented in lines 344-356 of the ABEL4 listing (page 1-55).

At power up PROTODNP(L) is initialised as high by the SYSRES(L) signal from A6.

## STATUS1 (sheets 1 and 2)

The STATUS1 output from IC6 drives the enable lines of IC27 where the status of the signals below are monitored by the 68000. It is implemented by means of lines 268 and 347 of the ABEL4 listing (page 1-55).

#### PINIT(L)

The PINIT(L) line is driven by the INIT(L) output of the PROTO LCA through the PINIT(L). This line is held low by the LCAs during the clearing of their configuration memories. The writing of LCA configuration data must be delayed until this line is high.

It is read on 68KD1 when STATUS1 is read, via IC27.

#### PDNP

The PDNP line is read on 68KD2 when the 68000 reads STATUS1 via IC27.

#### PRDY

The READY/BUSY(L) output of IC7 (sheet 2) indicates during configuration when the PROTO LCA is ready for another byte of configuration data to be sent. The signal drives IC27 pin 5 and its status appears on 68KD3 when STATUS1 is read.

#### LDC1-4

The LDC (low during configuration) signals are output by each LCA in the configuration chain and can be used to help solve configuration problems. These signals provide information as to which LCA has failed to configure.

LDC1 is output by IC7, LDC2 is the FIFO LCA on A8, and LDC3 is the STE LCA on A8. LDC4 is presently unused. These signals drive IC27 and their states appear on 68KD4-7 when STATUS1 is read.

## Wait state logic (sheet 1)

The wait state logic is contained in the PROTODEC, IC6. It is described by lines 296 and 360-363 of the ABEL4 listing (page 1-55). It consists of two flip-flops WA and WB. WA is clocked by the 10 MHz system clock, CLK10M. WB is clocked by CLK10M inverted. AS(L) drives the data input of WA. WA drives the data input of WB. WA and WB are effectively ORed and feed the DTACK(L) logic.

The waveform diagram Fig. 1-7 on page 1-43 shows the functioning of the wait state logic.

The WAIT signal is high for states 2 to 4. This signal drives the DTACK logic. Any decode can be subjected to two wait states by delaying its DTACK(L) with the WAIT signal. DTACK(L) is sampled at the end of state 4. If high, wait states (shown as W in Fig. 1-7) are substituted for states 5 and 6. DTACK(L) goes low after WAIT goes low and normal states (i.e. 5-7) are resumed after the two wait states.

## DTACK logic (sheet 1)

The acknowledgement of data transfers is necessary for the 68000 to complete its read or write cycle. This is done by pulling the 68000 DTACK(L) signal low. DTACK(L) is formed from four open-collector outputs on the PROTODEC, IC6. The signal is pulled high by R104 when all DTACK(L) sources are inactive.

The DTACK logic is described by lines 369-391 of the ABEL4 listing (page 1-55). Four outputs are needed because of the large number of product terms that must be ORed together. Read DTACKs are generated by gating the appropriate decode address with either UDS(L) or LDS(L). Write DTACKs are generated by gating the decode address with AS(L) and RNW.

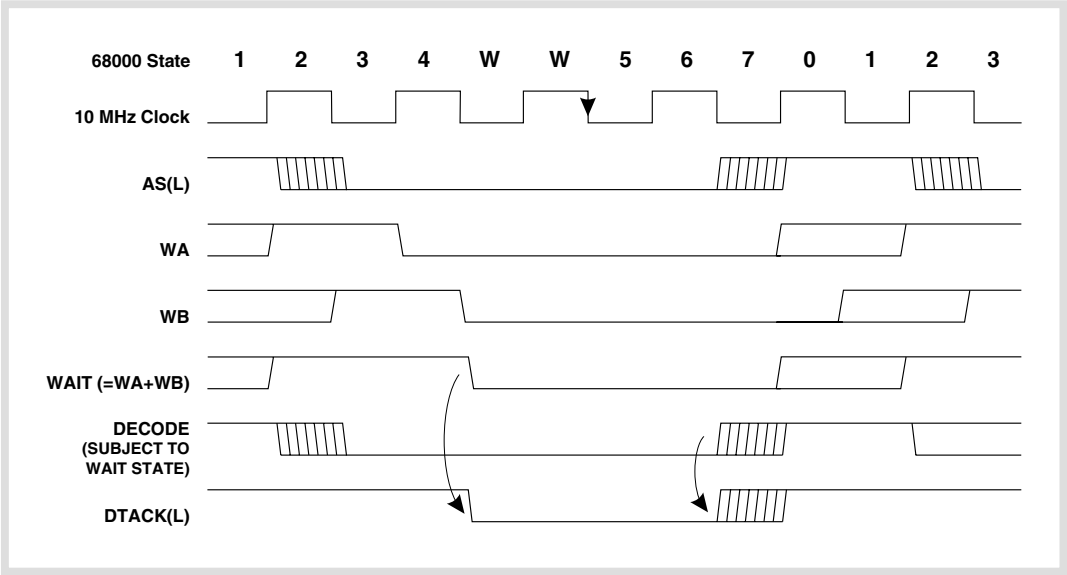



*Fig. 1-7 Wait state logic waveforms*

## Interrupt acknowledge logic (sheet 1)

The board was designed to support two acknowledge modes, vectored and auto-vectored. For auto-vectoring, R110 would be fitted. Current instruments use the vectored mode, so R110 is not fitted.

When R110 is not fitted, AUTOVEC(L) is high due to R115, and line 395 of the ABEL4 listing (page 1-55) applies. The function code signals FC0-2 from the 68000 drive the DECODER EPLD and are high during an interrupt acknowledge cycle, also AS(L) is low. This causes INTVEC(L) to go low. INTVEC(L) drives the PROTO LCA. The LCA generates the required vector on 68KD0-7. DTACKB is pulled low by IC6 (line 378 of the ABEL4 listing, page 1-55). The interrupt DTACK is subjected to two wait states to ensure valid interrupt vectors are generated by PROTO LCA.

## Bus error logic (sheet 1)

The bus error logic on the PROTODEC is designed to flag a bus error to the 68000 if it attempts to access an invalid address.

The declarations for the bus error logic are described in lines 291-306 of the ABEL4 listing (page 1-55). The equations are described in lines 404-424.

The system so formed is a state machine clocked on high to low transitions of clk10m. The bus error logic detects invalid address accesses by monitoring the four dtack pins. An invalid address access does not produce a DTACK. The state machine has 3 states. State A is the idle state. State C indicates a valid address access and State B indicates an invalid address access. State D is an invalid condition that might occur at power-up, in which case the state machine unconditionally jumps to State A.

The timing of the examination of DTACK is achieved with the wait state logic. Referring to Fig. 1-7 on page 1-43, the internal signal wait is low after 68000 state 4. On the next 10 MHz high-to-low transition (indicated by a downward arrow), DTACK is sampled.

### Valid address access

A valid address access will produce a DTACK and the state machine will jump from State A to C. Internal EPLD signal wait goes high during 68000 states 0, 1 or 2 (AS(L) timing dependent), at which time the state machine reverts to State A.

#### Invalid address access

No DTACK is produced, in which case internal signal dtack_exists is low. Consequently the state machine jumps from State A to State B. During State B, the EPLD berr_l signal is low. This signal drives the BERR(L) input of the 68000, which responds by negating its AS(L) signal and initiates a bus error exception. The negation of AS(L) causes internal EPLD signal dtack_cycle to go low, and the state machine reverts to State A.

#### Read-modify-write access

The bus error logic will work for zero wait state read-modify-write accesses. First the read cycle, if valid, invokes State C, otherwise State B. Second, if State C is reached, it is maintained until the internal EPLD signal wait goes high, when it reverts to State A. If the write cycle is invalid, no DTACK is produced and the state machine jumps to State B, giving rise to a bus error etc.

### PROTO LCA (sheet 2)

The 8 MHz clock for the PIT is provided by dividing the 16 MHz clock from A8. The various gating signals to trigger each stage of the PIT are provided. The PIT OUT signals are gated inside the PROTO LCA to form 68000 interrupts.

The DSP RESET CONTROL REGISTER provides a means of independently initialising the following DSPs:-

- On A4: Receive Traffic Processor (RTP) and Transmit Traffic Processor (TTP).
- On A8: Modulation Analysis Processor (MAP), In-phase modulation Generation Processor (IGP), Quadrature modulation Generation Processor (QGP) and Real-time Demodulation Processor (RDP).

The INTERRUPT ENABLING/DISABLING block accepts the various DSP bridge flags and the PIT TIMEINT flag as potential interrupt sources that can be enabled or disabled. These flags are logically combined and drive an interrupt priority encoder contained in the block. Outputs IPL0-2(L) interrupt the 68000.

Provided that the pending interrupt level exceeds the level set in the 68000 status register (apart from level 7, which is non-maskable), the interrupt acknowledge sequence is initiated by the 68000:-

- The 68000 outputs the interrupt acknowledge function code on FC0-2.
- This and AS(L) are decoded by the EPLD, producing signal INTVEC(L).
- The interrupt level is echoed on address lines A1-3.

INTVEC(L), A1-3 and the enabled flags are decoded to produce a unique interrupt vector on 68KD0-7. Also DTACK(L) is asserted to indicate completion of the data transfer.

The block shown in Fig. 1-6 as STATUS BUFFERS enables the state of the following groups of signals to be read by the 68000:-

| | |
|---|---|
| INT1-6 | Enabled interrupt lines internal to PROTO LCA |
| MISCINT | Enabled interrupt lines internal to PROTO LCA |
| TXFLAGs | External bridge flags |
| RXFLAGs | External bridge flags |
| Miscellaneous flags | |

The A4/A6 BRIDGE permits data communication between the main processor board A6 and A4. The facilities available are described in the *Software interface* section of this report - see page 1-47.

### A4/STE functions (sheet 2)

A4 initialises the A8 Systems Timing Element (STE), described on page 1-86, by writing to it through A8_4D0-7 (PLB, PLC). The following functions are provided:-

- Independent control of the various DSP clocks, 10 MHz and 40 MHz clocks.
- Control of the DSP SPORTS; routing and serial clock enabling.
- Control of the various system clocks, such as reference frequency, frame clock, slot clock, symbol clock and sample clock.
- Control of the various sync lines; RF_SYNC, RDP_SYNC, QGPSYNC, IGP_SYNC, MAPSYNC, RTP_SYNC and RTP_SYNC. Routing and level is controllable for each sync source.
- Control of the modulation generator phase-locked loop (PLL).
- Control of the A8 generator output level.
- Configuration of the FLEX chips used on A8.

## LCA configuration and readback (sheets 1 and 2)

The configuration patterns for the LCAs are contained in the EPROMs. The LCAs are normally loaded under control of the 68000 after reset/power-up. They can also be loaded and read back from a PC through PLW.

### Configuration by 68000

On sheet 2, the configuration mode of the PROTO LCA is selected with mode pins M0, M1 and M2. M0 and M2 are driven high by R206 and 207, M1 is pulled low by R201 and 202. This selects the byte-wide peripheral configuration mode. Configuration write cycles are decoded from the common assertion of the WS(L) and the Chip Select pins CS0(L), CS1(L) and CS2. WS(L) is driven by RNW, CS0(L) by PROTOLCAWR(L) from the IC6, CS1(L) by A1 from the 68000, CS2 by A2. The configuration data is written to the D0-7 inputs of the LCA. These inputs are connected to 68KD0-7.

Following a system reset, the 68000 executes code to configure the PROTO LCA and the FIFO and STE LCAs on A8. It first sets PRES(L) and PDNP by means of the IC6. It then pulls these two open-collector signals low for at least 6 μs and then releases them. Each LCA responds by performing an internal configuration clear operation. The PROTO LCA signals that this operation is in progress by asserting INIT(L). This signal drives IC27 pin 3, which is polled by the 68000.

When this line is polled as high, the 68000 writes the first byte of configuration data to the PROTO LCA. The LCA responds by taking its RDY/BUSY(L) line low. When ready for another byte of configuration data this line is asserted high. The 68000 polls this line and sends successive bytes of configuration data.

The PROTO LCA is eventually configured, and it then passes further configuration data that it receives to the second LCA in the configuration chain (on A8) by means of its CCLK and DOUT pins. The other LCAs have their mode pins wired high, which places them in bit serial slave configuration mode. When the second LCA is configured, it passes further configuration data to the third LCA, etc.

Eventually all LCAs in the chain are configured and the wired AND DNP lines go high. This signal feeds the IC27 pin 4, which can be read by the 68000 as a confidence check. The LDC signals (low during configuration) can also be monitored via IC 27 as a further confidence check.

At this stage in the configuration process, the PROTO LCA is completely configured and the two LCAs on A8 are nearly configured. They require one further CCLK pulse to complete the configuration. This is achieved by means of extra CCLK logic in the PROTO LCA.

### Readback

The PROTO LCA can be read back and internal nodes can be probed using the XChecker cable connected to PLW via a suitable adapter. PLW pin 11 drives the M0/RTRIG pin of the LCA. The PC pulls this pin low to trigger a readback. The LCA outputs the readback data on M1/RDATA, which connects to PLW pin 10.

### Receive (uplink) traffic processor (RTP) (sheet 3)

The RTP is based around the ADSP2115 DSP, IC11. ICs 12 and 13 are 32K x 8 RAMs, IC14 is an 8K x 8 RAM. These are mapped through the memory decoder PAL, IC15, to provide 8K of 24-bit external program memory, 6K of 16-bit external program memory for data storage, and 13K of 16-bit external data memory for data storage.

The fast external memory, with 15 ns access time, must operate with zero wait states, so the memory decoder has a propagation delay of less than 10 ns. A single I/O decode enables the bridge controller (see below) for RTP to M68000 communication. PMEN enables external RAM during data and program memory access. PMXEN enables the extended external memory (IC14) during external program memory access. The memory decoder design supports paged operation, in this unpaged application, the unused inputs are tied low through a 10 kW resistor, R314, and unused outputs are tied high through 10 kW pull-up resistors R316..320.

IC16 is a Programmable Logic Array (PLA), known as the bridge controller, which provides a bidirectional, 8-bit data link between the RTP and the 68000 host processor. The bridge controller contains internal registers for flow control and interrupt generation and drives and external 8-bit 74FCT652 transceiver, IC28. The bridge controller may raise an interrupt via the RTP's /IRQ0 pin.

The bridge controller also provides four auxiliary outputs, R_AUX0..3, which can be written to by the DSP for debug purposes.

DSP reset is controlled by the M68000 host processor.

The 16 MHz DSP clock is provided on SKA from A8.

The RTP's /IRQ2 pin may be driven by the /RTP_SYNC signal taken from the STE on A8.

The RTP's serial port receives from the RDP on A8 via PLJK and sends to the CODEC port on the accessory socket via PLE (sheet 5). It may also output to the TTP's serial port input.

### Transmit (downlink) traffic processor (TTP) (sheet 4)

The TTP is similar in most respects to the IGP (page 1-85) with the exception of the SPORT routing.

Serial port data and sync (T_DR0, T_RFS0) is received via IC25 (sheet 5), which multiplexes the signals either from the RTP's serial output or from the CODEC serial port routed in via PLE. Sourcing of the serial port input is controlled via the T_AUX3 output of IC22, which controls the multiplexer IC25 (sheet 5).

The serial port transmits to A8 via PLJK where it is routed to the IGP or IGP and QGP on A8 - the necessary routing takes place on A8.

Furthermore, the TTP's serial clock is configured as an output and becomes the DSP SPORT clock master for the remaining five DSPs in the system.

### DSP clock distribution (sheet 5)

IC24, a 74HC365 CMOS buffer, distributes the 16 MHz DSP processor clock, which is received on SKA, to the two DSPs on A4 and to PLJK, where it is fed to A8 and further buffered to the four DSPs on that board.

IC24 also buffers the DSP SPORT clock master to the RTP, A8 and the CODEC port.

The series resistors in each clock distribution line prevent ringing. All clock lines are terminated with a single receiver.

IC25 is a 74AC157 multiplexer which sources the TTP SPORT receive data and receive frame sync either from the external CODEC connector (PLE), or from the RTP's SPORT transmitter. Multiplexer routing is controlled by the TTP's T_AUX3 control line.

## A4 software interfaces

### 68000 memory map

The decodes accessing the STE, PIT and LCA configuration decodes are subject to two wait states, others are not subject to any wait states.

Key to table below: B/W means byte/word, RO/WO/RW means read only/write only/read write.

| Address Range Hex | B/W | Decode | RO/WO/ RW | Comments |
|---|---|---|---|---|
| 000000-03FFFF | B/W | Flash | RO | Normal use, Flash read address range. |
| 808000-83FFFF | B/W | Flash | RW | Normal use, address range for programming or verification by A6. |
| 805554,5 | B/W | Flash_2aaa | W | Address is part of Flash "unlock programming sequence". |
| 800000-83FFFF | B/W | Flash | RW | Flash address range with boot board fitted. |
| 0 - 3FFFF | W | EXT ROM | RO | External ROM on bootcard enabled when fitted. |
| 600000-63FFFF | B/W | RAM | RW | RAM, ram expansion resistor not fitted. |
| 600000-6FFFFF | B/W | RAM | RW | RAM, ram expansion resistor fitted. |
| E00001-E0000D | B | | WO | Bridge write decodes. Produce general bridge Chip Selects, which are decoded externally as shown below:- |
| E00001 | B | rdpbri | WO | RDP bridge |
| E00003 | B | qgpbri | WO | QGP bridge |
| E00005 | B | igpbri | WO | IGP bridge |
| E00007 | B | mapbri | WO | MAP bridge |
| E00009 | B | rtpbri | WO | RTP bridge |
| E0000B | B | ttpbri | WO | TTP bridge |
| E0000D | B | a4a6bri | WO | A4/A6 bridge |
| E0000F | B | protoclk | WO | drives reset and dnp flip-flops |
| E00011 | B | pitctr0 | WO | (1 wait state, write address) |
| E00013 | B | pitctr1 | WO | (1 wait state, write address) |
| E00015 | B | pitctr2 | WO | (1 wait state, write address) |
| E00017 | B | pitconreg | WO | (1 wait state, write address) |
| E0001D | B | protocs0 | WO | Via pin protolcawr - allows configuration of PROTO LCA (1 wait state). |
| E00021-E00029 | B | PROTOLCAWR | WO | Write decode that drives the PROTO LCA where PROTOLCARD and A1:4 are further decoded in the PROTO LCA as follows:- |
| E00021 | B | RESCONT | WO | Used to independently reset DSPs. |
| E00023 | B | TXINTEN | WO | Used to independently enable/disable bridge Tx interrupts |

| Address Range Hex | B/W | Decode | RO/WO/ RW | Comments |
|---|---|---|---|---|
| E00025 | B | RXINTEN | WO | Used to independently enable/disable bridge Rx interrupts |
| E00027 | B | MISCINTEN | WO | Used to independently enable/disable miscellaneous interrupts |
| E00029 | B | TCRREG | WO | Controls 82C54 GATE0 drive, can reset timer interrupts |
| E00031-E0004F | B | STECS | WO | Used to write to STE LCA where STECS A1-4 are further decoded as shown below:- |
| E00031 | B | | | Synthesizer N reg.high byte |
| E00033 | B | | | Synthesizer N reg. low byte |
| E00035 | B | | | Pri. attenuator high byte |
| E00037 | B | | | Pri. attenuator low byte |
| E00039 | B | | | Sec. attenuator high byte |
| E0003B | B | | | Sec. attenuator low byte |
| E0003D | B | | | O/p attenuator control reg. |
| E0003F | B | | | JTAG port control. |
| E00041 | B | | | Instrument clock control |
| E00043 | B | | | Serial port control |
| E00045 | B | | | System clock control |
| E00047 | B | | | Synchronization control |
| E00049 | B | | | Synchronization level |
| E0004B | B | | | Synthesizer C reg. |
| E0004D | B | | | Synthesizer R reg. high byte |
| E0004F | B | | | Synthesizer R reg. low byte |
| F00001-F0000D | B | Bridge read decodes | | Produce general bridge Chip Selects, which are decoded externally as shown below:- |
| F00001 | B | rdpbri | RO | |
| F00003 | B | qgpbri | RO | |
| F00005 | B | igpbri | RO | |
| F00007 | B | mapbri | RO | |
| F00009 | B | rtpbri | RO | |
| F0000B | B | ttpbri | RO | |
| F0000D | B | a4a6bri | RO | |
| F0000F | B | status1 | RO | Allows reading of LCA configuration lines;rdy, init, dnp and ldc pins. |
| F00011 | B | pitctr0 | RO | (1 wait state, readaddress) |
| F00013 | B | pitctr1 | RO | (1 wait state, read address) |
| F00015 | B | pitctr2 | RO | (1 wait state, read address) |
| F00017 | B | pitstatreg | RO | (1 wait state, read address) |

| Address Range | B/W | Decode | RO/WO/ RW | Comments |
|---|---|---|---|---|
| F00021-F00025 | B | PROTOLCARD | | Read decode that drives the PROTO LCA where PROTOLCARD and A1:3 are further decoded in the PROTO LCA as follows:- |
| F00021 | B | TXRDYREG | RO | Bridge TX ready register |
| F00023 | B | RXRDYREG | RO | Bridge RX ready register |
| F00025 | B | status2 | RO | Status buffer, TIMEINT and PPH_SYNC |
| F00031-F0004F | B | STECS | RO | Used to read STE LCA, where STECS and A1-4 are further decoded as shown below:- |
| F00031 | B | | | Synthesizer N reg. high byte |
| F00033 | B | | | Synthesizer N reg. low byte |
| F00035 | B | | | Pri. attenuator high byte |
| F00037 | B | | | Pri. attenuator low byte |
| F00039 | B | | | Sec. attenuator high byte |
| F0003B | B | | | Sec. attenuator low byte |
| F0003D | B | | | O/p atten. control reg |
| F0003F | B | | | JTAG port control |
| F00041 | B | | | Instrument clock control |
| F00043 | B | | | Serial port control |
| F00045 | B | | | System clock control |
| F00047 | B | | | Synchronization control |
| F00049 | B | | | Synchronization level |
| F0004B | B | | | Synthesizer C reg. |
| F0004D | B | | | Synthesizer R reg. high byte |
| F0004F | B | | | Synthesizer R reg. low byte |

## Bit maps

### TXRDYREG bit map

This register is read only.

| 68K Bit | Name | Function |
|---|---|---|
| 0 | SPA_TXRDY(L) | Presently unused |
| 1 | RDP_TXRDY(L) | Ready for 68000 to transmit to RDP bridge if low. |
| 2 | QGP_TXRDY(L) | Ready for 68000 to transmit to QGP bridge if low. |
| 3 | IGP_TXRDY(L) | Ready for 68000 to transmit to IGP bridge if low. |
| 4 | MAP_TXRDY(L) | Ready for 68000 to transmit to MAP bridge if low. |
| 5 | RTP_TXRDY(L) | Ready for 68000 to transmit to RTP bridge if low. |
| 6 | TTP_TXRDY(L) | Ready for 68000 to transmit to TTP bridge if low. |
| 7 | A6_TXRDY(L) | Ready for 68000 to transmit to A4/A6 bridge if low. |

Following power up/reset, the flags are low.

**RXRDYREG bit map**

This register is read only.

| 68K Bit | Name | Function |
|---|---|---|
| 0 | SPA_RXRDY(L) | Presently unused |
| 1 | RDP_RXRDY(L) | Ready for 68000 to receive from RDP bridge if low. |
| 2 | QGP_RXRDY(L) | Ready for 68000 to receive from QGP bridge if low. |
| 3 | IGP_RXRDY(L) | Ready for 68000 to receive from IGP bridge if low. |
| 4 | MAP_RXRDY(L) | Ready for 68000 to receive from MAP bridge if low. |
| 5 | RTP_RXRDY(L) | Ready for 68000 to receive from RTP bridge if low. |
| 6 | TTP_RXRDY(L) | Ready for 68000 to receive from TTP bridge if low. |
| 7 | A6_RXRDY(L) | Ready for 68000 to receive from A4/A6 bridge if low. |

Following power up/reset, the flags are high.

**STATUS1 bit map**

This register is read only.

| 68KBit | Name | Function |
|---|---|---|
| 1 | PINIT(L) | During LCA configuration, if clear it indicates that the LCAs are busy clearing their configuration memories. Configuration should be delayed until this status line is polled as high. |
| 2 | PDNP | If polled low it indicates that LCA configuration is still in progress. If polled as high, configuration is complete. Failure of this line to go high after transmission of configuration data indicates LCA configuration problems. |
| 3 | PRDY | During LCA configuration, if set, it indicates that the PROTO LCA is ready for another byte of configuration data from the 68000. |
| 4 | LDC1 | Low during configuration status from the PROTO LCA. It goes high when this LCA has configured. |
| 5 | LDC2 | Low during configuration status from the FIFO LCA on A8. It goes high when this LCA has configured. |
| 6 | LDC3 | Low during configuration status from the STE LCA on A8. It goes high when this LCA has configured. |
| 7 | LDC4 | Presently unused. |

The LDC status signals can be used to help solve LCA configuration problems.

**STATUS2 bit map**

This register is read only.

| 68KBit | Name | Function |
|---|---|---|
| 0 | TIMERQ0 | Latched signal indicating detection of end of a timer period from PIT counter 0. |
| 1 | TIMERQ1 | Latched signal indicating detection of end of a timer period from PIT counter 1. |
| 2 | TIMERQ2 | Latched signal indicating detection of end of a timer period from PIT counter 2.- |
| 3 | PPH_SYNC(L) | Synchronization signal from A8. Currently unused. |

**RESCONT bit map**

This register is write only.

| 68KBit | Name | Function |
|---|---|---|
| 1 | RDP_RST(L) | RDP DSP reset, active if register bit is clear. |
| 2 | QGP_RST(L) | QGP DSP reset, active if register bit is clear. |
| 3 | IGP_RST(L) | IGP DSP reset, active if register bit is clear. |
| 4 | MAP_RST(L) | MAP DSP reset, active if register bit is clear. |
| 5 | RTP_RST(L) | RTP DSP reset, active if register bit is clear. |
| 6 | TTP_RST(L) | TTP DSP reset, active if register bit is clear. |
| 7 | MRST(L) | Miscellaneous reset, active if register bit is clear. |

All register bits are clear after the PROTO LCA has configured. A particular reset is released by writing a high to the appropriate RESCONT bit.

**TXINTEN bit map**

This register is write only.

| 68KBit | Name | Function |
|---|---|---|
| 0 | SPA_TXEN | When set, enables SPA_TXRDY(L), the spare bridge TX flag as an interrupt source. |
| 1 | RDP_TXEN | When set, enables the RDP_TXRDY(L) flag as an interrupt source. |
| 2 | QGP_TXEN | When set, enables the QGP_TXRDY(L) flag as an interrupt source. |
| 3 | IGP_TXEN | When set, enables the IGP_TXRDY(L) flag as an interrupt source. |
| 4 | MAP_TXEN | When set, enables the MAP_TXRDY(L) flag as an interrupt source. |
| 5 | RTP_TXEN | When set, enables the RTP_TXRDY(L) flag as an interrupt source. |
| 6 | TTP_TXEN | When set, enables the TTP_TXRDY(L) flag as an interrupt source. |
| 7 | A6_TXEN | When set, enables the A6_TXRDY(L) flag as an interrupt source. |

After LCA configuration the above register bits are all clear.

**RXINTEN bit map**

This register is write only.

| 68KBit | Name | Function |
|---|---|---|
| 0 | SPA_RXEN | When set, enables SPA_RXRDY(L), the spare bridge RX flag as an interrupt source. |
| 1 | RDP_RXEN | When set, enables the RDP_RXRDY(L) flag as an interrupt source. |
| 2 | QGP_RXEN | When set, enables the QGP_RXRDY(L) flag as an interrupt source. |
| 3 | IGP_RXEN | When set, enables the IGP_RXRDY(L) flag as an interrupt source. |
| 4 | MAP_RXEN | When set, enables the MAP_RXRDY(L) flag as an interrupt source. |

| | | |
|---|---|---|
| 5 | RTP_RXEN | When set, enables the RTP_RXRDY(L) flag as an interrupt source. |
| 6 | TTP_RXEN | When set, enables the TTP_RXRDY(L) flag as an interrupt source. |
| 7 | A6_RXEN | When set, enables the A6_RXRDY(L) flag as an interrupt source. |

After LCA configuration, the above register bits are all clear.

**MISCINTEN bit map**

This register is write only.

| 68KBit | Name | Function |
|---|---|---|
| 0 | TIMER0EN | When set, enables the PIT counter 0 flag as an interrupt source. |
| 1 | TIMER1EN | When set, enables the PIT counter 0 flag as an interrupt source. |
| 2 | TIMER2EN | When set, enables the PIT counter 0 flag as an interrupt source. |
| 3 | PPH_SYNCEN | When set enables the PPH SYNC signal from A8 as an interrupt source. Currently unused. |

After PROTO LCA configuration, the above register bits are all clear.

**TCRREG bit map and extra CCLK pulse**

This register is write only. Before describing its use, the associated circuits are described.

A simplified circuit diagram of the PIT to PROTO LCA interconnections is shown in Fig. 1-8.

The 82C54 PIT contains three identical timer/counters; counters 0,1 and 2. The GATE0 input of counter 0 is connected to either control bit TCR4 or an external test point HWTRIG, allowing timing to be synchronized by software or some external hardware. The clock input of counter 0 is of frequency 8 MHz. This allows counter 0 to produce periodic time intervals between 125 ns and 8.2 ms in 125 ns steps. The 8MHz clock also drives counter 2.

The Counter 0 OUT0 output drives the clock input of counter 1, allowing time intervals up to 537 seconds. The OUT signals of each counter drive D flip-flops inside PROTOLCA that are set by low transitions of OUT. The flip-flops ensure reliable interrupt detection by the 68000. The three flip-flop outputs TIMERQ0,1 and 3 drive interrupt logic in the PROTO LCA.

The counters are programmed in modes 4 or 5 as described in the Intel 82C54 data sheet.

| 68KBit | Name | Function |
|---|---|---|
| 0 | TCR0 | Clears interrupt flip-flop TIMERQ0 when low. Allows 82C54 OUT0 to set the flip-flop when high. |
| 1 | TCR1 | Clears interrupt flip-flop TIMERQ1 when low. Allows 82C54 OUT1 to set the flip-flop when high. |
| 2 | TCR2 | Clears interrupt flip-flop TIMERQ2 when low. Allows 82C54 OUT2 to set the flip-flop when high. |
| 3 | TCR3 | Selects external HWTRIG to drive GATE0 if high, otherwise selects TCR4. |
| 4 | TCR4 | Used to trigger counter 0 if selected by TCR3. |

The above register bits are clear after PROTO LCA initialisation.

Bit 5 of this register is used to provide additional CCLK pulses for configuring the XC4000 LCAs on A8. This needs to be done to complete the configuration of the LCAs on A8. Clearing bit 5 will take CCLK low, setting bit 5 takes CCLK high. When manipulating bits 0-4 of TCR, bit 5 should be maintained high.

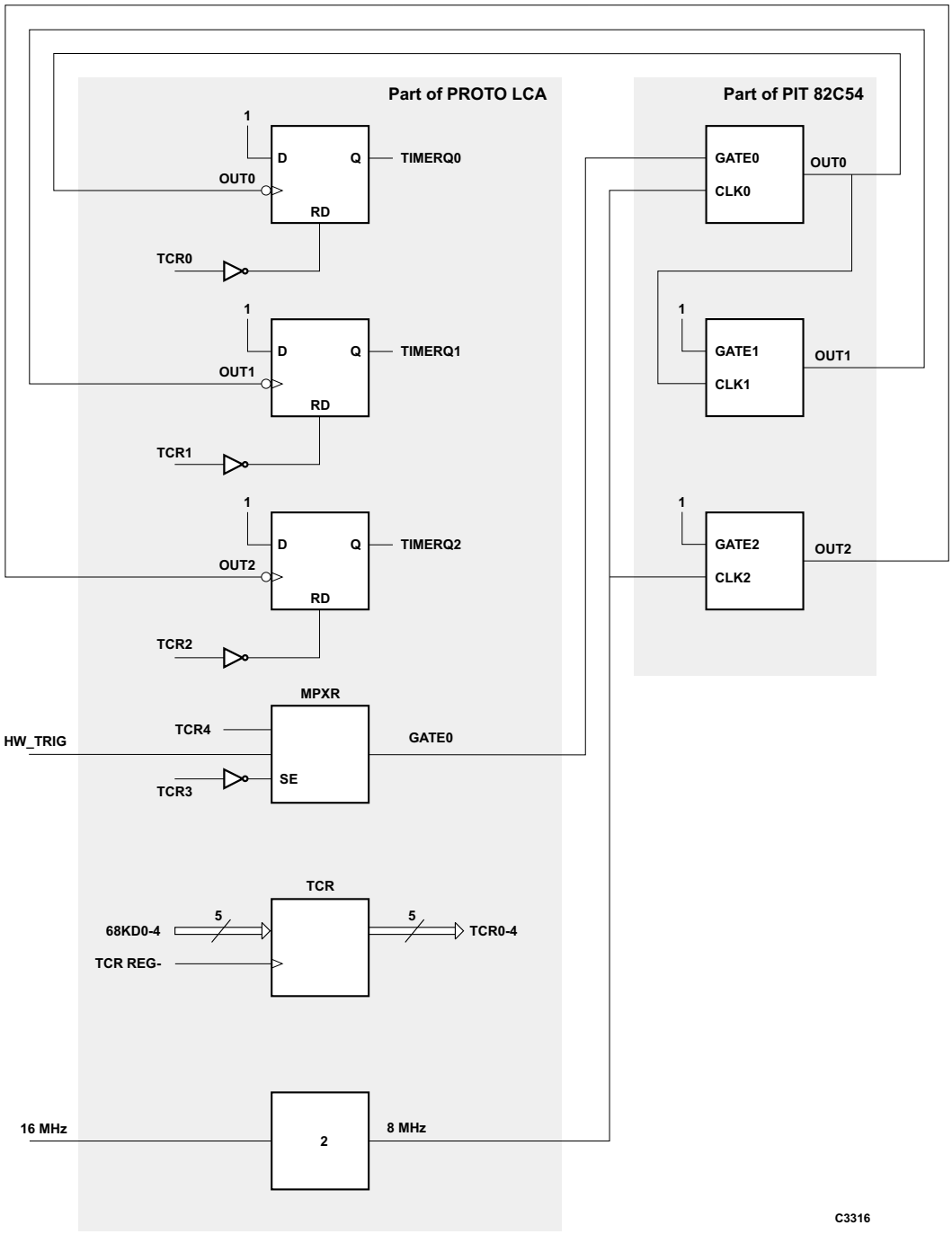



*Fig. 1-8 Block diagram of PIT to PROTO LCA interconnections*

**PROTOCLK bit map**

This register is write only.

| 68KBit | Name | Function |
|---|---|---|
| 0 | PROTORES(L) | Clearing this bit pulls the RESET inputs of all LCAs in the PROTO LCA configuration chain low. Setting this bit allows the LCA RESET pins to be pulled high by means of a pull-up resistor. |
| 1 | PROTODNP | Clearing this bit pulls the DNP inputs of all LCAs in the PROTO LCA configuration chain low. Setting this bit allows the LCA DNP pins to be pulled high by means of a pull-up resistor. |

## 68000 interrupt sources

The interrupt sources are shown in the table below. The vector numbers and the provisional priority levels are shown.

| Source | Enabled by | Level | Vector no (Hex) |
|---|---|---|---|
| RDP_TXRDY | RDP_TXEN | 1 | 41 |
| QGP_TXRDY | QGP_TXEN | 1 | 42 |
| IGP_TXRDY | IGP_TXEN | 1 | 43 |
| RTP_TXRDY | RTP_TXEN | 2 | 44 |
| MAP_TXRDY | MAP_TXEN | 2 | 45 |
| QGP_RXRDY | QGP_RXEN | 2 | 46 |
| IGP_RXRDY | IGP_RXEN | 2 | 47 |
| TTP_RXRDY | TTP_RXEN | 5 | 48 |
| TIMERQ1 | TIMER1EN | 6 | 49 |
| TIMERQ0 | TIMER0EN | 6 | 4A |
| A6_TXRDY | A6_TXEN | 2 | 4B |
| SPA_RXRDY | SPA_RXEN | 3 | 4C |
| SPA_TXRDY | SPA_TXEN | 2 | 4D |
| MAP_RXRDY | MAP_RXEN | 3 | 4E |
| PPH_SYNC- | PPH_SYNCEN | unused | 4F |
| TIMERQ2 | TIMER2EN | 6 | 50 |
| A6_RXRDY(L) | A6_RXEN | 3 | 51 |
| RDP_RXRDY | RDP_RXEN | 2 | 52 |
| TTP_TXRDY | TTP_TXEN | 4 | 53 |
| RTP_RXRDY | RTP_RXEN | 5 | 54 |

## ABEL4 listing of PPH decoder

```
0001 |MODULE  PPHDEC4
0002 |title 'DSC board 68000 decoder and dtack generation
0003 |J.Welch
0004 |
0005 |Date     :- 10-Nov-94
0006 |Issue    :- 9.
0007 |'
0008 |" For A4 PM2 and PM3.
0009 to 0025 |"Comments ...
0026 |
0027 |"DSC decoder - Memory Map
0028 |"=======================
0029 |"
0030 |"     Address Range    Decode      Comments
0031 |"     -------------    ------      --------
0032 |"     0000000-03ffffh  FLASH       Read only, normal use
0033 |"     000000h-03ffffh  extrom_l    External roms, extrom_en_l low
0034 |"
0035 |
0036 |"     600000h-63ffffh  RAM         RAM, ram_exp_l input high.
0037 |"     600000h-6fffffh  RAM         RAM, ram_exp_l input low.
0038 |
0039 |
0040 |"     808000h-83ffffh  FLASH write, extrom_en_l high (also readable).
0041 |"     800000h-83ffffh  FLASH write, extrom_en_l low.
0042 |
0043 |
0044 |"     e00001h-e0000dh  Bridge write decodes. Produce general bridge cs
0045 |"     which are decoded externally as below :-
0046 |"     e00001h          rdpbri         rdpbri
0047 |"     e00003h          qgpbri         qgpbri
0048 |"     e00005h          igpbri         igpbri
0049 |"     e00007h          mapbri         mapbri
0050 |"     e00009h          rtpbri         rtpbri
0051 |"     e0000Bh          ttpbri         ttpbri
0052 |"     e0000Dh          bridgeA6        Bridge to/from A6
0053 |
0054 |"     e0000fh           protoclk        drives reset and dnp flip-flops
0055 |
0056 |"     e00011h          pitctr0         (2 wait states, write address)
0057 |"     e00013h          pitctr1         (2 wait states, write address)
0058 |"     e00015h          pitctr2         (2 wait states, write address)
0059 |"     e00017h          pitconreg       (2 wait states, write address)
0060 |
0061 |"     e0001dh          protocs0        Via pin protolcawr - allows
0062 |" configuration of protocol LCA (2 wait states)
0063 |
0064 |"     e00021h-e00029h  PROTOLCAWR  Write decode that drives the PROTOCOL
0065 |" LCA where PROTOLCARD and A1:3 are further decoded in the PROTOCOL LCA
0066 |" as follows :-
0067 |
0068 |"     e00021h          RESCONT     Used to independently reset DSPs
0069 |"     e00023h          TXINTEN     Used to independently enable/disable
0070 |"                                   bridge tx interrupts
0071 |"     e00025h          RXINTEN     Used to independently enable/disable
0072 |"                                   bridge rx interrupts
0073 |"     e00027h          MISCINTEN   Used to independently enable/disable
0074 |"                                   miscellaneous interrupts
0075 |"     e00029h          TCRREG      Controls 82C54 GATE0 drive, can reset
0076 |"                                   timer interrupts
0077 |
0078 |
0079 |
0080 |"     e00031h-e0004Fh  STECS       Used to write to STE LCA ( 2 wait states)
0081 |
0082 |
0083 |"     f00001h-f0000dh  Bridge read decodes. Produce general bridge cs
0084 |"     which are decoded externally as below :-
0085 |"     f00001h          rdpbri         rdpbri
0086 |"     f00003h          qgpbri         qgpbri
0087 |"     f00005h          igpbri         igpbri
0088 |"     f00007h          mapbri         mapbri
0089 |"     f00009h          rtpbri         rtpbri
0090 |"     f0000Bh          ttpbri         ttpbri
0091 |"     f0000Dh          bridgeA6        Bridge to/from A6
0092 |
0093 |"     f0000fh          status1         Allows reading of LCA config
```

```
0094 |"                                    lines; rdy, init, dnp and ldc
0095 |"                                    pins.
0096 |
0097 |"     f00011h          pitctr0        (2 wait states, read address)
0098 |"     f00013h          pitctr1        (2 wait states, read address)
0099 |"     f00015h          pitctr2        (2 wait states, read address)
0100 |"     f00017h          pitstatreg     (2 wait states, read address)
0101 |
0102 |
0103 |"     f00021h-f00025h  PROTOLCARD  Read decode that drives the PROTOCOL LCA where
0104 |"                                  PROTOLCARD and A1:3 are further decoded
0105 |"                                  in the PROTOCOL LCA as follows :-
0106 |"     f00021h          TXRDYREG    Bridge TX ready register
0107 |"     f00023h          RXRDYREG    Bridge RX ready register
0108 |"     f00025h          status2     Status buffer, TIMEINT and PPH_SYNC.
0109 |
0110 |"     f00031h-f0004fh  STECS       Used to read STE LCA ( 2 wait states)
0111 |
0112 |
0113 |
0114 |
0115 |   PPHDEC4 device 'e1800';
0116 |
0117 |"inputs
0118 |
0119 | a23,a22,a21,a20,a19,a18              pin  14,15,16,17,19,20   ;
0120 | a17,a16,a15                          pin  21,22,56            ;
0121 | a6,a5,a4,a3,a2,a1                    pin  55,54,53,51,50,49   ;
0122 |
0123 | dec_2aaa_l                           pin  13   ;
0124 |
0125 |
0126 |
0127 | ram_exp_l                            pin  12   ;
0128 | " if high 256k, if low 1M.
0129 |
0130 | extrom_en_l                          pin  11   ; " if low, external
0131 | " ROM is read from in place of on-board FLASH. Provides a means of
0132 | "programming new boards fitted with blank FLASH EPROMS.
0133 |
0134 | as_l,uds_l,lds_l,rnw                 pin  57,58,59,48;
0135 |
0136 | fc2,fc1,fc0                          pin  47,46,45;
0137 |
0138 | clk10m                               pin  60;
0139 |
0140 | autovec_l                            pin  34;
0141 | " Driven by external resistor. If low interrupt acknowledge via VPA,
0142 |  " otherwise by intvec_l thro' to protolca.
0143 |
0144 |
0145 | dscres_l                             pin  36;
0146 |
0147 | d1                                   pin 39 ;
0148 |
0149 |
0150 |
0151 |
0152 | d0                                   pin  40;
0153 |
0154 |
0155 |
0156 |"decode outputs
0157 |
0158 | romlcs_l             pin  2 ;
0159 | romucs_l             pin  3 ;
0160 | romoe_l              pin  4 ;
0161 | extromcs_l           pin  5 ;
0162 | raml_l               pin  6 ;
0163 | ramu_l               pin  7 ;
0164 | bridge_l             pin  68 ;
0165 | a8en_l               pin  67;
0166 | " active when A8 bridges or ste is accessed
0167 |
0168 | protolcard_l         pin  65 ;
0169 | protolcawr_l         pin  64 ;
0170 | stecs_l              pin  63 ;
0171 | pitcs_l              pin  62 ;
0172 | pitrd_l              pin  61 ;
0173 | pitwr_l              pin  66 ;
0174 | status1_l            pin  8 ;
```

```
0175 |
0176 | protoclk_l           pin 10 ;
0177 |
0178 |"other outputs
0179 | protodnp               pin  41;
0180 |   protoresq            pin  43         istype 'reg' ;
0181 |   " flip-flop controlling protocol LCA reset
0182 |
0183 |   protores_l           pin  37         istype 'com' ;
0184 |   " open drain buffer for above flip-flop
0185 |
0186 |   vpa_l                pin  27;
0187 |   dtacka_l             pin  23 ;
0188 |   dtackb_l             pin  24 ;
0189 |   dtackc_l             pin  25 ;
0190 |   dtackd_l             pin  26 ;
0191 |   intvec_l             pin  30;
0192 |   pdnpoe               pin  42         istype 'reg' ;
0193 |   res68k_l             pin  44         ;
0194 |   halt68k_l            pin  38 ;
0195 |
0196 |   wa                 pin  28         istype 'reg' ;
0197 |   " part of wait state logic
0198 |
0199 |   wb                 pin  29         istype 'reg' ;
0200 |   " part of wait state logic
0201 |
0202 |   berr_l               pin  32         istype 'reg';
0203 |   berr_q1              pin  33         istype 'reg';
0204 |
0205 |
0206 |declarations
0207 |
0208 | h,l,x,c,z,d    = 1,0,.X.,.C.,.Z.,.D.;
0209 | true = 1;
0210 |
0211 | address = [a23,a22,a21,a20,  a19,a18,a17,a16, a15,x,x,x, x,x,x,x,
0212 | x,a6,a5,a4,  a3,a2,a1,x];
0213 |
0214 |
0215 | romoe1_add = ((address >= ^h000000) & (address <= ^h03ffff)) & extrom_en_l ;
0216 | " FLASH o/p enable signals, normal use, 256k size
0217 |
0218 |
0219 | romoe2_add = ((address >= ^h800000) & (address <= ^h83ffff))
0220 | & !extrom_en_l ;
0221 | " FLASH o/p enable signals, 256k size, used to verify FLASH against
0222 | "external EPROM
0223 |
0224 |
0225 |
0226 |
0227 | romcs1_ro = ((address >= ^h000000) & (address <= ^h03ffff))
0228 | & extrom_en_l & rnw ;
0229 | " forms part of FLASH CS, normal use, allows reads of 256k FLASH
0230 |
0231 | romcs1_rw  = ((address >= ^h808000) & (address <= ^h83ffff)) ;
0232 | " forms part of FLASH CS, normal use, allows writes to 256k FLASH
0233 | "apart from boot sector area
0234 |
0235 | rom_2aaa_w = ((address == ^h805554) & (address == ^h805555)) &
0236 |  extrom_en_l & !rnw & !dec_2aaa_l ;
0237 |
0238 |
0239 | romcs_rw = ((address >= ^h800000) & (address <= ^h83ffff)) & !extrom_en_l ;
0240 | " forms part of FLASH CS, external ROM mode, allows writes and
0241 | " verifies of whole flash area (including boot sector),assumes 256k total
0242 | " size
0243 |
0244 |
0245 |
0246 |
0247 | extrom_add = ((address >= ^h000000) & (address <= ^h03ffff)) &
0248 | !extrom_en_l ;
0249 | " forms ext ROM CS, 256k size
0250 |
0251 |
0252 | ram1_add     = ((address >= ^h600000) & (address <= ^h63ffff))
0253 | & ram_exp_l ;      " 256k range
0254 |
0255 | ram2_add     = ((address >= ^h600000) & (address <= ^h6fffff))
```

```
0256 | & !ram_exp_l ;      " 1M range
0257 |
0258 |
0259 | bridge_w       = (address >= ^he00000) & (address <= ^he0000d) ;
0260 |
0261 | bridge_r       = (address >= ^hf00000) & (address <= ^hf0000d) ;
0262 |
0263 | protocs0     = (address == ^he0001d) ; " LCA configuration address
0264 |
0265 | protolcadec_wr =( (address >= ^he00020) & (address <= ^he00029) ) ;
0266 | " write decodes done inside PROTOCOL LCA
0267 |
0268 | protolcawr   = protolcadec_wr # protocs0 ;
0269 |
0270 | protolcard   = (address >= ^hf00020) & (address <= ^hf00025);
0271 |
0272 | status1  = (address == ^hf0000f);
0273 |
0274 | protoclk_add = (address == ^he0000f);
0275 |
0276 | ste_w        = ((address >= ^he00030) & (address <= ^he0004f)) ;
0277 | ste_r        = ((address >= ^hf00030) & (address <= ^hf0004f)) ;
0278 |
0279 | a8_w         = ((address >= ^he00000) & (address <= ^he00007))
0280 | # ste_w ;
0281 | a8_r         = ((address >= ^hf00000) & (address <= ^hf00007))
0282 | # ste_r ;
0283 |
0284 | pit_w        = (address >= ^he00010) & (address <= ^he00017) ;
0285 | pit_r        = (address >= ^hf00010) & (address <= ^hf00017) ;
0286 |
0287 |
0288 |
0289 |
0290 |
0291 | iack = fc0 & fc1 & fc2 ;        " Interrupt Acknowledge cycle
0292 |dtack_exists = !dtacka_l.PIN ;
0293 |
0294 | dtack_cycle = !as_l & !iack ;
0295 |
0296 | wait = (wa.fb # wb.fb) ;
0297 | strobes_l = uds_l & lds_l ;
0298 |
0299 |" bus error state machine assignment
0300 |berr_state = [ berr_l, berr_q1 ] ;
0301 |A          = [   1   ,    1    ] ;
0302 |B          = [   0   ,    1    ] ; " Bus error condition.
0303 |C          = [   1   ,    0    ] ;
0304 |
0305 |" unused state
0306 |D          = [   0   ,    0    ] ;
0307 |
0308 |
0309 |
0310 |
0311 |equations
0312 |
0313 |
0314 | !romoe_l = (romoe1_add # romoe2_add ) & !as_l
0315 | & rnw ;
0316 |
0317 | !romlcs_l = (romcs1_ro # romcs1_rw # romcs_rw # rom_2aaa_w ) & !as_l &
0318 |  !lds_l ;
0319 |
0320 |
0321 | !romucs_l = (romcs1_ro # romcs1_rw # romcs_rw # rom_2aaa_w ) & !as_l &
0322 |  !uds_l ;
0323 |
0324 | !extromcs_l =  extrom_add & !as_l & rnw ;
0325 |
0326 | !ramu_l = (ram1_add # ram2_add) & !as_l & !uds_l ;
0327 | !raml_l = (ram1_add # ram2_add) & !as_l & !lds_l ;
0328 |
0329 | !bridge_l      = ((bridge_w & !rnw) # (bridge_r & rnw)) & !as_l & !lds_l ;
0330 |
0331 | !a8en_l      = ((a8_w & !rnw) # (a8_r & rnw)) & !as_l & !lds_l ;
0332 | !protolcard_l   = protolcard & !as_l & !lds_l & rnw ;
0333 |
0334 | !protolcawr_l   = protolcawr & !as_l & !rnw & !lds_l ;
0335 |
0336 | !status1_l     = status1 & !as_l & rnw & !lds_l ;
```

```
0337 |
0338 | !stecs_l    = ( (ste_w & !rnw) # (ste_r & rnw) ) & !as_l & !lds_l ;
0339 |
0340 | !pitcs_l     =( (pit_w & !rnw) # (pit_r & rnw) ) & !as_l & !lds_l ;
0341 | !pitrd_l     = !pitcs_l.PIN & rnw ;
0342 | !pitwr_l     = !pitcs_l.PIN & !rnw ;
0343 |
0344 | !protoclk_l  =  protoclk_add & !lds_l & !as_l & !rnw  ;
0345 |
0346 | protoresq.ar = !dscres_l ;
0347 | protoresq  := !d0 ;
0348 | protoresq.clk = protoclk_l.pin ;
0349 | protores_l   = l ;
0350 | protores_l.oe  = protoresq.fb ;
0351 |
0352 | pdnpoe       := !d1 ;
0353 | pdnpoe.clk   = protoclk_l.pin ;
0354 | pdnpoe.ar = !dscres_l ;
0355 | protodnp     = l ;
0356 | protodnp.oe  = pdnpoe.fb ;
0357 |
0358 |
0359 |
0360 | wa         := as_l ;
0361 | wa.clk       = clk10m ;
0362 | wb         := wa.fb ;
0363 | wb.clk       = !clk10m ;
0364 |
0365 |
0366 |
0367 |
0368 |
0369 | !dtacka_l = ((romcs1_ro # romcs_rw # extrom_add) & rnw & (!lds_l # !uds_l))
0370 |  # (ram1_add # ram2_add) & rnw & !uds_l
0371 |  # (ste_r & !wait) & !lds_l & rnw ;
0372 | dtacka_l.oe = !dtacka_l.d ;
0373 | " dtacka handles Flash and external rom reads, RAM reads and STE reads.
0374 |
0375 | !dtackb_l = ( (bridge_r # protolcard # (pit_r & !wait) # status1) &
0376 |  !lds_l & rnw )
0377 |  # (ram1_add # ram2_add) & !lds_l & rnw
0378 |  # (!intvec_l & !wait & !lds_l & rnw) ;
0379 | dtackb_l.oe = !dtackb_l.d ;
0380 | " dtackb handles lower byte peripheral reads ( except STE ) and upper and
0381 | " lower byte ram reads and interrupt vectoring dtack.
0382 |
0383 | !dtackc_l = (rom_2aaa_w # romcs1_rw # romcs_rw # ram1_add #
0384 | ram2_add) & !as_l & !rnw ;
0385 | dtackc_l.oe = !dtackc_l.d ;
0386 | " dtackc handles upper and lower writes to ram and rom.
0387 |
0388 | !dtackd_l = (bridge_w # protolcadec_wr # ((protocs0 # pit_w) & !wait)
0389 |  # (ste_w & !wait) # protoclk_add) & !as_l & !rnw ;
0390 | dtackd_l.oe = !dtackd_l.d ;
0391 | " dtackd handles lower byte peripheral writes.
0392 |
0393 |
0394 |   !vpa_l        = fc0 & fc1 & fc2 & !as_l & !autovec_l ;
0395 |   !intvec_l     = fc0 & fc1 & fc2 & !as_l & autovec_l ;
0396 |
0397 |   res68k_l     = l ;
0398 |   res68k_l.oe  = !dscres_l ;
0399 |
0400 |   halt68k_l    = l ;
0401 |   halt68k_l.oe = !dscres_l ;
0402 |
0403 |
0404 |" berr state machine equations etc.
0405 |berr_l.c  = !clk10m ;
0406 |berr_q1.c  = !clk10m ;
0407 |
0408 |state_diagram berr_state
0409 | state A: if ( !wait & dtack_exists & dtack_cycle ) then C ; "valid access
0410 |          if ( !wait & !dtack_exists & dtack_cycle ) then B ;"invalid access
0411 |
0412 |          if !( ( !wait & dtack_exists & dtack_cycle ) #
0413 |             ( !wait & !dtack_exists & dtack_cycle ) ) then A ;
0414 |
0415 | state B:
0416 |          if ( !dtack_cycle ) then A ;
0417 |          if ( dtack_cycle  ) then B ;
```

```
0418 |
0419 | state C: if ( wait ) then A ;
0420 |          if ( !strobes_l & !rnw & !dtack_exists ) then B ;
0421 |          if !( ( wait ) # ( !strobes_l & !rnw & !dtack_exists ) ) then C ;
0422 |
0423 | state D: goto A ;
0424 |" attempt to reduce no. product terms
0425 |
0426 |
```

0427 to 0797 |test_vectors (details not included)

```
0800 |
0801 |end
```

# A5, A5/2 Display board

## Introduction

A simplified block diagram of the board is shown in Fig. 1-9.

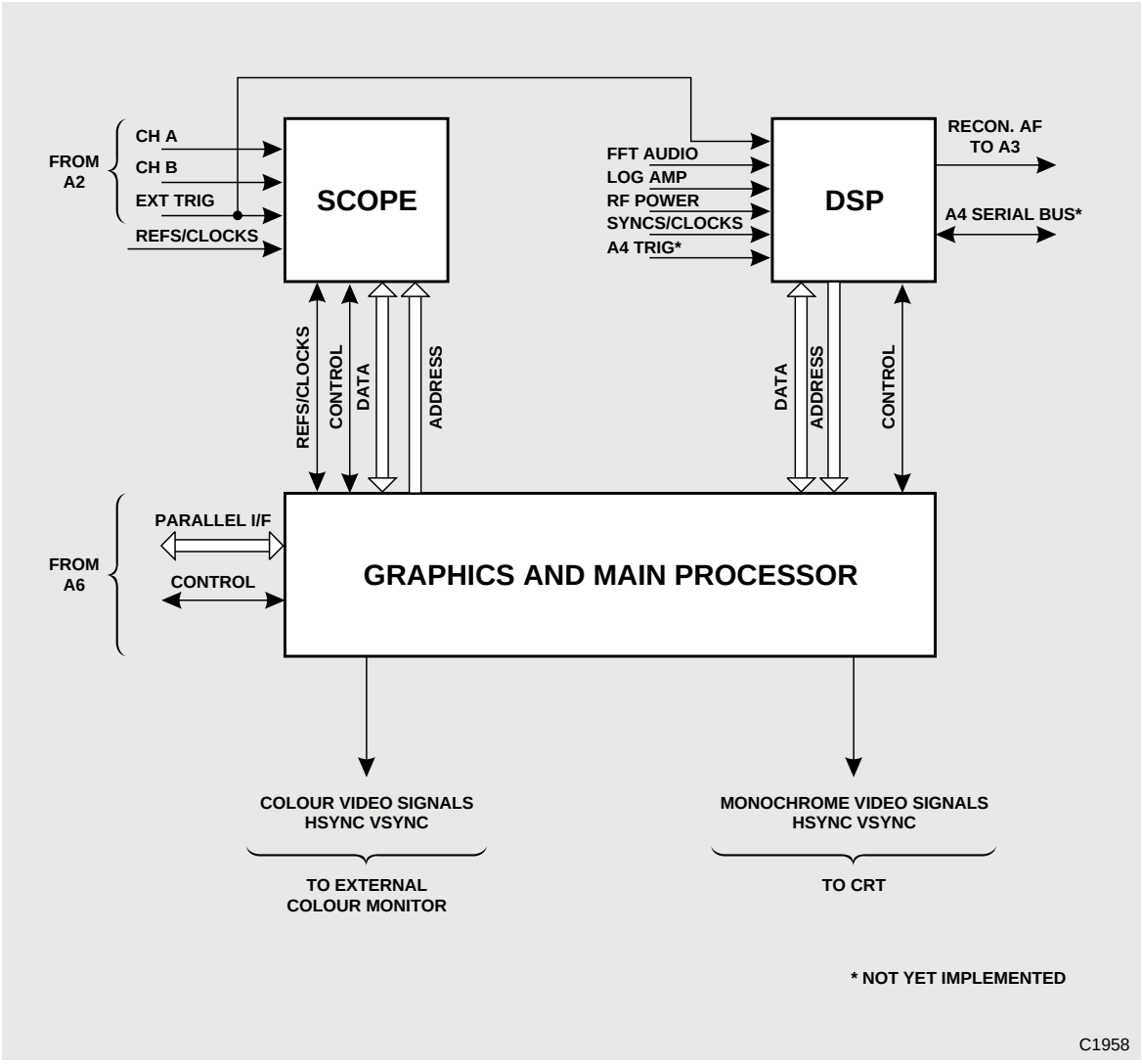



*Fig. 1-9 A5, A5/2 board - block diagram*

The block diagram shows three main areas:-

- Graphics and main processor.
- DSP
- Scope

### Graphics and main processor section

This section communicates with the A6 CPU board via an 8-bit bidirectional parallel interface. Its purpose is to acquire data from either the scope section or the DSP section. The acquired data is processed by the resident software and the resulting display data is output to the monochrome CRT and to an analog VGA connector for an external colour monitor.

The circuitry for this section is shown on sheets 1 and 2 of the circuit diagram.

### DSP section

The function of the DSP section is to process one of three inputs: FFT AUDIO, LOGAMP or PWROUT. A 12-bit ADC digitizes the input at a sample rate of 102.4 kHz. Capture can be triggered by EXTTRIG or (as yet unimplemented) A4TRIG, and synchronized to various SYNC signals (see page 1-63). For each of the inputs, the DSP is configured in a different way.

When the FFT AUDIO signal is being processed, the DSP is configured as an FFT analyzer.

LOGAMP is the output of the logarithmic amplifier in the receiver section of the RF tray. When this signal is being processed, the RFSYNC line is used to synchronize RF tray signal steps with data samples that have to be processed prior to scaling, calibration and positioning on the display. Each time the RFSYNC signal goes low, the DSP section takes a sample.

Signal PWROUT represents the power present on the broad-band power sensor on AB2.

The selected signal, after processing, is transmitted to the graphics and main processor section.

Digital to analog circuits are included in the DSP section. The outputs of these include a reconstructed AF signal to the A3 board.

An A4 serial bus is provided for future expansion. This will be the means of communication with the A4 board, when it is fitted. The A4 board will process digital modulation.

The DSP section is RAM based, this memory being reloaded from an EPROM in the graphics and main processor section whenever the mode of operation is changed.

The circuitry for this section is shown on sheets 4 and 5 of the circuit diagram.

### Scope section

There are two main inputs to this section: CHA and CHB. Triggering can be internal or by means of EXTTRIG. After scaling, digitized trace data appears on the data bus for reading by the graphics and main processor. The scope section is configured by the graphics and main processor section for trigger level, timebase, channel, etc., by means of the data bus and the various decode and address lines linking the two sections.

The circuitry for this section is shown on sheet 3 of the circuit diagram.

## Circuit description

### Graphics (sheet 1)

IC7 is the graphics processor and is configured as a 16-bit asynchronous slave interface, driven from the main processor circuits on sheet 2. Graphics data bus GD0-15 is the communication highway between the graphics processor and the microprocessor IC13 on sheet 2. The bus also provides the data path to and from the video DRAMs IC8 to IC11. Overall control of communications between processors IC7 and IC13 is exerted by Field Programmable Gate Arrays (FPGAs) IC15 and IC16 on sheet 2.

There are two clock inputs to IC7, one of 25 MHz to pin VCLK and one of 20 MHz to pin CLK. These are for the display and co-processor sections of the IC respectively.

Control lines BHE(L), M/IO, A0, GWR(L) and GRD(L) from the FPGA on sheet 2 control the modes of operation of IC7. The first three signals are associated with the setting of the asynchronous slave mode, the other two being write/read controls. Signal SEN (slave enable) is asserted by IC7 when the graphics processor is executing a transfer to or from the main processor, ensuring IC13 waits for the cycle to complete before continuing. It also provides a ready indication to the main processor..

IC3 and IC4 are palette RAMs associated with the external colour monitor and monochrome CRT respectively. They are driven with graphics data from IC7 by signals VD0-5, HSYN/WS0 and HSYN/WS1 and programmed by data downloaded from the main processor via data buses 68KD0-7 and 68KD8-15. Each RAM contains three DACs and provides three current outputs, IOB, IOR and IOG, representing the three primary colours. The IOR output from IC4 is amplified by IC5 to produce the 1 V peak-to-peak VIDEO signal required by the monochrome CRT. IC1 generates the horizontal and vertical sync pulses for the colour monitor and CRT, derived from the signals on IC7 HSYNC, VSYNC and BLANK pins. BLANK is also inverted and applied to both palette RAMs so that their outputs are all at the blanking level during inactive video time periods.

## Main processor (sheet 2)

IC13 is a 68000 microprocessor which, together with the other components on this sheet, serves as the main processor in the graphics and main processor section described previously. It uses a 10 MHz clock derived from the 80 MHz board input by IC21, which also supplies 20 MHz and 40 MHz clocks to other parts of the board. IC12 buffers the lower order bits of the data bus. RAM is provided by IC14/19 and ROM by IC17/20.

FPGA IC15 handles communications between the 68000 main processor IC13 and the DSP section on sheet 4, the A6 board CPU, and the graphics processor IC7 on sheet 1. It also generates the necessary interrupts for achieving those tasks. Communications between IC13 and IC7 require that IC13 inserts wait states in its clock cycles until IC7 is ready. This is achieved by signals UDS(L) and LDS(L) from IC13, the 10 MHz clock, and SEN from IC7 which cause FPGA IC15 to produce the data transfer acknowledge signal DTACK(L) for the graphics processor.

FPGA IC16 performs graphics reset and initialization, interrupt encoding, address and function decoding for IC13, and clock generation. Signals A0, M/IO and BHE(L) are controlled by a state machine within the chip, and set up the graphics processor in the 16-bit asynchronous mode. BMS(L) from the DSP section enables ROMs IC17 and IC20 during the DSP boot sequence. Signals GINT, FFTINT(L) and A6INT(L) produce an interrupt level on the IPL0-2(L) lines. IC13 address lines A1-3 and A20-23 are decoded, producing a memory map for the processor, enabled by UDS(L), LDS(L) and AS(L). Function codes FC0-2 produce just DTACK(L), or VPA(L) and DTACK(L), in the latter case causing IC13 to generate an interrupt vector number according to the requested interrupt level.

## Scope section (sheet 3)

This section is based on FPGA IC26 whose functionality is downloaded from ROM IC27 which also provides the data for the other FPGAs. IC26 is controlled from IC13 via data bus 68KD0-7 and address bus A1-3, and by means of signals SCOPE(L) and LDS(L). It provides selection facilities for graticule size, trigger functions and channel selection. A 40 MHz (normal use) or 39 MHz (for future use) clock is selected by the 39/40L signal from the A6 board CPU,

Two channels are supported, the CHA and CHB signals originating from the SC A and SC B signals from the A3 board and being fed via the A2 board. The FPGA switches IC22 to select either CHA or CHB for analog-to-digital conversion by IC24. IC25 latches the 8-bit wide digital signal to the AD0-7 port of the FPGA.

To support the FPGAs processing, IC28 and IC30 provide first-in/first-out (FIFO) memory used by the FPGA to store minimum and maximum values over each ordinate interval obtained by successive signal sampling. The minimum and maximum values are interfaced to the 68000 processor data bus by IC29 (low-order) and IC31 (high-order). To control the signal sampling and processing intervals, the FPGA uses the programmable timer IC33.

As the graphics processor IC7 requires a 25 MHz clock, a phase-locked-loop PLL is provided. This PLL comprises 50 MHz VCO TR1, loop filter IC32, and dividers and phase detector programmed within the FPGA. The FPGA then outputs the HIGHER and LOWER signals to control the VCO frequency via IC32.

### DSP section (sheets 4 and 5)

The circuitry on sheet 4 centres on processor IC42 which performs the required digital signal processing. Sheet 5 shows the DAC circuits.

IC42 processes data from ADC IC39 which communicates results with processor IC13 via FPGA IC15 on sheet 2. This processing includes notch filtering, Fast Fourier Transform (FFT) and spectrum analysis, etc. IC39 can be supplied from various signal sources, from this sheet, selected by IC37, or from input selector IC34 (FFT AUDIO or LOG AMP).

IC35(a) and IC35(b) function as an anti-alias filter prior to 40 kHz low-pass filtering by switched capacitor filter IC36. IC38 filters any 4 MHz clock ripple introduced by IC36.

ICs 44-46 enable a boot sequence to occur at powerup/reset, which loads IC42 memory from ROM IC17 on sheet 2. Extra RAM for IC42 is provided by ICs 40-41.

FPGA IC43 contains the random logic needed for interfacing, clock division, etc. All ICs under its control are addressed via the FFTA8-14 lines. Among the clocks that it generates are one at 2.5 MHz that drives a successive approximation register in IC39, and one at 102.4 kHz which sets the conversion rate of IC39.

IC47 on sheet 5 is a 12-bit DAC used for offset correction of the RF power signal. The offset correction is written to it via its digital interface FFTD4-15. IC49(a) and (B) form a 1 Hz low-pass filter for the RFPOWER input. The offset correction is subtracted from RFPOWER at IC49(a).

IC53 on sheet 5 is a 12-bit DAC fed via latches IC51-52. Its output is fed to the A3 board via reconstruction filter IC54(b) and IC57(a)/(b).

IC50 provides a +5 V reference for the offset and audio DACs, and also to set the mean level of the PWROUT signal.

### A5/2 reset and boot sequence

A buffered reset signal RESET(L) is generated by IC2(f) and IC18(a) on sheet 2 from the SYSRES_L signal from A6 main processor board. It initiates the loading of data to the FPGAs, loading of boot code to DSP IC42 and resetting of the 68000 processor IC13. The signal from A6 may be driven low at any time by its 68000 processor to initiate A5/2 into a known state.

The sequence of events following a reset pulse is described below.

RESET(L) goes low

All four FPGAs held in reset state with all user I/O pins tri-state.

68000, IC13 held in reset state by DISPRES(L) from FPGA IC26.

Graphics processor, IC7 held in reset state by R12 pulling FPGA IC16 output GRESET high.

DSP, IC42 held in reset state by RES21201(L) from FPGA IC43.

Download serial ROM, IC27 address counters reset to zero by RESET(L).

Done/not programmed D/NP signal on TP4 is pulled low by IC18(c).

RESET(L) goes high

All three FPGAs enter configuration mode, continuing to hold D/NP low.

FPGA IC26 generates clock pulses CCLK incrementing the counters in the serial ROM IC27, which outputs configuration data to IC26 as DIN.

Once IC26 is filled, data is passed through it to FPGA IC15 which is then configured followed by IC16 and finally IC43.

When configuration is complete, the D/NP signal is released by the FPGAs but will not go high until all four FPGAs are correctly configured.

On completion of configuration, the LDC (low during configuration) output on FPGA IC43 goes high. As this line drives RES2101(L) the DSP is then allowed to enter its boot process.

During this boot process, the DSP reads program data from PROM IC17 on sheet 2. To do this, address information is passed through buffers IC44, 45 and IC46(a) to the PROM, which remains enabled whilst the DISPRES(L) signal is still low. The BMS(L) signal from DSP IC42 is used to indicate to the decoder in IC16 (sheet 2) that the data output from the PROM is to be enabled via select line ROM(L). Once the boot sequence is complete, the DSP sets BMS(L) high and runs the program loaded from IC17.

Once the DSP is running, it sets the DISPRES(L) signal high, which releases the 68000 processor IC13 from its reset state. IC13 then runs the program contained in PROMs IC17, and IC20 releases the graphics processor IC7 from its reset state by setting GRESET low.

# A6 CPU board

This board contains the main 68000 CPU IC1 (sheet 1), together with associated memory, decoding and port interfacing. As this board uses a standard type of microprocessor architecture, the following description summarizes the operation of the various circuit components.

Functions on A6 CPU board include:-

- Central processing for the Test Set.
- Calibration data storage in EEPROM.
- Short term non-volatile data storage in NOVRAM.
- GPIB interface port.
- Serial (RS-232) interface port.
- Parallel printer port.
- Real-time clock.
- IF counter.
- A6 to A5 display board 8-bit parallel ‘bridge’ interface.
- $I^2C$ serial bus interface for control of RF tray, audio circuits and keyboard interface A7.

## Clock generation (sheet 1)

The 40 MHz clock from A5 is connected to PLC from where it is fed to the amplifier circuit formed by IC57(c) and resistors R70, R71. The CMOS logic level from IC57(c) is fed via R72 to the clock generation circuits. R72 helps to reduce ringing on the clock tracks.

IC67, IC57(d), IC69(a), IC68(a) and IC68(b) form a ÷13 circuit which generates a 3.077 MHz clock that is used by IC26 (sheet 3), which controls PC-compatible serial and parallel ports.

Three ÷2 circuits, IC69(b), IC70(a), and IC70(b), provide three clocks:-

20 MHz for the A7 board
10 MHz for the $I^2C$ bus interface IC30 (sheet 3) and processor IC1
5 MHz for the GPIB interface IC22 (sheet 4)

The remaining clock dividers provide 50 kHz for the IF counter VCO phase detector (sheet 5) and 125 kHz for power supply synchronization via PLG.

## Reset generation (sheet 1)

Signal RESIN(L) on PLR is a manual system reset. IC73 detects when it is activated (low), and also if the +5 V level falls below 4.75 V. In either case, this asserts:-

- RES and HALT to IC1 (both active low).
- $I^2C$RES(L) to $I^2C$ bus interface IC30 (sheet 3).
- SYSRES(L) to A6 board circuits together with A1, A5 and A7 boards.

## Processor (sheet 1)

Processing on the A6 board is provided by the Motorola 68000 IC1, running at 10 MHz. This is a 16-bit microprocessor with an addressing range of 16 Mbytes.

IC2 and IC3 are bidirectional buffers, directional control being exercised by the processor RD/W(L) line, which when low outputs data onto the main data bus lines D0 to D15.

## Interrupt handling (sheet 1)

EPLD IC60 (sheet 1) is formatted as an interrupt encoder which assigns programmed priorities on the various device/port interrupt signals and translates them to the CPU interrupt priorities IPL0, IPL1 and IPL2. The CPU can enable/disable various interrupt handling operations via the data bus and the signals ENACCINT (accessory socket) and ENFPINT (A7 board). The CPU can also read the status of all interrupt lines via buffers IC61 and IC62 (sheet 1) and the data bus. Interrupt line read operation is enabled by the decoded address line INTSTA(L)from IC63. On receipt of an IPLn prioritized interrupt, the CPU can read and mask the interrupts to access the appropriate interrupt routines. The significance of each interrupt line is:-

| | | |
|---|---|---|
| DO | SP INT(L) | Spare interrupt line. |
| D1 | BR INT | Bridge interrupt. |
| D2 | ACC INT(L) | Accessory interface interrupt. |
| D3 | CTR INT(L) | IF counter interrupt. |
| D4 | FP INT | A2 board microcontroller interrupt. |
| D5 | GPIB INT | GPIB port interrupt. |
| D6 | $I^2C$ INT(L) | $I^2C$ bus interrupt |
| D7 | OVTEMP(L) | Over temperature interrupt from PSU. |
| D8 | PAR INT | Parallel port interrupt. |
| D9 | POWDWN(L) | Power down interrupt from PSU via AR1 board. |
| D10 | RF OV | RF overload. |
| D11 | SER INT0 | Serial port interrupt. |
| D12 | SER INT1 | Test connector interrupt. |
| D11 | VRTX INT | Real-time clock interrupt. |

## Address decoding (sheet 1)

Address decoding for the memory and peripheral ICs on A6 is provided by EPLD IC63. Processor address lines A15-23 and control lines RD/W(L), AS(L), UDS(L), LDS(L) are used to enable the appropriate output required.

The DTACK1 and DTACK2 outputs from IC63 provide the data transfer acknowledge signal DTACK(L) when combined by open collector buffers IC64(b) and IC64(c). For some of the decoder outputs, wait states are inserted by logic inside IC63.

## Memory (sheet 2)

All of the memory requirements for A6 are contained in the circuit on sheet 2. These are as listed below:-

- EPROM. Up to three pairs of EPROM ICs may be fitted to IC10 to IC15 sockets for storage of program data. Odd numbered ICs are used for low byte information with data read on D0-7. Even numbers are high byte read on D8-15.
- NOVRAM. Non-volatile RAM is provided for short term data storage by IC8 and IC9. These contain internal Lithium batteries.
- RAM. Temporary data storage is in RAMs IC4 and IC5.
- EEPROM. IC17 and IC18 are used for the long term storage of calibration data. The EEPROMs are protected against inadvertent writes during power up or down by analog switch IC16, which disconnects the write and chip enables from their source when SYSRES(L) is active.
- Flash. Programming voltage switching is accomplished using IC21(a) and TR1-3.

## Bridge circuit (sheet 3)

IC36 and IC31 (sheet 3) comprise a communication bridge. This permits communication between the processor IC1 and other processors/microcontrollers via the low-order bits (D0 to D7) of the data bus.

Currently, communication is provided to the A5 board by latching data in/out via IC31. Control is exercised by the programmed EPLD IC36.

The direction and source/destination of a data transfer can be found by looking at the appropriate IC36 signal name. For example, A6TXA5(L) indicates that A6 is transmitting data to A5. Bridge status is shown by the lines RDYA6*xxx*, where *xxx* is TX5, RX5, which show when A6 can transfer data and in which direction.

## Real-time clock (sheet 3)

IC44 provides both a real-time clock facility and a periodic interrupt every 7.8 milliseconds. As IC44 has a combined address and data bus it is driven by processor IC1 in a 6800 peripheral mode. When AS(L) and VMA(L) from IC1 are low and high respectively, addressing information is passed to IC44 via buffer IC43. When AS(L) has gone high and VMA(L) low, a short time later ENABLE becomes high enabling data transfer through bidirectional buffer IC42.

The IC44 module contains the RTC IC, a timing crystal and a Lithium battery.

## $I^2C$ interface (sheet 3)

IC30 provides a serial communication interface, using the Philips $I^2C$ protocol, between processor IC1, A boards and AE1 board. Bi-directional data and clock lines SDA and SCL are able to transfer data to and from A6 at rates up to 100 kbits per second. For a complete explanation of the $I^2C$ serial bus, please refer to the appropriate Philips documentation.

## Serial/parallel ports (sheet 3)

IC26 provides two asynchronous serial RS232 (VT10/VT21) interfaces to the rear panel serial port and the test connector, as well as a parallel (printer) interface. The two rear panel ports are compatible with current PC technology. The interface IC handles modem control signals (CTS, DSR, RLSD and RI), interrupt enables, baud rate programming and parallel port control signals.

ICs 27-29 provide the interfacing between rear panel serial lines and IC26. Decode lines for the serial ports are SER0(L) and SER1(L), and interrupt lines are SER INT 0 and SER INT 1.

The parallel port in IC26 conforms to the requirements of a Centronix type printer. The decode line for the parallel port is PAR(L) and the interrupt line PAR INT.

## Step attenuator drivers (sheet 4)

The step attenuators used in the signal generator and receiver of the Test Set use coils to switch an attenuation stage in or out. A separate coil is used for in and out, each requiring 0.5 A pulses for a minimum of 20 ms.

IC54 and 55 are 8-bit wide latches with their inputs tied to the 68000 data bus. To change an attenuator setting, a high must be written to the appropriate bit. As ATT(L) becomes true, monostable IC56(a) is triggered at the negative going edge. The Q output on pin 13 becomes high, removing the clear input from the two latches. Data is latched into IC48 and 49 on the positive going edge of ATT(L) and appears on the output pins. After approximately 27 ms the monostable clears, thus clearing the outputs of the latches.

Transistors TR4 to TR17 provide high current grounding of the coils as the latch outputs go high. As the other end of the coils are connected to +5 V, each coil can be driven as required. It is important that no more than one coil is energized at one time, otherwise the +5 V rail would be pulled low due to the excessive load. In addition, a delay of around 20 ms should be allowed before driving the next coil.

## External reference status circuit (sheet 4)

The status of the external reference selection circuits on the AR1 board can read onto the data bus via buffer IC66, enabled by ODD IN(L) from decoder EPLD IC63 (sheet 1).

## Control port (sheet 4)

ODD SIG(L) from decoder IC63 (sheet 1) latches IC65 with information from the data bus, used as follows:

- ENACCINT, ENFPINT and ENSPINT are used to enable accessory socket interrupts, A7 front panel interface board interrupts and a spare interrupt, respectively.
- RX PREAMP(L) signal causes the pre-amplifier to be switched into the signal path on the AE3 board.
- EXT REF causes the AR1 board OCXO frequency to lock on to the incoming signal from the EXT REF socket on the rear panel.
- REF OUT either connects the AR1 board 10 MHz output to the rear panel EXT REF socket, or connects an incoming external reference to the AR1 board.

## GPIB interface (sheet 4)

IC22 is a microcontroller providing a bidirectional IEE488 interface. It works in conjunction with transceiver ICs IC23 and IC24.

## IF counter (sheet 5)

The IF COUNT input from AE6 board in the RF tray is fed via IC47 which is a high speed comparator performing a level shifting function. IC47 output feeds 8-bit counter/latch IC48.

Gating for the counter is achieved by means of a noise shaping synchronizer. This comprises a simple digital synchronizer IC50(a) and (b), a phase sensitive detector with two integrators, and a voltage-controlled oscillator VCO.

IC51 contains the phase detector and VCO. The phase detector has two inputs, a 50 kHz reference and the signal from the digital synchronizer (COMP IN). The output from the phase detector on pin 13 is fed to the integrators formed by the two halves of IC52. C174 is used to reduce any high impedance pick-up on the phase detector output when it is in its high impedance state. R51-52 bias the integrators to the centre of the VCO tuning range. As this range is only 0 to 5 V, D2 is used to limit the voltage swing from IC52(b).

The VCO in IC51 has its frequency limits set by C17 and R48-49. Pin 4 output is fed to the digital synchronizer.

So that the 68000 processor does not have to collect each of the 1000 required counts as they happen, a FIFO memory IC49 is used to temporarily store the data. FIFO operation is controlled from IC63 (sheet 1), CTR GO(L) initiating loading of the FIFO. On completion of data storage CTRINT(L) is asserted to indicate that counting is finished and data may be read using CTR RD(L).

## Accessory interface (sheet 5)

Expander IC IC58 is $I^2C$ controlled, and provides four logic control lines and three status lines to the rear panel accessory plug. R60 resistor pack provides extra pull-up capability for these output lines, as they are only capable of supplying 100 µA. Any change in state of the lines can be detected by enabling the accessory interrupt, as described previously in the Interrupt handling section.

The $I^2C$ signal can be made available on PLE by enabling switch IC59. This is accomplished by setting bit 7 of IC58 high.

### A7 interface (sheet 5)

SKN is the interface to the A7 board. Outgoing services include a buffered 20 MHz clock, power supplies for A7, AA1 and AB2, $I^2C$ drive to A7 and AA1, and the system reset line. Incoming signals are an interrupt line from the A7 board processor and an RF overload line from AA1 which is routed via A7.

## A6/2 CPU board

### Overview

A6/2 is the second version of the A6 board. It provides the central processing core for the Test Set, handling MMI, data storage, I/O tasks and the IF counter.

The following facilities are provided by A6/2.

- Max. 4 Mbytes of program memory, expandable to 8 Mbytes using a daughter board.
- 128K of EEPROM non-volatile data storage.
- Max. 512K battery-backed non-volatile data storage.
- Max. 1 Mbyte volatile random access memory.
- Bridge communications to A4 digital systems and A5 display processing.
- $I^2C$ serial communications to the RF tray, front panel interface,audio generation, audio processing and accessory port.
- Personal computer style parallel port.
- Personal computer style serial (RS232) port.
- General purpose interface bus (GPIB) port.
- Digital I/O for rear panel accessory port.
- 10.7 MHz IF counter.
- Step attenuator drivers.
- Status LEDs.

Improvements over the earlier A6 board include the provision of a great deal more program and data storage memory. The program resides in Flash memory, allowing for easy field upgrade of software. A boot sector area of the program memory is loaded via a dedicated on board connector when the board is first powered up. This controls the download of the main program into the rest of the Flash memory via the parallel port.

Both the battery-backed non-volatile RAM (NOVRAM) and the Electrically Erasable PROM (EEPROM) have been increased in size to cater for the future demands of analog and digital radio testing. The NOVRAM module containing memory and battery is no longer used and a separate off-board battery is used with standard low power RAM chips. This battery also provides standby power to the real-time clock.

Many of the functions that were implemented in discrete logic have been integrated into large pin-out PLDs. These include clock generation, reset generation and the IF counter as well as the circuit areas that were already in PLDs such as address decoding, interrupt handling and bridge communications.

Throughout this description and on the circuit diagrams references are made to signals with the suffix '_L' as in WR_L. This indicates that the signal is active low.

For detailed information on any of the devices used, please refer to the manufacturer's data.

## Clock generation (sheet 1)

The 40 MHz clock from A5 is connected to PLC from where it is fed to the amplifier circuit formed by IC1(d) and resistors R1, R2. The CMOS logic level clock from IC1(d) is fed via R3 to the clock dividers contained in IC2 PLD. R3 helps to reduce ringing on the clock tracks.

IC2 takes the 40 MHz clock signal and divides it down to the frequencies required elsewhere on A6/2. Three ÷2 circuits are used to give 20 MHz, 10 MHz and 5 MHz outputs.

The 3.077 MHz (actually 3.076923076923 MHz) is derived from the 40 MHz clock, using a 4-bit state machine with 13 states. This provides a clock with a mark-to-space ratio of 6:7. The outputs of the state machine are accessible on pins 5 to 8 of IC2.

A 1 MHz clock is generated for use inside the PLD by dividing the 5 MHz by 5, using a 3-bit counter with a maximum count of 4. The 1 MHz ÷5 has its outputs on pins 9 to 11.

The 1 MHz is divided by 2 three times, giving outputs at 500 kHz, 250 kHz and 125 kHz. The 125 kHz is used to provide power supply synchronization via R8 and PLG pin 15.

The 500 kHz is divided by 5 in the same manner as the 5 MHz to give 100 kHz, which is then divided by 2 to supply the 50 kHz reference required by the IF counter.

## Reset (sheet 1)

IC3 provides the power up reset for the processor and the rest of the Test Set. An active low reset pulse is output from pin 6 for a period of 250 to 1000 ms following application of the 5 V supply. Should the supply fall below 4.62 nominal the reset output is re-asserted thus ensuring the processor is held in reset as power disappears.

The Test Set may also be reset by shorting together the two pins of PLR which pulls down the PBRST or push button reset input of IC3.

The output from IC3 is connected to IC2 which outputs the reset pulse on four open drain pins, RES68K, HLT68K, I2CRES and SYSRES. These pins are pulled low during the power up reset state. Pull up of these four lines is by R108 to R111 inclusive. If the processor IC5 outputs a reset on its reset pin, the SYSRES_L and I2CRES_L lines are pulled low for the duration of the processor reset.

SYSRES_L is the reset line to devices other than the processor on A6 and to processors on A1, A5 and A7. An inverted, active high, output SYSRES from pin 27 of IC3 provides the reset pulse to the GPIB control integrated circuit, IC52. The line I2CRES_L is the reset for the $I^2C$ controller IC44. The $I^2C$ controller is capable of driving its own reset line and so must be provided with a separate reset.

## Processor and data buffers (sheet 1)

Processing on A6/2 is provided by IC5, the Motorola 68000 running at 10 MHz. This is a 16-bit microprocessor with an addressing range of 16 Mbytes.

IC6 and IC7 provide bidirectional data bus buffering. Directional control is provided by the processor read/write line WR_L, which when low outputs data onto the main data bus lines, D0 to D15.

## Interrupt handling (sheet 1)

The 68000 processor is capable of responding to seven interrupt levels, each one having a greater priority than the preceding one. All levels are maskable except for the highest.

As there are thirteen interrupting devices, it is necessary to encode them into the required priority level. This is accomplished using part of PLD IC4. All thirteen interrupt lines enter IC4, where they are encoded onto the three processor interrupt lines, IPL0-2.

In addition, the status of all thirteen interrupt lines can be read by the processor at the data outputs when the INTSTA input to IC4 on pin 23 is selected.

The interrupt acknowledge circuitry is also contained within IC4. When the processor acknowledges an interrupt, it sets the function code lines FC0-2 high, sets address lines A1-3 to the interrupt level being responded to, and asserts the address strobe line AS_L. This is detected by IC4, which then asserts the VPA output on pin 66. In the case of the interrupting device being the $I^2C$ controller, IC44, IC4 asserts I2CACK on pin 67 instead of VPA. IC44 then provides an interrupt vector to the processor. In the cases where VPA is asserted, the processor provides its own vector.

## Status LEDs (sheet 1)

Four status LEDs D1 to D4 are used to provide debug information. These are controlled by latches in PLD IC4 which are written to when the ODD_WR_L decode is driven. See the section on Odd signal in/out (page 1-74) for further details.

The following table indicates the sequence seen on the LEDs during power up as the boot diagnostic routines run. The symbol • indicates that the LED is lit.

| D1 | D2 | D3 | D4 | Status |
|---|---|---|---|---|
| • | • | • | • | Power up - boot diagnostics started. |
| • | • | • | | RAM test started. |
| • | • | | • | Flash memory test started. |
| • | • | | | NOVRAM test started. |
| • | | • | • | I/O ports test started |
| • | | • | | GPIB test started. |
| • | | | • | Real-time clock test started. |
| • | | | | $I^2C$ test started. |
| | • | • | • | IF counter test started. |
| | • | • | | EEPROM test started. |
| | | | | Boot diagnostics complete. |

The diagnostics execute very quickly, so the LEDs will ‘count’ down to zero almost quicker than the eye can see, except that the RAM test takes an appreciable amount of time, so the count will appear to pause at the second step. If the LEDs stick at a particular value, then the code is having problems executing a particular diagnostic or has crashed.

Once the boot diagnostics have been completed, the LEDs follow a second sequence to indicate that the main code is running. The LEDs remain at each state for approximately 0.1 second.

The sequence is as follows:

| D1 | D2 | D3 | D4 |
|---|---|---|---|
| | | | ● |
| | | ● | ● |
| | ● | ● | ● |
| ● | ● | ● | ● |
| ● | ● | ● | |
| ● | ● | | |
| ● | | | |
| | | | |

The LEDs then remain unlit.

## Address decoding (sheet 2)

Address decoding for the memory and peripherals on A6/2 is provided by PLDs IC8 and IC9. The BOOTUP input to pin 49 of IC8 from connector SKS pin 48, controls the switching of the mapping of the Flash memory. When this line is driven high by a memory expansion board, the Flash memory is mapped to a position starting 5 Mbytes higher. This allows the expansion board to run boot software. The decode line EXTMEM_L, on SKS pin 47, is used for any accesses to the bottom 5 Mbytes when the memory expansion is present.

Also generated by these ICs is the data transfer acknowledge signal, DTACK_L, required by the 68000 processor. The only instance where DTACK is not generated is for the $I^2C$ controller select line as the controller generates its own. Where necessary, wait states are inserted by delaying the DTACK response. The appropriate delay is set inside the PLDs by using the outputs of the wait state generator on pins W0-2 on IC8. The DTACK outputs of IC8 and 9 are open drain and drive DTACK_L low when active. Should DTACK not be generated within 14 wait states, IC9 outputs BUSERR_L to the processor indicating an incorrect address.

Other control signals from the decoder PLDs are:-

| | |
|---|---|
| IO_WR_L | Used by IC46 serial/parallel controller |
| IO_RD_L | Used by IC52 GPIB controllers |
| RD_L | Used by Flash and EEPROM memory devices |
| RTC_DS_L | Used by real-time clock IC43 and associated circuitry |
| RTC_AS_L | Used by real-time clock IC43 and associated circuitry |
| VPA_L | Used instead of the DTACK line to indicate a 6800 mode data transfer, which in this case is for the real-time clock. |

## Program Flash memory (sheet 2)

### Flash technology

A6/2 processor programming instructions are kept in the Flash memory, IC10 to IC17. This type of memory has major advantages over the traditional EPROM. The main one is that it is erasable electrically rather than by using ultra-violet light, enabling it to be programmed whilst fitted to the board.

The intention is that up to 4 Mbytes of Flash memory may be soldered directly to A6/2 and that a further 4 Mbytes can be fitted using a memory expansion board connected to SKS, SKT and SKU. Initially, only 3 Mbytes will actually be fitted to the board. When the parts are initially fitted they will not be programmed.

To program the Flash memory, a download PCB will be used. This plugs into PLS and will contain 68000 code that will load the first 128K of Flash memory with a three boot program. When the download card is plugged in, the address range of the Flash memory is shifted up, allowing the download card to reside at the bottom addresses as required by the 68000 processor for start-up.

The rest of the Test Set software will be downloaded using a personal computer (PC) to download code via the parallel port. This ability to download the main section of 68000 code allows updating of software in the field.

### Write protection

Although the Flash memory integrated circuits require a specific sequence of writes to initiate programming, two extra levels of write protection have been built into A6/2. The first of these prevents writes to any part of the Flash memory and the second acts as another level to protect the boot sector code.

The decoder, IC8, provides the write signal FL_WR_L to the Flash memory. Control of this line is by the processor write line, WR_L, the correct address range and the two inputs to IC8, DOWNLOAD and WR_BOOT. When the BOOTUP signal from external memory connector SKS, is set high, the Flash memory occupies its higher address range. During this time, all writes to Flash are allowed. However, under normal operation, writes to the boot section can only take place if both of the inputs, DOWNLOAD and WR_BOOT, to IC8 are set. If only DOWNLOAD is set, writes are allowed to all parts of the Flash memory except for the bottom 128 kbyte boot sector.

The DOWNLOAD and WR_BOOT signals are generated in part of PLD IC4 (sheet 1), the interrupt handler. To set DOWNLOAD, three writes must be made to the state machine in IC4. To set WR_BOOT an additional write must be made. Each write has different address and data so that a runaway processor could not set either line. Any incorrect writes will return the state machine to its idle state.

## Non-volatile memory (sheets 2 and 3)

### EEPROM (sheet 2)

EEPROM is provided for the storage of calibration and other sensitive data. IC18 to IC21 are 32K × 8 devices, giving a total EEPROM size of 128K. Unlike the Flash memory, these integrated circuits allow programming of individual bytes at any time. Although they require a fixed sequence of writes to enable programming, further protection is used during power up or down. The chip select lines are passed through the switches in IC22. When SYSRES_L is low during power transitions, all switches are open and resistors R35 to R38 pull the chip selects high, thus disabling any access to IC18-21. During power down, the supply to IC22 is maintained for a short length of time by D5 and storage capacitor C2. During this time, the switches remain open.

### NOVRAM (sheet 3)

A further 512K of non-volatile memory is supplied using static RAM with battery backup. The memory size is made up of 4 128K × 8 devices, IC27 to 30. Note that only 256K are to be fitted to the board initially; any extra can either be fitted to A6/2 or by use of a memory expansion board.

Power to these four chips comes via NOVRAM controllers, IC23 to 26. During normal operation, these apply the +5 V rail to the memory, but when no +5 V is present they apply the 3 V battery voltage from PLL. R39 has two purposes, firstly to protect the battery in case of shorts on the board and secondly to allow monitoring of the standby current (1 μA) by measuring the voltage between TP1 and TP2 (1 mV).

The chip selects to the memory are also passed through the NOVRAM controllers. When the +5 V rail falls below 4.5 V to 4.75 V, the controllers connect the CEO pin to either the +5 V rail or the battery, whichever has the higher voltage, thus disabling any accesses to the RAM ICs.

## Random access memory (sheet 3)

IC31 to IC38 are 128K × 8 RAM chips which make up the 1 Mbyte of random access memory. IC8 provides their chip select signals, RMn_xx_L, where n is the pair number and xx is UP or LO, indicating upper or lower byte. Only 512K of RAM will be fitted initially, any expansion on this can either be fitted to A6/2 or by use of a memory expansion board.

## A4/A5 bridge (sheet 4)

The bridge to A4, digital systems card and to A5, the display card, provides fast, byte wide communications between boards.

All the logic required to control the bridge is contained in IC39 PLD. IC40 is a bidirectional buffer which isolates the 68000 data bus from the bridge data and also controls the data direction. The decode signals from pins 62 to 65 of IC8 write or read data to or from the bridge. The direction and source/destination can be found by looking at the signal name. For instance, A6TXA5_L indicates that A6 is transmitting data to A5.

Status of the bridge is shown by the lines RDYA6*xxx* where *xxx* is TX5, RX5 etc.. These lines show when A6 can transfer data and in which direction. In addition, changes in status can also be made to generate processor interrupts. Enabling of these interrupts is controlled by latches in IC39, changes being made by writing appropriate data to the BRCTL_L address decode. Reading the bridge status is accomplished using the same address.

## Real-time clock (sheet 4)

Real-time clock IC43 provides time and date settings together with a regular interrupt on RTCINT_L if required. Present software uses this interrupt to provide a scheduling timer every 7.8125 milli-seconds. XL1, a 32.768 kHz crystal, is the timing reference. In addition, IC43 contains 50 bytes of non-volatile battery-backed memory.

As IC43 has a common address and data bus it is necessary to operate the 68000 processor in a 6800 mode during accesses. This is accomplished by using the ENABLE and VMA signals from the processor, pins 22 and 21 of IC5. The I/O decoder, IC9, does not respond to the real-time clock address by setting DTACK_L low as it does for other devices. Instead it responds with VPA_L (valid peripheral address). IC9 drives pin 36, RTC_AS, low during the 6800 address portion of the cycle. This tells buffer IC42 to place the address information on the RTC address/data pins and tells the RTC that it is there. During the data transfer part of the 6800 cycle, RTC_DS_L is asserted and data is transferred to or from the RTC by IC41, a bus transceiver. IC1(a) and (b) invert the RTC_AS_L and RTC_DS_L signal for IC43.

When normal supply power is not connected to IC43, power for the internal clocks is provided by the same battery as that used for the non-volatile RAM. If the +5 V rail is missing, IC43 automatically switches over to the battery supply. One of the RTC registers contains a flag indicating the validity of the stored data and time following a power down state. This flag is checked on power up.

## Serial and parallel ports (sheet 4)

The PC compatible serial and parallel data ports are controlled by IC46. This IC, a 16C452, contains dual-channel asynchronous communication element (ACE) interfaces along with a single Centronix parallel port interface. The 16C452 provides control for modem signals, interrupt enables, baud-rate programming and parallel port control signals. The 68000 processor can read the status of the ACE interfaces at any point in the operation. The status includes the state of the modem signals (CTS, DSR, RLSD and RI) and any changes to these signals that have occurred since the last time they were read, the state of the transmitter and receiver including errors detected on receive data, and printer status.

### Serial

The single serial (ACE) interface provides a serial-to-parallel conversion for data received from a peripheral device and a parallel-to-serial conversion for data transmitted by the Test Set.

IC45 provides the interfacing between the 5 V logic levels of IC46 and the RS-232-E compatible serial interface. Decode line SER0_L and SERINT_0 are the serial port chip select and interrupt lines respectively.

The spare serial interface has its inputs tied to +5 V by R49 to 53 to reduce noise whilst its chip select and interrupt lines are still accessible.

### Parallel

The parallel interface in IC46 provides a bidirectional parallel data port that fully conforms to the requirements of a Centronix-type printer. Resistors R54 to 61 and capacitors C9 to 16 provide an RC network as used on PCs.

Chip select for the parallel port is via decode PAR_L and its interrupt line is PAR_INT.

The control LPTOE_L from IC51 to pin 1 of IC46 is used to control data direction. When this line is low, data may only be sent over the parallel bus, but when high the PD0-7 data lines become high-impedance allowing them to be used for inputs. This mode of operation is only provided for possible future use.

## Step attenuator drives (sheet 5)

The step attenuators used in the signal generator and receiver of the Test Set use coils to switch an attenuation stage in or out. A separate coil is used for in and out. These require approximately 0.5 A pulses for a minimum of 20 milliseconds to operate.

IC48 and 49 are 8-bit wide latches with their inputs tied to the 68000 data bus. To change an attenuator setting a high must be written to the appropriate bit. As the ATTEN_L becomes true at its negative going edge, the monostable IC47(a) is triggered. The Q output on pin 13 becomes high removing the clear input from the two latches. Data is latched into IC48 and 49 on the positive going edge of ATTEN_L and appears on the output pins. After 27 milli-seconds the monostable clears thus clearing the outputs of the latches.

Transistors TR1 to 14 provide high current grounding of the coils as the latch outputs go high. As the other ends of the coils are connected to +5 V, each coil can be driven as required.

It is important that no more than one coil is energized at one time as the +5 V rail will be pulled low due to excessive load. In addition, a delay of around 20 ms is allowed before driving the next coil.

## Odd signal in/out (sheet 5)

ODD signals are defined as the various input and output signals not dealt with elsewhere. Buffer IC50 allows the following AR1 board status signals to be read:-

| | |
|---|---|
| EXT_PRES | External standard present |
| EXT_HI_L | External standard high in frequency |
| EXT_LO_L | External standard low in frequency |
| INT_OK | OCXO running |

8-bit latch IC51 controls the following:-

Two of the interrupt enable lines via ENACINT and ENFPINT
External/40 MHz clock switching on A5 with EX/40M_L
Frequency reference in/out on AR1 with REF_OUT and EXT_REF
RF tray receiver AE3 20 dB amplifier on/off with SENSRX_L and LPTOE_L

LPTOE_L enables the parallel port to read data as well as send it.

ODD_WR_L select line controls two further interrupt enables and the four status LEDs, D1 to D4 via IC4 (sheet 1).

## General purpose interface bus (sheet 5)

The GPIB is an 8-bit parallel bus designed for instrument control. On A6/2 this bus is implemented using IC52 a NEC uPD7210 or its INTEL equivalent, the 8291A.

IC53 and IC54 provide buffering and termination for the actual GPIB lines.

## IF counter (sheet 6)

This counter utilizes a noise shaping synchronizer for gating. The noise shaping synchronizer comprises a simple digital synchronizer made from two D-type flip-flops, a conventional three or more state phase-sensitive detector, with two integrators and a voltage-controlled oscillator.

Level shifting of the IF signal input on PLA pin 1 is performed by high speed comparator, IC55. The logic level IF signal is then passed to PLD, IC2(b). This PLD contains the simple digital synchronizer, an 8-bit binary counter and an 8-bit latch. Pins 23 and 24 carry the synchronizer outputs PHA_DET and CTR_CLR. The PHA_DET output also drives one input of the phase detector contained inside IC57. Counter outputs are on pins 44 to 47 and 57 to 60 of IC2 and drive the inputs of the latch in IC2. The positive going edge of PHA_DET loads the data into the latch. PHA_DET and CTR_CLR are gated together and clear the counter when both are high. Thus the counter data is latched and the counter then cleared one cycle of the IF signal later.

The phase detector is contained in IC57, a 74HC4046 which combines a voltage-controlled oscillator (used for the VCO required by the counter) with two different types of phase detector (type 2 used). One input to the phase detector is the PHA_DET signal and the other the 50 kHz frequency reference from IC2 pin 28. The output from the detector on pin 13 is fed to the integrators formed by the two halves of IC58 together with R95 to 98 and C29 and 30. C25 is used to reduce any high frequency pick-up on the phase detector output when in its high impedance state. R93 and 94 bias the integrators to the centre of the VCO tuning range. As this tuning range is only 0 to 5 V, D14 is used to limit the voltage swing from IC58(b).

The VCO in IC57 has its frequency limits set by C24 and R90,91, and its output on pin 4 feeds the synchronizer in IC2.

So that the 68000 processor does not have to collect each of the 1000 required counts as they happen, a first-in-first-out (FIFO) memory is used to temporarily store the data. IC56 is a 1K x 9 FIFO where eight of the inputs are connected to the latch outputs in IC2. The ninth input and output are not used. Data is transferred into the FIFO by the falling edge of FIFOWR_L from IC2. This is generated by PHA_DET gated with the END_WR signal generated in IC2. Storage of data into the FIFO is triggered by writing to the counter address. The write clears END_WR allowing FIFO writes to take place.

END_WR becomes true when either the FIFO half full flag HF or the full flag FF become true. The choice of which is used is set by the decode address used to trigger the storage of data. When the address ends in 1, the full flag is used and when it ends in 3, the half full flag is used. On completion of the data storage the counter interrupt line CTR_INT becomes true indicating to the processor that counting is finished. Data from the FIFO is read by the 68000 processor by reading from the counter address. Each consecutive byte of data is read from the same address. The first read will clear the interrupt.

## Accessory interface (sheet 6)

The interface for the rear panel accessory connector digital lines is based around the $I^2C$ bus. Outputs P0 to 3 of IC59, an $I^2C$ to parallel interface, are used to generate the four logic control lines, LOGIC_0-3 found on PLE. The next three bits of IC59 are used to provide the status lines, STATUS_1-3, which are required for 2955 accessory compatibility. R100 resistor pack provides extra pull-up capability for the outputs from IC59 as they are only capable of supplying 100 μA. Any change of state of the accessory connector digital lines can be detected by enabling the accessory interrupt.

The $I^2C$ signal can also be made available on PLE by enabling the switches in IC60. This is accomplished by setting bit 7 of IC59 high. This is the power up state of the IC59 outputs.

In addition, the 12 V power supplies are available, protected by resettable fuses FS1 and FS2. This type of fuse undergoes an abrupt change in resistance when an overcurrent heats it up to its trip temperature. This increase limits the current from the power supply. Once the overload is removed and the fuse cools down, it will return to its low-resistance state.

### A7 interface (sheet 6)

SKN provides the interface to A7. Signals contained on SKN include a buffered, 20 MHz, clock, power supplies for A7, AA1 and AB2, $I^2C$ drive to A7 and AA1 and the system reset line SYSRES_L.

Incoming signals are an interrupt line from A7 processor and the RF overload line, RF_OV_L, from AA1, which goes via A7.

### Memory expansion (sheet 7)

Capacities for the various types of memory have been described earlier in this board description. Should any extra memory up to the decode boundaries be required for a later software update, an expansion board will need to be fitted. Connectors SKS, SKT, SKU and SKX are fitted for this purpose. These connectors provide the address decodes, address and data lines and control signals to access the memory expansion.

This expansion board would not require anything other than the memory devices and in the case of NOVRAM, non-volatile controllers. The memory expansion facility will also be used for initial download of boot sector software and RAM expansion for the processor emulators using appropriate plug in boards. These boards will pull the BOOTUP line on SKS pin 48 high, indicating their fitment and changing the memory map appropriately.

## A7 Front panel interface board

### Introduction

Fig. 1-10 is a simple block diagram showing the A7 board and the units to which it is connected. The board is situated at the top of the Test Set, directly behind the front panel. It can be fitted with a memory card for storing instrument setups, etc. The memory card plugs directly into the A7 board through a slot in the panel.

Operation of the A7 is based on a microcontroller µC, which in turn is supervised by the A6 board CPU via the $I^2C$ bus. Note that there is also an $I^2C$ connection to the AA1 input switch. All front panel controls, except *Power On LED* and *Intensity*, interface with the µC, which also controls multimeter and RF calibration circuits.

### Microcontroller (sheet 1)

#### Port services

The µC IC1 has six ports, providing the following:-

- Port 0 8-bit multiplexed address/data bus.
- Port 1 Keyboard row scanning and $I^2C$ communication to A6 and AA1.
- Port 2 8-bit high-order address bits of 16-bit wide address bus.
- Port 3 Control signals associated with the keyboard scanning, memory card read/writing, and front panel VARIABLE control handling.
- Port 4 Keyboard column scanning.
- Port 5 Handling of memory card control signals, front panel POSITION, SQUELCH and VOLUME rotary control signals, and multimeter trip condition. This port includes an ADC function.

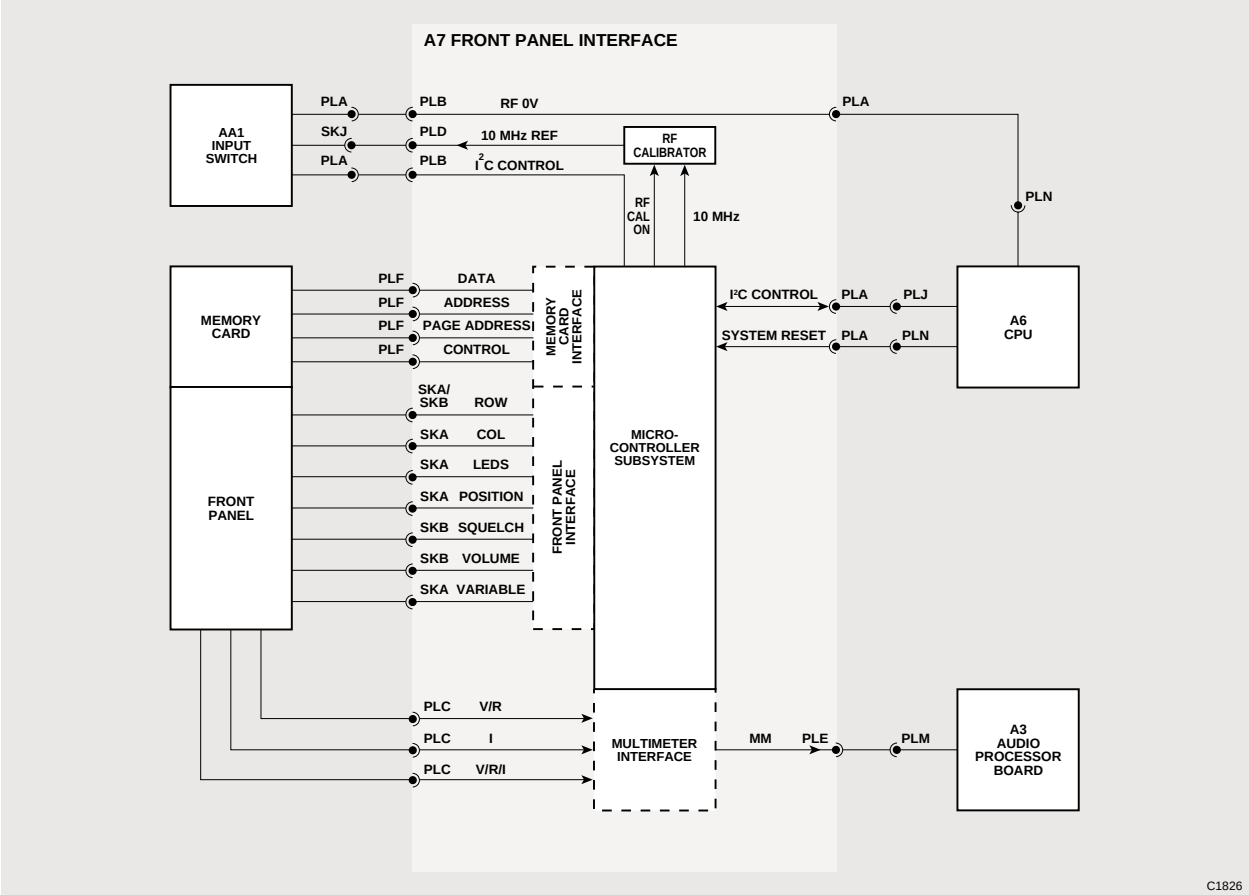



*Fig. 1-10 A7 board - block diagram*

## Keyboard scanning

The front panel keys are arranged in an 8-column by 9-row matrix. Row and column signals ROWx and COLx are connected to ports 1, 3 and 4, each line being provided with a pull-up resistor. When a key is pressed, a row line is connected to a column which is detected by the microcontroller.

## VARIABLE control

The front panel VARIABLE control is a rotary pulse encoder. The two signals VAR _A and VAR _B are pulsed when the VARIABLE front panel control is rotated. The phase displacement of VAR _B relative to VAR_ A indicates the direction of rotation. Movement is detected using a dedicated interrupt VARINT L. This signal is generated via inverter IC6(a). The µC, on receipt of VARINT L, strobes IC6(a) to determine the direction of rotation. The number of pulses indicates the amount of rotation, and the pulse repetition frequency indicates the rate of rotation.

## SCOPE POSITION, SQUELCH and VOLUME controls

The SCOPE POSITION, SQUELCH and VOLUME controls are 0 to 5 V analog signals which are filtered (R12/C1, R13/C2 and R14/C3) before being fed to the µC's port 5. AVREF+ and AVREF- are 5 V and 0 V references for the internal ADC. Note that the INTENSITY front panel control is connected directly to the CRT module.

## Address latch

The address latch IC2 demultiplexes the eight low order address lines from the µC's AD bus thus providing a 16-bit wide address on A0-15. IC4 is enabled by the µC's ALE, address latch enable, control signal.

### Memory

EPROM IC4 provides 16 kbytes of program memory and IC5 8 kbytes of RAM. IC4 is enabled by the µC's PSEN_L signal. IC5 is enabled by RAM_L from the address decoder, described later. RAM read and write are controlled directly by the µC's RD_L and WR_L signals. The paged memory of the plug-in memory card is described later.

### Address decoder and control latches

The µC's high order address bits A13, A14 and A15 are decoded by IC3 to provide either a RAM chip select or one of three latch signals LAT1_L, LAT2_L or LAT3_L. Each of the three latch signals places information on bus AD0-7 into a control latch. These three control latches, for the purposes of this description, are designated control latch 1, control latch 2 and control latch 3. Control latch 1 is associated with multimeter control on sheet 3, described later. Control latch 2 is associated with the plug-in memory card circuits on sheet 2, described later. Control latch 3 is on sheet 1 and is described in the next section.

It should be understood that, in each case, the strobed data on bus AD0-7 is accessed from a dedicated data location, for the particular latch, in the µC's memory space.

### LED control latch

The front panel TNC and N-type socket input/output functionality (controlled by the RF SELECT key) is indicated by four light-emitting diodes LED1, LED2, LED3 and LED4. These LEDs are driven via current limiting resistors R29 to R32 by IC7, which is the control latch 3 referred to in the previous section. The LED status is determined by data written by the microcontroller. Data is latched into IC7 by write signal WR_L occurring while LAT3_ L is asserted by IC3 decoder.

IC7 also latches the following:-

- RFCAL_ON to the RF calibrator circuits on sheet 5.
- CRDATT_L signal used in the memory card interface on sheet 2.
- FP_INT (front panel interrupt), which is currently unused.

## Memory card interface (sheet 2)

The memory card conforms to the JEIDA 4 standard, providing up to 8 Mbytes of paged storage capacity.

A page is selected by writing the page number to the dedicated location in the µC's memory space. The memory card is addressed in 32K pages numbered 0 to 255. To access a particular page, its address is latched into control latch 2, IC10. The page address then acts as the high order address lines for the memory card.

While a memory card is correctly inserted, contention between the EPROM and the memory card (which occupy the same physical memory space) is prevented by the µC's PSEN_L signal which enables/disables the EPROM for the appropriate EPROM read/memory card read-write operations.

Card detect signals CD1_L and CD2_L (bottom left of diagram) are used to generate the card present signal CPRES_L and the card data enable signal CDATEN L. These signals provide enabling for data/address buffers IC8 to IC12, and allow the µC to access the memory card only when the card is properly inserted thus preventing data corruption on insertion and removal.

Note that the address line A15 disables the memory card, but permits the page address to be set thus preventing the page address being changed while the memory card is being accessed.

Other card output lines are BVD1 and BVD2 (battery voltage detect) and CARD_WP (write protect). These all connect directly from the memory card socket to the µC.

Any memory card will contain some attribute memory (256 bytes or less) and some data memory. Selection between attribute and data is by CRDATT_L from control latch 3, IC7. If attribute memory has been selected, the CRDATT_L signal is asserted, producing REG_L to the memory card.

The outputs from memory card control buffer IC12 are only enabled when the card is present. Also buffered by IC12 are memory card signals CE1_L, OE_L and WE_L which are generated from µC signals A15, RD_L and WR_L respectively.

The lower half of IC12 is wired to provide an inverted system reset signal RST.

## Clock buffer and dividers (sheet 3)

The 20 MHz reference signal on PLA from the A6 board is first amplified by IC6(b) before being divided by 2 in IC13. The resultant 10 MHz clocks 10MHZ_A and 10MHZ_B are used by the µC and RF calibrator respectively.

## Multimeter interface

The multimeter interface on sheets 3 and 4 contains the following elements:-

- **Multimeter control** (sheet 3). Microcontroller control of multimeter functions.
- **Voltage references** (sheet 4). Used for the multimeter current source, ohms protection and RF calibrator.
- **Ohms on/off and ranging** (sheet 4). Sets the current source and its connection to the input terminals.
- **Current source** (sheet 4). Current source with selectable current used for resistance measurement.
- **Ohms protection** (sheet 4). Protects the current source against excessive input voltages.
- **V/I switch** (sheet 4). Switches differential amplifier input between voltage and current measurements.
- **CMRR CAL switch** (sheet 4). Used during current measurements to minimise the effects of common-mode input voltages.
- **Differential amplifier** (sheet 4). High impedance and voltage input differential amplifier with selectable gain.

### Control latch and relay drivers (sheet 3)

Sheet 3 shows IC14, which is designated control latch 1, described previously. This latches multimeter control data from the dedicated location in memory. The outputs of the latch feed relay drivers TR1-2, TR3-4 and TR13 which operate relays on sheet 4. Latch data determines which relays operate, which in turn select one of three modes of operation, i.e. voltage, current and resistance. In each of these modes, the meter ranging is partly done on this board, and some on A3 and A2 before the signal is digitized. See the section on AF, demod and multimeter ranging for further information.

### Voltage references

A precision +10 V reference is supplied by IC16 for use on A7. IC18 together with emitter follower TR12 invert this for use as a negative reference.

### Ohms on/off and ranging

Relay RLB is used to connect the current source to the multimeter input terminals during resistance measurements. Control is via MMV/R_L. The current source is also disconnected when the unit is powered down.

Switch IC17 and relay RLA set the current source to the value required. Control is as follows:-

| Current | MMR_1 | MMR_2 | IC17 | RLA |
|---|---|---|---|---|
| 0.5μA | Low | High | pins 1 to 2 | pins 12 to 9 |
| 5μA | High | High | pins 1 to 8 | pins 12 to 9 |
| 50μA | Low | Low | pins 1 to 2 | pins 5 to 8 |
| 500μA | High | Low | pins 1 to 8 | pins 5 to 8 |

### Current source and ohms protection

IC20 acts as the current source for resistance measurements. The arrangement is basically an inverting amplifier circuit with the resistance being measured being placed in the feedback path. The voltage source is either −10 V or −0.991 V as selected by IC17 and the input resistor selected between 20 kΩ and 2 MΩ by RLA (see previous section).

Knowing the current through the feedback resistance allows the voltage across the resistance under test to be measured using the differential amplifier and the resistance calculated.

Protection against inadvertent application of voltages likely to cause damage is by diodes D4(a)/(b) and zener diodes D7 and D8, which protect the input and output of IC20 respectively. IC19 comparators act when the voltages across sensing-resistors R103, R161 and R162 exceed the reference voltages set by R92/93 and R104/105, setting TRIP_L low. This signal then disconnects the current source from the input by setting D-type flip-flop IC15(a) (sheet 3), turning off relay driver TR5. The OHM_TRIP output from IC15(a) indicates to the μC that the circuit has tripped. To reset the trip condition, the flip-flop is reset by setting MMV/R_L control bit low, then high again.

### V/I and CMRR CAL switches (sheet 4)

Relay RLC switches the inverting differential amplifier input between the front panel voltage/resistance and the current inputs selecting current when control line MMVR/I_L is low.

For current measurement, calibration switches IC21-22 are switched several times a second. Normally, IC21 is open and IC22 closed, but in the opposite state the two inputs to the differential amplifier are connected together and to the I terminal. This allows only the common-mode error to appear at the output. This error can then be calibrated out of the current reading by alternately reading error and current measurements.

### Differential amplifier

The basic differential amplifier is formed by IC24. A high common-mode voltage capability is provided by high-value input resistors R106-111 and IC23. Volts ranging is controlled by two halves of a quad analog switch IC25 (bottom right of drawing). This sets the gain of the differential amplifier to either ×1 or ×0.01 by altering the amplifier feedback resistance. Gain is ×0.01 when the MMGAIN control line is low.

To protect the differential amplifier, relay RLE disconnects it from the front panel inputs when not in use during power up and power down.

## RF calibrator (sheet 5)

The RF calibrator provides either a 10 MHz sine wave at 0 dBm, or presents a 50 Ω load at its output, which is connected to the AA1 input switch where, during calibration, it is switched to the broad-band power meter AB1/AB2.

The 10 MHz square wave signal from IC13(b) is conditioned by the band-pass filter L5, C21 and C22 and the resulting 10 MHz sine wave is input to the current controlled variable gain amplifier TR6 (a), (b) and (c). The signal is then buffered by TR7 and filtered by C13, C15, C17, C18 and L7. The gain of the amplifier is determined by the voltage on the base of TR6(a) which, in turn, is determined by comparing in the integrator IC27 the output level (detected by D13) with a voltage derived by R126 from the +10VREF reference voltage. The output of IC27 then provides, via R131, the current control of the variable gain amplifier.

RF calibrator on/off control is from IC7 which is designated control latch 3 and has been previously described. The RFCAL_ON control signal performs two functions:-

- Switches the +12 V power supply to the gain controlled amplifier TR6 and TR7 via TR8 and TR9.
- Switches the RFCAL output with the SPDT relay RLD via the output switch control monostables IC28(a) and (b), and the relay drivers TR10 and TR11. Monostables are used because the relay coils only require short pulses to change over the contacts. In the off condition a nominal 50 Ω is placed on the RFCAL output.

# A8 Complex modem and IF board

## Introduction

The A8 assembly provides a digitised IF with 700 kHz bandwidth for the demodulation and analysis of complex modulation schemes and a complex (I, Q) signal generator for the generation of digital modulation schemes.

This description covers the:-

- Receiver IF path, where a 10.7 MHz signal from AE4 is mixed down with a buffered 10 MHz and is fed to the ADC through digitally controlled amplifiers.
- I/Q generation DACs, filters, and modulator, the up conversion from a 10 MHz IF to a 70 MHz IF, 80 MHz distribution, levelling loop, and output attenuator.
- Phase-Locked Loop (PLL) used for generating a variable frequency signal for the Systems Timing Element (STE).
- Switches used to route the reference frequency into and out of the instrument.
- Digital sections.

## Circuit description

### Receiver

#### IF path (sheet 1)

The 10.7 MHz IF signal from AE4 PLB is received on A8 SKC at a maximum level of −16 dBm (the actual level can vary between −16 dBm and −25 dBm due to attenuator setting and radio transmit level). After termination, it is amplified by TR10 before filtering to remove harmonics of the IF and 80 MHz LO signal. A 15 MHz Chebyshev 7th-order low-pass filter is used. This provides approximately 20 dB insertion loss at 20 MHz, with a worst case group delay variation of 1.5 ns in a 400 kHz bandwidth at 10 MHz. The nominal filter insertion loss at 10 MHz is 1 dB. The filter is followed by a double-balanced mixer with a LO frequency of 10 MHz to produce a 700 kHz IF signal. Selection of the 700 kHz sideband is achieved using a 2 MHz low-pass filter, which is a 5th-order Butterworth design with 50 Ω input and 100 Ω output impedance, providing 60 dB rejection to the 10 MHz LO and upper sideband.

The filter is followed by the AGC amplifier, which provides 0 to 80 dB gain controlled by two control voltages, each having a control range of 40 dB for a voltage range of ±0.625 V. The gain of the amplifier is controlled by the MAP processor to keep the received signal level optimum for the dynamic range of the input of the A-D converter.

#### 10 MHz local oscillator buffer (sheets 1, 11)

To maintain the dynamic range of the receiver measurement, it is essential that in-band spurious signals are kept to a minimum; this puts an additional requirement on the receiver local oscillator: that it should be free of unwanted signals which may, after mixing, appear in the IF bandwidth. The 10 MHz LO is derived from the 80 MHz signal by means of division in the STE (page 1-86); it is then passed to a crystal filter formed around TR11. The crystal is the part of the gain-control network in a series-feedback transistor amplifier. At series resonance of the crystal, fine tuned by C63, the crystal impedance drops to that of the ESR and the maximum signal is developed at the input to the following stage. At parallel resonance, the crystal impedance is at a maximum and no signal would be delivered to the load; at this time, a phase-shifted version of the input signal is added to the output via C61 to produce a symmetrical filter shape, thus the filter symmetry is controlled by the stage gain and the phase shift due to this capacitor.

The filter bandwidth is set by R73 and is nominally 1.5 kHz to allow for crystal and reference frequency tolerances. The filter stage is followed by an emitter-follower buffer to drive 10 dBm into the receiver mixer.

### Quadrature generator

#### I/Q DACs and filters (sheet 2)

The I/Q DACs and filters convert the digital I and Q signals to analog signals and remove the DAC clocking frequency. The filters are 5th-order Bessel filters. Each I and Q filter uses half of each operational amplifier package to match the filters. The filters are DC-coupled to aid testing.

The digital I and Q information is clocked into the I and Q DACs IC13, IC14 at a rate of 1.0833 MHz. The same reference voltage provided by IC12 is used for both DACs as well as the output attenuator and levelling loop. Each DAC produces a current output that is converted to a 0 V to −5.0 V swing by operational amplifiers IC15(a), IC15(b). The next operational amplifier stage IC16(a), IC16(b) provides a level-shift up to +2.5 V to −2.5 V and the first pole of the Bessel filter. The final four poles are configured around the operational amplifiers IC17(b), IC17(a), and IC17(c), IC17(d). The filters provide 25 dB of attenuation at 1 MHz.

All the resistors used are specified as 0.1% and the major capacitors as 1% to ensure close gain and phase matching between the filters and to keep the group delay within ±12 ns over the DC to 300 kHz band. For the same reason, the operational amplifiers were chosen to have high open-loop gain over this band.

#### Splitter (sheet 2)

The splitter is required to provide two signals, nominally 10 MHz, that are 90° out of phase, to the I/Q modulator. These signals are generated digitally from a 40 MHz input. IC20, a dual D-type flip-flop 74F74, is connected to divide by 4 and provides two 10 MHz TTL LO drives with the correct phase relationship for the I/Q modulator.

#### I/Q modulator (sheet 2)

The I/Q modulator modulates a 10 MHz IF with the I and Q base-band signals. The required accuracy of the modulator is to maintain the carrier and unwanted sideband at <−48 dBc. The I/Q modulator consists of a pair of MC1496 balanced modulators, IC18, IC19, connected so that their outputs add. To ensure matching, and to reduce components, the MC1496s are biased together. The TTL signals from the splitter are attenuated by resistors R110-R113 to reduce carrier feedthrough. The gain of the combined modulator is such that 4.7 V pk-pk I and Q signals produce −16 dBm in the 50 Ω output.

### 10 MHz to 70 MHz up converter (sheet 3)

The output from the I/Q modulator, at 10 MHz and −16 dBm, is fed to a filter similar to that used in the receiver IF path (see page 1-81 and sheet 1). The 10 MHz modulated IF signal is then passed to the up-conversion mixer, where it is mixed with a buffered 80 MHz signal; the resulting sideband signal level being −21 dBm. The signal level is increased by approximately 18 dB by the MSA 0386 amplifier IC9 before being fed to a 70 MHz SAW band-pass filter IC67, which is used to select the lower sideband and reject the carrier and upper sideband frequencies. Although the SAW filter has an input impedance of 1.5 kΩ, it is driven from a low impedance (nominally 50 Ω) to reduce ripple due to reflections within the filter structure. The balanced filter output is terminated in its characteristic impedance of 800 Ω using a differential amplifier, the outputs of which are summed using a trifilar transformer T1. The SAW filter has an in-band insertion loss of approximately 27 dB, and a group delay variation of about 4 ns in a 400 kHz bandwidth at 70 MHz. The overall group delay is 1.12 µs. The differential amplifier, TR6, TR7, provides a further 12 dB gain into a 50 Ω load, thus the output to the levelling loop is approximately −19 dBm. The filter stage provides about 37 dB rejection of the local oscillator and upper sideband.

### 80 MHz local oscillator distribution (sheet 3)

The 80 MHz 3rd local oscillator from the receiver chain on AE5 is fed to A8 SKE to be used as the master clock for the DSP (16 MHz), the PPH processor (10 MHz) and the local oscillators for the IF system (10 MHz and 80 MHz). The feed from AE5 is terminated and amplified by TR8 to overcome the termination loss and routed to A5 PLF, where it is used for clock generation. The received level at A8 is nominally 1 V pk-pk (4 dBm), and this is split into two paths, to TR8 and TR9.

The signal from TR9 collector, with a voltage gain of approximately 1.5 dB, is fed to a 74AC04 inverter IC8(a), configured as an amplifier, to produce a 4 V square wave. IC8(a) has DC feedback to maintain its bias at mid-rail voltage but is used open loop at 80 MHz. The 80 MHz signal is fed via IC8(c) to the STE (page 1-86) for clock generation and through a divider IC1 to SKB for use on A4 as a 10 MHz clock.

The signal from TR9 emitter is attenuated by 18 dB before being fed to an MSA 0886, IC10, which has a gain of 32 dB. The output signal is attenuated by 3 dB before driving the LO port of the up-conversion mixer at a nominal level of 0 dBm. The attenuation included in this circuit provides two functions; to ensure that the MSA 0886 and the mixer see a good termination and to ensure that sufficient isolation can be maintained between the two signals from TR9. Typical isolation from the mixer LO port to the A5 output (SKD) at 10 MHz is >75 dB.

### Voltage reference (sheet 4)

The 5 V reference used by the DACs (page 1-82) is converted to 7 V and −790 mV for use by the levelling loop and the output attenuator. This is done by IC5(b) and IC2 in conventional operational amplifier configurations.

### Levelling loop (sheet 4)

The levelling loop has six elements: a voltage-controlled attenuator, a fixed-gain amplifier, a low-pass filter, an emitter-follower buffer, a detector, and an integrator that provides feedback to the attenuator. The levelling loop provides a constant output, nominally 2 dBm, for an input of −19 dBm ±3 dB

The attenuator is formed by matched pin diodes D3 in a T network. These diodes are biased by D2, resistors R11 to 15, and inductor L1. Current setting resistors R13 and 15, together with the control voltage, set the bias current for the two series diodes. The network of R11,12,14 and D2 set the current for the shunt diode.

The DC control voltage varies from 0 V (maximum attenuation, ≅55 dB) to −5 V (minimum attenuation, ≅3 dB). The nominal attenuation of 13 dB is provided by a control voltage of ≅0.8 V.

The amplifier is made up of an MSA 0886, IC6, and an MSA 1105, IC7, which have nominal gains of 32.5 dB and 12.5 dB respectively. The second stage uses a parallel combination of mini-MELFs (R17, 18) to set the 59 mA required by the MSA 1105.

Inductors L4, L5 with C13, 14 and 15, constitute a 5th-order Chebyshev low-pass filter. A 0.1 dB ripple factor was chosen, since this provides a good compromise between group delay and attenuation of harmonics and intermodulation products. R19 provides a matched 50 Ω load.

Transistor TR5 is biased as an emitter-follower with a collector current of ≅30 mA. This provides a low impedance to the detector without introducing a large second harmonic.

The signal is peak-detected by diode D4(b), C5 and R9. A series resistor, R24, increases the load impedance that the detector presents to TR5. IC3(a), with D4(a), R7, R8 and C4, provides buffering and a degree of temperature compensation to the detector output voltage.

Operational amplifier IC3(b) integrates the difference between the set-point of −790 mV, and the detector output. The time constant is set by R6 and C3 such that the levelling loop can make a ≅6 dB transition in attenuation in 1 second. C2 provides stabilisation. TR1, TR2 and R5 provide a current buffer for the IC3(b) output.

### Output attenuator (sheet 4)

The output attenuator is made up of two back-to-back stages. Each of the stages is similar to the attenuator used in the levelling loop. Two stages are used to achieve an improved return loss. This is achieved with the CR networks, C20/R26 and C24/R37. The series combinations of the shunt PIN diode resistances and the CR network impedances provide input and output impedances of ≅50 Ω.

The control voltage to the attenuator is provided by the DAC IC4. This is a 12-bit serial interface DAC controlled by the system timing element (STE), shown on sheet 11. The DAC uses a 7 V voltage reference supplied by the voltage reference circuit.

IC5(a), together with TR3, TR4 and R10, functions as a current-to-voltage converter, using the feedback resistor within the DAC. TR3, TR4 and R10 provide current buffering of IC5(a), since the output attenuator draws up to 50 mA of bias current from that output. C129 slows down the converter so that it settles in 15 µs but does not produce any high frequency spikes that can be detected by the levelling loop detector.

The full scale output attenuator control voltage is nominally −(7×4095/4096) V. The resolution of this DAC is therefore approximately 1.71 mV/bit - adequate for a sensitivity of ≅0.1 dB/bit, for attenuations up to approximately 40 dB.

## Phase-locked loop (sheet 5)

The phase-locked loop (PLL) provides a variable frequency TTL signal to the STE (page 1-86). It has a frequency range of 72-79 MHz and a phase error of 0.2° RMS. The PLL consists of a VCO, a synthesizer chip, and an analog filter. The synthesizer chip is fed by a 10 MHz reference signal and can operate at a comparison frequency of 25 kHz, for 25 kHz resolution, or 100 kHz for lowest phase noise.

The VCO is a common-collector Clapp oscillator built around a BFR 93A and a 330 nH chip inductor, TR13 and L24. The nominal tuning range is from 69-81 MHz to allow for component tolerances. The phase noise at 20 kHz offset is better than −120 dBc/Hz across the band. The +12 V rail is regulated down to 8.6 V by IC21.

The synthesizer chip IC23 is a Motorola MC 145170D which has a maximum input frequency of 160 MHz, so it does not require a pre-scaler. The digital input is fed serially over a 3-wire bus from the STE. The double-ended phase detector outputs are used for maximum phase detector gain. The synthesizer chip is powered by its own +5 V regulator IC22.

The analog filter uses two low-noise operational amplifiers IC24, IC25. The first operational amplifier, an OP-27, integrates the difference between the two phase detector outputs. The second operational amplifier, an NE5534, implements a 3-pole Chebychev low-pass filter with a cut-off frequency of 14 kHz. The 25 kHz sidebands are attenuated to <−60 dBc over the band. The settling time, to within 1 kHz, is <3 ms for any frequency step.

### Reference frequency switches (sheet 12)

To enable the system reference frequency (13 MHz for GSM) to be available for input or output at the rear panel socket, the cable from AR1 to the rear panel connects to A8. When a system reference output is required at the rear panel, the system clock is switched into the feed and the 10 MHz from AR1 is disconnected; the drive is buffered using two inverters in a direct replication of the AR1 drive circuit. An external system reference can be accommodated by dividing the signal (by 13 for GSM) to produce a 1 MHz signal to synchronize with the AR1 reference oscillator. The switch used is a DG540, which is capable of producing >70 dB isolation at 10 MHz. The reverse power protection circuit is again a direct copy of that used on AR1.

## Digital circuits

### In-phase modulation generator processor (sheet 6)

The In-phase modulation Generator Processor (IGP) is based around the ADSP2115 DSP IC26 with external program and data memory (ICs 27-29). ICs 27, 28 are 32K × 8 devices, the lower 16K in each being mapped into the DSP's data memory space by connecting the DSP's /DMS line to A14 of the RAM. IC29 is an 8K × 8 device that is mapped into the DSP's program memory space, along with the upper half of the 32K devices. This arrangement results in 8K of 24-bit program memory being available externally, plus 6K of 16-bit program memory for use as data memory and 13K of external data memory.

IC30 provides fast memory and I/O decode. The 15 ns access time external memory must operate with zero wait states, so the decoder must have a propagation delay of less than 10 ns. Three I/O decodes are provided, although only one is used, namely DWR60. This enables writes into the output FIFO IC31, which queues samples and feeds them to the I channel DAC (IC13, sheet 2) under the control of the STE (page 1-86).

IC30 also provides four general purpose outputs, AUX3-0, which are fed to the STE for timing, synchronization and control functions. The ninth bit of the FIFO is fed to the STE as a synchronization strobe.

IC30 also provides a bridge interface between the DSP and the 68000 host processor on A4. The bridge may be programmed to generate interrupts on the DSP's /IRQ0 pin under ready-to-receive or ready-to-send conditions. The bridge also provides the means by which the DSPs acquire their bootstrap code.

DSP reset is controlled by the host on a dedicated reset line supplied on PLD. Host access to the bridge is via the host's bridge select line, IGPBRI(L) supplied on PLC (sheet 11), the read-not-write line on PLB (also sheet 11) and the A4-A8 data bus on PLB and PLC. The host bridge status lines (Tx Ready and Rx Ready) are fed to PLB.

The highest priority interrupt, IRQ2, is derived from the STE in the form of the IGP_SYNC line, which has a system-specific function.

The IGP's serial port sends to and receives from the STE, which performs SPORT routing functions.

### Quadrature-phase modulation generator processor (sheet 7)

The Quadrature-phase modulation Generator Processor (QGP) is similar in every respect to the IGP with the exception of the receive half of the serial port, which is derived directly from the A4-A8 SPORT connector.

### Modulation analysis processor (sheet 8)

The Modulation Analysis Processor (MAP) is similar to the IGP, having the same type of bridge controller and memory decoder (IC44). Memory arrangements differ slightly in that three 32K × 8 devices (IC39-41) are used to provide 14K of 24-bit external program memory. Four pages of 13K × 16-bit external data memory are provided in four 32K × 8 devices (ICs 42, 43 and 45, 46).

Although the pin-out of the bridge controller and memory decoder is identical for all the DSPs, the design differs slightly to enable paged accessing of the external data memory. This is achieved by writing the desired data page into the lower two bits of the AUX register.

The MAP controls three peripherals, the receiver sample FIFO IC57 (sheet 10) and the AGC control voltage DACs IC59 (sheet 10). The term FIFO is a slight misnomer, as the MAP actually reads from 32 individually-addressed, RAM-like locations. When full, the FIFO can generate an interrupt on the DSP's /IRQ1 pin. Five address lines give the MAP access to 32 addresses within the receiver FIFO. Write access is provided to control the depth of the FIFO (i.e., to control the number of samples that will be stored before an interrupt is generated. A0 selects the AGC1CTL or AGC2CTL latch (sheet 10) when addressing the DAC. The AGC DACs are write only.

The MAP's SPORT receives from and transmits to the STE (page 1-86), which performs signal routing.

### Real-time demodulation processor (sheet 9)

The Real-time Demodulation Processor (RDP) is similar to the MAP in almost every respect, with the exception that it has no control over the AGC DAC and the SPORT transmits to the A8 SPORT port.

### Receiver ADC and FIFO (sheet 10)

The 2.8 MHz sampling clock is fed from AE8 at a nominal level of 0.1 Vp p. This is squared up through a high speed comparator IC65 to minimise the phase noise on the sampling clock, which is then fed to the ADC IC56 and the receiver FIFO IC57.

The ADC reference out is fed to the reference in and decoupled by C174. IC58 buffers the reference to the AGC DACs IC59. Being a current output device, it is necessary to follow the DAC with a current-to-voltage conversion stage. Current-to-voltage conversion and level shifting to achieve a ±0.625 V swing for both channels is accomplished using a TL074 quad operational amplifier IC60.

The receiver FIFO is a XILINX device, type XC4003, which is configured serially by a master XILINX device on A4. The programming data and control signals are received via PLF, the LCA configuration port. The receiver FIFO's serial configuration DOUT pin drives the STE IC61 (sheet 11, see below) for daisy-chain programming. The three mode pins are tied high to configure the device in serial-slave mode.

### System timing element (sheet 11)

The system timing element (STE) IC61 is a XILINX device, type XC4005, which is configured serially by a master XILINX device on A4 via the Receiver FIFO IC57 (sheet 10). Programming control is as for the Receiver but data is sourced from the Receiver FIFO's configuration data output pin.

The STE generates clocks and synchronization signals for use throughout the A8 board. The host processor on A4 has access to the internal registers of the STE via the data bus delivered on PLB and PLC.

### Boundary scan and FLEX logic programming (sheets 6 to 11)

Both XILINX gate arrays and the four FX740 devices have boundary scan testability ports. Because the FX740 devices are configured through the boundary scan port, they cannot easily be combined into a single boundary scan bus. Therefore two buses are provided, the 'A' bus (ATMS, ATCK, ATDI0, ATDI1, ATDI2 on sheets 10,11), which accommodates the two XILINX devices, and the 'P' bus, which carries the programmable FX740 parts. The 'P' bus (PTMS, PTCK, PTDI0, PTDI1, PTDI2, PTDI3, PTDI4 on sheets 6, 7, 8 and 9) can be controlled by the STE when the board is operating within the Test Set, enabling the host processor to configure the devices. During autotest, however, the STE pins to the 'P' bus may be tri-stated, thus enabling the tester to manage the 'P' bus.

The FX740s power up in a tri-state mode if the EPROM is not programmed (as is the case for the A8 board). Consequently all the decoder and interrupt outputs must be pulled to their inactive states with external resistors.

# AE1 Fractional-N control board

## Introduction

Fig. 1-11 is a simplified block diagram of the board, with interconnections. The board is controlled from and communicates with the A6 CPU, and, in turn, controls the RF tray in which it is situated. It uses two similar fractional-N divider circuits, one to control receiver frequency selection, and the other to control signal generator frequency selection. A 1-bit ADC circuit is added to the fractional-N control circuit for the signal generator, enabling FM and PM to be injected into the loop and hence appear at the signal generator output.

Each of the fractional-N divider circuits on the AE1 board is part of a phase locked loop. That for the receiver includes circuitry on the AE2 board. That for the signal generator includes circuitry on the AF2 board.

Conventional dividers allow only integer division ratios. However, dividing by N for some of the time period, then dividing by N+1 for the remainder, results in an average division ratio which is not necessarily an integer. The fractional-N phase locked loop system takes this principle further by switching through several different division ratios, according to a complex algorithm. This results in an average fractional division ratio, with reduced fractional-N sideband levels.

## Microcontroller and communication circuits (sheet 1)

IC4 is an $I^2C$ compatible, general purpose µC. In this application, its function is to drive the two fractional-N devices on AE1 and the rest of the RF tray via $I^2C$ controller IC6. IC6 provides an $I^2C$ interface to the RF tray which is separate from the system $I^2C$ bus. IC7 is a booster which is required because of the high capacitive load presented by the RF tray filters. The RF tray $I^2C$ interface is unidirectional and supplies boards AE6-7, AF2 and AF4-6.

The eight least significant bits of the µC address bus are multiplexed with the data bus. The 8-bit latch IC2 is used to extract the address to allow interfacing with memory. Memory comprises 32K of RAM (IC9) and either 32K or 64K of PROM (IC5).

Address decoder IC3 provides chip select signals for the two fractional-N devices (sheets 2 and 4) and the $I^2C$ controller, these devices being mapped into the µC's memory space.

## Receiver fractional-N circuits (sheet 2)

Note that these circuits form only part of the receiver fractional-N loop. The theory of the signal generator fractional-N loop, which is similar, is described in the AF2 board section.

The loop input to the circuit is the LO frequency ÷2 from AE2. This is fed to programmable divider IC11 which is controlled by fractional-N device IC10. The divided output is level shifted (ECL to TTL) by TR1, TR2 and TR8, frequency doubled by IC12 and IC13(a) and fed to the phase/frequency detector on AE2 board.

## Single-bit ADC (sheet 3)

The FM and PM modulating signal from the A1 audio generator board is applied to both the AE1 and the AF2 RF oscillator board. AE1 handles the frequency and phase modulation of low frequencies and AF2 that of high frequencies. The way in which the transition between the two is handled is described in the AF2 board description. Here, we are only concerned with how the 1-bit ADC circuit allows the low frequency component to be injected digitally into the fractional-N phase locked loop.

Signal EAU (top right of drawing) is a 0 V to 5 V feedback from the fractional-N signal generator IC17 on sheet 4. IC15(a) and associated components R32 and R33 apply an offset causing the junction of R35 and R36 to swing equally above and below 0 V.

The FM DRIVE signal varies the mark/space ratio of the BS signal to IC17 in accordance with the feedback via the EAU signal. While FM DRIVE is high, the BS signal becomes a narrow negative going pulse; when FM DRIVE is centred, the pulses have an even mark/space ratio; when the FM DRIVE reaches its lowest extreme the BS signal becomes a series of narrow positive going pulses. These pulses modify the programmable divider IC18 and modulate the signal generator via the phase detector on the AF2 board.

More information on the modulation levels produced is given in the AF2 board description.

## Signal generator fractional-N circuits (sheet 4)

Note that these circuits form only part of the signal generator fractional-N loop. The theory of this loop is described in the AF2 board section.

The loop input to the circuit is the signal generator frequency ÷2 from AF2. This is fed to programmable divider IC18 which is controlled by fractional-N device IC17. The divided output is level shifted (ECL to TTL) by TR4, TR5 and TR7, frequency doubled by IC19 and IC20(a) and fed to the phase/frequency detector on AF2 board.

Signals BS to pin 54 and EAU from pin 34 of IC17 are associated with the 1-bit ADC circuit described in the previous section.

## Supply lines and filters (sheet 5)

Filtering of the +5 V, +12 V and −12 V supply lines is provided by L1 to L3, R61/R62, capacitors C40 to C43 and capacitors C47 to C50.

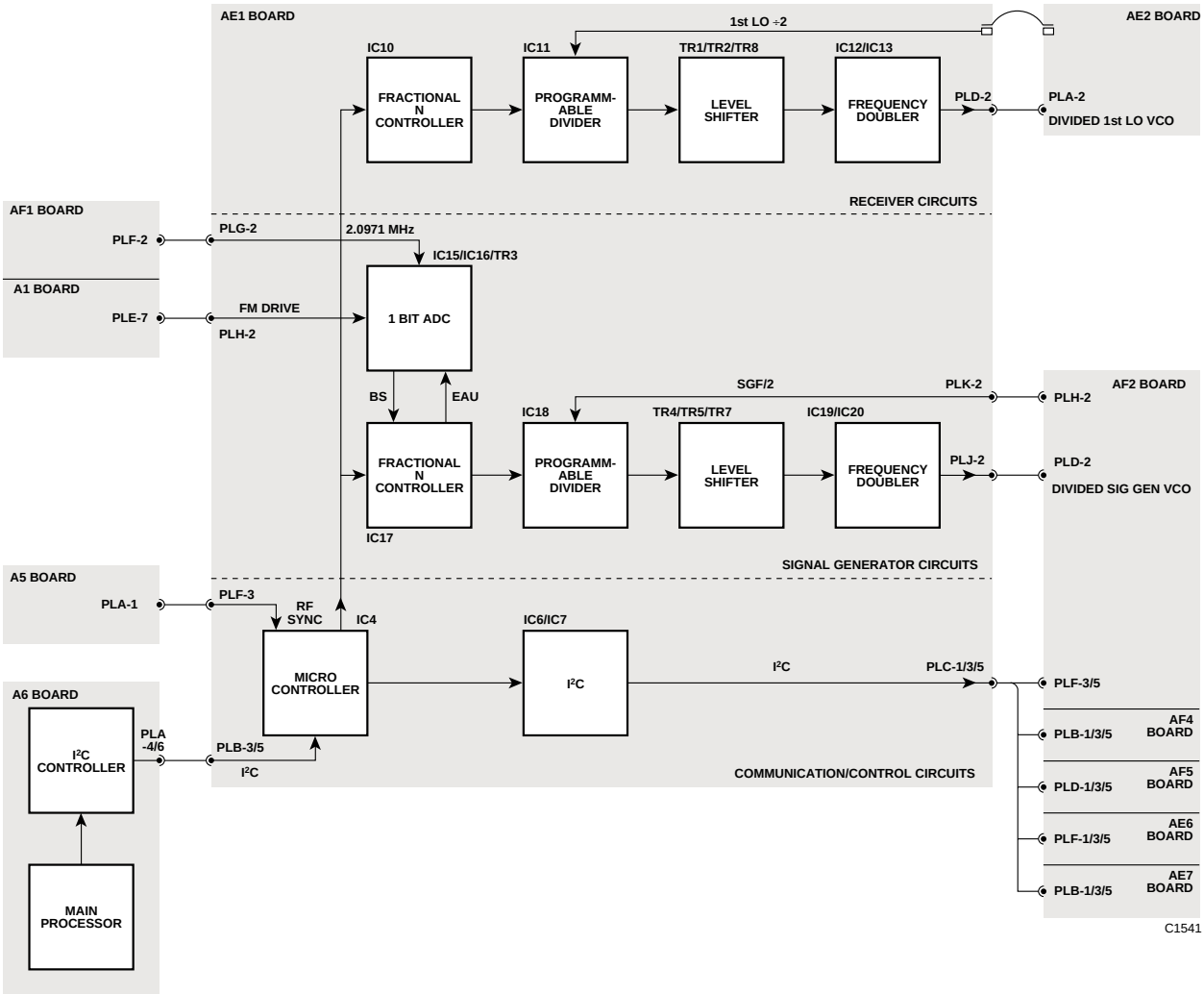



*Fig. 1-11 AE1 board - block diagram*

# Down converter module

This module is necessary for the GSM test function to operate at RF frequencies used by the DCS and PCS versions. Its purpose is to accept signals within the frequency range 1.709 GHz to 1.991 GHz and down convert them to within the range 429 to 711 MHz. They can then be processed by the receiver circuits of the Test Set. The usable range of the down converter is from 1.5 GHz to 2.2 GHz. A non- converting (Bypass) path is included in the module to handle signals within the specified range of 100 kHz to 1 GHz. This is usable from 30 kHz to 1.05 GHz.

The module contains two PCBs; the Down Converter Board AK2 and the Oscillator Board AK1.

AK2 was designed specifically for this application, but the oscillator board is identical to the AE5/1 board used elsewhere in the Test Set. As these boards are identical in every respect, all carry the printed type number AE5/1.

The module consists of a metal assembly comprising of two chambers back to back, with screening covers. One PCB is housed in each chamber. SMA RF connectors are used for RF input and output signals, and for passing the oscillator signal from AK1 to AK2. The 10 MHz reference signal enters the AK1 chamber through an SMB connector. Other connections are made using feed through bulkhead connections.

# AK1 Down converter oscillator board

Also see AE5 and AE5/1

This module uses an oscillator board originally designed to perform the 2nd and 3rd local oscillator function (AE5/1) within this Test Set. For convenience the board fitted within this down converter module is referred to as AK1, but it is marked AE5/1.

AK1 provides the 1280 MHz +10 dBm local oscillator signal for the down converter board AK2. The design of the board also provides an 80 MHz −8 dBm signal. In the AK1 application, this signal is not used for any off board duty. It does provide a reference signal for the 1280 MHz phase locked loop.

The 1280 MHz oscillator is disabled when the AK2 down converter is in bypass mode. The emitter of TR1 is returned to −12 V through TR11.

Three 80 MHz outputs are taken from TR5's emitter. A reference for the 1280 MHz oscillator is taken from the emitter of TR5 through TR8. Two other outputs are also taken from the emitter of TR5, one through TR6, the other through TR7. These signals are not used in this application.

# AK2 Down converter board

## Introduction

Fig. 1-12 shows a block diagram of the board.

This board contains circuits to perform all the functions mentioned in the description of the down converter module with the exception of the 1280 MHz oscillator which is on AK1.

## Overload detector

Under some operating conditions the input signal to AK2 can exceed its maximum input level of −30 dBm. To prevent damage to this board an overload detector and protection circuit is included.

The RF signal from the radio under test passes through the Input Attenuator AC1 and enters the board at PL2. After passing isolating capacitor C10, a sample of the signal is taken from the junction of R11 and R12 to the overload detection circuit. The positive cycles of the signal are detected by D4, smoothed by C8 and R13, then applied to the inverting input of comparator IC2. The non-inverting input is held at ≈+35 mV by R14 and R15.

While the inverting input is less positive than the non-inverting input, the output from the comparitor remains high, thereby keeping the S input of the D type flip-flop IC3a high.

If the RF input at PL2 rises above 10 dBm, the inverting input becomes more positive than the non-inverting input and the comparitor output will go low. This takes the S input of the D type flip-flop to low, setting its output logic high, causing TR5 and TR6 to conduct, which activates the protection circuit.

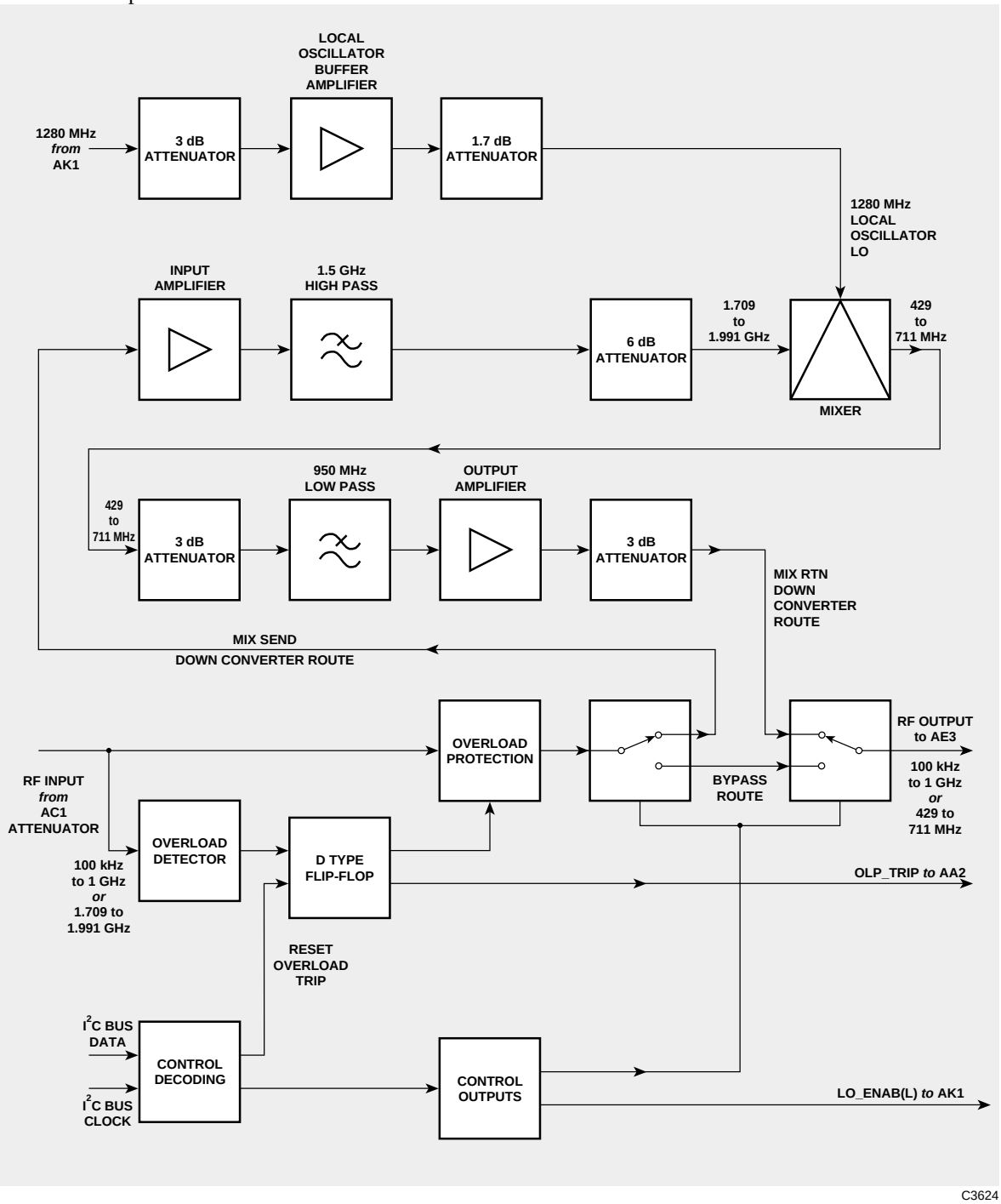



*Fig. 1-12 AK2 board - block diagram*

## Overload protection

Under normal conditions the signal path through the overload protection circuit is from PL2, through C10, L1, L2 and L3 to IC4 in the Mixer/Bypass switching circuit. Diodes D5 and D6 are reverse biased, thus having no effect on the signal. The bias path for D5 is through R28 and R29 to –12 V, for D6 through R27 and R26 to +12 V.

When the overload detector triggers the protection circuit, TR5, TR7, TR8 and TR9 conduct, which reverses the biasing on D5 and D6. This put a low impedance path on the RF line, diverting the RF power from the Mixer/Bypass switching circuit.

TR6 is also made to conduct when the detector is triggered. This causes the OLP_TRIP (L) line to go low, activating the main overload protection circuit on the input switching board AA2.

## $I^2C$ decoding

Control signals for the board are passed from AE1 over the $I^2C$ bus. Commands are decoded in the 8 bit I/O IC1. Only two of the eight ports are used. P7 (pin 12) provides the Mixer/Bypass switching control line. When this line is high, TR1 is cut off, causing TR2 to cut off and TR3 to conduct. This switches IC4 and IC5 to the Bypass route. TR4 also conducts, holding the LO_ENAB(L) line high. This disables the 1280 MHz local oscillator on AK1.

When P7 from IC1 is low, all the devices mentioned above are switched to the alternative sense. The Down Converter route is set up and the 1280 MHz oscillator enabled.

## Mixer/Bypass switching

The down converter circuit is only active when radios with an RF output of between 1.709 GHz and 1.991 GHz are to be tested. For this the Mixer/Bypass switching is set to the Down Converter route. For other functions the Bypass route is set. Switching is carried out by analogue switches IC4 and IC5.

## Local oscillator buffer

The 1.28 GHz local oscillator signal for the down converter is generated on AK1 and enters the board at PL1. It has a nominal level of +10 dBm.

The path to the mixer input includes a 3 dBm pad R44, R45, R46; a buffer amplifier IC6 and a 1.7 dB pad R47, R48, R49. The level of signal at the mixer input is restored to nominally +10 dBm.

## Input amplifier and mixer

Input signals to be down converted are routed by the Mixer/Bypass switch to the input amplifier path. Signal levels will be within the nominal range −46 to −56 dBm This path has an amplifier IC8, with a gain of approximately 25 dB, followed by a 1.5 GHz high pass filter formed by capacitors C36 to C42, together with their associated printed inductors. A 6 dB pad R41, R42, R43, precedes the mixer. Signal levels into the mixer will be nominally −27 to −37 dBm.

The Double Balanced Mixer IC7 provides a difference signal from the RF input signal and the 1.28 GHz local oscillator signal. This will have a level within the nominal range −35 to −45 dBm. For DCS/PCN applications the frequency range of the intermediate frequency from the mixer will be 429 to 711 MHz.

## Output amplifier path

The mixer output signal is padded by a 3 dB attenuator R50, R51, R52, then passed through the printed 950 MHz lowpass filter. Amplifier IC9 provides a gain of approximately 26 dB. The signal is passed through 3 dB pad R55, R56, R57 before being routed by the Mixer/Bypass switching to leave the board at PL3. The signal level at PL3 will be within the nominal range −18 to −28 dBm.

## Power rails

The board is powered by +12 V and -12 V rails which enter the board at PLA pin 1 and pin 3 respectively. Additional noise reduction is applied on the board to provide noise isolation between circuits.

A +5 V supply is derived from the +12 V rail by Zener diode D1 and its associated components.

A -7.5 V supply is derived from the -12 V rail by Zener diode D2 and its associated components. This supply is used to bias the Mixer/Bypass switch devices IC4 and IC5.

# AE2 1st LO synthesizer board

## Introduction

Fig. 1-13 is a block diagram of AE2. This board provides the 1st local oscillator frequency signal to the first mixer board AE3 via a PCB pad. Its main inputs are a 2.0971 MHz REF signal from the AF1 board and the divided 1st local oscillator signal from AE1. The board also provides the feedback signal (LO ÷2) for the fractional-N control circuit on AE1.

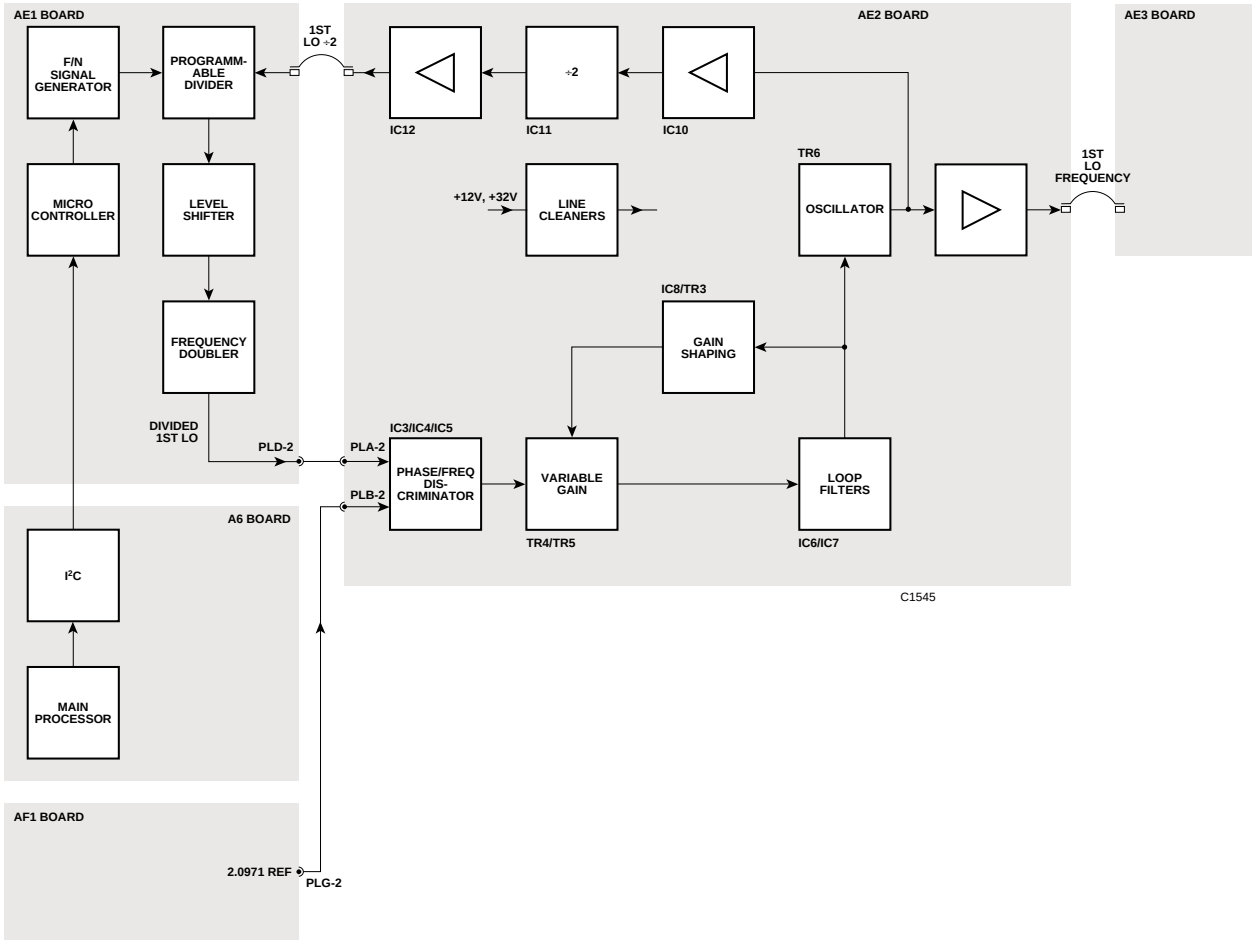



*Fig. 1-13 AE2 board - block diagram*

## Line cleaners

Line cleaners IC1/TR1 and IC2/TR2 prevent noise on the +32 V and +12 V supply lines from introducing phase noise via the VCO. Circuits for +32 V and +12 V line cleaning are similar so only one will be described.

The inverted input of IC1 is biased by the potential divider R2, R3 and R6, with the input maintained at an AC earth via the long time-constant R4 and C3. Any AC current transients on the power line are developed across R1 and applied via zener diode D2 to the non-inverted input. IC1 output drives the base of TR1 to compensate for the transient current change in the power supply.

## 1.35-2.35 GHz oscillator and ÷2

TR6 and associated components form a VCO which tunes from 1.35 GHz to 2.35 GHz under voltage control of between 2 V and 21 V at the junction of varactor diodes D12 and D13. The signal path to the AE3 board is amplified by IC9.

The VCO output is amplified by IC10, divided by 2 in IC11 and amplified by IC12 before passing to the AE1 board. The ÷2 output to AE1 is in the range 675 MHz to 1175 MHz.

### Phase/frequency discriminator and loop gain control

The phase/frequency discriminator IC3(a), IC4(a), and IC5(a) to IC5(d) provides differential outputs indicating the phase/frequency difference between the two inputs.

An automatic variable gain control loop is provided to compensate for the oscillator's non-linear control voltage/frequency characteristic. Thus the gain of TR4 and TR5 is controlled by the current mirror TR3 which is, in turn, controlled by the conditioned VCO frequency control voltage from IC7 via IC8.

IC8(a) is a non-inverting unity gain amplifier isolating the preceding circuits from the gain shaping circuits. R38, R39 and IC8(c) set a reference voltage of approximately 8.9 V. When the tuning control voltage is below this value D9 is forward-biased, clamping IC8(b) pin 5 to 8.9 V, and IC8(b) functions as a buffer. As the oscillator's frequency control voltage rises above 8.9 V, diode D9 turns off and releases IC8(b) pin 5 to follow IC8(b) pin 6, allowing IC8(b) pin 7 to follow the oscillator's frequency control voltage via R35. This output then sets the operating current in TR3.

## AE3, AE3/2 First mixer board

AE3 generates a 1349.3 MHz IF signal which is fed to the AE4 board. Main inputs to the board are:-

- 100 kHz to 1000 MHz RF signal from the front panel.
- 1.35 GHz to 2.35 GHz 1st LO signal from AE2.
- RX PREAMP (L) control signal from A6 CPU.

The RF input signal which enters the board at SKA has been routed from the selected RF connector on the front panel, through the input switching board (AA1, AA1/1 or AA2) and the receiver section of the RF attenuator unit.

Wideband amplifier IC1/IC2 provides 20 dB gain. It can be bypassed by relays RLA and RLB which are operated by relay driver TR1. TR1 is controlled by signal RX PREAMP L.

L2 to L7 and C1 to C7 comprise a 1 GHz low-pass filter whose characteristic can be adjusted by C1 to C5. C2 and C4 are adjusted for a shoulder at 1.1 GHz, while C1 and C5 are adjusted for a notch at 1349.3 MHz (the 1st IF frequency). A 3 dB pad attenuates the low-pass filter output, and matches its output impedance to the input of the balanced mixer IC3.

A 2 GHz low-pass filter comprising C16 to C21 and L11 to L17 removes the upper second-channel component from the mixer's output signal.

#### AE3/1 only

The input to the wideband amplifier is protected by diodes D2 and D3.

When the wide band amplifier is bypassed, the input is held to ground through R13 and RLA.

## AE4, AE4/2 IF board

This description applies to both AE4 and AE4/2. The boards are very similar, the only significant difference being the use of a ceramic filter on AE4/2.

AE4 (or AE4/2) generates two 10.7 MHz IF signals, one being fed to the AE6 board, and the other to the rear panel IF socket. Main inputs to the board are:-

- 1349.3 MHz IF signal from AE3.
- 1280 MHz 2nd LO signal from AE5.
- 80 MHz 3rd LO signal from AE5.

The IF input from AE3 is fed to:-

**On AE4:** A helical filter with four elements comprising series input and output tuned circuits and two parallel-tuned filters. The four sections are adjusted by C1 to C4 for 1349.3 MHz with a bandwidth of 20 MHz thus providing rejection of the fixed image frequency of 1210.7 MHz. C2 and C3 adjust the centre frequency, and C1 and C4 adjust the skirt cut-offs.

**On AE4/2:** A ceramic filter FL1 with a centre frequency of 1349.3 MHz and a bandwidth of 25 MHz.

The amplifier IC1 together with R1 isolates the filter from the balanced mixer stage. IC1 provides a gain of approximately 20 dB to compensate for losses. IC2 mixes the 1.28 GHz 2nd LO input signal from AE5 with the 1.3493 MHz signal from the filter to derive the 69.3 MHz 2nd IF signal.

A band-pass filter C6 to C13 and L6 to L9 is adjusted to remove the adjacent channel components of the mixing process from the signal path. Series components C6 and C7 are adjusted to the centre frequency of 69.3 MHz. C12 and C13 are adjusted to provide the maximum rejection of the third mixer's image frequency of 90.7 MHz. The resulting bandwidth is approximately 4 MHz.

Amplifier TR1 has a nominal gain of 16 dB and isolates the preceding band-pass filter from the mixer IC3. C14 is adjusted to the centre frequency of 69.3 MHz. This reduces the bandwidth further to that of the 3 MHz filter.

IC3 is a double balanced RF mixer. It mixes the 69.3 MHz second IF with the 80 MHz signal from AE5 to derive the two 10.7 MHz IF signals. Emitter-followers TR2 and TR3 provide low output impedances for the respective lines to the AE6 board and rear panel.

# AE5 2nd and 3rd LO board

AE5 provides the 2nd LO frequency (1280 MHz +10 dBm) and 3rd LO frequency (80 MHz –8 dBm). Both signals are fed to the 2nd and 3rd IF mixer board AE4. Each of the oscillators generating these frequencies is part of a phase-locked loop circuit.

AE5/1 is a later version of AE5, which has been developed to allow a second board to be used in another application within the Test Set. This is located within the Down Converter module and is referred to there as AK1. A description of AE5/1 is included separately, as there are some components changes included as part of IFR Ltd.'s policy of continual improvement.

## 1280 MHz oscillator

TR1 is a voltage-controlled common-emitter Hartley oscillator. The varactor diode D3 forms part of the capacitive coupling between the inductors. The oscillator output is buffered by IC2 with 12 dB gain, to give a signal level of +6 dBm at C16. Components L8, L9, C17, R17 and C18 form a Wilkinson power divider at 1280 MHz with an insertion loss of 3 dB and provide 25 dB isolation between the two signal paths. IC3 provides buffering and boosts the signal to the AE4 board to +10 dBm.

IC4 and IC5 frequency divide the signal by 16 to provide the controlled signal into the phase detector IC6 to be compared against the 80 MHz reference.

The phase detector IC6 is a double balanced mixer whose outputs are summed by IC1(a) and applied as an error signal to the search oscillator/loop amplifier IC1(b) which operates in two modes:-

- Before frequency lock, IC1(b) and associated components function as a Wien oscillator with nominal gain of 3 producing a 10 V pk-pk, 60 Hz square wave. This waveform sweeps the 1280 MHz oscillator about the phase lock point.
- When phase lock occurs, the gain of the control loop exceeds that of the Wien oscillator, and therefore the frequency sweep is halted. This permits control of the 1280 MHz oscillator to be exercised though phase difference alone.

If lock is lost, the loop gain becomes much less than the Wien oscillator gain, thus re-initiating oscillation to resume the search for a lock condition.

### 80 MHz oscillator

TR4, TR3 and associated components function as a Butler oscillator using a 5th overtone 80.0041 MHz crystal XL1. Frequency control is exercised by the varactor diode D4. L12 neutralises the crystal's parallel capacitance and L13 increases the series inductance, the effect being to reduce the frequency and increase the frequency control provided by D4. L11, C50 and C51 form a parallel-tuned circuit, ensuring that oscillation occurs at the correct overtone. To provide the maximum amount of frequency control, D4 anode is returned to −12 V permitting a 22 V control range.

TR5's collector signal is the feedback for the phase locked loop. After level conversion by TR2, the signal is divided by 8 in IC7 to provide a 10 MHz clock to IC8(a). The 10 MHz reference signal from AR1 is the clock to IC8(b). Phase detector IC8(a)/IC8(b) generates antiphase outputs whose pulse width is proportional to the phase difference between the two clocks. Loop filter IC10 functions as an integrator subtracting the antiphase inputs, thus generating an output level proportional to the phase difference. This voltage is used to bias the varactor diode D4 to maintain the 80 MHz oscillator at the correct frequency.

Three 80 MHz outputs are taken from TR5's emitter. These are the 3rd LO signal to AE4 via TR7, a reference for the 1280 MHz oscillator via TR8, and a clock to the A5 board via TR6.

## AE5/1 2nd and 3rd LO board

AE5/1 was developed from AE5 to include features which allow it to be used in a second location within the Test Set as AK1. This description of AE5/1 is included separately to that of AE5 as there are some components changes included as part of IFR Ltd.'s policy of continual improvement.

AE5/1 provides the 2nd LO frequency (1280 MHz +10 dBm) and 3rd LO frequency (80 MHz −8 dBm). Both signals are fed to the 2nd and 3rd IF mixer board AE4 or AE4/1. Each of the oscillators generating these frequencies is part of a phase-locked loop circuit.

### 80 MHz oscillator

TR4, TR3 and associated components function as a Butler oscillator using a 5th overtone 80.0041 MHz crystal XL1. Frequency control is exercised by the varactor diode D4. L12 neutralises the crystal's parallel capacitance and L13 increases the series inductance, the effect being to reduce the frequency and increase the frequency control provided by D4. L11, C50 and C51 form a parallel-tuned circuit, ensuring that oscillation occurs at the correct overtone. To provide the maximum amount of frequency control, D4 anode is returned to −12 V permitting a 22 V control range. Variable capacitor C51 is set so tuning voltage at TP9 is between −2 V and −4 V.

The oscillator output from the tuned circuit in TR4 collector is buffered by TR5 whose collector signal is the feedback for the phased lock loop. After level conversion by TR2, the signal is frequency divided by 8 in IC7 to provide a 10 MHz clock to IC8 (pin 3). The 10 MHz OCXO reference signal from AR1 is the clock to IC8 (pin 11). Phase detector IC8 generates antiphase outputs whose pulse width is proportional to the phase difference between the two clocks. Loop filter IC10 functions as an integrator subtracting the antiphase inputs, thus generating an output level proportional to the phase difference. This voltage is used to bias the varactor diode D4 to maintain the 80 MHz oscillator at the correct frequency.

The 80 MHz output from TR5's emitter is taken to three emitter followers.

These are a clock to the A5 display board via TR6, the 3rd LO signal to AE4 via TR7 and a reference for the 1280 MHz oscillator via TR8

The tuned circuits in TR4 and TR5 collector circuits, together with the series tuned circuit, act to reduce the harmonic content of the 80 MHz clock to A5. The outputs from TR6 and TR7 are unused when the board is used in the AK1 position.

### 1280 MHz oscillator

TR1 is a voltage-controlled common-emitter Hartley oscillator. The tuning varactor diode D3 forms part of the capacitive coupling between the printed inductors. When the board is used as AK1, the oscillator is stopped by turning off the power switch TR11, in its negative supply. When the control line, LOENAB(L) from AK2 is true (active low), P-channel MOSFET TR9 is turned on applying +5 V to the gate of N-channel MOSFET TR10, turning it on and therefore allowing power to the oscillator. If the board is used as AE5/1 no connection is made to PLG and TR10 is turned on by R83 providing gate bias.

The oscillator output is amplified by 12 dB in IC2, to give a signal level of +6 dBm at C16. Components L8, L9, C17, R17 and C18 form a Wilkinson power divider at 1280 MHz with an insertion loss of 3 dB and provides 25 dB isolation between the two signal paths.

The 1280 MHz, +10 dBm output to AE4 is provided by amplifying the divider output from L8 in IC3 and passing it through high pass filter C70, C71 and L17.

The second output from the power divider is used for the oscillator feedback to the phase detector. The signal is reduced by 13 dB in Ω attenuator R18, R19, R20, amplified by 12 dB in IC4 and passed to three input of divider IC5. This attenuator and amplifier serve to isolate the 1280 MHz oscillator from the divider.

IC5 divides the signal by 16 to provide the control signal into the phase detector IC6 to be compared against the 80 MHz reference.

The phase detector IC6 is a double balanced mixer whose output is amplified by approximately 11 times in IC1a and applied as an error signal to the search oscillator/loop amplifier IC1b which operates in two modes:-

- Before frequency lock IC1b and associated components functions as a Wien bridge oscillator with nominal gain of 3 producing a 18 V pk-pk, 60 Hz square wave. This waveform sweeps the 1280 MHz oscillator about the phase lock point.
- When phase lock occurs, the loop gain of the Wien oscillator becomes greater than 3 and it stops oscillating. This permits control of the 1280 MHz oscillator to be exercised though phase difference alone.

If lock is lost, the loop gain becomes much less than the Wien oscillator gain, thus re-initiating oscillation to resume the search for a lock condition.

Bias current through IC6 is set to 75 mA by R28. The −5 V supply rail for IC6 is derived from the −12 V rail using regulator IC11 and series pass transistor TR9.

## AE6, AE6/2 Spectrum analyzer board

### Introduction

This description covers the AE6 board and its replacement AE6/2. The boards are similar except for the log amplifier and video filter sections; these are described separately. Where there are only minor differences, AE6 references are shown in brackets.

Figs. 1-14 and 1-15 are block diagrams of AE6 and AE6/2 respectively. The board provides switchable and tuneable filtering and conditioning of the 10.7 MHz IF signal from AE4, controlled by $I^2C$ bus signals from AE1. It produces WIDEBAND and NARROWBAND IF signals to AE7, an IF COUNT to A6 and a LOG AMP signal to the A5 display board.

### $I^2C$ control (sheet 1)

$I^2C$ bus expander IC17 and 8-channel DAC IC16 are both interfaced to the $I^2C$ bus from the AE1 board. IC17 provides routeing control of the various filters and of the video filters that form part of the log amplifier circuit (page 1-98). IC16 outputs are used to drive the adjustment circuits of the 5-stage crystal filter.

## Switchable wideband filters (sheet 1)

Gain variations occurring in the conversion stages of the AE3 and AE4 boards are corrected by TR29 and TR30. R157 (SET GAIN) is set for a nominal −15 dBm (−17 dBm) level at TP11 when using 280 kHz or narrower filters. The signal is then applied to the 280 kHz and 110 kHz ceramic filter stages, each of which can be switched out. Where both are bypassed for 3 MHz bandwidth, 10 dB of attenuation is added by R67 to compensate for the removal of 10 dB RF attenuation.

With both filters switched into circuit, the wideband filter provides a pass band of 100 kHz with increased isolation.

Each of the two wideband filters uses the same technique, so only one is described. XL6 is a ceramic band-pass filter centred on 10.7 MHz. To compensate for the loss in the filter, the signal is first amplified by TR31. Matching for the ceramic filter is provided by R161 and R164. TR32 buffers the filter output.

Following the two wideband filter sections, TR35 and TR36 provide a fixed gain of 24 dB (21 dB), raising the nominal signal level to the crystal filter to +7 dBm (+4 dBm), while TR37 and TR38 raise the nominal signal level to the AE7 board to 0 dBm.

## Crystal filter control (sheet 1)

The paired outputs of DAC IC16 are summed and scaled by IC14 and IC15 to provide high resolution dynamic control of centre frequency, null strays, bandwidth adjust and gain adjust. The MSB provides coarse control, and the LSB fine control of the crystal filter parameters.

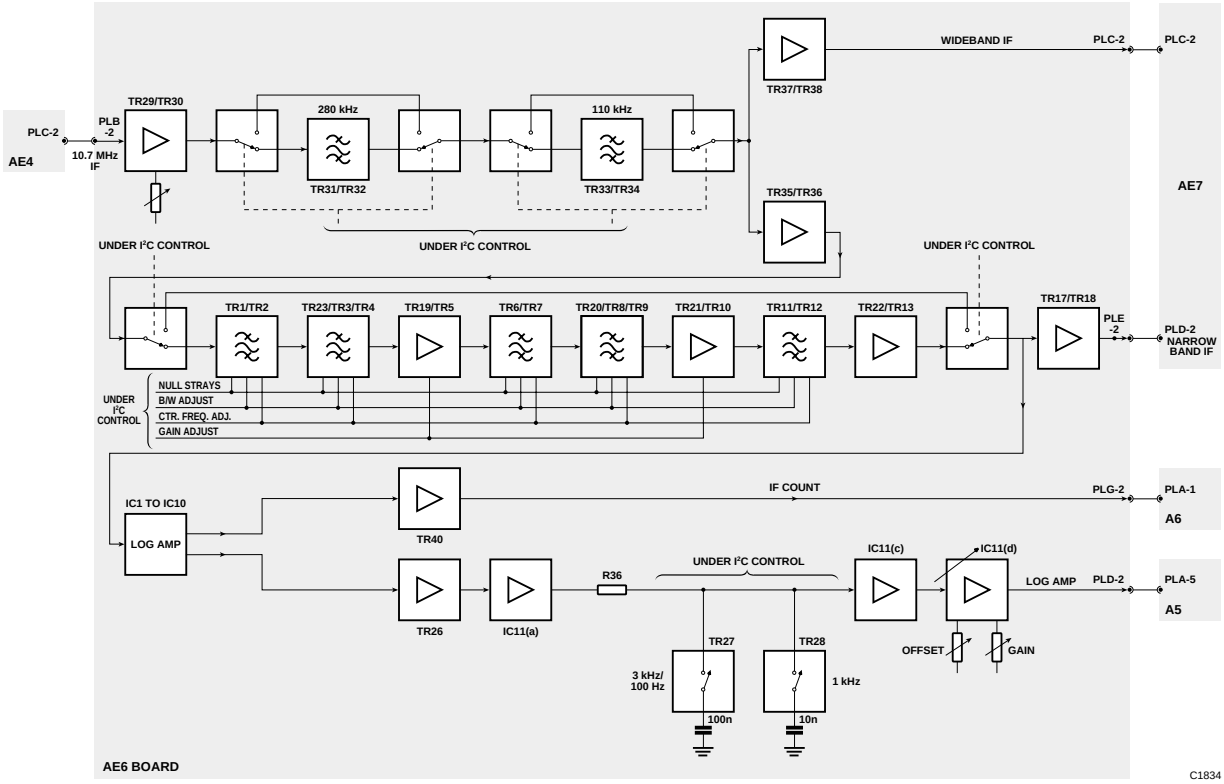



*Fig. 1-14 AE6 board - block diagram*

## Variable-bandwidth crystal filters

(AE6: sheets 2 and 3; AE6/2: sheets 2 to 4)

The five stages of the crystal filter are cascaded to approximate to a Gaussian filter. Each stage is the same, so only the first stage is described.

C4, C5 and varactor D9 are in series with the crystal XL1. The centre frequency can be initially adjusted by the variable capacitor C4, and dynamically adjusted by the bias voltage applied to D9. The range of control of CENTRE FREQ ADJUST on D9 is between 0 V to +10 V which is generated under software control by IC14(a) and IC15(a). The bandwidth is adjusted by varying the conductance of D1 and D23 (control line BANDWIDTH ADJUST), which effectively alters the resistive component of the filter and thus its Q factor.

At bandwidths greater than 10 kHz, the stray capacitances across D1 and D23 become significant and contribute to detuning the crystal. To compensate for this, the parallel-tuned circuit L2, C13, C14 and D10 permits the effect of the strays to be nulled, both initially by C13, and dynamically by NULL STRAYS under software control by adjusting the capacitance of varactor D10.

The effect of crystal mounting capacitance on the response skirt is nulled by applying an antiphase signal via TR2 and C7 to the output side of the crystal.

Emitter-followers TR1, TR23/TR3, TR19, TR6, TR20/TR8, TR21, TR11, and TR22/TR13 provide isolation and impedance matching between stages.

The effect of dynamic bandwidth adjustment is to reduce the overall gain as the bandwidth is increased. To compensate for this, the gain of TR5 and TR10 is adjusted by the software controlled GAIN ADJUST signal and associated pin diodes D3 and D6.

The whole of the crystal filter can be switched out by the XTAL FILTER BYPASS signal, which is applied to the input, R97 on sheet 2, and output, R98 on sheet 4 (sheet 3).

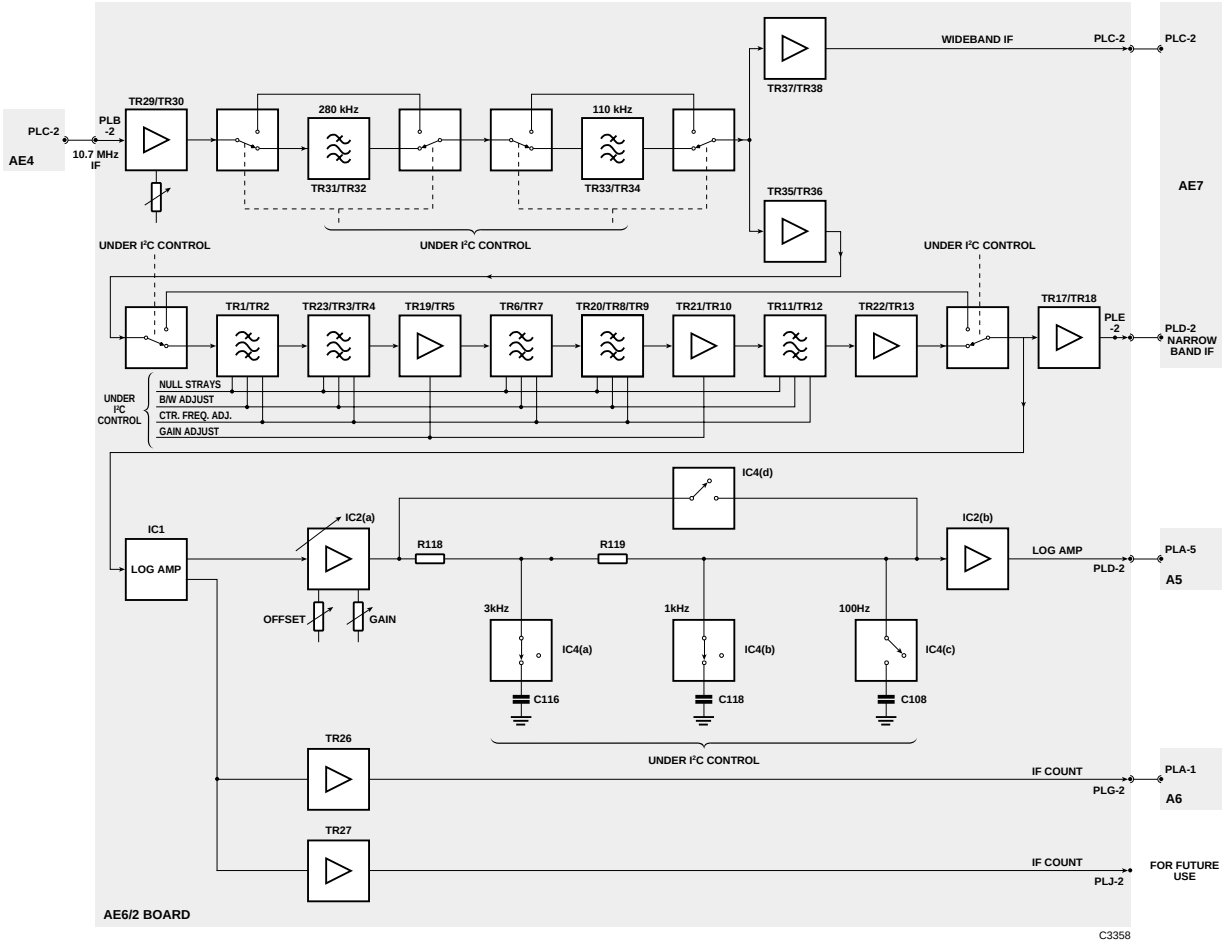



*Fig. 1-15 AE6/2 board - block diagram*

## AE6: Log amplifier and video filters (sheet 4)

The log amplifier is of the successive summation type. It uses a chain of identical amplifiers whose outputs successively saturate at a predetermined level. The outputs of all the stages are then summed.

Each of the ICs IC1 to IC8 has a detected output at pin 4, and an RF output at pin 3. The amplifier/detectors IC9 and IC10 provide additional drive to achieve a logarithmic response at high signal levels.

The output at IC8 pin 3, after isolation by the emitter follower TR40 and transformer T1, provides an IF COUNT signal over a wide dynamic input range with a suitable amplitude for counting on the A6 CPU board.

The detector current outputs of all stages are summed by TR26. R141 is adjusted to match the log amplifier's output to the A to D input on the A5 display board to give the correct display dB/div characteristic while R140 positions the trace on the display by applying a DC offset.

Different video filter characteristics are provided by the action of TR27 and TR28. These transistors switch in/out decoupling components under software control. R135/C133 are effective at 3 kHz bandwidth, R136/C134 at 100 Hz and R136/C135 at 1 kHz.

### AE6/2: Log amplifier and video filters (sheet 5)

The log amplifier IC1 is an AD606, which contains nine limiting amplifiers in a successive detection arrangement to provide a logarithmic response over a dynamic range of 90 dB. The stable accurate supply voltage of +5 V required by IC1 is provided by an LT1019, IC3.

IC1 has two outputs; an RF signal LI1LO on pin 8 and a DC signal VLOG on pin 6.

The RF output, after buffering by the emitter follower TR26, provides an IF COUNT signal over a wide dynamic input range with a suitable amplitude for counting on the A6 CPU board.

IC2(a), and potentiometers R141 (gain) and R140 (offset), allow the DC output to be adjusted. R141 is used to match the output to the A-D input on the A5 display board to give the correct display dB/div characteristic, while R140 positions the trace on the display by applying a DC offset. When correctly adjusted, input levels between −75 dBm and +5 dBm produce output signals on PLD-2 of between −0.5 V and +2.5 V.

Various video filter characteristics are provided by the filter components R118, R119, C116, C118, and C108, which are switched in or out by IC4(a) to IC4(d). These switches are controlled by bits P3 to P5 from IC17. The following table shows the relevant bit patterns.

| | P4 | P3 | Effective Filter |
|---|---|---|---|
| 0 | 0 | 1 | 100 Hz |
| 0 | 0 | 0 | 1 kHz |
| 0 | 1 | 0 | 3 kHz |
| 1 | 1 | 0 | None |

## AE7 Demodulator board

### Introduction

Fig. 1-16 is a block diagram of AE7. The board is supplied with 10.7 MHz wideband and narrowband IF signals from AE6. It has an FM and an AM/SSB channel, but the SSB facility only works in conjunction with the optional AE8 board which mounts on AE7 (**Note:** AE8 is always fitted on the 2966A and 2968). The AE7 board provides demodulation and filtering of the FM, AM and (where applicable) SSB signals, and generates DEMOD FM and DEMOD AM signals to A3 audio processor board.

The board supplies an AGC OUT signal to A2 receiving in return a SQUELCH signal. AE7 is controlled via the AE1 $I^2C$ bus.

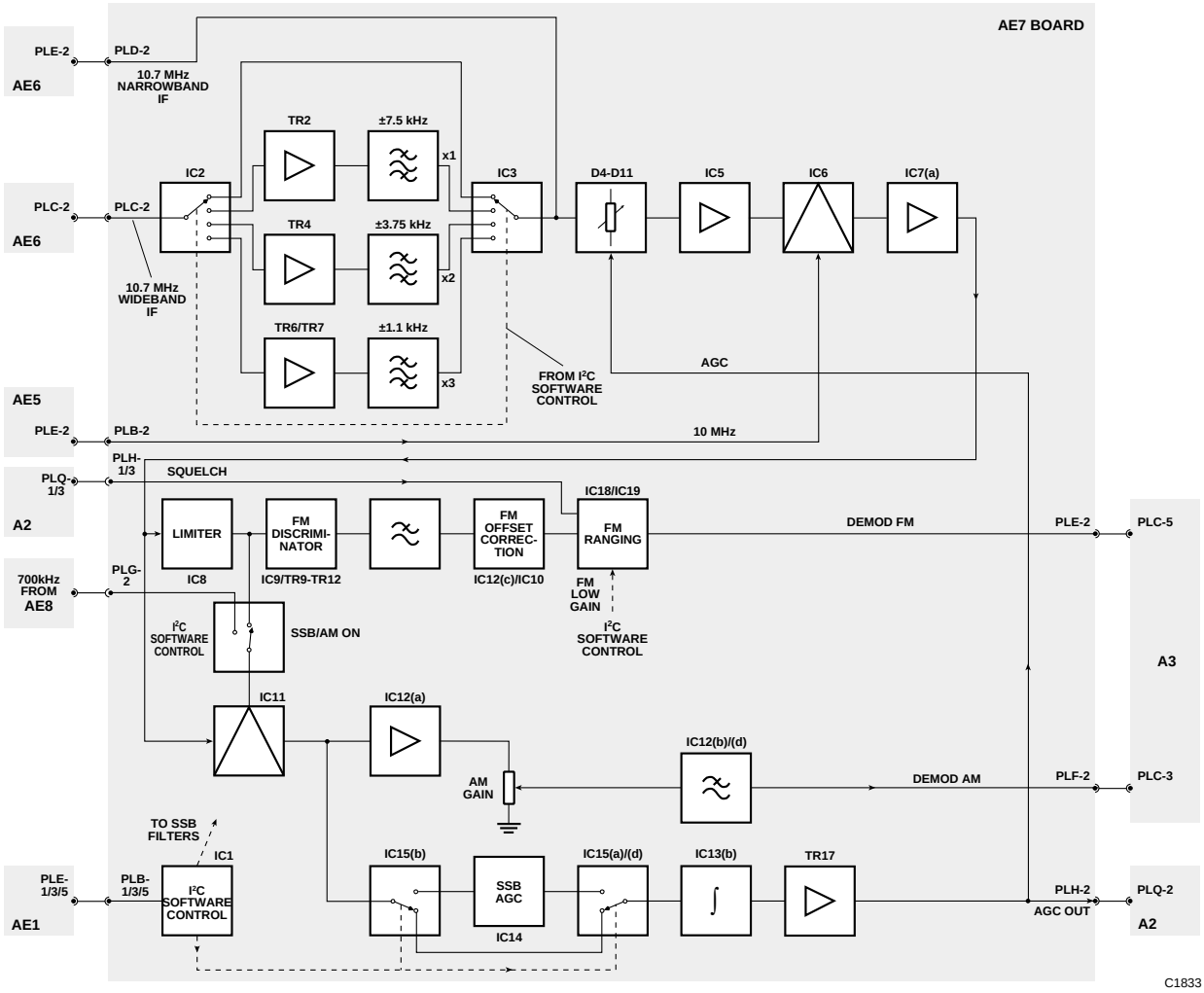



*Fig. 1-16 AE7 board - block diagram*

## I²C control (sheet 1)

The AE1 I²C bus is decoded by IC1 to provide:-

- SSB ON selection enabling SSB demodulation.
- AGC FAST selection to switch AGC time constants.
- FM LOW GAIN selection to set gain of FM demodulation.
- WIDEBAND SA (spectrum analyzer) FILTER SELECT.
- Selection of required ±7.5 kHz, ±3.75 kHz or ±1.1 kHz crystal filter. These are not normally fitted.

## Crystal filters and AGC attenuator (sheet 1)

Switches IC2 and IC3 select the required filter circuit, according to the D0-D3 outputs from IC1. Currently, the filters are unused. However, the WIDEBAND IF signal can be routed directly or through a filter. The NARROW band IF signal cannot be filtered here.

AGC attenuation is provided by PIN diode chain D4-D11, switched by IC4 according to whether or not wideband filter operation is required. For operation from the wideband path IC4 connects the AGC bias to diodes D4-7 whilst D8-11 are biased off via R48 for increased isolation between the two paths. AGC operation is described later. The output from the centre of the diode chain provides the drive for amplifier IC5 which provides antiphase signals to the balanced mixer IC6 (sheet 2). AGC operating level is set by altering the gain of IC5 with R154 (IF GAIN).

## Mixer and IF amplifier (sheet 2)

The two 10.7 MHz outputs from IC5 are connected to pins 12 and 13 of double balanced mixer IC6. They are mixed with a 10 MHz signal from AE5 to give the 4th IF signal of 700 kHz. The second channel component is removed from the signal by the low-pass filter L13/L14 and C55/C56/C106 and the signal is amplified by IC7(a). The 700 kHz IF is passed to limiter IC8 and the AM demodulator.

## AM/SSB channel

The output of IC7(a) is applied to multiplier IC11 together with the limited 700 kHz from IC8 for AM demodulation. Output from IC11 is fed via IC12(a) and AM GAIN control R116 to an 80 kHz low-pass filter formed by IC12(b)/(d) (sheet 3) and then to the A3 board as DEMOD AM.

The AE8 board, when fitted, allows the AM demodulator to be used for SSB. The 700 kHz BFO signal from AE8, when SSB is on, is applied to IC11 via switch IC16, which inserts this signal as the carrier. Control line SSB ON enables SSB operation.

## FM channel

The output of limiter IC8 (sheet 2) is applied to IC9 which produces differential square wave output signals. These signals are amplified by TR9 and TR10 whose collector outputs are clamped by D22 and D23 to ±6.2 V. TR11 and TR12 are switched by the input signal at 700 kHz, resulting in a differentiated signal at R101/R168 junction, representing the deviation on the FM carrier. L20/L22/L23/L25 and C78/C79/C145/C80/C146 form a low-pass filter to remove the 700 kHz and 1.4 MHz content, with R145 providing frequency response adjustment.

IC12(c) (sheet 3), with associated components, forms an adjustable offset voltage source for amplifier IC10. Normal/FM LOW GAIN control is provided by switch IC18 which also provides the means of connecting the SQUELCH signal from the A2 board. Gain may be ×1 or ×10 as referred to in the section on AF, demod and multimeter ranging.

## AM and FM AGC (sheet 2)

The push-pull outputs from IC11 are summed by IC13(a). DC content is extracted from the audio signal by C87/R125/R126 and integrated by IC13(b). To increase the current capability of the integrator output it is passed through emitter follower TR17 (sheet 1) before reaching the AGC control diodes.

For AM, a long time constant is required in the integrator, this being provided by C96. When FM is used, AGC FAST deselects C96 with IC15(c) just leaving C168, thus altering the integration time.

## SSB AGC (sheet 2)

When SSB ON is selected, the audio signal from IC13(a) is connected to the SSB AGC circuit. This two-way AGC circuit provides a fast-attack/slow-decay AGC characteristic, which is required to handle the typical "bursty" SSB operation. The main AGC path is via IC14(a) and detector D27, with its time constant determined by C53/R158/R138/R136/R137. IC14(b), D28, C84 and associated components constitute a peak detector with a relatively slow response. Under quiescent conditions, C84 is uncharged and IC14(c) holds TR14 off, thus the discharge resistance of C53 in the main AGC path is high (i.e. a long time constant).

When an SSB signal occurs, it is peak detected by D28, and C84 charges. When the charge reaches the threshold set by R134/R135, TR14 is turned on, which switches R137 out of circuit. This shortens the time constant of C53 in the main AGC path. The SSB AGC gain is adjustable by R139, which sets the gain of IC14(d). The output from the SSB AGC circuit then passes to the main AGC integrator via switch IC15(a).

# AE8 SSB BFO/Digital systems board

## Introduction

AE8, when fitted, is mounted on AE7, and forms part of the SSB option for the 2965/65A. It is always present in a 2966A and 2968, because the digital systems require a 2.8 MHz signal (see below). It generates the following:-

- A 700 kHz signal that provides a beat frequency for SSB demodulation.
- A 2.8 MHz signal that serves as the sampling frequency for the digital systems.

The board is fed with a 10 MHz reference from AE5, which it routes to AE7, and an SSB ON signal from AE7.

## Circuit description

TR1 and associated components form a 2.8 MHz VCO which is phase locked by means of a loop circuit to a reference of 400 kHz produced from the 10 MHz reference by divider IC1. IC1 and the VCO are enabled by the SSB ON signal fed via TR3.

The inputs to phase detector IC2(a)/IC2(b) are the 400 kHz signal from IC1 and the VCO output, divided by 7 by IC7. Its output pulses are fed to loop filter IC4 and filter circuit IC5 which effectively sum the average and integrate the result to produce a DC level that tunes the VCO.

One of the VCO outputs is taken to PLA and the DSC via an attenuator that reduces the signal level to approximately 1 V peak-to-peak. Another clocks a divide-by-4 counter IC8, producing the 700 kHz signal which is attenuated to approximately 700 mV peak-to-peak before being fed to AE7.

# AA1, AA1/1 Input switch

## Introduction

Input switch AA1, and later version AA1/1, sets up the internal RF connections to the N-type and TNC sockets on the front of the Test Set according to the function selected on the RF SELECT key. The necessary switching is carried out by double coil, latched relays, controlled by the A6 CPU via the $I^2C$ bus.

The unit also provides overload indications to A6 and power meter ranging information to power meter AB2.

Data relating to the manufacture of the board and calibration data relating to the frequency response of the switching paths through the board is stored in EEPROM.

In the 2967 only, input switch AA2 replaces AA1 or AA1/1.

## Relay control and switching configurations

IC1 (sheet 1) controls relay operation, the $I^2C$ signals from the CPU board A6 being routed via A7. Relays are driven by relay drivers TR1 to TR6 (sheet 1) and TR7 to TR12 and TR15 to TR16 (sheet 2) via NAND gates. Note that D0 and D3 from IC1 are set lines which are single pulsed by software to operate the required relay coil according to the data on D1-D2 and D4-D7. For example, if D1 is high, RLA coil 7/1 is energised with the set pulse on D0. Although the coil de-energises at the end of the pulse on D0, the relay contact remains in the same position, and will remain in that position until the other coil 6/1 is energised with D1 at a low and another set pulse.

The relay contacts are shown on sheet 2. Their positions configure the N-type and TNC socket connections to sockets SKC to SKF on AA1, which are connected respectively to signal generator attenuator, receiver attenuator, power meter and RF calibration input on A7. Data bits control respective relays as follows:-

| | | | |
|---|---|---|---|
| D1 | Relay A | D2 | Relays E-H |
| D4 | Relay B | D5 | Relay C |
| D6 | Relay D | D7 | Relay J |

Available configurations are summarised below:-

| Configuration | | D1 | D2 | D4 | D5 | D6 | D7 |
|---|---|---|---|---|---|---|---|
| 2Port Duplex | Rx to TNC<br>Sig gen to N type | L | L | L | L | L | L |
| 2Port Duplex | Rx to N type<br>Sig gen to TNC | L | H | L | L | L | L |
| 1Port Duplex<br>on TNC | Rx to TNC<br>Pwr Mtr to TNC<br>Sig gen to TNC | H | L | H | L | H | L |
| 1Port Duplex<br>on N type | Rx to N type<br>Pwr Mtr to N type<br>Sig gen to N type | H | H | H | L | H | L |
| 2Port Power<br>Meter to TNC | Rx/Pwr Mtr to TNC<br>Sig gen to N type | L | L | H | H | H | L |
| 2Port Power<br>Meter to N type | Rx/Pwr Mtr to N type<br>Sig gen to TNC | L | H | H | H | H | L |
| Power Meter<br>Calibrate | Pwr Mtr to<br>10 MHz input | L | L | L | L | L | H |
| Calibrate | Sig gen to Pwr Mtr | H | H | H | L | H | L |

**L = low, H = high**

## Overload detect circuits (sheet 1)

If an overload occurs on the TNC or N-type sockets, the OVERLOAD TNC or OVERLOAD N-TYPE lines to IC2 are driven low. The overload can be detected by the A6 CPU reading the state of IC2 D0 or D1 over the $I^2C$ bus. A direct indication is also given to the A6 CPU (via A7) by the RFOV_L interrupt line being asserted.

N-type overload is detected by monitoring the temperature of the 20 dB power load using a thermistor. This is connected via PLE to comparator IC3(a) which when gated via IC4(a) and IC4(c) switches relays RLE and RLG so that the signal is no longer connected. The output of IC3(a) also passes to IC2 D1.

For TNC input overload, the RF level is detected by D1-4 on sheet 1 after passing through the attenuator formed by R40/41, R69/70 on sheet 2. The detected level is compared with references set by R45/46, resetting flip-flop IC13(a) when a fault occurs. IC13(a) then switches RLF and RLH to safe positions and indicates the overload to IC2 D0. The flip-flop is set again by pulsing the relays again.

## Power meter ranging

IC2 (sheet 2) provides POWER METER GAIN RANGE and POWER METER GAIN signals to the AB2 power meter via PLB, controlled from the $I^2C$ bus.

## Calibration data

IC12 is an $I^2C$ bus EEPROM which holds frequency response calibration data for each of the possible switching paths on the board. The data relates to 21 frequency points for each path, from 10 MHz to 1000 MHz.

# AA2 Input switch

## Introduction

The AA2 input switch board performs all functions of the AA1 and AA1/1 boards, but with capability to handle signals up to 2.2 GHz. It is used in the 2967 only, where it replaces the AA1 or AA1/1 board.

Frequency response calibration data relating to the switching paths through the board is stored in EEPROM IC3.

## Relay control and switching configurations

IC1 (sheet 1) controls relay operation; the $I^2C$ signals from the CPU board A6/2 being routed via A7. Each relay coil is driven by an associated relay driver FET (TR2 to TR13 sheet 2) via NAND gates. Note that P0 from IC1 is a set line that is single pulsed by software to trigger the monostable IC8(b). When triggered, this produces a 10 ms enable signal to operate the required relay coils according to the data on P1, P2, P4 and P7. For example the arrival of a set signal on P0 will trigger IC8(b), thereby taking PULSE line high for 10 ms. If P1 is high, RLD coil 1/18 will energise for 10 ms through TR8. Although the coil de-energises at the end of the pulse from IC8, the relay contact latches in the same position. It will remain latched until RLD coil 10/9 is energised through TR9. This happens when P1 is low and another SET pulse triggers IC8(b).

The relay contacts are shown on sheet 2.

Their positions configure the N and TNC socket connections to sockets SKC to SKF on AA2 which are connected respectively to signal generator attenuator, receiver attenuator, power meter and RF calibration input on A7. Data bits control respective modes and relays as follows:

| Line | Logic high | Logic low | Relays affected |
|---|---|---|---|
| P1 | Simplex | Duplex | RLD |
| P2 | Direct | Changeover | RLA and RLB |
| P4 | Splitter | Straight through | RLC |
| P7 | Calibrator | out | RLE |

Available configurations are summarised below:

| Configuration | Routeing | P1 | P2 | P4 | P7 |
|---|---|---|---|---|---|
| 2 Port Duplex | Rx to TNC<br>Sig gen to N type | L | L | L | L |
| 2 Port Duplex | Rx to N type<br>Sig gen to TNC | L | H | L | L |
| 1 Port Duplex<br>on TNC | Rx to TNC<br>Pwr Mtr to TNC<br>Sig gen to TNC | H | L | H | L |
| 1 Port Duplex<br>on N type | Rx to N type<br>Pwr Mtr to N type<br>Sig gen to N type | H | H | H | L |
| 2 Port Power Meter<br>to TNC | Power Meter to TNC<br>Rx/Pwr Mtr to TNC<br>Sig gen to N type | L | L | H | L |
| 2 Port Power Meter<br>to N type | Rx/Pwr Mtr to N type<br>Sig gen to TNC | L | H | H | L |
| Power Meter<br>Calibrate | Pwr Mtr to 10 MHz input | L | L | L | H |
| Calibrate | Sig gen to Pwr Mtr | H | H | H | L |

**L = low, H = high**

## Data EEPROM

The $I^2C$ EEPROM IC3 retains data relevant to the module manufacture and signal path calibration data. Information is programmed into the device via the $I^2C$ bus during manufacture. Typical information includes module type and serial number, date of manufacture and batch number.

Calibration data for each of the possible switching paths on the board is also held. The data relates to 21 frequency points for each path, from 10 to 1000 MHz and a further 21 frequency points for each path, from 1705 to 2205 MHz.

## Overload detect circuits (sheet 1)

An overload on the N type connector is detected by monitoring the temperature of the 20 dB power load, using a thermistor mounted on the load heat sink. One end is connected to ground, the other end to the non-inverting input of comparitor IC5(b) and to +5 V through R8. A rise in load temperature causes the voltage on the comparitor input to fall, which triggers the comparitor output. This in turn changes the state of IC10(a) and IC11, triggering IC8(a). A 10 ms pulse is produced which is fed to the gates of TR3, TR6 and TR9. These transistors directly drive relay coils RLA 9/10 (S), RLB 9/10 (S) and RLD 1/18 (R).

As these are latching relays, an operating pulse applied to a coil will ensure that the relay takes up the selected state, irrespective of existing settings. RLA and RLB are put to the SET state, which is opposite to that shown on the circuit. RLD is put to the RESET state which is as shown on the circuit. The signal path from the N type connection meets an open circuit between pins 17 and 14 on RLD, the signal path from the TNC connector meets an open circuit between pins 11 and 14 on RLB.

The output of the comparitor IC5(b) is also fed to IC2 P1.

An overload on the TNC input is sensed by double Schottky diode D17, after passing through the attenuator formed by R30 and R39 when in duplex mode; or by D25 fed through R44 and R45 when in the duplex C/O mode. The positive and negative detected outputs are fed to the window comparitor circuit formed around IC6(a) and IC6(b). The reference levels are set by R14/15 and R16/17. When an overload is detected, the R input of flip-flop IC7(a) goes low, changing the state of IC10(a) and IC11, thereby triggering IC8(a). The 10 ms pulse causes RLA, RLB and RLD to set the same safe conditions as described for an N type overload.

The output of flip-flop IC7(a) is also fed to IC2 P0.

When an overload on the TNC or N sockets causes the output of IC11 to go low, the RFOL(L) line is driven low. This provides an interrupt signal to the A6/2 CPU (via A7) The identity of the overloaded connector is passed to the CPU by reading the state of IC2 P0 or P1 over the $I^2C$ bus.

The overload trip is reset by pulsing IC1 P0. The configuration of IC5 and IC8(b) prevents resetting before the thermistor indicates that the 20 dB power load has cooled sufficiently.

In some configurations it is possible for damaging power levels to be present within the instrument while the input power is still below the trip level of the AA2 overload protection circuitry.

The RPP_TRIP(L) line provides protection from these conditions. Excess power to AK2 takes PLE pin 2 low, similarly excess power on AF6 takes PLF pin 2 low. With this line low, IC7(a) changes state and has the same effect as detecting an overload on the TNC connector.

## Power down mode

The latching relays used on the input switching board retain their current settings when the instrument is powered down. Therefore they must be set to a configuration which will prevent damage occurring to the instrument if RF power is applied to it before it is powered up.

The power down circuitry formed by IC4, IC5(a) and IC8(a) is designed to ensure that when the unit is switched off, the relays are always in the tripped positions so as to remove any RF input paths to the rest of the unit circuitry.

Power-down is sensed by IC5(a) which compares the persistent 5.3V supply (see below) with the instrument 5V rail. When the 5V rail falls below the level determined by R11 and R12, the overload trip fires through IC10(a), IC11 and IC8(a), producing relay set pulses to RLA, RLB, and RLD as detailed in the TNC overload description above.

A +5.8V regulated supply is produced from the +12V rail by IC4, R7 and D7, with reservoir capacitors C3 and C4. This powers the relays and their drive transistors. Three relays (RLA, RLB and RLD) are switched during power down, requiring 100 mA of drive current for up to 5 ms; C3 and C4 hold sufficient charge for this. D4 prevents reverse current flow through the regulator during power down.

The logic in the power down and overload trip circuits must remain active for at least 20 ms after the power rails are removed. A 5.3 V supply is produced from the 5.8 V supply by D6. This powers the logic in the power down and overload trip circuits. It will continue to function from the charge held in reservoir capacitor C5, for the required time after power down.

Some configuration changes require more than three relays to switch at the same time, which would drain the 5.8 V supply, and therefore the 5.3 V supply, below 5 V. This is prevented by D5 and D26, which provide current from the 5 V rail.

### Power meter clamp circuit

The power meter sensor on AB2 could be damaged by RF power overloads before the overload detector and relays operate (around 2-5 ms). The clamp circuit formed by D18 to D21 and associated components is designed to provide protection to this output for this critical period.

The diodes are configured as a back to back clamp, with 2 diodes used in series to reduce capacitive loading on the RF line. Zener diodes D22 and D23 are biased via R37 and 38 to raise the reverse bias on the clamp diodes to approximately 2.7 V. This sets the peak clamp voltage to the equivalent of +26 dBm. The Zener diodes provide DC and LF clamping; the capacitors C26 to C29 form the RF path to ground.

### Power meter ranging

Signals to control the power meter ranging are decoded from the $I^2C$ bus by IC2 on P2 and P3. They are identified as PM_RANGE and PM_GAIN respectively. They are fed to the power meter board AB2 through PLB, pins 6 and 7. This connector also carries the +12 V, +5 V and −12 V rail to AB2.

### Auxiliary decoding

PLD is provided to power and control future boards or modules. IC2 has provision for decoding additional I/O ports, P4 to P7. These are routed to PLD for future use. PLD also carries the +12 V, +5 V, −5 V and −12 V rails.

### Temperature sensor

IC12 provides continuous temperature data to the main processor over the $I^2C$ bus to allow for dynamic compensation

## RF attenuator assembly

The RF attenuator assembly contains two sub-assemblies; a 3 stage unit which attenuates the RF input signal and a 4 stage unit which is in the RF generator output path. The assembly is not considered to be user-serviceable, but this description is provided to assist in localising a faulty assembly.

RF connections are made through SMA connections, control lead connections are through ribbon cable connectors.

### RF input attenuator

The input to the 3 stage unit is obtained from input/output switching board AA1, AA1/1 or AA2, where it has been routed from the selected RF input connector on the front panel.

Three attenuator pads are contained within the unit, with attenuation values of 10 dB, 20 dB and 40 dB. This gives an attenuator range of 0 dB to 70 dB in 10 dB steps.

The output signal from the unit is fed to the first mixer board AE3.

The attenuator pads are switched by latching relays, with their control pulses routed from the CPU board A6 or A6/2. The current required to drive each latch is approximately 500 mA at 5 V, therefore to prevent excessive drain on the 5 V rail, only one pad is switched at any one time. The CPU board provides control pulses of approximately 27 ms duration, with 20 ms between each pulse.

### RF output attenuator

The output from the 4 stage unit is fed to the input/output switching board AA1, AA1/1 or AA2.

The source of the input signal depends on the facilities provided by the Test Set. Where GSM1800 is provided, the signal comes from The frequency doubler board AF6; where GSM900 only is provided the signal comes from the mixer module AB3; where no digital modulation is provided, the signal comes from the RF output board AF5.

Four attenuator pads are contained within the unit, with attenuation values of 10 dB, 20 dB, 40 dB and 40 dB. This gives an attenuator range of 0 dB to 110 dB in 10 dB steps.

The attenuator pad switching is identical to the switching for the 3 stage unit.

## AB1 Power sensor
## AB2 Power meter

The input to the AB2 power meter comes via PLA from AB1, which is a module that plugs into AB2. Basically, AB1 consists of a Seebeck power sensor which senses RF and produces a DC voltage proportional to RMS power. This DC voltage is chopped by a circuit on the AB1 that is supplied with the approx. 200 Hz SWITCH DRIVE signal from the reference frequency generator IC9 on AB2. After chopping, the signal from AB1 is applied to AB2 in the form of anti-phase square waves VIN1 and VIN2.

The two anti-phase square waves are passed through a two balanced amplifiers formed by IC1, IC2 and IC3. Thermistor R65 provides temperature compensation for the Seebeck power sensor, adjusting the amplifier gain according to temperature.

The 1st and 2nd attenuator switches IC4 and IC6 are dual, 4-channel multiplexers. Each half of each IC is fed with four different signal levels from attenuation chains R21-7 and R35-41. Channel selection and hence attenuation level for IC4 and IC6 is determined by the address data on lines A0 and A1 which are the POWER METER GAIN RANGE and POWER METER GAIN signals described in the AA1 switch description.

IC4 enabling is controlled by a spike blanking circuit, comprising IC11 and associated components, which are arranged as a monostable. This circuit disables IC4 for a short period on the input waveform edges, thus eliminating spikes that may be present on the low level output of the Seebeck sensor.

The signals also pass through a third amplifier IC5 between the two attenuators and a fourth IC7 after them.

The differential to single ended conversion and synchronous detector stages produce a DC level which is the RF POWER signal to the A5 display.

The approximate gains of the amplifier stages are:-

| | |
|---|---|
| 1st amp | 23.1 |
| 2nd amp | 9.3 |
| 3rd amp | 18.5 |
| 4th amp | 18.5 |

The attenuator settings and nominal overall amplifier gain for each switch address are:-

| Switch A1 | Switch A0 | 1st Attenuator | 2nd Attenuator | Overall gain |
|---|---|---|---|---|
| Low | Low | ×0.008 | ×0.008 | 4.7 |
| Low | High | ×0.04 | ×0.04 | 117 |
| High | Low | ×0.2 | ×0.2 | 2928 |
| High | High | ×1 | ×1 | 73200 |

# AB3 Mixer module board

## Introduction

The AB3 mixer module provides several facilities:-

- A straight-through path from the Test Set signal generator output amplifier (AF5) to the step attenuator for standard operation.
- A double-balanced mixer to mix the digital systems IF from A8 with the Test Set signal generator output. The output from the mixer is routed to the step attenuator for output to a radio receiver.
- An $I^2C$ interface to control the switching paths.

### Switching paths

Switching paths are provided for:-

- Standard (i.e. analog) Test Set operation.
- Digital systems operation.

The switching configurations are shown in Figs. 1-17 and 1-18 respectively.

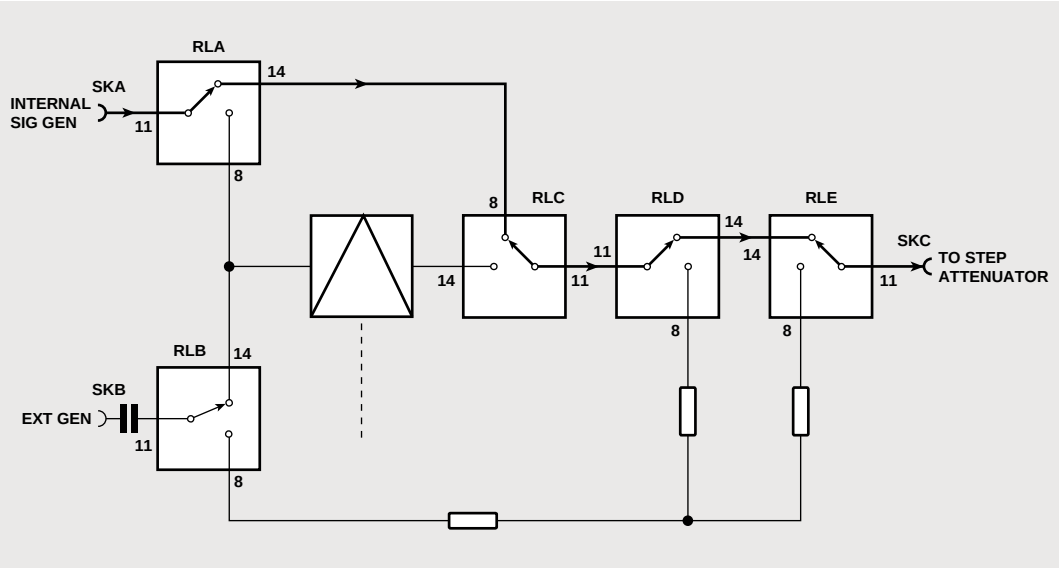



*Fig. 1-17 AB3 switching paths - analog operation*

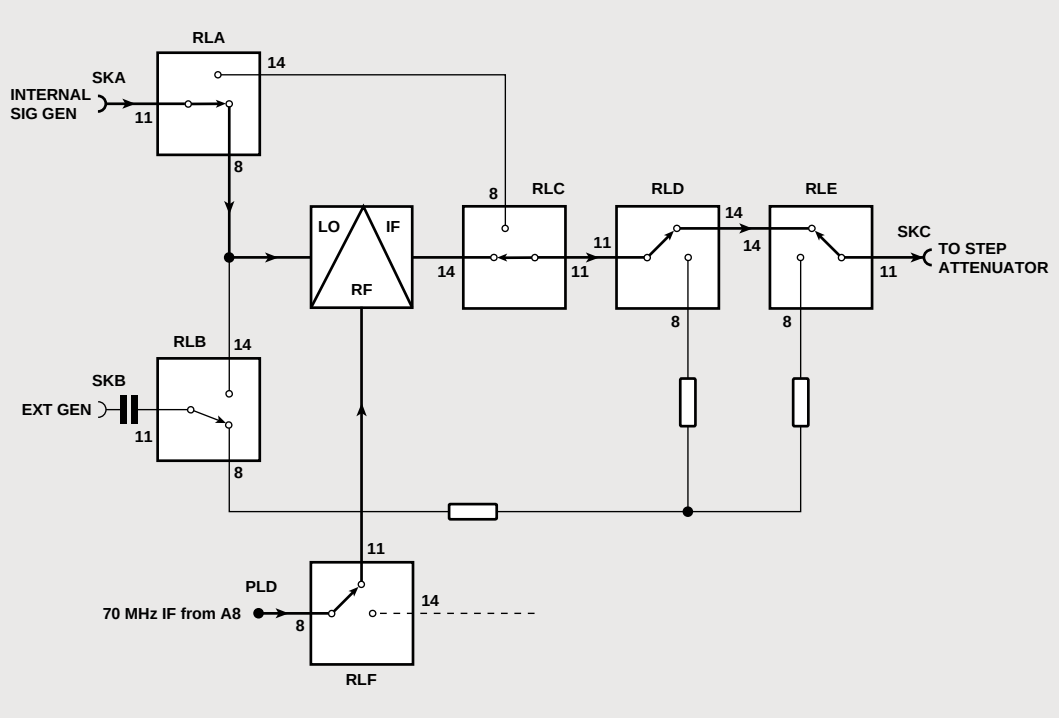



*Fig. 1-18 AB3 switching paths - digital systems operation*

## Circuit description

### I²C interface

The I²C bus enters the mixer module box via Filtercons. It is connected to the mixer module board via connector PLA, pins 1 (serial data - SDA) and 2 (serial clock - SCL). These two signals are routed to IC1. IC1 address pin A0 is pulled high by R54, and address pins A1 and A2 are pulled low by R55 and R56 respectively, to set the I²C bus address to 72Hex.

IC1 provides a decoder that controls relays to set the switching path for the appropriate operation. Its outputs, D0 to D7, provide the following functions:-

| | Output State | | Analog | Digital |
|---|---|---|---|---|
| | High | Low | | |
| D7 | N/C | N/C | *X* | *X* |
| D6 | Enable RLD to F | Disable RLD to F | H | H |
| D5 | RLF 11>14 | RLF 11>8 | H | L |
| D4 | RLD, RLE 11>14 | RLD, RLE 11>8 | H | H |
| D3 | RLC 11>14 | RLC 11>8 | L | H |
| D2 | RLB 11>14 | RLB 11>8 | H | L |
| D1 | RLA 11>14 | RLA 11>8 | H | L |
| D0 | Enable RLA to C | Disable RLA to C | H | H |
| Hex code | | | 77H | 59H |

**Notes**

The numbers 8, 11 and 14 above are pin numbers on the relay packages. For example, RLF 11>14 signifies a connection between RLF pins 11 and 14.

The relays used in the mixer module are of a latching type. If the appropriate relay is enabled (D0 or D6 at logic high), then that relay will be set to the state dictated by D1, 2, 3, 4 or 5, as appropriate (logic high connects pin 11 to pin 14; logic low connects pin 11 to pin 8). If the relay is disabled (D0 or D6 at logic low), then the relay will remain unchanged from the last enabled transition.

To change the state of the relays for analog mode, $I^2C$ data 77H is sent, followed immediately by 36H (i.e. the same code except that the relay enable bits are low). Similarly, to change to digital systems mode, $I^2C$ data 59H is sent, followed immediately by 18H. In each case, the second byte ensures that the relay enable is removed before the relay code.

## Relay control

Each of the relays RLA, B, C, and F has two drivers; one to set the contact to connect pins 11 and 14 (drives relay pin 6), the other to connect pins 11 and 8 (drives relay pin 7). relays D and E share their drivers as they are activated in unison. Each driver has:-

- A 74HC00 NAND gate, to NAND the enable bit with the relay control bit.
- A BCX17 pnp transistor (with bias resistors driven by the NAND gate) to pull the relay pin (6 or 7) to +5 V.
- A BAS16 catch diode across the relay coil, to prevent back EMF appearing on the transistor collector.
- A 10 nF decoupler near the transistor collector.
- A 220 pF decoupler near the relay.

The drivers for relay pin 7 have the relay control bit inverted, to provide the opposite function.

The circuit elements used for each of the above functions are summarised as follows:-

| | INV | NAND | Bias R | TR | D | 10 nF | 220 pF |
|---|---|---|---|---|---|---|---|
| RLA pin 6 | - | IC3(a) | R5(a), (b) | TR1 | D1 | C4 | C14 |
| RLA pin 7 | IC6(a) | IC3(b) | R5(e), (f) | TR2 | D2 | C5 | C15 |
| RLB pin 6 | - | IC3(c) | R5(g), (h) | TR3 | D3 | C6 | C16 |
| RLB pin 7 | IC6(b) | IC3(d) | R5(c), (d) | TR4 | D4 | C7 | C17 |
| RLC pin 6 | - | IC4(a) | R6(a), (b) | TR5 | D5 | C8 | C18 |
| RLC pin 7 | IC6(c) | IC4(b) | R6(e), (f) | TR6 | D6 | C9 | C19 |
| RLD, E pin 6 | - | IC4(c) | R7, 8 | TR7 | D7 | C10 | C20, 21 |
| RLD, E pin 7 | IC6(d) | IC4(d) | R9, 10 | TR8 | D8 | C11 | C22, 23 |
| RLF pin 6 | - | IC5(a) | R6(g), (h) | TR9 | D9 | C12 | C24 |
| RLF pin 7 | IC6(e) | IC5(b) | R6(c), (d) | TR10 | D10 | C13 | C25 |

## Analog mode

In this mode, the Test Set signal generator output from AF5 is routed from SKA to the step attenuator via RLA, RLC, RLD, RLE, and SKC.

## Digital systems mode

In this mode, the IF signal from board A8 is mixed with the Test Set signal generator output, as explained below.

### Double-balanced mixer

The double-balanced mixer IC7 is a Mini-Circuits LMX-149 device. It is currently only used in digital systems mode, so this description applies to its use in that mode.

The Test Set signal generator output (nominal level 13 dBm) is routed via RLA to the LO mixer port. The other input to the mixer is the 70 MHz IF signal from board A8, which is routed to the mixer RF port via RLF.

The LO frequency should be set to the required digital systems channel plus 70 MHz (the A8 frequency). The mixer then provides an output at the required digital systems channel frequency.

The output from the mixer IF port is routed to the step attenuator via RLC, RLD, RLE, and SKC. Being DC coupled, the mixer IF port is able to cater for the broad bandwidth of this output (the user frequency range is 100 kHz to 1.156 GHz).

The 3 dB pad R46 to R48 improves the mixer LO port VSWR to approximately 1.8. The 3 dB pad R49 to R51 and R69 performs a similar function for the mixer IF port.

### IF amplifier and filter

The IF amplifier and filter is not used.

### Power supplies

Power comes into the mixer module box via Filtercons and is connected to PLA pin 4 (+12 V) and pin 5 (+5 V). The rails are filtered by L1, C44 and C45 (+12 V); and L2, C46 and C47 (+5 V).

## AB4 Warp oscillator board

### Introduction

The Warp Oscillator board AB4 allows the warping test to be carried out to digital mobile telephones. This test checks that the tracking range of the reference oscillator within the mobile is centralised about the base station control signal.

The board produces a signal which can be is substituted for the 10 MHz Test Set clock reference frequency to certain boards in the Test Set. The frequency of this signal can be adjusted over a limited range through the Test Set software. When making warping tests, this signal is used as the reference for data signals and the RF carrier signal. By shifting the frequency of these signals above and below their true point, the ability of the mobile to compensate for any frequency shift within itself can be checked.

The board contains the following circuits:-

A Voltage Controlled crystal (Xtal) Oscillator (VCXO) to produce the 10 MHz signal. The frequency correction input is 'pulled' above or below 10 MHz as required.

A VCXO power control circuit.

A control circuit to decode $I^2C$ data bus instructions.

A D to A converter for producing the frequency shift voltages.

Output buffers for the 10 MHz signal.

Filtering for the supply rails.

### Power rails

Power for the board is supplied through PLA, which has connections to the –12 V, –5 V, +5 V, +12 V and +32 V rails. The supplies from the –12 V and +32 V rails are not used on this board but are routed to SKA, with supplies from the other rails, so that daisy-chaining to other boards or modules is possible.

On board filtering for the –5 V supply is provided by C1, C2, C3 and L1; for the +5 V supply by C7, C8, C9 and L2; for the +12 V supply by C4, C5, C6 and L3.

### Control circuit

Control signals for the board are routed over the $I^2C$ data bus. Two devices are connected to the bus. I/O IC3 decodes OSC_ON(L), CAL_ON(L) and WARP_ON(L) lines; Dual 8 bit DAC IC4 decodes the frequency shift data.

#### Function control

Power is applied to the he VCXO, IC6 when the GSM SYSTEM is selected from the SYSTEM SELECTION MENU.

The board is controlled by signals decoded from the $I^2C$ bus in IC3 at address 44H. When P0 on is low, TR1 conducts and applies +12 V to the input of voltage regulator IC1. The 5 V output from this powers the VCXO.

When calibration of the 10 MHz oscillator output is required, P1 is taken low, enabling the buffer providing the WARP_CAL output.

When the 10 MHz oscillator output is required for a warping test, P2 is taken low, enabling the buffer providing the WARP_OSC output.

#### Frequency control

The exact frequency of the warp signal is controlled by the data decoded by IC4 at $I^2C$ address 20H. This produces fine and course output voltages at OUT0 and OUT1.

The OUT0 and OUT1 signals from IC4 are summed by scaling resistors R9, R8 and applied to the inverting input of the summing amplifier built around IC5. The non-inverting input is biased to 2.5 V from the potential divider R10, R11. The output from IC5 can be set to any level over the nominal range of ±2.5 V and is fed to the correction input of the VCXO, IC6.

10.0 MHz is produced at a nominal level of 2.5 V on this input, with a change of approximately 200 mV being required for a frequency shift of 25 ppm.

### Signal output

The output from the VCXO is fed to two buffer amplifiers of a quad package. The output from one amplifier is attenuated to a level of approximately 60 mV p-p and fed to AB3 or AF6 (depending on the particular build of the Test Set) as the WARP_CAL signal. The other, at approximately 2 V p-p is fed to A8 as the WARP_OSC signal.

## AF1 104.86 MHz VCXO and PLL board

### Introduction

AF1 generates 6.5536 MHz, 2.097153 MHz and 419.4304 MHz signals locked to the 10 MHz reference frequency from AR1. The 6.5536 MHz signal is routed to the A5 display board. 2.097153 MHz signals are routed to AF2, AE1 and AE2. The 419.4304 MHz signal, when present, is fed to the AF5 board.

### Voltage-controlled crystal oscillator (VCXO)

TR1 operates as a tuned collector tuned emitter crystal controlled oscillator. The crystal is shunted by L1 in series with C2 and the varactor diode D1. The voltage applied to D1 permits the frequency and phase of oscillation to be adjusted about the resonant frequency of the third overtone crystal XL1. TR2 isolates the VCXO and provides a low impedance output drive for the three succeeding signal paths.

### Phase locked loop

The 10 MHz reference from AR1 is divided by 10 to provide a 1 MHz reference for the phase locked loop, which comprises the VCXO TR3, divider IC1/IC2, phase detector IC3(a)/IC4(a)-(c)/IC3(b) and loop filtering IC5(a)/(b).

The digital divider IC1 and programmed EPLD IC2 form a fractional-N divider circuit dividing the 104.8576 MHz oscillator output, buffered by TR3, producing a 1 MHz phase/frequency reference used to clock IC3(a). Pulses are generated by the phase detector whose width is determined by the phase difference between IC2 and IC6 outputs at the junction of diodes D3 and D5.

Filter IC5(a) sets the PLL loop bandwidth to 10 Hz, and the 100 Hz low-pass filter IC5(b) further prevents the introduction of spurious interference to the VCXO via the varactor control voltage.

### 6.5536 MHz signal path

After amplification by TR4, the VCXO output signal is divided by 16 in IC7. The resulting 6.5536 MHz signal is fed to the A5 display board.

### 419.4304 MHz signal path

Note that this signal is not always present. It is switched on by the DOUBLER ON signal from AF5 which switches on TR11 providing the +4.7 V LC power supply to TR8 and TR9.

Emitter follower TR7 is a high impedance load to the VCXO circuit. Amplifier TR8 generates the necessary drive for frequency doubler circuit D7 and D8. L11/12 and C40/41 match the output of the doubler to amplifier TR9 which drives the second doubler. The 419.43 MHz signal is then amplified by IC11 and conditioned by low-pass filter C48/L20/C69 and band-pass filter L18. It is connected to the AF5 board where it is used as a local oscillator for mixing with the main signal generator oscillators when low frequency signal generation (100 kHz to 36 MHz) is required.

### 2.097152 MHz signal path

After amplification by TR5 and TR6, the 104.8576 MHz VCXO output is divided by 50 in IC8 and IC9 to provide a 2.097152 MHz signal source for AF2, AE1 and AE2 boards after buffering by IC(b)-(e).

### Power line cleaning and isolation

The -12 V line cleaner circuit based on IC12(a) and TR10 prevents noise on the VCXO supply which might cause the VCXO to generate phase noise.

The inverted input of IC12(a) is biased by the potential divider R52, R51 and R53, with the non-inverted input maintained at an AC earth via the long time constant R53 and C50. Any high frequency current transients on the power line are developed across R57 and applied via zener diode D12 to the non-inverted input of IC12(a). The output of IC12(a) drives the base of TR1 to compensate for the transient current change.

## AF2 and AF3 RF oscillator and VCO boards

### Introduction

The AF2 and AF3 boards interact with the AE1 fractional-N control board in generating signals of frequency determined by the front panel settings. The output has a frequency range of 576 MHz to 1150 MHz in 1 Hz increments, and can be frequency or phase modulated using an AF source from the A1 board. Operation is controlled from the A6 CPU via the AE1 board and its I2C bus.

AF3 is contained in a metal enclosure mounted on the AF2 board.

Fig. 1-19 is a block diagram showing the main circuitry on the two boards and the interconnections with related circuits on other boards.

### Fractional-N control

The main elements of the fractional-N control are shown in Fig. 1-19. These include the phase detector, three oscillators and the ÷2 circuit IC9 on AF2, and the signal generator and programmable divider on AE1. Note also that the circuit uses a 2.09752 MHz reference from AF1. The 1-bit ADC circuit on AE1 has already been described, its function being to apply low-frequency modulation to the fractional-N signal when required.

Fractional-N control employs a complex algorithm which successively divides the oscillator output by $2^n$ and $2^{n+1}$ to provide a feedback signal which, when phase compared with a fixed reference frequency, produces an error signal to adjust the oscillator to the required frequency.

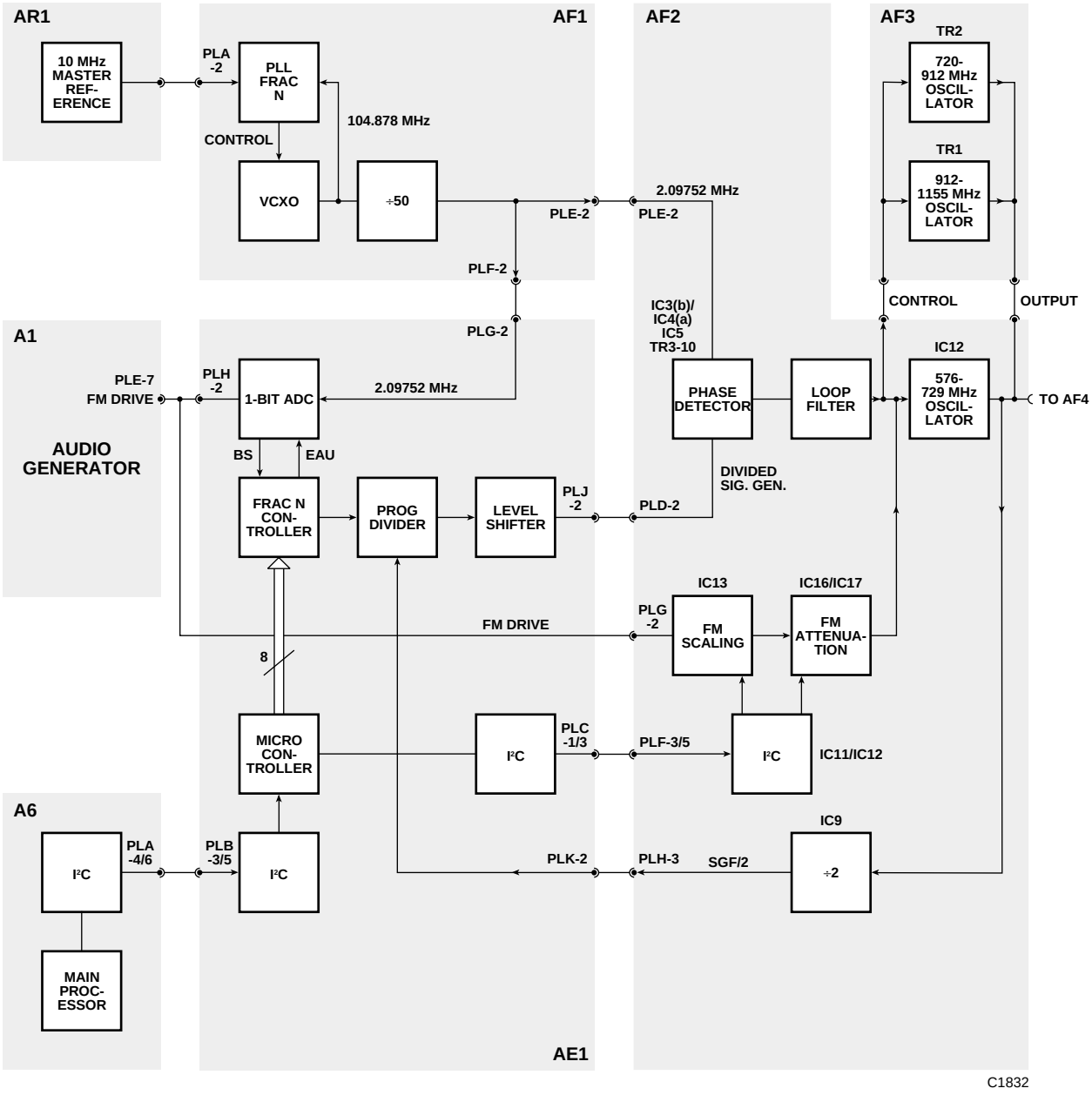



*Fig. 1-19 Block diagram of AF2, AF3, and associated boards*

## Oscillators

The frequency range 576 MHz to 1150 MHz is covered by three VCOs, one on AF2 and two on AF3. Each VCO is in the fractional-N control loop of which the signal generation circuits on AE1 form part. The required VCO is selected from the I²C bus decoded by IC12 and switched by IC6 according to the LOW (L), MED (L) and HIGH (L) signals to connect the -12 V line to the appropriate VCO.

The three oscillator circuits are similar, each comprising a common-emitter Hartley circuit, with a varactor diode forming part of the capacitive coupling between the inductors.

Oscillator ranges are as follows:-

LOW 576 MHz to 720 MHz
MED 720 MHz to 912 MHz
HIGH 912 MHz to 1150 MHz

The signal from the appropriate oscillator is fed to common-base amplifiers TR13, TR14 before passing to AF4 via amplifier IC7 at a level of +2 dBm. TR14 and IC8 amplify the oscillator signal to drive ¸2 IC9. IC10 amplifies the resultant signal to a level of +4 dBm before it is passed to AE1 board as SGF/2. After fractional-N division on AE1, the signal DIVIDED SIG GEN is returned to the phase detector circuit on AF2 via PLD.

## Phase detector

IC5(a) and IC5(b) outputs are antiphase square waves which cause TR3 and TR8 to conduct alternately. When TR3 is on, TR6 and TR7 are also on and current flows into C18. Similarly, when TR8 is switched on, TR6 and TR7 are held off, TR4 and TR5 are on, and current flows into C17. The ratio of these charges varies as the mark/space ratio of IC5(a) and IC5(b) outputs varies. TR5 and TR6 collector voltages are applied to TR10 and TR9, whose common collector voltage controls the selected VCO frequency. When the fractional-N control loop is phase locked, IC5(a) and IC5(b) outputs have an equal mark/space ratio, the charges are equal and TR9/TR10 collector voltage is such that the VCO frequency is held. If an imbalance occurs, the charges will differ and TR9/TR10 collector voltage will change, moving the VCO frequency towards lock again.

The filters in the collector circuits of TR5 and TR6 remove the fractional sidebands outside the loop bandwidth and also the reference frequency signals which would otherwise appear on the varactor drive line and modulate the oscillator.

TR11 and D8 form a voltage clamp to prevent the varactor voltage falling below +1 V and hence avoiding forward biasing of the varactor diode.

The loop filter formed by components C23, C24, R37, R38 and R39 gives a loop bandwidth of approximately 2 kHz or 7 kHz on later units, permitting narrow-band FM to be modulated via the fractional-N signal generator.

## FM/PM modulation

The FM/PM signal from the A1 board is applied to AE1 and AF2. AE1 handles the modulation of low frequencies, AF2 the modulation of high frequencies. This dual FM and PM is complementary through the high-pass characteristic of the AF2 board's fractional-N loop filter bandwidth, and the low-pass characteristic of the AE1 board's 1-bit ADC operating in association with the fractional-N signal generator. Though a notional crossover occurs at about 2 kHz, the transition occurs between 1 kHz (below which the AF2 modulation ceases to occur) and 10 kHz (above which the 1-bit ADC modulation ceases to occur). This crossover area is critical if deviation is to remain constant over the modulating frequency range, and software-controlled compensation for gain errors is applied during the FM deviation calibration procedure.

The range of the FM/PM signal is between 1 V RMS and 0.7071 V RMS (3 dB down on 1 V RMS). The same 3 dB range of this signal is used for all frequency deviations, and 3 dB step attenuation is applied by software increments to the AF2 board's DAC attenuators (effective at the higher modulation frequencies) and by software increments to the AE1 board's fractional-N signal generator (effective at the lower modulation frequencies). The overall effect is to provide seamless attenuation of the 1 V RMS level from 0 dB to 99 dB, corresponding to FM deviation frequencies between 925.500 kHz and 0 Hz.

FM scaling and attenuation circuitry is controlled via $I^2C$ expander chips IC11 and IC12 and switches IC16 and IC17. For function select codes and related VCO and FM/PM attenuation selection, refer to the next section on $I^2C$ control.

The 3 dB steps from 0 dB to 99 dB are constructed using appropriate connection of the FM attenuators via IC16/IC17 together with the 1 dB incremental setting of the A channel of dual channel, 8-bit, multiplying DAC IC13, via IC11. Note that channel B of IC13 is used for calibration only.

IC14 and IC15 are summing amplifiers enabling channels A and B of IC13 to be operated as programmable attenuators. The FM attenuator circuit, centred on switches IC16 and IC17 provides 0 to 80 dB attenuation in 20 dB steps via the $I^2C$ bus and IC12. IC18 and IC19 buffer the attenuator switch outputs. The modulating signal is applied to the fractional-N loop filter via the fixed attenuator R73/R39.

## $I^2C$ control

Control of the various functions of the AF2 board is exercised via the $I^2C$ bus using two expanders IC11 and IC12. IC11 is used to select the incremental steps of channels A and B of DAC IC13, described previously. IC12 selects VCO, FM attenuation and DAC channel according to the following codes:-

| Function | P7 | P6 | P5 | P4 | P3 | P2 | P1 | P0 |
|---|---|---|---|---|---|---|---|---|
| Low freq VCO on | X | X | X | X | X | High | High | Low |
| Medium freq VCO on | X | X | X | X | X | High | Low | High |
| High freq VCO on | X | X | X | X | X | Low | High | High |
| 0 dB FM attenuation | X | X | Low | Low | Low | X | X | X |
| 20 dB FM attenuation | X | X | Low | Low | High | X | X | X |
| 40 dB FM attenuation | X | X | Low | High | Low | X | X | X |
| 60 dB FM attenuation | X | X | High | Low | High | X | X | X |
| 80 dB FM attenuation | X | X | High | High | Low | X | X | X |
| IC11 output to DAC B | High | Low | X | X | X | X | X | X |
| IC11 output to DAC A | Low | Low | X | X | X | X | X | X |

**Note:** X means that the level is not important.

## Power line cleaning

Any noise on the supply rails with frequency components greater than the loop bandwidth of the F/N loop (2 kHz) will induce phase noise on oscillator output.

The +32 V power line is used by IC1 to derive the +26 V regulated supply for this board. The regulator adjust pin of IC1 is decoupled by C3 to improve ripple rejection. Diode D1 provides a discharge path for C4 on power-down.

Both ±12 V lines are provided with additional protection from noise and ripple when used in sensitive areas of the oscillator and phase detector, using line-cleaner circuits IC2(a), TR1 and IC2(b), TR2. The two line-cleaner circuits are similar and only the +12 V circuit is described.

The invert input of IC2(a) is biased by the potential divider R4, R5 and R9, with the input maintained at an AC earth via the long time constant R6 and C7. Any high frequency current transients on the power line are developed across R3 and applied via zener diode D2 to the non-invert input of IC2(a). IC2(a) output drives the base of TR1 to compensate for the transient current change in the power supply.

# AF4 RF divider board

## Introduction

This board selectively filters the 576 MHz to 1150 MHz signal from the AF2 board and provides frequency division, as required, under control of $I^2C$ bus signals from AE1. The output is fed to AF5 and is within one of the following frequency ranges:-

| | |
|---|---|
| 576 MHz to 1150 MHz | (fundamental) |
| 288 MHz to 576 MHz | (÷2) |
| 144 MHz to 288 MHz | (÷4) |
| 72 MHz to 144 MHz | (÷8) |
| 36 MHz to 72 MHz | (÷16) |

## Control circuits

Control is via $I^2C$ expander IC1 and 4 to 16 line decoder IC3. These ICs control the state of a series of control signals, i.e., S1 and S0 for setting the divide factor of programmable divider IC7, and V1 to V15 for configuring the filter switch matrix.

The filter selection range determines which and how many low-pass filters are switched in by the various switching diodes. As the divide factor is increased, so the number of filters used increases. Thus, at the top of the range, only one is used, whereas at the bottom, five are used.

Divider and filter selection codes and main controls are summarized in the tables below. These tables can be used to work out the filter switching. However, for guidance, switching control for the first three filter selection ranges is described. For the remaining ranges, the filters used are merely listed.

| Range (MHz) | P7 | P6 | P5 | P4 | P3 | P2 | P1 | P0 |
|---|---|---|---|---|---|---|---|---|
| 800-1150 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 |
| 576-800 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 1 |
| 400-576 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 0 |
| 288-400 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 1 |
| 200-288 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 |
| 144-200 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 1 |
| 100-144 | 1 | 1 | 0 | 1 | 0 | 1 | 1 | 0 |
| 72-100 | 1 | 1 | 0 | 1 | 0 | 1 | 1 | 1 |
| 50-72 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 |
| 36-50 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 1 |

**Note:** 0 = logic low, 1 = logic high.

| Range (MHz) | S1 | S0 | ÷ by | V1 | V2 | V3 | V4 | V5 | V6 | V6' | V7 | V8 | V9 | V10 | V11 | V12 | V13 | V14 | V15 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 800-1150 | X | X | ---- | N | P | P | P | P | P | 1 | P | P | P | P | P | P | P | P | P |
| 576-800 | X | X | ---- | P | N | P | P | P | P | 1 | P | P | P | P | P | P | P | P | P |
| 400-576 | 0 | 0 | 2 | P | P | N | N | P | N | 0 | P | P | P | P | P | P | P | P | P |
| 288-400 | 0 | 0 | 2 | P | P | N | P | N | N | 0 | P | P | P | P | P | P | P | P | P |
| 200-288 | 0 | 1 | 4 | P | P | P | P | P | N | 0 | N | N | P | P | P | P | P | P | P |
| 144-200 | 0 | 1 | 4 | P | P | P | P | P | N | 0 | N | P | N | P | P | P | P | P | P |
| 100-144 | 1 | 0 | 8 | P | P | P | P | P | N | 0 | P | P | P | N | N | P | P | P | P |
| 72-100 | 1 | 0 | 8 | P | P | P | P | P | N | 0 | P | P | P | N | P | N | P | P | P |
| 50-72 | 1 | 1 | 16 | P | P | P | P | P | N | 0 | P | P | P | P | P | P | N | N | P |
| 36-50 | 1 | 1 | 16 | P | P | P | P | P | N | 0 | P | P | P | P | P | P | N | P | N |

**Note:** 0 = logic low, 1 = logic high, N = –12 V, P = +12 V.

## 800 MHz to 1150 MHz

Here the input signal is undivided and only the 1150 MHz filter is switched in.

The state of the relevant signals is:-

- V1 (IC4 pin 1) at –12 V because IC3 Y0 output is low (address 0).
- V2 at +12 V.
- V6' at logic high.
- V6 at +12 V.

Divider IC7 is disabled by V6' switching on TR1. D1 is reverse-biased by V6, isolating the input from the divider. Since the divider is disabled, the state of S0 and S1 is irrelevant.

The amplified input from IC9 is switched to the 1150 MHz filter input by V1 which forward biases D2, D6 and D49. The 1150 MHz filter output is switched to the board output by D9 and D53 which are also forward-biased by V1. This through path is isolated from the rest of the switching matrix by D5,D10,D12, D14 and D50, reverse-biased by V2 which also forward biases D11,D15-17, and D13 which is reverse-biased by V6.

## 576 MHz to 800 MHz

Here the input signal is undivided and only the 800 MHz filter is switched in.

The state of the relevant signals is:-

- V2 at –12 V because IC3 Y1 output is low (address 1).
- V1 at +12 V.
- V6' at TTL high.
- V6 at +12 V.

Divider IC7 is disabled, as described previously, and the states of S0 and S1 are irrelevant.

The amplified input from IC9 is switched through the 800 MHz filter by V2 which forward biases D2, D5, D50, D14, D12 and D10. D6, D49, D53 and D9 are reverse-biased by V1, isolating the 1150 MHz filter. D13 is reverse-biased by V6, isolating the other filters.

### 400 MHz to 576 MHz

On this and all lower frequency ranges, the divider is used. V6' is at TTL low switching off TR1, and V6 is at −12 V, switching the input to the divider via D1. The output of the 575 MHz filter is always switched to the board output on these ranges because V6 forward biases D13 and D10. On these ranges TR3 is cut off, allowing the output of the divider to be applied to TR2 which, with its associated components, forms a compensation amplifier that flattens the frequency response of the divider. The divide factor is dependent on S0 and S1.

On this range, the 575 MHz filter only is switched in. The state of the relevant signals is:-

- V3 and V4 at −12 V.
- V5, V7, V10 and V13 at +12 V.
- S0 low, S1 low (divide factor 2).

D20 is forward-biased by V3, but D23 and D25 are reverse-biased by V5, isolating the 400 MHz filter. D22 and D39 are forward-biased by V4, so the signal path is switched to the 575 MHz filter. V7, V10 and V13 isolate the signal input paths to the lower frequency filters.

### 288 MHz to 400 MHz

On this range, the 400 MHz and 575 MHz filters are switched in.

### 200 MHz to 288 MHz

On this range, the 288 MHz and 575 MHz filters are switched in.

### 144 MHz to 200 MHz

On this range, the 200 MHz, 288 MHz and 575 MHz filters are switched in.

### 100 MHz to 144 MHz

On this range, the 144 MHz, 288 MHz and 575 MHz filters are switched in.

### 72 MHz to 100 MHz

On this range, the 100 MHz, 144 MHz, 288 MHz and 575 MHz filters are switched in.

### 50 MHz to 72 MHz

On this range, the 72 MHz, 144 MHz, 288 MHz and 575 MHz filters are switched in.

### 36 MHz to 50 MHz

On this range, the 50 MHz, 72 MHz, 144 MHz, 288 MHz and 575 MHz filters are switched in.

## AF5 RF output board

### Introduction

AF5 produces an output to the signal generator attenuator in the range 100 kHz to 1155 MHz, applying levelling and amplitude modulation, as required. It is $I^2C$ bus controlled from the AE1 board. A block diagram is shown in Fig. 1-20.

The board is fed with the 36 MHz to 1150 MHz signal from AF4 and the 419.43 MHz signal from AF1. The latter is switched on by a DOUBLER ON signal sent from AF5 to AF1, and is used to produce outputs in the range 100 kHz to 36 MHz using a mixer stage. There are two signal paths, one for 36 MHz to 1150 MHz and the other for 100 kHz to 36 MHz, selection being controlled by switching diodes.

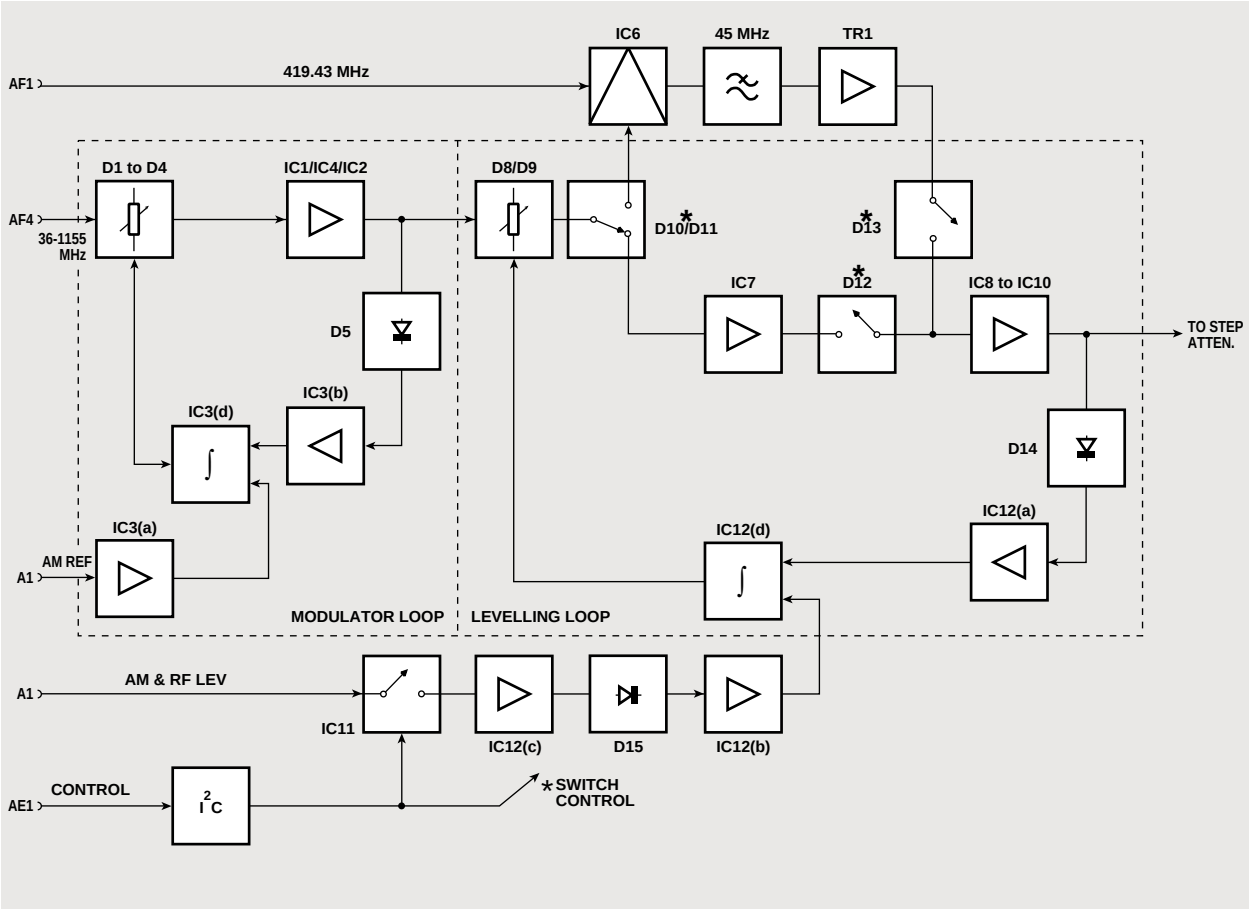



*Fig. 1-20 AF5 board - block diagram*

There are two control loops, one to apply amplitude modulation without introducing distortion, and the other to apply the required RF level to the output without stripping off the modulation component. Signal inputs for modulation and level setting both come from the A1 board.

## I²C bus control

I²C bus expander IC14 decodes the signals from AE1, providing the control signals for the board. The following table shows these decodes and their associated functions, which are described as they become relevant in the following sections.

| Function | IC14 P2 | IC14 P1 | IC14 P0 | D10 | D11 | D12 | D13 |
|---|---|---|---|---|---|---|---|
| Select 36-1150 MHz | X | X | Low | OFF | ON | ON | OFF |
| Select 100 kHz-36 MHz | X | X | High | ON | OFF | OFF | ON |
| AF1 DOUBLER ON | X | Low | X | X | X | X | X |
| Output level fixed on | High | X | X | X | X | X | X |

## Amplitude modulation loop

R1 to R3 provide a 6 dB pad to reduce the RF input to the modulating diodes D1 to D4, thus restricting signal swings to the linear portion of the diode characteristics, and preventing the generation of CW harmonics.

The AM REF modulating signal from A1 is applied via IC3(a) and IC3(d) to the diodes D1 to D4 to vary their conductance and amplitude modulate the RF signal. D5 detects the RF envelope, and C9 provides filtering. IC3(b) with D6, matched with D5, provide temperature compensation for the detector diode. Integrator IC3(d) then sets the RF level so that the detected level is the same as that of the reference from IC3(a). The effect of this feedback loop is to maintain the output from IC2 to 9 dBm and to minimize distortion which might otherwise be introduced by amplitude modulation.

The AM REF modulating signal normally includes a DC component of 1.678 V which serves to bias D1 to D4 in the centre of their attenuation characteristic. When RF levels between +7 dBm and +13 dBm are required on the TNC connector, the DC component is increased to 3.356 V which provides reduced attenuation and hence increased drive to achieve the required output. Note that AM modulation cannot be used at these higher RF output levels.

## 36 MHz to 1150 MHz signal path

D11 is On (forward-biased), D10 is Off, D12 is On, and D13 is Off, thus routeing the RF signal from IC2 through IC7, IC8 to IC10, the PCB pad and SMA connector to the signal generator's attenuator. Amplifiers IC7 and IC8 to IC10 provide the required drive to permit user selection of signal generator output of up to 13 dBm at the TNC connector.

## 100 kHz to 36 MHz signal path

D11 is Off, D10 is On, D12 is Off and D13 is On, thus routeing the RF signal from IC2 to the balanced mixer IC6, where it is mixed with the 419.43 MHz signal from AF1, amplified by TR1 and fed to IC8. The mixer produces the required frequency range because, for signal generator operation between 100 kHz and 36 MHz, the input signal from AF4 is in the range 420 MHz to 456 MHz.

## Output levelling

The AM and RF LEV signal comprises an AM signal superimposed on a DC level equivalent to the RF level setting. The AM component is used to prevent the output levelling loop circuit from stripping off the AM modulation.

The RF level component is applied via switch IC11, IC12(c) and IC12(b) to IC12(d) integrator non-inverting input. IC12(d) sets the attenuation introduced into the RF signal path by D8 and D9. D14/C48 detects the RF level from IC10 and the resulting signal is applied to the inverting input of IC12(d) after buffering by IC12(a). The loop reaches a steady state when the RF output reaches the level demanded by the RF level setting.

Within this circuit, control is exercised in 0.1 dB steps, through a 10 dB range. The step attenuator subsequently applies 10 dBm attenuation steps to achieve the required output level. Note that for non-AM operation, the action of the amplitude modulation loop extends the available RF output level by 10 dB.

At low modulation frequencies the AM component of the signal detected by D14/C48 would tend to strip the amplitude modulation from the modulated signal, but the AM component of the AM AND RF LEV signal is applied (via IC11, IC12(c) and IC12(b)) to the non-inverting input of IC12(d), thus nulling the effect of the detected AM component.

## Reference predistortion

The circuits IC12(c), D15/C54/R56/R58 and IC12(b) minimise the effects of any distortion introduced to the RF modulation envelope. These effects can be caused by:-

- Change in the characteristics of the detector circuit D14/C48/R51 at low modulation frequencies. This is minimised by the adjustment of R58.
- Change in the characteristics of D14 with temperature. This is minimized by the use of forward-biased D15 which is matched with D14.

### Reverse power protection

Though reverse RF power connected into the circuits is handled by the main attenuators on the AA1 board, D17 to D19 provide protection for the AF5 board circuits for the few milliseconds before the AA1 board attenuators switch in.

# AF6 Up converter board

## Introduction

The AF6 board is used for testing radio equipment in the 1.6 GHz to 2.2 GHz frequency band, generally associated with PCN and PCS communication networks.

This board allow the 2967 Test Set to test DCS1800 (GSM at 1800 MHz) equipment as well as all equipment tested by the 2966A and 2968 Test Sets.

AF6 provides a way of applying the digital modulation to an RF carrier in a similar manner to AB3 in the 2966A and 2968. The AF6 can route either the analogue signal generator output or the digitally modulated RF signal (at either 1 GHz or 2 GHz) to the output attenuators.

When fitted, the AF6 board is located in the RF tray, next to AF4/AF5.

### Overview

The board has five operating modes.

- **Analogue mode**
  AF6 routes the analogue signal from AF5 to AC2
- **GSM mode**
  The unmodulated analogue signal is used as an RF carrier. This is mixed with the digitally modulated 70 MHz IF from A8, producing a digital signal which is routed to AC2.
- **DCS1800 mode**
  The unmodulated analogue signal is doubled in frequency, then mixed with the digitally modulated 70 MHz IF from A8 before routeing to AC2
- **Warping Cal mode**
  During the cal sequence, a 10 MHz cal signal is routed from AB4 through AF6 to AC2 and into the Test Set receiver.
- **2 GHz Sig Gen Cal mode**
  The RF signal from AF5 is doubled on AF6, and then routed to AC2 and into the Test Set receiver.

### Analogue Mode or Bypass Path

The RF signal from AF5, enters AF6 at P2 and is applied to the common point of IC1 (pin 1). The signal at this point is within the frequency range 100 kHz to 1.155 GHz, with a maximum power level of +13 dBm. This power level is required to achieved the +11.5 dBm power level at the output of AF6. The RF signal is routed through the RF1 port of IC1 (pin 3), to the similar contact on IC10.

Devices IC1, IC2, IC6, IC10 and IC11 are GaAs SPDT MMIC (Gallium Arsenide Single-Pole-Double-Throw Microwave Monolithic Integrated Circuit) switches.

After passing through IC1 and IC10 the signal is routed through IC11. From the RFC port of IC11 (pin 1) the RF signal passes through the reverse power protection circuit before leaving the board at PLD. The maximum level at this point is +11.5 dBm.

The maximum specified RF output level from the Test Set is +10 dBm, therefore a 1.5 dB loss through the input/output switching circuits can be accommodated.

## GSM900 MHz Path

For the GSM900 path, the RF signal from AF5 is used to supply the LO signal to the mixer on AF6. This signal is within a frequency range of 870 MHz to 1.07 GHz. This is 70 MHz higher than the required front panel output frequency of 800 MHz to 1.0 GHz. A power level into AF6 of approximately +7.5 dBm is required to achieve the correct LO drive level into the mixer.

The RF signal passes through IC1, leaving at the RF2 port (pin 6), then through RFC and RF1 of IC2 through the 6 dB attenuator formed by R500, R501 and R502 to RF1 of IC6. The control connections of IC2 and IC6 are parallel connected to a common driver circuit. The signal from the RFC port of IC6, is amplified by IC7 (*Amplifier 3*).

IC7 is biased by R8, R9 and R56 to give a quiescent current of approximately 54 mA. This sets the gain of the device and determines the 1 dB compression point. This amplifier sets the RF level into the mixer, within the range of +10 dBm to +12 dBm, dependant on frequency.

The signal at the LO port of RF Mixer IC8 mixes with the digitally modulated 70 MHz IF from A8.

The mixer has a maximum conversion loss (IF to RF port) of 9 dB; with a minimum LO to RF port isolation of 25 dB.

The 70 MHz signals enters the board at PLC, at a maximum level of −4 dBm. For normal operation, the power level of the 70 MHz IF is within the −25 dBm to −15 dBm window. Yet the −4 dBm level is required to achieve the maximum level of -13.5 dBm at the output of the board. A 3 dB pad, R200, R201 and R202 is used prior to the IF port of IC8 to improve the return loss looking into the port.

There will be three predominant signals at the output (RF port) of the mixer, spaced 70 MHz apart. The middle signal is the LO leakage signal, with the two adjacent signals being the image frequencies. It is the lower one of the two that is of interest, although both image frequencies will contain the same modulation information.

It is for this reason that the LO drive is supplied at a frequency of 70 MHz higher than that required out of the front panel, i.e. the subtractive nature of the mixer gives a spectrum of signals at its output of :

$$fc \pm fm$$

where, $f_c$ is the carrier frequency or LO drive, and $f_m$ is the 70 MHz intermediate frequency.

All three signals will be present in the RF output from the Test Set, but this does not present a problem, as the receiver of the unit under test will select the required signal.

A 2 dB pad is added to the RF port of IC8 to improve the return loss. IC9 (*Amplifier 4*) is used to amplify the signal by 13 dB to compensate for the losses incurred by the mixer. IC9 is biased to 75 mA to set the required gain.

Another 2 dB pad is used to improve the VSWR figure seen looking into the output of AF6. Both The RF2 ports of IC10 and IC11 are selected, to route the signal to P4.

## DCS1800/GSM1800 MHz or Doubler Path

The DCS1800/GSM1800 MHz path has much in common with the GSM900 path. The only difference being that it occurs at twice the frequency, which implies there is a frequency doubler at some interim stage.

When in the doubler mode the input signal to AF6 enters the board at a level of approximately +13.5 dBm and within the frequency band 835 MHz to 1.135 GHz. This corresponds to the RF output frequency band of 1.6 to 2.2 GHz.

The RF2 ports of IC1 and IC2 are selected. This routes the RF signal through a 7 dB pad and 13 dB amplifier IC4 to T1.

T1 is a twelve turn, 1 **:** 1 transformer, which is connected to provide antiphase signals to the bridge connected quad pack of Schottky mixer diodes. This arrangement acts as a frequency doubler. The common anode connection of the bridge is forward biased to maximise the amplitude of the doubled frequency, and to minimise any harmonics and sub-harmonics.

The signal losses through the frequency doubler circuit are 3 dB in T1 and 12 dB in the diode bridge.

Temperature compensation is applied to D1 by the circuit configured around IC3. It is an ultra precision op-amp, with an extremely low offset voltage across the entire temperature range. D2 is a dual Schottky diode pack used as a temperature sensor. It gives a forward voltage drop variation of 0.225V to 0.325V for temperature variation from +80°C to 0°C respectively. i.e. as the temperature increases, the forward voltage decreases.

IC5 amplifies the doubled signal by 7 dB. The gain setting bias for IC5 is provided by R6, R7 and R55, through RF blocking inductors L3 and L14.

Spurious signals generated by the frequency doubler circuit are minimised by the 1.5 GHz high pass and 2.2 GHz low pass filters between the output of IC5 and the RF2 connection of IC6. The 3 dB pad R100, R101, R102 prevents response degradation by minimising the impedance variation interaction between the two filter designs.

The high pass filter uses printed inductors and surface mount capacitors; the low pass filter uses printed inductors and printed capacitors.

The filtered signal is routed through IC6's RF2 and RFC ports, then amplified by IC7 - as for the GSM900 path - which provides 7 dB gain before it is fed to the LO port of the mixer IC8. This will now be within the range 1.670 to 2.270 GHz which is 70 MHz above the required output signal frequency.

From the mixer output, the signal is routed as for the GSM900 path.

## Warping calibration mode

When the warping calibration route is chosen, a 10 MHz signal enters AF6 through P5. This is attenuated by R12, R13, then routed to the output, P4, through RF1 and RFC of IC11.

## 2 GHz signal generator calibration mode

During calibration of the digital receiver, a 2 GHz un-modulated carrier is required. This is provided by replacing the 70 MHz IF to mixer IC8 with a DC signal. (Refer to *GSM900 path* earlier).

A positive or negative DC bias is applied to IC8 through L12 and IC15. The software chooses whichever polarity provides the maximum output from AF6.

## Reverse Power Protection

Reverse power protection on the AF6 board is provided to guard against high power being applied to the RF connectors on the from panel.

At low frequencies, less then approximately 10 MHz, diodes D6, D8 and D5, D7 provide a clamping level equal to the combined diode drop level of each diode path.

At higher frequencies, the pin diode action of D5 and D6 is effective.

In normal operation, these diodes are heavily reversed biased; so that they present a high impedance to signals leaving the board. D5 anode is taken to -12 Volts through R17 and R18; D6 cathode is taken to +12 Volts through R15 and R16. When the RF detector triggers both diodes change state.

If a reverse signal which exceeds the threshold of +24 dBm is applied (maximum allowable into unit without damage is 10 Watts), the RF detector triggers.

In normal operation the RF detector is inactive, as the forward path signal amplitude is lower than the detector trigger threshold. If a reverse high power signal which exceeds the threshold is applied, the RF detector triggers.

The RF output line is sampled by divider chain R26 and R27. The RF sample is converted into a DC signal (detected) by D9, C29, R25 and L9. This is applied to the inverting input of voltage comparator IC13; the reference voltage from R28 and R29 is applied to the non-inverting input.

If the detected voltage exceeds the reference level set by R28 and R29, pin 7 of IC13 goes low (0V). As the "SET" input of IC12 is being active low, the Q output goes high (+5 Volts). It remains in this high state until IC12 receives a logic low (0 Volts) RESET on pin 1.

With the Q output of IC12 high, TR5, is switched on, and presents 0 Volts on the gates of TR3 and TR4. Both these MOSFETS turn on, and +12 V is present at pin 2 of TR1, a dual gate complimentary MOSFET. Simultaneously, as a result of TR4 turning on, current flows from −12 V through R20, R21 and TR4 to +12 V. This biases the gate of TR2 at 0 Volts which switches it on and places −12 V on pin 4 of TR1. The anode of D5 is now biased to +12 Volts and the cathode of D6 is biased at -12 Volts. By this action D5 and D6 are now heavily forward biased, and present an effective low impedance to any incoming RF signal.

The control processor and the input switch board have to be flagged when the protection clamp is active. TR6 is an open drain n-channel MOSFET. The drain is pulled up via a resistor on the input switch board, AA2. When AF6 reverse power protection becomes active, the input switching is set to a safe state and the processor is flagged.

## $I^2C$ control

$I^2C$ control of the paths through $I^2C$ expander IC14 which uses $I^2C$ address 42 hex. The $I^2C$ clock line SCL and data line SDA enter the board at P1 pins 5 and 6 respectively. Both the SCL and SDA lines are pulled up to +5 V by 10 kΩ resistors. The SDA line includes a series diode D12 to prevent bi-directional communication.

The outputs P0 to P7 of IC14 control the route switches through the MMIC switch driver circuits, IC15 2 GHz calibration bias selection, and resetting of the reverse power protection circuitry.

| | Output from IC14 | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Operating mode** | **P7** | **P6** | **P5** | **P4** | **P3** | **P2** | **P1** | **P0** |
| Analogue to 1 kHz | H | H | L | H | H | H | H | H |
| GSM900 | H | H | H | L | H | H | H | H |
| DCS1800 | H | H | L | L | H | H | H | H |
| Warping calibration | H | H | L | L | H | H | L | H |
| Reset reverse power protection | C | P | P | P | P | P | P | P |
| 2 GHz sig gen cal - positive bias | H | H | L | L | L | H | H | H |
| 2 GHz sig gen cal - negative bias | H | L | L | L | H | H | H | H |

H = +5 V; L = 0 V; C = pulse then back to H; P = keep at previous setting.

## MMIC switch driver circuits

The $I^2C$ output ports cannot drive the GaAs MMICs directly, therefore a driver stage is necessary. There are three identical driver circuits.

- Transistors TR7, TR8 and TR9 have control pins CTRL1 and CTRL2, which control IC1 and IC10.
- Transistors TR10, TR11 and TR12 have control pins CTRL3 and CTRL4, which control IC2 and IC6.
- Transistors TR13, TR14 and TR15 have control pins CTRL5 and CTRL6, which controls IC11.

The three MOSFETs in each driver provide complimentary driver voltages, i.e. when one is LOW the other is HIGH.

When P4 of IC14 goes high (+5 V), this makes the gate of TR7 equal to +5 V. This in turn switches TR7 off, and so −7.5 V is biased on the gate of TR8. This switches TR8 off, to give CTRL2 a voltage of 0 V. As the gate of TR9 will also be at 0 V this will turn on heavily, taking CTRL1 to −7.5 V.

# Monochrome monitor

## Introduction

The circuitry shown on the circuit diagram, together with a CRT, forms an integral monochrome monitor of high resolution. This is a bought-in unit, designed for use in a variety of environments, enabling certain components to be omitted when not required. Components that are not fitted in this particular application are mentioned, where applicable, in the following text.

There are three inputs to the unit from the A5 board:-

- A horizontal synchronizing signal HSYNC on PL2-3.
- A video signal on PL2-5.
- A vertical synchronizing signal VSYNC on PL2-7.

The INTENSITY control on the front panel is wired to PL3 pins 1 to 3. Internal preset controls are accessible through holes in the unit case after removal of the Test Set cover.

## Horizontal deflection circuits

IC2 is an ASIC that generates the horizontal time base waveform in accordance with the HSYNC input and the settings on the PHASE and H HOLD controls. In this application, PL2-3 is wired directly to the junction of R60 and R62, so the HSYNC signal is fed to IC2 pins 8 and 9. None of the components marked HSYNC PROCESSOR are fitted, i.e. Q1, Q11, Q2, etc., except R11 in the video input circuit. Note also that IC2 pin 10 output is not used, R59 and C27 being omitted.

Q3 is the horizontal driver, its gate being connected to the output of IC2 on pin 2 which is a drive pulse. The CRT deflection coil circuit is connected to SCAN pins 1 and 2 in the drain circuit of Q3. From the same point, there is also a drive to transformer T1 in the EHT generation circuit. Components not fitted in this area are R34, R35, L2 and C26.

## Vertical deflection circuits

IC1 is an ASIC that generates the vertical timebase waveform in accordance with the VSYNC input on pin 8 and the settings on the various vertical controls. Its output on pin 4 is routed to and from the vertical deflection coils via scan pins 3 and 4 and to the V SHIFT preset control. The ASIC includes a flyback generator circuit that generates a flyback blanking pulse on pin 3 which is fed to the video circuits. This pulse is generated regardless of whether or not there is a sync input.

## Video circuits

The video input signal on PL2-5 is developed across R11 and the INTENSITY control which is wired in parallel with it to PL3-1 to PL3-3. It is then fed to Q7, the first stage in the video pre-amplifier. Q9, Q10 and associated components provide DC clamping of the pre-amplifier output. Q4 and Q5 form the output stage of the video amplifier whose output is fed to the cathode circuit of the CRT. Flyback blanking is provided by the blanking signal from IC1 and Q6.

## CRT supply protection

All CRT supplies are protected by an integral flash protector on the valve base, and for each supply/signal line by a flash-blow series resistor.

# Power supply unit AC-DC units

## Introduction

The AC-DC Power Supply Unit was fitted to the 2965, 2965A and other types until superseded by the AC only unit described later. It provides all the supplies necessary for the operation of the Test Set. It is located at the rear of the Test Set within its own metal enclosure. Mounted in the side of the PSU are the AC input connector and fuses, DC input connector, AC ON/OFF/DC ON power switch and the AC voltage selector.

Input to the unit is one of the following:-

- DC supply between 11 V and 32 V at 225 W maximum.
- AC supply between 88 V and 132 V AC at frequency between 45 Hz and 440 Hz at 260 W maximum (110 V nominal).
- AC supply between 188 V and 265 V AC at frequency between 45 Hz and 440 Hz at 260 W maximum (240 V nominal).

The PSU is also supplied with a 125 kHz reference signal from A6 (via AR2), for the switched mode supplies.

### AC supply operation

The AC supply is connected via the fused AC input connector. The three position On-Off switch connects this to the PSU circuit when placed in the AC On position.

### DC supply operation

The 11 V to 32 V DC supply is connected via the CON2 plug. The DC supply is not switched directly by the three position On-Off switch. This switch controls a transistorised relay circuit which also protects against reverse polarity connection.

### Outputs

The outputs from the PSU to supply the instrument are taken from a multipin in line connection on the top of the unit. A plug formed on the PSU distribution board AR2 makes a direct connection. The supplies provided are –5 V 2 A, +12 V 2 A and 32 V 150 mA, +12 V 45 A and –12 V 2.5 A. All are relative to the instrument common ground. The circuit diagram for the PSU distribution board AR2 shows the connections and voltages at each pin.

The output connector also carries a *power down* line and an *over temperature* line, to allow the power source and PSU internal temperature to be monitored on the CPU.

The 125 kHz syncronization signal is taken *into* the PSU via this connector. This signal is provided from the CPU board A6, and is used to lock the switched mode converters within the power supply to the reference oscillator of the Test Set.

A 24 V supply for the cooling fan is taken from a small 2 pin connector.

### Operation

The unit operates on the switched mode principle. The design provides a high level of output stability with great power efficiency and adequate EMC compliance. Over voltage and over current protection prevent damage to the instrument or PSU in the event of circuit failure.

## Power supply unit AC only units

The AC only PSU modules fitted to later production is designed to operate from AC supply between 88 V and 132 V AC (110 V nominal).and 188 V and 265 V AC (240 V nominal) at frequency between 45 Hz and 440 Hz, with a power consumption of 260 W maximum. Input range switching is automatic.

These PSU's are similar to the AC-DC units in appearance, but do not have the DC input connection or the AC voltage selection switch. The power switch is two position (ON/OFF) rather than three position (Centre OFF).

The AC operation and the output provision is identical to the dual supply version.

# Chapter 2
# MAINTENANCE

## Contents



## List of figures

# Board variants

Some variants of the original 2965 boards have been introduced during development, as shown in the following table. This table is provided as a guide only. The presence or absence of a particular module in a specific instrument is not necessarily incorrect. For assistance consult the nearest IFR International Service Centre. Addresses will be found at the end of this manual.

**Table 2-1 2965 Series boards and variants**

| Board | Variant | Comments | Board | Variant | Comments |
|---|---|---|---|---|---|
| A1 | | *2965 only* | AE4 | | *2965 only* |
| | A1/2 | Not 2965 | | AE4/2 | *Not 2965* |
| A2 | | *2965 only* | AE5 | | *2965 only* |
| | A2/2 | Not 2965 | | AE5/2 | *Not 2965* |
| A3 | | All types | AE6 | | *2965 only* |
| A4 | | 2966A, 2967 & 2968 only | | AE6/2 | *Not 2965* |
| A5 | | 2965, 2965A | AE7 | | All types |
| | A5/2 | Not 2965 | AE8 | | 2965A with option 9.<br>2966A, 2967 & 2968 |
| A6 | | *2965 only* | AF1 | | All types |
| | A6/2 | 2965A, 2966A, 2967 & 2968 | AF2 | | All types. † See below |
| A7 | | Al types | AF3 | | All types |
| A8 | | 2966A, 2967 & 2968 only | AF4 | | All types |
| AA1 | | *2965 only* | AF5 | | All types |
| | AA1/1 | 2965A, 2966A & 2968 | AF6 | | 2967 only |
| AA2 | | 2967 only | AK1 | | 2967 only |
| AB2 | | All types | AK2 | | 2967 only |
| AB3 | | 2966A & 2968 only | AR1 | | *2965 only* |
| AB4 | | 2966A, 2967 and 2968<br>option 22 if option 22 fitted. | | AR1/2 | *Not 2965* |
| AE1 | | All types | AR2 | | All types |
| AE2 | | All types | AR4 | | 2967 only |
| AE3 | | *2965 only* | | | |
| | AE3/2 | *Not 2965* | | | |

†There are two distinct versions, early and late

# Board and unit access

For the location of boards, refer to Fig. 2-1 (2965) on page 2-6, Fig. 2-2 (2965A, 2966A, 2968) on page 2-6 or Fig. 2-3 (2967) on page 2-7.

Before attempting to hinge out the RF tray refer to Figs. 2-4 and 2-5 on page 2-8.

## Removal of covers

There are two covers (not shown): top and lower. Each is secured with eight countersunk self-tapping screws, four at the front and four at the rear. When refitting, ensure that the holes in the top cover for the loudspeaker are aligned correctly (at the rear), and that the ventilation holes in the lower cover are at the front.

## A7 board

Disconnect two pipes, one at the top of the AB2 board under the A7, the other at PLD on the A7. Disconnect PLA, PLB and PLE. Remove the three securing screws. Note that the board plugs into the keyboard, so to remove it, carefully ease it towards the rear of the test set. Lift the board carefully and then disconnect the lead to PLC on the underside of the board. When refitting the board, be careful to align the A7 and keyboard connectors when plugging in the board.

## A1, A2, A3 and A5 boards (2965)
## A1/2, A2/2, A3, A5 boards (2965A, 2966A, 2967, 2968)
## A4 and A8 boards (2966A, 2967, 2968)

These boards are mounted on a hinged assembly as indicated in Fig. 2-1 (2965) Fig. 2-2 (2965A, 2966A, 2968) or Fig. 2-3 (2967). To gain access to the boards, undo the two securing screws located either side of the attenuator unit and carefully lift the hinged assembly. Note that before the unit can be raised fully, PLN on the A5 board and two connectors to A3 must be disconnected. Individual boards can be taken out by removing the appropriate securing screws and spacers and disconnecting the associated connectors.

## A6 board (2965)
## A6/2 board (2965A, 2966A, 2967, 2968)

This board is mounted on the frame below the hinged assembly, as indicated in Fig. 2-1 (2965), Fig. 2-2 (2965A, 2966A, 2968) or Fig. 2-3 (2967). To remove it, simply unscrew the nine mounting screws and disconnect all connectors.

## AR1 and AR2 boards

These boards are frame mounted towards the rear of the test set, behind the hinged assembly, AR2 at the top and AR1 at the side. AR2 has five securing screws and AR1 four.

## AR4 (2967)

This board is mounted on top of AR2 and is secured by two screws.

## AE and AF boards

These boards are situated in the RF tray, which is mounted on the underside of the test set and has an upper and lower compartment. The AE boards are located inside the lower compartment and are easily accessed by removing the cover from the lower compartment. To gain access to the AF boards, the RF tray must be dismounted so as to access the upper compartment. To dismount the RF tray, disconnect the two pipes indicated at A and B in Fig. 2-4 *RF tray removal*, and remove the four mounting screws. The RF tray can then be moved away from the test set frame sufficiently to be able to remove the cover on the upper compartment to reveal the AF boards.

**(2967 only)**

See Fig. 2-5 *RF tray removal (2967).*

The 2967 has additional connections which must be removed before the RF tray can be hinged. An RF pipe C must be disconnected from the frequency doubler board AF6 and a fly lead D from AF6 must be disconnected from PLF of AA2. See Fig. 2-5 *RF tray removal (2967).*

Where the warping facility (option 22) is fitted an additional RF pipe E must be disconnected. This runs from the warping module AB4 to AF6.

## AA1, AA1/1 switch unit (not 2967)
## AA2 switch unit (2967)

To remove this unit, first disconnect the four pipe connectors at the top, then the single pipe connector at the bottom. The rubber grommet securing the RF N-type connector and the nut securing the RF TNC connector must now be removed. Disconnect the multi-way connector to the A7 board. After removing the frame mounting screws at the side, the unit can then be removed by withdrawing it towards the rear.

## AB2 power meter

This unit is situated below the A7 board but is accessed from the underside of the test set. Before turning the test set over, disconnect the pipe connector from the top of the unit. Turn the test set over and dismount the RF tray, as described above. The RF tray can then be swung aside to allow access to the AB2 mounting screws; undo the two screws at the bottom to remove the module, and then undo the seven screws at the side to remove the lid.

## AB3 board (2966A, 2968)

This board is situated below the A7 board but is accessed from the underside of the test set. Turn the test set over and dismount the RF tray, as described above. The RF tray can then be moved aside to allow access to the AB3 board.

## AB4 board (2966A, 2967, 2968)

This board is only fitted when the warping option is installed (Option 22). It is situated below the A7 board but is accessed from the underside of the test set. Turn the test set over and dismount the RF tray, as described above. The RF tray can then be moved aside to allow access to the AB4 board.

## Down converter module (2967)

**Containing AK1 and AK2 boards**

This unit is situated below the A7 board but is accessed from the underside of the test set. Turn the test set over and dismount the RF tray, as described above. The RF tray can then be moved aside to allow access to the down converter module.

## Front panel

Firstly, remove the A7 board, as described previously. The front panel is secured at the top of its mounting frame by three countersunk screws, one in the middle and each of the others just inboard of an outer screw hole for the top cover. It is secured at the bottom of the frame by four countersunk screws roughly situated below the VOLUME, SQUELCH, INTENSITY and SCOPE POSITION controls. Before it can be removed, the rubber grommet securing the RF N-type connector and the nut securing the RF TNC connector must be removed. The front panel will then pull away from the test set. The wires to the back of the EXT MOD INPUT and AF INPUT connectors must then be unsoldered and two plugs disconnected before the unit can be removed.

## CRT unit

The CRT unit has to be withdrawn from the front, so the first thing to do is remove the front panel as described above. Then remove the four securing screws at the top. The unit can then be withdrawn after disconnecting one in-line connector.

## Power supply unit

To remove this unit, it is necessary to disconnect the rear panel. This process includes removing the four rear feet , hinging up the hinged assembly and breaking all plug connections to the rear panel. There are eight securing screws to be removed, four at each side. The rear panel and power supply unit, together with the AR1 and AR2 boards, can then be removed as one assembly and then dis-assembled, as required.

# Fault finding

It is sometimes necessary to carry out tests to boards or modules while the test set is functioning. The procedures which follow explains how to position and connect the modules mentioned so that this is possible.

## Downconverter board AK2

The Downconverter module contains the Local Oscillator board AK1 (44830/184) and the Downconverter board AK2 (44830/186)

Remove the bottom cover of the test set. Release and hinge out the RF tray as previously described.

Disconnect all connections to the Downconverter module. This is located adjacent to the Power Meter module AB2. See Fig 2-3 *Board and unit layout - 2967.*

Remove the two mounting screws and lift out the module. When removing the module take care not to foul the pins at the rear of the front panel rotary control. It may be necessary to move the cable running from AA2/PLB to AB2 in order to withdraw the Downconverter module.

To obtain access to the AK2 board within the module, remove the six screws which secure the cover to the side of the module which has three SMA connectors on it.

Using a suitable insulating material to prevent damage or short circuits, rest the module across the A6/2 frame and the cover to the display module, with the AK2 board upwards. Take care not the short the feedthrough connections on the AB2 module.

Reconnect the cables from PL2 to the attenuator, from PLE to AE3 and the SMA connection to AK1. It may be necessary to slightly bend the flexible cables so as to release any strain on the connections.

## Local Oscillator AK1 - AE5/1

Remove the Downconverter module as described above. Using a suitable insulating material to prevent damage or short circuits, rest the module across the A6/2 frame and the cover to the display module, with the AK1 board upwards. Take care not the short the feedthrough connections on the AB2 module.

Reconnect the SMB cable and the $I^2C$/Power cable

## Doubler board AF6

The doubler board is located on the upper section of the RF tray, within a separate screened compartment.

Remove the bottom cover of the test set. Release and hinge out the RF tray as previously described.

To access the AF6 board remove the sixteen screws securing the lid to the compartment.

In this position, the instrument can be powered up and tests made to AF6. The connections which were disconnected to give access will not prevent AF6 from functioning.

## AB4 Warping module

The AB4 board is located below the A7 board and is accessed from the underside of the instrument.

Release and hinge out the RF tray as previously described.

Disconnect all cables from the board.

Remove the two mounting screws and lift out the module.

Using a suitable insulating material to prevent short circuits or physical damage, rest the board across the A6/2 frame and the cover of the display module.

Reconnect the $I^2C$ and power cables to PLA and SKA to allow fault finding while the board is powered up.

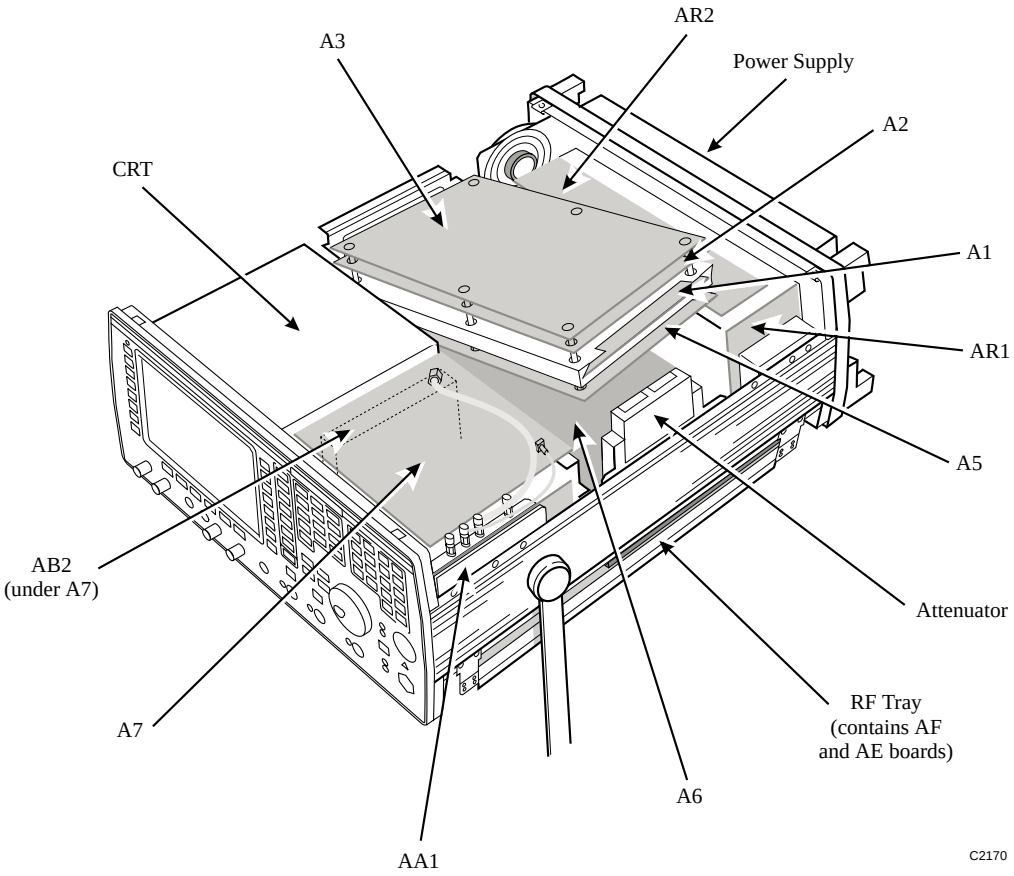



*Fig. 2-1 Board and unit layout - 2965*

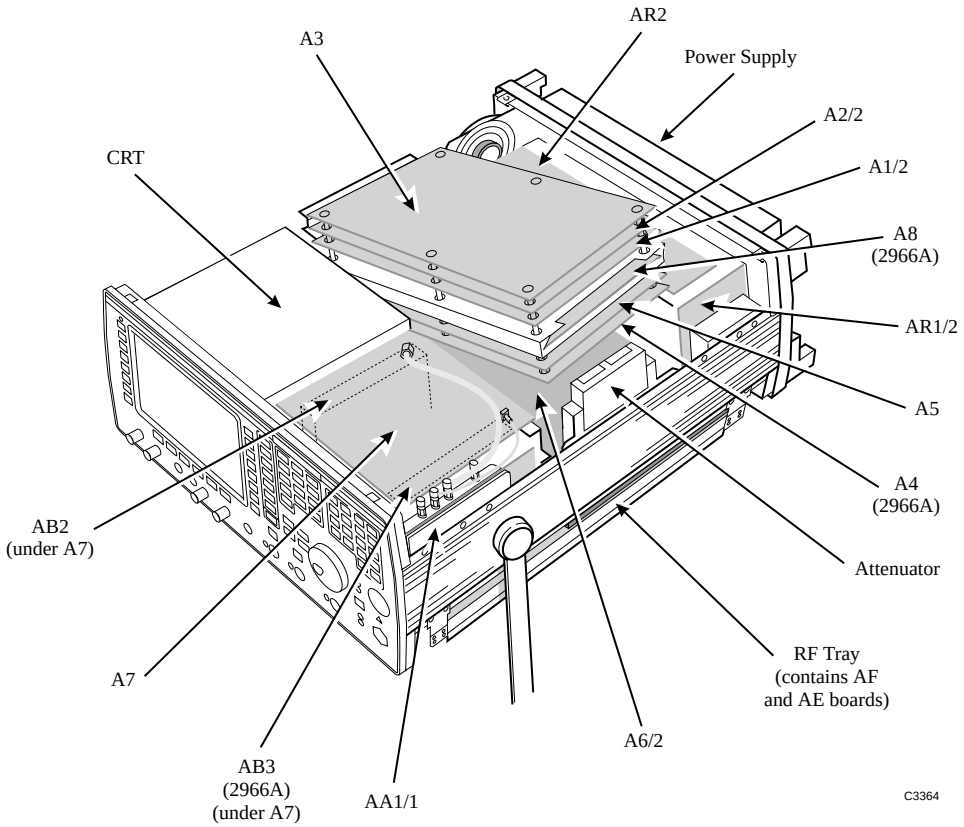



*Fig. 2-2 Board and unit layout - 2965A, 2966A, 2968*

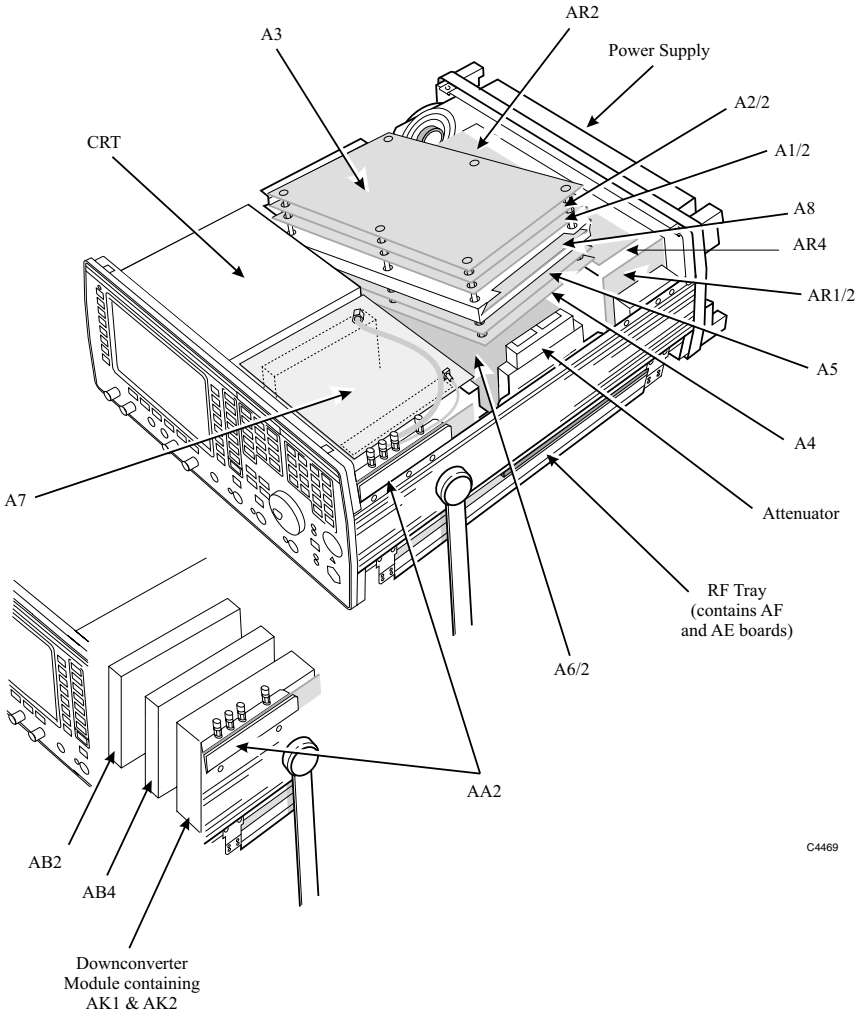



*Fig. 2-3 Board and unit layout - 2967*

*with cutaway section to show units hidden by A7*

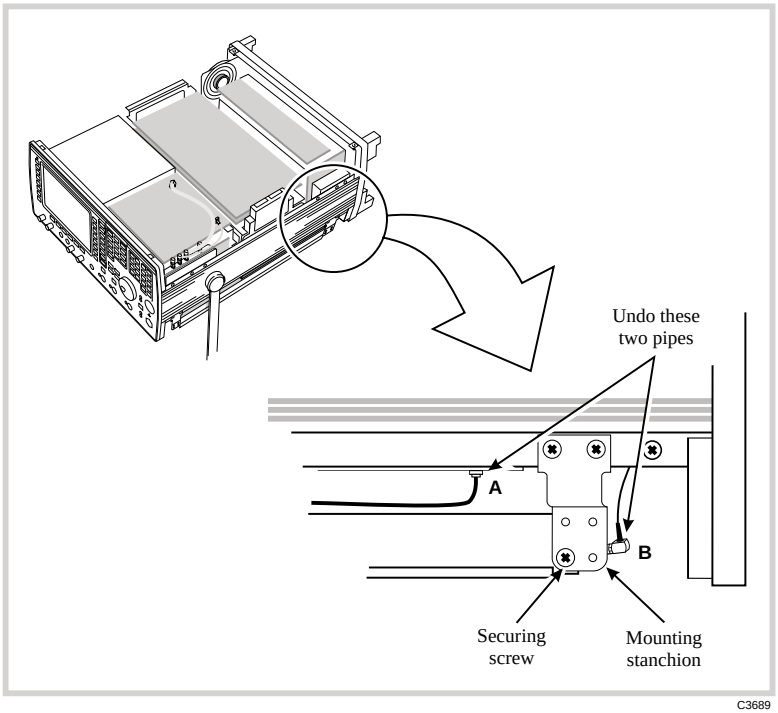



*Fig. 2-4 RF tray removal*

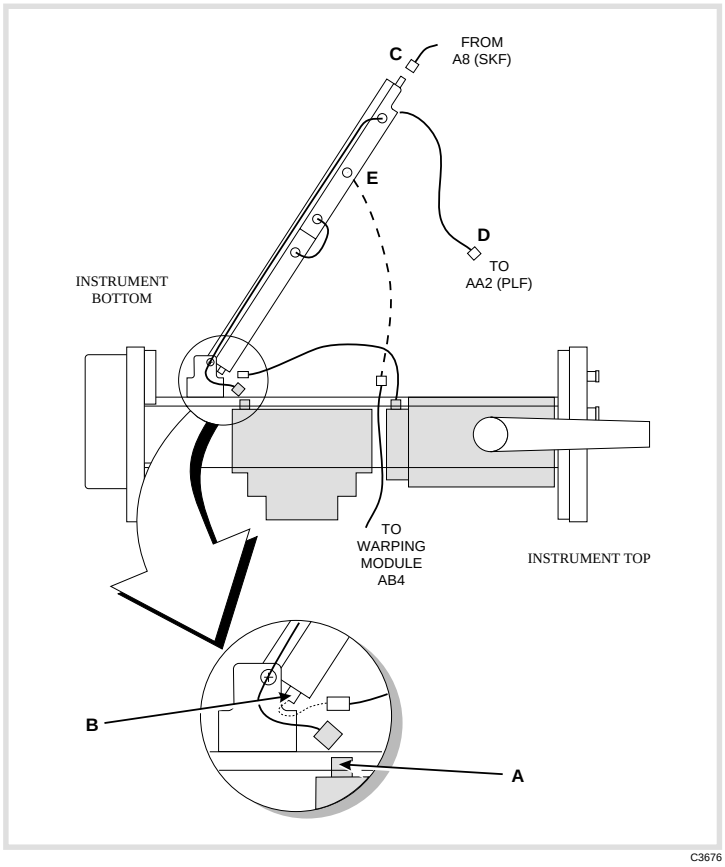



*Fig. 2-5 RF tray removal (2967)*

## Service policy

For the majority of 2965 Series boards, support to component level and a board exchange service are provided. For lists of replaceable parts, refer to Chapter 6.

The following modules are not currently fully supported to component level, but can be exchanged as complete units:-

| Unit | Part number |
|---|---|
| Attenuator SA | 44429/072 |
| Attenuator SG | 44429/073 |
| AA1 switch unit | 44829/848 |
| AA1/1 switch unit | 44830/040 |
| AA2 switch unit | 44991/233 |
| AB1 power sensor | 44991/024 |
| Monochrome monitor | 44991/051 |
| Power supply units | 44991/052, 44991/221 |
| Keyboard | 46662/446 |

Note, however, that full component parts lists are provided in Chapter 6 for the AA1/1 switch unit and AA2 switch unit. Major components can be supplied for these units for users wishing to carry out their own repairs.

## Routine safety testing and inspection

In the United Kingdom, the 'Electricity at Work Regulations' (1989) section 4(2) places a requirement on the users of equipment to maintain it in a safe condition. The explanatory notes call for regular inspections and tests together with a need to keep records.

The following electrical tests and inspection information is provided for guidance purposes and involves the use of voltages and currents that can cause injury. It is important that these tests are only performed by competent personnel.

Prior to carrying out any inspection and tests, the test set must be disconnected from the mains supply and all external signal connections removed. All tests should include the test set's own supply lead, all covers must be fitted and the supply switch must be in the ON position.

The recommended inspection and tests fall into three categories and should be carried out in the following sequence:-

1. Visual inspection
2. Earth bonding test
3. Insulation resistance test

### 1. Visual inspection

A visual inspection should be carried out on a periodic basis. This interval is dependant on the operating environment, maintenance and use, and should be assessed in accordance with guidelines issued by the Health and Safety Executive (HSE). As a guide, this test set when used indoors in a relatively clean environment would be classified as 'low risk' equipment and hence should be subject to safety inspections on an annual basis. If the use of the equipment is contrary to the conditions specified, you should review the safety re-test interval.

As a guide, the visual inspection should include the following, where appropriate:-

- The equipment has been installed in accordance with the instructions provided (e.g., ventilation is adequate, supply isolators are accessible, supply wiring is adequate and properly routed).
- The condition of the mains supply lead and supply connector(s).
- Mains supply switch isolates the test set from the supply.
- The correct rating and type of supply fuses.
- Security and condition of covers and handles.
- Supply indicator functions (if fitted).
- Presence and condition of all warning labels and markings and supplied safety information.
- Wiring in re-wireable plugs and appliance connectors.

If any defect is noticed, this should be rectified before proceeding with the following electrical tests.

## 2. Earth bonding tests

Earth bonding tests should be carried out using a 25A (12V maximum open circuit voltage) DC source. Tests should be limited to a maximum duration of 5 seconds and have a pass limit of 0.1 Ω after allowing for the resistance of the supply lead. Exceeding the test duration can cause damage to the equipment. The tests should be carried out between the supply earth and exposed case metalwork, no attempt should be made to perform the tests on functional earths (e.g. signal carrying connector shells or screen connections) as this will result in damage to the equipment.

## 3. Insulation tests

A 500 V DC test should be applied between the protective earth connection and combined live and neutral supply connections with the equipment supply switch in the 'on' position. It is advisable to make the live/neutral link on the appliance tester or its connector to avoid the possibility of returning the test set to the user with the live and neutral poles linked with an ad-hoc strap. The test voltage should be applied for 5 seconds before taking the measurement. IFR products employ reinforced insulation in their construction and hence a minimum pass limit of 7 MΩ should be achieved during this test.

Where a DC power adapter is provided with the test set, the adapter must pass the 7 MΩ test limit.

We do not recommend dielectric flash testing during routine safety tests. Most portable appliance testers use AC for the dielectric strength test which can cause damage to the supply input filter capacitors.

## 4. Rectification

It is recommended that the results from the above tests are recorded and checked during each repeat test. Significant differences between the previous readings and measured values should be investigated.

If any failure is detected during the above visual inspection or tests, the test set should be disabled and the fault should be rectified by an experienced Service Engineer who is familiar with the hazards involved in carrying out such repairs.

Safety critical components should only be replaced with equivalent parts, using techniques and procedures recommended by IFR Ltd.

The above information is provided for guidance only. IFR products are designed and constructed in accordance with International Safety Standards such that in normal use they represent no hazard to the operator. IFR Ltd reserves the right to amend the above information in the course of continuing its commitment to product safety.

# Chapter 3
# ADJUSTMENT AND CALIBRATION

## Contents



## List of figures



*contd./...*

**List of figures** *(continued)*

# Introduction

## Instrument software versions

The following procedures are based on test sets containing A6 software Version 5.4 or above.

## Default start-up

To minimise the number of key presses that you will need to make to obtain the correct settings, each section assumes that the test set is being configured from the test set factory default power-on state. To ensure that this occurs, initially press the following keys:-

**For SW Versions pre 7.1:** [HELP SET-UP], *[SET-UP]*, *[DEFAULT VALUES]*, *[INIT DEFAULT]*, [HELP SET-UP], *[RESET]*.

**For SW Version 7.1 onwards:** [HELP SET-UP], *[SET-UP]*, *[MISC CONFIG]*, *[default values]*, *[init default]*, [HELP SET-UP], *[RESET]*.

Each time the key sequence shown below is used, when called for in the following procedures, the test set will reset to a known power-on state.

[HELP SET-UP], *[RESET]*

## IFR Access

**Note** **The wording of the *[IFR Access]* soft key may appear as *[Marconi Access]* on test sets containing pre-Version 8 software.**

A number of software calibrations are contained under the IFR ACCESS menu. This menu is obtained via the following hidden key sequence:-

Press [HELP SET-UP].

Press, in turn, the unlabelled soft keys on the left side of the screen as follows:-

4th from bottom, 3rd from bottom, 2nd from bottom, bottom, bottom, 2nd from bottom, 3rd from bottom, 4th from bottom.

At the end of the key presses, the *[IFR Access]* soft key should be displayed on the left side of the display.

## Adjustment sequence

To meet their high performance specifications, the 2965 Series test sets make use of a complex set of alignment procedures, many of which are interactive. If you are not fully familiar with the test set, it is recommended that you read the technical description (Chapter 1) to gain a basic understanding of the instrument and its internal operation prior to attempting any adjustments.

Some guidance is given in the text on the possible effects of an adjustment on other areas; however, the general rules given below should be followed.

### General rules

Before attempting any of the adjustments, User calibration (see page 3-4) should be run, as this may be all that is necessary to resolve your calibration problems. User calibration should also be run after any in-depth calibrations/manual adjustments have been made.

If running User calibration does not resolve the problem, then the relevant IFR Access software calibrations (see page 3-4) should be carried out, after which the test set should be RESET and User calibration re-run.

Once set in the factory, the hardware adjustments (potentiometers/trimmers) are not likely to require readjustment unless repairs are carried out on a given board or a board is replaced. After hardware adjustments, any relevant IFR Access software calibrations should be carried out, and finally User calibration should be re-run.

# User calibration

## Power meter

(1) Press [HELP SET-UP], *[CAL]*.

(2) Press *[power meter]*, wait approximately 1 minute for the calibration to finish.

## Multimeter

(1) Press [HELP SET-UP], [CAL].

(2) Press [m'meter cal], wait approximately 1 minute for the calibration to finish.

## Spectrum analyzer

(1) Press [HELP SET-UP], [CAL].

(2) Press [specana levels], wait approximately 2 minutes for the calibration to finish.

## Audio filters

(1) Press [HELP SET-UP], [CAL].

(2) Press [audio filters], wait approximately 2 minutes for the calibration to finish.

## Digital signal generator (2965/65A Option 21, 2966A and 2968 only)

(1) Press [HELP SET-UP], [CAL].

(2) Press [digital sig gen], wait approximately 2 minutes for the calibration to finish.

## Digital power (2965/65A Option 21, 2966A and 2968 only)

(1) Press [HELP SET-UP], [CAL].

(2) Press [digital power], wait approximately 1 minute for the calibration to finish.

## Warping calibration (Option 22 2966A, 2967 and 2968 only)

(1) Press [SYSTEM], *[GSM]*,[HELP SET-UP], [CAL].

(2) Press *[warping cal]*, wait approximately 2 minute for the calibration to finish.

# IFR Access software calibrations

## Setting the test set 10 MHz frequency standard (Instruments fitted with AR1/2 board)

**Note:** The test set should have been ON for at least 30 minutes before making this adjustment.

(1) Set [Rx TEST], [RF SELECT] TNC output, [RF GEN], [FREQ] 1000 [MHz], [LEVEL] 0 [dBm]. Ensure that all modulation generators are OFF.

(2) **For SW Versions pre 7.1:** Press [HELP SET-UP], *[SET-UP]*, *[INPUT OUTPUT]*, *[BNC set-up]*, *[INT/EXT REF]* to select INT REFERENCE USED / REAR PANEL OUTPUT. For a 2966A or 2968 test set, use *[FREQ STD]* to select 10 MHz OUTPUT.
**For SW Version 7.1 onwards:** Press [HELP SET-UP], *[SET-UP]*, *[MISC CONFIG]*, *[select int/ext]*, *[int/ext ref]* to select INT REFERENCE USED / REAR PANEL OUTPUT. For a 2966A or 2968 test set, use *[freq std]* to select 10 MHz OUTPUT.

(3) Press [HELP SET-UP], *[return]*.

(4) Connect a frequency counter to the EXT REF BNC socket on the rear panel of the UUT. The counter should be locked to a frequency reference of 1 part in $10^9$ or better.

(5) Press [HELP SET-UP], *[IFR Access]*, *[PROD'N VALUES]*, *[Prod Values]*, *[AR1/2]* to highlight AR1/2 setup value : *xxx* (*xxx* is a number between 0 and 255 which represents the data sent to the AR1/2 board across the $I^2C$ communication link).

(6) Use the VARIABLE rotary control to vary the data sent to the AR1/2 board so that the reading on the frequency counter is 10 MHz ±1 Hz.

(7) Connect the counter to the RF TNC output port on the front panel. Adjust the VARIABLE control for a reading of 1000 MHz ±30 Hz on the counter.

(8) Store the data by pressing the ENTER data key.

Press [HELP SET-UP], *[return]* to return to normal operation.

## Ammeter calibration

From any screen except HELP AND SET-UP:-

(1) Press [AF TEST], *[MULTIMETER]*, *[DC AMPS]*.

(2) Apply an accurate 1 A DC to the test set ammeter.

(3) Note the reading on the test set. If this is not 1 A:-

(4) Press [HELP SET-UP], *[IFR Access]*, *[cal values]*, *[multimeter]*, *[Curr Sense]*.

(5) Enter a new value (the default is 9800, increasing the number reduces the current reading); terminate entry using the ENTER data key. Return to the multimeter display and check the displayed current. Repeat the process until the ammeter reads 1 A.

(6) Press [HELP SET-UP], *[RESET]*.

## Squelch offset gain figure (software)

(1) Press [HELP SET-UP], *[IFR Access]*, *[PROD'N VALUES*], *[Prod Values]*, *[Squelch Offset]* to enter the squelch offset gain figure. This should be set to the default value of 1000. Terminate entry using the ENTER data key. Press [HELP SET-UP] followed by *[return]* to get back to the normal display screen.

(2) Press [Tx TEST] and connect a voltmeter to TP15 on board A2.

(3) Set the SQUELCH control fully counter-clockwise and note the voltage. This voltage will be referred to as *ccw*.

(4) Set the SQUELCH control fully clockwise and note the voltage. This voltage will be referred to as *cw*.

(5) Calculate the new squelch offset (gain) value as follows:-

$$\text{New value} = \frac{1000 \times (ccw - 0.34)}{(ccw - cw)}$$

(6) Round the result up or down to the nearest integer and enter the new value into the squelch offset (gain) as above.

(7) Press [HELP SET-UP] followed by *[return]* to get back to the TRANSMITTER TEST screen and check that TP15 on A2 board is at 0.34 V ±20 mV when the SQUELCH control is fully clockwise. If *not*, adjust the squelch (gain) figure slightly. Reducing the gain figure makes the voltage on TP15 more positive.

(8) Press [HELP SET-UP], *[RESET]*.

## FFT DC marker suppression (software)

(1) Press [HELP SET-UP], *[RESET]*

(2) Press [HELP SET-UP], *[IFR Access]*, *[cal values]*, *[scope & fft]*, *[cal config]*.

(3) Set *[AF FFT Offset]* and *[DM FFT Offset]* to OFF.

(4) Press *[return]*, *[CAL]* and wait approximately 1 minute for the message Scope and fft cal finished.

(5) Press *[store data]*, *[return]*.

(6) Verify that the text beneath the WARNINGS annotation is None; if not, repeat the calibration procedure.

(7) Press [HELP SET-UP], *[RESET]*.

## Audio & demod calibration (software)

(1) Press [HELP SET-UP], *[RESET]*

(2) Press [HELP SET-UP], *[IFR Access]*, *[cal values]*, *[audio & demod]*.

(3) Press *[CAL]*.

(4) Wait approximately 20 minutes for the message Audio cal finished.

(5) Press *[store data]*, *[return]*.

(6) Verify that the text beneath the WARNINGS annotation is None; if not, repeat the calibration procedure.

(7) Press [HELP SET-UP], *[RESET]*.

## Spectrum analyzer (AE6 board) crystal filters (Manual software adjustment via spectrum analyzer diagnostics screen)

### Description

The crystal filters in the test set receiver can be set up and adjusted using the spectrum analyzer diagnostics screen. This screen is accessed by entering the HELP AND SET-UP screen and pressing *[IFR Access]* followed by *[PROD'N VALUES]* and *[Specana diag]*. This brings up an expanded spectrum analyzer screen.

On this screen, the title bar is split into four sections, each of which contains the name and current value of one of the crystal filter parameters:-

| | |
|---|---|
| Δ C.F. | Centre frequency adjustment. |
| STRAYS | Null strays adjustment. |
| BWIDTH | Bandwidth adjustment. |
| δ GAIN | Filter gain adjustment. |

Each of these parameters can be adjusted up or down using increment/ decrement keys - see below. Each parameter has a range of 0 to 4095, and there is an associated soft key *[INC]*: that can be used to change the increment size in steps of 1, 10, 100, or 200.

| **Screen title** | **To adjust, use** |
|---|---|
| Δ C.F. | INC ΔFREQ [⇧] and [⇩] hard keys. |
| STRAYS | *[NUL STRAYS]* soft keys. |
| BWIDTH | *[B/W]* soft keys. |
| δ GAIN | INC δ [⇧] and [⇩] hard keys. |

Using the soft key *[change filter]*, you can cycle through the filters in the following sequence:-

default filter
300 Hz crystal filter
1 kHz crystal filter
3 kHz crystal filter
10 kHz crystal filter
30 kHz crystal filter
110 kHz ceramic filter
280 kHz ceramic filter
3 MHz ceramic filter

The ceramic or default filters cannot be adjusted. The default selection will give the default filter for the current span.

**Notes on adjustments**

(1) The centre frequency adjustment is effective normally for the 300 Hz, 1 kHz and 3 kHz filters, while the null strays adjustment is used to set the centre frequency of the 10 kHz and 30 kHz filters.

(2) Full dB/div and marker facilities are available to allow the accurate measurement of a 3 dB bandwidth.

(3) If an external signal generator is used to provide the input, the test set and the external signal generator must be locked to the same frequency standard to ensure, in particular, the correct setting of the centre frequency. This problem does not occur if the test set signal generator is used (remember to set up the required frequency, level, and mod OFF before entering the HELP AND SET-UP screens).

(4) The bandwidth adjustment is such that decreasing the value results in increasing bandwidth.

(5) When the 3 MHz filter is selected, the level displayed is 10 dB lower than the true level - bear this in mind if you are tuning the crystal filter gains to the same level as the 3 MHz filter.

(6) Running the crystal filter gain calibration after making these adjustments should set the gain properly without too much effect on the other parameters provided that the gain is set reasonably closely as part of these adjustments (displayed 3 MHz filter level plus 10 dB).

(7) Note that the input switch configuration cannot be changed on this screen, so you should ensure that it is set as required before entering the HELP AND SET-UP screens.

(8) When exiting the spectrum analyzer diagnostics screen, always use the *[return]* key, not the [HELP SET-UP] key.

## Adjustment of crystal filters

(1) Press [RF SELECT] to set the TNC RF socket to 1-port duplex, then press [RF GEN], [LEVEL], –24 [dBm], [Tx], [FREQ] 150 [MHz]. Select *[Rx mod OFF]*.

(2) Using a short cable, connect the N-type socket to the TNC RF socket.

(3) Press [HELP SET-UP], *[IFR Access]*, *[PROD'N VALUES]*, *[Specana diag]*. Select a span of 500 Hz/div, a REF LEVEL of –20 dBm, press *[dB per div]* for a PER DIV of 1 dB.

(4) Press the *[change filter]* soft key until the 110 kHz filter is selected. Measure the level of the signal on the screen and if necessary return to duplex mode (use the [DUPLEX TEST] key, *not* the *[return]* soft key). Readjust the signal generator level to centre the displayed level 4 dB down from the top of the screen (on middle graticule line). Return to the spectrum analyzer diagnostic screen.

(5) **300 Hz filter adjustment:-**

Press the *[change filter]* soft key until the 300 Hz filter is selected. Select *[markers ON]*, *[move M1]*. Using the VARIABLE rotary control, move the marker to the left side of the screen. Select *[move M2]* and move M2 until ΔM at the top of the screen indicates 300Hz. Press *[lock M1←→M2]* and then move the locked markers until they are centred about the middle of the screen (M2 indicates 150.000150MHz).

(a) Use the δ keys (near VARIABLE rotary control) to set the signal level to the centre graticule line (–4 dB).

(b) Use the ΔFREQ keys to tune the signal until it is centred in the middle of the screen.

(c) Use the *[B/W]* soft keys to position M1 and M2 on, or as close as possible to, the horizontal graticule line 3 dB down from the centre line.

(d) Repeat adjustments (a) to (c) until all three are correct.

(6) **1 kHz filter adjustment:-**

Press *[change filter]* until the 1 kHz filter is selected. Press the *[unlock M1←→M2]* soft key. Move M2 until ΔM at the top of the screen indicates 1kHz. Press *[lock M1←→M2]* and then move the locked markers until they are centred about the middle of the screen (M2 indicates 150.000500 MHz).

Repeat adjustments (a) to (d) as for the 300 Hz filter.

(7) **3 kHz filter adjustment:-**

Press *[change filter]* until the 3 kHz filter is selected.

Press the *[unlock M1←→M2]* soft key. Move M2 until ΔM at the top of the screen indicates 3 kHz. Press *[lock M1←→M2]* and then move the locked markers until they are centred about the middle of the screen (M2 indicates 150.001500MHz).

Repeat adjustments (a) to (d) as for the 300 Hz filter. Some adjustment of null strays in addition to the ΔFREQ adjustment may be needed in step (b).

(8) **10 kHz filter adjustment:-**

Press *[change filter]* until the 10 kHz filter is selected. Select a span of 2kHz/div.

Press *[unlock M1←→M2]* and move M2 until ΔM at the top of the screen indicates 10kHz. Press *[lock M1←→M2]* and then move the locked markers until they are centred about the middle of the screen (M2 indicates 150.005000MHz).

Repeat adjustments (a) to (d) as for the 300 Hz filter. Use the *[NUL STRAYS]* soft keys instead of ΔFREQ in step (b).

(9) **30 kHz filter adjustment:-**

Press *[change filter]* until the 30 kHz filter is selected.

Select a span of 5kHz/div.

Press *[unlock M1←→M2]* and move M2 until ΔM at the top of the screen reads 30kHz. Press *[lock M1←→M2]* and then move the locked markers until they are centred about the middle of the screen (M2 indicates 150.015000MHz).

Repeat adjustments (a) to (d) as for the 300 Hz filter. Use the *[NUL STRAYS]* soft keys instead of ΔFREQ in step (b).

(10) Press *[change filter]* until the default filter is selected, then press *[return]*, *[return]*, *[cal values]*, *[spec ana]*, *[store data]*.

(11) Press [HELP SET-UP], *[RESET]*.

### Spectrum analyzer automatic calibration

(1) Press [HELP SET-UP], *[IFR Access]*, *[cal values]*, *[spec ana]*, *[CAL]*. Wait 5 minutes for the message Rx system cal finished.

(2) Press *[store data]*, *[return]*. Verify that the text beneath the WARNINGS annotation is None; if not, repeat the calibration procedure.

(3) Press [HELP SET-UP], *[RESET]*.

## Signal generator

### Signal generator FM & RF level calibration

(1) Turn the SQUELCH control on the front panel to minimum.

(2) Press [HELP SET-UP], *[RESET]*.

(3) Press [HELP SET-UP], *[IFR Access]*, *[cal values]*, *[signal gen]*, *[cal config]*. At the bottom of the CAL VALUES : SIG GEN CONFIG screen, for signal generator calibration, there should be a message: Prediction factor = 38. If this value is not 38, press *[TOGGLE VAR]* and use the VARIABLE rotary control to set it to 38.

(4) Press *[return]* and *[CAL]*. Wait approximately 25 minutes for the signal generator calibration to finish.

(5) Press *[store data]*, *[return]*. Verify that the text beneath the WARNINGS annotation is None; if not, repeat the calibration procedure.

(6) Press [HELP SET-UP], *[RESET]*.

### Signal generator AM/PM calibration.

(1) Press [HELP SET-UP], *[IFR Access], [cal values], [audio gen], [CAL]*. Wait 1 minute for the message A1 cal finished.

(2) Press *[store data], [return]*. Verify that the text beneath the WARNINGS annotation is None; if not, repeat the calibration procedure.

(3) Press [HELP SET-UP], *[RESET]*

(4) Connect the TNC RF socket of the test set to a modulation meter (e.g. IFR 2305). Set the modulation meter to monitor AM. If an IFR 2305 is being used, set it to AM, noise average, filter 300 Hz-3.4 kHz, CAL.

(5) Set [Rx TEST], [RF SELECT] TNC output, [RF GEN], [LEVEL] 0 [dBm], [FREQ] 101 [MHz], [MOD GEN], [LEVEL] 60 [%], [FREQ] 1 [kHz].

(6) Press [HELP SET-UP], *[IFR Access], [cal values], [audio gen], [cal config], [TOGGLE VAR]* to ON.

(7) Note the AM depth indicated on the modulation meter. Calculate the error from 60% and enter this error into the test set by rotating the VARIABLE control; the entered error will be displayed on the test set screen adjacent to the *[TOGGLE VAR]* soft key (e.g. if reading is 59.5%, rotate control until +0.500% is displayed).

(8) Press *[return], [store data]*, [HELP SET-UP], *[RESET]*.

(9) Press [RECALL] 0 to check the measurement, and if necessary readjust.

(10) Press [HELP SET-UP], *[RESET]*

### External modulator calibration

(1) Press [HELP SET-UP], *[IFR Access], [cal values], [extern mod], [CAL]*. Wait for the message External mod cal finished.

(2) Press *[store data], [return]*. Verify that the text beneath the WARNINGS annotation is None; if not, repeat the calibration procedure.

(3) Press [HELP SET-UP], *[RESET]*.

## Scope and FFT calibration

(1) Press [HELP SET-UP], *[IFR Access], [cal values], [scope & fft], [CAL]*. Wait for the message Scope and fft cal finished.

(2) Press *[store data], [return]*. Verify that the text beneath the WARNINGS annotation is None; if not, repeat the calibration procedure.

(3) Press [HELP SET-UP], *[RESET]*.

### AF scope calibration (manual insertion of data)

(1) The AF scope corrections are inserted manually using the PROD'N CAL : AUDIO MEASUREMENTS diagnostics screen. To enter this screen, press [HELP SET-UP], *[IFR Access], [PROD'N VALUES], [Audio meas]*.

(2) Press *[scope]*, then press *[change var par]* until the message Scope ref DAC appears at the top right of the screen. There is a calibration value for each of the scope ranges. Connect an accurate audio signal to the AF INPUT and for each range in the table below set the audio source level to the appropriate peak-to-peak or RMS value.

(3) Use the VARIABLE rotary control to change the Scope ref DAC value until the display shows correctly with reference to the graticule lines (keeping trace centred with scope position control). Be careful not to alter any other parameter.

| | Level | |
|---|---|---|
| **Range/div** | **Peak-to-peak** | **RMS** |
| 20 V | 80 V | 28.28 V |
| 10 V | 40 V | 14.14 V |
| 5 V | 20 V | 7.07 V |
| 2 V | 16 V | 5.656 V |
| 1 V | 8 V | 2.828 V |
| 500 mV | 4 V | 1.414 V |
| 200 mV | 1.6 V | 0.566 V |
| 100 mV | 800 mV | 282.8 mV |
| 50 mV | 400 mV | 141.4 mV |
| 20 mV | 160 mV | 56.56 mV |
| 10 mV | 80 mV | 28.28 mV |
| 5 mV | 40 mV | 14.14 mV |
| 2 mV | 16 mV | 5.56 mV |

**Note:** If no voltage source is available for the higher voltage ranges, set the Scope ref DAC values for these ranges to the value obtained for the highest measurable range.

When you have finished the calibration, store the values by selecting [HELP SET-UP], *[IFR Access]*, *[cal values]*, *[scope & fft]*, *[store data]*. Then press [HELP SET-UP], [RESET].

## AM & PM demodulator FFT calibration (manual insertion of data)

The following section gives the procedure for manually calibrating the demodulator FFT for AM and PM using the DEMOD DIAGNOSTICS screen. To summarise the adjustment procedure, it uses the test set signal generator to provide a signal with either AM or PM to the modulation meter side of the test set. This modulation level is monitored on the external modulation meter and a correction figure is adjusted until the demod FFT indicates the same reading as that shown on the external modulation meter.

**Note** **The calibration for the FM demod FFT is done automatically during the initial Scope & FFT calibration procedure described at the start of this section.**

(1) Press [RF SELECT] to set the TNC RF socket to 1-port duplex. Using a T-piece, connect the N-type socket to the TNC socket and also to an external modulation monitor (e.g. an IFR 2305). Initially, set the external modulation meter to monitor AM.

(2) Press [HELP SET-UP], *[IFR Access]*, *[PROD'N VALUES]*, *[Demod meas]*.

(3) Press [RF GEN], [LEVEL] 0 [dBm], [Tx], [FREQ] 150 [MHz].

(4) Press *[mod ana]*, [MOD GEN] 1, [LEVEL] 18 [%]. Press *[▼ ref level ▲]* to set the modulation analyzer reference level to 20% at the top graticule. From the power-on default, the demod filter should be set to 0.3-3.4 kHz, Mod 1 should be switched ON at a frequency of 1 kHz, Mod 2 and Mod 3 should be OFF, and the mod analyzer span should be 1 kHz/div. Check that this is the case; if not, select the appropriate settings.

(5) A marker reading is displayed beneath the FFT graticule display. The FFT offset value for the selected demod type and FFT reference level is displayed on the right side of the title box. Adjust this value using the VARIABLE rotary control until the marker reading indicates the same modulation level as that shown on the external modulation meter.

(6) Press *[▼ ref level ▲]* to select the second AM FFT range shown in the table below (50%) and then press [MOD GEN], [LEVEL] 45 [%] to set the test set to provide 45% AM. Again use the VARIABLE rotary control to adjust the marker reading so that it indicates the same modulation level as that shown on the external modulation meter. Repeat for the remaining FFT AM range.

(7) Press [MOD GEN], [LEVEL] 1.8 [rad], and carry out the same procedure for the FFT PM ranges and levels shown in the table. Set the external modulation meter to monitor phase modulation for these adjustments.

| AM | | PM | |
|---|---|---|---|
| **FFT Range** | **Mod Level** | **FFT Range** | **Mod Level** |
| 20% | 18% | 2 | 1.8 rad |
| 50% | 45% | 5 | 4.4 rad |
| 100% | 90% | 20 | 18 rad |

(8) When you have finished the calibration, **store the values** by selecting [HELP SET-UP], *[IFR Access]*, *[cal values]*, *[scope & fft]*, *[store data]*.

(9) Press [HELP SET-UP], *[RESET]*.

## Demod noise correction calibration

(1) Set [Rx TEST], [RF GEN], [FREQ] 150 [MHz]. [RF SELECT] N-type output, then set [LEVEL] –17 [dBm].

(2) Press [HELP SET-UP], *[CAL]*, *[demod noise]*.

(3) Wait for the message Calibrating Demod Noise DONE. Press *[return]*, *[RESET]*.

## Digital systems calibration (2965/65A Option 21; 2966A, 2967 and 2968)

**Note**

**For test sets containing A6/2 software before version 7.06, the test set must be set to single-port duplex mode, with the N-type socket selected, before running the digital systems calibration. Failure to do so may result in invalid calibration data.**

(1) Press [HELP SET-UP], *[IFR Access]*, *[cal values]*, *[dsc]*.

(2) Press *[CAL]*.

(3) Wait approximately 20 minutes for the message DSC cal finished.

(4) Press *[store data]*, *[return]*.

(5) Verify that the text beneath the WARNINGS annotation is None; if not, repeat the calibration procedure.

(6) Press [HELP SET-UP], *[RESET]*.

### Warping calibration (Option 22 only)

(1) Press [HELP SET-UP], *[IFR Access]*, *[cal values]*, *[AB4]*.

(2) Press *[CAL]*.

(3) Wait approximately 1 minutes for the message Warping cal finished.

(4) Press *[store data]*, *[return]*.

(5) Verify that the text beneath the WARNINGS annotation is None; if not, repeat the calibration procedure.

(6) Press [HELP SET-UP], *[RESET]*.

# Hardware adjustments

## 1.35 GHz & 69.3 MHz receiver filters

### (AE4 board C1-C4, C6, C7, C12, C13, C14)

**Note**

**The 1.35 GHz filter is of a helical design and is optimised by adjusting the 4 tuning capacitors C1 to C4. Once set up in the factory, it is *highly unlikely* that it will ever require further adjustment.**

(1) Press [HELP SET-UP], *[RESET]*. The test set should power up in DUPLEX TEST mode.

(2) Press [RF GEN], [LEVEL] –40 [dBm], select *[Rx mod OFF*], then press [Tx], [FREQ] 150 [MHz], *[duplex test (Tx)]*, *[spec ana]*, *[▼ ref level ▲]* 20 [dBm], *[bar charts]*.

(3) Connect a spectrum analyzer (e.g. IFR 2382/83) to the IF output socket on the test set rear panel. Set the spectrum analyzer to a reference frequency of 10.7 MHz, reference level –30 dBm and 50 kHz span/div.

(4) Set up the 1.35 GHz filter by adjusting the inner tuning cores of C1 to C4 for maximum level at 10.7 MHz on the external spectrum analyzer. If you find the tuning core runs out of range, loosen the tuning slug nut and move the outer shell up or down as appropriate.

(5) Set up the 69.3 MHz filter by adjusting C6, C7, C12, C13 and C14 for maximum level at 10.7 MHz on the external spectrum analyzer.

## Receiver 80 MHz 2nd LO

### (AE5 or AE5/1 board C51)

(1) Remove the connector from PLC pins 1 and 2 and reconnect in set up position across pins 2 and 3.

(2) Allow 5 minutes warm up and then adjust C51 for a frequency of 80 MHz ± 100 Hz on connector PLD pin 2.

(3) Reconnect the link across PLC pins 1 and 2. Then adjust C51 for a voltage between –2 V and –4V on IC 10 pin 6.

## Demodulation IF gain

### (AE7 board R154)

(1) Unplug the connector attached to AE7 PLC.

(2) Using a signal generator, apply a signal of 10.7 MHz at –50 dBm to PLC.

(3) On the test set, select [Tx TEST] and toggle *[IF BW]* to select a filter bandwidth of 280 kHz.

(4) Connect a DVM set to measure volts DC to PLH pin 2.

(5) Adjust R154 for a DVM reading of 3.5 V ± 0.05 V.

(6) Remove the signal generator and DVM, then reconnect PLC.

## 104 MHz VCXO gain

### (AF1 board C4)

(1) Monitor TP7 using an external spectrum analyzer and zero loss probe. Tune the external spectrum analyzer to 104.8576 MHz. Adjust C4 for maximum signal level on TP7. This should be greater than –5 dBm (typically +10 dBm).

(2) Connect a DVM to TP1 and check for a DC level within the range 3 V to 7 V. Adjust C4 slightly if the voltage is outside this range.

(3) Recheck the 104 MHz signal at TP7 and ensure that it is still greater than –5 dBm.

## 419 MHz BPF gain

### (AF1 board L18)

(1) Set [Rx TEST], [RF GEN], [FREQ] 30 [MHz] (this ensures that the 419 MHz circuit is switched on).

(2) Using an external spectrum analyzer and zero loss probe, monitor the 419.4304 MHz signal at the soldered link between AF1 and AF5 boards. Adjust L18 for maximum signal level. (0 dBm ± 3 dB).

## SSB receiver AGC reference

### (AE7 board R139)

This adjustment only affects SSB operation. The procedure can only be carried out if the test set has the SSB (Option 9) fitted.

(1) Press [RF TEST], *[SSB]*. Check that the default settings are as shown below; if not, select them:-

| | |
|---|---|
| Tx tune | ON |
| gen 1 | ON |
| gen 2 | OFF |
| AF1 FREQ | 1 kHz |
| AF1 LEVEL | 100.0 mV |

(2) Connect a signal generator set to provide 100.000 MHz at +10 dBm to the test set RF input. After a short time, the test set should tune to the following:-

| | |
|---|---|
| AUTOTUNE | 100.000 MHz ±10 Hz |
| MOD FREQ | 1 kHz |
| POWER LSB | 10 mW |

(3) Press *[spec ana]* and set *[▼ ref level ▲]* to +10 dBm (a signal should appear with a peak at approximately 10 dBm).

(4) Press *[sband ana]*, then select *[expand ON]*, *[markers ON]*, *[peak find]*. M1 should indicate –4 dB ±2 dB.

(5) Monitor PLF pin 2 with a DVM set to measure volts AC, and adjust R139 for a level of 2.5 V RMS ±3 mV.

## Setting up the 1 mW (10 MHz, 0 dBm) power reference

### (A7 board, R126)

(1) Press [HELP SET-UP], *[IFR Access]*, *[cal values]*, *[power meter]*.

(2) Press *[CAL DAC offset]* 0 to turn Range 0 OFF.

Press *[CAL DAC offset]* 1 to turn Range 1 OFF.

Press *[CAL DAC offset]* 2 to turn Range 2 OFF.

Press *[CAL DAC offset]* 3 to turn Range 3 OFF.

(3) Press *[CAL]* immediately followed by *[PAUSE CAL]* ( soft key beneath *[CAL]* ).

(4) Disconnect the SMA lead from the input to the power meter sensor (located at the cut-out in the top left corner of the A7 board).

(5) Connect a calibrated external power meter (e.g. IFR 6960 + 6912 sensor) to the end of this lead and adjust R126 until the external power meter reads 0.0 dBm ±0.02 dB.

(6) Remove the external power meter, reconnect the SMA lead to the test set power sensor and press [HELP SET-UP], *[RESET]*.

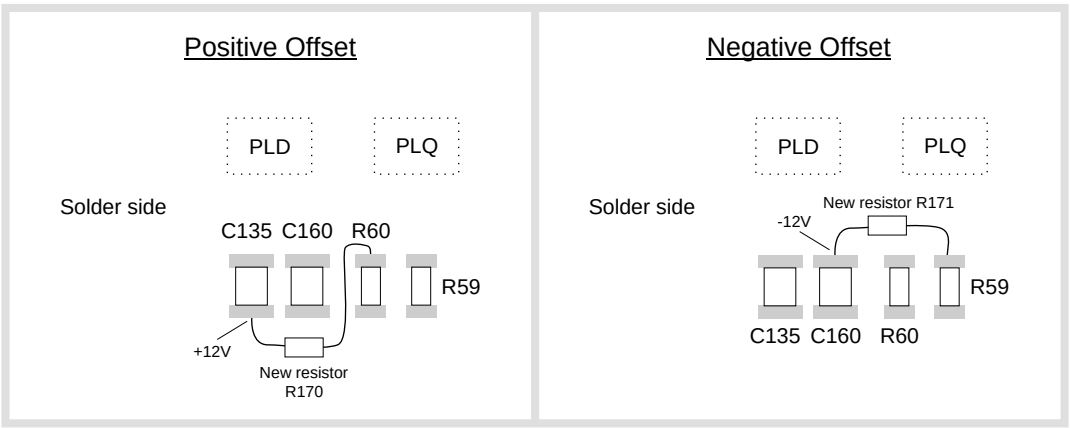
## FFT ADC Offset

### (A5, A5/2 Board)

1. Press [AF TEST], {AF IN/OUT}, {Audio Ana}. Measure the voltage on A5 TP9 w.r.t. ground using a DC voltmeter.
2. If an A5/2 board is fitted then adjust R206 for a minimum Offset voltage; this level should be less than ±80mV.
3. If the board fitted is an A5 and the Offset voltage is greater than ±80mV an SIC resistor will need to be added.
4. Choose and fit a resistor from the following table.

   **Note that the fitted position of the resistor is different for positive and negative offsets - see diagram below**

| Offset voltage (mV) | Resistor value (kΩ) | IFR part number |
|---|---|---|
| 80 to 160 | 1000 | 24772/141 |
| 160 to 250 | 560 | 24772/138 |
| 250 to 330 | 390 | 24772/135 |
| 330 to 400 | 330 | 24772/133 |
| 400 to 500 | 270 | 24772/131 |
| 500 to 600 | 220 | 24772/129 |
| 600 to 730 | 180 | 24772/127 |
| 730 to 860 | 150 | 24772/125 |




5. Once the resistor is fitted repeat the above procedure to check the offset level.

## Audio input compensation adjustment (no filters selected)

### (A3 board C7, C35)

(1) Using a BNC cable, connect the AF GEN OUTPUT socket to the AF INPUT socket on the test set front panel.

(2) Press [AF TEST], *[AF IN/OUT]*, [AF GEN] 1, [FREQ] 1 [kHz], [LEVEL] 1 [V]. Ensure that gen 1 is turned ON and that gen 2 and gen 3 are turned OFF.

(3) Press *[low pass]* until NONE is displayed as the selected filter.

(4) Note the audio level displayed on the test set voltmeter.

(5) Press [FREQ] 20 [kHz] and adjust C7 so that the measured level for a 20 kHz input is the same as that for the 1 kHz input noted in step 4.

(6) Set [AF GEN], [LEVEL] 100 [mV], [FREQ] 1 [kHz].

(7) Note the audio level displayed on the test set voltmeter.

(8) Press [FREQ] 20 [kHz] and adjust C35 so that the measured level for a 20 kHz input is the same as that for the 1 kHz input noted in step 7.

## External modulator input compensation adjustment

### (A3 board C17, C21)

(1) Connect the front panel AF INPUT socket to A3 PLE pin 5 using a ×1 scope probe. Connect the front panel AF GEN OUTPUT socket to the EXT MOD INPUT socket.

(2) From power on, configure the test set as follows: [AF GEN], [LEVEL] 1 [V], [FREQ] 1 [kHz], *[duplex test (Rx)]*, *[mod 1 OFF]*, *[mod X ON]*. *[mod 2]* and *[mod 3]* should already be OFF. Press *[display mod]* until MOD X is displayed. Set [MOD GEN], [DEVN] 10 [kHz] and toggle *[low pass]* filter until NONE is displayed. Finally press [DUPLEX TEST].

(3) Note the AF LEVEL reading on the display.

(4) Set [AF GEN], [FREQ] 20 [kHz] and adjust A3 C21 for the same reading as noted in the previous step.

The path incorporating C17 is not used, so this adjustment is not required.

## FFT 40 kHz set up

### (A5 & A5/2 board)

1. Press [AF TEST], *[AF IN/OUT]*, *[audio ana]*, *[expand]* to select ON, [TX], [FREQ], 40 [kHz], [TX] [LEVEL] 1 [V], *[markers]* to select ON *[peak find]*.
2. Connect a 50 ohm AF Generator set to provide 40 kHz 1V to the AF input socket of the test set.
3. Note the reading of marker 1 level. This should be between 0.907 and 1.093V. If the reading is outside this range then for A5 boards select the value of C34 between 18pF and 33pF (reducing C34 increases the reading at 40 kHz). If the board is an A5/2 then adjust C210 until marker 1 level reads between 0.907 and 1.093V.

## CRT brightness adjustment

(1) Turn the front panel INTENSITY control to its minimum position.

(2) Adjust the CRT module Intensity control (see Fig 3-1) so that the raster is just visible (shield the display from any light sources during this procedure).

(3) Return the front panel INTENSITY control to an acceptable level.

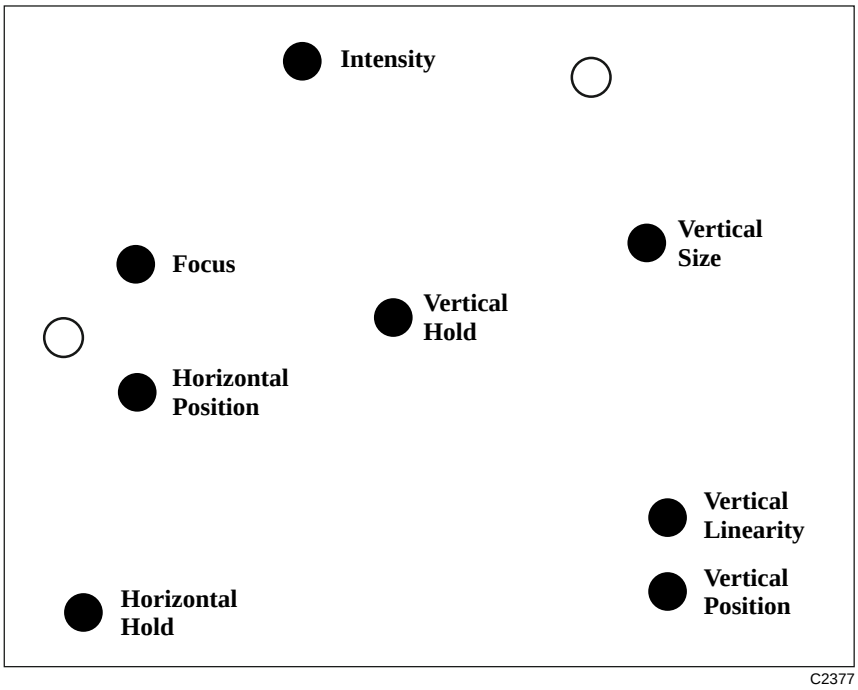



*Fig. 3-1 CRT module adjustment locations*

## Setting the test set 10 MHz frequency standard (Instruments fitted with AR1 board)

### (AR1 board R4)

**Note:** The test set should have been ON for at least 30 minutes before making this adjustment.

(1) Press [Tx TEST], [RF SELECT] TNC input, [Tx], [FREQ] 1000 [MHz].

(2) **For SW Versions pre 7.1:** Press [HELP SET-UP], *[SET-UP]*, *[TEST OPTIONS]*, *[misc]*.
**For SW Version 7.1 onwards:** Press [HELP SET-UP], *[SET-UP]*, *[TEST OPTIONS]*, *[Tx meas options]*.

(3) Toggle *[res'n & rate]* to select a Tx counter resolution of 1 Hz. Then press *[return]* to get back to Tx TEST.

(4) Connect a signal generator (e.g. IFR 2040) set to provide 1000 MHz at 0 dBm to the TNC RF input of the test set. The signal generator should be locked to an external reference of 1 part in $10^9$ or better.

(5) Adjust R4 on AR1 board until the frequency offset displayed on the test set indicates ±10 Hz or less.

## Spectrum analyzer adjustment (AE6 board only)

### (R157, R140 and R141)

(1) Set the test set as follows:- [Tx TEST], [RF SELECT] TNC input. Press *[IF BW]* until the 3 MHz IF filter is selected, press *[power BW]* to select IN BAND, [Tx], [FREQ] 101 [MHz], *[spec ana]*, *[▼ ref level ▲]* 0 dBm (using the soft keys beneath the screen), *[bar charts]*.

(2) Connect a signal generator set to provide –20 dBm at 101 MHz to the TNC RF input socket of the test set.

(3) Using a zero loss probe and external spectrum analyzer, measure the power level entering the log amp on R65 on AE6 board at 10.7 MHz. Adjust R157 until the level displayed on the external analyzer indicates –17 dBm.

(4) Refit the RF lid to the receiver tray.

(5) Set the test set IF filter bandwidth to 110 kHz.

(6) Set the signal generator level to −10 dBm. Adjust R140 for −10 dBm ±0.5 dB on the test set display (the power is displayed on the top line of the display).

(7) Set the signal generator level to −50 dBm. Note the reading on the test set display. If this is not −50 dBm ±0.5 dB, adjust R141 for twice the noted error. For example, if the reading is −51 dBm, adjust R141 for a reading of −52 dBm; this ensures that R141 is adjusted in the correct direction.

(8) Repeat the adjustment of R140 and R141 ( steps ((6)) and ((7)) ) until both are within 0.5 dB of their respective levels ( −10 dBm & −50 dBm ).

(9) Changing the signal generator level in 10 dB steps, check the linearity of the log amp between −50 dBm and −10 dBm. Each 10 dB step should be within ±1.5 dB. If necessary, readjust R140 & R141.

(10) Press [HELP SET-UP], *[IFR Access]*, *[cal values]*, *[spec ana]*, *[default data]*, *[store data]*, [HELP SET-UP], *[RESET]*.

(11) Press [HELP SET-UP], *[IFR Access]*, *[cal values]*, *[spec ana]*, *[cal config]*.

(12) On the CAL VALUES : SPEC ANA CONFIG screen, switch all cals OFF except the *[INPUT FILTER]* cal; this should be set to ON.

(13) Press *[return]*, *[CAL]*.

(14) Wait approximately 1 minute for the Rx system cal to finish.

(15) Press *[store data]*, *[return]*.

(16) Verify that the text beneath the WARNINGS annotation is None; if not, repeat the calibration procedure.

(17) Press [HELP SET-UP], *[RESET]*.

(18) Set the following on the test set; [Tx TEST], [RF SELECT] TNC input, [Tx], [FREQ] 101 [MHz], *[spec ana]*, *[▼ ref level ▲]* +10 dBm, *[bar charts]*, *[IF BW]* to select 3 MHz, *[power BW]* to select IN BAND.

(19) Set the external signal generator to 101 MHz, 0 dBm. To ensure that the level supplied to the test set is as close to 0 dBm as possible, disconnect the lead from the test set TNC RF socket and temporarily connect it to a power meter (e.g. IFR 6960/ 6912) and adjust the signal generator level until the power meter reads 0 dBm ± 0.05 dB. Remove the power meter connection and reconnect the cable to the test set TNC socket.

(20) Adjust AE6 R140 for a power indication of 0 dBm ± 0.1 dB on the test set.

## Spectrum analyzer adjustment (AE6/2 board)

### (C137, C142, R157, R140 and R141)

(1) Press [HELP SET-UP], *[IFR Access]*, *[PROD'N VALUES]*, *[Prod Values]*. Check that No Log Amp Cal Data is displayed beside the *[Log Amp Data]* soft key; if not, press *[Log Amp Data]* to display it.

(2) Press [HELP SET-UP], *[RESET]*. The test set should power up in its default DUPLEX TEST mode.

(3) Press *[res BW up]* until the 3 MHz bandwidth is selected and, using the relevant soft keys beneath the display, set a span of 1 MHz/div.

(4) Press [Tx] [LEVEL], then, using the VARIABLE rotary control, adjust the spectrum analyzer reference level to place the peak of the signal within the top graticule. Press *[dB per div]* to select 1 dB/div.

(5) Adjust both C137 and C142 until the signal on the display is at maximum amplitude and is centred on the dotted graticule line. **Note:** C137 and C142 are interactive.

(6) Press [HELP SET-UP], *[RESET]*.

(7) Set the test set as follows:- [Tx TEST], [RF SELECT] TNC input. Press *[IF BW]* until the 3 MHz IF filter is selected, press *[power BW]* to select IN BAND, [Tx], [FREQ] 101 [MHz], *[spec ana]*, *[▼ ref level ▲]* 0 dBm (using the soft keys beneath the screen), *[bar charts]*.

(8) Connect a signal generator set to provide −20 dBm at 101 MHz to the TNC RF input socket of the test set.

(9) Using a zero loss probe and external spectrum analyzer, measure the power level at 10.7 MHz entering the log amp input filter by monitoring the leg of variable capacitor C142 that is furthest from the screening can. Adjust R157 until the level displayed on the external analyzer indicates −11 dBm. (If you are using an IFR 2388 zero loss probe, set this to provide 10 dB of attenuation and adjust R157 until the level seen on the external analyzer is −21 dBm.)

(10) Adjust C142 for a maximum power reading on the test set.

(11) Refit the RF lid to the receiver tray.

(12) Set the test set IF filter bandwidth to 110 kHz.

(13) Set the signal generator level to −10 dBm. Adjust R140 for −10 dBm ±0.5 dB on the test set display (the power is displayed on the top line of the display).

(14) Set the signal generator level to −50 dBm. Note the reading on the test set display. If this is not −50 dBm ±0.5 dB, adjust R141 for twice the noted error. For example, if the reading is −51 dBm, adjust R141 for a reading of −52 dBm; this ensures that R141 is adjusted in the correct direction.

(15) Repeat the adjustment of R140 and R141 ( steps ((13)) and ((14)) ) until both are within 0.5 dB of their respective levels (−10 dBm & −50 dBm).

(16) Changing the signal generator level in 10 dB steps, check the linearity of the log amp between −50 dBm and −10 dBm. Each 10 dB step should be within ±1.5 dB. If necessary, readjust R140 & R141.

(17) Press [HELP SET-UP], *[IFR Access]*, *[cal values]*, *[spec ana]*, *[default data]*, *[store data]*, [HELP SET-UP], *[RESET]*.

(18) Press [HELP SET-UP], *[IFR Access]*, *[cal values]*, *[spec ana]*, *[cal config]*.

(19) On the CAL VALUES : SPEC ANA CONFIG screen, switch all cals OFF except the *[INPUT FILTER]* cal; this should be set to ON.

(20) Press *[return]*, *[CAL]*.

(21) Wait approximately 1 minute for the Rx system cal to finish.

(22) Press *[store data]*, *[return]*.

(23) Verify that the text beneath the WARNINGS annotation is None; if not, repeat the calibration procedure.

(24) Press [HELP SET-UP], *[RESET]*.

(25) Set the following on the test set; [Tx TEST], [RF SELECT] TNC input, [Tx], [FREQ] 101 [MHz], *[spec ana]*, *[▼ ref level ▲]* +10 dBm, *[bar charts]*, *[IF BW]* to select 3 MHz, *[power BW]* to select IN BAND.

(26) Set the external signal generator to 101 MHz, 0 dBm. To ensure that the level supplied to the test set is as close to 0 dBm as possible, disconnect the lead from the test set TNC RF socket and temporarily connect it to a power meter (e.g. IFR 6960/ 6912) and adjust the signal generator level until the power meter reads 0 dBm ± 0.05 dB. Remove the power meter connection and reconnect the cable to the test set TNC socket.

(27) Adjust R140 for a power indication of 0 dBm ± 0.1 dB on the test set.

## Spectrum analyzer crystal filter manual adjustments (AE6 and AE6/2 boards)

### (C4, C18, C34, C48, C65, C13, C25, C42, C55, C70, R9, R19, R32, R42, R55)

**Note**

**Once the crystal filters have been set up in the factory, there should be no need to readjust them unless repairs are carried out on the board in the crystal filter area. Adjustments should only be made if it is not possible to achieve the correct filter response by carrying out the manual software adjustment via the diagnostics screen. Before starting these**

**adjustments, ensure that R140, R141, and R157 have been set up (R140 and R141 should be rechecked after carrying out these filter adjustments).**

(1) Disconnect the link between TP15 and the TR13 emitter. On some boards, this link will be on top of the board, on others it will be underneath.

(2) Turn on the test set and leave it for a minimum of thirty minutes.

(3) Using a short cable, connect the TNC RF socket to the N-type RF socket.

(4) Press [DUPLEX TEST], use [RF SELECT] to set the TNC socket to 1-port duplex, then press [RF GEN], [FREQ] 150 [MHz], [LEVEL] −22 [dBm], [Tx], [FREQ] 150 [MHz]. Select *[Rx mod OFF]*, then press [HELP SET-UP], *[IFR Access]*, *[PROD'N VALUES]*, *[Specana diag]*, set a span of 500 Hz/div, *[▼ ref level ▲]* −10 dBm, *[dB per div]* 10 dB. Finally, press *[change filter]* until the 300 Hz filter is selected.

(5) The title bar is split into four sections, each of which contains the name and current value of one of the crystal filter parameters:

| | |
|---|---|
| Δ C.F. | Centre frequency adjustment. |
| STRAYS | Null strays adjustment. |
| BWIDTH | Bandwidth adjustment. |
| δ GAIN | Filter gain adjustment. |

Each of these parameters can be adjusted up and down by using increment/decrement keys. The null strays and bandwidth soft keys are on the right. The ΔFREQ increment/decrement keys are assigned to the centre frequency adjustment. The δ increment/decrement keys are used for gain adjustments. Each of these parameters has a range of 0 to 4095, and there is an associated soft key INC: which can be used to change the increment size in the sequence 1, 10, 100, 200.

Using the appropriate keys, initially set the following values:-

| | |
|---|---|
| Δ C.F. | 2048 |
| STRAYS | 2048 |
| BWIDTH | 4095 |
| δ GAIN | 200 |

(6) *1st stage, 1st part*. Link TP15 to TP2 (connector length must not exceed 10 cm). Set BWIDTH to 4095 (just −1 from 0) and set 500 Hz/div. Adjust C4 to centralise the peak of the response in the display. This should be very close to maximum amplitude. *See Fig 3-2.*

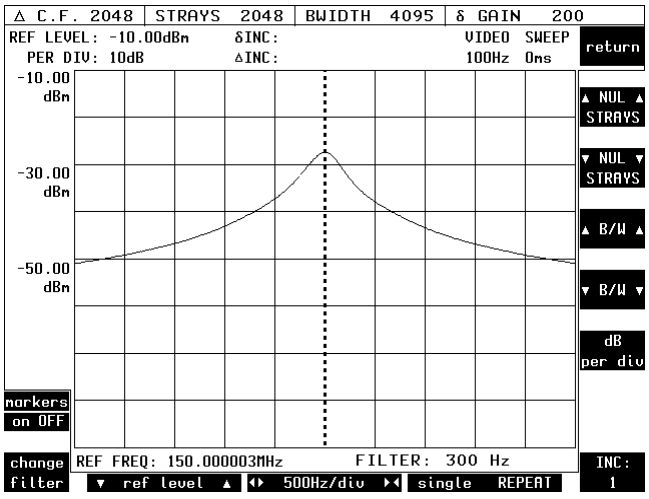



*Fig. 3-2 Using C4 to centralise the peak response*

(7) *1st stage, 2nd part*. Set 50 kHz/div, BWIDTH to 0. Adjust C13 for a minimum level. This will coincide with the resultant display having a flat band-pass response. Adjust R9 for best symmetry on the skirts of the response. *See Fig 3-3.*

**Note:** These two controls, C13 and R9, interact very strongly.

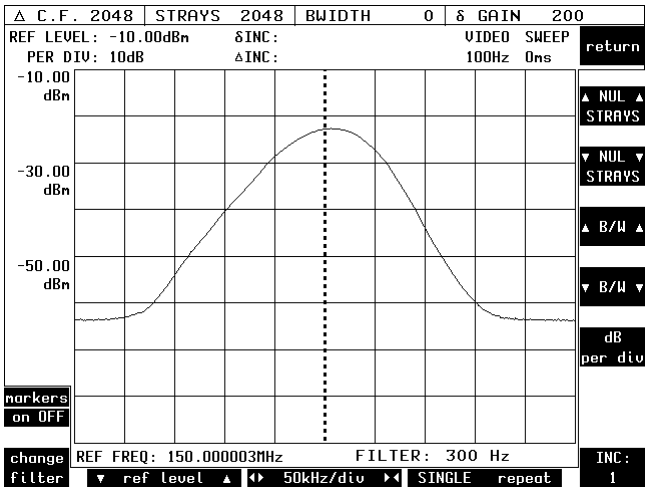



*Fig. 3-3 Typical response when set up - 1st stage, 2nd part*

If necessary, set dB/div to 2 dB for final adjustment. Effects of adjustment. C13 adjusts the flat portion at the top of the curve and R9 adjusts for equal spacing from the vertical centre line.

(8) *2nd stage, 1st part.* Remove the link from TP2 and connect it to TP3 (now TP15 to TP3). Set 500 Hz/div, BWIDTH to 4095. Adjust C18 to set peak of response to centre of screen. *See Fig 3-4.*

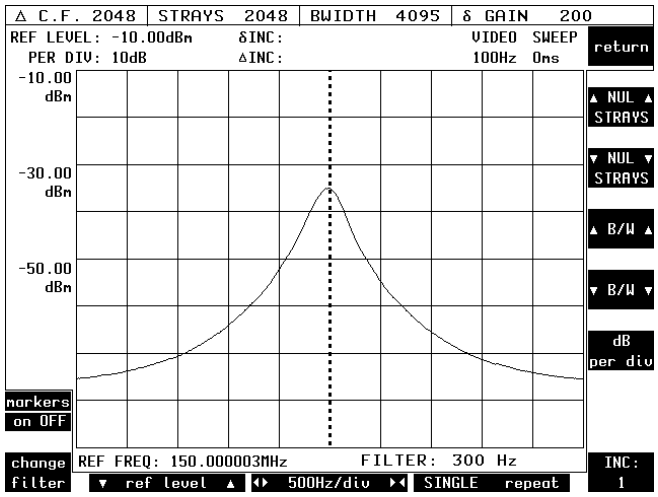



*Fig. 3-4 Typical response - 2nd stage, 1st part*

(9) *2nd stage, 2nd part.* Set 50 kHz/div, BWIDTH to 0. Adjust C25 for minimum level and flatness. Adjust R19 for best symmetry, as in *1st stage, 2nd part. See Fig 3-5.*

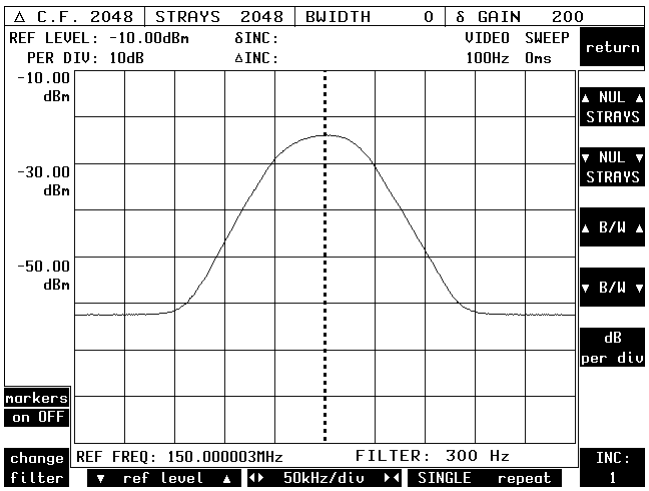



*Fig. 3-5 Typical response - 2nd stage, 2nd part*

(10) *3rd stage, 1st part.* Remove the link from TP3 and connect it to TP4 (TP15 - TP4). Set 500 Hz/div, BWIDTH to 4095. Adjust C34 to set peak of response in centre of screen. This will now start to coincide with the maximum amplitude. *See Fig 3-6.*

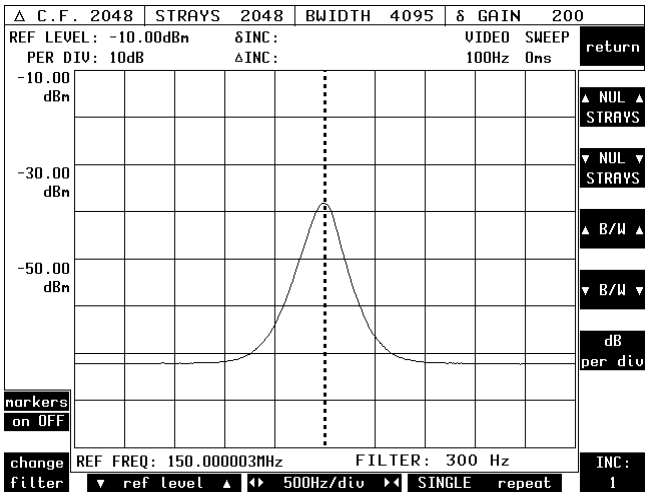



*Fig. 3-6 Typical response - 3rd stage, 1st part*

(11) *3rd stage, 2nd part.* Set 50 kHz/div, BWIDTH to 0. Adjust C42 for minimum level/flatness. Adjust R32 for best symmetry. *See Fig 3-7.*

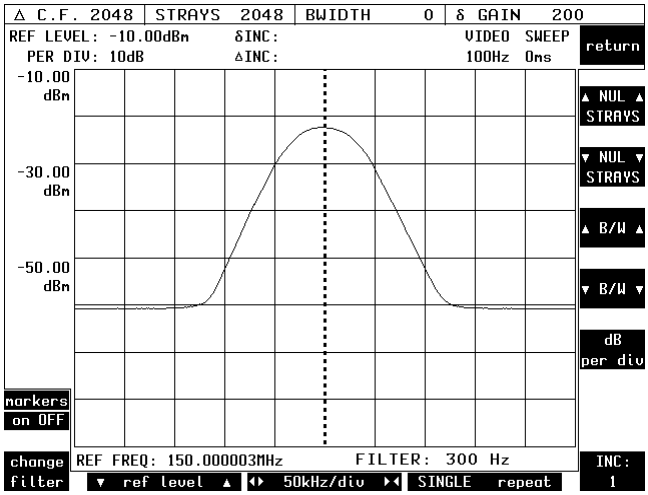



*Fig. 3-7 Typical response - 3rd stage, 2nd part*

(12) *4th stage, 1st part.* Remove link from the TP4 and connect to TP5 (TP15 to TP5). Set 500 Hz/div, BWIDTH to 4095. Adjust C48 to set peak at maximum amplitude. This may not coincide with the centre of the screen. *See Fig 3-8.*

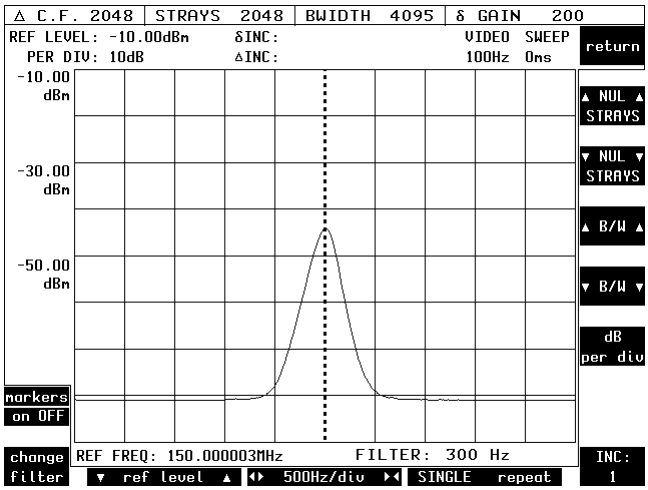



*Fig. 3-8 Typical response - 4th stage, 1st part*

(13) *4th stage, 2nd part.* Set 50 kHz/div, BWIDTH to 0. Adjust C55 for minimum level. Response no longer flat. Adjust R42 for best symmetry. *See Fig 3-9.*

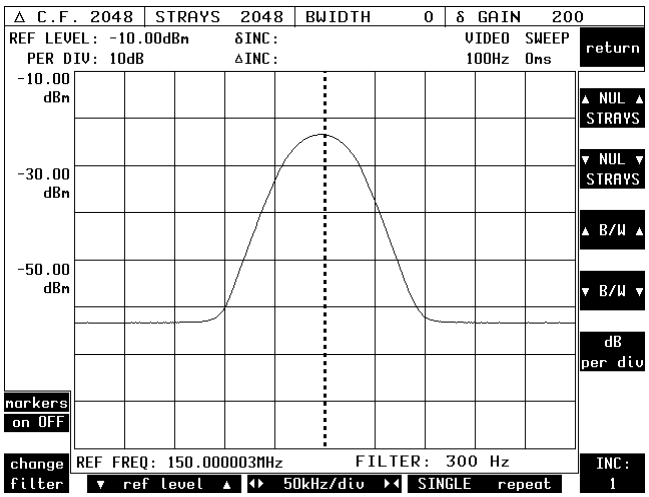



*Fig. 3-9 Typical response - 4th stage, 2nd part*

(14) *5th stage, 1st part.* Remove link from TP5 and TP15. Switch off test set and reconnect wire link between TP15 and TR13 emitter. Turn on and leave to warm up for 5 minutes. Set test set controls as in steps 4 and 5. Set 500 Hz/div, BWIDTH to 4095. Adjust C65 to set peak at maximum amplitude. *See Fig. 3-10.*

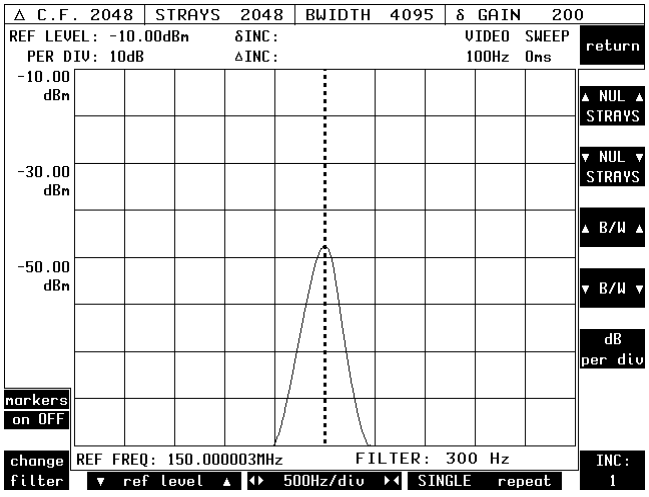



*Fig. 3-10 Typical response - 5th stage, 1st part*

(15) *5th stage, 2nd part.* Set 50 kHz/div, BWIDTH to 0. Adjust C70 for minimum level. Adjust R55 for best symmetry. *See Fig 3-11*.

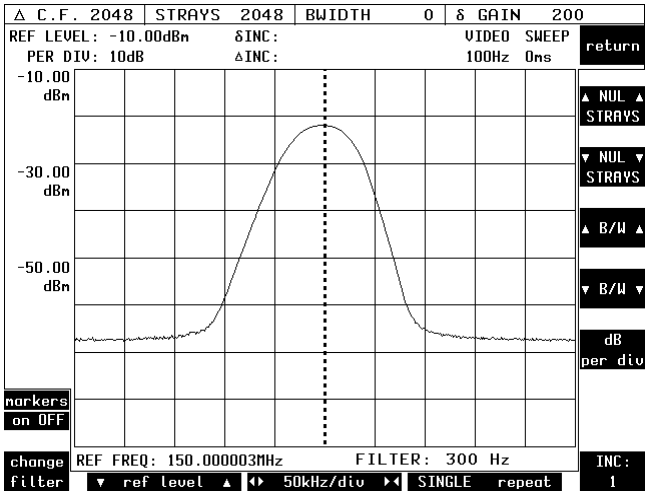



*Fig. 3-11 Typical response - 5th stage, 2nd part*

(16) Once manual adjustment is complete, exit from the diagnostic screen by pressing [HELP SET-UP], *[RESET]*.

(17) Recheck the adjustment of R140, R141 and adjust if required. Carry out the spectrum analyzer crystal filter manual software adjustment. Then SA input filter calibration. Then SA cal.

## Modulation meter FM & AM adjustment

### (AE7 board R84, R90, R145, and R116)

**Note** **The preliminary adjustments for the FM demodulator would only normally need to be carried out if repairs are carried out on AE7 or the board itself is replaced.**

### Preliminary adjustments

(1) Set [Tx TEST], [Tx], [FREQ] 101 [MHz], [RF SELECT] TNC input, *[mod type]* until FM is selected, *[band pass]* until the 0.3-3.4 kHz filter is selected.

(2) Connect a signal generator (e.g. IFR 2041) set to 10.7 MHz 0 dBm to PLC.

(3) Monitor PLE with a DVM set to measure DC Volts and adjust R84 for a reading of 0 V DC.

(4) Set the signal generator to provide 100 kHz deviation at 1 kHz modulation rate (set this up as accurately as possible by temporarily connecting to a modulation meter (e.g. IFR 2305, accuracy 0.5%). Reconnect the signal generator to PLC, set the DVM to monitor AC Volts, and adjust R90 for 2 V RMS on PLE.

(5) Recheck R84 adjustment and optimise if required. Recheck R90 adjustment if R84 was readjusted.

(6) With the signal generator supplying 100 kHz deviation at 1 kHz modulation rate, pull the $I^2C$ connector off PLB (this will prevent the board circuits from being auto-ranged).

(7) Set the signal generator modulation rate to 15 kHz.

(8) Adjust R145 for 2 V RMS on PLE.

(9) Remove the signal generator and reconnect PLC and PLB.

### Final adjustments

The AM and FM absolute accuracy are controlled by two potentiometers on the AE7 board. These potentiometers are accessible via holes in the RF lid on the immediate underside of the unit. The underside outer casing will have to be removed. The audio & demod calibrations (page 3-6) must have been run prior to this set up.

(1) Press [RF TEST], *[RF IN/OUT]*. Toggle [RF SELECT] to set the test set to 2-port mode (TNC RF output, N-type input). Set [RF GEN], [FREQ] 150 [MHz], [LEVEL] 0 [dBm], [Tx], [FREQ] 150 [MHz], toggle *[Tx filter]* to select the 300 Hz LP filter.

(2) Using a T-piece, connect the TNC RF output to both the N-type input and an accurate external modulation meter (e.g. IFR 2305). Set the external modulation meter to monitor FM in a 300 Hz to 3.4 kHz bandwidth with noise average ON.

(3) FM adjustment: Set [MOD GEN], [LEVEL] 90 [kHz], [FREQ] 100 [Hz], and check that the external modulation meter deviation reading is 90 kHz ± 1 kHz (this is just to confirm that the highly accurate fractional-N circuit of the test set Signal Generator is functioning, as it is used as the reference for setting up the FM modulation meter, *not* the IFR 2305 reading.).

(4) Adjust AE7 R90 until the test set Tx FM DEVN display indicates 90.0 kHz +0, –0.1 kHz.

(5) AM adjustment:- Set the external modulation meter to read AM in a 300 Hz-3.4 kHz bandwidth. Press the *[Tx filter]* soft key to select the 5 kHz LP filter (displayed on the Tx side of the screen). Press [MOD GEN], [FREQ] 1 [kHz], [LEVEL] 80 [%], [INC] 0.1 [%] and, using the delta keys, adjust the modulation generator level until exactly 80% AM is indicated on the external modulation meter.

(6) Wait for the readings to settle, then press *[hold ranges]*. Set MOD 1 to OFF and note the residual noise reading on the AM DEPTH readout (Tx side of the test set display).

(7) Set MOD 1 to ON and adjust R116 on AE7 until 80% + noted residual noise figure is indicated on the Tx AM DEPTH readout. For example, if residual noise was 0.3%, set the indicated depth to 80.3%.

## Signal generator AM distortion adjustment

### (AF5 board R58)

(1) Hinge the RF tray to gain access to the AF5 board.

(2) Connect a modulation meter (e.g. IFR 2305) to the signal generator output from AF5, i.e. the SMA connector on the tray wall.

(3) On the test set, select [Rx TEST], [RF GEN], [FREQ] 400 [MHz], [RF SELECT] TNC output, [LEVEL] 3 dBm, [MOD GEN], [FREQ] 100 [Hz], [LEVEL] 85 [%].

(4) Set the modulation meter to monitor AM with a bandwidth of 30 Hz to 50 kHz, and noise averaging ON. If an IFR 2305 is being used, set the LF output control knob to the marker.

(5) Connect a distortion meter to the modulation meter LF output and tune to 100 Hz.

(6) Adjust R58 on AF5 for minimum distortion.

## 2 GHz down convertor module 80 MHz oscillator

### (AE5/1 board C51 adjustment in AK1 location)

(1) Remove the connector from PLC pins 1 and 2 and reconnect in set up position across pins 2 and 3.

(2) Allow 5 minutes warm up and then adjust C51 for a frequency of 80 MHz ± 100 Hz on connector PLD pin 2.

(3) Reconnect the link across PLC pins 1 and 2. Then adjust C51 for a voltage between –2 V and –4V on IC 10 pin 6.

# Chapter 4
# SELF-CALIBRATION INFORMATION

## Contents

## List of figures

## Introduction

This chapter contains details of the automatic calibration routines built into the test set. These routines can only be initiated after gaining access to the *[IFR Access]* key (which may be worded *[Marconi Access]* on pre-Version 8 software). They are used as part of the adjustment and calibration procedures described in chapter 3. The details provided here explain how to run the calibrations to aid fault location if one of the IFR ACCESS calibrations fail. The step by step listings contain break point values which correlate to those shown on the bottom of the display while the calibrations are running.

After pressing the *[IFR Access]* key the following screen is shown:-

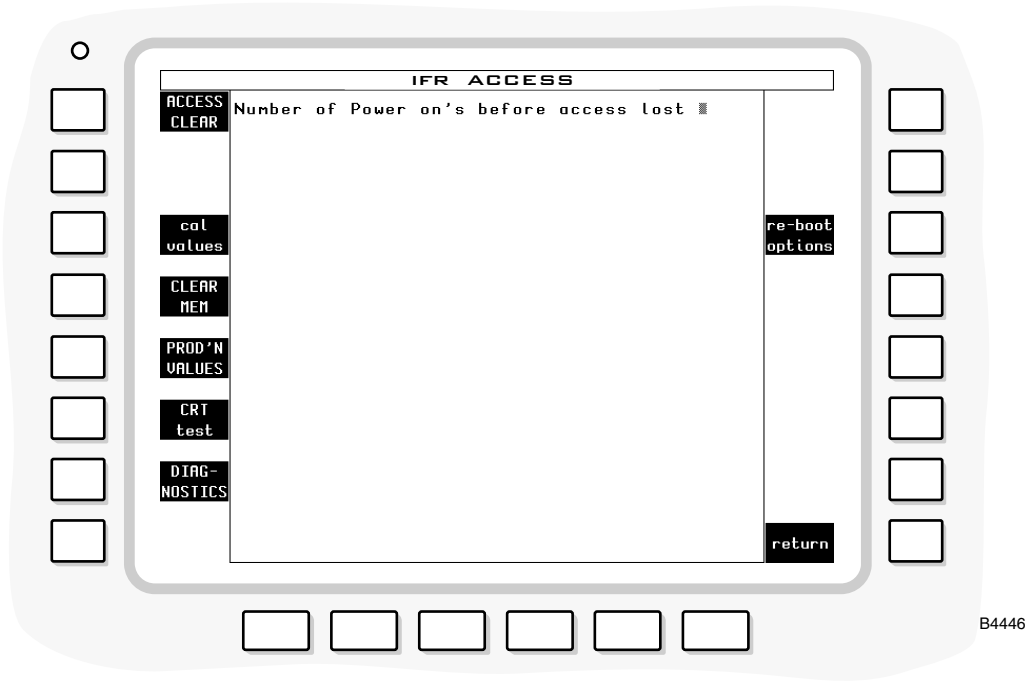



*Fig 4-1 IFR INSTRUMENTS ACCESS screen*

Pressing the *[cal values]* key causes the following screen - or a variation of it - to be displayed:-

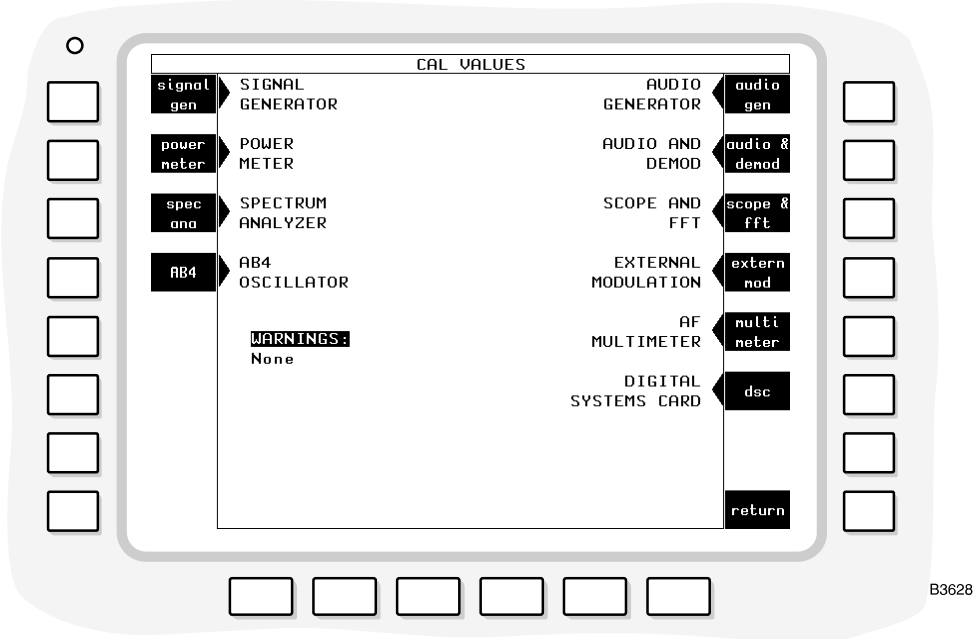



*Fig 4-2 CAL VALUES screen*

Pressing any key other than *[power meter]*, *[multimeter]* or *[return]* will display the screen shown below. The title will refer to the selected key. The *[power meter]* and *[multimeter]* screens are different as explained later.

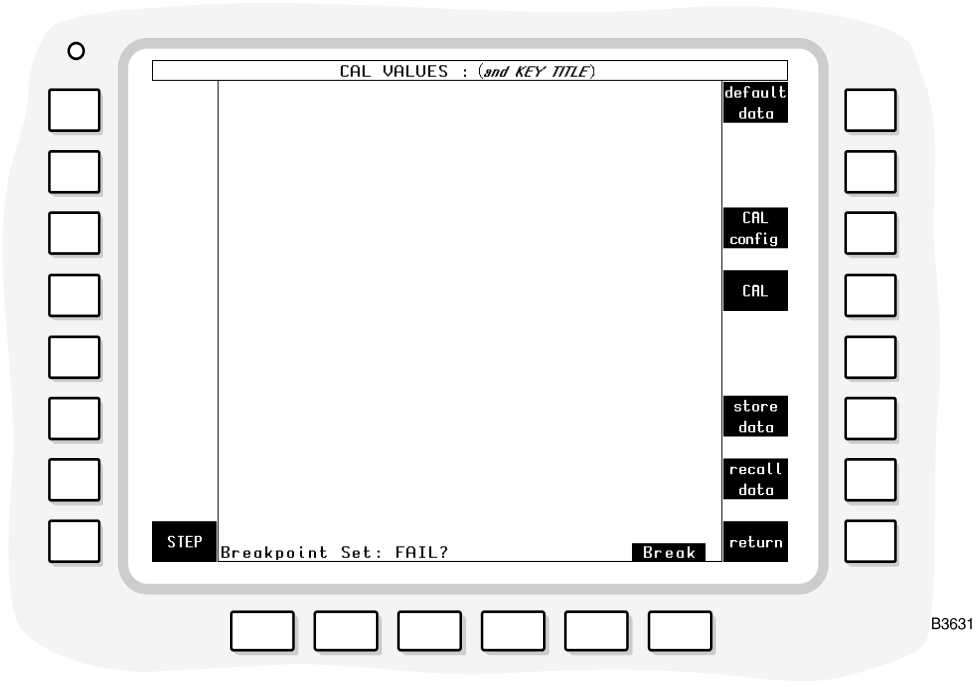



*Fig 4-3 CAL VALUES (specific) screen*

## Configuring a calibration routine

The calibration routines which have a *[cal config]* key can have the constituent parts of the routine included or excluded. Some of these routines can also have alternative cal points selected.

Pressing the *[cal config]* key displays the configuration screen for the selected routine.

The CAL VALUES : AUDIO & DEMOD CONFIG screen shows keys *[AF RANGE]*, *[AF GAIN]*, *[AF FILTERS]*, *[ADC RMS]*, *[PK DETECT]*, *[DEMOD FILTERS]*, and *[demod noise]*. Pressing any of these keys will toggle the adjacent legend between ON and OFF. The calibrations routines detailed later in this chapter (starting on page 4-7) are included in the appropriate calibration program when the relevant section is configured as ON. Some of the configuration keys control more than one calibration routine as shown in the tables below:-

| Setting this key on:- | Enables these calibration routines:- |
|---|---|
| **Audio & demod processor (A2/A3) calibrations** | |
| *[ADC RMS]* | ADC offset calibration procedure<br>ADC gain calibration procedure<br>RMS-DC and DC filter offsets<br>RMS-DC and DC filter gain calibration procedure |
| *[PK DETECT]* | Peak detectors offset calibration<br>Negative peak detector gain calibration procedure |
| *[AF RANGE]* | AF input offset DAC calibration procedure<br>AF output offset DAC calibration |
| *[AF GAIN]* | AF 1 V reference calibration procedure<br>Calibration of AF 20 dB and ÷3 stages<br>AF input attenuator calibration |
| *[AF FILTERS]* | AF filter gain calibration |
| *[DEMOD FILTERS]* | Demod filter calibration<br>Demod no filter audio filter gain calibration<br>Demod 20 kHz low-pass audio filter gain calibration<br>Demod 5 kHz low-pass audio filter gain calibration<br>Demod 300 Hz low-pass audio filter gain calibration<br>Demod 0.3-3.4 kHz band-pass audio filter gain calibration<br>Demod CCITT audio filter gain calibration<br>Demod CMESS audio filter gain calibration |
| *[demod noise]* | Demod noise calibration |
| **Signal generator calibrations** | |
| *[1dB Steps]* | A1 RF DAC linearity (1dB steps) calibration |
| *[50 MHz Steps]* | AF5 output level frequency response calibration |
| *[Bessel zero]* | Bessel zero calibration |
| *[FM DAC]* | FM drive gain calibration<br>FM sensitivity calibration |
| *[FM Atten]* | FM attenuator calibration |
| **Spectrum analyzer / receiver calibrations** | |
| *[INPUT FILTER]* | IF chain frequency response calibration |
| *[RX GAIN]* | Crystal filter automatic calibration<br>Ceramic filter loss calibration<br>Crystal filter gain calibration |
| **External modulation calibrations** | |
| *[Ext mod offsets]* | External modulation offset calibration |
| *[Ext mod fm gain]* | External modulation FM gain calibration |
| *[Ext mod am gain]* | External modulation AM gain calibration |
| **FFT calibrations** | |
| *[DC mkr Nulling]* | FFT DC marker nulling |
| *[AF FFT Offset]* | AF FFT gain offsets calibration |
| *[DM FFT Offset]* | FM demod FFT gain offsets calibration |
| **Power meter calibrations** | |
| *[power meter]* | Broad-band power meter calibration (gain and offsets) |
| **Audio generator calibrations** | |
| *[AM GAIN]* | AM gain calibration |
| *[PM GAIN]* | Phase modulation generation gain calibration |

*continued.....*

| Setting this key on:- | Enables these calibration routines:- |
|---|---|
| **Digital systems card calibrations** | |
| *{rx bulk atten]* | Digital receiver attenuator calibration |
| *[A8 dac]* | A8 attenuator DAC characteristic |
| *[sg freq resp]* | Digital sig gen frequency response *plus 2967 digital sig gen frequency response* |
| *[round trip]* | A8 Round trip delay calibration |
| *[rx freq resp]* | Digital receiver frequency response *plus 2967 digital receiver frequency response* |
| *[A8 rx agc]* | A8 receiver AGC gain calibration |
| *[A8 meas window]* | A8 measurement window calibration |
| **AB4 Warping calibrations** | |
| *[–25 ppm cal]* | –25 ppm warping calibration |
| *[–10 ppm cal]* | –10 ppm warping calibration |
| *[+10 ppm cal]* | +10 ppm warping calibration |
| *[+25 ppm cal]* | +25 ppm warping calibration |

## Power meter and multimeter cal values

The power meter and multimeter cal values screens do not have a *[cal config]* key. Do not make any alterations to settings on these screens other than as described in the ADJUSTMENT AND CALIBRATION procedures in Chapter 3.

## Running a calibration routine

Press either the *[CAL]* key or the *[STEP]* key . This will start the selected calibration routine.

- Pressing the *[CAL]* key causes the routine to run until the routine is complete;
- Pressing the *[STEP]* key advances the routine by one step for each key press.

Messages and break point numbers relating to the progress of the routine are displayed at the bottom of the screen.

- When a routine is being run by pressing the *[CAL]* key, it can be paused by pressing the *[PAUSE CAL]* key. The *[STEP]* key can then by used to advance the routine in single steps or the *[CONT CAL]* key pressed to resume the routine.
- When a routine is being run by pressing either the *[CAL]* key or the *[STEP]* key it can be aborted by pressing the *[ABORT CAL]* key.

### Setting break points

The break point setting can be changed to suit the fault finding requirements. Pressing the *[break]* key will highlight the Breakpoint Set legend (see Fig. 4-3 above). A 5 digit breakpoint figure can then be set using the data entry keys followed by the [ENTER] key.

- Entering a figure corresponding to a break point shown as *#BP nnnnn* in the calibration routines will halt the calibration at that point, allowing step by step progress through the remainder of the routine.
- Entering 99999 will set the FAIL (Halt on failure) option.
- Entering 00000 will set the NONE (No break points set) option. This setting is included for production use, and has no fault finding significance.

# CAL VALUE calibration routines

## Audio processor (A2/A3) calibrations

### ADC offset calibration procedure

#### Select/deselect path

*[cal values]; [audio & demod]; [cal config]; [ADC RMS]* (1 of 4 parts).

#### Purpose

This calibration is used to find the output value of the ADC on A2 that corresponds to 0 V input to the ADC. It is active following the use of the procedure described below.

#### Description

This calibration works by grounding the A2/A3 CAL path, routeing this ground signal to the input of the ADC, then reading the ADC output.

Calibration ON/OFF selection key: *[ADC RMS]*

#### Calibration procedure

```
        INITIALISATION
1       Ground input to A2 ADC
1       Screen message: "ADC offset initialised"
1       #BP 10000

        START ADC READINGS
2       Request A2 ADC reading
2       Screen message: "Requesting first ADC offset reading"

        RECEIVE ADC READINGS
3       ADC READING RETURNED
3       #BP 10001
3       Screen message: "Offset reading X = XXXX"
3       IF more readings to be taken
4               Request ADC reading
4               REPEAT from section 3
3       ELSE all readings have been done
5               Calculate average ADC reading
5               IF offset in range 2039 - 2057
6                       Screen message "ADC offset passed"
6                       #BP 10002
5               ELSE ADC offset CAL failed
7                       Screen message "ADC offset failed"
7                       #BP 10003
3       END
```

CAL FAILURE: #BP 10003

## ADC gain calibration procedure

### Select/deselect path

[cal values], [audio & demod]; [cal config] [ADC RMS] (2 of 4 parts).

### Purpose

This calibration is used to establish the gain of the ADC on A2.

### Description

This calibration is performed by routeing the +1 V reference, via the A2/A3 CAL path, to the input of the ADC on A2, and then reading the output of the ADC. This gives the ADC gain in bits/volt.

Calibration ON/OFF selection key: *[ADC RMS]*

### Calibration procedure

```
        INITIALISATION
1       Ground A1 AFREF signal
1       Route 1 V DC reference to A2/A3 CAL signal
1       Select CAL signal as input to A2 ADC
1       Screen message: "Initialised ADC gain CAL"
1       #BP #10000

        START ADC READINGS
2       Request A2 ADC reading
2       Screen message: "Start first ADC read"

        RECEIVE ADC READINGS
3       ADC READING RETURNED
3       #BP 10010
3       Screen message: "ADC (gain) reading X = XXXX"
3       IF more readings to be taken
4               Request ADC reading
4               REPEAT from section 3
3       ELSE all readings have been done
5               Calculate average ADC reading
5               IF 1 V reading in range 817 - 821
6                       Screen message "ADC gain passed"
6                       #BP 10011
5               ELSE ADC CAL CAL failed
7                       Screen message "ADC gain failed"
7                       #BP 10012
3       END
```

CAL FAILURE: #BP 10012

## RMS-DC and DC filter offsets

### Select/deselect path

*[cal values], [audio & demod]; [cal config] [ADC RMS]* (3 of 4 parts).

### Purpose

The purpose of this calibration is to measure the DC offsets presented to the A2 ADC input by the filtered and unfiltered outputs of the RMS-to-DC converter. Once they are known, the offsets can be applied to readings taken by the ADC to compensate for the DC offsets from the RMS-to-DC converter.

## Description

This calibration is performed by grounding the input to the RMS-to-DC converter, using the A2/A3 CAL path. The filtered and unfiltered outputs of the RMS-to-DC converter are selected in turn and the ADC output is read. The differences between these readings and the true ground value of the ADC gives numerical offsets which can be applied to ADC readings taken from the RMS-to-DC converter.

Limits on these offsets: –6 <= offset <= +6

Calibration ON/OFF selection key: *[*ADC RMS*]*

## Calibration procedure

```
        INITIALISATION
1       Ground A1 AFREF signal
1       Select GROUND as A2/A3 CAL signal
1       Select CAL signal as input to RMS-DC converter
1       Select 10 Hz filter output as input to ADC
1       Screen message: "DC FILT/RMS offset initialised"
1       #BP 10000

        START ADC READINGS
2       Request A2 ADC reading
2       Screen message: "Requesting first ADC offset reading"

        RECEIVE ADC READINGS
3       ADC READING RETURNED
3       #BP 10020
3       Screen message: "Offset reading X = XXXX"
3       IF more readings to be taken
4               Request ADC reading
4               REPEAT from section 3
3       ELSE all readings have been done
5               Calculate average ADC reading
5               IF 10 Hz filter output selected as ADC input
6                       Select RMS-DC converter filtered output as  input to ADC
6                       Screen message: "DC filt offset = XXXX, start RMS offset"
6                       Request ADC reading
6                       REPEAT from section 3
3       IF both offsets outside limits
7               Screen message: "RMS/DC FILT offsets, both failed"
7               Flag CAL as failed
7               #BP 10021
3       IF RMS-DC output offset outside limits
8               Screen message: "RMS offset failed"
8               Flag CAL as failed
8               #BP 10022
3       IF RMS-DC filtered output offset outside limits
9               Screen message: "DC FILTER offset failed"
9               Flag CAL as failed
9               #BP 10023
3       ELSE CAL has passed
10              Screen message: "RMS/DC FILT offsets passed"
10              Flag CAL as passed
10              #BP 10024
3       END
```

CAL FAILURE #BP 10021, 10022, 10023

## RMS-DC and DC filter gain calibration procedure

### Select/deselect path

*[cal values], [audio & demod]; [cal config] [ADC RMS]* (4 of 4 parts).

### Purpose

The purpose of this calibration is to measure the gains of the A2 RMS-to-DC converter when used with filtered and unfiltered output. Once the gains are known, they can be used to correct ADC readings for gain errors in the RMS-to-DC converter and its output paths.

### Description

This calibration is performed by routeing the +1 V reference signal to the input of the RMS-to-DC converter, using the A2/A3 CAL path. The filtered and unfiltered outputs of the RMS-to-DC converter are selected in turn and the ADC output is read. The readings are corrected for offsets and the gain of each path can be calculated, since the gain of the ADC itself is known.

Calibration ON/OFF selection key: *[*ADC RMS*]]*

### Calibration procedure

```
        INITIALISATION
1       Ground A1 AFREF signal
1       Select 1V DC reference as A2/A3 CAL signal
1       Select CAL signal as input to RMS-DC converter
1       Select 10 Hz filter output as input to ADC
1       Screen message: "Initialised RMS/DC FILTER gain"
1       #BP 10000

        START ADC READINGS
2       Request A2 ADC reading
2       Screen message: "Requesting first ADC offset reading"

        RECEIVE ADC READINGS
3       ADC READING RETURNED
3       #BP 10030
3       Screen message: "ADC reading X = XXXX"
3       IF more readings to be taken
4               Request ADC reading
4               REPEAT from section 3
3       ELSE all readings have been done
5               Calculate average ADC reading
5               IF 10 Hz filter output selected as ADC input
6                       Select RMS-DC converter filtered output as  input to ADC
6                       Screen message: "DC filt gain = XXXX, start RMS gain"
6                       Request ADC reading
6                       REPEAT from section 3
3       IF both gains outside limits
7               Screen message: "RMS/DC FILT gains, both failed"
7               Flag CAL as failed
7               #BP 10031
3       IF RMS-DC gain outside limits
8               Screen message: "RMS gain failed";
8               Flag CAL as failed
8               #BP 10032
3       IF RMS-DC filtered output gain outside limits
9               Screen message: "DC FILTER gain failed";
9               Flag CAL as failed
9               #BP 10033
3       ELSE CAL has passed
```

10 Screen message: "RMS/DC FILT gains passed"
10 Flag CAL as passed
10 #BP 10034
3 END

CAL FAILURE #BP 10031, 10032, 10033

## Peak detectors offset calibration

### Select/deselect path

*[cal values], [audio & demod]; [cal config] [PK DETECT]* (1 of 2 parts).

### Purpose

The purpose of this calibration is to find peak detector reading offsets with which to compensate for DC offsets in the peak detectors.

### Description

This calibration works by grounding the A2/A3 CAL path and routeing it to the input of the peak detectors on A2. The positive and negative peak detectors are then read. The readings returned are offset values for the detectors.

Limits on the offsets: 0 <= offset <= 24

Calibration ON/OFF selection key: *[*PK DETECT*]*

### Calibration procedure

INITIALISATION
1 Ground A1 AFREF signal
1 Select GROUND as A2/A3 CAL signal
1 Select CAL signal as input to A3 demod path
1 Set maximum attenuation (25.5 dB) in A3 demod programmable gain stage
1 Select positive peak detector
1 Route CAL signal to peak detectors input
1 Screen message: "Initialised pk dets offset"
1 #BP 10000

START PEAK DETECTOR READINGS
2 Request A2 peak detector reading
2 Screen message: "Reading pos peak detector"

RECEIVE PEAK DETECTOR READINGS
3 PEAK DETECTOR READING RETURNED
3 #BP 10040
3 Screen message: "Pos/Neg peak reading X = XXXX"
3 IF more readings to be taken
4 Request peak detector reading
4 REPEAT from section 3
3 ELSE all readings have been done
5 Calculate average peak detector reading
5 IF positive peak detector selected
6 Select negative peak detector
6 Screen message: "Pos pk offset = XXXX, start neg pk"
6 Request peak detector reading
6 REPEAT from section 3
3 IF both offsets outside limits
7 Screen message: "Failed offset CAL on both peak detectors";
7 Flag CAL as failed
7 #BP 10041

*continued.....*

```
3       IF RMS-DC output offset outside limits
8               Screen message: "Failed offset CAL on neg peak detector";
8               Flag CAL as failed
8               #BP 10042
3       IF RMS-DC filtered output offset outside limits
9               Screen message: "Failed offset CAL on pos peak detector");
9               Flag CAL as failed
9               #BP 10043

3       ELSE CAL has passed
10              Screen message: "Peak detectors offset passed";
10              Flag CAL as passed
10              #BP 10044
3       END

CAL FAILURE #BP 10041, 10042, 10043
```

## Negative peak detector gain calibration procedure

### Select/deselect path

*[cal values], [audio & demod]; [cal config] [PK DETECT]* (2 of 2 parts).

### Purpose

To calibrate the gain of the negative peak detector.

### Description

This calibration measures the gain of the negative peak detector by routeing –2 V DC from A1 via the CAL path to the peak detectors input with the negative peak detector selected. The peak detector output is then read and the gain calculated in bits/volt.

Calibration ON/OFF selection key: *[*PK DETECT*]*

### Calibration procedure

```
        INITIALISATION
1       Set –2 V DC on AFREF signal
1       Select AFREF as A2/A3 CAL signal
1       Select CAL signal as input to A2 ADC
1       Select CAL signal as input to A3 demod path
1       Set maximum attenuation (25.5 dB) in A3 demod programmable-gain stage
1       Route CAL signal to peak detectors input
1       Screen message: "Initialised neg peak gain CAL"
1       #BP 10000

        START ADC REFERENCE READINGS
2       Request A2 ADC reading
2       Screen message "Start –2V reading"

        RECEIVE ADC READINGS
3       ADC READING RETURNED
3       #BP 10060
3       Screen message: "–2V reading X = XXXX"
3       IF more readings to be taken
4               Request ADC reading
4               REPEAT from section 3
3       ELSE all readings have been done
5               Calculate average ADC reading
5               Select negative peak detector
5               Select CAL signal as input to peak detectors
5               Request A2 peak detector reading
5               Screen message: "Start first neg gain reading
```

```
        RECEIVE PEAK DETECTOR READINGS
6       PEAK DETECTOR READING RETURNED
6       #BP 10061
6       Screen message: "−2V reading X = XXXX"
6       IF more readings to be taken
7               Request peak detector reading
7               REPEAT from section 6
6       ELSE all readings have been done
8               Calculate average peak detector reading
8               IF reading in range 1640 - 1740
9                       Screen message "Neg pk gain CAL passed"
9                       #BP 10062
8               ELSE negative peak detector gain CAL failed
10              Screen message "Neg pk gain failed, xxxx"
10              #BP 10063
6       END
```

CAL FAILURE: #BP 10063

## AF input offset DAC calibration procedure

### Select/deselect path

*[cal values], [audio & demod]; [cal config] [AF RANGE]* (1 of 2 parts).

### Purpose

This calibration determines load values for the AF path input offset DAC on A3.

### Description

The AF input attenuator on A3 has two settings, 0.9 dB and 40.9 dB. Each of these settings introduces a DC offset to the AF path. This calibration grounds the input to the attenuator, and, for each setting of the attenuator, performs a successive approximation on the AF path input offset DAC load value to determine the load values which exactly null these DC offsets.

Calibration ON/OFF selection key: *[*AF RANGE]*]*

### Calibration procedure

```
        INITIALISATION
1       Ground AFREF signal
1       Select AF path output as input to RMS-DC converter
1       Ground A2/A3 CAL signal
1       Select AF NO FILTER, 30 V bar chart range
1       Route CAL signal to AF path input, AF input attenuation 40 dB
1       Select ADC input as 10 Hz filter output
1       Screen message "Initialised for af output offset, DAC A"
1       #BP 10000

        SET AF OUTPUT OFFSET DAC
2       SUCCESSIVE APPROXIMATION IN AF OFFSET DAC for ground reading at ADC
2       IF approximation has failed
3               Flag CAL as failed
3               #BP 10078
2       ELSE successive approximation was successful
2       #BP 10070

        FIND INPUT OFFSET DAC SETTING
4       Screen message: "Initialised AF high rnage offset CAL"
4       Range under test = 1 V bar chart
4       #BP 10071
```

*continued.....*

```
        INITIALISE FOR INPUT OFFSET
5       Set bar chart range under test
5       #BP 10072

        SUCCESSIVE APPROXIMATION ON AF INPUT OFFSET DAC
6       Load test value into AF input offset DAC
6       Screen message: "Set af input offset DAC = xxxx"
6       #BP 10073
6       Screen message: "Measure AF input offset for DAC value xxxx"
6a      Request ADC reading
6       READING RETURNED
6       #BP 10074
6       Screen message: "AF input offset xxxx for DAC value = xxxx"
6       #BP 10075
6       IF more readings to be done
7               REPEAT from line marked 6a
6       ELSE all readings done
6       Calculate average offset reading
6       Screen message: "Found input offset = xxxx for DAC value xxxx"
6       Generate new test value for DAC
6       IF more bits to be tested in DAC load value
8               REPEAT section 6
6       ELSE approximation finished
9               IF approximation failed
10              Screen message: "AF input offset CAL failed"
10              #BP 10079
10              END
9               ELSE approximation successful
11              Save DAC setting in RAM
11              Load DAC value to DAC
11              Screen message: "Found (range) input offset DAC value = xxxx"
11              #BP
11              IF on 1 V bar chart range
12                      Set range under test to 10 mV bar chart range
12                      #BP 10076
12                      REPEAT from section 5
11              ELSE
13                      #BP 10077
13                      END
```

## AF output offset DAC calibration

### Select/deselect path

*[cal values], [audio & demod]; [cal config] [AF RANGE]* (2 of 2 parts).

### Purpose

This calibration establishes load values for the A3 AF path output offset DAC.

### Description

This calibration works by grounding the input to the AF path on A3 by use of the A2/A3 CAL path. The load value of the output offset DAC is then adjusted to null out any DC offsets measured by the ADC on A2. Note that the band-pass filters are nulled on one range each only; this is because the filters are AC coupled in the last stage, so any DC offsets present are due to the output of the filters, not any of the gain stages prior to the filter.

The ADC load value is found by a successive approximation for each of the following hardware ranges, in the order given:-

| Filter | AF bar chart range |
|---|---|
| NONE | 30 mV |
| NONE | 100 mV |
| NONE | 300 mV |
| NONE | 3 V |
| NONE | 10 V |
| NONE | 30 V |
| 20 kHz low-pass | 3 mV |
| 20 kHz low-pass | 10 mV |
| 20 kHz low-pass | 30 mV |
| 20 kHz low-pass | 100 mV |
| 20 kHz low-pass | 300 mV |
| 20 kHz low-pass | 1 V |
| 20 kHz low-pass | 10 V |
| 20 kHz low-pass | 30 V |
| 300 Hz low-pass | 10 mV |
| 300 Hz low-pass | 30 mV |
| 300 Hz low-pass | 100 mV |
| 300 Hz low-pass | 300 mV |
| 300 Hz low-pass | 1 V |
| 300 Hz low-pass | 10 V |
| 300 Hz low-pass | 30 V |
| 0.3-3.4 kHz | 10 mV |
| CMESS | 10 mV |
| CCITT | 10 mV |

Calibration ON/OFF selection key: *[*AF RANGE*]*

## Calibration procedure

```
        INITIALISATION
1       Select AF path output as input to RMS-DC converter
1       Ground A1 AFREF signal
1       Select 10 Hz filter output as input to A2 ADC
1       Ground A2/A3 CAL signal
1       Screen message: "AF output offset DAC CAL"
1       #BP 10000

        SET UP FOR OFFSET CAL
2       Select filter for range under test
2       Set bar chart for range under test
2       Screen message: "(filter) (bar chart range)"
2       #BP 10080

        SUCCESSIVE APPROXIMATION ON OUTPUT OFFSET DAC
3       IF CAL failed
4               Flag CAL as failed
4               #BP 10082
4               END
3       ELSE approximation successful
5               Save DAC setting
5               REPEAT from section 2 for next range
```

*continued.....*

```
5               #BP 10083
3       WHEN all ranges done
6               Flag CAL as passed
6               #BP 10081
6               END
```

CAL FAILURE: #BP 10082

## AF 1 V reference calibration procedure

### Select/deselect path

*[cal values], [audio & demod]; [cal config] [AF GAIN]* (1 of 3 parts).

### Purpose

This calibration establishes a 1 V reference reading through the AF path on A2 and A3 to use in other calibrations.

### Description

This calibration uses the 1 V DC reference voltage on A2, routed through the A3 AF path on the 1 V bar chart range gain settings with NO FILTER selected.

The level at the ADC on A2 is then measured to allow accurate calibration of the gain of the AF 1 V bar chart range.

Calibration ON/OFF selection key: [AF GAIN]

### Calibration procedure

```
        INITIALISATION
1       Route A3 demod path to demod path output switch
1       Select AF filter NO FILTER
1       Set AF 1 V bar chart range
1       Select CAL signal as input to AF path, 40 dB input attenuation
1       Select 1 V DC reference as A2/A3 CAL signal
1       Set AF input offset DAC
1       Set AF output offset DAC
1       Screen message: "Starting AF_1V calibration"
1       #BP 10000

        START AF 1 V CAL
2       Request ADC reading
2       Screen message: "Started AF_1VOLT, CAL - +1V, 1V range"

        CALCULATE AF 1 V READING
3       ADC READING RETURNED
3       #BP 10090
3       Screen message: "AF_1VOLT reading x = xxxx"
3       IF more readings to take
4               Request ADC reading
4               REPEAT from section 3
3       ELSE all readings done
5               Calculate AF 1 V reading
5               Screen message: "Found af_1V = xxxx.xxxx"
5               IF af_1V outside limits (1638 +/- 100)
6                       Screen message: "Error! af_1V out of range,
                        using default"
6                       Flag CAL as failed
6                       #BP 10092
5               #BP
5               ELSE
7                       Flag CAL as passed
7                       #BP 10091
5               END
```

## Calibration of AF 20 dB and ÷3 stages

### Select/deselect path

*[cal values], [audio & demod]; [cal config] [AF GAIN]* (2 of 3 parts).

### Purpose

This calibration is used to calculate the gains of the 20 dB amplifier and the ÷3 divider in the AF filter path on A3.

### Description

The output from the AF path is routed to the FFT on A5 via the switch on the demod path output on A3. A1 is used to generate signals at 1 kHz which are measured with the stages in their 0 dB / 20 dB and ÷1/÷3 configurations to calculate their gains. The gains are calculated relative to the 0 dB and ÷1 settings which are normalised by the AF 1 V reference calibration.

Calibration ON/OFF selection key: *[*AF GAIN*]*

### Calibration procedure

```
        INITIALISATION
1       Set FFT for AF calibration (see description)
1       Route A3 AF path output to A2 via A3 demod path output switch
1       Select AF filter NO FILTER
1       Select AF bar chart 1 V range
1       Select CAL signal as AF path input on A3, 40 dB input attenuation
1       Set A1 CAL signal AFREF = 400 mV RMS @ 1kHz
1       Select AFREF as A2/A3 CAL signal
1       Screen message: "Initialised for 0/20 dB CAL"
1       #BP 10000

        REQUEST READING FOR 1 V RANGE
2       Request peak find and marker reading on FFT
2       Screen message: "Made peak find request"

        READ 1 V RANGE LEVEL
3       MARKER LEVEL READING RETURNED
3       #BP 10110
3       Record 1 V range reading
3       Screen message: "1 V range reading = xxxx"
3       Set 10 V AF bar chart range
3       Select CAL signal as AF path input on A3, 40 dB input attenuation
3       #BP 10111

        GET READING FOR 10 V RANGE
4       Request marker reading
4       MARKER LEVEL READING RETURNED
4       #BP 10112
4       Record 10 V range reading
4       Calculate gain of 20 dB amp stage (nominal value 0.1)
4       Screen message: "af_amp_gain [0] = x.xxxx"
4       IF gain error (limits +/- 0.01)
5               Flag CAL as failed
5               "Error! af_amp_gain [0] out of range, using default"
5               #BP 10113
5               END
4       ELSE 20 dB amp gain in range
4       Select AF 3 V bar chart range
4       #BP 10114
```

*continued....*

MEASURE ÷1/÷3 STAGE GAIN
6 Request marker reading
6 MARKER LEVEL READING RETURNED
6 #BP 10115
6 Calculate divider gain (nominal value 0.3333)
6 Screen message: "af_div_gain [0] = x.xxxx"
6 IF gain in range (limits +/- 10%)
7 Flag CAL as passed
7 #BP 10116
6 ELSE divider gain CAL failed
8 Flag CAL as failed
8 Screen message: "Error! af_div_gain [0] out of range, using_default"
8 #BP 10117
6 Route A3 demod path to A3 demod output
6 END

CAL FAILURE: #BP 10113, 10117

## AF input attenuator calibration

### Select/deselect path

*[cal values], [audio & demod]; [cal config] [AF GAIN]* (3 of 3 parts).

### Purpose

This calibration is used to calculate the gain of the 40 dB attenuator at the input to the AF filter path on A3.

### Description

The output from the AF path is routed to the FFT on A5 via the switch on the demod path output on A3. A1 is used to generate signals at 1 kHz which are measured with the attenuator in its 0 dB/ 40 dB configurations to calculate the gain of the 40 dB relative to the 0 dB setting, which is normalised by the AF 1 V reference calibration.

Calibration ON/OFF selection key: *[*AF GAIN*]*

### Calibration procedure

INITIALISATION
1 Set FFT for AF CAL
1 Route A3 AF path output to A2 via A3 demod path output switch
1 Select AF filter NO FILTER
1 Select AF bar chart 300 mV range
1 Select CAL signal as AF path input on A3, 40 dB input attenuation
1 Set A1 CAL signal AFREF = 120 mV RMS @ 1kHz
1 Select AFREF as A2/A3 CAL signal
1 Screen message: "Initialised for input attenuator CAL"
1 #BP 10000

GET 300 mV RANGE READING
2 Request peak find and marker reading on FFT
2 Screen message: "Made peak find request"
2 MARKER LEVEL READING RETURNED
2 #BP 10100
2 Screen message: "300 mV range reading = xxxx"
2 Set AF bar chart 30 V range
2 Select CAL signal as AF path input on A3, 0 dB input attenuation
2 #BP 10101

GET 30 V RANGE READING
3 Request marker reading
3 MARKER LEVEL READING RETURNED

3 #BP 10102
3 Calculate AF input attenuator gain (nominal value = 100)
3 Screen message: "af_ip_att_gain [0] = xxx.xxx"
3 IF attenuator gain in error (error limit 10%)
4 Flag CAL as failed
4 #BP 10104
4 Screen message: "Error! af_ip_att_gain [0] out of range, using default"
3 ELSE
5 Flag CAL as passed
5 #BP 10103
3 Route A3 demod path to A3 demod output
3 END

CAL FAILURE: #BP 10104

## AF filter gain calibration

### Select/deselect path

*[cal values], [audio & demod]; [cal config] [AF FILTERS]*

### Purpose

This calibration is used to calculate the gains of the various filters which can be selected in the AF filter path on A3.

### Description

The output from the AF path is routed to the FFT on A5 via the switch on the demod path output on A3. A1 is used to generate signals at various frequencies (unity gain points, see table below) which are measured with the FFT. The gains are calculated relative to readings found during this calibration for the AF filter NO FILTER selected. The NO FILTER gain is normalised by the AF 1 V reference calibration.

| Index | Filter | Test frequency | FFT Ref Frequency | FFT Span / Div |
|---|---|---|---|---|
| 0 | 20 kHz LP | 6 kHz | 5 kHz | 1 kHz |
| 1 | 300 Hz LP | 100 Hz | 500 Hz | 100 Hz |
| 2 | BAND-PASS | 1 kHz | 1.250 kHz | 250 Hz |
| 3 | CCITT | 800 Hz | 1.250 kHz | 250 Hz |
| 4 | CMESS | 1 kHz | 1.250 kHz | 250 Hz |

Calibration ON/OFF selection key: *[*AF FILTERS*]*

### Calibration procedure

INITIALISATION
1 Set FFT for AF CAL
1 Route AFREF to A2/A3 CAL signal
1 Route AF path output to FFT via A3 demod output switch
1 Set filter under test = 20 kHz low-pass
1 #BP 10000

INITIALISE FILTER FOR CAL
2 Select AF filter NO FILTER
2 Set AF 1 V bar chart range
2 Set FFT span and ref freq for filter under test
2 Set AFREF signal level to 400 mV RMS
2 Set AFREF signal frequency for filter under test
2 Screen message: "Initialised for AF filters CAL"
2 #BP 11000 + FILTER INDEX (see description, above)

*continued....*

GET NO FILTER LEVEL
3 Request FFT marker peak find and marker level
3 Screen message: "Made peak find request"
3 READING RETURNED
3 #BP 11010 + FILTER INDEX
3 Screen message: "No filter: reading = xxxx"
3 Select filter under test as AF filter
3 #BP 11020 + FILTER INDEX

GET FILTER UNDER TEST LEVEL
4 Request marker reading
4 MARKER READING RETURNED
4 #BP 11030 + FILTER INDEX
4 Calculate filter gain
4 Screen message: "<filter>, gain = x.xxxx"
4 IF more filters to calibrate
5 #BP 11040 + FILTER INDEX
5 REPEAT from section 2 for next filter

ALL FILTERS DONE
6 Select A3 demod path as A3 demod path output
6 Switch OFF FFT
6 #BP 11009
6 END

## Demod filter calibration

### Select/deselect path

*[cal values], [audio & demod]; [cal config] [DEMOD FILTERS]* (1 of 8 parts).

### Purpose

The purpose of this calibration is to find, for each demod audio filter, the output offset DAC setting values for each demod range, and the gain of that filter.

### Description

This calibration works by finding, for each demod audio filter in turn, the output offset DAC settings and the filter gain. The filters calibrated are numbered as follows:-

| Filter Nbr | Filter |
|---|---|
| 0 | NO FILTER |
| 1 | 20 kHz low-pass |
| 2 | 5 kHz low-pass |
| 3 | 300 Hz low-pass |
| 4 | 0.3-3.4 kHz |
| 5 | CMESS |
| 6 | CCITT |

The offsets are found for each of the following demod range settings on A3, for NO FILTER and the low-pass filters. (Band-pass filters are only calibrated for the FM 1 kHz range since the output offset DAC settings are independent of range on the band-pass filters.)

| Range Nbr | DEMOD RANGE |
|---|---|
| 00 | FM 1 kHz |
| 01 | FM 3 kHz |
| 02 | FM 10 kHz |
| 03 | FM 30 kHz |
| 04 | FM 100 kHz |
| 05 | FM 300 kHz |
| 06 | AM 10% |
| 07 | AM 30% |
| 08 | AM 100% |
| 09 | PM 1 RAD |
| 10 | PM 3 RAD |
| 11 | PM 10 RAD |
| 12 | PM 30 RAD |

Calibration ON/OFF selection key: *[*DEMOD FILTERS*]*

## Calibration procedure

1 Clear up display area
1 IF filter under test = NO FILTER
2 Select DC input to A2 ADC (RMS-DC converter bypassed)
2 Set demod path op offset DAC for NO FILTER, 1 kHz FM demod range
1 ELSE for all other filters
3 Select DC filter output as input to ADC on A2
1 Select demod path output as input to DC filter and RMS-DC converter on A2
1 Select demod path output as input to A2 peak detector
1 Route A2/A3 CAL signal to A3 demod path input
1 Ground A2/A3 CAL signal
1 Ground AFREF
1 #BP 10000

CALIBRATE DEMOD OUTPUT OFFSET DAC SETTING
4 FIND FILTER OUTPUT OFFSET DAC SETTING
4 IF output offset approximation has failed
5 Flag CAL as failed
5 #BP 13XYY (where X is filter number, YY is range number, see above)
5 END
4 IF more demod ranges to find offset setting for
6 #BP 12XYY (where X is filter number, YY is range number, see above)
6 REPEAT from start of section 4 for next demod range
4 ELSE all output offsets done for filter under test
7 #BP 12X99 (where X is filter number, see above)

CALIBRATE FILTER GAIN
8 FIND FILTER GAIN
8 IF gain measurement has failed
9 #BP 15X00 (where X is filter number, see above)
9 END
8 ELSE gain measurement successful
10 #BP 14X00 (where X is filter number, see above)
8 IF more filters to calibrate
11 REPEAT from section 4 for next filter
8 ELSE all filters calibrated
12 Screen message: "Demod filter CAL finished"
12 #BP 16000
12 END

CAL FAILURE: #BP 13XYY, #BP 15X00

where X is the filter number shown above and YY is the range number shown above

## Demod no filter audio filter gain calibration

### Select/deselect path

*[cal values], [audio & demod]; [cal config] [DEMOD FILTERS]* (2 of 8 parts).

### Purpose

The purpose of this calibration is to determine a gain correction value which can be used to correct demod measurements made with no demod audio filter selected.

### Description

This calibration works by measuring, with the ADC on A2, the output from A3 when the A2/A3 + 1 V reference is routed through A3 with no demod audio filter selected. Comparison of the measurement with the expected reading yields the gain figure for the demod NO FILTER path.

Calibration ON/OFF selection key: *[*DEMOD FILTERS*]*

### Calibration procedure

```
        INITIALISATION
1       Select A2/A3 CAL signal as input to A3 demod path
1       Set demod path ÷1/÷3 divider stage to ÷1
1       Set demod path programmable gain/loss stage to 0 dB
1       Route +1 V reference to A2/A3 CAL signal
1       #BP 10000

        START NO FILTER GAIN MEASUREMENTS
2       Request ADC reading from A2
2       ADC READING RETURNED
2       #BP 16001
2       Screen message: "No filter gain reading x = xxxx"
2       IF more readings to take
3               REPEAT from start of section 2
2       ELSE all readings done
4               Calculate gain for demod NO FILTER
4               Screen message: "Found no filter gain = xx.xxxxx"
4               IF gain > 2.2  OR  gain < 1.8
5                       Screen message: "No filt gain over range, using
                        default"
5                       Flag CAL as failed
5                       #BP 15000
4               ELSE gain value OK
6                       Print gain value in table on screen
6                       Screen message: "x.xx"
6                       #BP 16002
2       END
```

CAL FAILURE: #BP 15000

## Demod 20 kHz low-pass audio filter gain calibration

### Select/deselect path

*[cal values], [audio & demod]; [cal config] [DEMOD FILTERS]* (3 of 8 parts).

### Purpose

The purpose of this calibration is to determine a gain correction value which can be used to correct demod measurements made with the 20 kHz low-pass audio filter selected.

## Description

This calibration works by measuring a 1 V RMS, 1 kHz signal routed through the demod 20 kHz low-pass filter, to the FFT, and measuring the same signal routed through the demod path with NO FILTER selected. Given that the gain of the NO FILTER setting is known from the calibration "DEMOD NO FILTER AUDIO FILTER GAIN", the gain of the 20 kHz low-pass filter can be calculated.

Calibration ON/OFF selection key: *[*DEMOD FILTERS*]*

## Calibration procedure

| | |
|---|---|
| | INITIALISATION |
| 1 | Select A2/A3 CAL signal as input to A3 demod path |
| 1 | Route A1 AF output to A2/A3 CAL signal via AFREF line |
| 1 | Select filtered output from RMS-DC converter as ADC input |
| 1 | Set AF generator frequency to 1 kHz |
| 1 | Set AF generator level to 1 V |
| 1 | Set demod path ÷1/÷3 divider stage to ÷1 |
| 1 | Set demod path programmable gain/loss for 20 kHz LP filter, 10 kHz range |
| 1 | Route demod path output to scope/FFT output on A2 |
| 1 | Route demod path output to speaker |
| 1 | Set FFT span 250 Hz/div |
| 1 | Set FFT vertical scale to 10 dB/div |
| 1 | Set demod scope gain −10.45 dB |
| 1 | Switch on FFT |
| 1 | Set FFT reference frequency = 1.05 kHz |
| 1 | Screen message: "Initialised for 20 kHz low pass gain" |
| 1 | #BP 10000 |
| | START 1 kHz READING |
| 2 | Switch on marker 1 on FFT |
| 2 | Request marker peak find |
| 2 | Screen message: "Reading 20 kHz low pass @ 1kHz, 1V RMS" |
| 2 | FFT PEAK LEVEL READING RETURNED |
| 2 | #BP 16100 |
| 2 | Screen message: "lp20k_1k = xxxx" |
| 2 | Set demod audio filter to NO FILTER |
| 2 | Set demod path programmable gain/loss for NO FILTER, 10 kHz range |
| 2 | #BP16101 |
| | START 1 kHz NO FILTER reading |
| 3 | Request marker level reading |
| 3 | Screen message: "Reading no filter @ 1kHz, 1V RMS" |
| 3 | MARKER LEVEL READING RETURNED |
| 3 | #BP 16102 |
| 3 | Screen message: "no_filt_1k = xxxx" |
| 3 | #BP 16103 |
| | REPEAT 1 kHz NO FILTER reading |
| 4 | Request marker level reading |
| 4 | Screen message: "Reading no filter @ 1.0kHz, 1V RMS" |
| 4 | MARKER LEVEL READING RETURNED |
| 4 | #BP 16104 |
| 4 | Screen message: "no_filt_10k = xxxx" |
| 4 | Set demod 20 kHz low-pass filter |
| 4 | Set demod path programmable gain/loss for 20 kHz LP filter, 10 kHz range |
| 4 | #BP 16105 |

*continued.....*

```
        REPEAT 20 kHz FILTER 1 kHz reading
5       Request marker level reading
5       Screen message: "Reading 20kHz low pass @ 1.0kHz, 1V RMS"
5       MARKER LEVEL READING RETURNED
5       #BP 16106
5       Screen message: "lp20k_10k = xxxx"
5       Calculate filter gain
5       Screen message: "x.xx"
5       Print gain value into table on screen
5       Switch off FFT
5       IF gain > 2.2  OR gain < 1.8
6               Flag CAL as failed
6               Screen message: "20 kHz gain over range, using default"
6               #BP 15100
5       ELSE filter gain OK
7               #BP 16107
5       END
```

CAL FAILURE: #BP 15100

## Demod 5 kHz low-pass audio filter gain calibration

### Select/deselect path

*[cal values], [audio & demod]; [cal config] [DEMOD FILTERS]* (4 of 8 parts).

### Purpose

The purpose of this calibration is to determine a gain correction value which can be used to correct demod measurements made with the 5 kHz low-pass demod audio filter selected.

### Description

This calibration works by measuring a 1 V RMS, 1 kHz signal routed through the demod 5 kHz low-pass filter, to the FFT, and measuring the same signal routed through the demod path with NO FILTER selected. Given that the gain of the NO FILTER setting is known from the calibration "DEMOD NO FILTER AUDIO FILTER GAIN", the gain of the 5 kHz low-pass filter can be calculated.

Calibration ON/OFF selection key: *[*DEMOD FILTERS*]*

### Calibration procedure

```
        INITIALISATION
1       Select A2/A3 CAL signal as input to A3 demod path
1       Route A1 AF output to A2/A3 CAL signal via AFREF line
1       Select filtered output from RMS-DC converter as ADC input
1       Set AF generator frequency to 1 kHz
1       Set AF generator level to 1 V
1       Set demod path ÷1/÷3 divider stage to ÷1
1       Set demod path programmable gain/loss for 5 kHz LP filter, 10 kHz range
1       Route demod path output to scope/FFT output on A2
1       Route demod path output to speaker
1       Set FFT span 250 Hz/div
1       Set FFT vertical scale to 10 dB/div
1       Set demod scope gain –10.45 dB
1       Switch on FFT
1       Set FFT reference frequency = 1.05 kHz
1       Screen message: "Initialised for 5 kHz low pass gain"
1       #BP 10000
```

```
        START 1 kHz READING
2       Switch on marker 1 on FFT
2       Request marker peak find
2       Screen message: "Reading 5 kHz low pass @ 1kHz, 1V RMS"
2       FFT PEAK LEVEL READING RETURNED
2       #BP 16200
2       Screen message: "lp5k_1k = xxxx"
2       Set demod audio filter to NO FILTER
2       Set demod path programmable gain/loss for NO FILTER, 10 kHz range
2       #BP 16201

        START 1 kHz NO FILTER READING
3       Request marker level reading
3       Screen message: "Reading no filter @ 1kHz, 1V RMS"
3       MARKER LEVEL READING RETURNED
3       #BP 16202
3       Screen message: "no_filt_1k = xxxx"
3       #BP 16203

        REPEAT 1 kHz NO FILTER reading
4       Request marker level reading
4       Screen message: "Reading no filter @ 1.0kHz, 1V RMS"
4       MARKER LEVEL READING RETURNED
4       #BP 16204
4       Screen message: "no_filt_10k = xxxx"
4       Set demod 5 kHz low-pass filter
4       Set demod path programmable gain/loss for 5 kHz LP filter, 10 kHz range
4       #BP 16205

        REPEAT 5 kHz FILTER 1 kHz reading

5       Request marker level reading
5       Screen message: "Reading 5kHz low pass @ 1.0kHz, 1V RMS"
5       MARKER LEVEL READING RETURNED
5       #BP 16206
5       Screen message: "lp5k_10k = xxxx"
5       Calculate filter gain
5       Screen message: "x.xx"
5       Print gain value into table on screen
5       Switch off FFT
5       IF gain > 2.2  OR gain < 1.8
6               Flag CAL as failed
6               Screen message: "5 kHz gain over range, using default"
6               #BP 15200
5       ELSE filter gain OK
7               #BP 16207
5       END

CAL FAILURE: #BP 15200
```

## Demod 300 Hz low-pass audio filter gain calibration

### Select/deselect path

*[cal values], [audio & demod]; [cal config] [DEMOD FILTERS]* (5 of 8 parts).

### Purpose

The purpose of this calibration is to determine a gain correction value which can be used to correct demod measurements made with the 300 Hz low-pass demod audio filter selected.

## Description

This calibration works by measuring a 1 V RMS, 100 Hz signal routed through the demod 300 Hz low-pass filter, to the FFT, and measuring the same signal routed through the demod path with NO FILTER selected. Given that the gain of the NO FILTER setting is known from the calibration "DEMOD NO FILTER AUDIO FILTER GAIN", the gain of the 300 Hz low-pass filter can be calculated.

Calibration ON/OFF selection key: *[*DEMOD FILTERS*]*

## Calibration procedure

| | |
|---|---|
| | INITIALISATION |
| 1 | Select A2/A3 CAL signal as input to A3 demod path |
| 1 | Route A1 AF output to A2/A3 CAL signal via AFREF line |
| 1 | Select filtered output from RMS-DC converter as ADC input |
| 1 | Set AF generator frequency to 100 Hz |
| 1 | Set AF generator level to 1 V |
| 1 | Set demod path ÷1/÷3 divider stage to ÷1 |
| 1 | Set demod path programmable gain/loss for 300 Hz LP filter, 10 kHz range |
| 1 | Route demod path output to scope/FFT output on A2 |
| 1 | Route demod path output to speaker |
| 1 | Set FFT span 50 Hz/div |
| 1 | Set FFT vertical scale to 10 dB/div |
| 1 | Set demod scope gain −10.45 dB |
| 1 | Switch on FFT |
| 1 | Set FFT reference frequency = 300 Hz |
| 1 | Screen message: "Initialised 300 Hz low pass gain CAL" |
| 1 | #BP 10000 |
| | START 1 V READING |
| 2 | Switch on marker 1 on FFT |
| 2 | Request marker peak find |
| 2 | Screen message: "Requested 300 Hz / 1V reading" |
| 2 | FFT PEAK LEVEL READING RETURNED |
| 2 | #BP 16300 |
| 2 | Screen message: "lp300 = xxxx" |
| 2 | Set demod audio filter to NO FILTER |
| 2 | Set demod path programmable gain/loss for NO FILTER, 10 kHz range |
| 2 | #BP 16301 |
| | START 1 V NO FILTER READING |
| 3 | Request marker level reading |
| 3 | Screen message: "Requested no filter / 1V reading" |
| 3 | MARKER LEVEL READING RETURNED |
| 3 | #BP 16302 |
| 3 | Calculate filter gain |
| 3 | Screen message: "300 Hz filter gain = x.xxxxxx" |
| 3 | Print gain value into table on screen |
| 3 | Switch off FFT |
| 3 | IF gain > 2.2 OR gain < 1.8 |
| 4 | Flag CAL as failed |
| 4 | Screen message: "300 Hz gain over range, using default" |
| 4 | #BP 15300 |
| 3 | ELSE filter gain OK |
| 5 | #BP 16303 |
| 3 | END |

CAL FAILURE: #BP 15300

## Demod 0.3-3.4 kHz band-pass audio filter gain calibration

### Select/deselect path

*[cal values], [audio & demod]; [cal config] [DEMOD FILTERS]* (6 of 8 parts).

### Purpose

The purpose of this calibration is to determine a gain correction value which can be used to correct demod measurements made with the 0.3-3.4 kHz demod audio filter selected.

### Description

This calibration works by measuring a 1 V RMS, 1 kHz signal routed through the demod 0.3-3.4 kHz filter, to the FFT, and measuring the same signal routed through the demod path with NO FILTER selected. Given that the gain of the NO FILTER setting is known from the calibration "DEMOD NO FILTER AUDIO FILTER GAIN", the gain of the 0.3-3.4 kHz filter can be calculated.

Calibration ON/OFF selection key: *[*DEMOD FILTERS*]*

### Calibration procedure

| | |
|---|---|
| | INITIALISATION |
| 1 | Select A2/A3 CAL signal as input to A3 demod path |
| 1 | Route A1 AF output to A2/A3 CAL signal via AFREF line |
| 1 | Select filtered output from RMS-DC converter as ADC input |
| 1 | Set AF generator frequency to 1 kHz |
| 1 | Set AF generator level to 1 V |
| 1 | Set demod path ÷1/÷3 divider stage to ÷1 |
| 1 | Set demod path programmable gain/loss for 0.3-3.4 kHz filter, 10 kHz range |
| 1 | Route demod path output to scope/FFT output on A2 |
| 1 | Route demod path output to speaker |
| 1 | Set FFT span 250 Hz/div |
| 1 | Set FFT vertical scale to 10 dB/div |
| 1 | Set demod scope gain –10.45 dB |
| 1 | Switch on FFT |
| 1 | Set FFT reference frequency = 1.05 kHz |
| 1 | Screen message: "Initialised for band-pass gain" |
| 1 | #BP 10000 |
| | START 1 kHz READING |
| 2 | Switch on marker 1 on FFT |
| 2 | Request marker peak find |
| 2 | Screen message: "Reading band pass @ 1kHz, 1V RMS" |
| 2 | FFT PEAK LEVEL READING RETURNED |
| 2 | #BP 16400 |
| 2 | Screen message: "1V @ 1 kHz, bp = xxxx" |
| 2 | Set demod audio filter to NO FILTER |
| 2 | Set demod path programmable gain/loss for NO FILTER, 10 kHz range |
| 2 | #BP 16401 |

*continued.....*

START 1 V NO FILTER READING
3 Request marker level reading
3 Screen message: "Reading no filter @ 1kHz, 1V RMS"
3 MARKER LEVEL READING RETURNED
3 #BP 16402
3 Calculate filter gain
3 Screen message: "x.xx"
3 Print gain value into table on screen
3 Switch off FFT
3 IF gain > 2.2 OR gain < 1.8
4 Flag CAL as failed
4 Screen message: "BP gain over range, using default"
4 #BP 15400
3 ELSE filter gain OK
5 #BP 16403
3 END

CAL FAILURE: #BP 15400

## Demod CCITT audio filter gain calibration

### Select/deselect path

*[cal values], [audio & demod]; [cal config] [DEMOD FILTERS]* (7 of 8 parts).

### Purpose

The purpose of this calibration is to determine a gain correction value which can be used to correct demod measurements made with the CCITT demod audio filter selected.

### Description

This calibration works by measuring a 1 V RMS, 800 Hz signal routed through the demod CCITT filter, to the FFT, and measuring the same signal routed through the demod path with NO FILTER selected. Given that the gain of the NO FILTER setting is known from the calibration "DEMOD NO FILTER AUDIO FILTER GAIN", the gain of the CCITT filter can be calculated.

Calibration ON/OFF selection key: *[*DEMOD FILTERS*]*

### Calibration procedure

INITIALISATION
1 Select A2/A3 CAL signal as input to A3 demod path
1 Route A1 AF output to A2/A3 CAL signal via AFREF line
1 Select filtered output from RMS-DC converter as ADC input
1 Set AF generator frequency to 800 Hz
1 Set AF generator level to 1 V
1 Set demod path ÷1/÷3 divider stage to ÷1
1 Set demod path programmable gain/loss for CCITT filter, 10 kHz range
1 Route demod path output to scope/FFT output on A2
1 Route demod path output to speaker
1 Set FFT span 250 Hz/div
1 Set FFT vertical scale to 10 dB/div
1 Set demod scope gain –10.45 dB
1 Switch on FFT
1 Set FFT reference frequency = 850 Hz
1 Screen message: "Initialised for CCITT band pass gain"
1 #BP 10000

START 1 kHz READING
2 Switch on marker 1 on FFT
2 Request marker peak find
2 Screen message: "Reading CCITT @ 800 Hz, 1V RMS"
2 FFT PEAK LEVEL READING RETURNED

2 #BP 16600
2 Screen message: "1V @ 800 Hz, bp = xxxx"
2 Set demod audio filter to NO FILTER
2 Set demod path programmable gain/loss for NO FILTER, 10 kHz range
2 #BP 16601

START 1 V NO FILTER READING
3 Request marker level reading
3 Screen message: "Reading no filter @ 800 Hz, 1V RMS"
3 MARKER LEVEL READING RETURNED
3 #BP 16602
3 Calculate filter gain
3 Screen message: "x.xx"
3 Print gain value into table on screen
3 Switch off FFT
3 IF gain > 2.2 OR gain < 1.8
4 Flag CAL as failed
4 Screen message: "CCITT gain over range, using default"
4 #BP 15600
3 ELSE filter gain OK
5 #BP 16603
3 END

CAL FAILURE: #BP 15600

## Demod CMESS audio filter gain calibration

### Select/deselect path

*[cal values], [audio & demod]; [cal config] [DEMOD FILTERS]* (8 of 8 parts).

### Purpose

The purpose of this calibration is to determine a gain correction value which can be used to correct demod measurements made with the CMESS demod audio filter selected.

### Description

This calibration works by measuring a 1 V RMS, 1 kHz signal routed through the demod CMESS filter, to the FFT, and measuring the same signal routed through the demod path with NO FILTER selected. Given that the gain of the NO FILTER setting is known from the calibration "DEMOD NO FILTER AUDIO FILTER GAIN", the gain of the CMESS filter can be calculated.

Calibration ON/OFF selection key: *[*DEMOD FILTERS*]*

### Calibration procedure

INITIALISATION
1 Select A2/A3 CAL signal as input to A3 demod path
1 Route A1 AF output to A2/A3 CAL signal via AFREF line
1 Select filtered output from RMS-DC converter as ADC input
1 Set AF generator frequency to 1 kHz
1 Set AF generator level to 1 V
1 Set demod path ÷1/÷3 divider stage to ÷1
1 Set demod path programmable gain/loss for CMESS filter, 10 kHz range
1 Route demod path output to scope/FFT output on A2
1 Route demod path output to speaker
1 Set FFT span 250 Hz/div
1 Set FFT vertical scale to 10 dB/div
1 Set demod scope gain –10.45 dB
1 Switch on FFT
1 Set FFT reference frequency = 1.05 kHz
1 Screen message: "Initialised for CMESS band pass gain"
1 #BP 10000

*continued.....*

```
        START 1 kHz READING
2       Switch on marker 1 on FFT
2       Request marker peak find
2       Screen message: "Reading CMESS @ 1kHz, 1V RMS"
2       FFT PEAK LEVEL READING RETURNED
2       #BP 16500
2       Screen message: "1V @ 1 kHz, bp = xxxx"
2       Set demod audio filter to NO FILTER
2       Set demod path programmable gain/loss for NO FILTER, 10 kHz range
2       #BP 16501
        START 1 V NO FILTER READING
3       Request marker level reading
3       Screen message: "Reading no filter @ 1kHz, 1V RMS"
3       MARKER LEVEL READING RETURNED
3       #BP 16502
3       Calculate filter gain
3       Screen message: "x.xx"
3       Print gain value into table on screen
3       Switch off FFT
3       IF gain > 2.2  OR gain < 1.8
4               Flag CAL as failed
4               Screen message: "CMESS gain over range, using default"
4               #BP 15500
3       ELSE filter gain OK
5               #BP 16503
3       END
```

CAL FAILURE: #BP 15500

## Demod noise calibration

### Select/deselect path

*[cal values], [audio & demod]; [cal config] [demod noise]*

### Purpose

The purpose of this calibration is to calculate the residual noise content for measurements of FM deviation in all filter and demod range configurations, so that the residual noise can be eliminated from each reading to improve the accuracy of the FM demod measurement.

### Description

This calibration works by setting up a deviation on the signal generator for each hardware range and demod filter. These deviations are set up at the unity gain frequency of each of the filters. The relatively noise-free 300 Hz low-pass filter readings are taken to be absolute, since the 1-bit ADC FM generation is accurate at 100 Hz (test frequency for the 300 Hz filter). When all measurements are done, the residual noise for each filter/range combination measurement is reckoned to be the difference between the reading for that filter and range, and the reading for the same range on the 300 Hz filter.

The following tables show the test frequencies for each filter and the FM deviation settings used for each range, along with the maximum correction allowable for those ranges.

| Filter Index | Filter | Test frequency (kHz) |
|---|---|---|
| 1 | LOW-PASS 20 kHz | 1.0 |
| 2 | LOW-PASS 5 kHz | 1.0 |
| 3 | LOW-PASS 300 Hz | 0.1 |
| 4 | BAND-PASS | 1.0 |
| 5 | CMESS | 1.0 |
| 6 | CCITT | 0.8 |

| Barchart | | Test level (kHz) | Max correction (kHz) |
|---|---|---|---|
| **Index** | **Range** | | |
| 0 | 3 kHz | 2.7 | 0.5 |
| 1 | 10 kHz | 9.0 | 1.5 |
| 2 | 30 kHz | 27.0 | 5.0 |
| 3 | 100 kHz | 90.0 | 15.0 |

Calibration ON/OFF selection key: *[*demod noise*]*

## Calibration procedure

INITIALISATION
1 Set all noise corrections to 0
1 Test filter = 20 kHz low-pass
1 Select single-port duplex mode on N-type connector
1 Set RF gen freq and receiver freq to 150 MHz
1 Switch RF generator on
1 Set RF generator level −27 dBm at N-type connector
1 Select 280 kHz IF filter
1 Set 30 dB in RF input attenuator
1 Screen message: "Initialising FM noise CAL"
1 #BP 10000

SELECT FILTER UNDER TEST
2 Select A3 demod filter under test
2 Set mod frequency to frequency for filter under test
2 Screen message: "Setting <filter name> filter"
2 #BP 102X0 (where X is filter index for filter under test, see above)

SET NOISE MEASUREMENT RANGE
3 Set FM deviation for range under test
3 Set demod measurement range under test
3 Screen message: "Setting demod range <range name>"
3 #BP 103XY (where X is filter index, Y is range index, see above)

INITIALISE NOISE MEASUREMENT
4 Request demod measurement
4 Screen message: "First reading <filter name> <range name>..."

RECEIVE FM READING
5 READING RETURNED
5 #BP 104XY (where X is filter index, Y is range index, see above)
5 Screen message: "Reading x = xxxx Hz"
5 IF more readings to take
6 Request demod measurement
6 REPEAT from start of section 5
5 ELSE all readings done for current range under test
7 IF more ranges to test for current filter
8 Set range under test = next range
8 #BP 105XY where X is filter index, Y is range index, see above)
8 REPEAT from section 3
7 ELSE all ranges done for filter under test
9 IF more filters to test
10 Set filter under test = next filter
10 REPEAT from section 2
9 ELSE all filters done
11 Calculate residual noise values for each range vs filter
11 #BP 10600
11 END

# Signal generator calibrations

## A1 RF DAC linearity (1dB steps) calibration

### Select/deselect path

*[cal values], [signal gen]; [cal config] [1dB Steps]*

### Purpose

The purpose of this calibration is to provide a look-up table of DAC values representing 1dB steps over a 40 dB operating range for the A1 RF DAC. The DAC is 16-bits wide.

### Description

This calibration works by measuring the signal generator output level on the log amp.

The DAC settings giving the top 10 dB of RF level (+7 dBm to -2 dBm out of AF5 in 1 dB steps) are accurately known and are each set in turn and the level at the log amp stored. 10 dB of attenuation is then switched out of the receiver path and a successive approximation begins on the DAC setting required to give log amp readings the same as measured above, thus providing DAC values for -3 dBm to -12 dBm. This is repeated for -13 dBm to -22 dBm and for -23 dBm to -32 dBm, switching 10 dB of attenuation out each time.

Note that switching out 10 dB attenuation means that for (say) the -3 dBm, -13 dBm and -23 dBm cal points we are looking for exactly the same level at the log amp as we got when setting +7 dBm. This also means that the log amp linearity (or lack of it) is not a problem. The cal fails if it finds a DAC value of 0 at any cal point.

Calibration ON/OFF selection key : [1dB steps]

### Calibration procedure

| | |
|---|---|
| | INITIALISATION |
| 1 | Switch off all mod sources |
| 1 | Select single-port duplex mode on N-type |
| 1 | Set sig gen & receiver to 10 MHz |
| 1 | Set 10 dB in sig gen attenuators |
| 1 | Set 40 dB in receiver attenuators |
| 1 | Select 30kHz IF bandwidth |
| 1 | Screen message: "Initialised rf 1dB steps cal" |
| 1 | #BP 10000 |
| | GET LOG AMP REFERENCE READINGS |
| 2 | Set A1 DCREF line HIGH |
| 2 | Set A1 RFDAC setting |
| 2 | Screen message: "Setting ref <dac setting> : <cal point>" |
| 2 | #BP 35000 + cal point |
| | READ LOG AMP REF READING |
| 3 | Screen message: "Requested ADC reading" |
| 3 | #BP 35100 + cal point |
| | RECEIVE LOG AMP REF READING |
| 4 | Save ref reading |
| 4 | Screen message: "Target for point <cal point> is <log amp level>" |
| 4 | #BP 35200 + cal point |
| 4 | Increment cal point |
| 4 | IF got 10 dB of reference readings |
| 5 | Goto SECTION 7 |
| 4 | ELSE |
| 6 | Goto SECTION 2 |

```
                    FIND DAC SETTING FOR CAL POINT
7       Set receiver attenuation for cal point
7       Set OR pattern, LOAD VALUE to 0x8000
7       Set DAC value to LOAD VALUE
7       Screen message: "Setting 0x8000, cal point <cal point>"
7       #BP 36000 + cal point

        GET LOG AMP READING
8       Screen message: "Requested ADC reading"
8       #BP 36100 + cal point

        RECEIVE LOG AMP READING
9       Compare reading with target reference reading
9       Form new LOAD VALUE
9       Shift OR PATTERN (div by 2)
9       IF OR PATTERN is non-zero
10              Set new LOAD VALUE
10              Screen message: "Loading <load value>, OR pattern <or pattern>,
                                                    cal point <cal point>"
10              #BP 36200 + cal point

9       ELSE
11              DAC VALUE FOUND
11              IF dac value is zero

12                      Screen message: "ERROR : found 0x0000 DAC value @ cal point <cal
                        point>"
12                      #BP 36599
12                      END
11              ELSE
13                      Screen message: "Found DAC value = <dac value> for cal point <cal
                        point"
13                      #BP 36500 + cal point
```

## AF5 output level frequency response calibration

### Select/deselect path

*[cal values], [signal gen]; [cal config] [50 MHz Steps]*

### Purpose

The purpose of this calibration is to measure the frequency response of the signal generator RF levelling board, AF5.

### Description

This calibration works by measuring the signal generator output level with the broad-band power meter.

Calibration points for the frequency response are 10 MHz, 50 MHz, 100 MHz, and so on, to 1150 MHz in 50 MHz steps. The output level of AF5 is set nominally to +7 dBm.

The limit on the errors measured during the calibration is ±4.0 dBm for any point. Any error measured that exceeds this limit will cause the calibration to abort and flag a failure.

Calibration ON/OFF selection key: *[50MHz Steps]*

### Calibration procedure

```
        INITIALISATION
1       Switch off all mod sources
1       Select single-port duplex mode on N-type connector
1       Set 0 dB in output attenuators
1       Set AF5 output level +7 dBm
1       Screen message: "Initialised rf level freq response CAL"
1       #BP 10000

        START FREQUENCY RESPONSE MEASUREMENT
2       Set RF generator to test frequency
2       Set receiver frequency to test frequency
2       Set AF5 output level +7 dBm
2       Screen message: "Setting xxx MHz"
2       #BP 20000 + (CAL frequency in MHz)

        START POWER MEASUREMENT
3       Request broad-band power measurement
3       Screen message: "Requested power reading X"

        RECEIVE POWER MEASUREMENT
4       POWER METER READING RETURNED
4       Screen message: "Power reading = xxxx (dBm x 100)"
4       #BP 20001 + (CAL frequency in MHz)
4       IF more readings to be taken
5               REPEAT from section 3
4       ELSE all readings done
6               Calculate average power reading & loss
6               IF error <2 dB
7                       Screen message: "Loss @ xxx MHz = xxxx dB (x100)"
7                       #BP  20002 + (CAL frequency in MHz)
7                       IF all frequency points done
8                       Screen message: "Passed AF5 freq response CAL"
8                       #BP 20003
8                       END
7                       ELSE more frequency points to measure
9                               Select next CAL frequency
9                               REPEAT from section 2
6               ELSE error too large
10              Flag CAL as failed
10              #BP 20004 + (CAL frequency in MHz)
10              END

CAL FAILURE: #BP 20004 + (CAL frequency in MHz)
```

## Bessel zero calibration

### Select/deselect path

*[cal values], [signal gen]; [cal config] [Bessel zero]*

### Purpose

This calibration is used to provide an absolute FM deviation to allow accurate measurement of FM deviations generated during the FM sensitivity and FM attenuator calibrations, in comparison with the reading for the reference generated by this calibration.

### Description

This calibration generates accurately a deviation of 38.64 kHz at a modulation frequency of 7 kHz and carrier frequency of 800 MHz. This is achieved by adjusting the set FM deviation until the carrier spur disappears. This is the second Bessel null (fmod ×5.52) for a modulation frequency of 7 kHz.

The carrier level is measured with the 300 Hz IF filter and the log amp.

Calibration ON/OFF selection key: *[Bessel zero]*

## Calibration procedure

```
        INITIALISATION:
1       Set 3 MHz IF filter
1       Set input attenuation 20 dB
1       Select FM input to demod path on A3
1       Set 100 kHz bar chart range
1       Select NO FILTER for demod audio filter
1       Turn off spectrum analyzer at tray
1       Set input switch single-port duplex mode on N-type connector
1       Select ACFM in fractional-N
1       Set RF gen frequency 800 MHz
1       Set Tx frequency 800 MHz
1       Set RF generator level –27 dBm at N-type connector
1       Set mod gen 1 frequency 100 Hz
1       Set mod gen 1 deviation 40 kHz
1       Switch mod gen 1 ON
1       Switch mod gens 2 & 3 OFF
1       Switch on FFT, 50 Hz/div, ref 300 Hz
1       Screen message "Initialised for Bessel zero"
1       #BP 10000

        MEASURE 40 kHz AT 100 Hz:
2       Request peak find on FFT
2       Screen message "Requesting mkr reading for 50 Hz/div @ 100 Hz"
2       5 readings on FFT
2       Screen message "Averaged marker reading = xxxxx"
2       #BP 22000

        FOUND 100 Hz READING:
3       Save reading as 100 Hz reference
3       Set mod 1 frequency 7 kHz
3       Set vco sensitivity DAC = 0x80
3       Centre frequency 7.2 kHz for FFT
3       Screen message "Dev @ 100Hz mod freq = xxxx Hz"
3       #BP 22001

        TRIGGER 7 kHz CAL:
4       Request peak find on FFT
4       Screen message "Req wideband reading @ 7 kHz mod freq"
4       5 readings on FFT
4       Screen message "Averaged marker reading = xxxxx"
4       #BP 22002

        SUCCESSIVE APPROXIMATION:
5       Test reading against 100 Hz reference reading
5       IF successive approximation finished
5               Load check value into sensitivity DAC
5               Screen message "800 MHz, read xxxxx, loading check xx"
5               #BP 22003
5               GOTO section 6
5       ELSE
5               Calculate and load new sensitivity DAC value for approximation
5               Screen message "800 MHz, read xxxxx, loading xx"
5               #BP 22004
5               REPEAT from section 4
```

*continued.....*

TRIGGER 7 kHz CHECK:
6 Request peak find on FFT
6 Screen message "Req wideband check reading @ 800 MHz"
6 5 readings on FFT
6 Screen message "Averaged marker reading = xxxxx"
6 #BP 22005

READ 7 kHz CHECK LEVEL
7 Select final sensitivity DAC setting for 40 kHz deviation @ 800 MHz
7 Screen message "800 MHz sensitivity value = xxx"
7 #BP 22006

INITIALIZE FOR ZERO:
8 Select 300 Hz IF filter
8 Select input attenuation 30dB
8 Set RF gen frequency 800 MHz
8 Set mod 1 frequency 7 kHz
8 Set nominal mod 1 deviation 40.001 kHz
8 #BP 22007

INITIALIZE ZERO SEARCH:
9 Request narrow-band power measurement of carrier level
9 Screen message "Requested log amp reading"
9 #BP 22008

10 GOT BESSEL ADC READING:
11 5 readings, screen message "xxxxx, Carrier level 1/2/3/4/5 = xxxx"
11 #BP 22009
10 Calculate average reading
10 Screen message "Reading @ (deviation) = (carrier level), going UP/DOWN"
10 Check for carrier null found
10 IF carrier null has not been found
12 Adjust deviation
12 GOTO section 9
12 #BP 22010
10 ELSE
13 Set IF filter 3 MHz
13 Set input attenuator 20 dB
13 Switch on FFT
13 Select FM input to A3 demod path
13 Set 100 kHz bar chart gain ranging
13 Select demod audio filter = NO FILTER
13 #BP 22011

FOUND ZERO:
14 Screen message "ZERO @ setting (deviation)Hz, error = x.x%"
14 Set FFT span = 500 Hz/div
14 Set FFT ref frequency 6 kHz
14 #BP 22012

READ SENSITIVITY REFERENCE:
15 Request FFT marker reading, averaged over 6 readings
15 Screen message "Requesting marker reading for 2.5 kHz/div"
15 6 readings on FFT
15 Screen message "Averaged marker reading = xxxxx"
15 #BP 22013

FOUND SENSITIVITY REFERENCE:
16 Screen message "Found reference for sens CAL = (marker reading)"
16 #BP 22014

SET FOR ATTEN REFERENCE:
17 Set FFT span = 50 Hz/div
17 Set FFT ref frequency 7.2 kHz
17 Screen message "Setting up FFT to read @ 7 kHz"
17 #BP 22015

READ_ATTEN_REF_10kHz:
18 Request peak find on FFT
18 Screen message "Requesting mkr reading for 50 Hz/div @ 7 kHz"
18 5 readings on FFT
18 Screen message "Averaged marker reading = xxxxx"
18 #BP 22016

SET UP ATTEN REFERENCE AT 100 Hz:
19 Screen message "7 kHz reading = (marker reading)"
19 Set mod 1 frequency 1 kHz
19 Set mod 1 deviation 38.64 kHz
19 Set FFT span = 50 Hz/div
19 Set FFT ref frequency 300 Hz
19 #BP 22017

READ ATTEN REFERENCE AT 100 HZ:
20 Request peak find on FFT
20 Screen message "Requesting mkr reading for 50 Hz/div @ 100 Hz"
20 5 readings on FFT
20 Screen message "Averaged marker reading = xxxxx"
20 #BP 22018

FOUND ATTEN REFERENCE:
21 Screen message "Found attenuator CAL correction = xx"
21 #BP 22019
END

CAL FAILURE: #BP 22020

## FM drive gain calibration

### Select/deselect path

*[cal values], [signal gen]; [cal config] [FM DAC]* (1 of 2 parts).

### Purpose

The purpose of this calibration is to set the gain of the FM source on A1 so that the FM generated on the AE1 1-bit ADC circuit is correct.

### Description

This calibration works by using the DCFM capability of the fractional-N chip on AE1. The signal generator and receiver are both tuned to 800 MHz. The FM drive signal from A1 is set to 1.414 V; this corresponds to the peak level of a 1 V RMS sinewave. With DCFM selected on AE1, and a deviation of 100 kHz set on the signal generator fractional-N, the expected result when the FM gain is calibrated is that the carrier should be offset by 100 kHz to 800.1 MHz. The IF counter is used to measure this offset as a successive approximation is performed on the 16-bit number forming the gain scaling for the FM drive on A1.

Calibration ON/OFF selection key: *[FM DAC]*

### Calibration procedure

INITIALISATION
1 Set RF gen and receiver frequency to 800 MHz
1 Set IF bandwidth 3 MHz
1 Set mod freq 0 Hz, level 0 Hz, 0 V DC
1 Select single-port duplex mode on N-type connector
1 Switch RF generator on
1 Switch FM on at tray
1 Set RF generator level –27 dBm at N-type connector
1 Set spectrum analyzer reference level +30 dBm, i.e. 0 dB input attenuation
1 Screen message: "Initialised freq factor CAL"
1 #BP 10000 *continued.....*

```
        DO FM NULLING
2       Set fractional-N FM time constant
2       Select ACFM operation on AE1
2       Screen message: "Doing FM nulling"
2       #BP 23000

        INITIALISE FOR FM GAIN
3       Set hardware for 100 kHz deviation at RF tray
3       Select DCFM operation on AE1
3       Switch mod on
3       Set mod freq 0 Hz
3       Set DC level 1.414 V on mod drive from A1
3       Download FM gain values to A1
3       Screen message: "Nulling complete, ready"
3       #BP 23001

        SUCCESSIVE APPROXIMATION OVER 16 BITS OF FM GAIN VALUE FOR IF
        OFFSET OF +100 kHz
4       Screen message: "Requesting freq measurement"
4       Request IF offset reading
4       IF OFFSET READING RETURNED
4       #BP 23002
4       IF more bits to test
5               Calculate new gain test value
5               Screen message: "Fm gain or-pattern = xx, loading xx"
5               #BP 23003
5               REPEAT from section 4
4       ELSE successive approximation finished
6               Select ACFM operation at AE1
6               Screen message: "Found FM gain = xxxxx"
6               IF gain value in range 0x1000 to 0xfff0
7                       Cal passed
7                       Screen message: "FM gain figure : xxxx"
7                       #BP 23004
6               ELSE error in gain CAL
8                       Screen message: "FM gain CAL : FAILED!  Using nominal"
8                       #BP 23005
6               END

CAL FAILURE: #BP 23005
```

## FM sensitivity calibration

### Select/deselect path

*[cal values], [signal gen]; [cal config] [FM DAC]* (2 of 2 parts).

### Purpose

This calibration is used to determine the required settings of the VCO sensitivity compensation DAC on AF2, across the range of frequencies of the three signal generator oscillators.

### Description

This calibration works by performing successive approximations on the load value of the sensitivity compensation DAC to get FM demod FFT readings the same as a reference reading. The reference reading is obtained either by:-

1. Setting up the test deviation at 100 Hz and relying on the accuracy of low frequency FM generation in the fractional-N and 1-bit ADC on AE1, and measuring the demod on the FFT.

or

2. Using the FFT reference reading found during the Bessel Zero calibration.

The CAL points are at 4 MHz intervals on the fundamental ranges of each oscillator (576 to 1155 MHz), but the calibration is performed over the range 288 to 576 MHz in 2 MHz steps.

The frequency ranges for each oscillator are as follows:-

| | |
|---|---|
| OSCILLATOR 0 | 288 - 360 MHz inclusive |
| OSCILLATOR 1 | 360 - 456 MHz inclusive |
| OSCILLATOR 2 | 456 - 576 MHz inclusive |

Note that some displayed frequencies and breakpoint values will be duplicated, i.e. 360 MHz and 456 MHz. However, for the final test point for each oscillator, the actual test frequencies are 100 Hz lower. This is done to ensure that the RF tray keeps the required oscillator selected.

For example, the last test frequency for oscillator 0 is 359.999900 MHz, but the display will show 360 MHz, and the CAL breakpoint values for that test point will include the digits 360, as will the display and breakpoint values for the first test point on oscillator 1 (which is at exactly 360 MHz).

Calibration ON/OFF selection key: *[FM DAC]*

## Calibration procedure

| | |
|---|---|
| | INITIALISATION |
| 1 | Set FFT for FM calibration |
| 1 | Select single-port duplex mode on N-type connector |
| 1 | Set fractional-N time constant to 31.25 ms |
| 1 | Switch RF generator ON |
| 1 | Set RF generator level –27 dBm at N-type connector |
| 1 | Set output attenuator to 20 dB |
| 1 | Select 3 MHz IF filter |
| 1 | Select A3 FM demod input as input to A3 demod filter path |
| 1 | Set 100 kHz FM bar chart range on A3 |
| 1 | Select demod audio filter = NO FILTER |
| 1 | Set mod freq 100 Hz |
| 1 | Set hardware for FM deviation = 38.64 kHz |
| 1 | Screen message: "Initialised FM sensitivity" |
| 1 | #BP 10000 |
| | START FM SENSITIVITY |
| 2 | Set RF gen freq for test point |
| 2 | Set receiver frequency for test point |
| 2 | Set mod gen frequency 100 Hz |
| 2 | Screen message: "Setting xxx MHz" |
| 2 | #BP 24000 |
| | START 1-BIT ADC READING |
| 3 | Set FFT reference frequency 500 Hz, span 100 Hz/div |
| 3 | Request FFT marker peak find and marker reading |
| 3 | Screen message: "Req mod reading, T.E., freq = xxx MHz" |
| 3 | #BP 24001 |
| 3 | MARKER LEVEL READING RETURNED = 1-bit ADC reference reading |
| 3 | Set mod gen frequency 7 kHz |
| 3 | Set FFT reference frequency 6 kHz, span 500 Hz/div |
| 3 | Screen message: "Dev @ 100Hz mod freq = xxxxx Hz" |
| 3 | IF BESSEL ZERO calibration done |
| 4 | Screen message: "Using Bessel reference" |
| 4 | 1-bit ADC reference reading = Bessel zero reference reading |
| 3 | #BP 24002 |

*continued.....*

```
        SET FOR WIDEBAND MEASUREMENTS
5       Set RF gen and receiver frequency to test point frequency
5       SUCCESSIVE APPROXIMATION OVER 8 BITS ON VCO SENSITIVITY DAC
6               Write test load value to DAC
6               #BP 24XXX (where XXX is the test frequency in MHz)
6               Request FFT marker peak find and marker reading
6               Screen message: "Req wideband reading @ xxx MHz"
6               MARKER LEVEL READING RETURNED
6               #BP 25XXX (where XXX is the test frequency in MHz)
6               Test reading to see if bit needed in load value
6               Screen message: "xxx MHz, read xxxxx, loading xx"
6               IF more bits to check in approximation
7                       REPEAT from section 6
6               ELSE all bits done
8                       IF DAC load value = 0 or 255
9                       Flag CAL as failed
9                       Screen message: "Failed sensitivity CAL at xxx MHz"
9                       #BP 24001 + (CAL frequency in MHz)
8                       ELSE sensible DAC value found
10                      Load DAC with (DAC value + 1)
10                      Screen message: "%ld MHz, read %ld, loading check %d"
10                      #BP 27XXX (where XXX is the test frequency in MHz)
        WIDEBAND GAIN CHECK
11      Request FFT marker peak find and marker reading
11      Screen message: "Req wide-band check reading @ xxx MHz"
11      MARKER LEVEL READING RETURNED
11      #BP 28XXX (where XXX is the test frequency in MHz)
11      Select final DAC load value
11      Store DAC load value for test point freq
11      Screen message: "Osc x, freq xxx, index xx, value xx"
11      Increment test frequency by 2 MHz
11      IF all test frequencies calibrated
12              #BP 24004
12              END
11      ELSE more frequencies to calibrate
13              #BP 29XXX (where XXX is the test frequency in MHz)
13              REPEAT from section 5
CAL FAILURE: #BP 24001 + (CAL frequency in MHz)
```

## FM attenuator calibration

### Select/deselect path

*[cal values], [signal gen]; [cal config] [FM Atten]*

### Purpose

The purpose of this calibration is to compensate for errors in the setting of the FM attenuator DAC on AF2 by adjusting the setting of the sensitivity compensation DAC (as found in the FM sensitivity calibration).

### Description

For each of the attenuator settings, there may be a slight error in the setting of the DAC or block attenuator. This calibration works by using the Bessel zero reference reading to calculate the error in the 1-bit ADC FM generation and FFT readings. FM deviations are set up and measured at 100 Hz; then at 7 kHz, and the sensitivity DAC setting is successively approximated for the same deviation reading, subject to corrections found in the Bessel zero / 1-bit ADC comparison found at the start of this calibration. From these settings of the sensitivity DAC, incremental correction

values are obtained with which the nominal sensitivity DAC settings (found in the FM sensitivity calibration) may be adjusted to cancel errors in the setting of the FM attenuators.

The ranges for the FM attenuator settings are shown in the table below. The attenuation range selected for a particular deviation required will be as shown for RF generator frequencies of 576 MHz and above.

Due to the limitation of 100 kHz on the deviation measurement, the higher ranges are tested by setting one half, one quarter, or one eighth of the required deviation at one half, one quarter, or one eighth of the RF generator test frequency of 800 MHz. For example, the maximum deviation range is tested by setting 100 kHz deviation at 100 MHz carrier frequency (this corresponds to 800 kHz deviation at 800 MHz at the oscillator on AF2).

Further, the calibration is conducted only for range 17 and above because of the difficulty of accurately measuring low deviations.

| Range | Lower dev | Upper dev | Total RF tray atten (dB) |
|---|---|---|---|
| 0 | | < 14 Hz | 96 |
| 1 | 14 Hz | 19 Hz | 93 |
| 2 | 20 Hz | 27 Hz | 90 |
| 3 | 28 Hz | 39 Hz | 87 |
| 4 | 40 Hz | 55 Hz | 84 |
| 5 | 56 Hz | 79 Hz | 81 |
| 6 | 80 Hz | 112 Hz | 78 |
| 7 | 113 Hz | 159 Hz | 75 |
| 8 | 160 Hz | 225 Hz | 72 |
| 9 | 226 Hz | 319 Hz | 69 |
| 10 | 320 Hz | 451 Hz | 66 |
| 11 | 452 Hz | 638 Hz | 63 |
| 12 | 639 Hz | 903 Hz | 60 |
| 13 | 904 Hz | 1.277 kHz | 57 |
| 14 | 1.278 kHz | 1.807 kHz | 54 |
| 15 | 1.808 kHz | 2.555 kHz | 51 |
| 16 | 2.556 kHz | 3.614 kHz | 48 |
| 17 | 3.615 kHz | 5.112 kHz | 45 |
| 18 | 5.113 kHz | 7.229 kHz | 42 |
| 19 | 7.230 kHz | 10.254 kHz | 39 |
| 20 | 10.255 kHz | 14.460 kHz | 36 |
| 21 | 14.461 kHz | 20.450 kHz | 33 |
| 22 | 20.451 kHz | 28.921 kHz | 30 |
| 23 | 28.922 kHz | 40.900 kHz | 27 |
| 24 | 40.901 kHz | 57.843 kHz | 24 |
| 25 | 57.844 kHz | 81.802 kHz | 21 |
| 26 | 81.803 kHz | 115.687 kHz | 18 |
| 27 | 115.688 kHz | 163.606 kHz | 15 |
| 28 | 163.607 kHz | 231.374 kHz | 12 |
| 29 | 231.375 kHz | 327.213 kHz | 9 |
| 30 | 327.214 kHz | 462.749 kHz | 6 |
| 31 | 462.750 kHz | 654.426 kHz | 3 |
| 32 | 654.427 kHz | 925.500 kHz | 0 |

The following table shows, for each FM attenuator range (from 17 to 32), the CAL setup used to calibrate the FM attenuator errors - RF generator frequency and receiver frequency, test deviation used, equivalent scope vertical range used to set the FFT range and the FM attenuator range.

| Index | RF gen freq | Test dev (kHz) | FFT scale (per/div) |
|---|---|---|---|
| 17 | 800 MHz | 5 | 20 kHz |
| 18 | 800 MHz | 7 | 20 kHz |
| 19 | 800 MHz | 10 | 20 kHz |
| 20 | 800 MHz | 14 | 20 kHz |
| 21 | 800 MHz | 20 | 50 kHz |
| 22 | 800 MHz | 28 | 50 kHz |
| 23 | 800 MHz | 40 | 50 kHz |
| 24 | 800 MHz | 50 | 50 kHz |
| 25 | 800 MHz | 80 | 100 kHz |
| 26 | 800 MHz | 100 | 100 kHz |
| 27 | 400 MHz | 80 | 100 kHz |
| 28 | 400 MHz | 100 | 100 kHz |
| 29 | 200 MHz | 80 | 100 kHz |
| 30 | 200 MHz | 100 | 100 kHz |
| 31 | 100 MHz | 80 | 100 kHz |
| 32 | 100 MHz | 100 | 100 kHz |

Calibration ON/OFF selection key: *[FM Atten]*

## Calibration procedure

INITIALISATION

1 Select single-port duplex mode on N-type connector
1 Select fractional-N FM time constant 31.25 ms
1 Set RF generator level –27 dBm at N-type connector
1 Select 3 MHz IF filter bandwidth
1 Set input attenuator 20 dB
1 Reset A1 sine generators
1 Select A3 demod bar chart 100 kHz range
1 Route A3 FM demod input to A3 demod filter path
1 Select A3 demod filter NO FILTER
1 Screen message: "Initialised FM attenuator CAL"
1 #BP 10000

INITIALISE FOR 1-BIT ADC READING

2 Set RF gen and receiver frequency to test point frequency
2 Set mod gen 1 frequency 100 Hz
2 Set mod level for test point
2 Screen message: "Setting 100 Hz mod freq, range xx"
2 Set FFT for FM CAL
2 Set FFT reference frequency 300 Hz, span 50 Hz/div
2 #BP 300XX (where XX is the range under test - see description above)

START 1-BIT ADC READING

3 Request peak find and marker level on FFT
3 Screen message: "Req mod reading, T.E., freq = xxx MHz"
3 MARKER LEVEL READING RETURNED
3 #BP 301XX (where XX is the range under test)
3 Save reading as 1-bit ADC reference reading
3 Set mod gen 1 frequency 7 kHz
3 Screen message: "Dev @ 100Hz mod freq = xxxxx Hz"
3 Set FFT reference frequency 7.2 kHz, span 50 Hz/div
3 #BP 302XX (where XX is the range under test)

SUCCESSIVE APPROXIMATION OVER 8 BITS ON VCO SENSITIVITY

```
        DAC FOR FM
        DEVIATION = 1-BIT ADC REFERENCE
4       Load test value to VCO sensitivity DAC
4       Request peak find and marker level on FFT
4       Screen message: "Req wideband reading @ 7 kHz mod freq"
4       MARKER LEVEL READING RETURNED
4       #BP 303XX (where XX is the range under test)
4       Test reading to see if bit needed in load value
4       Screen message: "xxx MHz, read xxxxx, loading xx"
4       IF more bits to check in approximation
5               REPEAT from section 4
5               #BP 304XX (where XX is the range under test)
4       ELSE all bits done
6               IF DAC load value = 0 or 255
7                       Flag CAL as failed
7                       Screen message: "Failed attenuators CAL on range xx"
7                       #BP 308XX (where XX is the range under test)
6               ELSE sensible DAC value found
8                       Load DAC with (DAC value + 1)
8                       Screen message: "xxx MHz, read xxx, loading check xxx"
8                       #BP 305XX (where XX is the range under test)
        WIDEBAND GAIN CHECK
9       Request FFT marker peak find and marker reading
9       Screen message: "Req wideband check reading @ xxx MHz"
9       MARKER LEVEL READING RETURNED
9       #BP 306XX (where XX is the range under test)
9       Select final DAC load value
9       Store DAC load value for test point
9       Screen message: "Nominal = xx, corrected = xx, corr = x.xxx"
9       IF all test points calibrated
10              #BP 30002
10              END
9       ELSE more test points to calibrate
11              #BP 307XX (where XX is the range under test)
11              REPEAT from section 2

CAL FAILURE: #BP 308XX (where XX is the range under test)
```

# Receiver calibrations

## IF chain frequency response calibration

### Select/deselect path

*[cal values], [spec ana]; [cal config] [INPUT FILTER]*

### Purpose

This calibration determines the frequency response of the IF chain in the RF tray to allow correction of frequency dependent level errors in log amp readings and spectrum analyzer levels.

### Description

The frequency response of the IF chain is measured at CAL points from 10 MHz, 50 MHz and up in 50 MHz steps to 1000 MHz. Two passes are made to perform the measurements for the sensitive receiver 20 dB amplifier being switch on and off. Level measurements are made by routeing the signal generator to the receiver and measuring the level in the log amp.

Calibration ON/OFF selection key: *[*INPUT FILTER*]*

## Calibration procedure

**Note:** In breakpoint values, X represents 0 when the normal mode (i.e. 20 dB amplifier bypassed) is under test; X represents 2 when the 20 dB amplifier path is selected for test.

| | |
|---|---|
| | INITIALISATION |
| 1 | Set input switch to single-port duplex mode on N-type connector |
| 1 | Set RF generator frequency 10 MHz |
| 1 | Set RF gen level +4 dBm at AF5 output |
| 1 | Set output attenuator to 0 dBm |
| 1 | Switch RF gen on |
| 1 | Select 3 MHz IF filter |
| 1 | Set Tx frequency to 10 MHz |
| 1 | Switch all mod sources off |
| 1 | Select 3 kHz video filter |
| 1 | Screen message: "Initialised i.f. chain response" |
| 1 | #BP 10000 |
| | INITIALISE FOR BYPASS PATH |
| 2 | Set input attenuation 40 dB |
| 2 | Bypass sensitive receiver amplifier |
| 2 | Screen message: "20 dB amplifier bypassed, 40dB input att" |
| 2 | #BP 40000 |
| 2 | GOTO SECTION 4 |
| | INITIALISE SENSITIVE RECEIVER PATH |
| 3 | Set input attenuation 60 dB |
| 3 | Select sensitive receiver amplifier |
| 3 | Screen message: "20 dB amplifier selected, 60dB input att" |
| 3 | #BP 42000 |
| 3 | GO TO SECTION 6 |
| | MEASURE 10 MHz REFERENCE |
| 4 | Set Tx and Rx freq to 10 MHz |
| 4 | RF Gen AF5 output level to +4 dBm |
| 4 | Screen message: "Initialised for 10 MHz reference reading" |
| 4 | #BP 40001 |
| | GET 10 MHz REFERENCE READING |
| 5 | Request log amp ADC reading |
| 5 | ADC READING RETURNED FROM A5 |
| 5 | #BP 40002 |
| 5 | Screen message: "10 MHz reference reading = xxxx" |
| 5 | #BP 40003 |
| | CALIBRATE IF PATH |
| 6 | Set test frequency (starts at 10 MHz) on generator and receiver |
| 6 | Set RF gen level +4 dBm at AF5 output, corrected for AA1 path loss |
| 6 | Screen message: "Setting up xxx MHz" |
| 6 | #BP 4X004 + test frequency in MHz |
| | GET ADC READING |
| 7 | Request log amp ADC reading |
| 7 | ADC READING RETURNED FROM A5 |
| 7 | #BP 4X005 + test frequency in MHz |
| 7 | Calculate IF level error |
| 7 | Screen message: "[freq in MHz], reading = xxxx, loss = xx (dBmx100)" |
| 7 | Store correction value |
| 7 | #BP 4X006 + test frequency in MHz |
| 7 | REPEAT from section 6 until test frequency = 1000 MHz |
| 7 | IF bypass path selected |
| 8 | GOTO SECTION 3 |
| 7 | ELSE |
| 9 | #BP 40007 |
| 9 | END |

## Crystal filter automatic calibration

### Select/deselect path

*[cal values], [spec ana]; [cal config] [RX GAIN]* (1 of 3 parts).

### Purpose

The purpose of this calibration is to provide automatic calibration of the spectrum analyzer crystal filters for centre frequency and gain settings.

### Description

This calibration determines load values for the centre frequency DAC settings of the 300 Hz and 1 kHz crystal filters, and null strays DAC settings for the 3 kHz, 10 kHz and 30 kHz crystal filters, such that all the filters are tuned to 10.7 MHz within the following limits:-

| Filter Nbr | Filter | Centre freq limit (Hz) |
|---|---|---|
| 0 | 300 Hz | >10 |
| 1 | 1 kHz | >30 |
| 2 | 3 kHz | >100 |
| 3 | 10 kHz | >300 |
| 4 | 30 kHz | >1000 |

The gain DAC settings are also determined such that the filter gain is set to ±5 dB of the correct level (gains are accurately set by the crystal filter fine levelling calibration).

Calibration ON/OFF selection key: *[RX GAIN]*

### Calibration procedure

INITIALISATION
1 Filter under test = 300 Hz
1 Select single-port duplex mode on N-type connector
1 Switch off all mod sources
1 Set receiver frequency to 10 MHz
1 Set RF gen frequency to 10 MHz
1 Set spectrum analyzer reference level +40 dBm
1 Set signal generator level to –30 dBm at N-type connector
1 Select power range 2 on broad-band power meter (measures –18 dBm to –3 dBm)
1 #BP 10000

START CRYSTAL REFERENCE
2 Request broad-band power measurement
2 Screen message: "Requested power reading 0"

READ CRYSTAL REFERENCE
3 POWER READING RETURNED
3 #BP 44000
3 IF more readings to take
4 Request broad-band power measurement
4 Screen message: "Requested power reading x"
4 REPEAT from start of section 3
3 ELSE all readings done
5 Calculate average power reading
5 Screen message: "Found crystal reference = xxxx"
5 Target level for filter peaking = power reading
5 #BP 44001

*continued.....*

```
        INITIALISE FOR CRYSTAL AUTOCAL
6       Set spectrum analyzer reference level 0 dBm
6       Set signal generator level to −70 dBm at N-type output

        CRYSTAL FILTER READY
7       Set for expanded size spectrum analyzer
7       Set spectrum analyzer reference frequency 10 MHz
7       Set spectrum analyzer span for filter under test
7       Set for repetitive sweep
7       Switch markers on
7       Select crystal filter under test
7       Screen message: "Initialised for <filter> filter autocal"
7       #BP 44X02 where X is filter number (see table above)

        REQUEST CENTRE FREQUENCY CHECK
8       FIND CRYSTAL FILTER CENTRE FREQUENCY
8       #BP 44X03 where X is filter number (see table above)

        FOUND CENTRE FREQUENCY
9       Screen mesage: "Centre freq= xxxxxxxxHz, error = xxxHz"
9       IF filter under test >= 3kHz
10              MEASURE LEVEL AT REFERENCE FREQUENCY
10              #BP 44X04 where X is filter number (see table above)
10              GOTO SECTION 14
9       ELSE filter under test is 300 Hz or 1 kHz
11              IF filter level outside ±5 dB of target level
                ADJUST PEAK LEVEL
12              #BP 44X05 where X is filter number (see table above)
12              REPEAT from start of section 9
11              ELSE filter level OK
13              GO TO SECTION 17

        CHECK LEVEL AT REFERENCE FREQUENCY
14      IF filter level outside 5 dB of target level
15              ADJUST LEVEL AT REFERENCE FREQUENCY
15              #BP 44X06 where X is filter number (see table above)
14      ELSE filter level OK at reference frequency
16              Screen message: "<filter> level ok, recheck centre freq"
16              #BP 44X07 where X is filter number (see table above)

17      CHECK CENTRE FREQUENCY
17      IF centre frequency outside limits
                ADJUST CENTRE FREQUENCY
18              #BP 44X08 where X is filter number (see table above)
17      ELSE centre frequency in limits
19              IF filter under test >= 3 kHz
20              ADJUST LEVEL AT REFERENCE FREQUENCY
20              #BP 44X09 where X is filter number (see table above)
19              ELSE on 300 Hz or 1 kHz filter
21              ADJUST PEAK LEVEL
21              #BP 44X09 where X is filter number (see table above)

        CENTRE FREQUENCY LEVEL IN LIMITS
22      Screen message: "<filter> filter done"
22      IF more filters to adjust
23              Choose next filter under test
23              REPEAT from section 7
22      ELSE all filters done
24              Switch off spectrum analyzer
24              Calculate target level for ceramic filter gain and crystal
                filter level fine-tune calibrations.
24              #BP 44010
24              END

CAL FAILURE: #BP
```

## Ceramic filter loss calibration

### Select/deselect path

*[cal values], [spec ana]; [cal config] [RX GAIN]* (2 of 3 parts)

### Purpose

The purpose of this calibration is to provide offsets which can be applied to log amp readings to compensate for gain errors in the 110 kHz, 280 kHz and 3 MHz ceramic IF filters.

### Description

This calibration relies on the set-up and target level used in the crystal filter automatic calibration. The level of the IF is measured for each of the filters and the difference between these readings and the target level (found using the broad-band power meter in the crystal filter autocal) give offsets which must be applied to log amp readings to correct for gain errors in these filters.

Calibration ON/OFF selection key: *[*RX GAIN*]*

### Calibration procedure

| | |
|---|---|
| | INITIALISATION |
| 1 | Select 3 MHz IF filter |
| 1 | Select 3 kHz video filter |
| 1 | Screen message: "Initialised ceramic filter CAL" |
| 1 | #BP 10000 |
| | READ IF LEVEL IN 3 MHz FILTER |
| 2 | Take 5 ADC readings |
| 3 | Screen message: "3MHz CAL, level x = xxxx" |
| 3 | #BP 45000 |
| 2 | Average readings |
| 2 | Calculate loss in 3 MHz filter |
| 2 | Screen message: "3MHz CAL done, loss = xxxx" |
| 2 | Select 280 kHz IF filter |
| 2 | IF loss within ±10 dB |
| 3 | Update loss figure |
| 3 | #BP 45001 |
| 2 | ELSE |
| 4 | Screen message: "3MHz loss out of range" |
| 4 | #BP 45100 |
| | READ IF LEVEL IN 280 kHz FILTER |
| 5 | Take 5 ADC readings |
| 6 | Screen message: "280kHz CAL, level x = xxxx" |
| 6 | #BP 45002 |
| 5 | Average readings |
| 5 | Calculate loss in 3 MHz filter |
| 5 | Screen message: "280kHz CAL done, loss = xxxx" |
| 5 | Select 110 kHz IF filter |
| 5 | IF loss within ±10 dB |
| 6 | Update loss figure |
| 6 | #BP 45003 |
| 5 | ELSE |
| 7 | Screen message: "280kHz loss out of range" |
| 7 | #BP 45200 |

*continued.....*

READ IF LEVEL IN 280 kHz FILTER
8 Take 5 ADC readings
7 Screen message: "110kHz CAL, level x = xxxx"
7 #BP 45004
8 Average readings
8 Calculate loss in 110 kHz filter
8 Screen message: "110kHz CAL done, loss = xxxx"
8 IF loss within ±10 dB
9 Update loss figure
9 #BP 45005
8 ELSE
10 Screen message: "110kHz loss out of range"
10 #BP 45300
8 END

CAL FAILURE: #BP 45100, #BP 45200, #BP 45300

## Crystal filter gain calibration

### Select/deselect path

*[cal values], [spec ana]; [cal config] [RX GAIN]* (3 of 3 parts)

### Purpose

The purpose of this calibration is to determine the settings for the crystal filter gain DAC on AE6 for each of the crystal filters, such that the level input to the log amp via any of these filters gives a power reading the same as that obtained using the broad-band power meter.

### Description

This calibration relies on the set-up and target level used in the crystal filter automatic calibration. The gain DAC setting for each crystal filter is determined by a successive approximation to the target level (found in crystal filter autocal) measured in the log amp. Due to the fact that the filters are adjusted in static conditions, this calibration provides more accurate adjustment than the automatic filter calibration during which the sweeping of the filter causes level errors.

| Filter Nbr | Filter |
|---|---|
| 0 | 300 Hz |
| 1 | 1 kHz |
| 2 | 3 kHz |
| 3 | 10 kHz |
| 4 | 30 kHz |

Filter number is represented by 'X' in the calibration breakpoint values.

Calibration ON/OFF selection key: *[*RX GAIN*]*

### Calibration procedure

INITIALISATION
1 Filter under test = 300 Hz
1 Screen message: "Initialised crystal filter gain CAL"
1 #BP 10000

START CRYSTAL FILTER GAIN CAL
2 Screen message: "Calibrating <filter name> crystal filter gain"
2 #BP 46X00 (see description, above)
2 SUCCESSIVE APPROXIMATION OVER 12 BITS OF CRYSTAL FILTER GAIN DAC FOR FILTER LEVEL = TARGET LEVEL FROM CRYSTAL FILTER AUTOCAL

```
3       Set crystal filter gain DAC with test value
3       Set filter under test
3       Screen message: "Set up <filter name> crystal filter"
3       #BP 46X01
3       Request narrow-band power reading
3       Screen message: "Requested ADC reading <filter name> crystal filter"
3       IF LEVEL READING RETURNED
3       #BP 46X02
3       Test level for bit set in DAC value
3       IF more bits to test in gain DAC value
4               Set new bit to test in DAC value
4               Screen message: "<filter name>, ADC=%ld, new load value = xx"
4               #BP 46X03
4               REPEAT from start of section 3
3       ELSE all bits tested
5               Screen message: "<filter name>, final load value = xx"
5               IF more filters to calibrate
6               #BP 46X04
6               IF filter load value = 0 or 4095
7                       Flag CAL as failed
7                       Screen message: "Failed succ approx on XTAL filter"
7                       #BP 46X06
7                       END
6               REPEAT from section 2 for next filter
5               ELSE CAL finished
8               Download gain settings to AE1
8               #BP 46005
8               END
```

CAL FAILURE: #BP 46006, #BP46106, #BP46206, #BP46306, #B46406

# External modulation calibrations

## External modulation offset calibration

### Select/deselect path

*[cal values], [extern mod]; [cal config] [Ext mod offsets]*

### Purpose

This calibration is used to determine the setting of the offset DAC for the external modulation path input on A3.

### Description

The load value required for the external mod input offset DAC on A3 is found by grounding the input to the external mod path and routeing the output of the path to the ADC on A2. A successive approximation is performed on the 12-bit load value for the DAC until the ADC reading indicates 0 V.

Calibration ON/OFF selection key: *[*Ext mod offsets*]*

### Calibration procedure

```
        INITIALISATION
1       Route external mod path to RMS-DC/DC filter inputs on A2
1       Select DC filter input to ADC
1       Route GROUND to CAL signal
1       Select GROUND for AFREF signal
1       Set external modulation gain range for 1 V RMS input
1       Set external modulation path input offset DAC to mid-point (2048)
1       Select non-inverted external mod (inverted at A2 output)
1       #BP 1000

        SUCCESSIVE APPROXIMATION FOR EXTERNAL MOD INPUT OFFSET DAC
2       Load DAC with test value
2       Screen message: "Set ext mod input offset DAC = xxxx"
2       #BP 19000

        READ EXTERNAL MOD INPUT OFFSET
3               Request ADC readings (8 off)
4                       ADC READING RETURNED
4                       #BP 19001
3               Screen message: "Measure EM input offset for DAC value xxxx"
3               Offset reading found
3               #BP 19002
3               Screen message: "EM input offset xxxx for DAC value xxxx = xxxx"

        CALC EM INPUT OFFSET
2       Average readings to calculate offset
2       Screen message: "Found EM offset = xxxx for DAC value xxxx"
2       #BP 19003
2       REPEAT section 2 in successive approx of DAC value for offset = 0

        SUCCESSIVE APPROXIMATION FINISHED
4       IF offset DAC setting = 0 or 4095
4               Screen message: "EM input offset failed"
4               #BP 19004
4       ELSE
4               Store DAC value in RAM
4               Set offset DAC with new offset value
4               Screen message: "Found EM input offset DAC value = xxxx"
4               #BP 19005
4       END
```

## External modulation FM gain calibration

### Select/deselect path

*[cal values], [extern mod]; [cal config] [Ext mod fm gain]*

### Purpose

This calibration is used to set the gain value used on A1 for scaling the external mod input signal for FM.

### Description

This calibration uses the DCFM capability of the fractional-N chip on AE1. After performing an "FM nulling" to remove effects of DC offsets in the AE1 1-bit ADC (digital FM loop), the hardware is set for a deviation of 100 kHz. The mod drive is set to 1.414 V DC and DC-coupled FM is selected on AE1. The result of this is that the signal generator frequency is offset by some amount. The value of the A1 external mod gain figure is changed by a successive approximation until the offset is exactly 100 kHz, at which point the external mod scaling is calibrated for FM.

Calibration ON/OFF selection key: *[*Ext mod fm gain*]*

## Calibration procedure

```
        INITIALISATION
1       Set RF gen freq 800 MHz
1       Set Tx freq 800 MHz
1       Select 3 MHz IF filter
1       Switch off all mod sources
1       Select CAL signal GROUND
1       Set external mod input offset to value found by offset CAL
1       Set external mod range on A3 for 1 V RMS
1       Select A2/A3 CAL signal as input to external mod path on A3
1       Set external mod input scaling to 90% on A1
1       Set external mod FM scaling on A1 to maximum
1       Route external mod input to FM summer on A1
1       Select single-port duplex mode on N-type connector
1       Switch RF gen on
1       Switch mod source (grounded) ON
1       Set RF gen level –27 dBm
1       Select 3 MHz spectrum analyzer filter, 30 dB input attenuation
1       Screen message: "Initialised ext mod FM gain  CAL"
1       #BP 10000

        DO EXTERNAL MOD FM NULLING
2       Set fractional-N FM time constant to 4 seconds
2       Select AC-coupled FM on signal generator fractional-N
2       Screen message: "Doing FM nulling"
2       #BP 19006

        NULLING COUNTDOWN
3       Countdown in seconds, Screen message: "24", "23", "22", etc.
3       #BP 19007

        INITIALISE FOR EM FM GAIN CAL
4       Set 1.414 V DC on A1 AFREF signal
4       Select 1 V DC on A2/A3 CAL signal
4       Set FM deviation 100 kHz
4       Select DC-coupled FM at signal generator fractional-N
4       Set external mod FM gain to 32768 (half full scale)
4       Switch FM mod ON
4       Screen message: "Nulling complete, ready"
4       #BP 19008

5       SUCCESSIVE APPROXIMATION ON EXTERNAL MOD FM GAIN
        FOR EACH OF 16 BITS IN GAIN VALUE:
6               Request IF count
6               Screen message: "Requesting freq measurement"
6               IF count returned
6               Screen message: "Received IF offset = xxxxx Hz"
6               #BP 19009
6               Load new external mod FM gain
6               Screen message: "EM FM gain or-pattern=xxxx, loading xxxx"
6               REPEAT section 6

5       WHEN APPROXIMATION FINISHED:
5       IF CAL successful
7               Screen message: "Found scaling factor = xxxx"
7               #BP 19011
5       ELSE (CAL failed)
8               Screen message: "Scaling factor = xxxx, FAILED!"
8               #BP 19012
5       END

CAL FAILURE: #BP 19012
```

## External modulation AM gain calibration

### Select/deselect path

*[cal values], [extern mod]; [cal config] [Ext mod am gain]*

### Purpose

This calibration is used to set the gain value used on A1 for scaling the external mod input signal for AM.

### Description

When carrier is amplitude modulated at 63.2% by a 1 kHz mod signal, the sidebands are separated from the carrier by 1 kHz, and are 10 dB down on the carrier level. This calibration uses such a set-up to measure the error in the carrier-to-sideband difference, using the log amp with a 300 Hz IF filter. From this error, the external mod scaling figure on A1 for AM can be adjusted to correct gain errors. To ensure the log amp readings are not affected by non-linearity in the log amp when measuring the sideband level, the signal generator output attenuation is reduced by 10 dB to bring the sideband up to the point on the log amp where the carrier level was measured. Further, the change in attenuation is measured accurately by the use of the broad-band power meter.

Calibration ON/OFF selection key: *[*Ext mod am gain*]*

### Calibration procedure

```
        INITIALISE ATTENUATOR STEP MEASUREMENT
1       Set input switch to route sig gen output to broad-band power meter
1       Switch OFF all internal mod sources
1       Set RF generator output frequency 36 MHz
1       Set receiver frequency 36 MHz
1       Set 5 dBm at AF5 output
1       Set output attenuators to 0 dB      /* Should read –4.5 dBm at the    */
1       #BP 10000

        MEASURE SIG GEN OUTPUT LEVEL FOR CARRIER REFERENCE
2       Request power meter reading
3               Screen message: "Requested power reading X"
3               POWER READING RETURNED
3               Screen message: "Power reading = xxx (dBm x 100)"
3               #BP 19020
3               IF reading out of range
4                       Screen message: "Cal failed, check power meter CAL"
4                       #BP 19021
4                       END
3               ELSE REPEAT section 3 until all readings done
2       Calculate average reading
2       Screen message: "Found reading, atten out, = xxx dBm*100"
2       Set RF output attenuation 10 dB
2       #BP 19022

        MEASURE ATTENUATOR STEP
5       Request power meter reading
6               Screen message: "Requested power reading X"
6               POWER READING RETURNED
6               Screen message: "Power reading = xxx (dBm x 100)"
6               #BP 19023
6               IF reading out of range
7                       Screen message: "Cal failed, check power meter CAL"
7                       #BP 19024
7                       END

6               ELSE REPEAT section 5 until all readings done
```

5 Calculate average reading, calculate 10 dB step size
5 Screen message: "Found attenuator step = xxx dBm*100"
5 #BP 19025

INITIALISE EXTERNAL MOD AM GAIN CAL
8 Set RF input to single-port duplex mode on N-type connector
8 Set +7 dBm at AF5 output
8 Set input attenuation to 40 dB
8 Select sensitive receiver OFF (20 dB amplifier bypassed)
8 Select 300 Hz crystal IF filter
8 On A1 connect Vref/2 to AFREF signal
8 Route external mod input on A1 to A1 AM output
8 Screen message: "Initialised ext AM gain CAL"
8 #BP 19026

MEASURE AM CARRIER LEVEL
9 Set receiver frequency 36 MHz
9 Set 10 dB in RF output attenuator
9 Set external mod input offset DAC
9 Rout A2/A3 CAL signal into A3 external mod input
9 Select 40 dB attenuation in A3 external mod input path
9 Set inverted external mod on A2
9 Set 1V RMS, 1 kHz on A1 audio generator and route to AFREF
9 Select AFREF as A2/A3 CAL signal
9 Screen message: "Initialised for carrier read"
9 #BP 19027
9 Request log amp ADC reading
9 Screen message: "Requesting first carrier read"

10 READING RETURNED
10 #BP 19028
10 Screen message: "Ext AM gain carrier level X = XXXX dBm (x100)"
10 Request log amp ADC reading
10 REPEAT section 10 until 8 readings have been taken

CALCULATE AVERAGED CARRIER LEVEL
11 Calculate averaged carrier level reading
11 Screen message: "Starting sideband measurement"
11 Set Tx freq 35.999 MHz
11 Set RF output attenuation to 0 dB
11 #BP 19029

MEASURE AM SIDEBAND LEVEL
12 Request log amp ADC reading
12 Screen message: "Requesting sideband read"

13 READING RETURNED
13 #BP 19030
13 Screen message: "Ext AM gain SB level X = XXXX dBm (x100)"
13 Request log amp ADC reading
13 REPEAT section 13 until 8 readings have been taken

CALCULATE AVERAGED SIDEBAND LEVEL
14 Calculate averaged sideband level reading
14 Calculate AM gain error & A1 gain value
14 Screen message: "Ext AM gain CAL value = %x, finished"
14 #BP 19031
14 END

CAL FAILURE: #BP 19021, #BP 19024

# FFT calibrations

## FFT DC marker nulling

### Select/deselect path

*[cal values], [scope & fft]; [cal config] [DC mkr Nulling]*

### Purpose

This calibration is used to enable the A5 2105 DSP to offset its DAC readings to compensate for DC offsets on the input path on A5.

### Description

This calibration works by grounding the CAL signal line on A2/A3, and routeing it to A5 from A2. Using the FFT display, the level of the DC marker is reduced to a minimum by varying the offset value which the DSP on A5 applies to its DAC readings. This offset value is important for reducing the size of the DC marker on the FFT displays, so that low signal levels can be found with the peak find facility. It is also essential for DTMF decoding to operate reliably.

Calibration ON/OFF selection key: *[*DC mkr Nulling*]*

### Calibration procedure

| | |
|---|---|
| | INITIALISATION |
| 1 | Set up AF FFT |
| 1 | Set fft ref freq = 5 kHz and span 1 kHz / div |
| 1 | Set fft vertical scale 10 dB/div |
| 1 | Select ground for A2/A3 CAL signal |
| 1 | Route CAL ground signal into A3 AF path input |
| 1 | Screen message: "Initialised for FFT DC marker suppression" |
| 1 | #BP 10000 |
| | GET STARTING POINT MEASUREMENTS |
| 2 | Set first offset start value |
| 2 | Screen message: "Requesting measurement, offset = xxxx" |
| 2 | Request fft marker 1 reading at ordinate 1 (DC marker position) |
| 2 | MARKER READING RETURNED |
| 2 | #BP 50000 |
| 2 | Save first DC marker level reading |
| 2 | Set second offset start value |
| 2 | Screen message: "Requesting measurement, offset = xxxx" |
| 2 | Request fft marker 1 reading at ordinate 1 (DC marker position) |
| 2 | MARKER READING RETURNED |
| 2 | #BP 50001 |
| 2 | Save second DC marker level reading |
| 2 | Set third offset value |
| 2 | Screen message: "Requesting measurement, offset = xxxx" |
| 2 | Request fft marker 1 reading at ordinate 1 (DC marker position) |
| 2 | MARKER READING RETURNED |
| 2 | #BP 50002 |
| 2 | Save third DC marker level reading |
| 2 | Screen message: "Starting point measurements done" |
| 2 | #BP 50003 |
| | SET DC NULL TEST POINT |
| 3 | Test data points to see in minimum DC marker level found |
| 3 | IF null found |
| 4 | Screen message: "Finished FFT DC offset nulling" |
| 4 | Save A5 ADC offset value & download to A5 |
| 4 | #BP 50004 |
| 4 | END |

```
3       ELSE null not found
5           Set new test point offset on A5
5           Screen message: "Requesting measurement, offset = xxxx"
5           Request fft marker 1 reading at ordinate 1 (DC marker position)
5           MARKER READING RETURNED
5           #BP 50005
5           Screen message: "Offset = xxxx, reading = xxxx",
5           #BP 50006
5           END
```

## AF FFT gain offsets calibration

### Select/deselect path

*[cal values], [scope & fft]; [cal config] [AF FFT Offset]*

### Purpose

This calibration function is used to calibrate the gain offsets for the AF FFT.

### Description

The calibration is performed by routeing a 1 kHz signal at defined levels to the AF FFT system using the A2/A3 CAL signal path. The reference levels that are calibrated, the order in which they are done, and the test levels used to calibrate them are shown in the following table; where possible, the test level is 90% of top of screen:-

| Range | Ref level (T.o.S.) | Test level |
|---|---|---|
| 00 | 2 mV | 1.8 mV |
| 01 | 5 mV | 4.5 mV |
| 03 | 20 mV | 18 mV |
| 04 | 50 mV | 45 mV |
| 05 | 100 mV | 90 mV |
| 06 | 200 mV | 180 mV |
| 07 | 500 mV | 450 mV |
| 08 | 1 V | 900 mV |
| 09 | 2 V | 1.8 V |
| 10 | 5 V | 4.5 V |
| 11 | 10 V | 5 V |
| 12 | 20 V | 5 V |
| 13 | 50 V | 5 V |

Gain offsets are in hundredths of a dB.

Calibration ON/OFF selection key: *[*AF FFT Offset*]*

### Calibration procedure

```
        INITIALISATION
1       Set AF FFT range gains to nominal (20)
1       Select AF input to FFT
1       Select AF input to speaker
1       Set FFT span 1 kHz / div
1       Set vertical scale to 10 dB / div
1       Reset all A1 audio and mod generators
1       Set audio gen 1 frequency to 1 kHz
1       Select A1 audio gens as A1 AFREF signal
1       Route af gen output to CAL signal
1       Screen message: "Initialised for AF FFT offset CAL"
1       #BP 10000
```

*continued.....*

SET TEST LEVEL
2 Set A1 output level to test level for FFT range (2 mV range first)
2 Set FFT range
2 Screen message: "Ref level : XXXmV, AF level XXXX.XmV"
2 #BP 51XX0 (where XX is range under test, see above)

READ PEAK LEVEL
3 Request FFT marker peak find
3 Screen message: "Made peak find request"
3 Request FFT marker level reading
3 Screen message: "Requested marker reading"
3 FFT MARKER LEVEL READING RETURNED
3 #BP 51XX1 (where XX is range under test, see above)
3 Calculate error between marker reading and levelset
3 Screen message: "XXXmV range, error = XX.XXXX, offset XX"
3 IF error inside limits
4 Adjust offset for error and store
4 IF all ref levels calibrated
5 #BP 51002
5 END
4 ELSE more levels to calibrate
6 #BP 51XX3 (where XX is range under test, see above)
6 REPEAT from section 2 for next ref level
3 ELSE error outside limits

7 Adjust offset
7 Screen message: "<range> range, error xx.xxx, setting xxx"
7 Set FFT range to implement new offset
7 #BP 51XX4 (where XX is range under test, see above)
7 REPEAT from section 3

## FM demod FFT gain offsets calibration

### Select/deselect path

*[cal values], [scope & fft]; [cal config] [DM FFT Offset]*

### Purpose

This calibration function is used to calibrate the gain offsets for the FM demod FFT.

### Description

This calibration works by relying on the accuracy of the 1-bit ADC low-frequency FM generation in the signal generator. For various demod FFT reference levels (as shown in the table below), a test deviation is set up and measured on the FFT. The gain offset for the FFT range is adjusted until the error between the reading and the setting is less than 0.01 dB.

| Range | Ref level | Test dev (Hz) |
|---|---|---|
| 00 | 400 Hz | 360 |
| 01 | 800 Hz | 720 |
| 02 | 2 kHz | 1800 |
| 03 | 4 kHz | 3600 |
| 04 | 8 kHz | 7200 |
| 05 | 20 kHz | 18000 |
| 06 | 40 kHz | 36000 |
| 07 | 80 kHz | 72000 |
| 08 | 200 kHz | 100000 |
| 09 | 400 kHz | 100000 |

Calibration ON/OFF selection key: *[*DM FFT Offset*]*

### Calibration procedure

INITIALISATION
1 Set default FM fft offsets (35)
1 FFT ref level under test = 400 Hz
1 Switch on FFT
1 Route demod to FFT
1 Set FFT span per div to 100 Hz
1 Set FFT vertical scale 10 dB per div
1 Select single-port duplex mode on N-type connector
1 Set RF gen frequency and receiver frequency to 150 MHz
1 Switch on RF generator
1 Set RF generator level to –27 dBm at N-type connector
1 Select 3 MHz IF filter
1 Set 20 dB at RF input attenuator
1 Set mod frequency to 100 Hz
1 Route A3 FM demod input to A3 demod filter path
1 Select 300 Hz low-pass filter in demod filter path
1 Screen message: "Initialised demod FFT calibration"
1 #BP 10000

SET DEMOD TEST LEVEL
2 Set FM deviation test level for range under test
2 Set FFT reference level for range under test
2 Screen message: "Ref level: <ref level>, FM level xx.x kHz",
2 #BP 55XX0 where XX is range under test (see table above)

REQUEST FFT PEAK FIND
3 Request marker peak find and level reading
3 Screen message: "Made peak find request"
3 FFT MARKER READING RETURNED
3 #BP 55XX1 where XX is range under test (see table above)
3 Calculate error between reading and set level target
3 Screen message: "<ref level> range, error xx.xxx, offset = xx"
3 IF error in limits (0.01 dB)
4 IF more ref levels to calibrate
5 #BP 55XX2 where XX is range under test (see table above)
5 REPEAT from section 2 for next ref level
4 ELSE all done
6 #BP 55999
6 END
3 ELSE need to check this range again
7 Set new calculated gain offset for current range
7 Screen message: "<ref level> range, error xx.xxx, setting xx"
7 #BP 55XX3 where XX is range under test (see table above)
7 REPEAT from start of section 3

# Power meter calibration

## Broad-band power meter calibration (gain and offsets)

### Select/deselect path

*[cal values], [power meter]*.

### Purpose

The purpose of the power meter calibration routines is to find offsets for each of the four power meter ranges, and the gain of the power meter.

### Description

The offset calibrations are performed by grounding the input to the power meter and instructing A5 to perform an offset measurement, the result of which is returned to A6.

The power meter gain calibration is performed by routeing the RF calibrator signal (10 MHz, 0 dBm) to the power meter via the input switch. A5 is instructed to perform a gain reading, the result of which is returned to A6.

Calibration ON/OFF selection key: *[*power meter*]*

### Offset calibration procedure (performed for each of four ranges)

| | |
|---|---|
| | INITIALISATION |
| 1 | Select power meter CAL path in input switch. |
| 1 | Switch RF calibrator OFF (input to power meter is grounded) |
| 1 | Set power meter range for offset calibration |
| 1 | Screen message: "1. Initialised offset x" |
| 1 | #BP 10000 |
| | START OFFSET MEASUREMENT |
| 2 | Screen message: "2. Reading offset x" |
| 2 | Request power meter offset reading from A5 |
| 2 | #BP 17000 |
| 2 | DAC offset and ADC offset returned from A5 |
| 2 | Update power meter offset data |
| 2 | #BP 17001 |
| 2 | Screen message: "3. Offset x updated" |
| 2 | END |

### Gain calibration procedure

| | |
|---|---|
| 1 | Set input switch to route RF calibrator output to power meter input |
| 1 | Switch on RF calibrator |
| 1 | Set power meter range 1, to read 0 dBm |
| 1 | Screen message: "5. Initialised gain CAL" |
| 1 | #BP 10000 |
| | START POWER METER GAIN |
| 2 | Request A5 power meter gain calculation |
| 2 | Screen message: "6.Requested gain reading" |
| 2 | Gain reading returned from A5 |
| 2 | #BP 17010 |
| | READ PM GAIN |
| 3 | Screen message: "6.Gain received & updated" |
| 3 | #BP 17011 |
| 3 | END |

# Audio generator calibrations

## AM gain calibration

### Select/deselect path

*[cal values], [audio gen]; [cal config] [AM GAIN]*

### Purpose

This calibration is used to set the gain value used on A1 for scaling the internal mod levels for AM generation.

### Description

When carrier is amplitude modulated at 63.2% by a 1 kHz mod signal, the sidebands are separated from the carrier by 1 kHz, and are 10 dB down on the carrier level. This calibration uses such a set

up to measure the error in the carrier-to-sideband difference, using the log amp with a 300 Hz IF filter. From this error, the AM gain scaling figure on A1 can be adjusted to correct gain errors. To ensure the log amp readings are not affected by non-linearity in the log amp, when measuring the sideband level, the signal generator output attenuation is reduced by 10 dB to bring the sideband up to the point on the log amp where the carrier level was measured. Further, the change in attenuation is measured accurately by using the broad-band power meter. There are four paths on A1 through which AM drive may be generated (see A1 technical description for details); each of these is calibrated.

Calibration ON/OFF selection key: *[*AM GAIN*]*

## Calibration procedure

```
        INITIALISATION
1       Set RF input switch to single-port duplex mode on N-type connector
1       Switch off all mod sources
1       Select Vref as RF level reference
1       Set RF generator freq 36 MHz
1       Set 0 dB in output attenuator
1       Set AF5 output level +5 dBm
1       #BP 10000

        GET ATTENUATOR OUT LEVEL
2       Screen message: "Requested power reading X"
2       Request broad-band power measurement
2       POWER READING RETURNED
2       #BP 18000
2       If power meter over- or under-ranged
3               Flag CAL as failed
8               Screen message: "Cal failed, check power meter CAL
3               #BP 18001
3               END
2       ELSE power meter in range
4               IF more readings to take
5                       REPEAT from start of section 2
4               ELSE all readings done
6                       Calculate average power reading
6                       Screen message: "Found reading, atten out, =  xxxx dBm*100"
6                       Set 10 dB in output attenuator
6                       #BP 18002

        GET ATTENUATOR IN LEVEL
7       Screen message: "Requesting first read for attenuator in"
7       Request broad-band power measurement
7       POWER READING RETURNED
7       #BP 18003
7       If power meter over- or under-ranged
8               Flag CAL as failed
8               Screen message: "Cal failed, check power meter CAL
8               #BP 18004
8               END
7       ELSE power meter in range
9               IF more readings to take
10              REPEAT from start of section 7
9               ELSE all readings done
11              Calculate average power reading
11              Calculate attenuator step for 10 dB change in setting
11              Screen message: "Found attenuator step = xxxx dBm*100"
11              #BP 18005
```

*continued.....*

INITIALISE FOR AM GAINS
12 Set AF5 output level to +7 dBm
12 Set input attenuation to 40 dB
12 Switch sensitive receiver off
12 Select 300 Hz IF filter
12 Connect Vref/2 as RF level reference
12 Screen message: "Initialised AM gains CAL"
12 #BP 18006

START CARRIER MEASUREMENT
13 Set Tx freq 36 MHz
13 Set output attenuation 10 dB
13 Screen message: "Initialised for carrier read, path x"
13 Set mod gen freq 1 kHz for A1 modulation path under test
13 Set AM depth to 63.2%
13 #BP 18X07 (where X is 0, 1, 2 or 3 for path under test)

MEASURE CARRIER LEVEL
14 Request narrow-band power measurement
14 Screen message: Requesting first carrier read, path x"

READING RETURNED
15 #BP 18X08 (where X is 0, 1, 2 or 3 for path under test)
15 Screen message: "AM gain x, carrier level x = xxxx dBm (x100)"
15 IF more readings to take
16 Request narrow-band power measurement
16 REPEAT from section 15
15 ELSE all readings done
17 Calculate average power level for carrier signal
17 Screen message: ""Starting sideband measurement, path x"
17 Set Tx freq 35.999 MHz
17 Set output attenuator to 0 dB
17 #BP 18X09 (where X is 0, 1, 2 or 3 for path under test)

MEASURE SIDEBAND LEVEL
18 Screen message: "Requesting sideband read, path x"
18 Request narrow-band power reading

READING RETURNED
19 #BP 18X10 (where X is 0, 1, 2 or 3 for path under test)
19 Screen message: "AM gain x, SB level x = xxxx dBm (x100)"
19 IF more readings to take
20 Request narrow-band power measurement
20 REPEAT from section 19
19 ELSE all readings done
21 Calculate average power level for carrier signal
21 Calculate AM gain scaling for path under test
21 Screen message: "AM gain CAL value %u = %x"
21 IF more A1 mod paths to calibrate
22 #BP 18X11 (where X is 0, 1, 2 or 3 for path under test)
22 Select next mod path
22 REPEAT from section 13
21 ELSE all mod paths done
23 #BP 18X12 (where X is 0, 1, 2 or 3 for path under test)
23 END

CAL FAILURE: #BP 18001, #BP 18004

## Phase modulation generation gain calibration

### Select/deselect path

*[cal values], [audio gen]; [cal config] [PM GAIN]*

### Purpose

The purpose of the calibration is to determine the A1 scaling value required to produce correctly levelled audio signals for the PM drive.

### Description

Given that the generation of phase mod drive signals is no different for A1 than generating FM drive signals, this calibration works by setting up a signal on the FM path on A1 and routeing it from A1 to the RMS-DC converter and ADC on A2. This signal is measured. An equivalent PM drive level is set up and measured. The difference between the two DC readings allows a correction to be made to the phase mod drive scaling so that the phase mod drive is the same level as the FM drive.

Calibration ON/OFF selection key: *[*PM GAIN*]*

### Calibration procedure

| | |
|---|---|
| | INITIALISATION |
| 1 | Connect Vref as RF level reference |
| 1 | Select A1 FM mod path as AFREF |
| 1 | Route AFREF to A2/A3 CAL signal |
| 1 | Select RMS-DC converter output as input to A2 ADC |
| 1 | Select CAL signal as input to RMS-DC converter |
| 1 | Screen message: "PM gain initialised" |
| 1 | #BP 10000 |
| | START FM DRIVE MEASUREMENT |
| 2 | Route required gen source to FM output on A1 |
| 2 | Select FM on A1 |
| 2 | Set mod frequency to 5 kHz, half scale on A1 gain |
| 2 | Screen message: "Initialised for FM drive level check" |
| 2 | #BP 17500 |
| | MEASURE FM DRIVE LEVEL |
| 3 | Screen message: "Requesting first read for FM drive" |
| 3 | Request A2 ADC reading |
| 4 | ADC READING RETURNED |
| 3 | #BP 17501 |
| 4 | Screen message: "FM drive reading x = xxxx" |
| 4 | If more readings to take |
| 5 | Request A2 ADC reading |
| 5 | REPEAT from section 4 |
| 4 | ELSE all readings done |
| 6 | Calculate average reading for FM drive signal |
| 6 | Screen message: "FM drive level reading = xxxx" |
| 6 | #BP 17502 |

*continued.....*

```
                SUCCESSIVE APPROXIMATION ON PM GAIN SCALING
7               FOR EACH OF 16 BITS IN PM GAIN SCALING:
8                       Set PM gain value
8                       Screen message: "OR = xxxx, LOAD = xxxx"
8                       #BP 17503
8                       Request A2 ADC reading
8                       Screen message: "Requesting first read for pm drive"
9                       ADC READING RETURNED
9                       #BP 17504
9                       Screen message: "PM drive reading x = xxxx"
9                       IF more readings to take
10                      Request A2 ADC reading
10                      REPEAT from section 9
9                       ELSE all readings done
11                      Calculate average PM drive level reading
11                      Screen message: "PM drive level reading = xxxx"
11                      #BP 17505
                END OF SUCCESSIVE APPROXIMATION
12              Check PM drive reading in limits  (+/- 3 lsb)
12              IF reading OK
13                      Flag CAL as passed
13              Screen message: "Passed PM gain CAL..."
13                      #BP 17506
12              ELSE
14                      Flag CAL as failed
14              Screen message: "Failed PM gain CAL..."
14                      #BP 17507
12              END

CAL FAILURE: #BP 17507
```

# Digital systems board calibration

## Introduction to DSC calibrations

There are seven Digital Systems Card (DSC) calibrations:

1. Digital receiver attenuator cal
2. A8 attenuator DAC characteristic
3. Digital sig gen frequency response *plus 2967 digital sig gen frequency response*
4. A8 Round trip delay cal
5. Digital receiver frequency response *plus 2967 digital receiver frequency response*
6. A8 receiver AGC gain cal
7. A8 measurement window cal

The calibrations shown in *italics* apply to the 2967 only.

The calibrations are all ON by default (with the obvious exception of the 2967 cals in a non-2967 instrument) and are run in the order shown above. They should only be run after the standard 2965 hardware has been calibrated.

The digital sig gen user cal consists of routines 1, 2 and 3 above plus, initially, a partial calibration of the broadband power meter if required.

The digital power meter user cal consists of routines 1, 5 and 6 above, again starting with a partial calibration of the broadband power meter if required.

In addition to these, there is the AF6 mixer DC bias direction sub-calibration, which is run as part of the extended (2967) frequency response calibrations (see note below).

There are also calibrations for the warp offsets for the AB4 warp oscillator. These are limited to ±25ppm for 2966A and 2968, and additionally ±10ppm for the 2967.

**Note:** The 2967 extended frequency calibrations rely on the fact that routing the DC supply into the AF6 mixer I.F. port enables the analog sig gen (AF5) output to be doubled. This is the AF6 'cal path'. The noise generated by the mixer is low enough not to affect the broadband power meter accuracy, which therefore measures the level of the sig gen in the 2 GHz band. Note that because the I.F. frequency is effectively 0 Hz, there are no mixer sidebands. For a +13 dBm input to AF6 in cal mode the output should be around +5 dBm.

## Digital Receiver Attenuator Cal

### Purpose of Cal

The aim of the digital receiver attenuator cal is to find the actual attenuation of the 10, 20 and 40 dB receiver attenuator pads (AC1 module). These values are then applied to all in-band power measurements within the DSC calibration routines, as well as to all GSM Tx power measurements.

### Description

#### 10 dB Attenuator Pad

The AF5 output level is set to a nominal +3.00 dBm with 10 dB sig gen attenuation set. The receiver attenuation is set to 0 dB with the sensitive receiver amplifier out. The A8 receiver AGC is successively set to give -6.00 dB ± 0.25 dB at the A8 ADC. The 10 dB pad is then switched in and the ADC read. The actual attenuation in the 10 dB pad is simply the difference between the two ADC power measurements.

#### 20 dB Attenuator Pad

The AF5 output level is set to a nominal +13.00 dBm with 10 dB sig gen attenuation set. The receiver attenuation is set to 10 dB with the sensitive receiver amplifier out. The A8 receiver AGC is successively set to give -6.00 dB ± 0.25 dB at the A8 ADC. The 20 dB pad is then switched in, the 10 dB pad is switched out, and the ADC read. The actual attenuation in the 20 dB pad is the actual 10 dB attenuation (as found above) plus the difference between the two ADC power measurements.

#### 40 dB Attenuator Pad

The AF5 output level is set to a nominal +13.00 dBm with 10 dB sig gen attenuation set. The receiver attenuation is set to 30 dB (i.e. 10 and 20 dB pads switched in) with the sensitive receiver amplifier in. The A8 receiver AGC is successively set to give -6.00 dB ± 0.25 dB at the A8 ADC. The 40 dB pad is then switched in, the 10 and 20 dB pads are switched out, and the ADC read. The actual attenuation in the 40 dB pads is the actual 10 dB attenuation plus the actual 20 dB attenuation (both found above) plus the difference between the two ADC power measurements.

### Calibration Procedure

In the following routine, 'bp' is the current attenuator code (0 for 10 dB, 1 for 20 dB and 2 for the 40 dB pad) multiplied by 10.

INITIALISATION

1 Load GSM application on DSC, then load GSM cal application
1 Set RF port configuration to N-type duplex
1 Screen message "Initialised Rx attenuation cal"
1 #BP 10000

*continued.....*

SET HARDWARE FOR POINT

2 Select analog sig gen path in AB3/AF6 with low A8 70 MHz IF level
2 Set Rx and sig gen frequencies to 10 MHz
2 Set AF5 level, sensitive receiver, and sig gen and receiver attenuators as above
2 Screen message "Set *xx* dB rx atten for cal point *p*"
2 #BP 65000 + bp

FIND A8 RX AGC DAC SETTING

3 Set minimum AGC gain, request ADC power measurement
3 #BP 65001 + bp

RECEIVED REFERENCE ADC POWER MEASUREMENT

4 IF power is -6.00 ± 0.25 dB
5 Set next receiver attenuation for difference measurement
5 Screen message "Found *x.xx* dB using 0x*yy*/*zz*"
5 #BP 65002 + bp
5 Proceed to section 10
4 ELSE IF Already had 5 re-tries
6 Screen message "Failed to find AGC gain after 5 re-tries"
6 #BP 99998
6 Flag cal as FAILED
4 ELSE
7 Calculate new AGC DAC settings
7 IF new settings out of range
8 Screen message "AGC request 0x*yy*/*zz* out of range"
8 #BP 99998
8 Flag cal as FAILED
7 ELSE
9 Set AGC DAC, request power measurement
9 Screen message "Got *x.xx* dB, trying 0x*yy*/*zz*"
9 #BP 65003 + bp
9 Repeats from 4

REQUEST DIFFERENCE MEASUREMENT

10 Request ADC power measurement
10 #BP 65004 + bp

RECEIVED ADC DIFFERENCE MEASUREMENT

11 Screen message "**** *yy-zz* ATTEN DELTA IS *x.xx* dB ****"
11 #BP 65005 + bp
11 IF More attenuators to calibrate

Repeat from 2
11 ELSE
Proceed to 12

END OF RX ATTENUATOR CAL

12 Calculate attenuator values:
12 10 dB atten = 0-10 dB delta
12 20 dB atten = 10-20 dB delta + 10 dB atten
12 40 dB atten = 30-40 dB delta + 10 dB atten + 20 dB atten
12 IF Any value is greater than 0.50 dB in error
13 Screen message "Failed Rx attenuator cal"
13 #BP 99998
13 Flag cal as FAILED
12 ELSE
14 Screen message "Finished Rx attenuator cal"
14 #BP 65050
14 Flag cal as PASSED

FAIL POINT: #99998

## Typical Values and Failures

The calculated values should all be within ±0.50 dB of the nominal values (cal will fail if outside this range).

If the cal fails with the screen message “Failed to find AGC gain after 5 re-tries” then there is a problem in finding the AGC DAC setting to used - the problem is unlikely to lie with the bulk attenuators but instead in the linearity of the AGC DACs. Try running the Rx AGC gain cal on it’s own to investigate the actual linearity, looking for an approximate 0.16 dB/code slope on the AGC gain across the whole range of the DACs.

If the cal fails with the screen message “AGC request 0x*yy/zz* out of range” then there is a problem with either the AF5 output level, the receiver gain, or the receiver bulk attenuators. Alternatively there could be a fault with the sig gen bulk attenuators, but note that the sig gen attenuation remains at 10 dB throughout the cal so if the 20 or 40 dB receiver pad cals fail with this message but the 10 dB pad passed there is unlikely to be a problem in the sig gen attenuators.

## A8 Attenuator DAC Characteristic

### Purpose of Cal

The aim of the A8 attenuator DAC characteristic calibration is to provide DAC values for the sig gen attenuator DAC which controls the level of the 70 MHz output from A8 SKF. The 12-bit DAC is calibrated using a successive approximation on fixed points followed by the application of a curve fitting-algorithm, which together give values for 0 to -32 dBm A8 output level, in 0.5 dB steps.

Note that different analog sig gen settings are used to generate the reference power readings for the 2967:

1. Frequency is 800 MHz rather than 10 MHz because AF6 only works down to 800 MHz (at the AF6 RF output port).
2. Level is -22.5 dBm (at N-type) rather than -29.5 dBm because AF6 has a nominal IF to RF insertion loss of 3 dB rather than AB3’s 10 dB.

These differences are shown in *italics* in the following sections.

### Description

The analog sig gen path is set in AB3/AF6 and the output is routed to the broadband power meter with 40 dB of receiver attenuation set. The sig gen is set to -29.5 dBm (at N-type) at 10 MHz (*-22.5 dBm at 800 MHz for 2967*) with no correction data applied. The broadband power meter uses input switch correction data and should read 0 dBm (*7 dBm for 2967)* using range 2. Any error is applied to the sig gen level. We now have the analog sig gen generating the equivalent of 0 dBm out of A8.

The A8 receiver AGC gain is successively adjusted to give an ADC power reading of -6.00 ± 0.25 dB. This provides a target ADC power reading for 0 dBm out of A8. This is adjusted to compensate for the actual attenuation in the receiver (as found in the digital receiver attenuator cal).

The receiver attenuation is changed to 30 dB (to account for the IF to RF insertion loss of AB3/AF6) and AB3/AF6 set to digital mode. The sig gen frequency is adjusted for the single tone offset (67.708 kHz). A successive approximation is then performed on the output attenuator DAC load value to give the same ADC reading as for the reference found above, with the power readings again adjusted to compensate for receiver attenuator error. This process is repeated for -0.5 dBm through to -4.5 dBm A8 output levels by simply looking for (target-0.5) dB through to (target-4.5) dB on the ADC. These values are found explicitly because the curve has a major discontinuity in it somewhere between 0 and -5 dBm.

Values are then found for -5 dBm, -8 dBm, -11 dBm, -15 dBm, -17 dBm, -20 dBm, -23 dBm, -27 dBm, and -31 dBm. The receiver attenuation is decreased by 10 dB each time the required A8 output level drops 10 dB so that the target level on the ADC is always less than 10 dB away from the 0 dBm target. These DAC values are then used with a cubic spline curve-fitting algorithm to give a look-up table of DAC values representing the A8 output levels between -5 dBm and -32 dBm in 0.5 dB steps.

## Calibration Procedure

INITIALISATION

1 Load GSM application on DSC, then load GSM cal application
1 Set RF port configuration to N-type duplex
1 Calculate Rx attenuator errors
1 Screen message “Initialised A8 attenuator DAC cal”
1 #BP 10000

FIND BROADBAND REFERENCE

2 Select analog AB3/AF6 path, set sig gen level and frequency
2 Set 40 dB receiver attenuation, switch in sensitive receiver amp
2 Screen message “Set *x* MHz for absolute ref”
2 #BP 60000

REQUEST BROADBAND POWER REFERENCE

3 Request averaged reading using range 2
3 Screen message “Requested absolute ref reading”
3 #BP 60001

GOT BROADBAND REFERENCE

4 IF Reference is out of range or invalid
5 Screen message “Ref out of range :*x.xx* dBm, offset *y.yy* dB”
5 #BP 99998
5 Flag cal as FAILED
4 ELSE
6 Screen message “Ref is *x.xx* dBm, offset is *y.yy* dB of loss”
6 #BP 60050

INITIALISE FOR ADC REFERENCE READING

7 Increase analog sig gen level by *y.yy* dB
7 Screen message “Set *x* MHz for digital ref”
7 #BP 60100

FIND A8 RX AGC DAC SETTING

8 Set minimum AGC gain, request ADC power measurement
8 #BP 60101

RECEIVED ADC REFERENCE MEASUREMENT

9 IF power is -6.00 ± 0.25 dB
10 Set next receiver attenuation for difference measurement
10 Screen message “Found *x.xx* dB using 0x*yy*/*zz*”
10 #BP 60102
10 Proceed to section 15
9 ELSE IF Already had 5 re-tries
11 Screen message “Failed to find AGC gain after 5 re-tries”
11 #BP 99998
11 Flag cal as FAILED
9 ELSE
12 Calculate new AGC DAC settings
12 IF new settings out of range
13 Screen message “AGC request 0x*yy*/*zz* out of range”
13 #BP 99998
13 Flag cal as FAILED
12 ELSE
14 Set AGC DAC, request power measurement
14 Screen message “Got *x.xx* dB, trying 0x*yy*/*zz*”
14 #BP 60103
14 Repeats from section 9

GOT ADC REFERENCE

15 Adjust ADC power for rx attenuator error
15 Screen message “Digital ref is *x.xx* dB”
15 #BP 60150

SET FOR SUCCESSIVE APPROXIMATION

16 Set digital mode in AB3/AF6, set AF5 output to +13 dBm for mixer LO input
16 Set 0 dB sig gen bulk attenuation
16 Calculate ADC target levels
16 Screen message “Starting successive approximation…”
16 #BP 60200

INITIALISE FOR CAL POINT

17 Load output attenuator DAC with 0x800
17 Reset OR pattern to 0x800
17 Set receiver bulk attenuation
17 Screen message “Set 0x800, cal point *p*”
17 #BP 60200 + p

REQUEST ADC READING

18 Request ADC power measurement
18 Screen message “Requested digital reading, cal point *p*”
18 #BP 60300 + p

GOT ADC READING

19 Adjust ADC power for rx attenuator error
19 IF Power < target
    Keep load value
19 Shift OR pattern right 1 bit
19 Next load value is load value OR’ed with OR pattern
19 IF Still bits to test
20  Load DAC with new load value
20  Screen message “Measured *x.xx* dB, set 0x*yyy*, cal point *p*”
20  #BP 60400 + p
20  Repeats from section 18
19 ELSE
21  IF DAC value is 0x000
22  Screen message “FOUND 0x000 FOR *x.xx* dBm A8 OUTPUT”
22  #BP 99998
22  Flag cal as FAILED
21  ELSE IF cal point is 10 and DAC value is 0xfff
23  Screen message “ERROR: DAC value for -5dBm is 0xfff”
23  #BP 99998
23  Flag cal as FAILED
21  ELSE
24  Screen message “Found DAC value = 0x*yyy* for *y.y* dBm A8 o/p”
24  #BP 60500 + p
24  Increment cal point
24  IF Still more points
        Repeat from section 17
24  ELSE
        Proceed to section 25

END OF ATTENUATOR DAC CAL

25 Load 0 to -4.5 dBm DAC values
25 Calculate -5 to -32 dBm DAC values via cubic spline curve fit
25 Screen message “Passed A8 attenuator DAC cal”
25 #BP 61000
25 Flag cal as PASSED
FAIL POINT: #99998

## Typical Values and Failures

There are two pages of attenuator DAC values. These usually start at 0xfff for 0 dBm A8 output (*or around 0xa00 for 2967*) and go down to between 0x200 and 0x100 for -32 dBm output.

If the cal fails with the screen message "Ref out of range :*x.xx* dBm, offset *y.yy* dB" then there is probably a fault in either the sig gen or the broadband power meter. Check initially the level at the N-type; it should be -29.5 dBm at 10 MHz (*-22.5 dBm at 800 MHz for 2967*). If the sig gen appears to be correct then the fault is likely to lie with the broadband power meter.

If the cal fails with the screen message "Failed to find AGC gain after 5 re-tries" then there is a problem in finding the AGC DAC setting to used - the problem is unlikely to lie with the bulk attenuators but instead in the linearity of the AGC DACs. Try running the Rx AGC gain cal on it's own to investigate the actual linearity, looking for an approximate 0.16 dB/code slope on the AGC gain across the whole range of the DACs.

If the cal fails with the screen message "AGC request 0x*yy*/*zz* out of range" then the level getting to A8 is wrong such that the AGC DACs cannot bring the level at the ADC to -6.00 dB. Given the broadband power meter reference measurement was okay, the fault probably lies in the receiver chain (including possibly the receiver bulk attenuators).

If the cal fails with the screen message "FOUND 0x000 FOR *x.xx* dBm A8 OUTPUT" then the output attenuator DAC has reached its bottom limit - this is unlikely to be due to the receiver (since it has already been fairly comprehensively exercised by the ramping of the AGC gain) but may possibly indicate the A8 output level cannot get low enough, either because there is too much gain or the attenuator DAC is stuck.

If the cal fails with the screen message "ERROR: DAC value for -5dBm is 0xfff" then the sig gen level is excessively low. This is likely to be caused by an A8 fault (e.g. the leveling loop output, stuck attenuator DAC, attenuator DAC reference voltage low), or by a problem in the AB3/AF6 mixer module.

The cal will not run if the digital receiver attenuator cal has already failed.

## Digital Sig Gen Frequency Response

### Purpose of Cal

The aim of the digital sig gen frequency response cal is to obtain loss figures for the digital sig gen output as it varies with frequency. These figures provide absolute leveling for the sig gen output across its frequency range. Note that these losses also include the frequency response of the AB3/AF6 mixer module.

### Description

#### Standard Sig Gen Frequency Response

The analog sig gen path is set in AB3/AF6 and the output is routed to the broadband power meter with 10 dB of receiver attenuation set and the sensitive receiver amplifier path selected. The sig gen is set to -33 dBm (at the N-type output) at 10 MHz (*725 MHz for 2967*) with no correction data applied. The broadband power meter uses input switch correction data and should read -3.5 dBm using range 2. Any error is stored (where a positive error implies loss) as the *absolute loss*. This is repeated in 25 MHz steps (10 MHz, then 25 MHz, 50 MHz, …) up to and including 1000 MHz. -33 dBm is chosen as the sig gen level so that there is at least one bulk attenuator in the sig gen path at all times, thereby reducing the effects of VSWR.

The analog sig gen level is then set to -53 dBm (i.e. switch in an extra 20 dB sig gen attenuation); this value is chosen as a level achievable on the digital sig gen that is a multiple of 10 dB away from the initial (broadband) gen level. The receiver and sig gen frequencies are set back to 10 MHz (*725 MHz for 2967*). The A8 receiver AGC gain is successively adjusted to give an ADC power reading of -8.50 ± 0.25 dB. This value is chosen because it is close to -6.00 dB (the optimum ADC input level) but gives room for the AF5 output level to vary without compressing the ADC. The ADC is then read in 25 MHz steps to 1000 MHz. We have now effectively calibrated the A8 (in-band) power meter against the broadband power meter. This is necessary because (1) the level out

of the digital sig gen is too low to be measured accurately on the broadband power meter, and (2) the mixer products and L.O. breakthrough would give misleading power readings on the broadband meter.

The digital sig gen is now selected and set to an (uncorrected) -53 dBm and swept across the frequency range as above (with the 67.708 kHz single tone offset applied). The *relative loss* at each frequency is the difference between the two ADC readings, i.e. analog - digital. The digital sig gen loss at each frequency is then given by

digital sig gen loss = absolute loss - relative loss

### Extended Sig Gen Frequency Response (*2967 Only*)

The AF5 output level is set to +13 dBm, the calibration path is selected in AF6, and the optimum bias direction selected. The AF6 output is then routed to the broadband power meter with 0 dB sig gen and 20 dB of receiver attenuation set and the sensitive receiver bypass path selected. (Ideally the sig gen attenuation would be 10 dB to reduce the effects of VSWR, but this gives a level too low for the broadband power meter to read accurately.) The sig gen and receiver are both set to 1705 MHz. The broadband power meter uses input switch correction data and uses range 2. The mixer L.O. breakthrough should give rise to a +5 dBm reading from the broadband power meter (this corresponds to -24.5 dBm at the N-type). Any error is stored (where a positive error implies loss) as the *absolute loss*. This is repeated in 25 MHz steps up to and including 2005 MHz.

The sig gen attenuation is then set to 30 dB (this corresponds to -54.5 dBm at the N-type, a level also achievable on the digital sig gen) and the frequency set back to 1705 MHz. The A8 receiver AGC gain is successively adjusted to give an ADC power reading of -6.00 ± 0.25 dB. The ADC is then read in 25 MHz steps to 2005 MHz.

The digital sig gen is now selected and set to an (uncorrected) -54.5 dBm and swept across the frequency range as above (with the 67.708 kHz single tone offset applied). The *relative loss* at each frequency is the difference between the two ADC readings, i.e. analog - digital. The digital sig gen loss at each frequency is then given by

digital sig gen loss = absolute loss - relative loss

## Calibration Procedure

In the following routines, ‘bp’ is the frequency in MHz *rounded down* to a multiple of 10 MHz, so for 725 MHz the value of bp is 720.

### Standard Sig Gen Frequency Response

INITIALISATION

1 Load GSM application on DSC, then load GSM cal application
1 Set RF port configuration to N-type duplex
1 Set receiver attenuator and switch amplifier in
1 Select analog AB3/AF6 path, set sig gen level and frequency
1 Screen message “Initialised digital sig gen freq response cal”
1 #BP 10000

INITIALISE BROADBAND FREQUENCY POINT

2 Set receiver and sig gen frequencies for cal point
2 Screen message “Setting *x* MHz”
2 #BP 70000 + bp

REQUEST BROADBAND READING

3 Request averaged broadband power measurement
3 Screen message “Requested power reading at *x* MHz”
3 #BP 70001 + bp

*continued.....*

RECEIVED BROADBAND READING

4 Calculate absolute loss for frequency
4 IF at first point AND loss is greater than ±4 dB
5 Screen message “ERROR: absolute loss out of range (*x.xx* dB)”
5 #BP 99998
5 Flag cal as FAILED
4 ELSE
6 Screen message “Found absolute loss @ *x* MHz = *y.yy* dB”
6 #BP 70002 + bp
6 Increment cal frequency to next point
6 IF reached 1000 MHz
7 Set sig gen level for AGC gain check
7 Proceed to section 8
6 ELSE
Repeat from section 2

FIND A8 RX AGC DAC SETTING

8 Set minimum AGC gain, request ADC power measurement
8 Screen message “Set *x* MHz for AGC gain check
8 #BP 75000

RECEIVED GAIN CHECK POWER MEASUREMENT

9 IF power is -8.50 ± 0.25 dB
10 Screen message “Found *x.xx* dB using 0x*yy*/*zz*”
10 #BP 75001
10 Proceed to section 15
9 ELSE IF already had 5 re-tries
11 Screen message “Failed to find AGC gain after 5 re-tries”
11 #BP 99998
11 Flag cal as FAILED
9 ELSE
12 Calculate new AGC DAC settings
12 IF new settings out of range
13 Screen message “AGC request 0x*yy*/*zz* out of range”
13 #BP 99998
13 Flag cal as FAILED
12 ELSE
14 Set AGC DAC, request power measurement
14 Screen message “Got *x.xx* dB, trying 0x*yy*/*zz*”
14 #BP 75002
14 Repeats from section 9

INITIALISE ANALOG IN-BAND FREQUENCY POINT

15 Set receiver and sig gen frequencies for cal point
15 Screen message “Setting in-band @ *x* MHz”
15 #BP 70003 + bp

REQUEST ANALOG IN-BAND READING

16 Request averaged in-band reading from A8
16 Screen message “Requested in-band reading @ *x* MHz”
16 #BP 70004 + bp RECEIVED ANALOG IN-BAND READING

17 Store ADC power
17 Screen message “In-band reading for *x* MHz = *y.yy* dB”
17 #BP 70005 + bp
17 Increment cal frequency to next point
17 IF reached 1000 MHz
18 Select digital AB3/AF6 path
18 Set digital sig gen level
18 Proceed to section 19
17 ELSE
Repeat from section 15

INITIALISE DIGITAL IN-BAND FREQUENCY POINT

19 Set receiver and sig gen frequencies for cal point
19 Screen message "Setting digital @ *x* MHz"
19 #BP 70006 + bp

REQUEST DIGITAL IN-BAND READING

20 Request averaged in-band reading from A8
20 Screen message "Requested digital in-band reading"
20 #BP 70007 + bp

RECEIVED DIGITAL IN-BAND READING

21 Calculate loss at frequency point
21 IF at first point AND loss is greater than ±5 dB
22 Screen message "ERROR: *x* MHz loss = *y.yy* dB : out of range"
22 #BP 99998
22 Flag cal as FAILED
21 ELSE
23 Screen message "Ave *x.xx* dB. Loss @ *y* MHz = *z.zz* dB"
23 #BP 70008 + bp
23 Increment cal frequency to next point
23 IF reached 1000 MHz
Proceed to section 24
23 ELSE
Repeat from section 19

END OF DIGITAL SIG GEN FREQUENCY RESPONSE CAL

24 Extrapolate 10 MHz figure back to 0 MHz (ensures 25 MHz steps)
24 Screen message "Passed digital sig gen freq response cal"
24 #BP 70009
24 Flag cal as PASSED

FAIL POINT: #99998

### Extended Sig Gen Frequency Response (*2967 Only*)

INITIALISATION

1 Load GSM application on DSC, then load GSM cal application
1 Set RF port configuration to N-type duplex
1 Screen message "Initialised ext dig sig gen freq response cal"
1 #BP 10000

GET AF6 BIAS DIRECTION

2 Invoke bias direction cal
2 Screen message "Establishing AF6 bias direction…"
2 #BP 70000

FOUND BIAS DIRECTION

3 Set receiver attenuator and switch amplifier out
3 Select AF6 cal path (as found above), set sig gen level and frequency
3 Screen message "Selected *xxxxxx* bias, starting cal…"
3 #BP 70000

INITIALISE BROADBAND 2967 FREQUENCY POINT

4 Set receiver and sig gen frequencies for cal point
4 Screen message "Setting *x* MHz"
4 #BP 70000 + bp

REQUEST BROADBAND READING

5 Request averaged broadband power measurement
5 Screen message "Requested power reading at *x* MHz"
5 #BP 70001 + bp

*continued.....*

RECEIVED BROADBAND READING

6 Calculate absolute loss for frequency
6 IF at first point AND loss is greater than ±10 dB
7 Screen message “ERROR: absolute loss out of range (*x.xx* dB)”
7 #BP 99998
7 Flag cal as FAILED
6 ELSE
8 Screen message “Found absolute loss @ *x* MHz = *y.yy* dB”
8 #BP 70002 + bp
8 Increment cal frequency to next point
8 IF reached 2005 MHz
9 Set sig gen attenuation for AGC gain check
9 Proceed to section 10
8 ELSE
Repeat from section 4

FIND A8 RX AGC DAC SETTING

10 Set minimum AGC gain, request ADC power measurement
10 #BP 75010

RECEIVED GAIN CHECK POWER MEASUREMENT

11 IF power is -6.00 ± 0.25 dB
12 Screen message “Found *x.xx* dB using 0x*yy*/*zz*”
12 #BP 75011
12 Proceed to section 17
11 ELSE IF already had 5 re-tries
13 Screen message “Failed to find AGC gain after 5 re-tries”
13 #BP 99998
13 Flag cal as FAILED
11 ELSE
14 Calculate new AGC DAC settings
14 IF new settings out of range
15 Screen message “AGC request 0x*yy*/*zz* out of range”
15 #BP 99998
15 Flag cal as FAILED
14 ELSE
16 Set AGC DAC, request power measurement
16 Screen message “Got *x.xx* dB, trying 0x*yy*/*zz*”
16 #BP 75012
16 Repeats from section 11

INITIALISE ANALOG IN-BAND 2967 FREQUENCY POINT

17 Set receiver and sig gen frequencies for cal point
17 Screen message “Setting in-band @ *x* MHz”
17 #BP 70003 + bp

REQUEST ANALOG IN-BAND READING

18 Request averaged in-band reading from A8
18 Screen message “Requested in-band reading @ *x* MHz”
18 #BP 70004 + bp

RECEIVED ANALOG IN-BAND READING

19 Store ADC power
19 Screen message “In-band reading for *x* MHz = *y.yy* dB”
19 #BP 70005 + bp
19 Increment cal frequency to next point
19 IF reached 2005 MHz
20 Select digital AB3/AF6 path
20 Set digital sig gen level
20 Proceed to section 21
19 ELSE
Repeat from section 17

INITIALISE DIGITAL IN-BAND 2967 FREQUENCY POINT

21 Set receiver and sig gen frequencies for cal point
21 Screen message “Setting digital @ *x* MHz”
21 #BP 70006 + bp

REQUEST DIGITAL IN-BAND READING

22 Request averaged in-band reading from A8
22 Screen message “Requested digital in-band reading”
22 #BP 70007 + bp

RECEIVED DIGITAL IN-BAND READING

23 Calculate loss at frequency point
23 IF at first point AND loss is greater than ±5 dB
24 Screen message “ERROR: *x* MHz loss = *y.yy* dB : out of range”
24 #BP 99998
24 Flag cal as FAILED
23 ELSE
25 Screen message “Ave *x.xx* dB. Loss @ *y* MHz = *z.zz* dB”
25 #BP 70008 + bp
25 Increment cal frequency to next point
25 IF reached 2005 MHz
Proceed to section 26
25 ELSE
Repeat from section 21

END OF DIGITAL SIG GEN FREQUENCY RESPONSE CAL

26 Screen message “Passed digital sig gen ext freq response cal”
26 #BP 70009
26 Flag cal as PASSED

FAIL POINT: #99998

## Typical Values and Failures

The loss figures range from around 0 dB at 0 or 10 MHz to around 5 dB at 1000 MHz. For 2967, the figures are around 1 dB for the 800 to 1000 MHz range, and between 3 and 5 dB in the 1705 to 2005 MHz range. The 2967 figures are usually fairly flat (within 1 dB of each other).

If the cal fails with the screen message “ERROR: absolute loss out of range (*x.xx* dB)” then there is a problem with either the broadband power meter or the sig gen. Measuring the sig gen level at the N-type will establish whether the sig gen is at fault.

If the cal fails with the screen message “Failed to find AGC gain after 5 re-tries” then there is a problem in finding the AGC DAC setting to used - the problem is unlikely to lie with the bulk attenuators but instead in the linearity of the AGC DACs. Try running the Rx AGC gain cal on it’s own to investigate the actual linearity, looking for an approximate 0.16 dB/code slope on the AGC gain across the whole range of the DACs.

If the cal fails with the screen message “AGC request 0x*yy/zz* out of range” then there is a problem with either the AF5 output level, the receiver gain, or the receiver bulk attenuators. Alternatively there could be a fault with the sig gen bulk attenuators, but note that the sig gen attenuation remains at 10 dB throughout the cal so if the 20 or 40 dB receiver pad cals fail with this message but the 10 dB pad passed there is unlikely to be a problem in the sig gen attenuators.

If the cal fails with the screen message “ERROR: *x* MHz loss = *y.yy* dB : out of range” then there is a fault in the digital sig gen output level. Verify initially that the attenuator DAC cal has been run and passed; if it has then there is most likely a frequency-dependent fault in the AB3/AF6 mixer module or in the standard 2965 sig gen hardware.

The cal will not run if either the digital receiver attenuator cal or any of the digital sig gen calibrations have already failed.

## A8 Round Trip Delay Cal

### Purpose of Cal

The round trip delay (RTD) represents the time taken for a burst to be processed by the digital systems card. This is a combination of the time between issuing the instruction to transmit a burst and this actually happening, RF delay (small), and the time taken to process the burst in the receiver. The aim of the RTD calibration is to find this delay (in bits) so that the measured mobile timing advance can be adjusted to compensate for the inherent test set delay, giving the true mobile timing advance. For example, if the measured timing is +0.60 bits and the RTD is +0.50 bits, the actual mobile timing advance is 0.60 - 0.50 = 0.10 bits.

### Description

The digital path is selected in AB3/AF6 and the digital sig gen is set to approximately -45 dBm at 909 MHz. The MAP (modulation analyzer processor on A8) is set to closed receiver (loop-back) mode and the TTP (transmit traffic processor on A4) is set to generate a bursty signal. The TTP is now generating a signal similar to that generated by a mobile, which the MAP can demodulate and measure. The receiver attenuation is set to 20 dB with the sensitive receiver amplifier selected.

A Tx measurement is requested from the MAP and the burst timing stored. The measurement is discarded if it is invalid. The round trip delay is the average of 20 burst timing measurements. The cal fails if there are 10 successive invalid measurements.

Note that the GSM cal application is not loaded for the RTD cal.

### Calibration Procedure

INITIALISATION

1 Load GSM application on DSC
1 Set TTP to bursty mode
1 Set MAP to closed receiver mode
1 Set RF port configuration to N-type duplex
1 Screen message “Initialised round trip delay cal”
1 #BP 10000

START RTD CAL

2 Set receiver and sig gen frequencies for RTD cal
2 Set sig gen level and receiver attenuation
2 Screen message “Starting round trip delay cal”
2 #BP 62900

REQUEST TIMING MEASUREMENT

3 Request digital Tx measurement
3 Screen message “Requested timing measurement *p*”
3 #BP 63000 + p

RECEIVED TIMING MEASUREMENT

4 IF measurement is invalid
5 Increment fail count
5 IF fail count is 10
6 Screen message “Retrying for measurement *p*”
6 #BP 63100
6 Repeat from section 3
5 ELSE
7 Screen message “Cannot find valid reading”
7 #BP 99998
7 Flag cal as FAILED
4 ELSE IF averaging not complete
8 Clear fail count
8 Log burst timing

```
8               #BP 63000 + p
8               Repeat from section 3
4       ELSE
9               RTD cal complete
9               IF averaged timing measurement is less than ±2 bits
10                      Screen message “Round trip delay is x.xx bits”
10                      #BP 63000 + p
10                      Proceed to section 12
9               ELSE
11                      Screen message “Round trip delay out of range, x.xx bits”
11                      #BP 99998
11                      Flag cal as FAILED
        END OF RTD CAL
12      Screen message “Passed round trip delay cal”
12      #BP 63101
12      Flag cal as PASSED
FAIL POINT: #99998
```

## Typical Values and Failures

The round trip delay changes as the digital systems card software is up-issued. For version 7.00 GSM application the RTD was approximately 0.50 bits, and for 8.00 this has increased to approximately 0.60 bits.

If the cal fails with the screen message “Cannot find valid reading” then first try re-running the cal on its own. If it still fails, use the “A4 test mode” diagnostic with bursty mode switched on and the hardware set to the same settings as used in the cal. This verifies that the sig gen and receiver are working correctly.

If the cal fails with the screen message “Round trip delay out of range, *x.xx* bits” then re-run the cal. This failure should not occur unless there is some serious fault in the software, and should be reported immediately to engineering should it occur.

## Digital Receiver Frequency Response

### Purpose of Cal

The aim of the digital receiver frequency response cal is to obtain frequency loss figures for the receiver I.F. chain, including the AK2 down-converter module when fitted. The frequency losses of both the sensitive receiver bypass path and the sensitive receiver amplifier path are measured, with all figures then referred back to the 10 MHz loss figure of the sensitive receiver bypass path (i.e. the 10 MHz bypass path loss is always 0.00 dB). Absolute leveling at 10 MHz is provided by the A8 receiver AGC gain cal.

This calibration is similar to that performed in the analog frequency response calibration (spectrum analyzer input filter cal) but is done using the A8 in-band power meter rather than the log-amp.

### Description

#### Standard Receiver Frequency Response

The analog sig gen path is set in AB3/AF6 and the output is routed to the broadband power meter with 10 dB of receiver attenuation set and the sensitive receiver bypass path selected. The sig gen is set to give +7 dBm out of AF5 with 10 dB attenuation set (corresponds to -32.5 dBm at the N-type output) at 10 MHz with no correction data applied. The broadband power meter uses input switch correction data and should read -3 dBm using range 2. This broadband reading is stored. This is repeated in 50 MHz steps (10 MHz, then 50 MHz, 100 MHz, …) up to and including 1000 MHz. As with the sig gen frequency response cal, there is at least one bulk attenuator in the sig gen path at all times, thereby reducing the effects of VSWR.

The receiver and sig gen frequencies are then set back to 10 MHz and the A8 receiver AGC gain successively adjusted to give an ADC power reading of -6.00 ± 0.25 dB. The ADC is then read in 50 MHz steps from 10 MHz to 1000 MHz, with the ADC power reading adjusted to compensate for the actual bulk attenuation in the receiver (as found in the digital receiver attenuator cal).

When 1000 MHz is reached, the frequencies are set back to 10 MHz and the sensitive receiver amplifier path selected and the receiver bulk attenuation set to 30 dB (i.e. 20 dB amplifier so switch in an extra 20 dB bulk attenuation to keep the level at the A8 the same as on the bypass path). The frequency sweep is then repeated, with the ADC power again adjusted to compensate for the error in the new attenuator setting.

The digital receiver loss at each frequency is then given by

digital receiver loss = (A810 - A8freq) - (BBPM10 - BBPM freq) + (AA110 - AA1 freq)

where $A8_{10}$ is the corrected ADC power at 10 MHz for the bypass path, $A8_{freq}$ is the corrected ADC power at the cal frequency in question for a given I.F. input path, BBPM represents the broadband power meter readings, and AA1 is the input switch loss (*or AA2 if 2967*).

### Extended Receiver Frequency Response (*2967 Only*)

The AF5 output level is set to +5 dBm (this is the nominal AF6 output level when in cal mode) with 0 dB sig gen attenuation set (giving -24.5 dBm at the N-type output). The receiver attenuation is set to 20 dB with the sensitive receiver bypass path selected. The sig gen and receiver frequencies are both set to 10 MHz. The broadband power meter uses input switch correction data and should read +5 dBm using range 2. This broadband reading is stored as the broadband 10 MHz reference reading.

The A8 receiver AGC gain is successively adjusted to give an ADC power reading of -8.00 ± 0.25 dB. ADC power reading adjusted to compensate for the actual bulk attenuation in the receiver (as found in the digital receiver attenuator cal) and stored as the in-band (A8) 10 MHz reference reading.

The AF5 output level is set to +13 dBm, the calibration path is selected in AF6, and the optimum bias direction selected. The AF6 output is then routed to the broadband power meter with 0 dB sig gen and 50 dB of receiver attenuation set and the sensitive receiver bypass path selected. (Ideally the sig gen attenuation would be 10 dB to reduce the effects of VSWR, but this gives a level too low for the broadband power meter to read accurately.) The sig gen and receiver are both set to 1705 MHz. The broadband power meter uses input switch correction data and uses range 2. The mixer L.O. breakthrough should give rise to a +5 dBm reading from the broadband power meter (this again corresponds to -24.5 dBm at the N-type). This broadband reading is stored. This is repeated in 25 MHz steps up to and including 2005 MHz.

The sig gen and receiver frequencies are then set back to 1705 MHz and the ADC read in 25 MHz steps to 2005 MHz. The ADC readings are again adjusted to compensate for the actual receiver bulk attenuation.

The digital receiver loss at each frequency is then given by

digital receiver loss = (A810 - A8freq) - (BBPM10 - BBPM freq) + (AA210 - AA2 freq)

where $A8_{10}$ is the corrected ADC power at 10 MHz for the bypass path, $A8_{freq}$ is the corrected ADC power at the cal frequency in question, BBPM represents the broadband power meter readings, and AA2 is the input switch loss.

Only the sensitive receiver bypass path is calibrated for the 2967 extended frequency range; the sensitive receiver amplifier path is never selected when operating in the 1705 - 2005 MHz range.

## Calibration Procedure

### Standard Receiver Frequency Response

In the following routine, 'bp' is simply the frequency in MHz, so at 10 MHz the value of bp is 10.

INITIALISATION

1 Load GSM application on DSC, then load GSM cal application
1 Set RF port configuration to N-type duplex
1 Set receiver attenuation and switch amplifier out
1 Select analog AB3/AF6 path, set AF5 level and sig gen attenuation
1 Calculate receiver attenuator errors
1 Screen message "Initialised digital rx freq response cal"
1 #BP 10000

INITIALISE BROADBAND FREQUENCY POINT

2 Set receiver and sig gen frequencies for cal point
2 Screen message "Setting *x* MHz"
2 #BP 80000 + bp

REQUEST BROADBAND READING

3 Request averaged broadband power measurement
3 Screen message "Requested power reading at *x* MHz"
3 #BP 80001 + bp

RECEIVED BROADBAND READING

4 Store broadband power reading
4 Screen message "Found absolute loss @ *x* MHz = *y.yy* dB"
4 #BP 80002 + bp
4 Increment cal frequency to next point
4 IF reached 1000 MHz
    Proceed to section 5
4 ELSE
    Repeat from section 2

INITIALISE FOR AGC GAIN CHECK

5 Set sig gen and receiver to 10 MHz
5 Screen message "Set 10 MHz for AGC gain check"
5 #BP 75020

FIND A8 RX AGC DAC SETTING

6 Set minimum AGC gain, request ADC power measurement
6 #BP 75021

RECEIVED GAIN CHECK POWER MEASUREMENT

7 IF power is -6.00 ± 0.25 dB
8     Screen message "Found *x.xx* dB using 0x*yy*/*zz*"
8     #BP 75022
8     Proceed to section 13
7 ELSE IF already had 5 re-tries
9     Screen message "Failed to find AGC gain after 5 re-tries"
9     #BP 99998
9     Flag cal as FAILED
7 ELSE
10    Calculate new AGC DAC settings
10    IF new settings out of range
11        Screen message "AGC request 0x*yy*/*zz* out of range"
11        #BP 99998
11        Flag cal as FAILED
10    ELSE
12        Set AGC DAC, request power measurement
12        Screen message "Got *x.xx* dB, trying 0x*yy*/*zz*"
12        #BP 75023
12        Repeats from section 7

*continued.....*

INITIALISE IN-BAND FREQUENCY POINT

13 Set receiver and sig gen frequencies for cal point
13 Screen message "Set *x* MHz, sens rx *yyy*"
13 #BP 80003 + bp

REQUEST IN-BAND READING

14 Request averaged in-band reading from A8
14 Screen message "Requested digital in-band reading"
14 #BP 80004 + bp

RECEIVED IN-BAND READING

15 Adjust ADC power for receiver attenuator error
15 Calculate receiver loss
15 IF receiver loss is greater than 5 dB gain or 10 dB loss
16 Screen message "Loss @ *x* MHz = *y.yy* dB out of range"
16 #BP 99998
16 Flag cal as FAILED
15 ELSE
17 Screen message "Found loss @ *x* MHz = *y.yy* dB"
17 #BP 80005 + bp
17 Increment cal frequency to next point
17 IF reached 1000 MHz
18 IF on sensitive receiver bypass path
19 Select sensitive receiver amplifier path
19 Set new receiver attenuation
19 Set receiver and sig gen back to 10 MHz
19 Repeat from section 13
18 ELSE
Proceed to section 20
17 ELSE
Repeat from Section 13

END OF DIGITAL RECEIVER FREQUENCY RESPONSE CAL

20 Extrapolate 10 MHz figures back to 0 MHz (ensures 50 MHz steps)
20 Screen message "Passed digital receiver freq response cal"
20 #BP 80019
20 Flag cal as PASSED

FAIL POINT: #99998

### Extended Receiver Frequency Response (*2967 Only*)

In the following routine, 'bp' is the frequency in MHz less 1705 then *rounded down* to a multiple of 10 MHz, so at 1730 MHz the value of bp is 20.

INITIALISATION

1 Load GSM application on DSC, then load GSM cal application
1 Set RF port configuration to N-type duplex
1 Set receiver attenuation and switch amplifier out
1 Select analog AB3/AF6 path, set AF5 level and sig gen attenuation
1 Calculate receiver attenuator errors
1 Screen message "Initialised ext dig rx freq response cal"
1 #BP 10000

INITIALISE BROADBAND REFERENCE

2 Set receiver and sig gen frequencies for 10 MHz reference measurement
2 Screen message "Setting 10 MHz for ref read"
2 #BP 82000

REQUEST BROADBAND REFERENCE READING

3 Request averaged broadband power measurement
3 Screen message “Requested ref power reading @ 10 MHz”
3 #BP 82001

RECEIVED BROADBAND REFERENCE READING

4 Store broadband power reading as broadband 10 MHz reference power
4 Screen message “Found power ref @ 10 MHz = *x.xx* dB”
4 #BP 80003

FIND A8 RX AGC DAC SETTING

5 Set minimum AGC gain, request ADC power measurement
5 #BP 75030

RECEIVED GAIN CHECK POWER MEASUREMENT

6 IF power is -6.00 ± 0.25 dB
7 Screen message “Found *x.xx* dB using 0x*yy*/*zz*”
7 #BP 75031
7 Proceed to section 12
6 ELSE IF already had 5 re-tries
8 Screen message “Failed to find AGC gain after 5 re-tries”
8 #BP 99998
8 Flag cal as FAILED
6 ELSE
9 Calculate new AGC DAC settings
9 IF new settings out of range
10 Screen message “AGC request 0x*yy*/*zz* out of range”
10 #BP 99998
10 Flag cal as FAILED
9 ELSE
11 Set AGC DAC, request power measurement
11 Screen message “Got *x.xx* dB, trying 0x*yy*/*zz*”
11 #BP 75032
11 Repeats from section 6

FOUND GAIN, GOT IN-BAND REFERENCE

12 Adjust ADC power for receiver attenuator error
12 Store adjusted power reading as in-band 10 MHz reference power
12 Screen message “Found in-band ref @ 10 MHz = *x.xx* dB”
12 #BP 82005

GET AF6 BIAS DIRECTION

13 Invoke bias direction cal
13 Screen message “Establishing AF6 bias direction…”
13 #BP 82006

FOUND BIAS DIRECTION

14 Set receiver attenuation and switch amplifier out
14 Select AF6 cal path (as found above), set AF5 level and sig gen attenuation
14 Set receiver and sig gen frequencies to 1705 MHz
14 Screen message “Selected *xxxxxx* bias, starting cal…”
14 #BP 82007

INITIALISE BROADBAND 2967 FREQUENCY POINT

15 Set receiver and sig gen frequencies for cal point
15 Screen message “Setting *x* MHz”
15 #BP 83000 + bp

*continued*

REQUEST BROADBAND READING

16 Request averaged broadband power measurement
16 Screen message “Requested power reading @ 10 MHz”
16 #BP 83001 + bp

RECEIVED BROADBAND READING

17 Store broadband power reading
17 Screen message “Found power ref @ *x* MHz = *y.yy* dB”
17 #BP 80002 + bp
17 Increment cal frequency to next point
17 IF reached 2005 MHz
18 Set cal frequency to 1705 MHz
18 Proceed to section 19
17 ELSE
Repeats from section 15

INITIALISE IN-BAND 2967 FREQUENCY POINT

19 Set receiver and sig gen frequencies for cal point
19 Screen message “Set *x* MHz, sens rx *yyy*”
19 #BP 83003 + bp

REQUEST IN-BAND READING

20 Request averaged in-band reading from A8
20 Screen message “Requested digital in-band reading”
20 #BP 83004 + bp

RECEIVED IN-BAND READING

21 Adjust ADC power for receiver attenuator error
21 Calculate receiver loss
21 IF receiver loss is greater than 5 dB gain or 10 dB loss

22 Screen message “Loss @ *x* MHz = *y.yy* dB out of range”
22 #BP 99998
22 Flag cal as FAILED
21 ELSE
23 Screen message “Found loss @ *x* MHz = *y.yy* dB”
23 #BP 83005 + bp
23 Increment cal frequency to next point
23 IF reached 2005 MHz
Proceed to section 24
23 ELSE
Repeat from Section 19

END OF DIGITAL RECEIVER FREQUENCY RESPONSE CAL

24 Screen message “Passed digital rx extended freq resp cal”
24 #BP 83999
24 Flag cal as PASSED

FAIL POINT: #99998

## Typical Values and Failures

The loss figures range from around 0 dB at 0 or 10 MHz to around 5 dB at 1000 MHz. For 2967, the figures are around 1 dB for the 800 to 1000 MHz range, and between 3 and 5 dB in the 1705 to 2005 MHz range. The 2967 figures are usually fairly flat (within 1 dB of each other).

If the cal fails with the screen message “Failed to find AGC gain after 5 re-tries” then there is a problem in finding the AGC DAC setting to used - the problem is unlikely to lie with the bulk attenuators but instead in the linearity of the AGC DACs. Try running the Rx AGC gain cal on it’s own to investigate the actual linearity, looking for an approximate 0.16 dB/code slope on the AGC gain across the whole range of the DACs.

If the cal fails with the screen message “AGC request 0x*yy/zz* out of range” then there is a problem with either the AF5 output level, the bulk attenuators, or the receiver gain. Measuring the sig gen level at the N-type will establish whether it is the sig gen at fault.

If the cal fails with the screen message “Loss @ *x* MHz = *y.yy* dB out of range” then there is a problem with either the AF5 output level, the bulk attenuators, or the receiver gain. Measuring the sig gen level at the N-type will establish whether it is the sig gen at fault.

The cal will not run if the digital receiver attenuator cal has already failed.

## A8 Receiver AGC Gain Cal

### Purpose of Cal

The aim of the A8 receiver AGC gain cal is to find the gain of the receiver AGC for a given AGC DAC setting. It is this cal which provides absolute leveling at 10 MHz and linearity at all frequencies for the digital power meter.

The A8 receiver AGC gain is controlled by two DACs. DAC1 operates from 0x70 (lowest gain) to 0xf0 with DAC2 held at 0x10. Further gain is provided by holding DAC1 at 0xf0 and operating DAC2 up to 0x70. The cal must therefore provide gain data for 0x70/10 to 0xf0/10 and 0xf0/10 through to 0xf0/70 in steps of 0x01.

The AGC gain increases by approximately 10 dB for a 0x40 increase in DAC code. This gives corresponds to an approximate slope of 0.16 dB/code.

### Description

The analog sig gen path is set in AB3/AF6 and the sig gen set to -30 dBm (at the N-type output) at 10 MHz. The receiver is also set to 10 MHz with 40 dB bulk attenuation and the sensitive receiver bypass selected. The broadband power meter uses input switch correction data and should read approximately -0.5 dBm using range 2. The measured power is used to calculate the actual power getting to A8 by subtracting the sig gen to receiver input switch attenuation at 10 MHz from the measured broadband power.

Each combination of AGC DAC code is then set and the ADC power measured and corrected for receiver attenuation error. The receiver attenuation is decreased by 10 dB each time the ADC power reaches -6.00 dB to ensure that the ADC operates in its optimum -16 to -6 dB range. The number of ADC averages taken doubles each time the receiver attenuation is increased to take account of the deterioration of noise performance.

The gain for each AGC DAC setting is given by

*AGC gain = A8 ADC power - A8 input power - receiver attenuation*

INITIALISATION

1 Load GSM application on DSC, then load GSM cal application
1 Set RF port configuration to N-type duplex
1 Screen message “Initialised Rx AGC cal”
1 #BP 10000

INITIALISE BROADBAND REFERENCE

2 Select analog sig gen path in AB3/AF6 with low A8 70 MHz IF level
2 Set receiver and sig gen frequencies to 10 MHz
2 Set sig gen level and receiver attenuation
2 Screen message “Setting 10 MHz for broadband ref”
2 #BP 72000

REQUEST BROADBAND REFERENCE READING

3 Request averaged broadband power measurement
3 Screen message “Requested absolute ref reading”
3 #BP 72100

*continued*

```
        RECEIVED BROADBAND REFERENCE READING
4       IF within ±4 dB of expected power
5               Calculate A8 input power
5               Screen message "Broadband ref is x.xx dBm, A8 is y.y dB"
5               #BP 72101
5               Proceed to section 7
4       ELSE
6               Screen message "Broadband ref out of range, offset x.xx dB"
6               #BP 99998
6               Flag cal as FAILED
        INITIALISE AGC FOR CAL POINT
7       IF last ADC power greater than -6.00 dB AND not at first point
                Increase receiver attenuation by 10 dB
7       Screen message "Setting 0xxx, 0xyy, cal point p, atten z dB"
7       #BP 72200 + p
        REQUEST ADC READING
8       Request averaged in-band reading from A8
8       #BP 72200 + p
        RECEIVED ADC READING
9       IF power measurement is valid
10              Clear fail count
10              Calculate AGC gain
10              IF first point AND gain is greater than ±10 dB
11                      Screen message "ERROR: gain x.xx dB out of range at point 0"
11                      #BP 99998
11                      Flag cal as FAILED
10              ELSE IF gain has decreased (allowing 0.1 dB for noise)
12                      Screen message "ERROR: gain (x.xx dB) DECREASE at cal point p"
12                      #BP 99998
12                      Flag cal as FAILED
10              ELSE
13                      Store gain for cal point
13                      Screen message "Gain contribution at cal point p = x.xx dB"
13                      #BP 72200 + p
13                      Increment cal point and DAC code
13                      IF all DAC codes covered
                                Proceed to section 16
13                      ELSE
                                Repeats from section 7
9       ELSE if fail count is less than 10
14              Increment fail count
14              Screen message "Retrying for measurement p"
14              #BP 72499
9       ELSE
15              Screen message "Cannot find valid reading"
15              #BP 99998
15              Flag cal as FAILED
                END OF A8 RECEIVER AGC GAIN CAL
16              Screen message "Passed A8 receiver AGC cal"
16              #BP 72500
16              Flag cal as PASSED
FAIL POINT: #99998
```

## Typical Values and Failures

The receiver AGC gain usually starts at around 0 dB for the 0x70/10 DAC code, and should rise linearly with an approximate slope of 0.16 dB/code to around 35 dB for the 0xf0/70 code.

If the cal fails with the screen message “Broadband ref out of range, offset *x.xx* dB” then there is most likely a problem with the sig gen. Verify the level is approximately -30 dBm at the N-type output at 10 MHz. If the sig gen is okay then the fault lies with the broadband power meter or the input switch. Note that the ‘offset’ is the difference between the measured power and the expected -0.5 dBm, with a positive offset indicating too much loss.

If the cal fails with the screen message “ERROR: gain *x.xx* dB out of range at point 0” and the sig gen level is okay then too much or too little gain is present in the receiver path. This may indicate a receiver bulk attenuator problem, a gain problem through the standard 2965 receiver hardware, or a problem with the A8 receiver. Note that the sig gen level is constant throughout the cal.

If the cal fails with the screen message “ERROR: gain (*x.xx* dB) DECREASE at cal point *p*” then there is either a fault with the AGC amplifiers, or a problem with the receiver bulk attenuators. Examples of this are excessively long settling times after changeover (even though the eventual attenuation may be correct once settled), a stuck pad, or dirty contacts giving incorrect attenuation. If the bulk attenuation had not just been changed then the problem is likely to be on A8.

If the cal fails with the screen message “Cannot find valid reading” then the input level to A8 is probably excessively high or the AGC gain stuck high causing the ADC to overflow.

The cal will not run if either the digital receiver attenuator cal or either of the receiver frequency response cals have already failed.

## A8 measurement window cal

### Purpose of Cal

The aim of the A8 measurement window cal is to determine the position of the 12.5 dB window in which the MAP can make its measurements with optimum accuracy. When the AGC starts providing gain which takes the DAC codes outside of this window, the DSC may request A6 to set more or less receiver bulk attenuation to bring the AGC DACs back inside this window.

This calibration determines only the lower AGC DAC limit; the upper limit is calculated by A8 using the DAC settings’ 0.16 dB/code slope.

The lower limit applies only to the first AGC DAC. During this cal, the second AGC DAC should always be at 0x10; if it is set to anything else then there is a hardware problem and the cal fails.

### Description

The analog sig gen path is set in AB3/AF6 and the sig gen set to -29 dBm (at the N-type output) at 909 MHz. The receiver is also set to 909 MHz with 10 dB bulk attenuation and the sensitive receiver bypass selected. The broadband power meter uses input switch correction data and should read approximately +0.5 dBm using range 2. The measured power is used to adjust the sig gen level to give an actual -29 dBm (at the N-type).

The sig gen level is adjusted to compensate for the measure broadband power and the sig gen to receiver input switch loss, and a digital Tx measurement requested. The setting of the first AGC DAC is noted.

The lower DAC limit for the A8 measurement window is the average of 10 DAC setting measurements. The cal fails if it receives 10 successive invalid measurements or if the second AGC DAC is not at 0x10.

Note that the GSM CW application is loaded rather than the GSM cal application for the measurement window cal.

## Calibration Procedure

INITIALISATION

1 Load GSM application on DSC, then load GSM CW application
1 Set RF port configuration to N-type duplex
1 Screen message “Initialised A8 measurement window cal”
1 #BP 10000

INITIALISE BROADBAND REFERENCE

2 Select analog sig gen path in AB3/AF6 with low A8 70 MHz IF level
2 Set receiver and sig gen frequencies to 909 MHz
2 Set sig gen level and receiver attenuation
2 Screen message “Setting 909 MHz for broadband ref”
2 #BP 73000

REQUEST BROADBAND REFERENCE READING

3 Request averaged broadband power measurement
3 Screen message “Requested broadband ref reading”
3 #BP 73100

RECEIVED BROADBAND REFERENCE READING

4 IF within ±4 dB of expected power
5 Screen message “Broadband ref is *x.xx* dBm, offset is *y.y* dB”
5 #BP 73100
5 Proceed to section 7
4 ELSE
6 Screen message “Broadband ref out of range, offset *x.xx* dB”
6 #BP 99998
6 Flag cal as FAILED

INITIALISE FOR DAC SETTING MEASUREMENT

7 Adjust sig gen level for offset (above) and input switch loss
7 Screen message “Sig gen level set to *x.x* dBm”
7 #BP 73200

REQUEST AGC DAC SETTING

8 Request digital Tx measurement
8 Screen message “Requested AGC measurement *y*”
8 #BP 73300 + y

RECEIVED MEASUREMENT WITH DAC SETTING

9 IF measurement is invalid OR second AGC DAC is not at 0x10
10 Increment fail count
10 IF fail count is less than 10
11 IF second DAC not at 0x10
Screen message “AGC2 at 0x*xx*, retrying measurement *y*…”
11 ELSE
Screen message “Measurement *y* is invalid, retrying…”
11 #BP 73400
11 Repeats from section 8
10 ELSE
12 IF second AGC DAC is at 0x10
Screen message “Cannot find valid reading”
12 ELSE
Screen message “AGC2 NOT AT 0x10!!!!”
12 #BP 99998
12 Flag cal as FAILED
9 ELSE IF averaging not yet complete
13 Clear fail count
13 Repeats from section 8
9 ELSE

```
14              IF averaged AGC DAC is in range 0x70 to 0xf0
15                      Screen message “AGC1 lower value is 0xxx”
15                      #BP 73300 + y
15                      Proceed to section 17
14              ELSE
16                      Screen message “AGC1 lower value out of range : 0xxx”
16                      #BP 99998
16                      Flag cal as FAILED
        END OF A8 MEASUREMENT WINDOW CAL
17      Screen message “Passed A8 measurement window cal”
17      #BP 73401
17      Flag cal as PASSED
FAIL POINT: #99998
```

## Typical Values and Failures

The lower limit of the first AGC DAC can be anywhere between 0xa0 and 0xe0. A problem with this calibration will probably already have shown up on other calibrations.

If the cal fails with the screen message “Broadband ref out of range, offset *x.xx* dB” then there may be a sig gen problem. Verify the level at the N-type output. If it is correct there may be a problem with the input switch or broadband power meter.

If the cal fails with the screen message “Cannot find valid reading” then there is a problem in the receiver. Check the A8 ADC power reading to see if the ADC is overloading (greater than -6.00 dB) or if it is excessively low (AGC DACs will be at 0x70/10).

If the cal fails with the screen message “AGC2 NOT AT 0x10!!!!” then the level getting to the A8 ADC is too high, indicating a gain error anywhere between the input switch and the ADC. If the input level to A8 is correct (should be around -19 dBm) then the fault is on A8, otherwise the problem is in the standard 2965 I.F. chain.

If the cal fails with the screen message “AGC1 lower value out of range : 0x*xx*” then there is a problem in the software. Either the MAP is using AGC DAC values it should not be using, or the averaging has fallen over within the calibration routines. This failure should not occur unless there is some serious fault in the software, and should be reported immediately to engineering should it occur.

## AF6 Mixer Bias Cal

### Purpose of Cal

The 2967 extended frequency calibrations rely on the fact that routing the DC supply into the AF6 mixer I.F. port enables the analog sig gen (AF5) output to be doubled. This is the AF6 ‘cal path’. The noise generated by the mixer is low enough not to affect the broadband power meter accuracy, which therefore measures the level of the sig gen in the 2 GHz band. Note that because the I.F. frequency is effectively 0 Hz, there are no mixer sidebands. For a +13 dBm input to AF6 in cal mode the output should be around +5 dBm.

The aim of the AF6 bias calibration is to establish the optimum DC bias direction (i.e. positive or negative) to use in achieving analog sig gen frequencies in the 2967 range. The aim is to choose the direction which gives the flattest response so that the broadband power meter will not report under- or over-range readings due to the response of AF6 when in cal mode.

This cal assumes that the GSM cal application is already loaded on the DSC.

### Description

The AF5 output level is set to +13 dBm at 1900 MHz with 10 dB sig gen attenuation. The receiver is set to 1900 MHz with 50 dB bulk attenuation and the sensitive receiver bypass selected. The 3 kHz I.F. filter is selected.

The negative supply is then routed into the AF6 mixer and the log amp read. This process is repeated for the positive supply.

The lower of these two readings corresponds to the setting which will give the flattest cal path response over the 2967 frequency range.

Note that the displayed log amp readings are in dB x 100 from top of screen, so the lower level is actually the larger of the two readings.

### Calibration Procedure

INITIALISATION

1 Set AF5 level and sig gen bulk attenuation with low A8 70 MHz IF level
1 Set receiver bulk attenuation, sensitive receiver and IF filter
1 Screen message “Initialised AF6 bias cal”
1 #BP 10000

SELECT BIAS DIRECTION

2 Set AF6 path
2 Drive AF6/AK2 by setting receiver and sig gen frequencies
2 Screen message “Selected *x* MHz for *yyyyyyy* bias”
2 #BP 12000

REQUEST LOG AMP READING

3 Request averaged log amp power measurement
3 Screen message “Requested *yyyyyyy* bias ADC read”
3 #BP 12001

RECEIVED LOG AMP READING

4 Store reading
4 Screen message “Reading for *yyyyyyy* bias = *xxxx* (dB x 100)”
4 #BP 12002
4 Select next bias direction
4 IF done both negative and positive directions
Proceed to 5
4 ELSE
Repeats from 2

END OF AF6 BIAS CAL

5 Screen message “Selected *yyyyyyy* bias direction”
5 #BP 12003
5 Flag cal as PASSED

RETURN CONTROL TO CALLER

6 Screen message “Re-queuing the caller…”
6 #BP 12004
6 Cal finished, calling cal routine continues execution

## Typical Values and Failures

This calibration stores no data, but provides the optimum bias direction to the calling calibration routine.

There are no failure points for this calibration. Problems will be picked up in the calling calibration routine and show up as the broadband power meter being out of range.

## Warping Calibration

### Purpose of Cal

The aim of the AB4 warp oscillator cal is to find the DAC values for the VCO DAC to give the required frequency offsets. The nominal oscillator frequency is 10 MHz and DAC values for offsets of ±25ppm (*and additionally ±10ppm for 2967*) must be found.

The offsets are found in the following sequence: -25ppm, *-10ppm*, *+10ppm*, +25ppm.

There are two DACs that control the VCO output frequency. DAC0 provides course control and is only calibrated if its current cal value is such that the offset cannot be achieved by only adjusting DAC1, the fine control DAC. Note that an increase in DAC value gives a decrease in VCO output frequency.

## Description

The warping cal path (power combiner path) is set in AB3/AF6 and the sig gen switched off. The sig gen bulk attenuation is set to 0 dB and the receiver set to 10 MHz with 10 dB bulk attenuation and the sensitive receiver bypass selected. The 10 kHz I.F. filter is selected in AE6 and a log amp ADC measurement taken to ensure that the AB4 module is present.

If DAC0 is not to be re-calibrated regardless (this is the default condition but can be changed in the cal config screen) then the validity of the current DAC0 value is tested. If the target offset cannot be achieved using this value, or the DAC should be re-calibrated regardless, then the DAC0 cal begins using a successive approximation on the 8-bit load value. The I.F. count is performed using an average of 1 count for DAC0.

Once DAC0 has a valid cal value, the DAC1 setting to give the required offset is found, again using a successive approximation on the 8-bit load value. For DAC1, the reported frequency is based upon the average of 10 I.F. counts.

## Calibration Procedure

In the following routine, 'bp' is the current cal ppm code where this code is 0 for -25ppm, 100 for -10ppm (even if the instrument is not a 2967), etc., through to 300 for the +25ppm offset.

This routine is run for each applicable ppm offset (i.e. ±10ppm offset is not run unless the instrument is a 2967).

INITIALISATION

1 Set RF port configuration to N-type duplex
1 Select AB4 cal path in AB3/AF6
1 Select 10 kHz I.F. filter in AE6
1 Set sig gen and receiver frequencies
1 Turn off sig gen output in tray, set receiver and sig gen attenuation
1 Screen message "Initialised *ppm* ppm cal"
1 #BP 10000

CHECK SIGNAL LEVEL

2 Request log amp power level
2 Screen message "Requested *ppm* ppm level check"
2 #BP 90000 + bp

RECEIVED LOG AMP READING

3 IF log amp reading is greater than -20 dB AND is less than 0 dB
4 Screen message "AB4 level okay : *x.xx* dBm"
4 #BP 90001 + bp
4 IF cal DAC0 is to be calibrated
Proceed to section 19
4 ELSE
Proceed to section 6
3 ELSE
5 Screen message "AB4 level out of range : *x.xx* dBm FAILED"
5 #BP 90002 + bp
5 Flag cal as FAILED

CHECK MINIMUM FREQ FOR CURRENT DAC0 VALUE

6 Load DAC0 with cal value, DAC1 set to 0xff
6 Screen message "Loaded 0x*xx* for min freq check"
6 #BP 90003 + bp

*continued.....*

REQUEST MINIMUM FREQUENCY MEASUREMENT

7 Request Tx frequency measurement
7 Screen message “Requested min freq check”
7 #BP 90004 + bp

RECEIVED MINIMUM FREQUENCY MEASUREMENT

8 IF measured frequency is less than 2 Hz from last measured frequency
9 Store measured frequency
9 Screen message “Minimum freq is *xxxxxx* Hz”
9 #BP 90005 + bp
9 Proceed to section 11
8 ELSE
10 Screen message “Min freq: Measured *xxxxxx* Hz, settling…”
10 #BP 90006 + bp
10 Repeats from section 7

CHECK MAXIMUM FREQ FOR CURRENT DAC0 VALUE

11 Load DAC0 with cal value, DAC1 set to 0x00
11 Screen message “Loaded 0x*xx* for max freq check”
11 #BP 90007 + bp

REQUEST MAXIMUM FREQUENCY MEASUREMENT

12 Request Tx frequency measurement
12 Screen message “Requested max freq check”
12 #BP 90008 + bp

RECEIVED MAXIMUM FREQUENCY MEASUREMENT

13 IF measured frequency is less than 2 Hz from last measured frequency
14 Store measured frequency
14 Screen message “Maximum freq is *xxxxxx* Hz”
14 #BP 90009 + bp
14 Proceed to section 16
13 ELSE
15 Screen message “Max freq: Measured *xxxxxx* Hz, settling…”
15 #BP 90010 + bp
15 Repeats from section 12

CHECK DAC0 VALUE

16 IF target offset cannot be found changing only DAC1
17 Screen message “DAC 0 needs cal”
17 Proceed to section 19
16 ELSE
18 Screen message “DAC 0 is okay - skip to DAC 1”
18 Proceed to section 26
16 #BP 90011 + bp

INIT FOR DAC0

19 Load DAC0 and DAC1 with 0x80
19 Set OR pattern to 0x80
19 Screen message “Starting DAC 0 successive approximation…”
19 #BP 90012 + bp

REQUEST DAC0 FREQUENCY MEASUREMENT

20 Request Tx frequency measurement
20 Screen message “DAC 0: Loaded 0x*xx*, Or 0x*yy*, requested offset”
20 #BP 90013 + bp

RECEIVED DAC0 FREQUENCY MEASUREMENT

21 IF measured frequency is less than 2 Hz from last measured frequency
22 IF measured freq is greater than target freq
Keep load value

22 Shift OR pattern right 1 bit
22 Next load value is load value OR'ed with OR pattern
22 IF Still bits to test
23 Load DAC with new load value
23 Screen message "DAC 0: Loaded 0x*xx*, Or 0x*yy*, offset *zzzzzz* Hz"
23 #BP 90014 + bp
23 Repeats from section 20
22 ELSE
24 Screen message "Found DAC 0 value = 0x*xx*"
24 #BP 90015 + bp
24 Proceed to section 26
21 ELSE
25 Screen message "DAC 0: Measured *xxxxxx* Hz, settling…"
25 #BP 90016 + bp
25 Repeats from section 20

INIT FOR DAC1

26 Load DAC0 with new cal value and DAC1 with 0x80
26 Set OR pattern to 0x80
26 Screen message "Starting DAC 1 successive approximation…"
26 #BP 90017 + bp

REQUEST DAC1 FREQUENCY MEASUREMENT

27 Request Tx frequency measurement
27 Screen message "DAC 1: Loaded 0x*xx*, Or 0x*yy*, requested offset"
27 #BP 90018 + bp

RECEIVED DAC0 FREQUENCY MEASUREMENT

28 IF measured frequency is less than 2 Hz from last measured frequency
29 IF measured freq is greater than target freq
Keep load value
29 Shift OR pattern right 1 bit
29 Next load value is load value OR'ed with OR pattern
29 IF Still bits to test
30 Load DAC with new load value
30 Screen message "DAC 1: Loaded 0x*xx*, Or 0x*yy*, offset *zzzzzz* Hz"
30 #BP 90019 + bp
30 Repeats from section 27
29 ELSE
31 Screen message "Found DAC 1 value = 0x*xx*"
31 #BP 90020 + bp
31 Proceed to section 33
28 ELSE
32 Screen message "DAC 1: Measured *xxxxxx* Hz, settling…"
32 #BP 90021 + bp
32 Repeats from section 27

FOUND DAC VALUES FOR THIS PPM OFFSET

33 IF any value is 0x00 or 0xff
34 Screen message "DAC 0: 0x*xx*, DAC 1: 0x*yy* FAILED (*zzzzz*)"
34 #BP 90022 + bp
34 Flag cal as FAILED
33 ELSE
35 Screen message "DAC 0: 0x*xx*, DAC 1: 0x*yy* for *zzzzz* offset"
35 #BP 90025 + bp
35 Flag cal as PASSED

FAIL POINTS: #90002 + bp, #90022 + bp

## Typical Values and Failures

The DAC values vary from unit to unit and change with temperature. As such, there a no ‘typical’ values.

If the cal fails with the screen message “AB4 level out of range : *x.xx* dBm FAILED” then there is a fault anywhere between (and including) the AB4 module cal path output and the log amp. Check initially that the level at the N-type output is between -50 and -70 dBm.

If the cal fails with the screen message “DAC 0: 0x*xx*, DAC 1: 0x*yy* FAILED (*zzzzz*)” then there is a problem achieving the target cal frequency and the fault probably lies with the AB4 module itself, but may indicate a problem with the I.F. counter.

# Chapter 5
# FAULT DIAGNOSIS

## Contents



## List of figures



## Introduction

This chapter provides:-

- A quick fault-finding guide for digital systems
- Information about the diagnostics that can be run from HELP SET-UP

## Quick fault-finding guide - digital systems

The following sequence is the simplest way to narrow down faults with the digital systems hardware when working on the 2966A or 2968:-

### 1. Power on

### 2. Select [SYSTEMS]

### 3. Select *[GSM]*

**Message: DSC failure Cannot load kernel**

Indicates that A6/2 was unable to set up A4. Is:-

- The instrument set up as a 2966A or 2968 with A4 fitted ?
- A6/2 <-> A4 interconnect OK ?

**Message: DSP exception 0x01 : boot error**
**<*map*> <*rdp*> <*igp*> <qg*p*> failed to boot**

Reports that one or more of the DSPs has failed to boot.

Use the HELP SET-UP diagnostics see page 5-2.

### 4. Select [DUPLEX TEST], *[duplex test (Tx)]*, *[spec ana]*, [Rx=Tx FREQ], [▼ *ref level* ▲]

Adjust reference level for maximum sensitivity. You should see the characteristic GMSK spectrum and, if you expand and select max hold, you should be able to spot the FCCH 'spike' 67.7 kHz above the carrier frequency.

**If 67.7kHz 'spike' not present:-**

**Are generator I,Q in quadrature?**

Set oscilloscope to 1 V pk-pk in X-Y mode and probe A8 TPs 55(I) and 56(Q). A near perfect circle should be seen. If a straight line is seen, I or Q is failing. If a strange, square, web-like pattern is seen, then I,Q are not in sync. Suspect SPORT loop / resets to I and Q FIFO chips.

**Is SPORT loop connected ? (run diagnostic)**

### 5. Select [SYSTEMS], *[MANUAL]*

### 6. Connect a mobile and switch on

#### Is registration attempted?

Measurements on access bursts will be displayed on Digital Duplex screen. The mobile's service 'light' may flash.

**No. Suspect 10MHz standard reference or 78MHz PLL**

#### Does registration succeed?

**No. Suspect receiver -- check SPORT loop (run diagnostic) and IF.**

Use bursty loop-back mode to provide signals for probing the IF. Note that the bursty loop-back power profile will fail the mask -- **this is not a fault**.

**Yes. Registration may succeed, but *[place call]* may fail.**

If the BCCH and TCH channels differ and place call fails, suspect RF SYNC failure.

Finally, select [DUPLEX], *[tx test]*, *[power ana]*, *[full burst]*. Is the trace updated? If not, suspect SPORT connector between A8 and A4.

## HELP SET-UP diagnostics

### Introduction

To bring up the DIAGNOSTICS menu, press the following keys:-

[HELP SET-UP], *[IFR Access]*, *[DIAGNOSTICS]*

**Note:** *[IFR Access]* may appear as *[Marconi Access]* on test sets containing pre-Version 8 software.

This menu provides access to tests on digital systems, the AB3 mixer module, step attenuators, $I^2C$ devices, front panel (rotary) controls (VOLUME, SQUELCH, SCOPE POS), and debug flags.

This chapter deals with the first of these, i.e. digital systems. The others are self-explanatory.

### Digital systems

Press the *[DSC]* key. This brings up the digital system options.

#### *[DSC DIAGS]*

Allows you to run the A4/A8 diagnostic tests. The following subsections describe in detail the diagnostics that are provided. Each subsection includes a brief statement of the purpose of the diagnostic, instructions about its use and an explanation of the information that it provides.

A single shot diagnostic is run once when invoked. A continuous diagnostic runs repeatedly until stopped.

To run a test, use the *[UP]*, *[DOWN]*, *[PAGE UP]*, *[PAGE DOWN]* keys, or the VARIABLE rotary control, to highlight the required test, and then press *[SELECT]*. Alternatively enter the number of the required diagnostic followed by [ENTER] on the numeric keys. The message sent to A4 to run the test is displayed along with the results of the test.

Note that if A4 or A8 is faulty, it may not be possible to run certain diagnostic tests. In particular, if there is a problem booting a DSP, it is unlikely that it will be possible to run any diagnostic tests on that DSP. It may also be necessary to reset the test set if a fault causes unpredictable operation to occur.

The 'K' and 'G' prefixes indicate if the diagnostic is located in the A4 kernel or the GSM application, respectively, on A4. If it is not possible to initialise the GSM application, or the GSM application has not been downloaded to A4, it may not be possible to run the diagnostics in the GSM application. Diagnostics located in the kernel are available at all times unless prevented by a fault.

### K 01 A6 ↔ A4 Bridge Test

Tests that the A6 ↔ A4 bridge is working by sending a set of 'Y' commands to A4. 'Y' commands are sent straight back to A6 in the form in which they were received. The commands sent and the responses received are displayed.

#### Possible results

1. Display of sent and received commands are the same, indicating that the test has been successful
2. Display of sent and received commands are not the same, indicating that there is a problem with the bridge

### K 02 Protocol Processor Host (PPH) Booting Test

Tests that the PPH will boot up with no errors. This diagnostic has the same effect as selecting [SYSTEMS] followed by *[GSM]* in normal operation.

#### Possible results

1. Done
2. Error message in a window, which indicates an error that occurred during the boot up process

The Done message indicates that the booting process has been completed with no errors.

### K 03 PPH Flash Checksum Test

Verifies operation of the Flash ROMs on A4. This is done by calculating the checksum of the ROMs and comparing it with the checksum value that was stored in the ROMs when the current application was downloaded to A4.

#### Possible results

1. Test passed
2. Test failed

### K 04 PPH RAM Test

Verifies operation of the PPH RAM on A4 using algorithms that test the address and data lines to the RAM devices and the ability of the devices to store data.

#### Possible results

1. Test passed
2. Test failed: error code = *xx*

The error code is a bit-mapped byte value, displayed in hexadecimal, which indicates which parts of the test failed. 0 indicates that a part of the test passed, 1 indicates that it failed. The bits represent parts of the test as follows:-

| | |
|---|---|
| Bit 0 | Address line test result |
| Bit 1 | Data line test result |
| Bit 2 | Bit test result |
| Bits 3 - 7 | Not used |

### K 05 PPH Peek Function

Allows the contents of PPH storage to be examined in blocks of up to 16 bytes.

**Possible results**

1. PPH peek data: *xx*
2. Bus error occurred - kernel reset

The number of bytes of peek data displayed corresponds to the number of bytes requested.

The bus error message will occur if the address entered by the user is not a valid address. The kernel is reset to allow digital systems operation to continue.

### K 06 PPH Poke Function

Allows the contents of PPH storage to be set to specific values.

**Possible results**

1. Done
2. Bus error occurred - kernel reset

The Done message indicates that no errors occurred during the poke process.

The bus error message will occur if the address entered by the user is not a valid address. The kernel is reset to allow digital systems operation to continue.

### K 08 Continuous Poke and Peek Of PPH Memory Location

Allows a PPH memory location to be continuously written to and then read back from so that an oscilloscope/logic analyzer may be used to diagnose problems.

**Possible results**

1. Diagnostic running
2. Bus error occurred - kernel reset

The Diagnostic running message indicates that the continuous poke and peek is in operation.

The bus error message will occur if the address entered by the user is not a valid address. The kernel is reset to allow digital systems operation to continue.

Note that a continuous poke then peek may not be performed on the Flash ROMs.

### K 09 PROTO, STE And FIFO LCA Configuration Test

Configures the Xilinx devices, i.e. the PROTO LCA (A4 IC6), the FIFO LCA (A8 IC57) and the STE LCA (A8 IC61).

**Possible results**

1. Test passed
2. Test failed: error code = *xx*

The error code is a numeric value having the following possible meanings:-

01 = DNP line did not go high at the end of the programming sequence

02 = INIT line did not go high after LCA reset at start of programming sequence

03 = PRDY line did not go high after configuration byte written to LCA

04 = LDC line did not go high at the end of the programming sequence

05 = LCAs failed to hold DNP line low after DNP line pulsed low to program LCAs

06 = INIT line remained high at end of programming sequence - CRC check failed

### G 10 A8 DSP Bridge FPGA Configuration Test

Verifies the configuration process for the DSP bridge FPGAs, A8 IC30, IC36, IC44 and IC53. This is done by configuring the devices and then reading back the configuration data and checking that it is the same.

#### Possible results

1. Test passed
2. Test failed: error code = *xx*

The error code is a numeric value which indicates which device was being tested when the test failed and it has the following values:-

01 = RDP bridge FPGA, A8 IC53

02 = MAP bridge FPGA, A8 IC44

03 = QGP bridge FPGA, A8 IC36

04 = IGP bridge FPGA, A8 IC30

### K 11 STE Read/Write Test

Verifies operation of the registers and memory locations in the STE using algorithms which test the address and data lines to the device.

#### Possible results

1. Test passed
2. Test failed: error code = *xx*

The error code indicates the nature of the failure and has the following values:-

01 = address line error

02 = data line error

### G 12 Programmable Interval Timer (PIT) & Interrupt Test

Verifies that the PIT and interrupt circuitry work correctly by configuring the three counters in the PIT to generate interrupts and loading interrupt handlers to indicate when an interrupt has been received.

#### Possible results

1. Test passed
2. Test failed: error code = *xx*

The error code is bit-mapped byte value displayed in hexadecimal which indicates which counter interrupts failed. 0 indicates that no interrupt was received from the corresponding counter, 1 indicates that an interrupt was received. The bits represent counter interrupt status as follows:-

Bit 0 - Counter 0 interrupt status

Bit 1 - Counter 1 interrupt status

Bit 2 - Counter 2 interrupt status

Bits 3 - 7 not used

### G 13 DSP Booting Test

Tests that an individual DSP boots up with no errors.

#### Possible results

1. Test passed
2. Test failed: error code = *xx*

The error code is a bit-mapped byte value displayed in hexadecimal which indicates the error condition which occurred in the DSP booting process. 0 indicates that an error condition did not occur, 1 indicates that an error condition occurred. The bits represent errors in parts of the booting process, as follows:-

Bit 0 - Error found in address in boot data for DSP

Bit 1 - Missing 'end of section' marker in boot data for DSP

Bit 2 - DSP failed to read first byte of boot data

Bit 3 - DSP failed to read subsequent byte of boot data

Bit 4 - DSP failed to read last byte of boot data

Bit 5 - DSP did not respond to last byte of boot data with error message

Bit 6 - DSP responded to last byte of boot data but did not send error message

Bit 7 - not used

### G 14 DSP Short Boot Test

Sends a user-defined byte of data repeatedly on the bridge of a DSP to allow an oscilloscope/logic analyzer to be used to test the bridge data lines.

#### Possible results

1. Diagnostic running

The Diagnostic running message indicates that the byte value is being sent on the DSP bridge.

### G 15 DSP Diagnostic Application Checksum Test

Tests the checksum of the DSP diagnostic application once the application has been loaded into a DSP.

#### Possible results

1. Test passed
2. Test failed

### G 16 DSP Bridge Test

Tests the bridge between the PPH and a DSP in both directions.

#### Possible results

1. Test passed
2. Test failed

### G 18 DSP Memory Test

Verifies the operation of the external program and data memory of a DSP using algorithms which test the address, data and page select lines to the devices.

#### Possible results

1. Test passed
2. Test failed: error code = *xx*

DSP memory test errors are sent back in groups of three digits, each digit representing the test result for a part of the test. The digits in each group have the following meanings:-

| First digit<br>Data line test result | Second digit<br>Page test result | Third digit<br>Address line test result |
|---|---|---|
| 0 = passed | 0 = passed | 0 = passed |
| 1 = failed | 1 = failed | 1 = failed |
| 2 = not attempted | 2 = not attempted | 2 = not attempted |

For DSPs with paged memory, the results are sent back as three groups of three digits. For DSPs without paged memory, the results are sent back as two groups of three digits. The groups have the following meanings:-

| | First group | Second group | Third group |
|---|---|---|---|
| **Paged memory** | Result for external data memory pages 0 and 1 | Result for external program memory | Result for external data memory pages 2 and 3 |
| **Non-paged memory** | Result for external data memory | Result for external program memory | - |

**Examples**

| | |
|---|---|
| Error 000 102 000 | DSP with paged memory, external data memory pages 0 - 3 passed tests, external program memory failed data line test, and address line test not attempted. |
| Error 000 000 012 | DSP with paged memory, external data memory pages 0 and 1 passed tests, external program memory passed tests, external data memory page test failed, and address line test not attempted |
| Error 000 001 | DSP with non-paged memory, external data memory passed tests, external program memory failed address line test |
| Error 102 000 | DSP with non-paged memory, external data memory failed data line test, and address line test not attempted, external program memory passed tests. |

### G 19 DSP Peek Function

Allows the contents of DSP program and data memory to be examined in words.

**Possible results**

1. Peeked value = *xxxxxx*

### G 20 DSP Poke Function

Allows the contents of DSP program and data memory to be set to specific values.

**Possible results**

1. Done

The Done message indicates that the data supplied has been written to the address indicated.

### G 21 Continuous Poke Then Peek Of DSP Memory Location

Allows DSP memory location to be continuously poked then peeked, so that an oscilloscope/logic analyzer may be used to probe R/W and memory decode signals.

**Possible results**

1. Diagnostic running

The ‘Diagnostic running’ message indicates that the continuous poke then peek is in progress.

### G 22 DSP Serial Comms Connectivity Test

Tests that DSP serial communications interfaces work correctly.

Fig. 5-1 shows the way in which the DSP serial port links are interconnected for this test. The PPH instructs the DSP at the sending end of a link to send a value. The DSP at the receiving end of the link reports the value that it received to the PPH. If the values match, the PPH indicates that the link is working, otherwise it indicates that the link is not working.

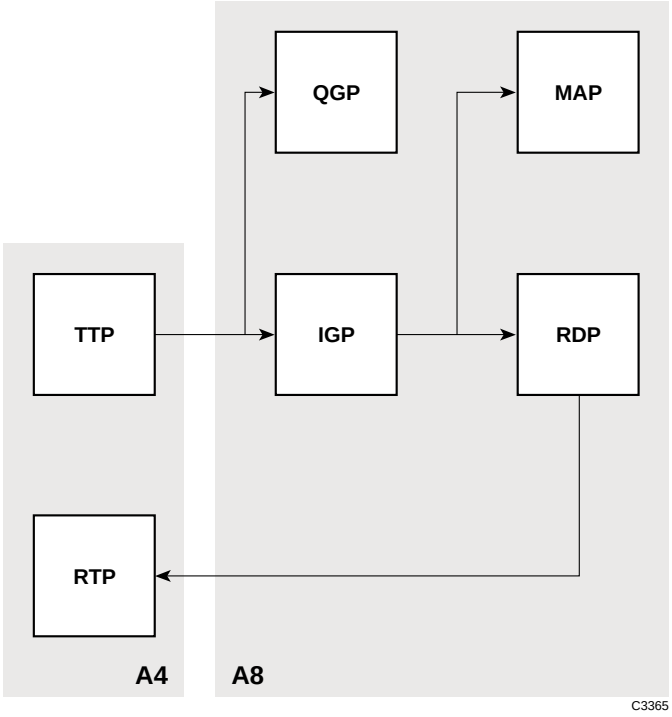



*Fig. 5-1 DSP serial communications test*

**Possible results**

1. Test passed
2. Test failed: error code = *xx*

The error code is a bit-mapped byte value, displayed in hexadecimal, which indicates which serial port links did not work correctly. 0 indicates that the link worked, 1 indicates that it did not work.

The bits represent serial port links, as follows:-

Bit 0 - Serial port link between TTP and IGP

Bit 1 - Serial port link between TTP and QGP

Bit 2 - Serial port link between IGP and RDP

Bit 3 - Serial port link between IGP and MAP

Bit 4 - Serial port link between RDP and RTP

Bit 5 - 7 not used

### G 23 DSP Serial Comms Test Pattern Test

Causes the DSP serial communications ports to produce a test pattern to allow the SPORT lines to be tested using an oscilloscope.

The DSP serial port links are interconnected as for diagnostic 22. The TTP is the source of the test pattern. All the other DSPs are set up to transmit on their transmit serial ports whatever they receive on their receive serial ports. In this way the serial port interconnections may be easily tested with an oscilloscope by verifying that the pattern which a DSP transmits is the same as the pattern which is being transmitted by the TTP. Note that each DSP delays the test pattern slightly.

#### Possible results

1. Diagnostic running

The 'Diagnostic running' message indicates that the DSP serial communications ports are producing a test pattern.

### K 24 A8 Transmitter IF Attenuator Control

Sets A8 transmitter IF attenuator control DAC level to allow voltages in the attenuator control circuit to be measured.

#### Possible results

1. Done

The 'Done' message indicates that the A8 transmitter IF attenuator control DAC has been set to the value indicated.

### G 30 AGC DAC Ramp Test

Causes the MAP to output ramps on the AGC DAC outputs to allow DAC operation to be examined with an oscilloscope.

The ramp on one DAC has a positive slope and the ramp on the other has a negative slope.

#### Possible results

1. Diagnostic running

The 'Diagnostic running' message indicates that the AGC DACs are being written to produce ramps at their outputs.

### K 31 Output Attenuator DAC Ramp Test

Causes the PPH to output a ramp on the IF transmitter output attenuator DAC to allow DAC operation to be examined with an oscilloscope.

#### Possible results

1. Diagnostic running

The 'Diagnostic running' message indicates that the IF transmitter output DAC is being written to produce a ramp at its output.

## Development aids

**Note:** The other soft key options are mainly intended as aids for development work. Their use by the uninitiated is **not** advisable. However, since in some instances they could be used for test purposes by testers with a good understanding of how the test set functions, they are described briefly below, with the proviso that IFR Ltd. cannot be held responsible for their misuse.

### *[A4 TEST MODE]*

*[digital cw mode]* initialises the digital systems for calibration verification. This allows the calibration of the digital parts of the test set to be verified. In this mode, the MAP measures power only, and performs this measurement on continuous wave signals. A signal of known power level is fed into the test set from a signal generator and the test set's power measurement is checked against it to verify that the test set calibration is correct.

*[digital dx mode]* initialises the digital systems for normal (GSM) mode. This is used in conjunction with *[bursty on OFF]*.

*[dsc fft]* initialises the digital systems MAP with a Fast Fourier Transform algorithm which allows the frequency response of the receiver to be examined. A frequency spectrum 1.2 MHz wide is displayed with the test set's receiver frequency at the centre.

*[bursty on OFF]* allows measurements of the GSM signal generator to be made by the receiver on A8. Since the A8 receiver can only perform measurements on bursty signals, the signal generator is configured to produce bursty output. This soft key must be followed by the *[digital dx mode]* soft key. Once in digital duplex test mode, pressing the [Rx=Tx FREQ] key causes the signal generator output to be fed back into the receiver chain, allowing it to be measured.

*[load kernel]* forces the kernel to load.

*[exit digital]* followed by [HELP SET-UP], *[return]*, returns you to normal DUPLEX mode.

### *[A4 LOAD OPTIONS]*

Allows a new GSM application to be downloaded to the digital systems from A6. This may be required in the following circumstances:-

- When new digital systems boards A4 and A8 have been fitted for the first time, in production or as a result of service work, the Flash ROMs on the A4 card will not contain the GSM application.
- When the A6 software has been upgraded, the GSM application in the Flash ROMs on the A4 card may be the wrong version.
- The GSM application in the Flash ROMs on the A4 card may have been corrupted for some reason; for example, as a result of one of the ROM devices being changed.

This utility downloads the GSM application that is stored in the A6 software to A4/A8, verifying that the programming has been carried out correctly in the process.

### *[A8 rx agc]*

Allows the operation of the receiver AGC and trigger on A4/A8 to be controlled; this is mainly used for software development.

The MAP on A8 has an upper and lower limit of power readings (referred to as a 'window') which it can bring to the standard 1 V peak-to-peak level using the receiver AGC. If the signal level arriving at A8 is outside the window, it is necessary for the bulk attenuators to be changed to modify the signal level. When auto-levelling is in operation, the MAP signals to A6 that the bulk attenuators need to be changed and A6 changes them accordingly. The lower limit of the window is set during calibration - the upper limit is fixed in the MAP code.

In addition, the MAP has a trigger system that detects if a burst is present or not. The trigger level is automatically modified according to a set of rules which aims to keep it at the most appropriate level at all times.

*[change window]* displays the current value of the lower window limit in the MAP. **Note:** This key is for development use only. Do **NOT** change this setting.

*[autolev ON off]* allows auto-levelling to be turned on and off.

*[debug on OFF]* Enable/disable A8 AGC debug allows the current AGC value to be displayed on the top line of the Digital DUPLEX TEST and Systems MANUALTEST screens.

*[debug on OFF]* Enable/disable MAP autotrig allows the MAP automatic trigger level adjustment to be turned on or off.

### *[meas diags]*

Allows the Tx measurements from A4/A8 to be displayed in full, including information that is useful for debugging. Information displayed on this screen is as follows:-

| | |
|---|---|
| BURST | Type of burst measured. |
| FRAME | Frame number when burst was measured. |
| TAG | Measurement tag value. Each measurement request and each measurement response includes a tag which A6 uses to match up requests and responses. |
| STATUS | Measurement status flags from MAP. |
| AGC STATUS | Flags which indicate if the AGC is able to bring the received power level to the standard 1 V peak-to-peak level. |
| SETTLING | Flags which indicate if the peak worst case/average measurement processing has settled. |
| TX POWER | Burst power level. |
| AGC 1 & 2 | AGC DAC setting used in making the power measurement. |
| GAIN | Gain corresponding to AGC DAC setting. |
| DSP | DSP measured power - nominally –6 dBm. |
| ATTEN | Current level of attenuation including bulk attenuators and A8 AGC. |
| OFFSET | RF input level offset. |
| PROFILE | Indication of whether or not the burst power level was within the standard profile for the burst type. |
| TX PHASE | RMS and peak burst phase measurements. |
| TX FREQ | Burst frequency measurement. |
| TX TIMING | Burst. |

***[TTP msg errors]***

Allows the last 0x23 exception message from the TTP to be displayed.

# Chapter 6
# REPLACEABLE PARTS

## Contents



## List of figures

# Introduction

Each sub-assembly or printed circuit board in this equipment has been allocated a reference designator code, e.g. A0, A1, A2 etc.

The complete component reference includes its reference designator as a prefix, e.g. A2C1 (capacitor C1 on sub-assembly A2, but, for convenience in the text and diagrams, the prefix is omitted unless it is needed to avoid confusion. However, when ordering replacements or in correspondence, the complete component reference should be quoted.

# Component values

One or more of the components fitted in the equipment may differ from those listed in this chapter (see *Supply statement* below).

Components indicated by an * (or SIC) have their values selected during test to achieve particular performance limits. This may mean that in some instances no component is fitted.

When there is a difference between the component fitted and the one listed, always use as a replacement the same type and value of component as that found in the equipment.

# Component spares and assemblies

## Supply statement

(a) IFR satisfies its material requirements by purchasing components from leading suppliers, who may manufacture in many countries. In most instances, components with different identities and slightly different specifications will be acceptable to us and will be identified under a single IFR part number regardless of manufacturer.

The IFR part number is the definitive reference. Service manuals and recommended service parts lists will give an example of one of the manufacturer's devices that meets our specification requirement.

We reserve the right to supply in manufactured equipment or for service spares any item that meets the requirements of our part number.

(b) It may be necessary (due for example to obsolescence) to supply an item with a different IFR Ltd part number from that identified in our published documentation. Supply of such an alternative item is deemed to satisfy, in full, the requirements of any order or contract.

IFR Ltd warrants that the device supplied under our part number will function correctly when placed in the correctly identified circuit location for such a device in the relevant product.

# Ordering

When ordering replacements, address the order to our Service Division (address at rear of manual) or nearest agent and specify the following for each component required:-

- Type and serial number of equipment, as given on the serial number label at the rear of the equipment. If this is superseded by a model number label, quote the model number instead of the type number.
- Complete circuit reference.
- Description.
- IFR part number.

# Electrical components

## AR1 10 MHz OCXO

When ordering, prefix circuit reference with AR1.

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| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| C1 to C3 | 26421/116 | CAPACITOR-FIXED ALUMINIUM 47uF +/-20% 16V ELECTROLYTIC, RADIAL, 5mm PWP, (LOOSE OR TAPED). | PANASONIC INDUSTRIAL | ECE-A-1C-KA-470-B |
| C4 | 26421/143 | CAPACITOR-FIXED ALUMINIUM 470uF +/-20% 6.3V ELECTROLYTIC, RADIAL, 5mm PWP, (TAPED). | PANASONIC INDUSTRIAL | ECE-A-0J-U-471-B |
| C5 | 26386/883 | CAPACITOR-FIXED CERAMIC 47nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-473-KP |
| C6 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C7 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C8 | 26386/871 | CAPACITOR-FIXED CERAMIC 4.7nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-472-KP |
| C9 | 26386/818 | CAPACITOR-FIXED CERAMIC 33pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-330-JP |
| C10 | 26386/863 | CAPACITOR-FIXED CERAMIC 1nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-102-KP |
| C11 | 26386/824 | CAPACITOR-FIXED CERAMIC 100pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-101-JP |
| C12 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C13 | 26386/887 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-104-KP |
| C14 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C15 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C16 | 26386/871 | CAPACITOR-FIXED CERAMIC 4.7nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-472-KP |
| C17 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C18 | 26386/760 | CAPACITOR-FIXED CERAMIC 220nF +/-10% 50V X7R MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | PHILIPS | 1210-2R-224-K9-BBC |
| C19 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C20 to C23 | 26386/760 | CAPACITOR-FIXED CERAMIC 220nF +/-10% 50V X7R MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | PHILIPS | 1210-2R-224-K9-BBC |
| C24 to C28 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C29 | 26421/106 | CAPACITOR-FIXED ALUMINIUM 1uF +/-20% 50V ELECTROLYTIC, RADIAL, 5mm PWP, (TAPED). | PANASONIC INDUSTRIAL | ECE-A-1H-KA-010-B |
| C30 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| **AR1** | **10 MHz OCXO (contd.)** | | | |
| D1 | 28383/930 | DIODE SMALL-SIGNAL, BAS16... 330mW 75V 250mA 2pF 1Vf @ 50mA, MARKING CODE A6, SURFACE MOUNTED, | PHILIPS | BAS16 |
| D2 | 28383/930 | DIODE SMALL-SIGNAL, BAS16... 330mW 75V 250mA 2pF 1Vf @ 50mA, MARKING CODE A6, SURFACE MOUNTED, | PHILIPS | BAS16 |
| D3 | 28371/494 | DIODE VOLTAGE REFERENCE, 1N825... 250mW 6.2V 5% 50mA 20ppm/DEG.C, AXIAL, DO-7, (TAPED). | PHILIPS | 1N825 |
| D4 to D6 | 28383/930 | DIODE SMALL-SIGNAL, BAS16... 330mW 75V 250mA 2pF 1Vf @ 50mA, MARKING CODE A6, SURFACE MOUNTED, | PHILIPS | BAS16 |
| D7 | 28371/303 | DIODE ZENER, BZX84-C6V2... 350mW 6.2V 5% 250mA MARKING CODE Z4, SURFACE MOUNTED, SOT-23, (8mm | PHILIPS | BZX84-C6V2 |
| D8 | 28383/930 | DIODE SMALL-SIGNAL, BAS16... 330mW 75V 250mA 2pF 1Vf @ 50mA, MARKING CODE A6, SURFACE MOUNTED, | PHILIPS | BAS16 |
| IC1 | 28461/896 | IC-ANALOGUE SWITCH DG413... QUAD, 15V SPST, ON-RESISTANCE<35R, 2 x N/O & 2 x N/C @ LOGIC 1, | TEMIC UK LTD | DG413DY |
| IC2 | 28469/026 | IC-DIGITAL INVERTER 74HCT04... HEX, CMOS-H/SPEED+TTL, 14 PIN, SMALL-OUTLINE. | PHILIPS | 74HCT04D |
| IC3 | 28469/026 | IC-DIGITAL INVERTER 74HCT04... HEX, CMOS-H/SPEED+TTL, 14 PIN, SMALL-OUTLINE. | PHILIPS | 74HCT04D |
| IC4 | 28469/543 | IC-DIGITAL COUNTER 74HC390... 4 BIT, DUAL, DECADE RIPPLE, CMOS-H/SPEED, 16 PIN, SMALL-OUTLINE. | PHILIPS | 74HC390D |
| IC5 | 28466/393 | IC-DIGITAL NAND-GATE 74HC132... 2 INPUT, QUAD, SCHMITT TRIGGER, CMOS-H/SPEED, 14 PIN, | PHILIPS | 74HC132D |
| IC6 | 28461/413 | IC-ANALOGUE OPERATIONAL AMP TL074... QUAD, JFET INPUT, LOW NOISE, SLEW RATE 8V/uS MIN, GAIN | MOTOROLA INC. | TL074CD |
| IC8 | 28461/388 | IC-ANALOGUE OPERATIONAL AMP LM324D... QUAD, GEN-PURPOSE, SLEW RATE 0.2V/uS MIN, GAIN BANDWIDTH | PHILIPS | LM324D |
| IC9 | 28461/734 | IC-ANALOGUE VOLTAGE-REGULATOR 78L05AC... 5V 100mA POSITIVE, LINEAR, 5% REGULATION, MONOLITHIC, 3 | NAT. SEMICONDUCTOR | LM78L05ACZ |
| PLB | 23437/042 | CONNECTOR MULTIWAY, PCB HEADER, 10 WAY, STRAIGHT, 2-ROW, 2.54mm GRID, TO ACCEPT LATCHING SOCKET, | BERG ELECTRONICS | 75869-301 |
| R1 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R2 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R3 | 24811/171 | RESISTOR-FIXED METAL-FILM 825R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-825R-1%50ppm |
| R4 | 25748/570 | RESISTOR-VARIABLE CERMET LINEAR, 50K 10% 500mW 200V 100 ppm/DEG.C, MULTI-TURN, VERTICAL-PCB, | MEGGITT ELECTRONICS | 4290W404/8/06411/503 |
| R5 | 24811/213 | RESISTOR-FIXED METAL-FILM 47K5 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-47K5-1%50ppm |
| R6 | 24811/133 | RESISTOR-FIXED METAL-FILM 22R1 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-22R1-1%50ppm |
| R7 | 24811/193 | RESISTOR-FIXED METAL-FILM 6K81 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-6K81-1%50ppm |

| Cir. Ref. | IFR part number | Description | Manufacturer part number | Manufacturer's |
|---|---|---|---|---|

**AR1 10 MHz OCXO (contd.)**

| | | | |
|---|---|---|---|
| R8 | 24811/201 | RESISTOR-FIXED METAL-FILM 15K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS SMM0204-15K-1%50ppm |
| R9 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS SMM0204-1K0-1%-50ppm |
| R10 | 24811/185 | RESISTOR-FIXED METAL-FILM 3K32 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS SMM0204-3K32-1%50ppm |
| R11 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS SMM0204-1K0-1%-50ppm |
| R12 | 24811/169 | RESISTOR-FIXED METAL-FILM 681R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS SMM0204-681R-1%50ppm |
| R13 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS SMM0204-10K-1%50ppm |
| R14 | 24811/201 | RESISTOR-FIXED METAL-FILM 15K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS SMM0204-15K-1%50ppm |
| R15 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS SMM0204-10K-1%50ppm |
| R16 | 24811/189 | RESISTOR-FIXED METAL-FILM 4K75 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS SMM0204-4K75-1%50ppm |
| R17 | 24811/237 | RESISTOR-FIXED METAL-FILM 475K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS SMM0204-475K-1%50ppm |
| R23 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS SMM0204-10K-1%50ppm |
| R24 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS SMM0204-1K0-1%-50ppm |
| R25 | 24811/133 | RESISTOR-FIXED METAL-FILM 22R1 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS SMM0204-22R1-1%50ppm |
| R26 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS SMM0204-1K0-1%-50ppm |
| R27 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS SMM0204-1K0-1%-50ppm |
| R28 | 24811/199 | RESISTOR-FIXED METAL-FILM 12K1 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS SMM0204-12K1-1%50ppm |
| R29 | 24811/225 | RESISTOR-FIXED METAL-FILM 150K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS SMM0204-150K-1%50ppm |
| R30 | 24811/225 | RESISTOR-FIXED METAL-FILM 150K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS SMM0204-150K-1%50ppm |
| R31 | 24811/199 | RESISTOR-FIXED METAL-FILM 12K1 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS SMM0204-12K1-1%50ppm |
| R32 | 24811/225 | RESISTOR-FIXED METAL-FILM 150K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS SMM0204-150K-1%50ppm |
| R33 | 24811/199 | RESISTOR-FIXED METAL-FILM 12K1 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS SMM0204-12K1-1%50ppm |
| R34 | 24811/161 | RESISTOR-FIXED METAL-FILM 332R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS SMM0204-332R-1%50ppm |
| R39 | 24811/195 | RESISTOR-FIXED METAL-FILM 8K25 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS SMM0204-8K25-1%50ppm |
| R40 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS SMM0204-1K0-1%-50ppm |
| R49 | 24811/169 | RESISTOR-FIXED METAL-FILM 681R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS SMM0204-681R-1%50ppm |
| R50 | 24811/177 | RESISTOR-FIXED METAL-FILM 1K5 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS SMM0204-1K5-1%50ppm |

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| **AR1** | **10 MHz OCXO (contd.)** | | | |
| R51 | 24811/149 | RESISTOR-FIXED METAL-FILM 100R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100R-1%50ppm |
| R52 | 24811/149 | RESISTOR-FIXED METAL-FILM 100R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100R-1%50ppm |
| SKA | 23435/990 | CONNECTOR SHORTING, SOCKET, 2 WAY, FOR 0.64mm SQ PINS, 2.54mm PITCH, 9.6mm HIGH, FREE MOUNTING, | BERG ELECTRONICS | 65474-001 |
| TR1 | 28431/767 | TRANSISTOR PNP BIPOLAR MPS4258... 12V 700MHz 1W 80mA 30hFE @ 50mA, TO-92, (LOOSE). | NAT. SEMICONDUCTOR | PN4258 |
| TR2 | 28459/050 | TRANSISTOR N-CHANNEL-DEPLETION JFET 2N4856... 40V 360mW 50mA 25R TO-18. | TEMIC UK LTD | 2N4856 |
| XL1 | 28313/883 | OSCILLATOR CRYSTAL, 10 MHz +/- 0.1 ppm, OCXO, 12V, 30mm LONG, 30mm WIDE, 26mm HIGH, 5 PIN, MODULE. | NDK CO LTD | END3032A |

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|

## AR1/2 10 MHz OCXO

When ordering, prefix circuit reference with AR1/2.

| | | | | |
|---|---|---|---|---|
| | 44830/069 | Complete unit | Issue 05 | |
| C1 | 26386/760 | CAPACITOR-FIXED CERAMIC 220nF +/-10% 50V X7R MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | PHILIPS | 1210-2R-224-K9-BBC |
| C2 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C3 | 26386/871 | CAPACITOR-FIXED CERAMIC 4.7nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-472-KP |
| C4 to C6 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C7 | 26386/760 | CAPACITOR-FIXED CERAMIC 220nF +/-10% 50V X7R MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | PHILIPS | 1210-2R-224-K9-BBC |
| C8 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C9 | 26386/760 | CAPACITOR-FIXED CERAMIC 220nF +/-10% 50V X7R MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | PHILIPS | 1210-2R-224-K9-BBC |
| C10 | 26386/760 | CAPACITOR-FIXED CERAMIC 220nF +/-10% 50V X7R MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | PHILIPS | 1210-2R-224-K9-BBC |
| C11 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C12 | 26451/015 | CAPACITOR-FIXED ALUMINIUM 470uF +/-20% 10V ELECTROLYTIC, SURFACE-MOUNTED, SIZE 10.3 x 10.3mm, | PANASONIC INDUSTRIAL | ECE-V-1A-A-471-P |
| C13 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C14 | 26386/818 | CAPACITOR-FIXED CERAMIC 33pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-330-JP |
| C15 | 26386/863 | CAPACITOR-FIXED CERAMIC 1nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-102-KP |
| C16 | 26386/824 | CAPACITOR-FIXED CERAMIC 100pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-101-JP |
| C17 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C18 | 26386/871 | CAPACITOR-FIXED CERAMIC 4.7nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-472-KP |
| C19 | 26451/001 | CAPACITOR-FIXED ALUMINIUM 1uF +/-20% 50V ELECTROLYTIC, SURFACE-MOUNTED, SIZE 4.3 x 4.3mm, | PANASONIC INDUSTRIAL | ECE-V-1HA-010R |
| C20 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C21 to C23 | 26451/009 | CAPACITOR-FIXED ALUMINIUM 47uF +/-20% 16V ELECTROLYTIC, SURFACE-MOUNTED, SIZE 6.6 x 6.6mm, | PANASONIC INDUSTRIAL | ECE-V-1CA-470P |
| C24 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C25 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C26 | 26386/760 | CAPACITOR-FIXED CERAMIC 220nF +/-10% 50V X7R MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | PHILIPS | 1210-2R-224-K9-BBC |
| C27 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C28 to C31 | 26386/760 | CAPACITOR-FIXED CERAMIC 220nF +/-10% 50V X7R MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | PHILIPS | 1210-2R-224-K9-BBC |

## AR1/2 10 MHz OCXO (contd.)

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| C32 to C34 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C35 | 26386/760 | CAPACITOR-FIXED CERAMIC 220nF +/-10% 50V X7R MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | PHILIPS | 1210-2R-224-K9-BBC |
| C36 to C39 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C40 to C42 | 26386/760 | CAPACITOR-FIXED CERAMIC 220nF +/-10% 50V X7R MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | PHILIPS | 1210-2R-224-K9-BBC |
| D1 | 28383/934 | DIODE SMALL-SIGNAL, LL4148... 500mW 50V 150mA 1Vf @ 10mA, SURFACE MOUNTED, MINI-MELF, (8mm TAPE - | PHILIPS | PMLL4148L |
| D2 | 28383/934 | DIODE SMALL-SIGNAL, LL4148... 500mW 50V 150mA 1Vf @ 10mA, SURFACE MOUNTED, MINI-MELF, (8mm TAPE - | PHILIPS | PMLL4148L |
| D3 | 28371/494 | DIODE VOLTAGE REFERENCE, 1N825... 250mW 6.2V 5% 50mA 20ppm/DEG.C, AXIAL, DO-7, (TAPED). | PHILIPS | 1N825 |
| D4 | 28349/029 | DIODE SMALL-SIGNAL, SCHOTTKY, HSMS-2810... 20V 1.2pF 410mVf @ 1mA, MARKNG CODE B0, LOW PROFILE, | HEWLETT-PACKARD | HSMS-2810-L31 |
| D5 to D8 | 28383/934 | DIODE SMALL-SIGNAL, LL4148... 500mW 50V 150mA 1Vf @ 10mA, SURFACE MOUNTED, MINI-MELF, (8mm TAPE - | PHILIPS | PMLL4148L |
| D9 | 28371/303 | DIODE ZENER, BZX84-C6V2... 350mW 6.2V 5% 250mA MARKING CODE Z4, SURFACE MOUNTED, SOT-23, (8mm | PHILIPS | BZX84-C6V2 |
| IC1 | 28467/110 | IC-MICRO PERIPHERAL, PCF8574A... REMOTE 8-BIT I/O EXPANDER, I.IC BUS, UP TO 16 DEVICE ADDRESS | PHILIPS | PCF8574AT |
| IC2 | 28461/828 | IC-ANALOGUE D/A-CONVERTER DAC-08... 8 BIT, HIGH SPEED MULTIPLYING, MONOLITHIC, 16 PIN, | NAT. SEMICONDUCTOR | DAC-0801LCM |
| IC3 | 28461/819 | IC-ANALOGUE OPERATIONAL AMP OP177... SINGLE, 22V OFFSET VOLTAGE 25uV, OFFSET CURRENT 1.5nA, | ANALOG DEVICES LTD | OP177GS |
| IC4 | 28461/888 | IC-ANALOGUE SWITCH DG419... SINGLE, 15V SPDT, ON-RESISTANCE<35R, CHANGEOVER, TTL COMPATIBLE, | TEMIC UK LTD | DG419DY |
| IC5 | 28461/388 | IC-ANALOGUE OPERATIONAL AMP LM324D... QUAD, GEN-PURPOSE, SLEW RATE 0.2V/uS MIN, GAIN BANDWIDTH | PHILIPS | LM324D |
| IC6 | 28466/390 | IC-DIGITAL NAND-GATE 74HC00... 2 INPUT, QUAD, CMOS-H/SPEED, 14 PIN, SMALL-OUTLINE. | PHILIPS | 74HC00D |
| IC7 | 28461/888 | IC-ANALOGUE SWITCH DG419... SINGLE, 15V SPDT, ON-RESISTANCE<35R, CHANGEOVER, TTL COMPATIBLE, | TEMIC UK LTD | DG419DY |
| IC8 | 28469/543 | IC-DIGITAL COUNTER 74HC390... 4 BIT, DUAL, DECADE RIPPLE, CMOS-H/SPEED, 16 PIN, SMALL-OUTLINE. | PHILIPS | 74HC390D |
| IC9 | 28466/393 | IC-DIGITAL NAND-GATE 74HC132... 2 INPUT, QUAD, SCHMITT TRIGGER, CMOS-H/SPEED, 14 PIN, | PHILIPS | 74HC132D |
| IC10 | 28469/026 | IC-DIGITAL INVERTER 74HCT04... HEX, CMOS-H/SPEED+TTL, 14 PIN, SMALL-OUTLINE. | PHILIPS | 74HCT04D |
| IC11 | 28461/412 | IC-ANALOGUE OPERATIONAL AMP TL072... DUAL, 18V UNITY GAIN BNDWDTH 3MHz, OFFSET VOLTAGE 10mV, SLEW | MOTOROLA INC. | TL072CD |
| IC12 | 28469/026 | IC-DIGITAL INVERTER 74HCT04... HEX, CMOS-H/SPEED+TTL, 14 PIN, SMALL-OUTLINE. | PHILIPS | 74HCT04D |
| IC13 | 28461/707 | IC-ANALOGUE VOLTAGE-REGULATOR 7805... 5V 1A POSITIVE, LINEAR, MONOLITHIC, 3 PIN, TO-220. | NAT. SEMICONDUCTOR | uA7805UC |

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|

## AR1/2 10 MHz OCXO (contd.)

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|---|---|---|---|---|
| PLB | 23437/042 | CONNECTOR MULTIWAY, PCB HEADER, 10 WAY, STRAIGHT, 2-ROW, 2.54mm GRID, TO ACCEPT LATCHING SOCKET, | BERG ELECTRONICS | 75869-301 |
| R1 | 24811/221 | RESISTOR-FIXED METAL-FILM 100K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100K-1%50ppm |
| R2 | 24811/221 | RESISTOR-FIXED METAL-FILM 100K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100K-1%50ppm |
| R3 | 24811/165 | RESISTOR-FIXED METAL-FILM 475R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-475R-1%50ppm |
| R4 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R5 | 24811/147 | RESISTOR-FIXED METAL-FILM 82R5 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-82R5-1%50ppm |
| R6 | 24811/169 | RESISTOR-FIXED METAL-FILM 681R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-681R-1%50ppm |
| R7 | 24811/189 | RESISTOR-FIXED METAL-FILM 4K75 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-4K75-1%50ppm |
| R8 | 24811/189 | RESISTOR-FIXED METAL-FILM 4K75 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-4K75-1%50ppm |
| R9 | 24811/193 | RESISTOR-FIXED METAL-FILM 6K81 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-6K81-1%50ppm |
| R10 | 24811/237 | RESISTOR-FIXED METAL-FILM 475K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-475K-1%50ppm |
| R11 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R12 | 24811/155 | RESISTOR-FIXED METAL-FILM 182R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-182R-1%50ppm |
| R13 | 24811/133 | RESISTOR-FIXED METAL-FILM 22R1 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-22R1-1%50ppm |
| R14 | 24811/189 | RESISTOR-FIXED METAL-FILM 4K75 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-4K75-1%50ppm |
| R15 | 24811/221 | RESISTOR-FIXED METAL-FILM 100K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100K-1%50ppm |
| R16 | 24811/221 | RESISTOR-FIXED METAL-FILM 100K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100K-1%50ppm |
| R17 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R18 | 24811/133 | RESISTOR-FIXED METAL-FILM 22R1 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-22R1-1%50ppm |
| R19 | 24811/165 | RESISTOR-FIXED METAL-FILM 475R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-475R-1%50ppm |
| R20 | 24811/187 | RESISTOR-FIXED METAL-FILM 3K92 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-3K92-1%50ppm |
| R21 | 24811/149 | RESISTOR-FIXED METAL-FILM 100R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100R-1%50ppm |
| R22 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R23 | 24811/149 | RESISTOR-FIXED METAL-FILM 100R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100R-1%50ppm |

## AR1/2 10 MHz OCXO (contd.)

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| R24 | 24811/176 | RESISTOR-FIXED METAL-FILM 1K3 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K3-1%50ppm |
| R25 | 24811/176 | RESISTOR-FIXED METAL-FILM 1K3 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K3-1%50ppm |
| R26 | 24811/159 | RESISTOR-FIXED METAL-FILM 274R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-274R-1%50ppm |
| R27 | 24811/169 | RESISTOR-FIXED METAL-FILM 681R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-681R-1%50ppm |
| R28 | 24811/169 | RESISTOR-FIXED METAL-FILM 681R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-681R-1%50ppm |
| R29 | 24811/177 | RESISTOR-FIXED METAL-FILM 1K5 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K5-1%50ppm |
| R30 | 24811/201 | RESISTOR-FIXED METAL-FILM 15K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-15K-1%50ppm |
| R31 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R32 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R33 | 24811/237 | RESISTOR-FIXED METAL-FILM 475K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-475K-1%50ppm |
| R34 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R35 | 24811/171 | RESISTOR-FIXED METAL-FILM 825R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-825R-1%50ppm |
| R36 | 24811/193 | RESISTOR-FIXED METAL-FILM 6K81 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-6K81-1%50ppm |
| R37 | 24811/171 | RESISTOR-FIXED METAL-FILM 825R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-825R-1%50ppm |
| R38 | 24811/161 | RESISTOR-FIXED METAL-FILM 332R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-332R-1%50ppm |
| R39 to R41 | 24811/165 | RESISTOR-FIXED METAL-FILM 475R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-475R-1%50ppm |
| TR1 | 28457/854 | TRANSISTOR PNP BIPOLAR BFT93... 12V 5GHz 200mW 35mA MARKING CODE X1, SURFACE MOUNTED, SOT-23, | PHILIPS | BFT93 |
| TR2 | 28459/061 | TRANSISTOR N-CHANNEL-DEPLETION JFET BSR56... 40V 250mW 50mA MARKING CODE M4, SURFACE MOUNTED, | PHILIPS | BSR56 |
| XL1 | 28313/883 | OSCILLATOR CRYSTAL, 10 MHz +/- 0.1 ppm, OCXO, 12V, 30mm LONG, 30mm WIDE, 26mm HIGH, 5 PIN, MODULE. | NDK CO LTD | END3032A |

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|

## AR2 PSU distribution

When ordering, prefix circuit reference with AR2.

| | | | | |
|---|---|---|---|---|
| | 44829-828 | Complete unit | Issue 05 | |
| C1 | 26386/899 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | ROHM ELECTRONICS LTD | MCH31-5C-104-KP |
| C2 | 26386/899 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | ROHM ELECTRONICS LTD | MCH31-5C-104-KP |
| C3 | 26386/899 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | ROHM ELECTRONICS LTD | MCH31-5C-104-KP |
| C4 | 26386/899 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | ROHM ELECTRONICS LTD | MCH31-5C-104-KP |
| C5 | 26386/899 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | ROHM ELECTRONICS LTD | MCH31-5C-104-KP |
| D1 | 28371/735 | DIODE ZENER, BZX84-C8V2... 350mW 8.2V 5% 250mA MARKING CODE Z7, SURFACE MOUNTED, SOT-23, (TAPED). | PHILIPS | BZX84-C8V2 |
| D2 | 28371/303 | DIODE ZENER, BZX84-C6V2... 350mW 6.2V 5% 250mA MARKING CODE Z4, SURFACE MOUNTED, SOT-23, (TAPED). | PHILIPS | BZX84-C6V2 |
| L1 | 23642/909 | WOUND-PART INDUCTOR, WIDEBAND HF CHOKE, BEAD-CORE, 4B1 GRADE MATERIAL, 2.5 TURNS, TINNED COPPER WIRE. | PHILIPS | 4312-020-36700 |
| L2 | 23642/909 | WOUND-PART INDUCTOR, WIDEBAND HF CHOKE, BEAD-CORE, 4B1 GRADE MATERIAL, 2.5 TURNS, TINNED COPPER WIRE. | PHILIPS | 4312-020-36700 |
| L3 | 23642/909 | WOUND-PART INDUCTOR, WIDEBAND HF CHOKE, BEAD-CORE, 4B1 GRADE MATERIAL, 2.5 TURNS, TINNED COPPER WIRE. | PHILIPS | 4312-020-36700 |
| L4 | 23642/909 | WOUND-PART INDUCTOR, WIDEBAND HF CHOKE, BEAD-CORE, 4B1 GRADE MATERIAL, 2.5 TURNS, TINNED COPPER WIRE. | PHILIPS | 4312-020-36700 |
| L5 | 23642/909 | WOUND-PART INDUCTOR, WIDEBAND HF CHOKE, BEAD-CORE, 4B1 GRADE MATERIAL, 2.5 TURNS, TINNED COPPER WIRE. | PHILIPS | 4312-020-36700 |
| PLA | 23436/795 | CONNECTOR MULTIWAY, PCB HEADER, 14 WAY, STRAIGHT, 3.96mm PITCH, WITHOUT LOCK, TIN PLATED PINS, | MOLEX ELECTRONICS | 26-48-1141 |
| PLB | 23436/794 | CONNECTOR MULTIWAY, PCB HEADER, 2 WAY, STRAIGHT, 3.96mm PITCH, WITHOUT LOCK, TIN PLATED PINS, | MOLEX ELECTRONICS | 26-48-1021 |
| PLC | 23435/950 | CONNECTOR MULTIWAY, PCB HEADER, 20 WAY, RIGHT ANGLED, 2-ROW, 2.54mm GRID, POLARISED, SHROUDED, | MOLEX ELECTRONICS | 39-26-7208 |
| PLD | 23436/777 | CONNECTOR MULTIWAY, PCB HEADER, 6 WAY, RIGHT ANGLED, 3.96mm PITCH, WITH FRICTION LOCK, GOLD | MOLEX ELECTRONICS | 26-48-2066 |
| PLE | 23435/120 | CONNECTOR MULTIWAY, PCB HEADER, 36 WAY, RIGHT ANGLED, 2.54mm PITCH, PINS GOLD PLATED TO CLASS 2, | BERG ELECTRONICS | 75168-101-36 |

## AR2 PSU distribution (contd.)

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| PLF | 23435/112 | CONNECTOR MULTIWAY, PCB HEADER, 36 WAY, RIGHT ANGLED, 2.54mm PITCH, PINS GOLD PLATED TO CLASS 2, | BERG ELECTRONICS | 75168-107-36 |
| | 23435/120 | CONNECTOR MULTIWAY, PCB HEADER, 36 WAY, RIGHT ANGLED, 2.54mm PITCH, PINS GOLD PLATED TO CLASS 2, | BERG ELECTRONICS | 75168-101-36 |
| PLG | 23435/112 | CONNECTOR MULTIWAY, PCB HEADER, 36 WAY, RIGHT ANGLED, 2.54mm PITCH, PINS GOLD PLATED TO CLASS 2, | BERG ELECTRONICS | 75168-107-36 |
| | 23435/120 | CONNECTOR MULTIWAY, PCB HEADER, 36 WAY, RIGHT ANGLED, 2.54mm PITCH, PINS GOLD PLATED TO CLASS 2, | BERG ELECTRONICS | 75168-101-36 |
| R1 | 24811/182 | RESISTOR-FIXED METAL-FILM 2K43 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-2K43-1%50ppm |
| R2 | 24811/177 | RESISTOR-FIXED METAL-FILM 1K5 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K5-1%50ppm |
| R3 | 24811/189 | RESISTOR-FIXED METAL-FILM 4K75 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-4K75-1%50ppm |
| R4 | 24811/159 | RESISTOR-FIXED METAL-FILM 274R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-274R-1%50ppm |
| TR1 | 28455/302 | TRANSISTOR NPN BIPOLAR BCX54... 45V 130MHz 1W 1A 40hFE MIN @ 150mA, MARKING CODE BA/BB/BC/BD, | PHILIPS | BCX54 |
| TR2 | 28433/828 | TRANSISTOR PNP BIPOLAR BC858B... 30V 150MHz 200mW 100mA 220hFE MIN @ 2mA, MARKING CODE 3K, SURFACE | PHILIPS | BC858B |

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|

## AR4 10 MHz oscillator buffer

When ordering, prefix circuit reference with AR4.

| | | | | |
|---|---|---|---|---|
| | 44830/192 | Complete unit | Issue 3 | |
| C1 to C2 | 26386/875 | CAPACITOR CERAMIC 10nF+/-10% 50V 0805 | AVX | 0805-5C-103-KAT-1A o |
| IC1 | 28469/026 | IC-DIGITAL INVERTER74HCT04.. HEX SO-14 | PHILIPS | 74HCT04D |
| PLB | 23435/112 | CONNECTOR PCB HEADER36-WAY 0.64mmSQ RT-ANG | FCI | 75168-107-36 |
| | 23435/120 | CONNECTOR PCB HEADER36-WAY 0.64mmSQ RT-ANG | FCI | 75168-101-36 |
| PLC | 23435/120 | CONNECTOR PCB HEADER36-WAY 0.64mmSQ RT-ANG | FCI | 75168-101-36 |
| PLD | 23435/112 | CONNECTOR PCB HEADER36-WAY 0.64mmSQ RT-ANG | FCI | 75168-107-36 |
| | 23435/120 | CONNECTOR PCB HEADER36-WAY 0.64mmSQ RT-ANG | FCI | 75168-101-36 |
| R1 to R3 | 24811/125 | RESISTOR 10R 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-10R-1%-50ppm |
| R4 | 24811/221 | RESISTOR 100K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-100K-1%-50ppm |
| R5 | 24811/165 | RESISTOR 475R 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-475R-1%-50ppm |
| SKA | 23437/523 | CONNECTOR SKT 14-WAY RT-ANG 2-ROW SURFACE MTG | FCI | 1609-307 |

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|

## A1 Audio generator

When ordering, prefix circuit reference with A1.

| | | | | |
|---|---|---|---|---|
| | 44829-831 | Complete unit | Issue 13 | |
| C1 | 26386/828 | CAPACITOR-FIXED CERAMIC 220pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-221-JP |
| C2 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C3 | 26386/863 | CAPACITOR-FIXED CERAMIC 1nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-102-KP |
| C4 | 26421/106 | CAPACITOR-FIXED ALUMINIUM 1uF +/-20% 50V ELECTROLYTIC, RADIAL, 5mm PWP, (TAPED). | PANASONIC INDUSTRIAL | ECE-A-1H-KA-010-B |
| C5 | 26386/863 | CAPACITOR-FIXED CERAMIC 1nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-102-KP |
| C6 | 26421/106 | CAPACITOR-FIXED ALUMINIUM 1uF +/-20% 50V ELECTROLYTIC, RADIAL, 5mm PWP, (TAPED). | PANASONIC INDUSTRIAL | ECE-A-1H-KA-010-B |
| C7 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C8 | 26386/819 | CAPACITOR-FIXED CERAMIC 39pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-390-JP |
| C9 | 26386/830 | CAPACITOR-FIXED CERAMIC 330pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-331-JP |
| C10 to C12 | 26538/635 | CAPACITOR-FIXED POLYSTYRENE 470pF +/-2% 63V 150 ppm/DEG.C, RADIAL, 7.6mm PWP, (TAPED). | LCR COMPONENTS | EP9-470pF-2%-63V |
| C13 | 26538/603 | CAPACITOR-FIXED POLYSTYRENE 330pF +/-2% 63V 150 ppm/DEG.C, RADIAL, 7.6mm PWP, (TAPED). | LCR COMPONENTS | EP9-330pF-2%-63V |
| C14 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C15 | 26421/112 | CAPACITOR-FIXED ALUMINIUM 10uF +/-20% 35V ELECTROLYTIC, RADIAL, 5mm PWP, (TAPED). | PANASONIC INDUSTRIAL | ECE-A-1V-KA-100-B |
| C16 | 26386/863 | CAPACITOR-FIXED CERAMIC 1nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-102-KP |
| C17 | 26582/432 | CAPACITOR-FIXED POLYESTER 1uF +/-10% 50V 330 ppm/DEG.C, RADIAL, 5mm PWP, (TAPED). | VISHAY COMPONENTS | MKT-1826-510/065 |
| C18 | 26386/887 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-104-KP |
| C19 | 26383/592 | CAPACITOR-FIXED CERAMIC 1.2nF +/-10% 63V 2C2 SINGLELAYER, RADIAL, 2.5mm PWP, (TAPED). | PHILIPS | 2222-630-51122 |
| C20 | 26386/887 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-104-KP |
| C21 | 26386/887 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-104-KP |
| C22 | 26383/592 | CAPACITOR-FIXED CERAMIC 1.2nF +/-10% 63V 2C2 SINGLELAYER, RADIAL, 2.5mm PWP, (TAPED). | PHILIPS | 2222-630-51122 |
| C23 | 26386/887 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-104-KP |
| C24 | 26538/902 | CAPACITOR-FIXED POLYSTYRENE 1nF +/-1% 63V 125 ppm/DEG.C, RADIAL, 5.08mm PWP, SQUARE, WIRES ON | PHILIPS | 2222-443-81002 |

## A1 Audio generator (contd.)

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| C25 | 26386/887 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-104-KP |
| C26 | 26386/887 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-104-KP |
| C27 | 26538/618 | CAPACITOR-FIXED POLYSTYRENE 300pF +/-2% 63V 150 ppm/DEG.C, RADIAL, 7.6mm PWP, (TAPED). | LCR COMPONENTS | EP9-300pF-2%-63V |
| C28 | 26538/902 | CAPACITOR-FIXED POLYSTYRENE 1nF +/-1% 63V 125 ppm/DEG.C, RADIAL, 5.08mm PWP, SQUARE, WIRES ON | PHILIPS | 2222-443-81002 |
| C29 | 26386/887 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-104-KP |
| C30 | 26386/887 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-104-KP |
| C31 | 26538/618 | CAPACITOR-FIXED POLYSTYRENE 300pF +/-2% 63V 150 ppm/DEG.C, RADIAL, 7.6mm PWP, (TAPED). | LCR COMPONENTS | EP9-300pF-2%-63V |
| C32 | 26343/767 | CAPACITOR-FIXED CERAMIC 10pF +/-5% 50V NPO MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-100-DP |
| C33 | 26386/825 | CAPACITOR-FIXED CERAMIC 120pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-121-JP |
| C34 | 26386/887 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-104-KP |
| C35 | 26386/887 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-104-KP |
| C36 | 26421/112 | CAPACITOR-FIXED ALUMINIUM 10uF +/-20% 35V ELECTROLYTIC, RADIAL, 5mm PWP, (TAPED). | PANASONIC INDUSTRIAL | ECE-A-1V-KA-100-B |
| C37 | 26386/887 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-104-KP |
| C38 | 26386/887 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-104-KP |
| C39 | 26421/112 | CAPACITOR-FIXED ALUMINIUM 10uF +/-20% 35V ELECTROLYTIC, RADIAL, 5mm PWP, (TAPED). | PANASONIC INDUSTRIAL | ECE-A-1V-KA-100-B |
| C40 | 26386/819 | CAPACITOR-FIXED CERAMIC 39pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-390-JP |
| C41 | 26386/819 | CAPACITOR-FIXED CERAMIC 39pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-390-JP |
| C42 | 26421/112 | CAPACITOR-FIXED ALUMINIUM 10uF +/-20% 35V ELECTROLYTIC, RADIAL, 5mm PWP, (TAPED). | PANASONIC INDUSTRIAL | ECE-A-1V-KA-100-B |
| C43 | 26386/887 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-104-KP |
| C44 | 26386/887 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-104-KP |
| C45 | 26421/112 | CAPACITOR-FIXED ALUMINIUM 10uF +/-20% 35V ELECTROLYTIC, RADIAL, 5mm PWP, (TAPED). | PANASONIC INDUSTRIAL | ECE-A-1V-KA-100-B |
| C46 | 26343/767 | CAPACITOR-FIXED CERAMIC 10pF +/-5% 50V NPO MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-100-DP |
| C47 | 26386/814 | CAPACITOR-FIXED CERAMIC 15pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-150-JP |
| C48 | 26386/814 | CAPACITOR-FIXED CERAMIC 15pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-150-JP |
| C49 | 26343/767 | CAPACITOR-FIXED CERAMIC 10pF +/-5% 50V NPO MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-100-DP |

## A1 Audio generator (contd.)

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| C50 | 26386/871 | CAPACITOR-FIXED CERAMIC 4.7nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-472-KP |
| C51 | 26343/767 | CAPACITOR-FIXED CERAMIC 10pF +/-5% 50V NPO MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-100-DP |
| C52 | 26421/118 | CAPACITOR-FIXED ALUMINIUM 100uF +/-20% 6.3V ELECTROLYTIC, RADIAL, 5mm PWP, (TAPED). | PANASONIC INDUSTRIAL | ECE-A-0J-KA-101-B |
| C53 | 26386/887 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-104-KP |
| C54 | 26421/118 | CAPACITOR-FIXED ALUMINIUM 100uF +/-20% 6.3V ELECTROLYTIC, RADIAL, 5mm PWP, (TAPED). | PANASONIC INDUSTRIAL | ECE-A-0J-KA-101-B |
| C55 | 26386/887 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-104-KP |
| C56 | 26421/116 | CAPACITOR-FIXED ALUMINIUM 47uF +/-20% 16V ELECTROLYTIC, RADIAL, 5mm PWP, (LOOSE OR TAPED). | PANASONIC INDUSTRIAL | ECE-A-1C-KA-470-B |
| C57 | 26386/887 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-104-KP |
| C58 | 26421/116 | CAPACITOR-FIXED ALUMINIUM 47uF +/-20% 16V ELECTROLYTIC, RADIAL, 5mm PWP, (LOOSE OR TAPED). | PANASONIC INDUSTRIAL | ECE-A-1C-KA-470-B |
| C59 | 26386/887 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-104-KP |
| C61 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C62 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C63 | 26386/883 | CAPACITOR-FIXED CERAMIC 47nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-473-KP |
| C64 | 26421/118 | CAPACITOR-FIXED ALUMINIUM 100uF +/-20% 6.3V ELECTROLYTIC, RADIAL, 5mm PWP, (TAPED). | PANASONIC INDUSTRIAL | ECE-A-0J-KA-101-B |
| C65 to C88 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C89 | 26582/432 | CAPACITOR-FIXED POLYESTER 1uF +/-10% 50V 330 ppm/DEG.C, RADIAL, 5mm PWP, (TAPED). | VISHAY COMPONENTS | MKT-1826-510/065 |
| C91 | 26386/883 | CAPACITOR-FIXED CERAMIC 47nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-473-KP |
| C92 | 26421/118 | CAPACITOR-FIXED ALUMINIUM 100uF +/-20% 6.3V ELECTROLYTIC, RADIAL, 5mm PWP, (TAPED). | PANASONIC INDUSTRIAL | ECE-A-0J-KA-101-B |
| C93 to C141 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C142 to C144 | 26386/883 | CAPACITOR-FIXED CERAMIC 47nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-473-KP |
| C145 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C146 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C150 | 26582/432 | CAPACITOR-FIXED POLYESTER 1uF +/-10% 50V 330 ppm/DEG.C, RADIAL, 5mm PWP, (TAPED). | VISHAY COMPONENTS | MKT-1826-510/065 |
| C151 | 26582/432 | CAPACITOR-FIXED POLYESTER 1uF +/-10% 50V 330 ppm/DEG.C, RADIAL, 5mm PWP, (TAPED). | VISHAY COMPONENTS | MKT-1826-510/065 |
| C152 | 26343/767 | CAPACITOR-FIXED CERAMIC 10pF +/-5% 50V NPO MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-100-DP |

## A1 Audio generator (contd.)

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| D1 | 28383/901 | DIODE SMALL-SIGNAL, BAV70... DUAL, 70V 100mA 1.1Vf @ 50mA, COMMON CATHODE, MARKING CODE A4, SURFACE | PHILIPS | BAV70 |
| D2 | 28383/901 | DIODE SMALL-SIGNAL, BAV70... DUAL, 70V 100mA 1.1Vf @ 50mA, COMMON CATHODE, MARKING CODE A4, SURFACE | PHILIPS | BAV70 |
| D3 | 28372/781 | DIODE ZENER, BZX84-C18... 350mW 18V 5% 250mA MARKING CODE Y6, SURFACE MOUNTED, SOT-23, (TAPED). | PHILIPS | BZX84-C18 |
| D4 | 28372/781 | DIODE ZENER, BZX84-C18... 350mW 18V 5% 250mA MARKING CODE Y6, SURFACE MOUNTED, SOT-23, (TAPED). | PHILIPS | BZX84-C18 |
| D5 | 28383/901 | DIODE SMALL-SIGNAL, BAV70... DUAL, 70V 100mA 1.1Vf @ 50mA, COMMON CATHODE, MARKING CODE A4, SURFACE | PHILIPS | BAV70 |
| D6 | 28383/901 | DIODE SMALL-SIGNAL, BAV70... DUAL, 70V 100mA 1.1Vf @ 50mA, COMMON CATHODE, MARKING CODE A4, SURFACE | PHILIPS | BAV70 |
| D7 | 28372/781 | DIODE ZENER, BZX84-C18... 350mW 18V 5% 250mA MARKING CODE Y6, SURFACE MOUNTED, SOT-23, (TAPED). | PHILIPS | BZX84-C18 |
| D8 | 28372/781 | DIODE ZENER, BZX84-C18... 350mW 18V 5% 250mA MARKING CODE Y6, SURFACE MOUNTED, SOT-23, (TAPED). | PHILIPS | BZX84-C18 |
| D9 | 28383/901 | DIODE SMALL-SIGNAL, BAV70... DUAL, 70V 100mA 1.1Vf @ 50mA, COMMON CATHODE, MARKING CODE A4, SURFACE | PHILIPS | BAV70 |
| D10 | 28383/901 | DIODE SMALL-SIGNAL, BAV70... DUAL, 70V 100mA 1.1Vf @ 50mA, COMMON CATHODE, MARKING CODE A4, SURFACE | PHILIPS | BAV70 |
| D11 | 28372/032 | DIODE ZENER, BZX84-C10... 350mW 10V 5% 250mA MARKING CODE Z9, SURFACE MOUNTED, SOT-23, (TAPED). | PHILIPS | BZX84-C10 |
| D12 | 28372/032 | DIODE ZENER, BZX84-C10... 350mW 10V 5% 250mA MARKING CODE Z9, SURFACE MOUNTED, SOT-23, (TAPED). | PHILIPS | BZX84-C10 |
| D13 | 28383/901 | DIODE SMALL-SIGNAL, BAV70... DUAL, 70V 100mA 1.1Vf @ 50mA, COMMON CATHODE, MARKING CODE A4, SURFACE | PHILIPS | BAV70 |
| D14 | 28357/028 | DIODE RECTIFIER, 1N4004... 400V 1A 1.1Vf @ 1A, AXIAL, SOD-81, (TAPED). | PHILIPS | 1N4004 |
| D15 | 28357/028 | DIODE RECTIFIER, 1N4004... 400V 1A 1.1Vf @ 1A, AXIAL, SOD-81, (TAPED). | PHILIPS | 1N4004 |
| D16 | 28383/901 | DIODE SMALL-SIGNAL, BAV70... DUAL, 70V 100mA 1.1Vf @ 50mA, COMMON CATHODE, MARKING CODE A4, SURFACE | PHILIPS | BAV70 |
| IC1 | 28462/638 | IC-DIGITAL FLIP-FLOP/D-TYPE 74HC74... 2 BIT, DUAL, POS EDGE TRIGGER, PLUS SET & CLEAR, CMOS-H/SPEED, | PHILIPS | 74HC74D |
| IC2 | 28466/120 | IC-DIGITAL OR-GATE 74HC32... 2 INPUT, QUAD, CMOS-H/SPEED, 14 PIN, SMALL-OUTLINE. | PHILIPS | 74HC32D |
| IC3 | 28467/161 | IC-MICRO CONTROLLER, 80C652... 8 BIT, 16MHz, 256 BYTE RAM, I.IC BUS, DUPLEX UART, 4 x 8 BIT I/O | PHILIPS | P80C652FBA |
| IC4 | 28469/058 | IC-DIGITAL BUFFER/LINE-DRIVER 74HC244... 4 INPUT, 4 BIT, DUAL, NON-INVERTING, TRI-STATE BUS, | PHILIPS | 74HC244D |
| IC5 | 28466/032 | IC-DIGITAL AND-GATE 74HC08... 2 INPUT, QUAD, CMOS-H/SPEED, 14 PIN, SMALL-OUTLINE. | PHILIPS | 74HC08D |
| IC6 | 28469/057 | IC-DIGITAL INVERTER 74HC04... HEX, CMOS-H/SPEED, 14 PIN, SMALL-OUTLINE. | PHILIPS | 74HC04D |
| IC7 | 28469/049 | IC-DIGITAL TRANSCEIVER 74HCT245... OCTAL, BI-DIRECTIONAL, TRI-STATE BUS, CMOS-H/SPEED+TTL, | PHILIPS | 74HCT245D |
| IC8 | 28462/438 | IC-DIGITAL LATCH 74HC373... OCTAL, TRANSPARENT WITH TRI-STATE BUS, CMOS-H/SPEED, 20 PIN, | PHILIPS | 74HC373D |

## A1 Audio generator (contd.)

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| IC9 | 28469/058 | IC-DIGITAL BUFFER/LINE-DRIVER 74HC244... 4 INPUT, 4 BIT, DUAL, NON-INVERTING, TRI-STATE BUS, | PHILIPS | 74HC244D |
| IC11 | 28467/118 | IC-MICRO STATIC-RAM, 32K x 8 BIT, 62256... 100nS, 100uA STANDBY CURRENT, 0.45in PITCH, CMOS, 28 PIN, | TOSHIBA (UK) LTD | TC55257BFL-10 |
| IC12 | 28465/055 | IC-DIGITAL DECODER/DEMULTIPLEX 74HC138... 3 INPUT, 8 BIT, SINGLE, INVERTING, 3 BIT ADDRESS, | PHILIPS | 74HC138D |
| IC13 | 28465/055 | IC-DIGITAL DECODER/DEMULTIPLEX 74HC138... 3 INPUT, 8 BIT, SINGLE, INVERTING, 3 BIT ADDRESS, | PHILIPS | 74HC138D |
| IC14 | 28466/120 | IC-DIGITAL OR-GATE 74HC32... 2 INPUT, QUAD, CMOS-H/SPEED, 14 PIN, SMALL-OUTLINE. | PHILIPS | 74HC32D |
| IC15 | 28466/120 | IC-DIGITAL OR-GATE 74HC32... 2 INPUT, QUAD, CMOS-H/SPEED, 14 PIN, SMALL-OUTLINE. | PHILIPS | 74HC32D |
| IC16 | 28462/638 | IC-DIGITAL FLIP-FLOP/D-TYPE 74HC74... 2 BIT, DUAL, POS EDGE TRIGGER, PLUS SET & CLEAR, CMOS-H/SPEED, | PHILIPS | 74HC74D |
| IC17 | 28462/431 | IC-DIGITAL LATCH 74HCT373... OCTAL, TRANSPARENT WITH TRI-STATE BUS, CMOS-H/SPEED+TTL, 20 PIN, | PHILIPS | 74HCT373D |
| IC18 | 28462/431 | IC-DIGITAL LATCH 74HCT373... OCTAL, TRANSPARENT WITH TRI-STATE BUS, CMOS-H/SPEED+TTL, 20 PIN, | PHILIPS | 74HCT373D |
| IC19 | 28469/058 | IC-DIGITAL BUFFER/LINE-DRIVER 74HC244... 4 INPUT, 4 BIT, DUAL, NON-INVERTING, TRI-STATE BUS, | PHILIPS | 74HC244D |
| IC20 | 28462/438 | IC-DIGITAL LATCH 74HC373... OCTAL, TRANSPARENT WITH TRI-STATE BUS, CMOS-H/SPEED, 20 PIN, | PHILIPS | 74HC373D |
| IC21 | 28466/120 | IC-DIGITAL OR-GATE 74HC32... 2 INPUT, QUAD, CMOS-H/SPEED, 14 PIN, SMALL-OUTLINE. | PHILIPS | 74HC32D |
| IC22 | 28466/032 | IC-DIGITAL AND-GATE 74HC08... 2 INPUT, QUAD, CMOS-H/SPEED, 14 PIN, SMALL-OUTLINE. | PHILIPS | 74HC08D |
| IC23 | 28469/058 | IC-DIGITAL BUFFER/LINE-DRIVER 74HC244... 4 INPUT, 4 BIT, DUAL, NON-INVERTING, TRI-STATE BUS, | PHILIPS | 74HC244D |
| IC24 | 28469/058 | IC-DIGITAL BUFFER/LINE-DRIVER 74HC244... 4 INPUT, 4 BIT, DUAL, NON-INVERTING, TRI-STATE BUS, | PHILIPS | 74HC244D |
| IC25 | 28469/051 | IC-DIGITAL INVERTER 74AC04... HEX, CMOS-ADVANCED, 14 PIN, SMALL-OUTLINE. | NAT. SEMICONDUCTOR | 74AC04SC |
| IC26 | 28462/638 | IC-DIGITAL FLIP-FLOP/D-TYPE 74HC74... 2 BIT, DUAL, POS EDGE TRIGGER, PLUS SET & CLEAR, CMOS-H/SPEED, | PHILIPS | 74HC74D |
| IC27 | 28466/241 | IC-DIGITAL NOR-GATE 74HC02... 2 INPUT, QUAD, CMOS-H/SPEED, 14 PIN, SMALL-OUTLINE. | PHILIPS | 74HC02D |
| IC28 | 28461/736 | IC-ANALOGUE VOLTAGE-REGULATOR 79L05AC... 5V 100mA NEGATIVE, OUTPUT VOLTAGE ERROR <5% OVERLOAD, | NAT. SEMICONDUCTOR | LM79L05ACZ |
| IC30 | 28467/108 | IC-MICRO DIGIT/SGNL PROCESSR, ADSP2105... 10MHz DIGITAL SIGNAL PROCESSING, 1K PROGRAM & 0.5K DATA | ANALOG DEVICES LTD | ADSP2105KP-40 |
| IC31 | 28469/057 | IC-DIGITAL INVERTER 74HC04... HEX, CMOS-H/SPEED, 14 PIN, SMALL-OUTLINE. | PHILIPS | 74HC04D |
| IC32 | 28465/055 | IC-DIGITAL DECODER/DEMULTIPLEX 74HC138... 3 INPUT, 8 BIT, SINGLE, INVERTING, 3 BIT ADDRESS, | PHILIPS | 74HC138D |
| IC33 | 28466/120 | IC-DIGITAL OR-GATE 74HC32... 2 INPUT, QUAD, CMOS-H/SPEED, 14 PIN, SMALL-OUTLINE. | PHILIPS | 74HC32D |
| IC34 | 28462/157 | IC-DIGITAL FLIP-FLOP/D-TYPE 74HC377... OCTAL, POS EDGE TRIGGER WITH DATA ENABLE, CMOS-H/SPEED, 20 | PHILIPS | 74HC377D |
| IC35 | 28462/157 | IC-DIGITAL FLIP-FLOP/D-TYPE 74HC377... OCTAL, POS EDGE TRIGGER WITH DATA ENABLE, CMOS-H/SPEED, 20 | PHILIPS | 74HC377D |

## A1 Audio generator (contd.)

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| IC36 | 28469/058 | IC-DIGITAL BUFFER/LINE-DRIVER 74HC244... 4 INPUT, 4 BIT, DUAL, NON-INVERTING, TRI-STATE BUS, | PHILIPS | 74HC244D |
| IC37 | 28462/638 | IC-DIGITAL FLIP-FLOP/D-TYPE 74HC74... 2 BIT, DUAL, POS EDGE TRIGGER, PLUS SET & CLEAR, CMOS-H/SPEED, | PHILIPS | 74HC74D |
| IC38 | 28462/638 | IC-DIGITAL FLIP-FLOP/D-TYPE 74HC74... 2 BIT, DUAL, POS EDGE TRIGGER, PLUS SET & CLEAR, CMOS-H/SPEED, | PHILIPS | 74HC74D |
| IC39 | 28469/546 | IC-DIGITAL FILTER DF1700... 16 INPUT, SINGLE, 8 x OVER SAMPLING, STOPBAND ATTEN >110dB, USER SELECT | BURR-BROWN INTERNAT | DF1700P |
| IC40 | 28461/804 | IC-ANALOGUE D/A-CONVERTER DAC-312... SINGLE, 12 BIT, HIGH SPEED MULTIPLYING, BIPOLAR, 20 PIN, | ANALOG DEVICES LTD | DAC-312HS |
| IC41 | 28461/806 | IC-ANALOGUE OPERATIONAL AMP OP-249... DUAL, PRECISION HI SPEED, SETTLING TIME-1.2uS, GAIN | ANALOG DEVICES LTD | OP-249GS |
| IC42 | 28461/806 | IC-ANALOGUE OPERATIONAL AMP OP-249... DUAL, PRECISION HI SPEED, SETTLING TIME-1.2uS, GAIN | ANALOG DEVICES LTD | OP-249GS |
| IC43 | 28461/803 | IC-ANALOGUE VOLTAGE-REFERENCE LT1019... 5V PRECISION, OUTPUT VOLTAGE DRIFT 20ppm/DEG.C MAX, | LINEAR TECHNOLOGY | LT1019CS8-5 |
| IC44 | 28461/819 | IC-ANALOGUE OPERATIONAL AMP OP177... SINGLE, 22V OFFSET VOLTAGE 25uV, OFFSET CURRENT 1.5nA, | ANALOG DEVICES LTD | OP177GS |
| IC45 | 28462/638 | IC-DIGITAL FLIP-FLOP/D-TYPE 74HC74... 2 BIT, DUAL, POS EDGE TRIGGER, PLUS SET & CLEAR, CMOS-H/SPEED, | PHILIPS | 74HC74D |
| IC46 | 28461/734 | IC-ANALOGUE VOLTAGE-REGULATOR 78L05AC... 5V 100mA POSITIVE, LINEAR, 5% REGULATION, MONOLITHIC, 3 | NAT. SEMICONDUCTOR | LM78L05ACZ |
| IC47 | 28461/805 | IC-ANALOGUE D/A-CONVERTER AD1865... DUAL, 5V 18 BIT, AUDIO, SERIAL INPUT, CO-PHASED OUTPUT, 116dB | ANALOG DEVICES LTD | AD1865N |
| IC48 | 28461/897 | IC-ANALOGUE OPERATIONAL AMP OP-27GS... 22V LOW NOISE, 8 PIN, SMALL-OUTLINE. | ANALOG DEVICES LTD | OP-27GS |
| IC49 | 28461/897 | IC-ANALOGUE OPERATIONAL AMP OP-27GS... 22V LOW NOISE, 8 PIN, SMALL-OUTLINE. | ANALOG DEVICES LTD | OP-27GS |
| IC50 | 28461/874 | IC-ANALOGUE SWITCH DG411... QUAD, 15V SPST, ON-RESISTANCE<35R, 4 x N/O @ LOGIC 1, TTL | SILICONIX LTD | DG411DY |
| IC51 | 28461/806 | IC-ANALOGUE OPERATIONAL AMP OP-249... DUAL, PRECISION HI SPEED, SETTLING TIME-1.2uS, GAIN | ANALOG DEVICES LTD | OP-249GS |
| IC52 | 28469/759 | IC-ANALOGUE MULTIPLEXER DG508A... 8 INPUT, SINGLE, 15V & -15V, CMOS, 16 PIN, SMALL-OUTLINE. | ANALOG DEVICES LTD | MUX-08FS |
| IC53 | 28469/053 | IC-ANALOGUE BUFFER-AMPLIFIER EL2001... 18V UNITY GAIN, SLEW-RATE 1200 V/uS MIN, BANDWIDTH 70MHz @ | ELANTEC INC | EL2001CN |
| IC54 | 28461/874 | IC-ANALOGUE SWITCH DG411... QUAD, 15V SPST, ON-RESISTANCE<35R, 4 x N/O @ LOGIC 1, TTL | SILICONIX LTD | DG411DY |
| IC55 | 28461/874 | IC-ANALOGUE SWITCH DG411... QUAD, 15V SPST, ON-RESISTANCE<35R, 4 x N/O @ LOGIC 1, TTL | SILICONIX LTD | DG411DY |
| IC56 | 28461/806 | IC-ANALOGUE OPERATIONAL AMP OP-249... DUAL, PRECISION HI SPEED, SETTLING TIME-1.2uS, GAIN | ANALOG DEVICES LTD | OP-249GS |
| IC57 | 28461/977 | IC-ANALOGUE D/A-CONVERTER AD7537... DUAL, 15V 12 BIT, 8+4 LOADING, REL-ACC +/-1 LSB, GAIN-ERR +/-6 | ANALOG DEVICES LTD | AD7537JN |
| IC58 | 28461/806 | IC-ANALOGUE OPERATIONAL AMP OP-249... DUAL, PRECISION HI SPEED, SETTLING TIME-1.2uS, GAIN | ANALOG DEVICES LTD | OP-249GS |
| IC59 | 28469/759 | IC-ANALOGUE MULTIPLEXER DG508A... 8 INPUT, SINGLE, 15V & -15V, CMOS, 16 PIN, SMALL-OUTLINE. | ANALOG DEVICES LTD | MUX-08FS |
| IC60 | 28461/806 | IC-ANALOGUE OPERATIONAL AMP OP-249... DUAL, PRECISION HI SPEED, SETTLING TIME-1.2uS, GAIN | ANALOG DEVICES LTD | OP-249GS |

## A1 Audio generator (contd.)

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| IC61 | 28461/874 | IC-ANALOGUE SWITCH DG411... QUAD, 15V SPST, ON-RESISTANCE<35R, 4 x N/O @ LOGIC 1, TTL | SILICONIX LTD | DG411DY |
| IC62 | 28461/806 | IC-ANALOGUE OPERATIONAL AMP OP-249... DUAL, PRECISION HI SPEED, SETTLING TIME-1.2uS, GAIN | ANALOG DEVICES LTD | OP-249GS |
| IC63 | 28461/874 | IC-ANALOGUE SWITCH DG411... QUAD, 15V SPST, ON-RESISTANCE<35R, 4 x N/O @ LOGIC 1, TTL | SILICONIX LTD | DG411DY |
| IC64 | 28466/120 | IC-DIGITAL OR-GATE 74HC32... 2 INPUT, QUAD, CMOS-H/SPEED, 14 PIN, SMALL-OUTLINE. | PHILIPS | 74HC32D |
| IC65 | 28462/638 | IC-DIGITAL FLIP-FLOP/D-TYPE 74HC74... 2 BIT, DUAL, POS EDGE TRIGGER, PLUS SET & CLEAR, CMOS-H/SPEED, | PHILIPS | 74HC74D |
| IC66 | 44535/236 | IC-PROGRAMMED PAL, SET OF 1, 2965, AUDIO COUNTER LOGIC. | IFR LTD | |
| IC67 | 28467/101 | IC-MICRO CONTROLLER, 82C54... PROGRAMMABLE INTERVAL TIMER, 8MHz, CMOS, 28 PIN, PLCC. | HARRIS SEMICONDUCTOR | CS82C54 |
| IC68 | 28462/152 | IC-DIGITAL FLIP-FLOP/D-TYPE 74HC273... 8 INPUT, 8 BIT, OCTAL, WITH RESET, CMOS-H/SPEED, 20 PIN, | PHILIPS | 74HC273D |
| IC69 | 28469/057 | IC-DIGITAL INVERTER 74HC04... HEX, CMOS-H/SPEED, 14 PIN, SMALL-OUTLINE. | PHILIPS | 74HC04D |
| IC70 | 28469/057 | IC-DIGITAL INVERTER 74HC04... HEX, CMOS-H/SPEED, 14 PIN, SMALL-OUTLINE. | PHILIPS | 74HC04D |
| IC71 | 28462/152 | IC-DIGITAL FLIP-FLOP/D-TYPE 74HC273... 8 INPUT, 8 BIT, OCTAL, WITH RESET, CMOS-H/SPEED, 20 PIN, | PHILIPS | 74HC273D |
| IC72 | 28469/057 | IC-DIGITAL INVERTER 74HC04... HEX, CMOS-H/SPEED, 14 PIN, SMALL-OUTLINE. | PHILIPS | 74HC04D |
| IC73 | 28462/152 | IC-DIGITAL FLIP-FLOP/D-TYPE 74HC273... 8 INPUT, 8 BIT, OCTAL, WITH RESET, CMOS-H/SPEED, 20 PIN, | PHILIPS | 74HC273D |
| IC74 | 28461/806 | IC-ANALOGUE OPERATIONAL AMP OP-249... DUAL, PRECISION HI SPEED, SETTLING TIME-1.2uS, GAIN | ANALOG DEVICES LTD | OP-249GS |
| L1 to L4 | 23642/555 | INDUCTOR-FIXED 10uH +/- 10% COATED-LACQUER, MINIATURE, 470mA 0R9 MAX, 45 Q @ 7.9 MHz, 45 MHz | MEGGITT ELECTRONICS | C11-406/8/27520/006 |
| PLA | 23436/901 | CONNECTOR MULTIWAY, PCB HEADER, 16 WAY, RIGHT ANGLED, 2-ROW, 2.54mm GRID, POLARISED, SHROUDED, | THOMAS & BETTS LTD | 609-1607 |
| PLB to PLF | 23435/120 | CONNECTOR MULTIWAY, PCB HEADER, 36 WAY, RIGHT ANGLED, 2.54mm PITCH, PINS GOLD PLATED TO CLASS 2, | BERG ELECTRONICS | 75168-101-36 |
| R1 | 24811/189 | RESISTOR-FIXED METAL-FILM 4K75 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-4K75-1%50ppm |
| R2 | 24811/221 | RESISTOR-FIXED METAL-FILM 100K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100K-1%50ppm |
| R3 | 24811/221 | RESISTOR-FIXED METAL-FILM 100K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100K-1%50ppm |
| R4 | 24811/146 | RESISTOR-FIXED METAL-FILM 75R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-75R0-1%50ppm |
| R5 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |

## A1 Audio generator (contd.)

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| R6 | 24811/165 | RESISTOR-FIXED METAL-FILM 475R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-475R-1%50ppm |
| R7 | 24811/190 | RESISTOR-FIXED METAL-FILM 5K11 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-5K11-1%50ppm |
| R8 | 24811/190 | RESISTOR-FIXED METAL-FILM 5K11 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-5K11-1%50ppm |
| R9 | 24811/182 | RESISTOR-FIXED METAL-FILM 2K43 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-2K43-1%50ppm |
| R10 | 24811/182 | RESISTOR-FIXED METAL-FILM 2K43 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-2K43-1%50ppm |
| R11 | 24811/193 | RESISTOR-FIXED METAL-FILM 6K81 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-6K81-1%50ppm |
| R12 | 24811/183 | RESISTOR-FIXED METAL-FILM 2K74 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-2K74-1%50ppm |
| R13 | 24811/183 | RESISTOR-FIXED METAL-FILM 2K74 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-2K74-1%50ppm |
| R14 | 24811/179 | RESISTOR-FIXED METAL-FILM 1K82 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-1K82-1%50ppm |
| R15 | 24811/183 | RESISTOR-FIXED METAL-FILM 2K74 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-2K74-1%50ppm |
| R16 | 24811/177 | RESISTOR-FIXED METAL-FILM 1K5 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K5-1%50ppm |
| R17 | 24811/184 | RESISTOR-FIXED METAL-FILM 3K01 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-3K01-1%50ppm |
| R18 | 24811/186 | RESISTOR-FIXED METAL-FILM 3K65 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-3K65-1%50ppm |
| R19 | 24811/180 | RESISTOR-FIXED METAL-FILM 2K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-2K0-1%50ppm |
| R20 | 24811/188 | RESISTOR-FIXED METAL-FILM 4K32 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-4K32-1%50ppm |
| R21 | 24811/192 | RESISTOR-FIXED METAL-FILM 6K19 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-6K19-1%50ppm |
| R22 to R27 | 24811/193 | RESISTOR-FIXED METAL-FILM 6K81 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-6K81-1%50ppm |
| R28 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R29 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R30 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R31 | 24811/203 | RESISTOR-FIXED METAL-FILM 18K2 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-18K2-1%50ppm |
| R32 | 24811/209 | RESISTOR-FIXED METAL-FILM 33K2 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-33K2-1%50ppm |
| R33 | 24811/612 | RESISTOR-FIXED METAL-FILM 80K6 +/- 0.1% 250mW 200V 15 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-80K6-0.1%-15 |
| R34 | 24811/612 | RESISTOR-FIXED METAL-FILM 80K6 +/- 0.1% 250mW 200V 15 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-80K6-0.1%-15 |
| R35 | 24811/611 | RESISTOR-FIXED METAL-FILM 9K09 +/- 0.1% 250mW 200V 15 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-9K09-0.1%-15 |

## A1 Audio generator (contd.)

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| R36 | 24811/610 | RESISTOR-FIXED METAL-FILM 909R +/- 0.1% 250mW 200V 15 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-909R-0.1%-15 |
| R37 | 24811/609 | RESISTOR-FIXED METAL-FILM 90R9 +/- 0.1% 250mW 200V 15 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-90R9-0.1%-15 |
| R38 | 24811/125 | RESISTOR-FIXED METAL-FILM 10R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10R-1%-50ppm |
| R39 | 24811/215 | RESISTOR-FIXED METAL-FILM 56K2 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-56K2-1%50ppm |
| R40 | 24811/215 | RESISTOR-FIXED METAL-FILM 56K2 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-56K2-1%50ppm |
| R41 | 24573/089 | RESISTOR-FIXED METAL-OXIDE 4K7 +/- 2% 500mW 350V 250 ppm/DEG.C, AXIAL, (LOOSE OR TAPED). | VISHAY COMPONENTS | TR5-4K7-2% |
| R42 | 24811/221 | RESISTOR-FIXED METAL-FILM 100K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100K-1%50ppm |
| R43 | 24811/215 | RESISTOR-FIXED METAL-FILM 56K2 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-56K2-1%50ppm |
| R44 | 24811/215 | RESISTOR-FIXED METAL-FILM 56K2 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-56K2-1%50ppm |
| R45 | 24811/221 | RESISTOR-FIXED METAL-FILM 100K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100K-1%50ppm |
| R46 | 24573/089 | RESISTOR-FIXED METAL-OXIDE 4K7 +/- 2% 500mW 350V 250 ppm/DEG.C, AXIAL, (LOOSE OR TAPED). | VISHAY COMPONENTS | TR5-4K7-2% |
| R47 | 24573/097 | RESISTOR-FIXED METAL-OXIDE 10K +/- 2% 500mW 350V 250 ppm/DEG.C, AXIAL, (LOOSE OR TAPED). | VISHAY COMPONENTS | TR5-10K-2% |
| R48 | 24573/097 | RESISTOR-FIXED METAL-OXIDE 10K +/- 2% 500mW 350V 250 ppm/DEG.C, AXIAL, (LOOSE OR TAPED). | VISHAY COMPONENTS | TR5-10K-2% |
| R49 to R54 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R55 | 24811/200 | RESISTOR-FIXED METAL-FILM 13K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-13K-1%50ppm |
| R56 | 24811/207 | RESISTOR-FIXED METAL-FILM 27K4 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-27K4-1%50ppm |
| R57 | 24811/195 | RESISTOR-FIXED METAL-FILM 8K25 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-8K25-1%50ppm |
| R58 | 24811/200 | RESISTOR-FIXED METAL-FILM 13K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-13K-1%50ppm |
| R59 | 24811/204 | RESISTOR-FIXED METAL-FILM 20K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-20K-1%50ppm |
| R60 | 24811/200 | RESISTOR-FIXED METAL-FILM 13K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-13K-1%50ppm |
| R61 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R62 to R65 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R66 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R67 | 24811/202 | RESISTOR-FIXED METAL-FILM 16K2 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-16K2-1%50ppm |
| R68 | 24811/207 | RESISTOR-FIXED METAL-FILM 27K4 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-27K4-1%50ppm |

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|

## A1 Audio generator (contd.)

| | | | | |
|---|---|---|---|---|
| R69 | 24811/202 | RESISTOR-FIXED METAL-FILM 16K2 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-16K2-1%50ppm |
| R70 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R71 to R73 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R74 | 24811/157 | RESISTOR-FIXED METAL-FILM 221R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-221R-1%50ppm |
| R75 | 24811/193 | RESISTOR-FIXED METAL-FILM 6K81 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-6K81-1%50ppm |
| R76 | 24811/193 | RESISTOR-FIXED METAL-FILM 6K81 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-6K81-1%50ppm |
| R77 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R78 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R79 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R80 to R84 | 24811/213 | RESISTOR-FIXED METAL-FILM 47K5 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-47K5-1%50ppm |
| R85 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R86 | 24811/213 | RESISTOR-FIXED METAL-FILM 47K5 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-47K5-1%50ppm |
| R87 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R88 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R89 | 24811/221 | RESISTOR-FIXED METAL-FILM 100K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100K-1%50ppm |
| R90 to R93 | 24811/213 | RESISTOR-FIXED METAL-FILM 47K5 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-47K5-1%50ppm |
| R94 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R95 | 24811/213 | RESISTOR-FIXED METAL-FILM 47K5 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-47K5-1%50ppm |
| R96 | 24811/221 | RESISTOR-FIXED METAL-FILM 100K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100K-1%50ppm |
| R98 to R100 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R101 to R104 | 24811/213 | RESISTOR-FIXED METAL-FILM 47K5 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-47K5-1%50ppm |
| R105 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R106 to R108 | 24811/213 | RESISTOR-FIXED METAL-FILM 47K5 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-47K5-1%50ppm |
| R109 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R110 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |

## A1 Audio generator (contd.)

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| R111 | 24811/213 | RESISTOR-FIXED METAL-FILM 47K5 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-47K5-1%50ppm |
| R112 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R113 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R114 to R118 | 24811/213 | RESISTOR-FIXED METAL-FILM 47K5 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-47K5-1%50ppm |
| R119 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R120 | 24811/213 | RESISTOR-FIXED METAL-FILM 47K5 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-47K5-1%50ppm |
| R121 | 24681/672 | RESISTOR-NETWORK BUSSED, THICK-FILM, 15K 2% 1W 50V 100 ppm/DEG.C, 9 RESISTORS, LOW PROFILE, 10 PIN, | VISHAY COMPONENTS | LC0-001-1502G |
| R122 | 24811/149 | RESISTOR-FIXED METAL-FILM 100R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100R-1%50ppm |
| R124 | 24811/142 | RESISTOR-FIXED METAL-FILM 51R1 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-51R1-1%50ppm |
| R126 | 24811/213 | RESISTOR-FIXED METAL-FILM 47K5 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-47K5-1%50ppm |
| R128 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R129 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 | VISHAY COMPONENTS | |
| TR1 | 28487/810 | TRANSISTOR NPN BIPOLAR BSV52... 12V 400MHz 250mW 100mA MARKING CODE B2, SURFACE MOUNTED, SOT-23, | PHILIPS | BSV-52 |
| TR2 | 28459/045 | TRANSISTOR N-CHANNEL-ENHANCE MOSFET IRFD110... 60V 1W 1A 0R6 4 PIN, DUAL-IN-LINE. | INTERNAT RECTIFIER | IRFD110 |
| TR3 | 28453/829 | TRANSISTOR NPN BIPOLAR BC848B... 30V 200MHz 200mW 100mA 290hFE TYP @ 2mA, NOISE 2dB @ 1KHz, MARKING | PHILIPS | BC848B |
| TR4 | 28459/063 | TRANSISTOR P-CHANNEL-ENHANCE MOSFET BST100... 60V 1W 300mA 4R5 TO-92, (LOOSE). | PHILIPS | BST100 |
| TR5 | 28457/852 | TRANSISTOR PNP BIPOLAR BSR15... 60V 200MHz 300mW 600mA MARKING CODE CH/T7p, SURFACE MOUNTED, | PHILIPS | BSR15 |

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
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## A1/2 Audio generator

When ordering, prefix circuit reference with A1/2.

| | | | | |
|---|---|---|---|---|
| | 44830/043 | Complete unit | Issue 8 | |
| C1 | 26386/875 | CAPACITOR CERAMIC 10nF+/-10% 50V 0805 | AVX | 0805-5C-103-KAT-1A o |
| to C2 | | | | |
| C3 | 26386/863 | CAPACITOR CERAMIC 1nF+/-10% 50V 0805 | AVX | 0805-5C-102-KAT-1A o |
| C4 | 26451/009 | CAPACITOR ALUM 47uF+/-20% 16V 6.6mmSQ | RUBYCON | 16-REV-47 |
| C5 | 26386/863 | CAPACITOR CERAMIC 1nF+/-10% 50V 0805 | AVX | 0805-5C-102-KAT-1A o |
| C6 | 26451/009 | CAPACITOR ALUM 47uF+/-20% 16V 6.6mmSQ | RUBYCON | 16-REV-47 |
| C7 | 26386/875 | CAPACITOR CERAMIC 10nF+/-10% 50V 0805 | AVX | 0805-5C-103-KAT-1A o |
| C8 | 26386/819 | CAPACITOR CERAMIC 39pF+/-5% 50V 0805 | AVX | 0805-5A-390-JAT-1A o |
| C9 | 26386/830 | CAPACITOR CERAMIC 330pF+/-5% 50V 0805 | AVX | 0805-5A-331-JAT-1A o |
| C10 | 26386/931 | CAPACITOR CERAMIC 470pF+/-1% 50V 0805 | AVX | 0805-5A-471-FAT-1A |
| to C12 | | | | |
| C13 | 26386/783 | CAPACITOR CERAMIC 330pF+/-1% 50V 0805 | AVX | 0805-5A-331-FAT-1A |
| C14 | 26386/875 | CAPACITOR CERAMIC 10nF+/-10% 50V 0805 | AVX | 0805-5C-103-KAT-1A o |
| C15 | 26451/004 | CAPACITOR ALUM 10uF+/-20% 35V 5.3mmSQ | RUBYCON | 35-REV-10 |
| C16 | 26386/863 | CAPACITOR CERAMIC 1nF+/-10% 50V 0805 | AVX | 0805-5C-102-KAT-1A o |
| C17 | 26585/001 | CAPACITOR POLYESTR 1uF+/-10% 63V 7.3x10mm | WIMA | SMD7.3-1uF10%-63V-TR |
| C18 | 26386/887 | CAPACITOR CERAMIC 100nF+/-10% 50V 1210 | AVX | 1210-5C-104-KAT-1A o |
| C19 | 26386/933 | CAPACITOR CERAMIC 1.2nF+/-1% 50V 1206 | AVX | 1206-5A-122-FAT-1A |
| C20 | 26386/887 | CAPACITOR CERAMIC 100nF+/-10% 50V 1210 | AVX | 1210-5C-104-KAT-1A o |
| to C21 | | | | |
| C22 | 26386/933 | CAPACITOR CERAMIC 1.2nF+/-1% 50V 1206 | AVX | 1206-5A-122-FAT-1A |
| C24 | 26386/932 | CAPACITOR CERAMIC 1nF+/-1% 50V 1206 | AVX | 1206-5A-102-FAT-1A |
| C25 | 26386/887 | CAPACITOR CERAMIC 100nF+/-10% 50V 1210 | AVX | 1210-5C-104-KAT-1A o |
| to C26 | | | | |
| C27 | 26386/782 | CAPACITOR CERAMIC 120pF+/-1% 50V 0805 | AVX | 0805-5A-121-FAT-1A |
| C28 | 26386/932 | CAPACITOR CERAMIC 1nF+/-1% 50V 1206 | AVX | 1206-5A-102-FAT-1A |
| C29 | 26386/887 | CAPACITOR CERAMIC 100nF+/-10% 50V 1210 | AVX | 1210-5C-104-KAT-1A o |
| to C30 | | | | |
| C31 | 26386/782 | CAPACITOR CERAMIC 120pF+/-1% 50V 0805 | AVX | 0805-5A-121-FAT-1A |
| C32 | 26343/767 | CAPACITOR CERAMIC 10pF+/-5% 50V 0805 | AVX | 0805-5A-100-JAT-1A o |
| C33 | 26386/829 | CAPACITOR CERAMIC 270pF+/-5% 50V 0805 | AVX | 0805-5A-271-JAT-1A o |
| C34 | 26386/887 | CAPACITOR CERAMIC 100nF+/-10% 50V 1210 | AVX | 1210-5C-104-KAT-1A o |
| to C35 | | | | |
| C36 | 26451/004 | CAPACITOR ALUM 10uF+/-20% 35V 5.3mmSQ | RUBYCON | 35-REV-10 |
| C37 | 26386/887 | CAPACITOR CERAMIC 100nF+/-10% 50V 1210 | AVX | 1210-5C-104-KAT-1A o |
| to C38 | | | | |
| C39 | 26451/004 | CAPACITOR ALUM 10uF+/-20% 35V 5.3mmSQ | RUBYCON | 35-REV-10 |
| C40 | 26386/819 | CAPACITOR CERAMIC 39pF+/-5% 50V 0805 | AVX | 0805-5A-390-JAT-1A o |
| to C41 | | | | |
| C42 | 26451/004 | CAPACITOR ALUM 10uF+/-20% 35V 5.3mmSQ | RUBYCON | 35-REV-10 |
| C43 | 26386/887 | CAPACITOR CERAMIC 100nF+/-10% 50V 1210 | AVX | 1210-5C-104-KAT-1A o |
| to C44 | | | | |
| C45 | 26451/004 | CAPACITOR ALUM 10uF+/-20% 35V 5.3mmSQ | RUBYCON | 35-REV-10 |

## A1/2 Audio generator (contd.)

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| C46 | 26343/767 | CAPACITOR CERAMIC 10pF+/-5% 50V 0805 | AVX | 0805-5A-100-JAT-1A o |
| C47 | 26386/814 | CAPACITOR CERAMIC 15pF+/-5% 50V 0805 | AVX | 0805-5A-150-JAT-1A o |
| to C48 | | | | |
| C49 | 26343/767 | CAPACITOR CERAMIC 10pF+/-5% 50V 0805 | AVX | 0805-5A-100-JAT-1A o |
| C50 | 26386/871 | CAPACITOR CERAMIC 4.7nF+/-10% 50V 0805 | AVX | 0805-5C-472-KAT-1A o |
| C51 | 26343/767 | CAPACITOR CERAMIC 10pF+/-5% 50V 0805 | AVX | 0805-5A-100-JAT-1A o |
| C54 | 26451/010 | CAPACITOR ALUM 100uF+/-20% 6.3V 6.6mmSQ | RUBYCON | 6.3-REV-100 |
| C55 | 26386/887 | CAPACITOR CERAMIC 100nF+/-10% 50V 1210 | AVX | 1210-5C-104-KAT-1A o |
| C56 | 26451/009 | CAPACITOR ALUM 47uF+/-20% 16V 6.6mmSQ | RUBYCON | 16-REV-47 |
| C57 | 26386/887 | CAPACITOR CERAMIC 100nF+/-10% 50V 1210 | AVX | 1210-5C-104-KAT-1A o |
| C58 | 26451/009 | CAPACITOR ALUM 47uF+/-20% 16V 6.6mmSQ | RUBYCON | 16-REV-47 |
| C59 | 26386/887 | CAPACITOR CERAMIC 100nF+/-10% 50V 1210 | AVX | 1210-5C-104-KAT-1A o |
| C61 | 26386/875 | CAPACITOR CERAMIC 10nF+/-10% 50V 0805 | AVX | 0805-5C-103-KAT-1A o |
| to C62 | | | | |
| C63 | 26386/883 | CAPACITOR CERAMIC 47nF+/-10% 50V 1210 | SYFER | 1210-J-050-0473K-X-T |
| C64 | 26451/010 | CAPACITOR ALUM 100uF+/-20% 6.3V 6.6mmSQ | RUBYCON | 6.3-REV-100 |
| C65 | 26386/875 | CAPACITOR CERAMIC 10nF+/-10% 50V 0805 | AVX | 0805-5C-103-KAT-1A o |
| to C88 | | | | |
| C89 | 26585/001 | CAPACITOR POLYESTR 1uF+/-10% 63V 7.3x10mm | WIMA | SMD7.3-1uF10%-63V-TR |
| C91 | 26386/883 | CAPACITOR CERAMIC 47nF+/-10% 50V 1210 | SYFER | 1210-J-050-0473K-X-T |
| C92 | 26451/010 | CAPACITOR ALUM 100uF+/-20% 6.3V 6.6mmSQ | RUBYCON | 6.3-REV-100 |
| C93 | 26386/875 | CAPACITOR CERAMIC 10nF+/-10% 50V 0805 | AVX | 0805-5C-103-KAT-1A o |
| to C141 | | | | |
| C142 | 26386/883 | CAPACITOR CERAMIC 47nF+/-10% 50V 1210 | SYFER | 1210-J-050-0473K-X-T |
| to C144 | | | | |
| C145 | 26386/875 | CAPACITOR CERAMIC 10nF+/-10% 50V 0805 | AVX | 0805-5C-103-KAT-1A o |
| to C147 | | | | |
| C150 | 26585/001 | CAPACITOR POLYESTR 1uF+/-10% 63V 7.3x10mm | WIMA | SMD7.3-1uF10%-63V-TR |
| to C151 | | | | |
| C152 | 26343/767 | CAPACITOR CERAMIC 10pF+/-5% 50V 0805 | AVX | 0805-5A-100-JAT-1A o |
| C160 | 26386/930 | CAPACITOR CERAMIC 180pF+/-1% 50V 0805 | AVX | 0805-5A-181-FAT-1A |
| to C161 | | | | |
| D1 | 28383/901 | DIODE BAV70.. SMALL-SIGDUAL 70V MKD-A4 SOT-23 | PHILIPS | BAV70 |
| to D2 | | | | |
| D3 | 28372/781 | DIODE BZX84-C18.. ZENER18V MKD-Y6 SOT-23 | PHILIPS | BZX84-C18 |
| to D4 | | | | |
| D5 | 28383/901 | DIODE BAV70.. SMALL-SIGDUAL 70V MKD-A4 SOT-23 | PHILIPS | BAV70 |
| to D6 | | | | |
| D7 | 28372/781 | DIODE BZX84-C18.. ZENER18V MKD-Y6 SOT-23 | PHILIPS | BZX84-C18 |
| to D8 | | | | |
| D9 | 28383/901 | DIODE BAV70.. SMALL-SIGDUAL 70V MKD-A4 SOT-23 | PHILIPS | BAV70 |
| to D10 | | | | |
| D11 | 28372/032 | DIODE BZX84-C10.. ZENER10V MKD-Z9 SOT-23 | PHILIPS | BZX84-C10 |
| to D12 | | | | |

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| **A1/2 Audio generator (contd.)** | | | | |
| D13 | 28383/901 | DIODE BAV70.. SMALL-SIGDUAL 70V MKD-A4 SOT-23 | PHILIPS | BAV70 |
| D14 to D15 | 28383/934 | DIODE LL4148.. SMALL-SIG50V MINI-MELF | GENERAL SEMICONDUCTORS | LL4148 |
| D16 | 28383/901 | DIODE BAV70.. SMALL-SIGDUAL 70V MKD-A4 SOT-23 | PHILIPS | BAV70 |
| FL1 | 23642/801 | FILTER RFI-SUPPRESSION3A SURFACE MTG 5.7x5mm | TDK | HF50ACC-575032-T |
| IC1 | 28462/638 | IC-DIGITAL FLIP-FLOP-D74HC74.. DUAL SO-14 | PHILIPS | 74HC74D |
| IC2 | 28466/120 | IC-DIGITAL OR-GATE74HC32.. QUAD SO-14 | HARRIS | D74HC32M |
| IC3 | 28467/161 | IC-MICRO CONTROLLER80C652.. PLCC-44 | PHILIPS | P80C652FBA |
| IC4 | 28469/058 | IC-DIGITAL BFR/LINE-DRVR74HC244.. DUAL SO-20 | HARRIS | D74HC244M |
| IC5 | 28466/032 | IC-DIGITAL AND-GATE74HC08.. QUAD SO-14 | PHILIPS | 74HC08D |
| IC6 | 28469/057 | IC-DIGITAL INVERTER74HC04.. HEX SO-14 | HARRIS | CD74HC04M |
| IC7 | 28469/049 | IC-DIGITAL TRANSCEIVER74HCT245.. OCT SO-20 | PHILIPS | 74HCT245D |
| IC8 | 28462/438 | IC-DIGITAL LATCH74HC373.. OCT SO-20 | PHILIPS | 74HC373D |
| IC10 | 44533/405 | IC-PROGRAM EPROM x1 2965, AUDIO GENERATOR CPU. | | |
| IC9 | 28469/058 | IC-DIGITAL BFR/LINE-DRVR74HC244.. DUAL SO-20 | HARRIS | D74HC244M |
| IC11 | 28467/118 | IC-MICRO STATIC-RAM62256.. 32Kx8 SO-28 | HITACHI | HM62256LFP-10T or AL |
| IC12 to IC13 | 28465/055 | IC-DIGITAL DECDR/DEMPLEX74HC138.. SO-16 | PHILIPS | 74HC138D |
| IC14 to IC15 | 28466/120 | IC-DIGITAL OR-GATE74HC32.. QUAD SO-14 | HARRIS | D74HC32M |
| IC16 | 28462/638 | IC-DIGITAL FLIP-FLOP-D74HC74.. DUAL SO-14 | PHILIPS | 74HC74D |
| IC17 to IC18 | 28462/431 | IC-DIGITAL LATCH74HCT373.. OCT SO-20 | PHILIPS | 74HCT373D |
| IC19 | 28469/058 | IC-DIGITAL BFR/LINE-DRVR74HC244.. DUAL SO-20 | HARRIS | D74HC244M |
| IC20 | 28462/438 | IC-DIGITAL LATCH74HC373.. OCT SO-20 | PHILIPS | 74HC373D |
| IC21 | 28466/120 | IC-DIGITAL OR-GATE74HC32.. QUAD SO-14 | HARRIS | D74HC32M |
| IC22 | 28466/032 | IC-DIGITAL AND-GATE74HC08.. QUAD SO-14 | PHILIPS | 74HC08D |
| IC23 to IC24 | 28469/058 | IC-DIGITAL BFR/LINE-DRVR74HC244.. DUAL SO-20 | HARRIS | D74HC244M |
| IC25 | 28469/051 | IC-DIGITAL INVERTER74AC04.. HEX SO-14 | FAIRCHILD | 74AC04SC |
| IC26 | 28462/638 | IC-DIGITAL FLIP-FLOP-D74HC74.. DUAL SO-14 | PHILIPS | 74HC74D |
| IC27 | 28466/241 | IC-DIGITAL NOR-GATE74HC02.. QUAD SO-14 | PHILIPS | 74HC02D |
| IC28 | 28461/780 | IC-ANALOG VOLTAGE-REG79L05AC.. SO-8 | ST MICRO | L79L05ACZ |
| IC30 | 28467/108 | IC-MICRO DIGIT/SGNL PROCADSP2105.. PLCC-68 | ANALOG | ADSP2105KP-55 |
| IC31 | 28469/057 | IC-DIGITAL INVERTER74HC04.. HEX SO-14 | HARRIS | CD74HC04M |
| IC32 | 28465/055 | IC-DIGITAL DECDR/DEMPLEX74HC138.. SO-16 | PHILIPS | 74HC138D |
| IC33 | 28466/120 | IC-DIGITAL OR-GATE74HC32.. QUAD SO-14 | HARRIS | D74HC32M |
| IC34 to IC35 | 28462/157 | IC-DIGITAL FLIP-FLOP-D74HC377.. OCTAL SO-20 | PHILIPS | 74HC377D |
| IC36 | 28469/058 | IC-DIGITAL BFR/LINE-DRVR74HC244.. DUAL SO-20 | HARRIS | D74HC244M |

## A1/2 Audio generator (contd.)

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| IC37 to IC38 | 28462/638 | IC-DIGITAL FLIP-FLOP-D74HC74.. DUAL SO-14 | PHILIPS | 74HC74D |
| IC39 | 28469/546 | IC-DIGITAL FILTERDF1700.. DIL-28 | NIPPON | SM5813/APT |
| IC40 | 28461/804 | IC-ANALOG D/A-CONVERTERDAC-312.. SO-20 | ANALOG | DAC-312HS |
| IC41 to IC42 | 28461/806 | IC-ANALOG OP AMPOP-249.. DUAL SO-8 | ANALOG | OP-249GS |
| IC43 | 28461/803 | IC-ANALOG VOLTAGE-REFLT1019.. SO-8 | LINEAR TECH | LT1019CS8-5 |
| IC44 | 28461/819 | IC-ANALOG OP AMPOP177.. SO-8 | ANALOG | OP177GS |
| IC45 | 28462/638 | IC-DIGITAL FLIP-FLOP-D74HC74.. DUAL SO-14 | PHILIPS | 74HC74D |
| IC46 | 28461/774 | IC-ANALOG VOLTAGE-REG78L05AC.. SO-8 | NATIONAL SEMICONDUCTORS | LM78L05ACM |
| IC47 | 28461/847 | IC-ANALOG D/A-CONVERTERAD1865.. DUAL SO-28 | ANALOG | AD1865R |
| IC48 to IC49 | 28461/897 | IC-ANALOG OP AMPOP-27GS.. SO-8 | ANALOG | OP-27GS |
| IC50 | 28461/874 | IC-ANALOG SWITCHDG411.. QUAD S0-16 | ANALOG | ADG411BR |
| IC51 | 28461/806 | IC-ANALOG OP AMPOP-249.. DUAL SO-8 | ANALOG | OP-249GS |
| IC52 | 28469/759 | IC-ANALOG MULTIPLEXERDG508A.. SO-16 | TEMIC | DG508ADY |
| IC53 | 28461/514 | IC-ANALOG BUFFER-AMPEL2001.. SO-20 | ELANTEC | EL2001CM |
| IC54 to IC55 | 28461/874 | IC-ANALOG SWITCHDG411.. QUAD S0-16 | ANALOG | ADG411BR |
| IC56 | 28461/806 | IC-ANALOG OP AMPOP-249.. DUAL SO-8 | ANALOG | OP-249GS |
| IC57 | 28461/037 | IC-ANALOG D/A-CONVERTERAD7537.. DUAL PLCC-28 | ANALOG | AD7537JP |
| IC58 | 28461/806 | IC-ANALOG OP AMPOP-249.. DUAL SO-8 | ANALOG | OP-249GS |
| IC59 | 28469/759 | IC-ANALOG MULTIPLEXERDG508A.. SO-16 | TEMIC | DG508ADY |
| IC60 | 28461/806 | IC-ANALOG OP AMPOP-249.. DUAL SO-8 | ANALOG | OP-249GS |
| IC61 | 28461/874 | IC-ANALOG SWITCHDG411.. QUAD S0-16 | ANALOG | ADG411BR |
| IC62 | 28461/806 | IC-ANALOG OP AMPOP-249.. DUAL SO-8 | ANALOG | OP-249GS |
| IC63 | 28461/874 | IC-ANALOG SWITCHDG411.. QUAD S0-16 | ANALOG | ADG411BR |
| IC64 | 28466/120 | IC-DIGITAL OR-GATE74HC32.. QUAD SO-14 | HARRIS | D74HC32M |
| IC65 | 28462/638 | IC-DIGITAL FLIP-FLOP-D74HC74.. DUAL SO-14 | PHILIPS | 74HC74D |
| IC66 | 44535/236 | IC-PROGRAM PAL x1 2965,AUDIO COUNTER LOGIC. | | |
| IC67 | 28467/101 | IC-MICRO CONTROLLER82C54.. PLCC-28 | HARRIS | CS82C54 |
| IC68 | 28462/152 | IC-DIGITAL FLIP-FLOP-D74HC273.. OCTAL SO-20 | PHILIPS | 74HC273D |
| IC69 to IC70 | 28469/057 | IC-DIGITAL INVERTER74HC04.. HEX SO-14 | HARRIS | CD74HC04M |
| IC71 | 28462/152 | IC-DIGITAL FLIP-FLOP-D74HC273.. OCTAL SO-20 | PHILIPS | 74HC273D |
| IC72 | 28469/057 | IC-DIGITAL INVERTER74HC04.. HEX SO-14 | HARRIS | CD74HC04M |
| IC73 | 28462/152 | IC-DIGITAL FLIP-FLOP-D74HC273.. OCTAL SO-20 | PHILIPS | 74HC273D |
| IC74 | 28461/806 | IC-ANALOG OP AMPOP-249.. DUAL SO-8 | ANALOG | OP-249GS |
| L1 to L2 | 23642/535 | INDUCTOR 1uH 5%MOULDED 3.2x2.5mm | MEGGITT | 3612-T-1R0-J |
| PLA | 23436/901 | CONNECTOR PCB-HEADER16-WAY RT-ANG 2-ROW | THOMAS & BETTS | 609-1607 |
| PLB to PLF | 23435/120 | CONNECTOR PCB HEADER36-WAY 0.64mmSQ RT-ANG | FCI | 75168-101-36 |

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| **A1/2 Audio generator (contd.)** | | | | |
| PLG | 23435/990 | CONNECTOR SHORTING SKT2-WAY 0.64mm FREE | FCI | 65474-001 |
| PLH | 23435/990 | CONNECTOR SHORTING SKT2-WAY 0.64mm FREE | FCI | 65474-001 |
| R1 | 24811/189 | RESISTOR 4K75 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-4K75-1%-50ppm |
| R2 | 24811/221 | RESISTOR 100K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-100K-1%-50ppm |
| to R3 | | | | |
| R5 | 24811/221 | RESISTOR 100K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-100K-1%-50ppm |
| R6 | 24811/165 | RESISTOR 475R 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-475R-1%-50ppm |
| R7 | 24811/190 | RESISTOR 5K11 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-5K11-1%-50ppm |
| to R8 | | | | |
| R9 | 24811/182 | RESISTOR 2K43 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-2K43-1%-50ppm |
| to R10 | | | | |
| R11 | 24811/193 | RESISTOR 6K81 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-6K81-1%-50ppm |
| R12 | 24811/183 | RESISTOR 2K74 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-2K74-1%-50ppm |
| to R13 | | | | |
| R14 | 24811/179 | RESISTOR 1K82 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-1K82-1%-50ppm |
| R15 | 24811/183 | RESISTOR 2K74 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-2K74-1%-50ppm |
| R16 | 24811/177 | RESISTOR 1K5 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-1K5-1%-50ppm |
| R17 | 24811/184 | RESISTOR 3K01 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-3K01-1%-50ppm |
| R18 | 24811/186 | RESISTOR 3K65 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-3K65-1%-50ppm |
| R19 | 24811/180 | RESISTOR 2K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-2K0-1%-50ppm |
| R20 | 24811/188 | RESISTOR 4K32 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-4K32-1%-50ppm |
| R21 | 24811/192 | RESISTOR 6K19 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-6K19-1%-50ppm |
| R22 | 24811/193 | RESISTOR 6K81 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-6K81-1%-50ppm |
| to R27 | | | | |
| R28 | 24811/173 | RESISTOR 1K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-1K0-1%-50ppm |
| to R29 | | | | |
| R30 | 24811/197 | RESISTOR 10K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-10K-1%-50ppm |
| R31 | 24811/203 | RESISTOR 18K2 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-18K2-1%-50ppm |
| R32 | 24811/209 | RESISTOR 33K2 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-33K2-1%-50ppm |
| R33 | 24811/612 | RESISTOR 80K6 0.1% 250mW200V 15ppm MINI-MELF | VTM | 501-0-80K6-0.1%-15 |
| to R34 | | | | |
| R35 | 24811/611 | RESISTOR 9K09 0.1% 250mW200V 15ppm MINI-MELF | VTM | 501-0-9K09-0.1%-15 |
| R36 | 24811/610 | RESISTOR 909R 0.1% 250mW200V 15ppm MINI-MELF | VTM | 501-0-909R-0.1%-15 |
| R37 | 24811/609 | RESISTOR 90R9 0.1% 250mW200V 15ppm MINI-MELF | VTM | 501-0-90R9-0.1%-15 |
| R38 | 24811/125 | RESISTOR 10R 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-10R-1%-50ppm |
| R39 | 24811/215 | RESISTOR 56K2 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-56K2-1%-50ppm |
| to R40 | | | | |
| R41 | 24811/197 | RESISTOR 10K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-10K-1%-50ppm |
| R42 | 24811/221 | RESISTOR 100K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-100K-1%-50ppm |
| R43 | 24811/215 | RESISTOR 56K2 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-56K2-1%-50ppm |
| to R44 | | | | |
| R45 | 24811/221 | RESISTOR 100K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-100K-1%-50ppm |
| R46 | 24811/197 | RESISTOR 10K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-10K-1%-50ppm |
| to R48 | | | | |

## A1/2 Audio generator (contd.)

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| R49 to R54 | 24811/173 | RESISTOR 1K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-1K0-1%-50ppm |
| R55 | 24811/200 | RESISTOR 13K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-13K-1%-50ppm |
| R56 | 24811/207 | RESISTOR 27K4 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-27K4-1%-50ppm |
| R57 | 24811/195 | RESISTOR 8K25 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-8K25-1%-50ppm |
| R58 | 24811/200 | RESISTOR 13K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-13K-1%-50ppm |
| R59 | 24811/204 | RESISTOR 20K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-20K-1%-50ppm |
| R60 | 24811/200 | RESISTOR 13K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-13K-1%-50ppm |
| R61 | 24811/197 | RESISTOR 10K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-10K-1%-50ppm |
| R62 to R65 | 24811/173 | RESISTOR 1K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-1K0-1%-50ppm |
| R66 | 24811/197 | RESISTOR 10K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-10K-1%-50ppm |
| R67 | 24811/202 | RESISTOR 16K2 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-16K2-1%-50ppm |
| R68 | 24811/208 | RESISTOR 30K1 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-30K1-1%-50ppm |
| R69 | 24811/202 | RESISTOR 16K2 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-16K2-1%-50ppm |
| R70 | 24811/197 | RESISTOR 10K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-10K-1%-50ppm |
| R71 to R73 | 24811/173 | RESISTOR 1K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-1K0-1%-50ppm |
| R74 | 24811/157 | RESISTOR 221R 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-221R-1%-50ppm |
| R75 to R76 | 24811/193 | RESISTOR 6K81 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-6K81-1%-50ppm |
| R77 to R78 | 24811/173 | RESISTOR 1K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-1K0-1%-50ppm |
| R79 | 24811/197 | RESISTOR 10K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-10K-1%-50ppm |
| R80 to R84 | 24811/213 | RESISTOR 47K5 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-47K5-1%-50ppm |
| R85 | 24811/197 | RESISTOR 10K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-10K-1%-50ppm |
| R86 | 24811/213 | RESISTOR 47K5 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-47K5-1%-50ppm |
| R87 to R88 | 24811/197 | RESISTOR 10K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-10K-1%-50ppm |
| R89 | 24811/221 | RESISTOR 100K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-100K-1%-50ppm |
| R90 to R93 | 24811/213 | RESISTOR 47K5 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-47K5-1%-50ppm |
| R94 | 24811/197 | RESISTOR 10K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-10K-1%-50ppm |
| R95 | 24811/213 | RESISTOR 47K5 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-47K5-1%-50ppm |
| R96 | 24811/221 | RESISTOR 100K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-100K-1%-50ppm |
| R98 to R100 | 24811/197 | RESISTOR 10K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-10K-1%-50ppm |
| R101 to R104 | 24811/213 | RESISTOR 47K5 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-47K5-1%-50ppm |
| R105 | 24811/197 | RESISTOR 10K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-10K-1%-50ppm |
| R106 to R108 | 24811/213 | RESISTOR 47K5 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-47K5-1%-50ppm |
| R109 to R110 | 24811/197 | RESISTOR 10K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-10K-1%-50ppm |
| R111 | 24811/213 | RESISTOR 47K5 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-47K5-1%-50ppm |

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| **A1/2 Audio generator (contd.)** | | | | |
| R112 to R113 | 24811/197 | RESISTOR 10K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-10K-1%-50ppm |
| R114 to R118 | 24811/213 | RESISTOR 47K5 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-47K5-1%-50ppm |
| R119 | 24811/197 | RESISTOR 10K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-10K-1%-50ppm |
| R120 | 24811/213 | RESISTOR 47K5 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-47K5-1%-50ppm |
| R121 | 24681/528 | RESISTOR-NTWK ISOLATED10K 2% x8 SO-16 | BOURNS | 4816P-001-103 |
| R122 | 24811/149 | RESISTOR 100R 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-100R-1%-50ppm |
| R124 | 24811/142 | RESISTOR 51R1 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-51R1-1%-50ppm |
| R126 | 24811/213 | RESISTOR 47K5 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-47K5-1%-50ppm |
| R128 to R129 | 24811/197 | RESISTOR 10K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-10K-1%-50ppm |
| R140 to R141 | 24811/197 | RESISTOR 10K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-10K-1%-50ppm |
| R142 | 24811/173 | RESISTOR 1K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-1K0-1%-50ppm |
| R143 | 24811/221 | RESISTOR 100K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-100K-1%-50ppm |
| R144 | 24811/142 | RESISTOR 51R1 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-51R1-1%-50ppm |
| TP1 to TP11 | 23435/188 | TERMINAL CONNECTOR-PIN0.64mmSQ 5.97mmHI | FCI | 75401-001 |
| TR1 | 28487/810 | TRANSISTOR NPN BSV52..12V 400MHz MKD-B2 SOT-23 | PHILIPS | BSV52 |
| TR2 | 28459/102 | TRANSISTOR N-ENH MOSFETIRFR121.. 80V TO-252AA | HARRIS | IRFR121(TUBE) |
| TR3 | 28453/829 | TRANSISTOR NPN BC848B..30V 200MHz MKD-1K SOT-23 | PHILIPS | BC848B |
| TR4 | 28459/103 | TRANSISTOR P-ENH MOSFETIRFR9121.. 60V TO-252AA | INTERNAT RECTIFIER | IRFR9120 |
| TR5 | 28457/852 | TRANSISTOR PNP BSR15..40V MKD-CH/T7p SOT-23 | PHILIPS | BSR15 or BSR16 |

## A2 Audio processor 2

When ordering, prefix circuit reference with A2.

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| | 44829-832 | Complete unit | Issue 14 | |
| C1 | 26386/897 | CAPACITOR-FIXED CERAMIC 4.7pF +/-0.1pF 50V 60 ppm/DEG.C, HIGH-Q, SINGLELAYER, SURFACE-MOUNTED, | AVX LTD | 0805-5K4R7-BAW-TR |
| C2 | 26386/897 | CAPACITOR-FIXED CERAMIC 4.7pF +/-0.1pF 50V 60 ppm/DEG.C, HIGH-Q, SINGLELAYER, SURFACE-MOUNTED, | AVX LTD | 0805-5K4R7-BAW-TR |
| C3 | 26386/824 | CAPACITOR-FIXED CERAMIC 100pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-101-JP |
| C4 | 26386/899 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | ROHM ELECTRONICS LTD | MCH31-5C-104-KP |
| C5 | 26582/427 | CAPACITOR-FIXED POLYESTER 470nF +/-10% 63V 330 ppm/DEG.C, RADIAL, 5mm PWP, (TAPED). | VISHAY COMPONENTS | MKT-1826-447/065 |
| C6 | 26386/897 | CAPACITOR-FIXED CERAMIC 4.7pF +/-0.1pF 50V 60 ppm/DEG.C, HIGH-Q, SINGLELAYER, SURFACE-MOUNTED, | AVX LTD | 0805-5K4R7-BAW-TR |
| C7 | 26386/897 | CAPACITOR-FIXED CERAMIC 4.7pF +/-0.1pF 50V 60 ppm/DEG.C, HIGH-Q, SINGLELAYER, SURFACE-MOUNTED, | AVX LTD | 0805-5K4R7-BAW-TR |
| C8 | 26386/824 | CAPACITOR-FIXED CERAMIC 100pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-101-JP |
| C9 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C10 | 26386/899 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | ROHM ELECTRONICS LTD | MCH31-5C-104-KP |
| C11 | 26386/899 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | ROHM ELECTRONICS LTD | MCH31-5C-104-KP |
| C12 | 26386/824 | CAPACITOR-FIXED CERAMIC 100pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-101-JP |
| C13 | 26386/820 | CAPACITOR-FIXED CERAMIC 47pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-470-JP |
| C14 | 26582/427 | CAPACITOR-FIXED POLYESTER 470nF +/-10% 63V 330 ppm/DEG.C, RADIAL, 5mm PWP, (TAPED). | VISHAY COMPONENTS | MKT-1826-447/065 |
| C15 to C18 | 26386/893 | CAPACITOR-FIXED CERAMIC 330nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 2220, NICKEL | SYFER TECHNOLOGY LTD | 2220-J-050-0334K-X-T |
| C23 | 26421/116 | CAPACITOR-FIXED ALUMINIUM 47uF +/-20% 16V ELECTROLYTIC, RADIAL, 5mm PWP, (LOOSE OR TAPED). | PANASONIC INDUSTRIAL | ECE-A-1C-KA-470-B |
| C24 | 26386/899 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | ROHM ELECTRONICS LTD | MCH31-5C-104-KP |
| C25 | 26386/830 | CAPACITOR-FIXED CERAMIC 330pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-331-JP |
| C26 | 26386/760 | CAPACITOR-FIXED CERAMIC 220nF +/-10% 50V X7R MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | PHILIPS | 1210-2R-224-K9-BB |
| C27 | 26421/142 | CAPACITOR-FIXED ALUMINIUM 220uF +/-20% 16V ELECTROLYTIC, RADIAL, 5mm PWP, (TAPED). | PANASONIC INDUSTRIAL | ECE-A-1CU-221B |
| C28 | 26421/108 | CAPACITOR-FIXED ALUMINIUM 4.7uF +/-20% 35V ELECTROLYTIC, RADIAL, 5mm PWP, (TAPED). | PANASONIC INDUSTRIAL | ECE-A-1V-KA-4R7-B |
| C29 | 26421/142 | CAPACITOR-FIXED ALUMINIUM 220uF +/-20% 16V ELECTROLYTIC, RADIAL, 5mm PWP, (TAPED). | PANASONIC INDUSTRIAL | ECE-A-1CU-221B |
| C30 | 26386/760 | CAPACITOR-FIXED CERAMIC 220nF +/-10% 50V X7R MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | PHILIPS | 1210-2R-224-K9-BB |

## A2 Audio processor 2 (contd.)

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| C31 | 26582/427 | CAPACITOR-FIXED POLYESTER 470nF +/-10% 63V 330 ppm/DEG.C, RADIAL, 5mm PWP, (TAPED). | VISHAY COMPONENTS | MKT-1826-447/065 |
| C32 | 26421/118 | CAPACITOR-FIXED ALUMINIUM 100uF +/-20% 6.3V ELECTROLYTIC, RADIAL, 5mm PWP, (TAPED). | PANASONIC INDUSTRIAL | ECE-A-0J-KA-101-B |
| C33 | 26386/899 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | ROHM ELECTRONICS LTD | MCH31-5C-104-KP |
| C34 | 26421/141 | CAPACITOR-FIXED ALUMINIUM 100uF +/-20% 35V ELECTROLYTIC, RADIAL, 5mm PWP, (TAPED). | PANASONIC INDUSTRIAL | ECE-A-1VU-101B |
| C35 | 26386/899 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | ROHM ELECTRONICS LTD | MCH31-5C-104-KP |
| C36 | 26582/432 | CAPACITOR-FIXED POLYESTER 1uF +/-10% 50V 330 ppm/DEG.C, RADIAL, 5mm PWP, (TAPED). | VISHAY COMPONENTS | MKT-1826-510/065 |
| C37 | 26421/141 | CAPACITOR-FIXED ALUMINIUM 100uF +/-20% 35V ELECTROLYTIC, RADIAL, 5mm PWP, (TAPED). | PANASONIC INDUSTRIAL | ECE-A-1VU-101B |
| C38 | 26386/899 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | ROHM ELECTRONICS LTD | MCH31-5C-104-KP |
| C39 | 26582/432 | CAPACITOR-FIXED POLYESTER 1uF +/-10% 50V 330 ppm/DEG.C, RADIAL, 5mm PWP, (TAPED). | VISHAY COMPONENTS | MKT-1826-510/065 |
| C40 | 26421/142 | CAPACITOR-FIXED ALUMINIUM 220uF +/-20% 16V ELECTROLYTIC, RADIAL, 5mm PWP, (TAPED). | PANASONIC INDUSTRIAL | ECE-A-1CU-221B |
| C41 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C42 | 26386/899 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | ROHM ELECTRONICS LTD | MCH31-5C-104-KP |
| C43 | 26386/817 | CAPACITOR-FIXED CERAMIC 27pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-270-JP |
| C44 | 26343/784 | CAPACITOR-FIXED CERAMIC 68pF +/-5% 50V NPO MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-680-JP |
| C45 | 26386/824 | CAPACITOR-FIXED CERAMIC 100pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-101-JP |
| C46 | 26386/863 | CAPACITOR-FIXED CERAMIC 1nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-102-KP |
| C47 | 26386/818 | CAPACITOR-FIXED CERAMIC 33pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-330-JP |
| C101 to C199 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C200 to C209 | 26421/112 | CAPACITOR-FIXED ALUMINIUM 10uF +/-20% 35V ELECTROLYTIC, RADIAL, 5mm PWP, (TAPED). | PANASONIC INDUSTRIAL | ECE-A-1V-KA-100-B |
| C210 | 26421/142 | CAPACITOR-FIXED ALUMINIUM 220uF +/-20% 16V ELECTROLYTIC, RADIAL, 5mm PWP, (TAPED). | PANASONIC INDUSTRIAL | ECE-A-1CU-221B |
| C211 | 26421/142 | CAPACITOR-FIXED ALUMINIUM 220uF +/-20% 16V ELECTROLYTIC, RADIAL, 5mm PWP, (TAPED). | PANASONIC INDUSTRIAL | ECE-A-1CU-221B |
| C212 to C214 | 26421/112 | CAPACITOR-FIXED ALUMINIUM 10uF +/-20% 35V ELECTROLYTIC, RADIAL, 5mm PWP, (TAPED). | PANASONIC INDUSTRIAL | ECE-A-1V-KA-100-B |
| C220 to C229 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C230 | 26343/435 | CAPACITOR-FIXED CERAMIC 220pF +/-2% 63V N750 SINGLELAYER, RADIAL, 2.5mm PWP, (TAPED). | VISHAY COMPONENTS | ROU-221-GAK-ACR-J |

## A2 Audio processor 2 (contd.)

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| D1 | 28383/909 | DIODE SMALL-SIGNAL, SCHOTTKY, HSMS-2822... DUAL, 8V 1pF 340mVf @ 1mA, IN SERIES, MARKING CODE C2, | HEWLETT-PACKARD | HSMS-2822-L31 |
| D9 | 28383/903 | DIODE SMALL-SIGNAL, BAV99... DUAL, 70V 100mA 1.1Vf @ 50mA, IN SERIES, MARKING CODE A7, SURFACE | PHILIPS | BAV99 (A7) |
| D10 | 28383/903 | DIODE SMALL-SIGNAL, BAV99... DUAL, 70V 100mA 1.1Vf @ 50mA, IN SERIES, MARKING CODE A7, SURFACE | PHILIPS | BAV99 (A7) |
| D11 | 28383/909 | DIODE SMALL-SIGNAL, SCHOTTKY, HSMS-2822... DUAL, 8V 1pF 340mVf @ 1mA, IN SERIES, MARKING CODE C2, | HEWLETT-PACKARD | HSMS-2822-L31 |
| D13 | 28383/901 | DIODE SMALL-SIGNAL, BAV70... DUAL, 70V 100mA 1.1Vf @ 50mA, COMMON CATHODE, MARKING CODE A4, SURFACE | PHILIPS | BAV70 |
| D14 | 28383/901 | DIODE SMALL-SIGNAL, BAV70... DUAL, 70V 100mA 1.1Vf @ 50mA, COMMON CATHODE, MARKING CODE A4, SURFACE | PHILIPS | BAV70 |
| D15 | 28383/903 | DIODE SMALL-SIGNAL, BAV99... DUAL, 70V 100mA 1.1Vf @ 50mA, IN SERIES, MARKING CODE A7, SURFACE | PHILIPS | BAV99 (A7) |
| D16 | 28383/903 | DIODE SMALL-SIGNAL, BAV99... DUAL, 70V 100mA 1.1Vf @ 50mA, IN SERIES, MARKING CODE A7, SURFACE | PHILIPS | BAV99 (A7) |
| D17 | 28383/934 | DIODE SMALL-SIGNAL, LL4148... 500mW 50V 150mA 1Vf @ 10mA, SURFACE MOUNTED, MINI-MELF, (TAPED). | PHILIPS | PMLL4148L |
| D19 | 28383/934 | DIODE SMALL-SIGNAL, LL4148... 500mW 50V 150mA 1Vf @ 10mA, SURFACE MOUNTED, MINI-MELF, (TAPED). | PHILIPS | PMLL4148L |
| D20 | 28371/216 | DIODE ZENER, BZX84-C3V3... 350mW 3.3V 5% 250mA MARKING CODE Z14/W6, SURFACE MOUNTED, SOT-23, | PHILIPS | BZX84-C3V3 |
| D21 | 28371/216 | DIODE ZENER, BZX84-C3V3... 350mW 3.3V 5% 250mA MARKING CODE Z14/W6, SURFACE MOUNTED, SOT-23, | PHILIPS | BZX84-C3V3 |
| IC1 | 28461/806 | IC-ANALOGUE OPERATIONAL AMP OP-249... DUAL, PRECISION HI SPEED, SETTLING TIME-1.2uS, GAIN | ANALOG DEVICES LTD | OP-249GS |
| IC2 | 28461/898 | IC-ANALOGUE D/A-CONVERTER 7528... 8 INPUT, DUAL, 8-BIT, BUFFERED, MULTIPLYING, CMOS, 20 PIN, | ANALOG DEVICES LTD | AD7528JR |
| IC3 | 28461/806 | IC-ANALOGUE OPERATIONAL AMP OP-249... DUAL, PRECISION HI SPEED, SETTLING TIME-1.2uS, GAIN | ANALOG DEVICES LTD | OP-249GS |
| IC4 | 28461/888 | IC-ANALOGUE SWITCH DG419... SINGLE, 15V SPDT, ON-RESISTANCE<35R, CHANGEOVER, TTL COMPATIBLE, | SILICONIX LTD | DG419DY |
| IC5 | 28461/806 | IC-ANALOGUE OPERATIONAL AMP OP-249... DUAL, PRECISION HI SPEED, SETTLING TIME-1.2uS, GAIN | ANALOG DEVICES LTD | OP-249GS |
| IC6 | 28461/356 | IC-ANALOGUE OPERATIONAL AMP LF357N... SINGLE, LINEAR, SLEW-RATE 50V/uS TYP, JFET, 8 PIN, | NAT. SEMICONDUCTOR | LF357N |
| IC7 | 28461/676 | IC-ANALOGUE COMPARATOR LM311... 2 INPUT, SINGLE, 15V I/P-OFFSET 7.5mV MAX, RESPONSE-TIME 200nS TYP, | PHILIPS | LM311D |
| IC8 | 28469/032 | IC-DIGITAL INVERTER 74HC14... HEX, SCHMITT-TRIGGER OPERATION, CMOS-H/SPEED, 14 PIN, SMALL-OUTLINE. | PHILIPS | 74HC14D |
| IC9 | 28461/806 | IC-ANALOGUE OPERATIONAL AMP OP-249... DUAL, PRECISION HI SPEED, SETTLING TIME-1.2uS, GAIN | ANALOG DEVICES LTD | OP-249GS |
| IC10 | 28461/803 | IC-ANALOGUE VOLTAGE-REFERENCE LT1019... 5V PRECISION, OUTPUT VOLTAGE DRIFT 20ppm/DEG.C MAX, | LINEAR TECHNOLOGY | LT1019CS8-5 |
| IC11 to IC13 | 28461/819 | IC-ANALOGUE OPERATIONAL AMP OP177... SINGLE, 22V OFFSET VOLTAGE 25uV, OFFSET CURRENT 1.5nA, | ANALOG DEVICES LTD | OP177GS |
| IC14 | 28469/759 | IC-ANALOGUE MULTIPLEXER DG508A... 8 INPUT, SINGLE, 15V & -15V, CMOS, 16 PIN, SMALL-OUTLINE. | ANALOG DEVICES LTD | MUX-08FS |

## A2 Audio processor 2 (contd.)

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| IC15 | 28461/819 | IC-ANALOGUE OPERATIONAL AMP OP177... SINGLE, 22V OFFSET VOLTAGE 25uV, OFFSET CURRENT 1.5nA, | ANALOG DEVICES LTD | OP177GS |
| IC16 | 28461/819 | IC-ANALOGUE OPERATIONAL AMP OP177... SINGLE, 22V OFFSET VOLTAGE 25uV, OFFSET CURRENT 1.5nA, | ANALOG DEVICES LTD | OP177GS |
| IC17 | 28461/999 | IC-ANALOGUE SWITCH DG441... QUAD, 15V SPST, ON-RESISTANCE<85R, 4 x N/O @ LOGIC 1, TTL | SILICONIX LTD | DG441DY |
| IC18 | 28461/806 | IC-ANALOGUE OPERATIONAL AMP OP-249... DUAL, PRECISION HI SPEED, SETTLING TIME-1.2uS, GAIN | ANALOG DEVICES LTD | OP-249GS |
| IC19 | 28461/888 | IC-ANALOGUE SWITCH DG419... SINGLE, 15V SPDT, ON-RESISTANCE<35R, CHANGEOVER, TTL COMPATIBLE, | SILICONIX LTD | DG419DY |
| IC20 | 28461/898 | IC-ANALOGUE D/A-CONVERTER 7528... 8 INPUT, DUAL, 8-BIT, BUFFERED, MULTIPLYING, CMOS, 20 PIN, | ANALOG DEVICES LTD | AD7528JR |
| IC21 | 28461/806 | IC-ANALOGUE OPERATIONAL AMP OP-249... DUAL, PRECISION HI SPEED, SETTLING TIME-1.2uS, GAIN | ANALOG DEVICES LTD | OP-249GS |
| IC22 to IC25 | 28461/999 | IC-ANALOGUE SWITCH DG441... QUAD, 15V SPST, ON-RESISTANCE<85R, 4 x N/O @ LOGIC 1, TTL | SILICONIX LTD | DG441DY |
| IC26 | 28461/411 | IC-ANALOGUE OPERATIONAL AMP TL071... SINGLE, JFET INPUT, LOW NOISE, 8 PIN, SMALL-OUTLINE. | MOTOROLA INC. | TL071CD |
| IC27 | 28461/953 | IC-ANALOGUE RMS/DC CONVERTER AD637KD... 18V TOTAL-ERROR +/-0.5mV +/-0.2% OF READING, | ANALOG DEVICES LTD | AD637KD |
| IC28 | 28461/819 | IC-ANALOGUE OPERATIONAL AMP OP177... SINGLE, 22V OFFSET VOLTAGE 25uV, OFFSET CURRENT 1.5nA, | ANALOG DEVICES LTD | OP177GS |
| IC29 | 28461/819 | IC-ANALOGUE OPERATIONAL AMP OP177... SINGLE, 22V OFFSET VOLTAGE 25uV, OFFSET CURRENT 1.5nA, | ANALOG DEVICES LTD | OP177GS |
| IC30 | 28461/458 | IC-ANALOGUE OPERATIONAL AMP OP37... 15V LOW NOISE, HI-SPEED, PRECISION, BIPOLAR, 8 PIN, | ANALOG DEVICES LTD | OP37GS |
| IC31 | 28461/806 | IC-ANALOGUE OPERATIONAL AMP OP-249... DUAL, PRECISION HI SPEED, SETTLING TIME-1.2uS, GAIN | ANALOG DEVICES LTD | OP-249GS |
| IC32 | 28461/888 | IC-ANALOGUE SWITCH DG419... SINGLE, 15V SPDT, ON-RESISTANCE<35R, CHANGEOVER, TTL COMPATIBLE, | SILICONIX LTD | DG419DY |
| IC36 | 28469/759 | IC-ANALOGUE MULTIPLEXER DG508A... 8 INPUT, SINGLE, 15V & -15V, CMOS, 16 PIN, SMALL-OUTLINE. | ANALOG DEVICES LTD | MUX-08FS |
| IC37 | 28461/897 | IC-ANALOGUE OPERATIONAL AMP OP-27GS... 22V LOW NOISE, 8 PIN, SMALL-OUTLINE. | ANALOG DEVICES LTD | OP-27GS |
| IC38 | 28461/829 | IC-ANALOGUE A/D CONVERTER ADC912AHS... 12 BIT, MICROPROCESSOR COMPATIBLE, 8/16 BIT BUS O/P, | ANALOG DEVICES LTD | ADC912AHS |
| IC39 | 28461/806 | IC-ANALOGUE OPERATIONAL AMP OP-249... DUAL, PRECISION HI SPEED, SETTLING TIME-1.2uS, GAIN | ANALOG DEVICES LTD | OP-249GS |
| IC40 | 28461/495 | IC-ANALOGUE AUDIO-AMPLIFIER TDA2030... SINGLE, 28V 14W, MONOLITHIC, 5 PIN, TO-220. | SGS-THOMSON | TDA2030H |
| IC41 | 28461/384 | IC-ANALOGUE OPERATIONAL AMP LF356N... SINGLE, LINEAR, SLEW-RATE 12V/uS TYP, JFET, 8 PIN, | NAT. SEMICONDUCTOR | LF356N |
| IC42 | 28461/356 | IC-ANALOGUE OPERATIONAL AMP LF357N... SINGLE, LINEAR, SLEW-RATE 50V/uS TYP, JFET, 8 PIN, | NAT. SEMICONDUCTOR | LF357N |
| IC43 | 28461/676 | IC-ANALOGUE COMPARATOR LM311... 2 INPUT, SINGLE, 15V I/P-OFFSET 7.5mV MAX, RESPONSE-TIME 200nS TYP, | PHILIPS | LM311D |
| IC44 to IC48 | 28467/111 | IC-MICRO PERIPHERAL, PCF8574... REMOTE 8-BIT I/O EXPANDER, I.IC BUS, UP TO 8 DEVICE ADDRESS | PHILIPS | PCF8574T |
| IC49 to IC51 | 28465/056 | IC-DIGITAL DECODER/DEMULTIPLEX 74HC139... 2 INPUT, 4 BIT, DUAL, INVERTING, 1 BIT ADDRESS, | PHILIPS | 74HC139D |

## A2 Audio processor 2 (contd.)

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| IC52 | 28461/717 | IC-ANALOGUE VOLTAGE-REGULATOR 7905... SINGLE, 5V 1A NEGATIVE, LINEAR, MONOLITHIC, 3 PIN, TO-220. | NAT. SEMICONDUCTOR | LM7905CT |
| IC53 | 28461/707 | IC-ANALOGUE VOLTAGE-REGULATOR 7805... 5V 1A POSITIVE, LINEAR, MONOLITHIC, 3 PIN, TO-220. | NAT. SEMICONDUCTOR | uA7805UC |
| IC54 | 28461/828 | IC-ANALOGUE D/A-CONVERTER DAC-08... 8 BIT, HIGH SPEED MULTIPLYING, MONOLITHIC, 16 PIN, | NAT. SEMICONDUCTOR | DAC-0801LCM |
| IC55 | 28462/151 | IC-DIGITAL FLIP-FLOP/D-TYPE 74HC374... 1 INPUT, OCTAL, NON-INVERTING, POS EDGE TRIGGER, TRI-STATE, | PHILIPS | 74HC374D |
| IC56 | 28461/897 | IC-ANALOGUE OPERATIONAL AMP OP-27GS... 22V LOW NOISE, 8 PIN, SMALL-OUTLINE. | ANALOG DEVICES LTD | OP-27GS |
| IC57 | 28461/897 | IC-ANALOGUE OPERATIONAL AMP OP-27GS... 22V LOW NOISE, 8 PIN, SMALL-OUTLINE. | ANALOG DEVICES LTD | OP-27GS |
| IC58 | 28461/963 | IC-ANALOGUE COMPARATOR LT1016... RESPONSE-TIME 14nS MAX, PRECISION, 8 PIN, DUAL-IN-LINE. | MAXIM INTEG PRODUCTS | LT1016CN8 |
| IC59 | 28461/888 | IC-ANALOGUE SWITCH DG419... SINGLE, 15V SPDT, ON-RESISTANCE<35R, CHANGEOVER, TTL COMPATIBLE, | SILICONIX LTD | DG419DY |
| IC60 | 28462/638 | IC-DIGITAL FLIP-FLOP/D-TYPE 74HC74... 2 BIT, DUAL, POS EDGE TRIGGER, PLUS SET & CLEAR, CMOS-H/SPEED, | PHILIPS | 74HC74D |
| IC61 to IC63 | 28464/175 | IC-DIGITAL COUNTER 74HC191... 4 BIT, SINGLE, BINARY UP/DOWN, SYNCHRONOUS, PRESETTABLE, | PHILIPS | 74HC191D |
| IC64 | 28461/804 | IC-ANALOGUE D/A-CONVERTER DAC-312... SINGLE, 12 BIT, HIGH SPEED MULTIPLYING, BIPOLAR, 20 PIN, | ANALOG DEVICES LTD | DAC-312HS |
| IC65 | 28469/552 | IC-DIGITAL BUFFER/LINE-DRIVER 74HC541... OCTAL, TRI-STATE, NON-INVERTING, CMOS-H/SPEED, 20 PIN, | PHILIPS | 74HC541D |
| IC66 | 28469/552 | IC-DIGITAL BUFFER/LINE-DRIVER 74HC541... OCTAL, TRI-STATE, NON-INVERTING, CMOS-H/SPEED, 20 PIN, | PHILIPS | 74HC541D |
| IC67 | 28465/055 | IC-DIGITAL DECODER/DEMULTIPLEX 74HC138... 3 INPUT, 8 BIT, SINGLE, INVERTING, 3 BIT ADDRESS, | PHILIPS | 74HC138D |
| L1 to L5 | 23642/535 | INDUCTOR-FIXED 1uH +/- 5% MOULDED-EPOXY, 400mA 0R7 MAX, 30 Q @ 7.96 MHz, 120 MHz SRF, SURFACE | MEGGITT ELECTRONICS | 3612-T-1R0-J |
| PLA | 23435/120 | CONNECTOR MULTIWAY, PCB HEADER, 36 WAY, RIGHT ANGLED, 2.54mm PITCH, PINS GOLD PLATED TO CLASS 2, | BERG ELECTRONICS | 75168-101-36 |
| PLB | 23436/900 | CONNECTOR MULTIWAY, PCB HEADER, 10 WAY, RIGHT ANGLED, 2-ROW, 2.54mm GRID, POLARISED, SHROUDED, | MOLEX ELECTRONICS | 39-26-7108 |
| PLC to PLK | 23435/120 | CONNECTOR MULTIWAY, PCB HEADER, 36 WAY, RIGHT ANGLED, 2.54mm PITCH, PINS GOLD PLATED TO CLASS 2, | BERG ELECTRONICS | 75168-101-36 |
| PLM | 23436/901 | CONNECTOR MULTIWAY, PCB HEADER, 16 WAY, RIGHT ANGLED, 2-ROW, 2.54mm GRID, POLARISED, SHROUDED, | THOMAS & BETTS LTD | 609-1607 |
| PLQ | 23435/120 | CONNECTOR MULTIWAY, PCB HEADER, 36 WAY, RIGHT ANGLED, 2.54mm PITCH, PINS GOLD PLATED TO CLASS 2, | BERG ELECTRONICS | 75168-101-36 |
| R1 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R2 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R3 | 24811/187 | RESISTOR-FIXED METAL-FILM 3K92 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-3K92-1%50ppm |
| R4 | 24811/199 | RESISTOR-FIXED METAL-FILM 12K1 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-12K1-1%50ppm |

## A2 Audio processor 2 (contd.)

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| R5 | 24811/201 | RESISTOR-FIXED METAL-FILM 15K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-15K-1%50ppm |
| R6 | 24811/190 | RESISTOR-FIXED METAL-FILM 5K11 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-5K11-1%50ppm |
| R7 | 24811/199 | RESISTOR-FIXED METAL-FILM 12K1 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-12K1-1%50ppm |
| R8 | 24811/187 | RESISTOR-FIXED METAL-FILM 3K92 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-3K92-1%50ppm |
| R9 | 24811/231 | RESISTOR-FIXED METAL-FILM 274K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-274K-1%50ppm |
| R10 | 24811/180 | RESISTOR-FIXED METAL-FILM 2K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-2K0-1%50ppm |
| R11 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R12 | 24811/221 | RESISTOR-FIXED METAL-FILM 100K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100K-1%50ppm |
| R13 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R14 | 24811/187 | RESISTOR-FIXED METAL-FILM 3K92 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-3K92-1%50ppm |
| R15 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R16 | 24811/169 | RESISTOR-FIXED METAL-FILM 681R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-681R-1%50ppm |
| R17 | 24811/167 | RESISTOR-FIXED METAL-FILM 562R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-562R-1%50ppm |
| R18 | 24811/187 | RESISTOR-FIXED METAL-FILM 3K92 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-3K92-1%50ppm |
| R19 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R20 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R21 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R22 | 24811/187 | RESISTOR-FIXED METAL-FILM 3K92 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-3K92-1%50ppm |
| R23 | 24811/199 | RESISTOR-FIXED METAL-FILM 12K1 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-12K1-1%50ppm |
| R24 | 24811/201 | RESISTOR-FIXED METAL-FILM 15K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-15K-1%50ppm |
| R25 | 24811/190 | RESISTOR-FIXED METAL-FILM 5K11 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-5K11-1%50ppm |
| R26 | 24811/199 | RESISTOR-FIXED METAL-FILM 12K1 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-12K1-1%50ppm |
| R27 | 24811/187 | RESISTOR-FIXED METAL-FILM 3K92 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-3K92-1%50ppm |
| R28 | 24811/221 | RESISTOR-FIXED METAL-FILM 100K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100K-1%50ppm |
| R29 | 24811/141 | RESISTOR-FIXED METAL-FILM 47R5 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-47R5-1%50ppm |

## A2 Audio processor 2 (contd.)

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| R30 | 24811/141 | RESISTOR-FIXED METAL-FILM 47R5 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-47R5-1%50ppm |
| R31 | 24811/602 | RESISTOR-FIXED METAL-FILM 10K +/- 0.1% 250mW 200V 15 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-10K0-0.1%-15 |
| R32 | 24811/179 | RESISTOR-FIXED METAL-FILM 1K82 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-1K82-1%50ppm |
| R33 | 24811/641 | RESISTOR-FIXED METAL-FILM 2K +/- 0.1% 250mW 200V 15 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-2K0-0.1%-15 |
| R34 | 24811/602 | RESISTOR-FIXED METAL-FILM 10K +/- 0.1% 250mW 200V 15 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-10K0-0.1%-15 |
| R35 | 24811/189 | RESISTOR-FIXED METAL-FILM 4K75 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-4K75-1%50ppm |
| R36 | 24811/602 | RESISTOR-FIXED METAL-FILM 10K +/- 0.1% 250mW 200V 15 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-10K0-0.1%-15 |
| R37 | 24811/164 | RESISTOR-FIXED METAL-FILM 432R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-432R-1%50ppm |
| R38 | 24811/161 | RESISTOR-FIXED METAL-FILM 332R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-332R-1%50ppm |
| R39 | 24811/160 | RESISTOR-FIXED METAL-FILM 301R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-301R-1%50ppm |
| R40 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R41 | 24811/175 | RESISTOR-FIXED METAL-FILM 1K21 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-1K21-1%50ppm |
| R42 | 24811/146 | RESISTOR-FIXED METAL-FILM 75R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-75R0-1%50ppm |
| R43 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R44 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R45 | 24811/213 | RESISTOR-FIXED METAL-FILM 47K5 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-47K5-1%50ppm |
| R46 | 24811/190 | RESISTOR-FIXED METAL-FILM 5K11 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-5K11-1%50ppm |
| R47 | 24811/209 | RESISTOR-FIXED METAL-FILM 33K2 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-33K2-1%50ppm |
| R48 | 24811/169 | RESISTOR-FIXED METAL-FILM 681R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-681R-1%50ppm |
| R49 | 24811/149 | RESISTOR-FIXED METAL-FILM 100R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100R-1%50ppm |
| R50 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R51 | 24811/221 | RESISTOR-FIXED METAL-FILM 100K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100K-1%50ppm |
| R52 | 24811/221 | RESISTOR-FIXED METAL-FILM 100K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100K-1%50ppm |
| R53 | 24811/159 | RESISTOR-FIXED METAL-FILM 274R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-274R-1%50ppm |
| R54 | 24811/206 | RESISTOR-FIXED METAL-FILM 24K3 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-24K3-1%50ppm |

## A2 Audio processor 2 (contd.)

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| R55 | 24811/206 | RESISTOR-FIXED METAL-FILM 24K3 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-24K3-1%50ppm |
| R56 | 24811/211 | RESISTOR-FIXED METAL-FILM 39K2 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-39K2-1%50ppm |
| R57 | 24811/211 | RESISTOR-FIXED METAL-FILM 39K2 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-39K2-1%50ppm |
| R58 | 24811/181 | RESISTOR-FIXED METAL-FILM 2K21 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-2K21-1%50ppm |
| R59 | 24811/181 | RESISTOR-FIXED METAL-FILM 2K21 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-2K21-1%50ppm |
| R66 | 24811/602 | RESISTOR-FIXED METAL-FILM 10K +/- 0.1% 250mW 200V 15 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-10K0-0.1%-15 |
| R67 | 24811/602 | RESISTOR-FIXED METAL-FILM 10K +/- 0.1% 250mW 200V 15 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-10K0-0.1%-15 |
| R68 | 24811/221 | RESISTOR-FIXED METAL-FILM 100K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100K-1%50ppm |
| R69 | 24811/217 | RESISTOR-FIXED METAL-FILM 68K1 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-68K1-1%50ppm |
| R70 to R73 | 24811/189 | RESISTOR-FIXED METAL-FILM 4K75 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-4K75-1%50ppm |
| R74 | 24811/225 | RESISTOR-FIXED METAL-FILM 150K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-150K-1%50ppm |
| R75 | 24811/101 | RESISTOR-FIXED METAL-FILM 1R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1R-1%-50ppm |
| R76 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R77 | 24811/221 | RESISTOR-FIXED METAL-FILM 100K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100K-1%50ppm |
| R78 | 24811/169 | RESISTOR-FIXED METAL-FILM 681R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-681R-1%50ppm |
| R79 | 24811/187 | RESISTOR-FIXED METAL-FILM 3K92 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-3K92-1%50ppm |
| R80 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R81 | 24811/167 | RESISTOR-FIXED METAL-FILM 562R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-562R-1%50ppm |
| R82 | 24811/187 | RESISTOR-FIXED METAL-FILM 3K92 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-3K92-1%50ppm |
| R83 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R84 | 24811/221 | RESISTOR-FIXED METAL-FILM 100K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100K-1%50ppm |
| R85 | 24811/221 | RESISTOR-FIXED METAL-FILM 100K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100K-1%50ppm |
| R86 to R92 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R93 | 24811/189 | RESISTOR-FIXED METAL-FILM 4K75 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-4K75-1%50ppm |
| R94 | 24811/189 | RESISTOR-FIXED METAL-FILM 4K75 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-4K75-1%50ppm |

## A2 Audio processor 2 (contd.)

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| R95 | 24811/190 | RESISTOR-FIXED METAL-FILM 5K11 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-5K11-1%50ppm |
| R96 | 24811/198 | RESISTOR-FIXED METAL-FILM 11K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-11K-1%50ppm |
| R97 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R98 | 24811/221 | RESISTOR-FIXED METAL-FILM 100K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100K-1%50ppm |
| R99 to R107 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R108 | 24811/137 | RESISTOR-FIXED METAL-FILM 33R2 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-33R2-1%50ppm |
| R109 | 24811/181 | RESISTOR-FIXED METAL-FILM 2K21 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-2K21-1%50ppm |
| R110 | 24811/125 | RESISTOR-FIXED METAL-FILM 10R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10R-1%-50ppm |
| R111 | 24811/181 | RESISTOR-FIXED METAL-FILM 2K21 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-2K21-1%50ppm |
| R112 | 24811/181 | RESISTOR-FIXED METAL-FILM 2K21 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-2K21-1%50ppm |
| R113 | 24811/185 | RESISTOR-FIXED METAL-FILM 3K32 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-3K32-1%50ppm |
| R114 | 24811/181 | RESISTOR-FIXED METAL-FILM 2K21 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-2K21-1%50ppm |
| R115 | 24811/166 | RESISTOR-FIXED METAL-FILM 511R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-511R-1%50ppm |
| R116 | 24811/181 | RESISTOR-FIXED METAL-FILM 2K21 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-2K21-1%50ppm |
| R117 | 24811/166 | RESISTOR-FIXED METAL-FILM 511R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-511R-1%50ppm |
| R118 | 24811/181 | RESISTOR-FIXED METAL-FILM 2K21 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-2K21-1%50ppm |
| R120 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R121 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R122 | 24811/165 | RESISTOR-FIXED METAL-FILM 475R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-475R-1%50ppm |
| R123 | 24811/168 | RESISTOR-FIXED METAL-FILM 619R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-619R-1%50ppm |
| R124 | 24811/159 | RESISTOR-FIXED METAL-FILM 274R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-274R-1%50ppm |
| R125 | 24811/235 | RESISTOR-FIXED METAL-FILM 392K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-392K-1%50ppm |
| R126 | 24811/190 | RESISTOR-FIXED METAL-FILM 5K11 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-5K11-1%50ppm |
| R127 | 24811/190 | RESISTOR-FIXED METAL-FILM 5K11 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-5K11-1%50ppm |
| R128 to R136 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| **A2 Audio processor 2 (contd.)** | | | | |
| R137 | 24811/213 | RESISTOR-FIXED METAL-FILM 47K5 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-47K5-1%50ppm |
| TR1 | 28487/811 | TRANSISTOR NPN BIPOLAR BC818-40... 25V 170MHz 330mW 500mA 250hFE MIN @ 100mA, MARKING CODE 6G, | PHILIPS | BC818-40 |
| TR2 | 28459/061 | TRANSISTOR N-CHANNEL-DEPLETION JFET BSR56... 40V 250mW 50mA MARKING CODE M4, SURFACE MOUNTED, | PHILIPS | BSR56 |

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|

## A2/2 Audio processor 2

When ordering, prefix circuit reference with A2/2.

| | | | | |
|---|---|---|---|---|
| | 44830-044 | Complete unit | Issue 06 | |
| C1 | 26386/897 | CAPACITOR-FIXED CERAMIC 4.7pF +/-0.1pF 50V 60 ppm/DEG.C, HIGH-Q, SINGLELAYER, SURFACE-MOUNTED, | AVX LTD | 0805-5K4R7-BAW-TR |
| C2 | 26386/897 | CAPACITOR-FIXED CERAMIC 4.7pF +/-0.1pF 50V 60 ppm/DEG.C, HIGH-Q, SINGLELAYER, SURFACE-MOUNTED, | AVX LTD | 0805-5K4R7-BAW-TR |
| C3 | 26386/824 | CAPACITOR-FIXED CERAMIC 100pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-101-JP |
| C4 | 26386/899 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | ROHM ELECTRONICS LTD | MCH31-5C-104-KP |
| C5 | 26386/997 | CAPACITOR-FIXED CERAMIC 470nF +/-10% 50V X7R, MULTILAYER, SURFACE-MOUNTED, SIZE 1812, NICKEL | PHILIPS | 1812-2B-474-K9BB |
| C6 | 26386/897 | CAPACITOR-FIXED CERAMIC 4.7pF +/-0.1pF 50V 60 ppm/DEG.C, HIGH-Q, SINGLELAYER, SURFACE-MOUNTED, | AVX LTD | 0805-5K4R7-BAW-TR |
| C7 | 26386/897 | CAPACITOR-FIXED CERAMIC 4.7pF +/-0.1pF 50V 60 ppm/DEG.C, HIGH-Q, SINGLELAYER, SURFACE-MOUNTED, | AVX LTD | 0805-5K4R7-BAW-TR |
| C8 | 26386/824 | CAPACITOR-FIXED CERAMIC 100pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-101-JP |
| C9 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C10 | 26386/899 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | ROHM ELECTRONICS LTD | MCH31-5C-104-KP |
| C11 | 26386/899 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | ROHM ELECTRONICS LTD | MCH31-5C-104-KP |
| C12 | 26386/824 | CAPACITOR-FIXED CERAMIC 100pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-101-JP |
| C13 | 26386/820 | CAPACITOR-FIXED CERAMIC 47pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-470-JP |
| C14 to C18 | 26386/992 | CAPACITOR-FIXED CERAMIC 330nF +/-10% 50V X7R, MULTILAYER, SURFACE-MOUNTED, SIZE 1812, NICKEL | PHILIPS | 1812-2B-334-K9BB |
| C23 | 26451/009 | CAPACITOR-FIXED ALUMINIUM 47uF +/-20% 16V ELECTROLYTIC, SURFACE-MOUNTED, SIZE 6.6 x 6.6mm, | PANASONIC INDUSTRIAL | ECE-V-1CA-470P |
| C24 | 26386/899 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | ROHM ELECTRONICS LTD | MCH31-5C-104-KP |
| C25 | 26386/830 | CAPACITOR-FIXED CERAMIC 330pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-331-JP |
| C26 | 26386/760 | CAPACITOR-FIXED CERAMIC 220nF +/-10% 50V X7R MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | PHILIPS | 1210-2R-224-K9-BBC |
| C27 | 26451/012 | CAPACITOR-FIXED ALUMINIUM 100uF +/-20% 16V ELECTROLYTIC, SURFACE-MOUNTED, SIZE 8.3 x 8.3mm, | PANASONIC INDUSTRIAL | ECE-V-1CA-101P |
| C28 | 26451/002 | CAPACITOR-FIXED ALUMINIUM 4.7uF +/-20% 35V ELECTROLYTIC, SURFACE-MOUNTED, SIZE 4.3 x 4.3mm, | PANASONIC INDUSTRIAL | ECE-V-1VA-4R7R |
| C29 | 26451/012 | CAPACITOR-FIXED ALUMINIUM 100uF +/-20% 16V ELECTROLYTIC, SURFACE-MOUNTED, SIZE 8.3 x 8.3mm, | PANASONIC INDUSTRIAL | ECE-V-1CA-101P |
| C30 | 26386/760 | CAPACITOR-FIXED CERAMIC 220nF +/-10% 50V X7R MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | PHILIPS | 1210-2R-224-K9-BBC |
| C31 | 26386/997 | CAPACITOR-FIXED CERAMIC 470nF +/-10% 50V X7R, MULTILAYER, SURFACE-MOUNTED, SIZE 1812, NICKEL | PHILIPS | 1812-2B-474-K9BB |
| C32 | 26451/010 | CAPACITOR-FIXED ALUMINIUM 100uF +/-20% 6.3V ELECTROLYTIC, SURFACE-MOUNTED, SIZE 6.6 x 6.6mm, | PANASONIC INDUSTRIAL | ECE-V-0JA-101P |

## A2/2 Audio processor 2 (contd.)

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| C33 | 26386/899 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | ROHM ELECTRONICS LTD | MCH31-5C-104-KP |
| C34 | 26451/012 | CAPACITOR-FIXED ALUMINIUM 100uF +/-20% 16V ELECTROLYTIC, SURFACE-MOUNTED, SIZE 8.3 x 8.3mm, | PANASONIC INDUSTRIAL | ECE-V-1CA-101P |
| C35 | 26386/899 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | ROHM ELECTRONICS LTD | MCH31-5C-104-KP |
| C36 | 26386/992 | CAPACITOR-FIXED CERAMIC 330nF +/-10% 50V X7R, MULTILAYER, SURFACE-MOUNTED, SIZE 1812, NICKEL | PHILIPS | 1812-2B-334-K9BB |
| C37 | 26451/012 | CAPACITOR-FIXED ALUMINIUM 100uF +/-20% 16V ELECTROLYTIC, SURFACE-MOUNTED, SIZE 8.3 x 8.3mm, | PANASONIC INDUSTRIAL | ECE-V-1CA-101P |
| C38 | 26386/899 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | ROHM ELECTRONICS LTD | MCH31-5C-104-KP |
| C39 | 26386/992 | CAPACITOR-FIXED CERAMIC 330nF +/-10% 50V X7R, MULTILAYER, SURFACE-MOUNTED, SIZE 1812, NICKEL | PHILIPS | 1812-2B-334-K9BB |
| C40 | 26451/012 | CAPACITOR-FIXED ALUMINIUM 100uF +/-20% 16V ELECTROLYTIC, SURFACE-MOUNTED, SIZE 8.3 x 8.3mm, | PANASONIC INDUSTRIAL | ECE-V-1CA-101P |
| C41 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C42 | 26386/899 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | ROHM ELECTRONICS LTD | MCH31-5C-104-KP |
| C43 | 26386/817 | CAPACITOR-FIXED CERAMIC 27pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-270-JP |
| C44 | 26343/784 | CAPACITOR-FIXED CERAMIC 68pF +/-5% 50V NPO MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-680-JP |
| C45 | 26386/824 | CAPACITOR-FIXED CERAMIC 100pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-101-JP |
| C46 | 26386/863 | CAPACITOR-FIXED CERAMIC 1nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-102-KP |
| C47 | 26386/818 | CAPACITOR-FIXED CERAMIC 33pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-330-JP |
| C101 to C199 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C200 to C209 | 26451/004 | CAPACITOR-FIXED ALUMINIUM 10uF +/-20% 35V ELECTROLYTIC, SURFACE-MOUNTED, SIZE 5.3 x 5.3mm, | DUBILIER CAPACITORS | DVC-10/35-T/R |
| C210 | 26451/012 | CAPACITOR-FIXED ALUMINIUM 100uF +/-20% 16V ELECTROLYTIC, SURFACE-MOUNTED, SIZE 8.3 x 8.3mm, | PANASONIC INDUSTRIAL | ECE-V-1CA-101P |
| C211 | 26451/012 | CAPACITOR-FIXED ALUMINIUM 100uF +/-20% 16V ELECTROLYTIC, SURFACE-MOUNTED, SIZE 8.3 x 8.3mm, | PANASONIC INDUSTRIAL | ECE-V-1CA-101P |
| C212 to C214 | 26451/004 | CAPACITOR-FIXED ALUMINIUM 10uF +/-20% 35V ELECTROLYTIC, SURFACE-MOUNTED, SIZE 5.3 x 5.3mm, | DUBILIER CAPACITORS | DVC-10/35-T/R |
| C220 to C229 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C230 | 26386/828 | CAPACITOR-FIXED CERAMIC 220pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-221-JP |
| C240 to C244 | 26451/012 | CAPACITOR-FIXED ALUMINIUM 100uF +/-20% 16V ELECTROLYTIC, SURFACE-MOUNTED, SIZE 8.3 x 8.3mm, | PANASONIC INDUSTRIAL | ECE-V-1CA-101P |
| C245 | 26386/760 | CAPACITOR-FIXED CERAMIC 220nF +/-10% 50V X7R MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | PHILIPS | 1210-2R-224-K9-BBC |

## A2/2 Audio processor 2 (contd.)

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| D1 | 28383/909 | DIODE SMALL-SIGNAL, SCHOTTKY, HSMS-2822... DUAL, 8V 1pF 340mVf @ 1mA, IN SERIES, MARKING CODE C2, | HEWLETT-PACKARD | HSMS-2822-L31 |
| D9 | 28383/903 | DIODE SMALL-SIGNAL, BAV99... DUAL, 70V 100mA 1.1Vf @ 50mA, IN SERIES, MARKING CODE A7, SURFACE | PHILIPS | BAV99 (A7) |
| D10 | 28383/903 | DIODE SMALL-SIGNAL, BAV99... DUAL, 70V 100mA 1.1Vf @ 50mA, IN SERIES, MARKING CODE A7, SURFACE | PHILIPS | BAV99 (A7) |
| D11 | 28383/909 | DIODE SMALL-SIGNAL, SCHOTTKY, HSMS-2822... DUAL, 8V 1pF 340mVf @ 1mA, IN SERIES, MARKING CODE C2, | HEWLETT-PACKARD | HSMS-2822-L31 |
| D13 | 28383/901 | DIODE SMALL-SIGNAL, BAV70... DUAL, 70V 100mA 1.1Vf @ 50mA, COMMON CATHODE, MARKING CODE A4, SURFACE | PHILIPS | BAV70 |
| D14 | 28383/901 | DIODE SMALL-SIGNAL, BAV70... DUAL, 70V 100mA 1.1Vf @ 50mA, COMMON CATHODE, MARKING CODE A4, SURFACE | PHILIPS | BAV70 |
| D15 | 28383/903 | DIODE SMALL-SIGNAL, BAV99... DUAL, 70V 100mA 1.1Vf @ 50mA, IN SERIES, MARKING CODE A7, SURFACE | PHILIPS | BAV99 (A7) |
| D16 | 28383/903 | DIODE SMALL-SIGNAL, BAV99... DUAL, 70V 100mA 1.1Vf @ 50mA, IN SERIES, MARKING CODE A7, SURFACE | PHILIPS | BAV99 (A7) |
| D17 | 28383/934 | DIODE SMALL-SIGNAL, LL4148... 500mW 50V 150mA 1Vf @ 10mA, SURFACE MOUNTED, MINI-MELF, (8mm TAPE - | PHILIPS | PMLL4148L |
| D19 | 28383/934 | DIODE SMALL-SIGNAL, LL4148... 500mW 50V 150mA 1Vf @ 10mA, SURFACE MOUNTED, MINI-MELF, (8mm TAPE - | PHILIPS | PMLL4148L |
| D20 | 28371/216 | DIODE ZENER, BZX84-C3V3... 250mW 3.3V 5% 250mA MARKING CODE Z14/W6, SURFACE MOUNTED, SOT-23, (8mm | PHILIPS | BZX84-C3V3 |
| D21 | 28371/216 | DIODE ZENER, BZX84-C3V3... 250mW 3.3V 5% 250mA MARKING CODE Z14/W6, SURFACE MOUNTED, SOT-23, (8mm | PHILIPS | BZX84-C3V3 |
| IC1 | 28461/806 | IC-ANALOGUE OPERATIONAL AMP OP-249... DUAL, PRECISION HI SPEED, SETTLING TIME-1.2uS, GAIN | ANALOG DEVICES LTD | OP-249GS |
| IC2 | 28461/898 | IC-ANALOGUE D/A-CONVERTER 7528... 8 INPUT, DUAL, 8-BIT, BUFFERED, MULTIPLYING, CMOS, 20 PIN, | ANALOG DEVICES LTD | AD7528JR |
| IC3 | 28461/806 | IC-ANALOGUE OPERATIONAL AMP OP-249... DUAL, PRECISION HI SPEED, SETTLING TIME-1.2uS, GAIN | ANALOG DEVICES LTD | OP-249GS |
| IC4 | 28461/888 | IC-ANALOGUE SWITCH DG419... SINGLE, 15V SPDT, ON-RESISTANCE<35R, CHANGEOVER, TTL COMPATIBLE, | TEMIC UK LTD | DG419DY |
| IC5 | 28461/806 | IC-ANALOGUE OPERATIONAL AMP OP-249... DUAL, PRECISION HI SPEED, SETTLING TIME-1.2uS, GAIN | ANALOG DEVICES LTD | OP-249GS |
| IC6 | 28461/458 | IC-ANALOGUE OPERATIONAL AMP OP37... 15V LOW NOISE, HI-SPEED, PRECISION, BIPOLAR, 8 PIN, | ANALOG DEVICES LTD | OP37GS |
| IC7 | 28461/676 | IC-ANALOGUE COMPARATOR LM311... 2 INPUT, SINGLE, 15V I/P-OFFSET 7.5mV MAX, RESPONSE-TIME 200nS TYP, | PHILIPS | LM311D |
| IC8 | 28469/032 | IC-DIGITAL INVERTER 74HC14... HEX, SCHMITT-TRIGGER OPERATION, CMOS-H/SPEED, 14 PIN, SMALL-OUTLINE. | PHILIPS | 74HC14D |
| IC9 | 28461/806 | IC-ANALOGUE OPERATIONAL AMP OP-249... DUAL, PRECISION HI SPEED, SETTLING TIME-1.2uS, GAIN | ANALOG DEVICES LTD | OP-249GS |
| IC10 | 28461/803 | IC-ANALOGUE VOLTAGE-REFERENCE LT1019... 5V PRECISION, OUTPUT VOLTAGE DRIFT 20ppm/DEG.C MAX, | LINEAR TECHNOLOGY | LT1019CS8-5 |
| IC11 to IC13 | 28461/819 | IC-ANALOGUE OPERATIONAL AMP OP177... SINGLE, 22V OFFSET VOLTAGE 25uV, OFFSET CURRENT 1.5nA, | ANALOG DEVICES LTD | OP177GS |
| IC14 | 28469/759 | IC-ANALOGUE MULTIPLEXER DG508A... 8 INPUT, SINGLE, 15V & -15V, CMOS, 16 PIN, SMALL-OUTLINE. | ANALOG DEVICES LTD | MUX-08FS |

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| **A2/2 Audio processor 2 (contd.)** | | | | |
| IC15 | 28461/819 | IC-ANALOGUE OPERATIONAL AMP OP177... SINGLE, 22V OFFSET VOLTAGE 25uV, OFFSET CURRENT 1.5nA, | ANALOG DEVICES LTD | OP177GS |
| IC16 | 28461/819 | IC-ANALOGUE OPERATIONAL AMP OP177... SINGLE, 22V OFFSET VOLTAGE 25uV, OFFSET CURRENT 1.5nA, | ANALOG DEVICES LTD | OP177GS |
| IC17 | 28461/999 | IC-ANALOGUE SWITCH DG441... QUAD, 15V SPST, ON-RESISTANCE<85R, 4 x N/O @ LOGIC 1, TTL | TEMIC UK LTD | DG441DY |
| IC18 | 28461/806 | IC-ANALOGUE OPERATIONAL AMP OP-249... DUAL, PRECISION HI SPEED, SETTLING TIME-1.2uS, GAIN | ANALOG DEVICES LTD | OP-249GS |
| IC19 | 28461/888 | IC-ANALOGUE SWITCH DG419... SINGLE, 15V SPDT, ON-RESISTANCE<35R, CHANGEOVER, TTL COMPATIBLE, | TEMIC UK LTD | DG419DY |
| IC20 | 28461/898 | IC-ANALOGUE D/A-CONVERTER 7528... 8 INPUT, DUAL, 8-BIT, BUFFERED, MULTIPLYING, CMOS, 20 PIN, | ANALOG DEVICES LTD | AD7528JR |
| IC21 | 28461/806 | IC-ANALOGUE OPERATIONAL AMP OP-249... DUAL, PRECISION HI SPEED, SETTLING TIME-1.2uS, GAIN | ANALOG DEVICES LTD | OP-249GS |
| IC22 to IC25 | 28461/999 | IC-ANALOGUE SWITCH DG441... QUAD, 15V SPST, ON-RESISTANCE<85R, 4 x N/O @ LOGIC 1, TTL | TEMIC UK LTD | DG441DY |
| IC26 | 28461/810 | IC-ANALOGUE OPERATIONAL AMP OPA602AU... SINGLE, 15V PRECISION HI SPEED, SETTLING TIME 1uS, GAIN | BURR-BROWN INTERNAT | OPA602AU |
| IC27 | 28461/041 | IC-ANALOGUE RMS/DC CONVERTER AD637JR... 18V TOTAL-ERROR +/-1mV +/-0.5% OF READING, MONOLITHIC, | ANALOG DEVICES LTD | AD637JR |
| IC28 | 28461/819 | IC-ANALOGUE OPERATIONAL AMP OP177... SINGLE, 22V OFFSET VOLTAGE 25uV, OFFSET CURRENT 1.5nA, | ANALOG DEVICES LTD | OP177GS |
| IC29 | 28461/819 | IC-ANALOGUE OPERATIONAL AMP OP177... SINGLE, 22V OFFSET VOLTAGE 25uV, OFFSET CURRENT 1.5nA, | ANALOG DEVICES LTD | OP177GS |
| IC30 | 28461/458 | IC-ANALOGUE OPERATIONAL AMP OP37... 15V LOW NOISE, HI-SPEED, PRECISION, BIPOLAR, 8 PIN, | ANALOG DEVICES LTD | OP37GS |
| IC31 | 28461/806 | IC-ANALOGUE OPERATIONAL AMP OP-249... DUAL, PRECISION HI SPEED, SETTLING TIME-1.2uS, GAIN | ANALOG DEVICES LTD | OP-249GS |
| IC32 | 28461/888 | IC-ANALOGUE SWITCH DG419... SINGLE, 15V SPDT, ON-RESISTANCE<35R, CHANGEOVER, TTL COMPATIBLE, | TEMIC UK LTD | DG419DY |
| IC36 | 28469/759 | IC-ANALOGUE MULTIPLEXER DG508A... 8 INPUT, SINGLE, 15V & -15V, CMOS, 16 PIN, SMALL-OUTLINE. | ANALOG DEVICES LTD | MUX-08FS |
| IC37 | 28461/897 | IC-ANALOGUE OPERATIONAL AMP OP-27GS... 22V LOW NOISE, 8 PIN, SMALL-OUTLINE. | ANALOG DEVICES LTD | OP-27GS |
| IC38 | 28461/829 | IC-ANALOGUE A/D CONVERTER ADC912A... 12 BIT, MICROPROCESSOR COMPATIBLE, 8/16 BIT BUS O/P, | ANALOG DEVICES LTD | ADC912AFS |
| IC39 | 28461/806 | IC-ANALOGUE OPERATIONAL AMP OP-249... DUAL, PRECISION HI SPEED, SETTLING TIME-1.2uS, GAIN | ANALOG DEVICES LTD | OP-249GS |
| IC40 | 28461/495 | IC-ANALOGUE AUDIO-AMPLIFIER TDA2030... SINGLE, 28V 14W, MONOLITHIC, 5 PIN, TO-220. | SGS-THOMSON | TDA2030H |
| IC41 | 28461/411 | IC-ANALOGUE OPERATIONAL AMP TL071... SINGLE, JFET INPUT, LOW NOISE, 8 PIN, SMALL-OUTLINE. | MOTOROLA INC. | TL071CD |
| IC42 | 28461/458 | IC-ANALOGUE OPERATIONAL AMP OP37... 15V LOW NOISE, HI-SPEED, PRECISION, BIPOLAR, 8 PIN, | ANALOG DEVICES LTD | OP37GS |
| IC43 | 28461/676 | IC-ANALOGUE COMPARATOR LM311... 2 INPUT, SINGLE, 15V I/P-OFFSET 7.5mV MAX, RESPONSE-TIME 200nS TYP, | PHILIPS | LM311D |
| IC44 to IC48 | 28467/111 | IC-MICRO PERIPHERAL, PCF8574... REMOTE 8-BIT I/O EXPANDER, I.IC BUS, UP TO 8 DEVICE ADDRESS | PHILIPS | PCF8574T |
| IC49 to IC51 | 28465/056 | IC-DIGITAL DECODER/DEMULTIPLEX 74HC139... 2 INPUT, 4 BIT, DUAL, INVERTING, 1 BIT ADDRESS, | PHILIPS | 74HC139D |

## A2/2 Audio processor 2 (contd.)

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| IC52 | 28461/717 | IC-ANALOGUE VOLTAGE-REGULATOR 7905... SINGLE, 5V 1A NEGATIVE, LINEAR, MONOLITHIC, 3 PIN, TO-220. | NAT. SEMICONDUCTOR | LM7905CT |
| IC53 | 28461/707 | IC-ANALOGUE VOLTAGE-REGULATOR 7805... 5V 1A POSITIVE, LINEAR, MONOLITHIC, 3 PIN, TO-220. | NAT. SEMICONDUCTOR | uA7805UC |
| IC54 | 28461/828 | IC-ANALOGUE D/A-CONVERTER DAC-08... 8 BIT, HIGH SPEED MULTIPLYING, MONOLITHIC, 16 PIN, | NAT. SEMICONDUCTOR | DAC-0801LCM |
| IC55 | 28462/151 | IC-DIGITAL FLIP-FLOP/D-TYPE 74HC374... 1 INPUT, OCTAL, NON-INVERTING, POS EDGE TRIGGER, TRI-STATE, | PHILIPS | 74HC374D |
| IC56 | 28461/897 | IC-ANALOGUE OPERATIONAL AMP OP-27GS... 22V LOW NOISE, 8 PIN, SMALL-OUTLINE. | ANALOG DEVICES LTD | OP-27GS |
| IC57 | 28461/897 | IC-ANALOGUE OPERATIONAL AMP OP-27GS... 22V LOW NOISE, 8 PIN, SMALL-OUTLINE. | ANALOG DEVICES LTD | OP-27GS |
| IC58 | 28461/042 | IC-ANALOGUE COMPARATOR LT1016... I/P-OFFSET 3mV MAX, RESPONSE TIME 14nS MAX, TTL, 8 PIN, | MAXIM INTEG PRODUCTS | LT1016CS8 |
| IC59 | 28461/888 | IC-ANALOGUE SWITCH DG419... SINGLE, 15V SPDT, ON-RESISTANCE<35R, CHANGEOVER, TTL COMPATIBLE, | TEMIC UK LTD | DG419DY |
| IC60 | 28462/638 | IC-DIGITAL FLIP-FLOP/D-TYPE 74HC74... 2 BIT, DUAL, POS EDGE TRIGGER, PLUS SET & CLEAR, CMOS-H/SPEED, | PHILIPS | 74HC74D |
| IC61 to IC63 | 28464/175 | IC-DIGITAL COUNTER 74HC191... 4 BIT, SINGLE, BINARY UP/DOWN, SYNCHRONOUS, PRESETTABLE, | PHILIPS | 74HC191D |
| IC64 | 28461/804 | IC-ANALOGUE D/A-CONVERTER DAC-312... SINGLE, 12 BIT, HIGH SPEED MULTIPLYING, BIPOLAR, 20 PIN, | ANALOG DEVICES LTD | DAC-312HS |
| IC65 | 28469/552 | IC-DIGITAL BUFFER/LINE-DRIVER 74HC541... OCTAL, TRI-STATE, NON-INVERTING, CMOS-H/SPEED, 20 PIN, | PHILIPS | 74HC541D |
| IC66 | 28469/552 | IC-DIGITAL BUFFER/LINE-DRIVER 74HC541... OCTAL, TRI-STATE, NON-INVERTING, CMOS-H/SPEED, 20 PIN, | PHILIPS | 74HC541D |
| IC67 | 28465/055 | IC-DIGITAL DECODER/DEMULTIPLEX 74HC138... 3 INPUT, 8 BIT, SINGLE, INVERTING, 3 BIT ADDRESS, | PHILIPS | 74HC138D |
| L1 to L5 | 23642/535 | INDUCTOR-FIXED 1uH +/- 5% EPOXY-MOULD, 400mA 0R7 MAX, 30 Q @ 7.96 MHz, 120 MHz SRF, SURFACE | MEGGITT ELECTRONICS | 3612-T-1R0-J |
| PLA | 23435/120 | CONNECTOR MULTIWAY, PCB HEADER, 36 WAY, RIGHT ANGLED, 2.54mm PITCH, PINS GOLD PLATED TO CLASS 2, | BERG ELECTRONICS | 75168-101-36 |
| PLB | 23436/900 | CONNECTOR MULTIWAY, PCB HEADER, 10 WAY, RIGHT ANGLED, 2-ROW, 2.54mm GRID, POLARISED, SHROUDED, | MOLEX ELECTRONICS | 39-26-7108 |
| PLC to PLK | 23435/120 | CONNECTOR MULTIWAY, PCB HEADER, 36 WAY, RIGHT ANGLED, 2.54mm PITCH, PINS GOLD PLATED TO CLASS 2, | BERG ELECTRONICS | 75168-101-36 |
| PLM | 23436/901 | CONNECTOR MULTIWAY, PCB HEADER, 16 WAY, RIGHT ANGLED, 2-ROW, 2.54mm GRID, POLARISED, SHROUDED, | THOMAS & BETTS LTD | 609-1607 |
| PLQ | 23435/120 | CONNECTOR MULTIWAY, PCB HEADER, 36 WAY, RIGHT ANGLED, 2.54mm PITCH, PINS GOLD PLATED TO CLASS 2, | BERG ELECTRONICS | 75168-101-36 |
| R1 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R2 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |

## A2/2 Audio processor 2 (contd.)

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| R3 | 24811/187 | RESISTOR-FIXED METAL-FILM 3K92 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-3K92-1%50ppm |
| R4 | 24811/199 | RESISTOR-FIXED METAL-FILM 12K1 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-12K1-1%50ppm |
| R5 | 24811/201 | RESISTOR-FIXED METAL-FILM 15K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-15K-1%50ppm |
| R6 | 24811/190 | RESISTOR-FIXED METAL-FILM 5K11 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-5K11-1%50ppm |
| R7 | 24811/199 | RESISTOR-FIXED METAL-FILM 12K1 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-12K1-1%50ppm |
| R8 | 24811/187 | RESISTOR-FIXED METAL-FILM 3K92 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-3K92-1%50ppm |
| R9 | 24811/231 | RESISTOR-FIXED METAL-FILM 274K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-274K-1%50ppm |
| R10 | 24811/180 | RESISTOR-FIXED METAL-FILM 2K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-2K0-1%50ppm |
| R11 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R12 | 24811/221 | RESISTOR-FIXED METAL-FILM 100K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100K-1%50ppm |
| R13 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R14 | 24811/187 | RESISTOR-FIXED METAL-FILM 3K92 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-3K92-1%50ppm |
| R15 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R16 | 24811/169 | RESISTOR-FIXED METAL-FILM 681R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-681R-1%50ppm |
| R17 | 24811/167 | RESISTOR-FIXED METAL-FILM 562R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-562R-1%50ppm |
| R18 | 24811/187 | RESISTOR-FIXED METAL-FILM 3K92 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-3K92-1%50ppm |
| R19 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R20 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R21 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R22 | 24811/187 | RESISTOR-FIXED METAL-FILM 3K92 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-3K92-1%50ppm |
| R23 | 24811/199 | RESISTOR-FIXED METAL-FILM 12K1 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-12K1-1%50ppm |
| R24 | 24811/201 | RESISTOR-FIXED METAL-FILM 15K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-15K-1%50ppm |
| R25 | 24811/190 | RESISTOR-FIXED METAL-FILM 5K11 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-5K11-1%50ppm |
| R26 | 24811/199 | RESISTOR-FIXED METAL-FILM 12K1 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-12K1-1%50ppm |
| R27 | 24811/187 | RESISTOR-FIXED METAL-FILM 3K92 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-3K92-1%50ppm |

## A2/2 Audio processor 2 (contd.)

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| R28 | 24811/221 | RESISTOR-FIXED METAL-FILM 100K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100K-1%50ppm |
| R29 | 24811/141 | RESISTOR-FIXED METAL-FILM 47R5 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-47R5-1%50ppm |
| R30 | 24811/141 | RESISTOR-FIXED METAL-FILM 47R5 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-47R5-1%50ppm |
| R31 | 24811/602 | RESISTOR-FIXED METAL-FILM 10K +/- 0.1% 250mW 200V 15 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-10K0-0.1%-15 |
| R32 | 24811/179 | RESISTOR-FIXED METAL-FILM 1K82 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-1K82-1%50ppm |
| R33 | 24811/641 | RESISTOR-FIXED METAL-FILM 2K +/- 0.1% 250mW 200V 15 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-2K0-0.1%-15 |
| R34 | 24811/602 | RESISTOR-FIXED METAL-FILM 10K +/- 0.1% 250mW 200V 15 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-10K0-0.1%-15 |
| R35 | 24811/189 | RESISTOR-FIXED METAL-FILM 4K75 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-4K75-1%50ppm |
| R36 | 24811/602 | RESISTOR-FIXED METAL-FILM 10K +/- 0.1% 250mW 200V 15 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-10K0-0.1%-15 |
| R37 | 24811/164 | RESISTOR-FIXED METAL-FILM 432R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-432R-1%50ppm |
| R38 | 24811/161 | RESISTOR-FIXED METAL-FILM 332R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-332R-1%50ppm |
| R39 | 24811/160 | RESISTOR-FIXED METAL-FILM 301R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-301R-1%50ppm |
| R40 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R41 | 24811/175 | RESISTOR-FIXED METAL-FILM 1K21 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-1K21-1%50ppm |
| R42 | 24811/146 | RESISTOR-FIXED METAL-FILM 75R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-75R0-1%50ppm |
| R43 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R44 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R45 | 24811/213 | RESISTOR-FIXED METAL-FILM 47K5 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-47K5-1%50ppm |
| R46 | 24811/190 | RESISTOR-FIXED METAL-FILM 5K11 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-5K11-1%50ppm |
| R47 | 24811/209 | RESISTOR-FIXED METAL-FILM 33K2 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-33K2-1%50ppm |
| R48 | 24811/169 | RESISTOR-FIXED METAL-FILM 681R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-681R-1%50ppm |
| R49 | 24811/149 | RESISTOR-FIXED METAL-FILM 100R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100R-1%50ppm |
| R50 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R51 | 24811/221 | RESISTOR-FIXED METAL-FILM 100K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100K-1%50ppm |
| R52 | 24811/221 | RESISTOR-FIXED METAL-FILM 100K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100K-1%50ppm |

## A2/2 Audio processor 2 (contd.)

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| R53 | 24811/159 | RESISTOR-FIXED METAL-FILM 274R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-274R-1%50ppm |
| R54 | 24811/206 | RESISTOR-FIXED METAL-FILM 24K3 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-24K3-1%50ppm |
| R55 | 24811/206 | RESISTOR-FIXED METAL-FILM 24K3 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-24K3-1%50ppm |
| R56 | 24811/211 | RESISTOR-FIXED METAL-FILM 39K2 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-39K2-1%50ppm |
| R57 | 24811/211 | RESISTOR-FIXED METAL-FILM 39K2 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-39K2-1%50ppm |
| R58 | 24811/181 | RESISTOR-FIXED METAL-FILM 2K21 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-2K21-1%50ppm |
| R59 | 24811/181 | RESISTOR-FIXED METAL-FILM 2K21 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-2K21-1%50ppm |
| R66 | 24811/602 | RESISTOR-FIXED METAL-FILM 10K +/- 0.1% 250mW 200V 15 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-10K0-0.1%-15 |
| R67 | 24811/602 | RESISTOR-FIXED METAL-FILM 10K +/- 0.1% 250mW 200V 15 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-10K0-0.1%-15 |
| R68 | 24811/221 | RESISTOR-FIXED METAL-FILM 100K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100K-1%50ppm |
| R69 | 24811/217 | RESISTOR-FIXED METAL-FILM 68K1 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-68K1-1%50ppm |
| R70 to R73 | 24811/189 | RESISTOR-FIXED METAL-FILM 4K75 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-4K75-1%50ppm |
| R74 | 24811/225 | RESISTOR-FIXED METAL-FILM 150K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-150K-1%50ppm |
| R75 | 24811/101 | RESISTOR-FIXED METAL-FILM 1R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1R-1%-50ppm |
| R76 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R77 | 24811/221 | RESISTOR-FIXED METAL-FILM 100K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100K-1%50ppm |
| R78 | 24811/169 | RESISTOR-FIXED METAL-FILM 681R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-681R-1%50ppm |
| R79 | 24811/187 | RESISTOR-FIXED METAL-FILM 3K92 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-3K92-1%50ppm |
| R80 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R81 | 24811/167 | RESISTOR-FIXED METAL-FILM 562R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-562R-1%50ppm |
| R82 | 24811/187 | RESISTOR-FIXED METAL-FILM 3K92 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-3K92-1%50ppm |
| R83 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R84 | 24811/221 | RESISTOR-FIXED METAL-FILM 100K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100K-1%50ppm |
| R85 | 24811/221 | RESISTOR-FIXED METAL-FILM 100K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100K-1%50ppm |
| R86 to R92 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |

## A2/2 Audio processor 2 (contd.)

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| R93 | 24811/189 | RESISTOR-FIXED METAL-FILM 4K75 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-4K75-1%50ppm |
| R94 | 24811/189 | RESISTOR-FIXED METAL-FILM 4K75 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-4K75-1%50ppm |
| R95 | 24811/190 | RESISTOR-FIXED METAL-FILM 5K11 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-5K11-1%50ppm |
| R96 | 24811/198 | RESISTOR-FIXED METAL-FILM 11K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-11K-1%50ppm |
| R97 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R98 | 24811/221 | RESISTOR-FIXED METAL-FILM 100K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100K-1%50ppm |
| R99 to R107 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R108 | 24811/137 | RESISTOR-FIXED METAL-FILM 33R2 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-33R2-1%50ppm |
| R109 | 24811/181 | RESISTOR-FIXED METAL-FILM 2K21 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-2K21-1%50ppm |
| R110 | 24811/125 | RESISTOR-FIXED METAL-FILM 10R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10R-1%-50ppm |
| R111 | 24811/181 | RESISTOR-FIXED METAL-FILM 2K21 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-2K21-1%50ppm |
| R112 | 24811/181 | RESISTOR-FIXED METAL-FILM 2K21 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-2K21-1%50ppm |
| R113 | 24811/185 | RESISTOR-FIXED METAL-FILM 3K32 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-3K32-1%50ppm |
| R114 | 24811/181 | RESISTOR-FIXED METAL-FILM 2K21 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-2K21-1%50ppm |
| R115 | 24811/166 | RESISTOR-FIXED METAL-FILM 511R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-511R-1%50ppm |
| R116 | 24811/181 | RESISTOR-FIXED METAL-FILM 2K21 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-2K21-1%50ppm |
| R117 | 24811/166 | RESISTOR-FIXED METAL-FILM 511R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-511R-1%50ppm |
| R118 | 24811/181 | RESISTOR-FIXED METAL-FILM 2K21 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-2K21-1%50ppm |
| R120 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R121 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R122 | 24811/165 | RESISTOR-FIXED METAL-FILM 475R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-475R-1%50ppm |
| R123 | 24811/168 | RESISTOR-FIXED METAL-FILM 619R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-619R-1%50ppm |
| R124 | 24811/159 | RESISTOR-FIXED METAL-FILM 274R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-274R-1%50ppm |
| R125 | 24811/235 | RESISTOR-FIXED METAL-FILM 392K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-392K-1%50ppm |
| R126 | 24811/190 | RESISTOR-FIXED METAL-FILM 5K11 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-5K11-1%50ppm |

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| **A2/2 Audio processor 2 (contd.)** | | | | |
| R127 | 24811/190 | RESISTOR-FIXED METAL-FILM 5K11 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-5K11-1%50ppm |
| R128 to R136 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R137 | 24811/213 | RESISTOR-FIXED METAL-FILM 47K5 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-47K5-1%50ppm |
| TR1 | 28487/811 | TRANSISTOR NPN BIPOLAR BC818-40... 25V 170MHz 330mW 500mA 250hFE MIN @ 100mA, MARKING CODE 6G, | PHILIPS | BC818-40 |
| TR2 | 28459/061 | TRANSISTOR N-CHANNEL-DEPLETION JFET BSR56... 40V 250mW 50mA MARKING CODE M4, SURFACE MOUNTED, | PHILIPS | BSR56 |

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|

## A3 Audio processor 1

When ordering, prefix circuit reference with A3.

| | | | | |
|---|---|---|---|---|
| | 44829-833 | Complete unit | Issue 20 | |
| C1 | 26386/897 | CAPACITOR-FIXED CERAMIC 4.7pF +/-0.1pF 50V 60 ppm/DEG.C, HIGH-Q, SINGLELAYER, SURFACE-MOUNTED, | AVX LTD | 0805-5K4R7-BAW-TR |
| C2 | 26386/897 | CAPACITOR-FIXED CERAMIC 4.7pF +/-0.1pF 50V 60 ppm/DEG.C, HIGH-Q, SINGLELAYER, SURFACE-MOUNTED, | AVX LTD | 0805-5K4R7-BAW-TR |
| C3 | 26582/203 | CAPACITOR-FIXED POLYESTER 15nF +/-10% 250V RADIAL, 10.2mm PWP, (LOOSE). | VISHAY COMPONENTS | MKT-1822-315/405 |
| C4 | 26386/863 | CAPACITOR-FIXED CERAMIC 1nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-102-KP |
| C5 | 26386/863 | CAPACITOR-FIXED CERAMIC 1nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-102-KP |
| C6 | 26386/814 | CAPACITOR-FIXED CERAMIC 15pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-150-JP |
| C7 | 26878/406 | CAPACITOR-VARIABLE POLYPROPYLENE 2pF to 10pF 100V VERTICAL-PCB MOUNT, 7.5mm DIA, 10mm LONG, 3 PIN, | PHILIPS | 2222-808-11109 |
| C8 | 26538/910 | CAPACITOR-FIXED POLYSTYRENE 2.2nF +/-1% 63V 125 ppm/DEG.C, RADIAL, 5.08mm PWP, SQUARE, WIRES ON | LCR COMPONENTS | EXFS/HR-2200pF-63V |
| C9 to C11 | 26386/897 | CAPACITOR-FIXED CERAMIC 4.7pF +/-0.1pF 50V 60 ppm/DEG.C, HIGH-Q, SINGLELAYER, SURFACE-MOUNTED, | AVX LTD | 0805-5K4R7-BAW-TR |
| C12 | 26386/899 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | ROHM ELECTRONICS LTD | MCH31-5C-104-KP |
| C13 | 26386/899 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | ROHM ELECTRONICS LTD | MCH31-5C-104-KP |
| C14 | 26343/935 | CAPACITOR-FIXED CERAMIC 4.7nF +/-1% 63V NP0 MULTILAYER, RADIAL, 5.08mm PWP, (TAPED). | VISHAY COMPONENTS | VP41-BA-472-FA |
| C15 | 26582/203 | CAPACITOR-FIXED POLYESTER 15nF +/-10% 250V RADIAL, 10.2mm PWP, (LOOSE). | VISHAY COMPONENTS | MKT-1822-315/405 |
| C16 | 26538/827 | CAPACITOR-FIXED POLYSTYRENE 220pF +/-2% 63V 150 ppm/DEG.C, RADIAL, 7.6mm PWP, (TAPED). | LCR COMPONENTS | EP9-220pF-2%-63V |
| C17 | 26878/408 | CAPACITOR-VARIABLE POLYPROPYLENE 5.5pF to 65pF 100V VERTICAL-PCB MOUNT, 10mm DIA, 10mm LONG, 3 | PHILIPS | 2222-808-32659 |
| C18 | 26386/863 | CAPACITOR-FIXED CERAMIC 1nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-102-KP |
| C19 | 26386/863 | CAPACITOR-FIXED CERAMIC 1nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-102-KP |
| C20 | 26386/814 | CAPACITOR-FIXED CERAMIC 15pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-150-JP |
| C21 | 26878/406 | CAPACITOR-VARIABLE POLYPROPYLENE 2pF to 10pF 100V VERTICAL-PCB MOUNT, 7.5mm DIA, 10mm LONG, 3 PIN, | PHILIPS | 2222-808-11109 |
| C22 | 26538/910 | CAPACITOR-FIXED POLYSTYRENE 2.2nF +/-1% 63V 125 ppm/DEG.C, RADIAL, 5.08mm PWP, SQUARE, WIRES ON | LCR COMPONENTS | EXFS/HR-2200pF-63V |
| C23 to C25 | 26386/897 | CAPACITOR-FIXED CERAMIC 4.7pF +/-0.1pF 50V 60 ppm/DEG.C, HIGH-Q, SINGLELAYER, SURFACE-MOUNTED, | AVX LTD | 0805-5K4R7-BAW-TR |
| C26 | 26386/760 | CAPACITOR-FIXED CERAMIC 220nF +/-10% 50V X7R MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | PHILIPS | 1210-2R-224-K9-BBC |
| C27 | 26386/760 | CAPACITOR-FIXED CERAMIC 220nF +/-10% 50V X7R MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | PHILIPS | 1210-2R-224-K9-BBC |

## A3 Audio processor 1 (contd.)

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| C28 | 26386/899 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | ROHM ELECTRONICS LTD | MCH31-5C-104-KP |
| C29 | 26386/814 | CAPACITOR-FIXED CERAMIC 15pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-150-JP |
| C30 | 26386/760 | CAPACITOR-FIXED CERAMIC 220nF +/-10% 50V X7R MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | PHILIPS | 1210-2R-224-K9-BBC |
| C31 | 26386/760 | CAPACITOR-FIXED CERAMIC 220nF +/-10% 50V X7R MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | PHILIPS | 1210-2R-224-K9-BBC |
| C32 | 26386/899 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | ROHM ELECTRONICS LTD | MCH31-5C-104-KP |
| C33 | 26386/814 | CAPACITOR-FIXED CERAMIC 15pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-150-JP |
| C34 | 26538/827 | CAPACITOR-FIXED POLYSTYRENE 220pF +/-2% 63V 150 ppm/DEG.C, RADIAL, 7.6mm PWP, (TAPED). | LCR COMPONENTS | EP9-220pF-2%-63V |
| C35 | 26878/408 | CAPACITOR-VARIABLE POLYPROPYLENE 5.5pF to 65pF 100V VERTICAL-PCB MOUNT, 10mm DIA, 10mm LONG, 3 | PHILIPS | 2222-808-32659 |
| C36 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C37 | 26386/863 | CAPACITOR-FIXED CERAMIC 1nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-102-KP |
| C38 | 26421/118 | CAPACITOR-FIXED ALUMINIUM 100uF +/-20% 6.3V ELECTROLYTIC, RADIAL, 5mm PWP, (TAPED). | PANASONIC INDUSTRIAL | ECE-A-0J-KA-101-B |
| C39 | 26386/899 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | ROHM ELECTRONICS LTD | MCH31-5C-104-KP |
| C40 | 26421/141 | CAPACITOR-FIXED ALUMINIUM 100uF +/-20% 35V ELECTROLYTIC, RADIAL, 5mm PWP, (TAPED). | PANASONIC INDUSTRIAL | ECE-A-1VU-101B |
| C41 | 26386/899 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | ROHM ELECTRONICS LTD | MCH31-5C-104-KP |
| C42 | 26421/118 | CAPACITOR-FIXED ALUMINIUM 100uF +/-20% 6.3V ELECTROLYTIC, RADIAL, 5mm PWP, (TAPED). | PANASONIC INDUSTRIAL | ECE-A-0J-KA-101-B |
| C43 | 26386/899 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | ROHM ELECTRONICS LTD | MCH31-5C-104-KP |
| C44 | 26421/118 | CAPACITOR-FIXED ALUMINIUM 100uF +/-20% 6.3V ELECTROLYTIC, RADIAL, 5mm PWP, (TAPED). | PANASONIC INDUSTRIAL | ECE-A-0J-KA-101-B |
| C45 | 26386/899 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | ROHM ELECTRONICS LTD | MCH31-5C-104-KP |
| C46 | 26421/141 | CAPACITOR-FIXED ALUMINIUM 100uF +/-20% 35V ELECTROLYTIC, RADIAL, 5mm PWP, (TAPED). | PANASONIC INDUSTRIAL | ECE-A-1VU-101B |
| C47 | 26386/899 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | ROHM ELECTRONICS LTD | MCH31-5C-104-KP |
| C48 | 26386/897 | CAPACITOR-FIXED CERAMIC 4.7pF +/-0.1pF 50V 60 ppm/DEG.C, HIGH-Q, SINGLELAYER, SURFACE-MOUNTED, | AVX LTD | 0805-5K4R7-BAW-TR |
| C49 | 26386/897 | CAPACITOR-FIXED CERAMIC 4.7pF +/-0.1pF 50V 60 ppm/DEG.C, HIGH-Q, SINGLELAYER, SURFACE-MOUNTED, | AVX LTD | 0805-5K4R7-BAW-TR |
| C50 | 26386/814 | CAPACITOR-FIXED CERAMIC 15pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-150-JP |
| C51 | 26386/814 | CAPACITOR-FIXED CERAMIC 15pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-150-JP |
| C52 to C55 | 26386/899 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | ROHM ELECTRONICS LTD | MCH31-5C-104-KP |

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| **A3 Audio processor 1 (contd.)** | | | | |
| C100 to C123 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C124 | 26386/899 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | ROHM ELECTRONICS LTD | MCH31-5C-104-KP |
| C125 | 26386/899 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | ROHM ELECTRONICS LTD | MCH31-5C-104-KP |
| C126 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C127 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C128 | 26386/899 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | ROHM ELECTRONICS LTD | MCH31-5C-104-KP |
| C129 | 26386/899 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | ROHM ELECTRONICS LTD | MCH31-5C-104-KP |
| C130 to C229 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C230 to C244 | 26421/112 | CAPACITOR-FIXED ALUMINIUM 10uF +/-20% 35V ELECTROLYTIC, RADIAL, 5mm PWP, (TAPED). | PANASONIC INDUSTRIAL | ECE-A-1V-KA-100-B |
| C245 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C246 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C249 to C256 | 26386/899 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | ROHM ELECTRONICS LTD | MCH31-5C-104-KP |
| C258 to C265 | 26486/225 | CAPACITOR-FIXED TANTALUM 10uF +/-20% 35V ELECTROLYTIC, RADIAL, 5mm PWP, (TAPED). | AVX LTD | TAP-10-M-35-CRW |
| C266 to C269 | 26421/112 | CAPACITOR-FIXED ALUMINIUM 10uF +/-20% 35V ELECTROLYTIC, RADIAL, 5mm PWP, (TAPED). | PANASONIC INDUSTRIAL | ECE-A-1V-KA-100-B |
| C270 | 26386/863 | CAPACITOR-FIXED CERAMIC 1nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-102-KP |
| C271 | 26386/863 | CAPACITOR-FIXED CERAMIC 1nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-102-KP |
| C272 to C275 | 26451/003 | CAPACITOR-FIXED ALUMINIUM 10uF +/-20% 16V ELECTROLYTIC, SURFACE-MOUNTED, SIZE 4.3 x 4.3mm, | PANASONIC INDUSTRIAL | ECE-V-1CA-100R |
| D1 to D4 | 28335/485 | DIODE SMALL-SIGNAL, BAV45... 20V 50mA 1.3pF 1Vf @ 10mA, LOW LEAKAGE TYPE, 5pA Ir @ 5Vr, METAL-CASED, | PHILIPS | BAV45 |
| D5 | 28371/412 | DIODE ZENER, BZX84-C5V1... 250mW 5.1V 5% 250mA MARKING CODE Z2, SURFACE MOUNTED, SOT-23, (8mm | PHILIPS | BZX84-C5V1 |
| D6 | 28371/412 | DIODE ZENER, BZX84-C5V1... 250mW 5.1V 5% 250mA MARKING CODE Z2, SURFACE MOUNTED, SOT-23, (8mm | PHILIPS | BZX84-C5V1 |
| D7 | 28383/903 | DIODE SMALL-SIGNAL, BAV99... DUAL, 70V 100mA 1.1Vf @ 50mA, IN SERIES, MARKING CODE A7, SURFACE | PHILIPS | BAV99 (A7) |
| D8 to D13 | 28383/934 | DIODE SMALL-SIGNAL, LL4148... 500mW 50V 150mA 1Vf @ 10mA, SURFACE MOUNTED, MINI-MELF, (8mm TAPE - | PHILIPS | PMLL4148L |
| IC1 | 28469/759 | IC-ANALOGUE MULTIPLEXER DG508A... 8 INPUT, SINGLE, 15V & -15V, CMOS, 16 PIN, SMALL-OUTLINE. | ANALOG DEVICES LTD | MUX-08FS |

## A3 Audio processor 1 (contd.)

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| IC2 | 28461/810 | IC-ANALOGUE OPERATIONAL AMP OPA602AU... SINGLE, 15V PRECISION HI SPEED, SETTLING TIME 1uS, GAIN | BURR-BROWN INTERNAT | OPA602AU |
| IC3 | 28461/888 | IC-ANALOGUE SWITCH DG419... SINGLE, 15V SPDT, ON-RESISTANCE<35R, CHANGEOVER, TTL COMPATIBLE, | TEMIC UK LTD | DG419DY |
| IC4 | 28461/458 | IC-ANALOGUE OPERATIONAL AMP OP37... 15V LOW NOISE, HI-SPEED, PRECISION, BIPOLAR, 8 PIN, | ANALOG DEVICES LTD | OP37GS |
| IC5 | 28461/888 | IC-ANALOGUE SWITCH DG419... SINGLE, 15V SPDT, ON-RESISTANCE<35R, CHANGEOVER, TTL COMPATIBLE, | TEMIC UK LTD | DG419DY |
| IC6 | 28461/458 | IC-ANALOGUE OPERATIONAL AMP OP37... 15V LOW NOISE, HI-SPEED, PRECISION, BIPOLAR, 8 PIN, | ANALOG DEVICES LTD | OP37GS |
| IC7 | 28385/995 | RELAY SOLID-STATE, OPTO-COUPLED, N/O, 1.2V CONTRL, 100V, 40mA MAX LOAD, MOS O/P, <0.5uV O/P OFFSET | HEWLETT-PACKARD | HSSR-8200 OPTION 300 |
| IC8 | 28461/810 | IC-ANALOGUE OPERATIONAL AMP OPA602AU... SINGLE, 15V PRECISION HI SPEED, SETTLING TIME 1uS, GAIN | BURR-BROWN INTERNAT | OPA602AU |
| IC9 | 28461/820 | IC-ANALOGUE D/A-CONVERTER 7248A... SINGLE, 15V 12 BIT, 8+4 LOADING, REL-ACC +/-1LSB, CMOS, 20 PIN, | ANALOG DEVICES LTD | AD7248AAR |
| IC10 | 28469/759 | IC-ANALOGUE MULTIPLEXER DG508A... 8 INPUT, SINGLE, 15V & -15V, CMOS, 16 PIN, SMALL-OUTLINE. | ANALOG DEVICES LTD | MUX-08FS |
| IC11 | 28461/458 | IC-ANALOGUE OPERATIONAL AMP OP37... 15V LOW NOISE, HI-SPEED, PRECISION, BIPOLAR, 8 PIN, | ANALOG DEVICES LTD | OP37GS |
| IC12 | 28461/888 | IC-ANALOGUE SWITCH DG419... SINGLE, 15V SPDT, ON-RESISTANCE<35R, CHANGEOVER, TTL COMPATIBLE, | TEMIC UK LTD | DG419DY |
| IC13 | 28461/458 | IC-ANALOGUE OPERATIONAL AMP OP37... 15V LOW NOISE, HI-SPEED, PRECISION, BIPOLAR, 8 PIN, | ANALOG DEVICES LTD | OP37GS |
| IC14 | 28461/806 | IC-ANALOGUE OPERATIONAL AMP OP-249... DUAL, PRECISION HI SPEED, SETTLING TIME-1.2uS, GAIN | ANALOG DEVICES LTD | OP-249GS |
| IC15 | 28461/999 | IC-ANALOGUE SWITCH DG441... QUAD, 15V SPST, ON-RESISTANCE<85R, 4 x N/O @ LOGIC 1, TTL | TEMIC UK LTD | DG441DY |
| IC16 | 28461/411 | IC-ANALOGUE OPERATIONAL AMP TL071... SINGLE, JFET INPUT, LOW NOISE, 8 PIN, SMALL-OUTLINE. | MOTOROLA INC. | TL071CD |
| IC17 | 28385/995 | RELAY SOLID-STATE, OPTO-COUPLED, N/O, 1.2V CONTRL, 100V, 40mA MAX LOAD, MOS O/P, <0.5uV O/P OFFSET | HEWLETT-PACKARD | HSSR-8200 OPTION 300 |
| IC18 | 28461/810 | IC-ANALOGUE OPERATIONAL AMP OPA602AU... SINGLE, 15V PRECISION HI SPEED, SETTLING TIME 1uS, GAIN | BURR-BROWN INTERNAT | OPA602AU |
| IC19 | 28461/820 | IC-ANALOGUE D/A-CONVERTER 7248A... SINGLE, 15V 12 BIT, 8+4 LOADING, REL-ACC +/-1LSB, CMOS, 20 PIN, | ANALOG DEVICES LTD | AD7248AAR |
| IC20 | 28461/411 | IC-ANALOGUE OPERATIONAL AMP TL071... SINGLE, JFET INPUT, LOW NOISE, 8 PIN, SMALL-OUTLINE. | MOTOROLA INC. | TL071CD |
| IC21 | 28469/759 | IC-ANALOGUE MULTIPLEXER DG508A... 8 INPUT, SINGLE, 15V & -15V, CMOS, 16 PIN, SMALL-OUTLINE. | ANALOG DEVICES LTD | MUX-08FS |
| IC22 | 28461/458 | IC-ANALOGUE OPERATIONAL AMP OP37... 15V LOW NOISE, HI-SPEED, PRECISION, BIPOLAR, 8 PIN, | ANALOG DEVICES LTD | OP37GS |
| IC23 | 28461/888 | IC-ANALOGUE SWITCH DG419... SINGLE, 15V SPDT, ON-RESISTANCE<35R, CHANGEOVER, TTL COMPATIBLE, | TEMIC UK LTD | DG419DY |
| IC24 | 28461/458 | IC-ANALOGUE OPERATIONAL AMP OP37... 15V LOW NOISE, HI-SPEED, PRECISION, BIPOLAR, 8 PIN, | ANALOG DEVICES LTD | OP37GS |
| IC25 | 28461/411 | IC-ANALOGUE OPERATIONAL AMP TL071... SINGLE, JFET INPUT, LOW NOISE, 8 PIN, SMALL-OUTLINE. | MOTOROLA INC. | TL071CD |
| IC26 | 28461/411 | IC-ANALOGUE OPERATIONAL AMP TL071... SINGLE, JFET INPUT, LOW NOISE, 8 PIN, SMALL-OUTLINE. | MOTOROLA INC. | TL071CD |

## A3 Audio processor 1 (contd.)

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| IC27 | 28461/888 | IC-ANALOGUE SWITCH DG419... SINGLE, 15V SPDT, ON-RESISTANCE<35R, CHANGEOVER, TTL COMPATIBLE, | TEMIC UK LTD | DG419DY |
| IC28 | 28461/834 | IC-ANALOGUE GAIN/LOSS CIRCUIT SC11310... SINGLE, 5V PROGRAMMABLE FROM -25.5 TO +25.5dB IN 0.1dB | | |
| IC29 | 28461/831 | IC-ANALOGUE FILTER MAX270... DUAL, INDEPENDENT, 2nd-ORDER, CONTINUOUS-TIME, LOW PASS, 1-25KHz, | MAXIM INTEG PRODUCTS | MAX270CWP |
| IC30 | 28461/830 | IC-ANALOGUE FILTER MAX260A... DUAL, 5V SWITCHED CAPACITOR, SECOND ORDER, MICROPROCESSOR INTERFACE, | MAXIM INTEG PRODUCTS | MAX260ACWG |
| IC31 | 28461/999 | IC-ANALOGUE SWITCH DG441... QUAD, 15V SPST, ON-RESISTANCE<85R, 4 x N/O @ LOGIC 1, TTL | TEMIC UK LTD | DG441DY |
| IC32 | 28461/830 | IC-ANALOGUE FILTER MAX260A... DUAL, 5V SWITCHED CAPACITOR, SECOND ORDER, MICROPROCESSOR INTERFACE, | MAXIM INTEG PRODUCTS | MAX260ACWG |
| IC33 | 28461/999 | IC-ANALOGUE SWITCH DG441... QUAD, 15V SPST, ON-RESISTANCE<85R, 4 x N/O @ LOGIC 1, TTL | TEMIC UK LTD | DG441DY |
| IC34 | 28461/999 | IC-ANALOGUE SWITCH DG441... QUAD, 15V SPST, ON-RESISTANCE<85R, 4 x N/O @ LOGIC 1, TTL | TEMIC UK LTD | DG441DY |
| IC35 | 28461/411 | IC-ANALOGUE OPERATIONAL AMP TL071... SINGLE, JFET INPUT, LOW NOISE, 8 PIN, SMALL-OUTLINE. | MOTOROLA INC. | TL071CD |
| IC36 | 28461/831 | IC-ANALOGUE FILTER MAX270... DUAL, INDEPENDENT, 2nd-ORDER, CONTINUOUS-TIME, LOW PASS, 1-25KHz, | MAXIM INTEG PRODUCTS | MAX270CWP |
| IC37 | 28461/999 | IC-ANALOGUE SWITCH DG441... QUAD, 15V SPST, ON-RESISTANCE<85R, 4 x N/O @ LOGIC 1, TTL | TEMIC UK LTD | DG441DY |
| IC38 | 28461/411 | IC-ANALOGUE OPERATIONAL AMP TL071... SINGLE, JFET INPUT, LOW NOISE, 8 PIN, SMALL-OUTLINE. | MOTOROLA INC. | TL071CD |
| IC39 | 28461/898 | IC-ANALOGUE D/A-CONVERTER 7528... 8 INPUT, DUAL, 8-BIT, BUFFERED, MULTIPLYING, CMOS, 20 PIN, | ANALOG DEVICES LTD | AD7528JR |
| IC40 | 28461/806 | IC-ANALOGUE OPERATIONAL AMP OP-249... DUAL, PRECISION HI SPEED, SETTLING TIME-1.2uS, GAIN | ANALOG DEVICES LTD | OP-249GS |
| IC41 | 28461/411 | IC-ANALOGUE OPERATIONAL AMP TL071... SINGLE, JFET INPUT, LOW NOISE, 8 PIN, SMALL-OUTLINE. | MOTOROLA INC. | TL071CD |
| IC42 | 28461/888 | IC-ANALOGUE SWITCH DG419... SINGLE, 15V SPDT, ON-RESISTANCE<35R, CHANGEOVER, TTL COMPATIBLE, | TEMIC UK LTD | DG419DY |
| IC43 | 28461/834 | IC-ANALOGUE GAIN/LOSS CIRCUIT SC11310... SINGLE, 5V PROGRAMMABLE FROM -25.5 TO +25.5dB IN 0.1dB | | |
| IC44 | 28461/831 | IC-ANALOGUE FILTER MAX270... DUAL, INDEPENDENT, 2nd-ORDER, CONTINUOUS-TIME, LOW PASS, 1-25KHz, | MAXIM INTEG PRODUCTS | MAX270CWP |
| IC45 | 28461/830 | IC-ANALOGUE FILTER MAX260A... DUAL, 5V SWITCHED CAPACITOR, SECOND ORDER, MICROPROCESSOR INTERFACE, | MAXIM INTEG PRODUCTS | MAX260ACWG |
| IC46 | 28461/999 | IC-ANALOGUE SWITCH DG441... QUAD, 15V SPST, ON-RESISTANCE<85R, 4 x N/O @ LOGIC 1, TTL | TEMIC UK LTD | DG441DY |
| IC47 | 28461/830 | IC-ANALOGUE FILTER MAX260A... DUAL, 5V SWITCHED CAPACITOR, SECOND ORDER, MICROPROCESSOR INTERFACE, | MAXIM INTEG PRODUCTS | MAX260ACWG |
| IC48 | 28461/999 | IC-ANALOGUE SWITCH DG441... QUAD, 15V SPST, ON-RESISTANCE<85R, 4 x N/O @ LOGIC 1, TTL | TEMIC UK LTD | DG441DY |
| IC49 | 28461/999 | IC-ANALOGUE SWITCH DG441... QUAD, 15V SPST, ON-RESISTANCE<85R, 4 x N/O @ LOGIC 1, TTL | TEMIC UK LTD | DG441DY |
| IC50 | 28461/411 | IC-ANALOGUE OPERATIONAL AMP TL071... SINGLE, JFET INPUT, LOW NOISE, 8 PIN, SMALL-OUTLINE. | MOTOROLA INC. | TL071CD |
| IC51 | 28461/831 | IC-ANALOGUE FILTER MAX270... DUAL, INDEPENDENT, 2nd-ORDER, CONTINUOUS-TIME, LOW PASS, 1-25KHz, | MAXIM INTEG PRODUCTS | MAX270CWP |

## A3 Audio processor 1 (contd.)

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| IC52 | 28461/999 | IC-ANALOGUE SWITCH DG441... QUAD, 15V SPST, ON-RESISTANCE<85R, 4 x N/O @ LOGIC 1, TTL | TEMIC UK LTD | DG441DY |
| IC53 | 28461/897 | IC-ANALOGUE OPERATIONAL AMP OP-27GS... 22V LOW NOISE, 8 PIN, SMALL-OUTLINE. | ANALOG DEVICES LTD | OP-27GS |
| IC54 | 28461/898 | IC-ANALOGUE D/A-CONVERTER 7528... 8 INPUT, DUAL, 8-BIT, BUFFERED, MULTIPLYING, CMOS, 20 PIN, | ANALOG DEVICES LTD | AD7528JR |
| IC55 | 28461/806 | IC-ANALOGUE OPERATIONAL AMP OP-249... DUAL, PRECISION HI SPEED, SETTLING TIME-1.2uS, GAIN | ANALOG DEVICES LTD | OP-249GS |
| IC56 | 28461/999 | IC-ANALOGUE SWITCH DG441... QUAD, 15V SPST, ON-RESISTANCE<85R, 4 x N/O @ LOGIC 1, TTL | TEMIC UK LTD | DG441DY |
| IC57 | 28461/897 | IC-ANALOGUE OPERATIONAL AMP OP-27GS... 22V LOW NOISE, 8 PIN, SMALL-OUTLINE. | ANALOG DEVICES LTD | OP-27GS |
| IC58 | 28461/888 | IC-ANALOGUE SWITCH DG419... SINGLE, 15V SPDT, ON-RESISTANCE<35R, CHANGEOVER, TTL COMPATIBLE, | TEMIC UK LTD | DG419DY |
| IC59 | 28467/111 | IC-MICRO PERIPHERAL, PCF8574... REMOTE 8-BIT I/O EXPANDER, I.IC BUS, UP TO 8 DEVICE ADDRESS | PHILIPS | PCF8574T |
| IC60 | 28461/673 | IC-ANALOGUE COMPARATOR LM339... QUAD, SINGLE SUPPLY, BIPOLAR, 14 PIN, SMALL-OUTLINE. | PHILIPS | LM339D |
| IC61 | 28467/111 | IC-MICRO PERIPHERAL, PCF8574... REMOTE 8-BIT I/O EXPANDER, I.IC BUS, UP TO 8 DEVICE ADDRESS | PHILIPS | PCF8574T |
| IC62 | 28467/110 | IC-MICRO PERIPHERAL, PCF8574A... REMOTE 8-BIT I/O EXPANDER, I.IC BUS, UP TO 16 DEVICE ADDRESS | PHILIPS | PCF8574AT |
| IC63 | 28467/110 | IC-MICRO PERIPHERAL, PCF8574A... REMOTE 8-BIT I/O EXPANDER, I.IC BUS, UP TO 16 DEVICE ADDRESS | PHILIPS | PCF8574AT |
| IC64 | 28469/057 | IC-DIGITAL INVERTER 74HC04... HEX, CMOS-H/SPEED, 14 PIN, SMALL-OUTLINE. | PHILIPS | 74HC04D |
| IC65 | 28464/185 | IC-DIGITAL COUNTER 74HC160... 4 INPUT, 4 BIT, SINGLE, BCD, PRESETTABLE, SYNCHRONOUS, | PHILIPS | 74HC160D |
| IC66 | 28462/438 | IC-DIGITAL LATCH 74HC373... OCTAL, TRANSPARENT WITH TRI-STATE BUS, CMOS-H/SPEED, 20 PIN, | PHILIPS | 74HC373D |
| IC67 | 28462/438 | IC-DIGITAL LATCH 74HC373... OCTAL, TRANSPARENT WITH TRI-STATE BUS, CMOS-H/SPEED, 20 PIN, | PHILIPS | 74HC373D |
| IC68 | 28465/056 | IC-DIGITAL DECODER/DEMULTIPLEX 74HC139... 2 INPUT, 4 BIT, DUAL, INVERTING, 1 BIT ADDRESS, | PHILIPS | 74HC139D |
| IC69 | 28462/438 | IC-DIGITAL LATCH 74HC373... OCTAL, TRANSPARENT WITH TRI-STATE BUS, CMOS-H/SPEED, 20 PIN, | PHILIPS | 74HC373D |
| IC70 | 28465/056 | IC-DIGITAL DECODER/DEMULTIPLEX 74HC139... 2 INPUT, 4 BIT, DUAL, INVERTING, 1 BIT ADDRESS, | PHILIPS | 74HC139D |
| IC71 | 28465/056 | IC-DIGITAL DECODER/DEMULTIPLEX 74HC139... 2 INPUT, 4 BIT, DUAL, INVERTING, 1 BIT ADDRESS, | PHILIPS | 74HC139D |
| IC72 | 28462/438 | IC-DIGITAL LATCH 74HC373... OCTAL, TRANSPARENT WITH TRI-STATE BUS, CMOS-H/SPEED, 20 PIN, | PHILIPS | 74HC373D |
| IC73 | 28465/056 | IC-DIGITAL DECODER/DEMULTIPLEX 74HC139... 2 INPUT, 4 BIT, DUAL, INVERTING, 1 BIT ADDRESS, | PHILIPS | 74HC139D |
| IC74 | 28465/056 | IC-DIGITAL DECODER/DEMULTIPLEX 74HC139... 2 INPUT, 4 BIT, DUAL, INVERTING, 1 BIT ADDRESS, | PHILIPS | 74HC139D |
| IC75 | 28465/065 | IC-DIGITAL DECODER/DEMULTIPLEX 74HC154... 4-TO-16 LINE, CMOS-H/SPEED, 24 PIN, SMALL-OUTLINE. | PHILIPS | 74HC154D |
| IC76 | 28467/101 | IC-MICRO CONTROLLER, 82C54... PROGRAMMABLE INTERVAL TIMER, 8MHz, CMOS, 28 PIN, PLCC. | HARRIS SEMICONDUCTOR | CS82C54 |

## A3 Audio processor 1 (contd.)

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| IC77 | 28467/101 | IC-MICRO CONTROLLER, 82C54... PROGRAMMABLE INTERVAL TIMER, 8MHz, CMOS, 28 PIN, PLCC. | HARRIS SEMICONDUCTOR | CS82C54 |
| IC78 | 28469/058 | IC-DIGITAL BUFFER/LINE-DRIVER 74HC244... 4 INPUT, 4 BIT, DUAL, NON-INVERTING, TRI-STATE BUS, | PHILIPS | 74HC244D |
| IC79 | 28466/120 | IC-DIGITAL OR-GATE 74HC32... 2 INPUT, QUAD, CMOS-H/SPEED, 14 PIN, SMALL-OUTLINE. | PHILIPS | 74HC32D |
| L1 to L5 | 23642/535 | INDUCTOR-FIXED 1uH +/- 5% EPOXY-MOULD, 400mA 0R7 MAX, 30 Q @ 7.96 MHz, 120 MHz SRF, SURFACE | MEGGITT ELECTRONICS | 3612-T-1R0-J |
| L6 to L13 | 23642/512 | INDUCTOR-FIXED 22uH +/- 5% EPOXY-MOULD, 110mA 3R7 MAX, 30 Q @ 2.5 MHz, 25 MHz SRF, SURFACE MOUNTED, | MEGGITT ELECTRONICS | 3612-T-220-J |
| PLA to PLH | 23435/120 | CONNECTOR MULTIWAY, PCB HEADER, 36 WAY, RIGHT ANGLED, 2.54mm PITCH, PINS GOLD PLATED TO CLASS 2, | BERG ELECTRONICS | 75168-101-36 |
| PLJ | 23436/901 | CONNECTOR MULTIWAY, PCB HEADER, 16 WAY, RIGHT ANGLED, 2-ROW, 2.54mm GRID, POLARISED, SHROUDED, | THOMAS & BETTS LTD | 609-1607 |
| PLM | 23435/120 | CONNECTOR MULTIWAY, PCB HEADER, 36 WAY, RIGHT ANGLED, 2.54mm PITCH, PINS GOLD PLATED TO CLASS 2, | BERG ELECTRONICS | 75168-101-36 |
| PLN | 23435/120 | CONNECTOR MULTIWAY, PCB HEADER, 36 WAY, RIGHT ANGLED, 2.54mm PITCH, PINS GOLD PLATED TO CLASS 2, | BERG ELECTRONICS | 75168-101-36 |
| R1 | 24811/188 | RESISTOR-FIXED METAL-FILM 4K32 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-4K32-1%50ppm |
| R2 | 24811/175 | RESISTOR-FIXED METAL-FILM 1K21 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-1K21-1%50ppm |
| R3 | 24811/208 | RESISTOR-FIXED METAL-FILM 30K1 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-30K1-1%50ppm |
| R4 | 24811/642 | RESISTOR-FIXED METAL-FILM 7K5 +/- 0.1% 250mW 200V 15 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-7K5-0.1%-15 |
| R5 | 24811/640 | RESISTOR-FIXED METAL-FILM 1K54 +/- 0.1% 250mW 200V 15 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-1K54-0.1%-15 |
| R6 | 24811/218 | RESISTOR-FIXED METAL-FILM 75K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-75K-1%50ppm |
| R7 | 24811/642 | RESISTOR-FIXED METAL-FILM 7K5 +/- 0.1% 250mW 200V 15 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-7K5-0.1%-15 |
| R8 | 24811/640 | RESISTOR-FIXED METAL-FILM 1K54 +/- 0.1% 250mW 200V 15 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-1K54-0.1%-15 |
| R9 | 24811/218 | RESISTOR-FIXED METAL-FILM 75K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-75K-1%50ppm |
| R10 | 24811/641 | RESISTOR-FIXED METAL-FILM 2K +/- 0.1% 250mW 200V 15 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-2K0-0.1%-15 |
| R11 | 24811/641 | RESISTOR-FIXED METAL-FILM 2K +/- 0.1% 250mW 200V 15 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-2K0-0.1%-15 |
| R12 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R13 | 24811/637 | RESISTOR-FIXED METAL-FILM 392R +/- 0.1% 250mW 200V 15 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-392R-0.1%-15 |

## A3 Audio processor 1 (contd.)

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| R14 | 24811/641 | RESISTOR-FIXED METAL-FILM 2K +/- 0.1% 250mW 200V 15 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-2K0-0.1%-15 |
| R15 | 24811/178 | RESISTOR-FIXED METAL-FILM 1K62 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-1K62-1%50ppm |
| R16 | 24811/155 | RESISTOR-FIXED METAL-FILM 182R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-182R-1%50ppm |
| R17 | 24811/202 | RESISTOR-FIXED METAL-FILM 16K2 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-16K2-1%50ppm |
| R18 | 24811/178 | RESISTOR-FIXED METAL-FILM 1K62 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-1K62-1%50ppm |
| R19 | 24811/155 | RESISTOR-FIXED METAL-FILM 182R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-182R-1%50ppm |
| R20 | 24811/202 | RESISTOR-FIXED METAL-FILM 16K2 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-16K2-1%50ppm |
| R21 | 24811/178 | RESISTOR-FIXED METAL-FILM 1K62 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-1K62-1%50ppm |
| R22 | 24811/155 | RESISTOR-FIXED METAL-FILM 182R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-182R-1%50ppm |
| R23 | 24811/202 | RESISTOR-FIXED METAL-FILM 16K2 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-16K2-1%50ppm |
| R24 | 24811/178 | RESISTOR-FIXED METAL-FILM 1K62 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-1K62-1%50ppm |
| R25 | 24811/155 | RESISTOR-FIXED METAL-FILM 182R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-182R-1%50ppm |
| R26 | 24811/202 | RESISTOR-FIXED METAL-FILM 16K2 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-16K2-1%50ppm |
| R27 | 24811/133 | RESISTOR-FIXED METAL-FILM 22R1 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-22R1-1%50ppm |
| R30 | 24811/221 | RESISTOR-FIXED METAL-FILM 100K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100K-1%50ppm |
| R31 | 24811/244 | RESISTOR-FIXED METAL-FILM 909K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-909K-1%50ppm |
| R32 | 24811/245 | RESISTOR-FIXED METAL-FILM 1M +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1M0-1%50ppm |
| R33 | 24811/196 | RESISTOR-FIXED METAL-FILM 9K09 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-9K09-1%50ppm |
| R34 | 24811/211 | RESISTOR-FIXED METAL-FILM 39K2 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-39K2-1%50ppm |
| R35 | 24811/185 | RESISTOR-FIXED METAL-FILM 3K32 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-3K32-1%50ppm |
| R36 | 24811/179 | RESISTOR-FIXED METAL-FILM 1K82 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-1K82-1%50ppm |
| R37 | 24811/143 | RESISTOR-FIXED METAL-FILM 56R2 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-56R2-1%50ppm |
| R38 | 24811/239 | RESISTOR-FIXED METAL-FILM 562K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-562K-1%50ppm |
| R39 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R40 to R44 | 24811/156 | RESISTOR-FIXED METAL-FILM 200R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-200R-1%50ppm |

## A3 Audio processor 1 (contd.)

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| R45 | 24811/178 | RESISTOR-FIXED METAL-FILM 1K62 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-1K62-1%50ppm |
| R46 | 24811/155 | RESISTOR-FIXED METAL-FILM 182R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-182R-1%50ppm |
| R47 | 24811/202 | RESISTOR-FIXED METAL-FILM 16K2 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-16K2-1%50ppm |
| R48 | 24811/178 | RESISTOR-FIXED METAL-FILM 1K62 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-1K62-1%50ppm |
| R49 | 24811/155 | RESISTOR-FIXED METAL-FILM 182R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-182R-1%50ppm |
| R50 | 24811/202 | RESISTOR-FIXED METAL-FILM 16K2 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-16K2-1%50ppm |
| R51 | 24811/178 | RESISTOR-FIXED METAL-FILM 1K62 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-1K62-1%50ppm |
| R52 | 24811/155 | RESISTOR-FIXED METAL-FILM 182R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-182R-1%50ppm |
| R53 | 24811/202 | RESISTOR-FIXED METAL-FILM 16K2 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-16K2-1%50ppm |
| R54 to R59 | 24811/238 | RESISTOR-FIXED METAL-FILM 511K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-511K-1%50ppm |
| R60 | 24811/212 | RESISTOR-FIXED METAL-FILM 43K2 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-43K2-1%50ppm |
| R61 | 24811/177 | RESISTOR-FIXED METAL-FILM 1K5 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K5-1%50ppm |
| R62 | 24811/133 | RESISTOR-FIXED METAL-FILM 22R1 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-22R1-1%50ppm |
| R65 | 24811/221 | RESISTOR-FIXED METAL-FILM 100K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100K-1%50ppm |
| R66 | 24811/244 | RESISTOR-FIXED METAL-FILM 909K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-909K-1%50ppm |
| R67 | 24811/245 | RESISTOR-FIXED METAL-FILM 1M +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1M0-1%50ppm |
| R68 | 24811/196 | RESISTOR-FIXED METAL-FILM 9K09 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-9K09-1%50ppm |
| R69 | 24811/215 | RESISTOR-FIXED METAL-FILM 56K2 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-56K2-1%50ppm |
| R70 | 24811/185 | RESISTOR-FIXED METAL-FILM 3K32 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-3K32-1%50ppm |
| R71 | 24811/179 | RESISTOR-FIXED METAL-FILM 1K82 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-1K82-1%50ppm |
| R72 | 24811/143 | RESISTOR-FIXED METAL-FILM 56R2 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-56R2-1%50ppm |
| R73 | 24811/239 | RESISTOR-FIXED METAL-FILM 562K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-562K-1%50ppm |
| R74 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R75 to R79 | 24811/156 | RESISTOR-FIXED METAL-FILM 200R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-200R-1%50ppm |
| R80 | 24811/178 | RESISTOR-FIXED METAL-FILM 1K62 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-1K62-1%50ppm |

## A3 Audio processor 1 (contd.)

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| R81 | 24811/155 | RESISTOR-FIXED METAL-FILM 182R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-182R-1%50ppm |
| R82 | 24811/202 | RESISTOR-FIXED METAL-FILM 16K2 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-16K2-1%50ppm |
| R83 | 24811/178 | RESISTOR-FIXED METAL-FILM 1K62 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-1K62-1%50ppm |
| R84 | 24811/155 | RESISTOR-FIXED METAL-FILM 182R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-182R-1%50ppm |
| R85 | 24811/202 | RESISTOR-FIXED METAL-FILM 16K2 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-16K2-1%50ppm |
| R86 | 24811/178 | RESISTOR-FIXED METAL-FILM 1K62 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-1K62-1%50ppm |
| R87 | 24811/155 | RESISTOR-FIXED METAL-FILM 182R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-182R-1%50ppm |
| R88 | 24811/202 | RESISTOR-FIXED METAL-FILM 16K2 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-16K2-1%50ppm |
| R89 | 24811/177 | RESISTOR-FIXED METAL-FILM 1K5 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K5-1%50ppm |
| R90 | 24811/171 | RESISTOR-FIXED METAL-FILM 825R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-825R-1%50ppm |
| R91 | 24811/225 | RESISTOR-FIXED METAL-FILM 150K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-150K-1%50ppm |
| R92 | 24811/177 | RESISTOR-FIXED METAL-FILM 1K5 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K5-1%50ppm |
| R93 | 24811/170 | RESISTOR-FIXED METAL-FILM 750R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-750R-1%50ppm |
| R95 | 24811/221 | RESISTOR-FIXED METAL-FILM 100K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100K-1%50ppm |
| R96 | 24811/189 | RESISTOR-FIXED METAL-FILM 4K75 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-4K75-1%50ppm |
| R97 | 24811/189 | RESISTOR-FIXED METAL-FILM 4K75 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-4K75-1%50ppm |
| R98 | 24811/221 | RESISTOR-FIXED METAL-FILM 100K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100K-1%50ppm |
| R99 | 24811/101 | RESISTOR-FIXED METAL-FILM 1R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1R-1%-50ppm |
| R101 | 24811/176 | RESISTOR-FIXED METAL-FILM 1K3 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K3-1%50ppm |
| R106 | 24811/217 | RESISTOR-FIXED METAL-FILM 68K1 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-68K1-1%50ppm |
| R107 | 24811/208 | RESISTOR-FIXED METAL-FILM 30K1 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-30K1-1%50ppm |
| R108 | 24811/221 | RESISTOR-FIXED METAL-FILM 100K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100K-1%50ppm |
| R109 | 24811/177 | RESISTOR-FIXED METAL-FILM 1K5 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K5-1%50ppm |
| R110 | 24811/189 | RESISTOR-FIXED METAL-FILM 4K75 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-4K75-1%50ppm |
| R111 | 24811/234 | RESISTOR-FIXED METAL-FILM 365K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-365K-1%50ppm |

## A3 Audio processor 1 (contd.)

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| R112 | 24811/177 | RESISTOR-FIXED METAL-FILM 1K5 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K5-1%50ppm |
| R114 | 24811/225 | RESISTOR-FIXED METAL-FILM 150K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-150K-1%50ppm |
| R117 | 24811/184 | RESISTOR-FIXED METAL-FILM 3K01 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-3K01-1%50ppm |
| R118 | 24811/189 | RESISTOR-FIXED METAL-FILM 4K75 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-4K75-1%50ppm |
| R119 | 24811/189 | RESISTOR-FIXED METAL-FILM 4K75 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-4K75-1%50ppm |
| R120 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R121 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R122 | 24811/221 | RESISTOR-FIXED METAL-FILM 100K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100K-1%50ppm |
| R123 | 24811/221 | RESISTOR-FIXED METAL-FILM 100K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100K-1%50ppm |
| R124 | 24811/101 | RESISTOR-FIXED METAL-FILM 1R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1R-1%-50ppm |
| R126 | 24811/176 | RESISTOR-FIXED METAL-FILM 1K3 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K3-1%50ppm |
| R131 | 24811/217 | RESISTOR-FIXED METAL-FILM 68K1 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-68K1-1%50ppm |
| R132 | 24811/208 | RESISTOR-FIXED METAL-FILM 30K1 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-30K1-1%50ppm |
| R133 | 24811/221 | RESISTOR-FIXED METAL-FILM 100K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100K-1%50ppm |
| R134 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R137 | 24811/177 | RESISTOR-FIXED METAL-FILM 1K5 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K5-1%50ppm |
| R139 | 24811/225 | RESISTOR-FIXED METAL-FILM 150K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-150K-1%50ppm |
| R142 | 24811/184 | RESISTOR-FIXED METAL-FILM 3K01 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-3K01-1%50ppm |
| R143 | 24811/172 | RESISTOR-FIXED METAL-FILM 909R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-909R-1%50ppm |
| R144 | 24811/208 | RESISTOR-FIXED METAL-FILM 30K1 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-30K1-1%50ppm |
| R145 | 24811/157 | RESISTOR-FIXED METAL-FILM 221R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-221R-1%50ppm |
| R146 | 24811/165 | RESISTOR-FIXED METAL-FILM 475R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-475R-1%50ppm |
| R147 | 24811/192 | RESISTOR-FIXED METAL-FILM 6K19 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-6K19-1%50ppm |
| R148 | 24811/171 | RESISTOR-FIXED METAL-FILM 825R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-825R-1%50ppm |
| R149 | 24811/185 | RESISTOR-FIXED METAL-FILM 3K32 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-3K32-1%50ppm |

## A3 Audio processor 1 (contd.)

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| R150 | 24811/177 | RESISTOR-FIXED METAL-FILM 1K5 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K5-1%50ppm |
| R151 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R152 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R153 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R154 | 24811/185 | RESISTOR-FIXED METAL-FILM 3K32 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-3K32-1%50ppm |
| R155 | 24811/185 | RESISTOR-FIXED METAL-FILM 3K32 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-3K32-1%50ppm |
| R157 | 24811/189 | RESISTOR-FIXED METAL-FILM 4K75 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-4K75-1%50ppm |
| R159 | 24811/189 | RESISTOR-FIXED METAL-FILM 4K75 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-4K75-1%50ppm |
| R160 to R163 | 24811/181 | RESISTOR-FIXED METAL-FILM 2K21 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-2K21-1%50ppm |
| R164 to R167 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R168 | 24811/201 | RESISTOR-FIXED METAL-FILM 15K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-15K-1%50ppm |
| R169 to R175 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R176 | 24811/146 | RESISTOR-FIXED METAL-FILM 75R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-75R0-1%50ppm |
| R177 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R178 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R179 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R185 | 24811/221 | RESISTOR-FIXED METAL-FILM 100K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100K-1%50ppm |
| R186 | 24811/221 | RESISTOR-FIXED METAL-FILM 100K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100K-1%50ppm |
| R187 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R188 | 24811/185 | RESISTOR-FIXED METAL-FILM 3K32 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-3K32-1%50ppm |
| R189 | 24811/185 | RESISTOR-FIXED METAL-FILM 3K32 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-3K32-1%50ppm |
| R190 to R196 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R197 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R198 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R200 to R207 | 24338/004 | RESISTOR-FIXED METAL-GLAZE 150R +/- 5% 1W 100V 350 ppm/DEG.C, SURFACE MOUNTED, SIZE 2512, (12mm | VISHAY COMPONENTS | CR2512-150R-5%-P4 |

## A3 Audio processor 1 (contd.)

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| R208 to R214 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R215 to R218 | 24811/181 | RESISTOR-FIXED METAL-FILM 2K21 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-2K21-1%50ppm |
| R221 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R222 to R225 | 24811/149 | RESISTOR-FIXED METAL-FILM 100R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100R-1%50ppm |
| R226 | 24811/177 | RESISTOR-FIXED METAL-FILM 1K5 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K5-1%50ppm |
| R227 | 24811/207 | RESISTOR-FIXED METAL-FILM 27K4 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-27K4-1%50ppm |
| R228 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R229 | 24811/177 | RESISTOR-FIXED METAL-FILM 1K5 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K5-1%50ppm |
| R230 | 24811/207 | RESISTOR-FIXED METAL-FILM 27K4 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-27K4-1%50ppm |
| R231 | 24811/199 | RESISTOR-FIXED METAL-FILM 12K1 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-12K1-1%50ppm |
| RLA to RLF | 23486/166 | RELAY MAGNETIC, DOUBLE-POLE CHANGEOVER, 12V COIL, 720R - CONTACTS 1A, 125V, MAX LOAD 30W, PCB | FUJITSU LTD | FBR46-N-D012-P |
| TR1 to TR4 | 28459/079 | TRANSISTOR N-CHANNEL-ENHANCE MOSFET SST211... 10V 350mW 50mA 75R ON 1nS, OFF 2nS, MARKING CODE D1**, | TEMIC UK LTD | SST211-T1 |
| TR5 | 28487/811 | TRANSISTOR NPN BIPOLAR BC818-40... 25V 170MHz 330mW 500mA 250hFE MIN @ 100mA, MARKING CODE 6G, | PHILIPS | BC818-40 |
| TR6 | 28487/811 | TRANSISTOR NPN BIPOLAR BC818-40... 25V 170MHz 330mW 500mA 250hFE MIN @ 100mA, MARKING CODE 6G, | PHILIPS | BC818-40 |
| TR7 | 28487/811 | TRANSISTOR NPN BIPOLAR BC818-40... 25V 170MHz 330mW 500mA 250hFE MIN @ 100mA, MARKING CODE 6G, | PHILIPS | BC818-40 |
| TR8 | 28487/811 | TRANSISTOR NPN BIPOLAR BC818-40... 25V 170MHz 330mW 500mA 250hFE MIN @ 100mA, MARKING CODE 6G, | PHILIPS | BC818-40 |
| TR9 | 28487/811 | TRANSISTOR NPN BIPOLAR BC818-40... 25V 170MHz 330mW 500mA 250hFE MIN @ 100mA, MARKING CODE 6G, | PHILIPS | BC818-40 |
| TR10 | 28487/811 | TRANSISTOR NPN BIPOLAR BC818-40... 25V 170MHz 330mW 500mA 250hFE MIN @ 100mA, MARKING CODE 6G, | PHILIPS | BC818-40 |

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|

## A3/1 Audio processor 1

When ordering, prefix circuit reference with A3/1.

| | | | | |
|---|---|---|---|---|
| | 44830-197 | Complete unit | Issue 03 | |
| C1 | 26386/897 | CAPACITOR-FIXED CERAMIC 4.7pF +/-0.1pF 50V 60 ppm/DEG.C, HIGH-Q, SINGLELAYER, SURFACE-MOUNTED, | AVX LTD | 0805-5K4R7-BAW-TR |
| C2 | 26386/897 | CAPACITOR-FIXED CERAMIC 4.7pF +/-0.1pF 50V 60 ppm/DEG.C, HIGH-Q, SINGLELAYER, SURFACE-MOUNTED, | AVX LTD | 0805-5K4R7-BAW-TR |
| C3 | 26582/203 | CAPACITOR-FIXED POLYESTER 15nF +/-10% 250V RADIAL, 10.2mm PWP, (LOOSE). | VISHAY COMPONENTS | MKT-1822-315/405 |
| C4 | 26386/863 | CAPACITOR-FIXED CERAMIC 1nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-102-KP |
| C5 | 26386/863 | CAPACITOR-FIXED CERAMIC 1nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-102-KP |
| C6 | 26386/814 | CAPACITOR-FIXED CERAMIC 15pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-150-JP |
| C7 | 26878/406 | CAPACITOR-VARIABLE POLYPROPYLENE 2pF to 10pF 100V VERTICAL-PCB MOUNT, 7.5mm DIA, 10mm LONG, 3 PIN, | PHILIPS | 2222-808-11109 |
| C8 | 26386/932 | CAPACITOR-FIXED CERAMIC 1nF +/-1% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | AVX LTD | 1206-5A-102-FAT-1A |
| C9 to C11 | 26386/897 | CAPACITOR-FIXED CERAMIC 4.7pF +/-0.1pF 50V 60 ppm/DEG.C, HIGH-Q, SINGLELAYER, SURFACE-MOUNTED, | AVX LTD | 0805-5K4R7-BAW-TR |
| C12 | 26386/899 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | ROHM ELECTRONICS LTD | MCH31-5C-104-KP |
| C13 | 26386/899 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | ROHM ELECTRONICS LTD | MCH31-5C-104-KP |
| C14 | 26343/935 | CAPACITOR-FIXED CERAMIC 4.7nF +/-1% 63V NP0 MULTILAYER, RADIAL, 5.08mm PWP, (TAPED). | VISHAY COMPONENTS | VP41-BA-472-FA |
| C15 | 26582/203 | CAPACITOR-FIXED POLYESTER 15nF +/-10% 250V RADIAL, 10.2mm PWP, (LOOSE). | VISHAY COMPONENTS | MKT-1822-315/405 |
| C16 | 26386/934 | CAPACITOR-FIXED CERAMIC 220pF +/-1% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | VISHAY COMPONENTS | VJ0805-A-221F-XAT |
| C17 | 26878/408 | CAPACITOR-VARIABLE POLYPROPYLENE 5.5pF to 65pF 100V VERTICAL-PCB MOUNT, 10mm DIA, 10mm LONG, 3 | PHILIPS | 2222-808-32659 |
| C18 | 26386/863 | CAPACITOR-FIXED CERAMIC 1nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-102-KP |
| C19 | 26386/863 | CAPACITOR-FIXED CERAMIC 1nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-102-KP |
| C20 | 26386/814 | CAPACITOR-FIXED CERAMIC 15pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-150-JP |
| C21 | 26878/406 | CAPACITOR-VARIABLE POLYPROPYLENE 2pF to 10pF 100V VERTICAL-PCB MOUNT, 7.5mm DIA, 10mm LONG, 3 PIN, | PHILIPS | 2222-808-11109 |
| C22 | 26386/932 | CAPACITOR-FIXED CERAMIC 1nF +/-1% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | AVX LTD | 1206-5A-102-FAT-1A |
| C23 to C25 | 26386/897 | CAPACITOR-FIXED CERAMIC 4.7pF +/-0.1pF 50V 60 ppm/DEG.C, HIGH-Q, SINGLELAYER, SURFACE-MOUNTED, | AVX LTD | 0805-5K4R7-BAW-TR |
| C26 | 26386/760 | CAPACITOR-FIXED CERAMIC 220nF +/-10% 50V X7R MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | PHILIPS | 1210-2R-224-K9-BBC |
| C27 | 26386/760 | CAPACITOR-FIXED CERAMIC 220nF +/-10% 50V X7R MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | PHILIPS | 1210-2R-224-K9-BBC |
| C28 | 26386/899 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | ROHM ELECTRONICS LTD | MCH31-5C-104-KP |

## A3/1 Audio processor 1 (contd.)

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| C29 | 26386/814 | CAPACITOR-FIXED CERAMIC 15pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-150-JP |
| C30 | 26386/760 | CAPACITOR-FIXED CERAMIC 220nF +/-10% 50V X7R MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | PHILIPS | 1210-2R-224-K9-BBC |
| C31 | 26386/760 | CAPACITOR-FIXED CERAMIC 220nF +/-10% 50V X7R MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | PHILIPS | 1210-2R-224-K9-BBC |
| C32 | 26386/899 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | ROHM ELECTRONICS LTD | MCH31-5C-104-KP |
| C33 | 26386/814 | CAPACITOR-FIXED CERAMIC 15pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-150-JP |
| C34 | 26386/934 | CAPACITOR-FIXED CERAMIC 220pF +/-1% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | VISHAY COMPONENTS | VJ0805-A-221F-XAT |
| C35 | 26878/408 | CAPACITOR-VARIABLE POLYPROPYLENE 5.5pF to 65pF 100V VERTICAL-PCB MOUNT, 10mm DIA, 10mm LONG, 3 | PHILIPS | 2222-808-32659 |
| C36 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C37 | 26386/863 | CAPACITOR-FIXED CERAMIC 1nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-102-KP |
| C38 | 26451/010 | CAPACITOR-FIXED ALUMINIUM 100uF +/-20% 6.3V ELECTROLYTIC, SURFACE-MOUNTED, SIZE 6.6 x 6.6mm, | PANASONIC INDUSTRIAL | ECE-V-0JA-101P |
| C39 | 26386/899 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | ROHM ELECTRONICS LTD | MCH31-5C-104-KP |
| C40 | 26451/013 | CAPACITOR-FIXED ALUMINIUM 100uF +/-20% 35V ELECTROLYTIC, SURFACE-MOUNTED, SIZE 10.3 x 10.3mm, | PANASONIC INDUSTRIAL | ECE-V-1V-A-101-P |
| C41 | 26386/899 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | ROHM ELECTRONICS LTD | MCH31-5C-104-KP |
| C42 | 26451/010 | CAPACITOR-FIXED ALUMINIUM 100uF +/-20% 6.3V ELECTROLYTIC, SURFACE-MOUNTED, SIZE 6.6 x 6.6mm, | PANASONIC INDUSTRIAL | ECE-V-0JA-101P |
| C43 | 26386/899 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | ROHM ELECTRONICS LTD | MCH31-5C-104-KP |
| C44 | 26451/010 | CAPACITOR-FIXED ALUMINIUM 100uF +/-20% 6.3V ELECTROLYTIC, SURFACE-MOUNTED, SIZE 6.6 x 6.6mm, | PANASONIC INDUSTRIAL | ECE-V-0JA-101P |
| C45 | 26386/899 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | ROHM ELECTRONICS LTD | MCH31-5C-104-KP |
| C46 | 26451/013 | CAPACITOR-FIXED ALUMINIUM 100uF +/-20% 35V ELECTROLYTIC, SURFACE-MOUNTED, SIZE 10.3 x 10.3mm, | PANASONIC INDUSTRIAL | ECE-V-1V-A-101-P |
| C47 | 26386/899 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | ROHM ELECTRONICS LTD | MCH31-5C-104-KP |
| C48 | 26386/897 | CAPACITOR-FIXED CERAMIC 4.7pF +/-0.1pF 50V 60 ppm/DEG.C, HIGH-Q, SINGLELAYER, SURFACE-MOUNTED, | AVX LTD | 0805-5K4R7-BAW-TR |
| C49 | 26386/897 | CAPACITOR-FIXED CERAMIC 4.7pF +/-0.1pF 50V 60 ppm/DEG.C, HIGH-Q, SINGLELAYER, SURFACE-MOUNTED, | AVX LTD | 0805-5K4R7-BAW-TR |
| C50 | 26386/814 | CAPACITOR-FIXED CERAMIC 15pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-150-JP |
| C51 | 26386/814 | CAPACITOR-FIXED CERAMIC 15pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-150-JP |
| C52 to C55 | 26386/899 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | ROHM ELECTRONICS LTD | MCH31-5C-104-KP |
| C100 to C123 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|

## A3/1 Audio processor 1 (contd.)

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| C124 | 26386/899 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | ROHM ELECTRONICS LTD | MCH31-5C-104-KP |
| C125 | 26386/899 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | ROHM ELECTRONICS LTD | MCH31-5C-104-KP |
| C126 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C127 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C128 | 26386/899 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | ROHM ELECTRONICS LTD | MCH31-5C-104-KP |
| C129 | 26386/899 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | ROHM ELECTRONICS LTD | MCH31-5C-104-KP |
| C130 to C229 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C230 to C244 | 26451/004 | CAPACITOR-FIXED ALUMINIUM 10uF +/-20% 35V ELECTROLYTIC, SURFACE-MOUNTED, SIZE 5.3 x 5.3mm, | DUBILIER CAPACITORS | DVC-10/35-T/R |
| C245 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C246 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C249 to C256 | 26386/899 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | ROHM ELECTRONICS LTD | MCH31-5C-104-KP |
| C258 to C265 | 26486/225 | CAPACITOR-FIXED TANTALUM 10uF +/-20% 35V ELECTROLYTIC, RADIAL, 5mm PWP, (TAPED). | AVX LTD | TAP-10-M-35-CRW |
| C266 to C269 | 26451/004 | CAPACITOR-FIXED ALUMINIUM 10uF +/-20% 35V ELECTROLYTIC, SURFACE-MOUNTED, SIZE 5.3 x 5.3mm, | DUBILIER CAPACITORS | DVC-10/35-T/R |
| C270 | 26386/863 | CAPACITOR-FIXED CERAMIC 1nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-102-KP |
| C271 | 26386/863 | CAPACITOR-FIXED CERAMIC 1nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-102-KP |
| C272 to C275 | 26451/003 | CAPACITOR-FIXED ALUMINIUM 10uF +/-20% 16V ELECTROLYTIC, SURFACE-MOUNTED, SIZE 4.3 x 4.3mm, | PANASONIC INDUSTRIAL | ECE-V-1CA-100R |
| C276 | 26386/814 | CAPACITOR-FIXED CERAMIC 15pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-150-JP |
| C277 | 26386/814 | CAPACITOR-FIXED CERAMIC 15pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-150-JP |
| C278 | 26386/897 | CAPACITOR-FIXED CERAMIC 4.7pF +/-0.1pF 50V 60 ppm/DEG.C, HIGH-Q, SINGLELAYER, SURFACE-MOUNTED, | AVX LTD | 0805-5K4R7-BAW-TR |
| C279 | 26386/814 | CAPACITOR-FIXED CERAMIC 15pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-150-JP |
| C280 | 26386/814 | CAPACITOR-FIXED CERAMIC 15pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-150-JP |
| C281 | 26386/897 | CAPACITOR-FIXED CERAMIC 4.7pF +/-0.1pF 50V 60 ppm/DEG.C, HIGH-Q, SINGLELAYER, SURFACE-MOUNTED, | AVX LTD | 0805-5K4R7-BAW-TR |
| C282 to C291 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C292 | 26386/933 | CAPACITOR-FIXED CERAMIC 1.2nF +/-1% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | AVX LTD | 1206-5A-122-FAT-1A |
| C293 | 26386/933 | CAPACITOR-FIXED CERAMIC 1.2nF +/-1% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | AVX LTD | 1206-5A-122-FAT-1A |

## A3/1 Audio processor 1 (contd.)

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| D1 to D4 | 28335/485 | DIODE SMALL-SIGNAL, BAV45... 20V 50mA 1.3pF 1Vf @ 10mA, LOW LEAKAGE TYPE, 5pA Ir @ 5Vr, METAL-CASED, | PHILIPS | BAV45 |
| D5 | 28371/412 | DIODE ZENER, BZX84-C5V1... 250mW 5.1V 5% 250mA MARKING CODE Z2, SURFACE MOUNTED, SOT-23, (8mm | PHILIPS | BZX84-C5V1 |
| D6 | 28371/412 | DIODE ZENER, BZX84-C5V1... 250mW 5.1V 5% 250mA MARKING CODE Z2, SURFACE MOUNTED, SOT-23, (8mm | PHILIPS | BZX84-C5V1 |
| D7 | 28383/903 | DIODE SMALL-SIGNAL, BAV99... DUAL, 70V 100mA 1.1Vf @ 50mA, IN SERIES, MARKING CODE A7, SURFACE | PHILIPS | BAV99 (A7) |
| D8 to D13 | 28383/934 | DIODE SMALL-SIGNAL, LL4148... 500mW 50V 150mA 1Vf @ 10mA, SURFACE MOUNTED, MINI-MELF, (8mm TAPE - | PHILIPS | PMLL4148L |
| D14 to D17 | 28371/224 | DIODE ZENER, BZX79-C3V6... 500mW 3.6V 5% 250mA AXIAL, DO-35, (TAPED). | PHILIPS | BZX79-C3V6 |
| IC1 | 28469/759 | IC-ANALOGUE MULTIPLEXER DG508A... 8 INPUT, SINGLE, 15V & -15V, CMOS, 16 PIN, SMALL-OUTLINE. | ANALOG DEVICES LTD | MUX-08FS |
| IC2 | 28461/810 | IC-ANALOGUE OPERATIONAL AMP OPA602AU... SINGLE, 15V PRECISION HI SPEED, SETTLING TIME 1uS, GAIN | BURR-BROWN INTERNAT | OPA602AU |
| IC3 | 28461/888 | IC-ANALOGUE SWITCH DG419... SINGLE, 15V SPDT, ON-RESISTANCE<35R, CHANGEOVER, TTL COMPATIBLE, | TEMIC UK LTD | DG419DY |
| IC4 | 28461/458 | IC-ANALOGUE OPERATIONAL AMP OP37... 15V LOW NOISE, HI-SPEED, PRECISION, BIPOLAR, 8 PIN, | ANALOG DEVICES LTD | OP37GS |
| IC5 | 28461/888 | IC-ANALOGUE SWITCH DG419... SINGLE, 15V SPDT, ON-RESISTANCE<35R, CHANGEOVER, TTL COMPATIBLE, | TEMIC UK LTD | DG419DY |
| IC6 | 28461/458 | IC-ANALOGUE OPERATIONAL AMP OP37... 15V LOW NOISE, HI-SPEED, PRECISION, BIPOLAR, 8 PIN, | ANALOG DEVICES LTD | OP37GS |
| IC7 | 28385/995 | RELAY SOLID-STATE, OPTO-COUPLED, N/O, 1.2V CONTRL, 100V, 40mA MAX LOAD, MOS O/P, <0.5uV O/P OFFSET | HEWLETT-PACKARD | HSSR-8200 OPTION 300 |
| IC8 | 28461/810 | IC-ANALOGUE OPERATIONAL AMP OPA602AU... SINGLE, 15V PRECISION HI SPEED, SETTLING TIME 1uS, GAIN | BURR-BROWN INTERNAT | OPA602AU |
| IC9 | 28461/820 | IC-ANALOGUE D/A-CONVERTER 7248A... SINGLE, 15V 12 BIT, 8+4 LOADING, REL-ACC +/-1LSB, CMOS, 20 PIN, | ANALOG DEVICES LTD | AD7248AAR |
| IC10 | 28469/759 | IC-ANALOGUE MULTIPLEXER DG508A... 8 INPUT, SINGLE, 15V & -15V, CMOS, 16 PIN, SMALL-OUTLINE. | ANALOG DEVICES LTD | MUX-08FS |
| IC11 | 28461/458 | IC-ANALOGUE OPERATIONAL AMP OP37... 15V LOW NOISE, HI-SPEED, PRECISION, BIPOLAR, 8 PIN, | ANALOG DEVICES LTD | OP37GS |
| IC12 | 28461/888 | IC-ANALOGUE SWITCH DG419... SINGLE, 15V SPDT, ON-RESISTANCE<35R, CHANGEOVER, TTL COMPATIBLE, | TEMIC UK LTD | DG419DY |
| IC13 | 28461/458 | IC-ANALOGUE OPERATIONAL AMP OP37... 15V LOW NOISE, HI-SPEED, PRECISION, BIPOLAR, 8 PIN, | ANALOG DEVICES LTD | OP37GS |
| IC14 | 28461/806 | IC-ANALOGUE OPERATIONAL AMP OP-249... DUAL, PRECISION HI SPEED, SETTLING TIME-1.2uS, GAIN | ANALOG DEVICES LTD | OP-249GS |
| IC15 | 28461/999 | IC-ANALOGUE SWITCH DG441... QUAD, 15V SPST, ON-RESISTANCE<85R, 4 x N/O @ LOGIC 1, TTL | TEMIC UK LTD | DG441DY |
| IC16 | 28461/806 | IC-ANALOGUE OPERATIONAL AMP OP-249... DUAL, PRECISION HI SPEED, SETTLING TIME-1.2uS, GAIN | ANALOG DEVICES LTD | OP-249GS |
| IC17 | 28385/995 | RELAY SOLID-STATE, OPTO-COUPLED, N/O, 1.2V CONTRL, 100V, 40mA MAX LOAD, MOS O/P, <0.5uV O/P OFFSET | HEWLETT-PACKARD | HSSR-8200 OPTION 300 |
| IC18 | 28461/810 | IC-ANALOGUE OPERATIONAL AMP OPA602AU... SINGLE, 15V PRECISION HI SPEED, SETTLING TIME 1uS, GAIN | BURR-BROWN INTERNAT | OPA602AU |

## A3/1 Audio processor 1 (contd.)

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| IC19 | 28461/820 | IC-ANALOGUE D/A-CONVERTER 7248A... SINGLE, 15V 12 BIT, 8+4 LOADING, REL-ACC +/-1LSB, CMOS, 20 PIN, | ANALOG DEVICES LTD | AD7248AAR |
| IC20 | 28461/411 | IC-ANALOGUE OPERATIONAL AMP TL071... SINGLE, JFET INPUT, LOW NOISE, 8 PIN, SMALL-OUTLINE. | MOTOROLA INC. | TL071CD |
| IC21 | 28469/759 | IC-ANALOGUE MULTIPLEXER DG508A... 8 INPUT, SINGLE, 15V & -15V, CMOS, 16 PIN, SMALL-OUTLINE. | ANALOG DEVICES LTD | MUX-08FS |
| IC22 | 28461/458 | IC-ANALOGUE OPERATIONAL AMP OP37... 15V LOW NOISE, HI-SPEED, PRECISION, BIPOLAR, 8 PIN, | ANALOG DEVICES LTD | OP37GS |
| IC23 | 28461/888 | IC-ANALOGUE SWITCH DG419... SINGLE, 15V SPDT, ON-RESISTANCE<35R, CHANGEOVER, TTL COMPATIBLE, | TEMIC UK LTD | DG419DY |
| IC24 | 28461/458 | IC-ANALOGUE OPERATIONAL AMP OP37... 15V LOW NOISE, HI-SPEED, PRECISION, BIPOLAR, 8 PIN, | ANALOG DEVICES LTD | OP37GS |
| IC25 | 28461/411 | IC-ANALOGUE OPERATIONAL AMP TL071... SINGLE, JFET INPUT, LOW NOISE, 8 PIN, SMALL-OUTLINE. | MOTOROLA INC. | TL071CD |
| IC26 | 28461/411 | IC-ANALOGUE OPERATIONAL AMP TL071... SINGLE, JFET INPUT, LOW NOISE, 8 PIN, SMALL-OUTLINE. | MOTOROLA INC. | TL071CD |
| IC27 | 28461/888 | IC-ANALOGUE SWITCH DG419... SINGLE, 15V SPDT, ON-RESISTANCE<35R, CHANGEOVER, TTL COMPATIBLE, | TEMIC UK LTD | DG419DY |
| IC28 | 28461/070 | IC-ANALOGUE D/A-CONVERTER 7537... DUAL, 15V 12 BIT, 8+4 LOADING, REL-ACC +/-1/2 LSB, GAIN-ERROR | ANALOG DEVICES LTD | AD7537KP |
| IC29 | 28461/831 | IC-ANALOGUE FILTER MAX270... DUAL, INDEPENDENT, 2nd-ORDER, CONTINUOUS-TIME, LOW PASS, 1-25KHz, | MAXIM INTEG PRODUCTS | MAX270CWP |
| IC30 | 28461/830 | IC-ANALOGUE FILTER MAX260A... DUAL, 5V SWITCHED CAPACITOR, SECOND ORDER, MICROPROCESSOR INTERFACE, | MAXIM INTEG PRODUCTS | MAX260ACWG |
| IC31 | 28461/999 | IC-ANALOGUE SWITCH DG441... QUAD, 15V SPST, ON-RESISTANCE<85R, 4 x N/O @ LOGIC 1, TTL | TEMIC UK LTD | DG441DY |
| IC32 | 28461/830 | IC-ANALOGUE FILTER MAX260A... DUAL, 5V SWITCHED CAPACITOR, SECOND ORDER, MICROPROCESSOR INTERFACE, | MAXIM INTEG PRODUCTS | MAX260ACWG |
| IC33 | 28461/999 | IC-ANALOGUE SWITCH DG441... QUAD, 15V SPST, ON-RESISTANCE<85R, 4 x N/O @ LOGIC 1, TTL | TEMIC UK LTD | DG441DY |
| IC34 | 28461/999 | IC-ANALOGUE SWITCH DG441... QUAD, 15V SPST, ON-RESISTANCE<85R, 4 x N/O @ LOGIC 1, TTL | TEMIC UK LTD | DG441DY |
| IC35 | 28461/411 | IC-ANALOGUE OPERATIONAL AMP TL071... SINGLE, JFET INPUT, LOW NOISE, 8 PIN, SMALL-OUTLINE. | MOTOROLA INC. | TL071CD |
| IC36 | 28461/831 | IC-ANALOGUE FILTER MAX270... DUAL, INDEPENDENT, 2nd-ORDER, CONTINUOUS-TIME, LOW PASS, 1-25KHz, | MAXIM INTEG PRODUCTS | MAX270CWP |
| IC37 | 28461/999 | IC-ANALOGUE SWITCH DG441... QUAD, 15V SPST, ON-RESISTANCE<85R, 4 x N/O @ LOGIC 1, TTL | TEMIC UK LTD | DG441DY |
| IC38 | 28461/411 | IC-ANALOGUE OPERATIONAL AMP TL071... SINGLE, JFET INPUT, LOW NOISE, 8 PIN, SMALL-OUTLINE. | MOTOROLA INC. | TL071CD |
| IC39 | 28461/898 | IC-ANALOGUE D/A-CONVERTER 7528... 8 INPUT, DUAL, 8-BIT, BUFFERED, MULTIPLYING, CMOS, 20 PIN, | ANALOG DEVICES LTD | AD7528JR |
| IC40 | 28461/806 | IC-ANALOGUE OPERATIONAL AMP OP-249... DUAL, PRECISION HI SPEED, SETTLING TIME-1.2uS, GAIN | ANALOG DEVICES LTD | OP-249GS |
| IC41 | 28461/411 | IC-ANALOGUE OPERATIONAL AMP TL071... SINGLE, JFET INPUT, LOW NOISE, 8 PIN, SMALL-OUTLINE. | MOTOROLA INC. | TL071CD |
| IC42 | 28461/888 | IC-ANALOGUE SWITCH DG419... SINGLE, 15V SPDT, ON-RESISTANCE<35R, CHANGEOVER, TTL COMPATIBLE, | TEMIC UK LTD | DG419DY |
| IC43 | 28461/070 | IC-ANALOGUE D/A-CONVERTER 7537... DUAL, 15V 12 BIT, 8+4 LOADING, REL-ACC +/-1/2 LSB, GAIN-ERROR | ANALOG DEVICES LTD | AD7537KP |

## A3/1 Audio processor 1 (contd.)

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| IC44 | 28461/831 | IC-ANALOGUE FILTER MAX270... DUAL, INDEPENDENT, 2nd-ORDER, CONTINUOUS-TIME, LOW PASS, 1-25KHz, | MAXIM INTEG PRODUCTS | MAX270CWP |
| IC45 | 28461/830 | IC-ANALOGUE FILTER MAX260A... DUAL, 5V SWITCHED CAPACITOR, SECOND ORDER, MICROPROCESSOR INTERFACE, | MAXIM INTEG PRODUCTS | MAX260ACWG |
| IC46 | 28461/999 | IC-ANALOGUE SWITCH DG441... QUAD, 15V SPST, ON-RESISTANCE<85R, 4 x N/O @ LOGIC 1, TTL | TEMIC UK LTD | DG441DY |
| IC47 | 28461/830 | IC-ANALOGUE FILTER MAX260A... DUAL, 5V SWITCHED CAPACITOR, SECOND ORDER, MICROPROCESSOR INTERFACE, | MAXIM INTEG PRODUCTS | MAX260ACWG |
| IC48 | 28461/999 | IC-ANALOGUE SWITCH DG441... QUAD, 15V SPST, ON-RESISTANCE<85R, 4 x N/O @ LOGIC 1, TTL | TEMIC UK LTD | DG441DY |
| IC49 | 28461/999 | IC-ANALOGUE SWITCH DG441... QUAD, 15V SPST, ON-RESISTANCE<85R, 4 x N/O @ LOGIC 1, TTL | TEMIC UK LTD | DG441DY |
| IC50 | 28461/411 | IC-ANALOGUE OPERATIONAL AMP TL071... SINGLE, JFET INPUT, LOW NOISE, 8 PIN, SMALL-OUTLINE. | MOTOROLA INC. | TL071CD |
| IC51 | 28461/831 | IC-ANALOGUE FILTER MAX270... DUAL, INDEPENDENT, 2nd-ORDER, CONTINUOUS-TIME, LOW PASS, 1-25KHz, | MAXIM INTEG PRODUCTS | MAX270CWP |
| IC52 | 28461/999 | IC-ANALOGUE SWITCH DG441... QUAD, 15V SPST, ON-RESISTANCE<85R, 4 x N/O @ LOGIC 1, TTL | TEMIC UK LTD | DG441DY |
| IC53 | 28461/897 | IC-ANALOGUE OPERATIONAL AMP OP-27GS... 22V LOW NOISE, 8 PIN, SMALL-OUTLINE. | ANALOG DEVICES LTD | OP-27GS |
| IC54 | 28461/898 | IC-ANALOGUE D/A-CONVERTER 7528... 8 INPUT, DUAL, 8-BIT, BUFFERED, MULTIPLYING, CMOS, 20 PIN, | ANALOG DEVICES LTD | AD7528JR |
| IC55 | 28461/806 | IC-ANALOGUE OPERATIONAL AMP OP-249... DUAL, PRECISION HI SPEED, SETTLING TIME-1.2uS, GAIN | ANALOG DEVICES LTD | OP-249GS |
| IC56 | 28461/999 | IC-ANALOGUE SWITCH DG441... QUAD, 15V SPST, ON-RESISTANCE<85R, 4 x N/O @ LOGIC 1, TTL | TEMIC UK LTD | DG441DY |
| IC57 | 28461/897 | IC-ANALOGUE OPERATIONAL AMP OP-27GS... 22V LOW NOISE, 8 PIN, SMALL-OUTLINE. | ANALOG DEVICES LTD | OP-27GS |
| IC58 | 28461/888 | IC-ANALOGUE SWITCH DG419... SINGLE, 15V SPDT, ON-RESISTANCE<35R, CHANGEOVER, TTL COMPATIBLE, | TEMIC UK LTD | DG419DY |
| IC59 | 28467/111 | IC-MICRO PERIPHERAL, PCF8574... REMOTE 8-BIT I/O EXPANDER, I.IC BUS, UP TO 8 DEVICE ADDRESS | PHILIPS | PCF8574T |
| IC60 | 28461/673 | IC-ANALOGUE COMPARATOR LM339... QUAD, SINGLE SUPPLY, BIPOLAR, 14 PIN, SMALL-OUTLINE. | PHILIPS | LM339D |
| IC61 | 28467/111 | IC-MICRO PERIPHERAL, PCF8574... REMOTE 8-BIT I/O EXPANDER, I.IC BUS, UP TO 8 DEVICE ADDRESS | PHILIPS | PCF8574T |
| IC62 | 28467/110 | IC-MICRO PERIPHERAL, PCF8574A... REMOTE 8-BIT I/O EXPANDER, I.IC BUS, UP TO 16 DEVICE ADDRESS | PHILIPS | PCF8574AT |
| IC63 | 28467/110 | IC-MICRO PERIPHERAL, PCF8574A... REMOTE 8-BIT I/O EXPANDER, I.IC BUS, UP TO 16 DEVICE ADDRESS | PHILIPS | PCF8574AT |
| IC64 | 28469/057 | IC-DIGITAL INVERTER 74HC04... HEX, CMOS-H/SPEED, 14 PIN, SMALL-OUTLINE. | PHILIPS | 74HC04D |
| IC65 | 28464/185 | IC-DIGITAL COUNTER 74HC160... 4 INPUT, 4 BIT, SINGLE, BCD, PRESETTABLE, SYNCHRONOUS, | PHILIPS | 74HC160D |
| IC66 | 28462/438 | IC-DIGITAL LATCH 74HC373... OCTAL, TRANSPARENT WITH TRI-STATE BUS, CMOS-H/SPEED, 20 PIN, | PHILIPS | 74HC373D |
| IC67 | 28462/438 | IC-DIGITAL LATCH 74HC373... OCTAL, TRANSPARENT WITH TRI-STATE BUS, CMOS-H/SPEED, 20 PIN, | PHILIPS | 74HC373D |
| IC68 | 28465/056 | IC-DIGITAL DECODER/DEMULTIPLEX 74HC139... 2 INPUT, 4 BIT, DUAL, INVERTING, 1 BIT ADDRESS, | PHILIPS | 74HC139D |

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| **A3/1** | **Audio processor 1 (contd.)** | | | |
| IC69 | 28462/438 | IC-DIGITAL LATCH 74HC373... OCTAL, TRANSPARENT WITH TRI-STATE BUS, CMOS-H/SPEED, 20 PIN, | PHILIPS | 74HC373D |
| IC70 | 28465/056 | IC-DIGITAL DECODER/DEMULTIPLEX 74HC139... 2 INPUT, 4 BIT, DUAL, INVERTING, 1 BIT ADDRESS, | PHILIPS | 74HC139D |
| IC71 | 28465/056 | IC-DIGITAL DECODER/DEMULTIPLEX 74HC139... 2 INPUT, 4 BIT, DUAL, INVERTING, 1 BIT ADDRESS, | PHILIPS | 74HC139D |
| IC72 | 28462/438 | IC-DIGITAL LATCH 74HC373... OCTAL, TRANSPARENT WITH TRI-STATE BUS, CMOS-H/SPEED, 20 PIN, | PHILIPS | 74HC373D |
| IC73 | 28465/056 | IC-DIGITAL DECODER/DEMULTIPLEX 74HC139... 2 INPUT, 4 BIT, DUAL, INVERTING, 1 BIT ADDRESS, | PHILIPS | 74HC139D |
| IC74 | 28465/056 | IC-DIGITAL DECODER/DEMULTIPLEX 74HC139... 2 INPUT, 4 BIT, DUAL, INVERTING, 1 BIT ADDRESS, | PHILIPS | 74HC139D |
| IC75 | 28465/065 | IC-DIGITAL DECODER/DEMULTIPLEX 74HC154... 4-TO-16 LINE, CMOS-H/SPEED, 24 PIN, SMALL-OUTLINE. | PHILIPS | 74HC154D |
| IC76 | 28467/101 | IC-MICRO CONTROLLER, 82C54... PROGRAMMABLE INTERVAL TIMER, 8MHz, CMOS, 28 PIN, PLCC. | HARRIS SEMICONDUCTOR | CS82C54 |
| IC77 | 28467/101 | IC-MICRO CONTROLLER, 82C54... PROGRAMMABLE INTERVAL TIMER, 8MHz, CMOS, 28 PIN, PLCC. | HARRIS SEMICONDUCTOR | CS82C54 |
| IC78 | 28469/058 | IC-DIGITAL BUFFER/LINE-DRIVER 74HC244... 4 INPUT, 4 BIT, DUAL, NON-INVERTING, TRI-STATE BUS, | PHILIPS | 74HC244D |
| IC79 | 28466/120 | IC-DIGITAL OR-GATE 74HC32... 2 INPUT, QUAD, CMOS-H/SPEED, 14 PIN, SMALL-OUTLINE. | PHILIPS | 74HC32D |
| IC80 | 28461/897 | IC-ANALOGUE OPERATIONAL AMP OP-27GS... 22V LOW NOISE, 8 PIN, SMALL-OUTLINE. | ANALOG DEVICES LTD | OP-27GS |
| IC81 | 28461/897 | IC-ANALOGUE OPERATIONAL AMP OP-27GS... 22V LOW NOISE, 8 PIN, SMALL-OUTLINE. | ANALOG DEVICES LTD | OP-27GS |
| IC82 | 28461/458 | IC-ANALOGUE OPERATIONAL AMP OP37... 15V LOW NOISE, HI-SPEED, PRECISION, BIPOLAR, 8 PIN, | ANALOG DEVICES LTD | OP37GS |
| IC83 | 28461/897 | IC-ANALOGUE OPERATIONAL AMP OP-27GS... 22V LOW NOISE, 8 PIN, SMALL-OUTLINE. | ANALOG DEVICES LTD | OP-27GS |
| IC84 | 28461/897 | IC-ANALOGUE OPERATIONAL AMP OP-27GS... 22V LOW NOISE, 8 PIN, SMALL-OUTLINE. | ANALOG DEVICES LTD | OP-27GS |
| IC85 | 28461/458 | IC-ANALOGUE OPERATIONAL AMP OP37... 15V LOW NOISE, HI-SPEED, PRECISION, BIPOLAR, 8 PIN, | ANALOG DEVICES LTD | OP37GS |
| IC86 | 28461/897 | IC-ANALOGUE OPERATIONAL AMP OP-27GS... 22V LOW NOISE, 8 PIN, SMALL-OUTLINE. | ANALOG DEVICES LTD | OP-27GS |
| L1 to L5 | 23642/535 | INDUCTOR-FIXED 1uH +/- 5% EPOXY-MOULD, 400mA 0R7 MAX, 30 Q @ 7.96 MHz, 120 MHz SRF, SURFACE | MEGGITT ELECTRONICS | 3612-T-1R0-J |
| L6 to L13 | 23642/512 | INDUCTOR-FIXED 22uH +/- 5% EPOXY-MOULD, 110mA 3R7 MAX, 30 Q @ 2.5 MHz, 25 MHz SRF, SURFACE MOUNTED, | MEGGITT ELECTRONICS | 3612-T-220-J |
| PLA to PLH | 23435/120 | CONNECTOR MULTIWAY, PCB HEADER, 36 WAY, RIGHT ANGLED, 2.54mm PITCH, PINS GOLD PLATED TO CLASS 2, | BERG ELECTRONICS | 75168-101-36 |
| PLJ | 23436/901 | CONNECTOR MULTIWAY, PCB HEADER, 16 WAY, RIGHT ANGLED, 2-ROW, 2.54mm GRID, POLARISED, SHROUDED, | THOMAS & BETTS LTD | 609-1607 |
| PLM | 23435/120 | CONNECTOR MULTIWAY, PCB HEADER, 36 WAY, RIGHT ANGLED, 2.54mm PITCH, PINS GOLD PLATED TO CLASS 2, | BERG ELECTRONICS | 75168-101-36 |

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| **A3/1 Audio processor 1 (contd.)** | | | | |
| PLN | 23435/120 | CONNECTOR MULTIWAY, PCB HEADER, 36 WAY, RIGHT ANGLED, 2.54mm PITCH, PINS GOLD PLATED TO CLASS 2, | BERG ELECTRONICS | 75168-101-36 |
| R1 | 24811/188 | RESISTOR-FIXED METAL-FILM 4K32 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-4K32-1%50ppm |
| R2 | 24811/175 | RESISTOR-FIXED METAL-FILM 1K21 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-1K21-1%50ppm |
| R3 | 24811/208 | RESISTOR-FIXED METAL-FILM 30K1 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-30K1-1%50ppm |
| R4 | 24811/642 | RESISTOR-FIXED METAL-FILM 7K5 +/- 0.1% 250mW 200V 15 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-7K5-0.1%-15 |
| R5 | 24811/640 | RESISTOR-FIXED METAL-FILM 1K54 +/- 0.1% 250mW 200V 15 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-1K54-0.1%-15 |
| R6 | 24811/218 | RESISTOR-FIXED METAL-FILM 75K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-75K-1%50ppm |
| R7 | 24811/642 | RESISTOR-FIXED METAL-FILM 7K5 +/- 0.1% 250mW 200V 15 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-7K5-0.1%-15 |
| R8 | 24811/640 | RESISTOR-FIXED METAL-FILM 1K54 +/- 0.1% 250mW 200V 15 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-1K54-0.1%-15 |
| R9 | 24811/218 | RESISTOR-FIXED METAL-FILM 75K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-75K-1%50ppm |
| R10 | 24811/641 | RESISTOR-FIXED METAL-FILM 2K +/- 0.1% 250mW 200V 15 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-2K0-0.1%-15 |
| R11 | 24811/641 | RESISTOR-FIXED METAL-FILM 2K +/- 0.1% 250mW 200V 15 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-2K0-0.1%-15 |
| R12 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R13 | 24811/637 | RESISTOR-FIXED METAL-FILM 392R +/- 0.1% 250mW 200V 15 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-392R-0.1%-15 |
| R14 | 24811/641 | RESISTOR-FIXED METAL-FILM 2K +/- 0.1% 250mW 200V 15 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-2K0-0.1%-15 |
| R15 | 24811/178 | RESISTOR-FIXED METAL-FILM 1K62 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-1K62-1%50ppm |
| R16 | 24811/155 | RESISTOR-FIXED METAL-FILM 182R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-182R-1%50ppm |
| R17 | 24811/202 | RESISTOR-FIXED METAL-FILM 16K2 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-16K2-1%50ppm |
| R18 | 24811/178 | RESISTOR-FIXED METAL-FILM 1K62 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-1K62-1%50ppm |
| R19 | 24811/155 | RESISTOR-FIXED METAL-FILM 182R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-182R-1%50ppm |
| R20 | 24811/202 | RESISTOR-FIXED METAL-FILM 16K2 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-16K2-1%50ppm |
| R21 | 24811/178 | RESISTOR-FIXED METAL-FILM 1K62 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-1K62-1%50ppm |
| R22 | 24811/155 | RESISTOR-FIXED METAL-FILM 182R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-182R-1%50ppm |
| R23 | 24811/202 | RESISTOR-FIXED METAL-FILM 16K2 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-16K2-1%50ppm |

## A3/1 Audio processor 1 (contd.)

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| R24 | 24811/178 | RESISTOR-FIXED METAL-FILM 1K62 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-1K62-1%50ppm |
| R25 | 24811/155 | RESISTOR-FIXED METAL-FILM 182R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-182R-1%50ppm |
| R26 | 24811/202 | RESISTOR-FIXED METAL-FILM 16K2 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-16K2-1%50ppm |
| R27 | 24811/133 | RESISTOR-FIXED METAL-FILM 22R1 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-22R1-1%50ppm |
| R30 | 24811/221 | RESISTOR-FIXED METAL-FILM 100K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100K-1%50ppm |
| R31 | 24811/244 | RESISTOR-FIXED METAL-FILM 909K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-909K-1%50ppm |
| R32 | 24811/245 | RESISTOR-FIXED METAL-FILM 1M +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1M0-1%50ppm |
| R33 | 24811/196 | RESISTOR-FIXED METAL-FILM 9K09 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-9K09-1%50ppm |
| R34 | 24811/211 | RESISTOR-FIXED METAL-FILM 39K2 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-39K2-1%50ppm |
| R35 | 24811/185 | RESISTOR-FIXED METAL-FILM 3K32 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-3K32-1%50ppm |
| R36 | 24811/179 | RESISTOR-FIXED METAL-FILM 1K82 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-1K82-1%50ppm |
| R37 | 24811/143 | RESISTOR-FIXED METAL-FILM 56R2 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-56R2-1%50ppm |
| R38 | 24811/239 | RESISTOR-FIXED METAL-FILM 562K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-562K-1%50ppm |
| R39 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R40 to R44 | 24811/156 | RESISTOR-FIXED METAL-FILM 200R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-200R-1%50ppm |
| R45 | 24811/178 | RESISTOR-FIXED METAL-FILM 1K62 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-1K62-1%50ppm |
| R46 | 24811/155 | RESISTOR-FIXED METAL-FILM 182R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-182R-1%50ppm |
| R47 | 24811/202 | RESISTOR-FIXED METAL-FILM 16K2 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-16K2-1%50ppm |
| R48 | 24811/178 | RESISTOR-FIXED METAL-FILM 1K62 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-1K62-1%50ppm |
| R49 | 24811/155 | RESISTOR-FIXED METAL-FILM 182R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-182R-1%50ppm |
| R50 | 24811/202 | RESISTOR-FIXED METAL-FILM 16K2 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-16K2-1%50ppm |
| R51 | 24811/178 | RESISTOR-FIXED METAL-FILM 1K62 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-1K62-1%50ppm |
| R52 | 24811/155 | RESISTOR-FIXED METAL-FILM 182R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-182R-1%50ppm |
| R53 | 24811/202 | RESISTOR-FIXED METAL-FILM 16K2 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-16K2-1%50ppm |
| R54 to R59 | 24811/238 | RESISTOR-FIXED METAL-FILM 511K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-511K-1%50ppm |

## A3/1 Audio processor 1 (contd.)

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| R60 | 24811/212 | RESISTOR-FIXED METAL-FILM 43K2 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-43K2-1%50ppm |
| R61 | 24811/177 | RESISTOR-FIXED METAL-FILM 1K5 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K5-1%50ppm |
| R62 | 24811/133 | RESISTOR-FIXED METAL-FILM 22R1 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-22R1-1%50ppm |
| R65 | 24811/221 | RESISTOR-FIXED METAL-FILM 100K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100K-1%50ppm |
| R66 | 24811/244 | RESISTOR-FIXED METAL-FILM 909K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-909K-1%50ppm |
| R67 | 24811/245 | RESISTOR-FIXED METAL-FILM 1M +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1M0-1%50ppm |
| R68 | 24811/196 | RESISTOR-FIXED METAL-FILM 9K09 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-9K09-1%50ppm |
| R69 | 24811/215 | RESISTOR-FIXED METAL-FILM 56K2 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-56K2-1%50ppm |
| R70 | 24811/185 | RESISTOR-FIXED METAL-FILM 3K32 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-3K32-1%50ppm |
| R71 | 24811/179 | RESISTOR-FIXED METAL-FILM 1K82 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-1K82-1%50ppm |
| R72 | 24811/143 | RESISTOR-FIXED METAL-FILM 56R2 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-56R2-1%50ppm |
| R73 | 24811/239 | RESISTOR-FIXED METAL-FILM 562K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-562K-1%50ppm |
| R74 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R75 to R79 | 24811/156 | RESISTOR-FIXED METAL-FILM 200R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-200R-1%50ppm |
| R80 | 24811/178 | RESISTOR-FIXED METAL-FILM 1K62 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-1K62-1%50ppm |
| R81 | 24811/155 | RESISTOR-FIXED METAL-FILM 182R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-182R-1%50ppm |
| R82 | 24811/202 | RESISTOR-FIXED METAL-FILM 16K2 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-16K2-1%50ppm |
| R83 | 24811/178 | RESISTOR-FIXED METAL-FILM 1K62 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-1K62-1%50ppm |
| R84 | 24811/155 | RESISTOR-FIXED METAL-FILM 182R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-182R-1%50ppm |
| R85 | 24811/202 | RESISTOR-FIXED METAL-FILM 16K2 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-16K2-1%50ppm |
| R86 | 24811/178 | RESISTOR-FIXED METAL-FILM 1K62 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-1K62-1%50ppm |
| R87 | 24811/155 | RESISTOR-FIXED METAL-FILM 182R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-182R-1%50ppm |
| R88 | 24811/202 | RESISTOR-FIXED METAL-FILM 16K2 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-16K2-1%50ppm |
| R89 | 24811/177 | RESISTOR-FIXED METAL-FILM 1K5 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K5-1%50ppm |
| R90 | 24811/171 | RESISTOR-FIXED METAL-FILM 825R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-825R-1%50ppm |

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| **A3/1 Audio processor 1 (contd.)** | | | | |
| R91 | 24811/225 | RESISTOR-FIXED METAL-FILM 150K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-150K-1%50ppm |
| R92 | 24811/177 | RESISTOR-FIXED METAL-FILM 1K5 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K5-1%50ppm |
| R93 | 24811/170 | RESISTOR-FIXED METAL-FILM 750R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-750R-1%50ppm |
| R95 | 24811/221 | RESISTOR-FIXED METAL-FILM 100K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100K-1%50ppm |
| R96 | 24811/189 | RESISTOR-FIXED METAL-FILM 4K75 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-4K75-1%50ppm |
| R97 | 24811/189 | RESISTOR-FIXED METAL-FILM 4K75 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-4K75-1%50ppm |
| R98 | 24811/221 | RESISTOR-FIXED METAL-FILM 100K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100K-1%50ppm |
| R99 | 24811/101 | RESISTOR-FIXED METAL-FILM 1R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1R-1%-50ppm |
| R101 | 24811/176 | RESISTOR-FIXED METAL-FILM 1K3 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K3-1%50ppm |
| R106 | 24811/217 | RESISTOR-FIXED METAL-FILM 68K1 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-68K1-1%50ppm |
| R107 | 24811/208 | RESISTOR-FIXED METAL-FILM 30K1 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-30K1-1%50ppm |
| R108 | 24811/221 | RESISTOR-FIXED METAL-FILM 100K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100K-1%50ppm |
| R109 | 24811/177 | RESISTOR-FIXED METAL-FILM 1K5 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K5-1%50ppm |
| R110 | 24811/189 | RESISTOR-FIXED METAL-FILM 4K75 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-4K75-1%50ppm |
| R111 | 24811/234 | RESISTOR-FIXED METAL-FILM 365K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-365K-1%50ppm |
| R112 | 24811/177 | RESISTOR-FIXED METAL-FILM 1K5 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K5-1%50ppm |
| R114 | 24811/225 | RESISTOR-FIXED METAL-FILM 150K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-150K-1%50ppm |
| R117 | 24811/184 | RESISTOR-FIXED METAL-FILM 3K01 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-3K01-1%50ppm |
| R118 | 24811/189 | RESISTOR-FIXED METAL-FILM 4K75 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-4K75-1%50ppm |
| R119 | 24811/189 | RESISTOR-FIXED METAL-FILM 4K75 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-4K75-1%50ppm |
| R120 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R121 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R122 | 24811/221 | RESISTOR-FIXED METAL-FILM 100K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100K-1%50ppm |
| R123 | 24811/221 | RESISTOR-FIXED METAL-FILM 100K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100K-1%50ppm |
| R124 | 24811/101 | RESISTOR-FIXED METAL-FILM 1R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1R-1%-50ppm |

## A3/1 Audio processor 1 (contd.)

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| R126 | 24811/176 | RESISTOR-FIXED METAL-FILM 1K3 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K3-1%50ppm |
| R131 | 24811/217 | RESISTOR-FIXED METAL-FILM 68K1 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-68K1-1%50ppm |
| R132 | 24811/208 | RESISTOR-FIXED METAL-FILM 30K1 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-30K1-1%50ppm |
| R133 | 24811/221 | RESISTOR-FIXED METAL-FILM 100K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100K-1%50ppm |
| R134 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R137 | 24811/177 | RESISTOR-FIXED METAL-FILM 1K5 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K5-1%50ppm |
| R139 | 24811/225 | RESISTOR-FIXED METAL-FILM 150K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-150K-1%50ppm |
| R142 | 24811/184 | RESISTOR-FIXED METAL-FILM 3K01 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-3K01-1%50ppm |
| R143 | 24811/172 | RESISTOR-FIXED METAL-FILM 909R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-909R-1%50ppm |
| R144 | 24811/208 | RESISTOR-FIXED METAL-FILM 30K1 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-30K1-1%50ppm |
| R145 | 24811/157 | RESISTOR-FIXED METAL-FILM 221R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-221R-1%50ppm |
| R146 | 24811/165 | RESISTOR-FIXED METAL-FILM 475R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-475R-1%50ppm |
| R147 | 24811/192 | RESISTOR-FIXED METAL-FILM 6K19 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-6K19-1%50ppm |
| R148 | 24811/171 | RESISTOR-FIXED METAL-FILM 825R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-825R-1%50ppm |
| R149 | 24811/185 | RESISTOR-FIXED METAL-FILM 3K32 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-3K32-1%50ppm |
| R150 | 24811/177 | RESISTOR-FIXED METAL-FILM 1K5 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K5-1%50ppm |
| R151 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R152 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R153 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R154 | 24811/185 | RESISTOR-FIXED METAL-FILM 3K32 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-3K32-1%50ppm |
| R155 | 24811/185 | RESISTOR-FIXED METAL-FILM 3K32 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-3K32-1%50ppm |
| R157 | 24811/189 | RESISTOR-FIXED METAL-FILM 4K75 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-4K75-1%50ppm |
| R159 | 24811/189 | RESISTOR-FIXED METAL-FILM 4K75 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-4K75-1%50ppm |
| R160 to R163 | 24811/181 | RESISTOR-FIXED METAL-FILM 2K21 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-2K21-1%50ppm |
| R164 to R167 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| **A3/1 Audio processor 1 (contd.)** | | | | |
| R168 | 24811/201 | RESISTOR-FIXED METAL-FILM 15K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-15K-1%50ppm |
| R169 to R175 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R176 | 24811/146 | RESISTOR-FIXED METAL-FILM 75R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-75R0-1%50ppm |
| R177 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R178 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R179 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R185 | 24811/221 | RESISTOR-FIXED METAL-FILM 100K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100K-1%50ppm |
| R186 | 24811/221 | RESISTOR-FIXED METAL-FILM 100K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100K-1%50ppm |
| R187 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R188 | 24811/185 | RESISTOR-FIXED METAL-FILM 3K32 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-3K32-1%50ppm |
| R189 | 24811/185 | RESISTOR-FIXED METAL-FILM 3K32 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-3K32-1%50ppm |
| R190 to R196 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R197 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R198 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R200 to R207 | 24338/004 | RESISTOR-FIXED METAL-GLAZE 150R +/- 5% 1W 100V 350 ppm/DEG.C, SURFACE MOUNTED, SIZE 2512, (12mm | VISHAY COMPONENTS | CR2512-150R-5%-P4 |
| R208 to R214 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R215 to R218 | 24811/181 | RESISTOR-FIXED METAL-FILM 2K21 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-2K21-1%50ppm |
| R221 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R222 to R225 | 24811/149 | RESISTOR-FIXED METAL-FILM 100R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100R-1%50ppm |
| R226 | 24811/177 | RESISTOR-FIXED METAL-FILM 1K5 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K5-1%50ppm |
| R227 | 24811/207 | RESISTOR-FIXED METAL-FILM 27K4 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-27K4-1%50ppm |
| R228 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R229 | 24811/177 | RESISTOR-FIXED METAL-FILM 1K5 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K5-1%50ppm |
| R230 | 24811/207 | RESISTOR-FIXED METAL-FILM 27K4 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-27K4-1%50ppm |
| R231 | 24811/199 | RESISTOR-FIXED METAL-FILM 12K1 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-12K1-1%50ppm |

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| **A3/1 Audio processor 1 (contd.)** | | | | |
| R232 | 24811/141 | RESISTOR-FIXED METAL-FILM 47R5 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-47R5-1%50ppm |
| R233 | 24811/141 | RESISTOR-FIXED METAL-FILM 47R5 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-47R5-1%50ppm |
| R234 | 24811/606 | RESISTOR-FIXED METAL-FILM 1K +/- 0.1% 250mW 200V 15 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-1K0-0.1%-15 |
| R235 | 24811/605 | RESISTOR-FIXED METAL-FILM 15K +/- 0.1% 250mW 200V 15 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-15K0-0.1%-15 |
| R236 | 24811/141 | RESISTOR-FIXED METAL-FILM 47R5 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-47R5-1%50ppm |
| R237 | 24811/141 | RESISTOR-FIXED METAL-FILM 47R5 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-47R5-1%50ppm |
| R238 | 24811/606 | RESISTOR-FIXED METAL-FILM 1K +/- 0.1% 250mW 200V 15 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-1K0-0.1%-15 |
| R239 | 24811/605 | RESISTOR-FIXED METAL-FILM 15K +/- 0.1% 250mW 200V 15 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-15K0-0.1%-15 |
| RLA to RLF | 23486/166 | RELAY MAGNETIC, DOUBLE-POLE CHANGEOVER, 12V COIL, 720R - CONTACTS 1A, 125V, MAX LOAD 30W, PCB | FUJITSU LTD | FBR46-N-D012-P |
| TR1 to TR4 | 28459/079 | TRANSISTOR N-CHANNEL-ENHANCE MOSFET SST211... 10V 350mW 50mA 75R ON 1nS, OFF 2nS, MARKING CODE D1**, | TEMIC UK LTD | SST211-T1 |
| TR5 | 28487/811 | TRANSISTOR NPN BIPOLAR BC818-40... 25V 170MHz 330mW 500mA 250hFE MIN @ 100mA, MARKING CODE 6G, | PHILIPS | BC818-40 |
| TR6 | 28487/811 | TRANSISTOR NPN BIPOLAR BC818-40... 25V 170MHz 330mW 500mA 250hFE MIN @ 100mA, MARKING CODE 6G, | PHILIPS | BC818-40 |
| TR7 | 28487/811 | TRANSISTOR NPN BIPOLAR BC818-40... 25V 170MHz 330mW 500mA 250hFE MIN @ 100mA, MARKING CODE 6G, | PHILIPS | BC818-40 |
| TR8 | 28487/811 | TRANSISTOR NPN BIPOLAR BC818-40... 25V 170MHz 330mW 500mA 250hFE MIN @ 100mA, MARKING CODE 6G, | PHILIPS | BC818-40 |
| TR9 | 28487/811 | TRANSISTOR NPN BIPOLAR BC818-40... 25V 170MHz 330mW 500mA 250hFE MIN @ 100mA, MARKING CODE 6G, | PHILIPS | BC818-40 |
| TR10 | 28487/811 | TRANSISTOR NPN BIPOLAR BC818-40... 25V 170MHz 330mW 500mA 250hFE MIN @ 100mA, MARKING CODE 6G, | PHILIPS | BC818-40 |

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|

## A4 PPH, RTP and TTP

When ordering, prefix circuit reference with A4.

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|---|---|---|---|---|
| | 44829-834 | Complete unit | Issue 10 | |
| C2 | 26451/010 | CAPACITOR-FIXED ALUMINIUM 100uF +/-20% 6.3V ELECTROLYTIC, SURFACE-MOUNTED, SIZE 6.6 x 6.6mm, | PANASONIC INDUSTRIAL | ECE-V-0JA-101P |
| C3 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C4 | 26451/008 | CAPACITOR-FIXED ALUMINIUM 47uF +/-20% 6.3V ELECTROLYTIC, SURFACE-MOUNTED, SIZE 5.3 x 5.3mm, | PANASONIC INDUSTRIAL | ECE-V-0JA-470P |
| C5 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C6 | 26451/010 | CAPACITOR-FIXED ALUMINIUM 100uF +/-20% 6.3V ELECTROLYTIC, SURFACE-MOUNTED, SIZE 6.6 x 6.6mm, | PANASONIC INDUSTRIAL | ECE-V-0JA-101P |
| C7 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C8 | 26451/008 | CAPACITOR-FIXED ALUMINIUM 47uF +/-20% 6.3V ELECTROLYTIC, SURFACE-MOUNTED, SIZE 5.3 x 5.3mm, | PANASONIC INDUSTRIAL | ECE-V-0JA-470P |
| C9 to C112 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C113 to C115 | 26386/899 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | ROHM ELECTRONICS LTD | MCH31-5C-104-KP |
| C116 to C120 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C121 | 26386/899 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | ROHM ELECTRONICS LTD | MCH31-5C-104-KP |
| C122 | 26386/899 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | ROHM ELECTRONICS LTD | MCH31-5C-104-KP |
| C123 to C136 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C137 | 26386/899 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | ROHM ELECTRONICS LTD | MCH31-5C-104-KP |
| IC1 | 28469/049 | IC-DIGITAL TRANSCEIVER 74HCT245... OCTAL, BI-DIRECTIONAL, TRI-STATE BUS, CMOS-H/SPEED+TTL, | PHILIPS | 74HCT245D |
| IC2 | 28467/096 | IC-MICRO PROCESSOR, 16 BIT, 68000... 10MHz, CHMOS, 68 PIN, PLCC. | SGS-THOMSON | EF68000/FN/10 |
| IC3 | 28469/049 | IC-DIGITAL TRANSCEIVER 74HCT245... OCTAL, BI-DIRECTIONAL, TRI-STATE BUS, CMOS-H/SPEED+TTL, | PHILIPS | 74HCT245D |
| IC4 | 28471/065 | IC-MICRO EEPROM, 128K x 8 BIT, 29F010... 90nS, 5V ONLY, FLASH MEMORY, 1000 ERASE/PROGRAMME CYCLES, | ADVANCED MICRO DEV | AM29F010-90JC |
| IC5 | 28467/117 | IC-MICRO STATIC-RAM, 128K x 8 BIT, HM628128... 5V, 100nS, 50uA MAX STANDBY CURRENT, CMOS, 32 PIN, | TOSHIBA (UK) LTD | TC551001BFL-10L |
| IC6 | 44535/309 | IC-PROGRAMMED PAL, SET OF 1, 2965, A4 PPH DECODER. | IFR LTD | |
| IC7 | 28469/607 | IC-DIGITAL FIELDPROG-GATE-ARRAY XC3030... 3000 GATES, 100 LOGIC BLOCKS, 80 INPUT/OUTPUTS, ZERO | XILINX (USA) | XC3030-100PQ100C |
| IC8 | 28471/065 | IC-MICRO EEPROM, 128K x 8 BIT, 29F010... 90nS, 5V ONLY, FLASH MEMORY, 1000 ERASE/PROGRAMME CYCLES, | ADVANCED MICRO DEV | AM29F010-90JC |

## A4 PPH, RTP and TTP (contd.)

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| IC9 | 28467/117 | IC-MICRO STATIC-RAM, 128K x 8 BIT, HM628128... 5V, 100nS, 50uA MAX STANDBY CURRENT, CMOS, 32 PIN, | TOSHIBA (UK) LTD | TC551001BFL-10L |
| IC10 | 28467/101 | IC-MICRO CONTROLLER, 82C54... PROGRAMMABLE INTERVAL TIMER, 8MHz, CMOS, 28 PIN, PLCC. | HARRIS SEMICONDUCTOR | CS82C54 |
| IC11 | 28467/159 | IC-MICRO DIGIT/SGNL PROCESSR, ADSP2115... 16.7MHz, DIGITAL SIGNAL PROCESSING, 1K PROGRAM & 512 WORD | ANALOG DEVICES LTD | ADSP-2115KP-66 |
| IC12 | 28467/157 | IC-MICRO STATIC-RAM, 32K x 8 BIT, KM68257B... 15nS ACCESS, STANDBY CURRENT 40mA MAX, J-LEADS, CMOS, | INTEG DEVICE TECH | IDT71256SA-15Y(TUBE) |
| IC13 | 28467/157 | IC-MICRO STATIC-RAM, 32K x 8 BIT, KM68257B... 15nS ACCESS, STANDBY CURRENT 40mA MAX, J-LEADS, CMOS, | INTEG DEVICE TECH | IDT71256SA-15Y(TUBE) |
| IC14 | 28467/156 | IC-MICRO STATIC-RAM, 8K x 8 BIT, KM6865B... 15nS ACCESS, STANDBY CURRENT 40mA MAX, J-LEADS, CMOS, | INTEG DEVICE TECH | IDT7164S-15Y(TUBE) |
| IC15 | 44535/311 | IC-PROGRAMMED PAL, SET OF 1, 2965, A4 DECFAST. | IFR LTD | |
| IC16 | 44535/310 | IC-PROGRAMMED PAL, SET OF 1, 2965, A4 BR TXR. | IFR LTD | |
| IC17 | 28467/159 | IC-MICRO DIGIT/SGNL PROCESSR, ADSP2115... 16.7MHz, DIGITAL SIGNAL PROCESSING, 1K PROGRAM & 512 WORD | ANALOG DEVICES LTD | ADSP-2115KP-66 |
| IC18 | 28467/157 | IC-MICRO STATIC-RAM, 32K x 8 BIT, KM68257B... 15nS ACCESS, STANDBY CURRENT 40mA MAX, J-LEADS, CMOS, | INTEG DEVICE TECH | IDT71256SA-15Y(TUBE) |
| IC19 | 28467/157 | IC-MICRO STATIC-RAM, 32K x 8 BIT, KM68257B... 15nS ACCESS, STANDBY CURRENT 40mA MAX, J-LEADS, CMOS, | INTEG DEVICE TECH | IDT71256SA-15Y(TUBE) |
| IC20 | 28467/156 | IC-MICRO STATIC-RAM, 8K x 8 BIT, KM6865B... 15nS ACCESS, STANDBY CURRENT 40mA MAX, J-LEADS, CMOS, | INTEG DEVICE TECH | IDT7164S-15Y(TUBE) |
| IC21 | 44535/311 | IC-PROGRAMMED PAL, SET OF 1, 2965, A4 DECFAST. | IFR LTD | |
| IC22 | 44535/310 | IC-PROGRAMMED PAL, SET OF 1, 2965, A4 BR TXR. | IFR LTD | |
| IC23 | 28469/028 | IC-DIGITAL BUFFER/LINE-DRIVER 74HCT244... OCTAL, NON-INVERTING, TRI-STATE BUS, CMOS-H/SPEED+TTL, 20 | PHILIPS | 74HCT244D |
| IC24 | 28469/052 | IC-DIGITAL BUFFER 74HC365... HEX, TRI-STATE, NON-INVERTING, CMOS-H/SPEED, 16 PIN, | PHILIPS | 74HC365D |
| IC25 | 28469/769 | IC-DIGITAL MULTIPLEXER 74AC157... 2 INPUT, 4 BIT, SINGLE, NON-INVERTING DATA-SELECTION, | NAT. SEMICONDUCTOR | 74AC157SC |
| IC26 | 28465/053 | IC-DIGITAL DECODER/DEMULTIPLEX 74HCT138... 3 INPUT, 8 BIT, SINGLE, INVERTING, 3 BIT ADDRESS, | PHILIPS | 74HCT138D |
| IC27 | 28469/030 | IC-DIGITAL BUFFER/LINE-DRIVER 74HCT541... OCTAL, TRI-STATE, NON-INVERTING, CMOS-H/SPEED+TTL, 20 | PHILIPS | 74HCT541D |
| IC28 | 28469/099 | IC-DIGITAL TRANSCEIVER/REGISTER 74FCT652... OCTAL, TRI-STATE, NON-INVERTING, CMOS-FAST+TTL, 24 PIN, | HARRIS SEMICONDUCTOR | CD74FCT652M |
| IC29 | 28469/099 | IC-DIGITAL TRANSCEIVER/REGISTER 74FCT652... OCTAL, TRI-STATE, NON-INVERTING, CMOS-FAST+TTL, 24 PIN, | HARRIS SEMICONDUCTOR | CD74FCT652M |
| IC30 | 28465/053 | IC-DIGITAL DECODER/DEMULTIPLEX 74HCT138... 3 INPUT, 8 BIT, SINGLE, INVERTING, 3 BIT ADDRESS, | PHILIPS | 74HCT138D |
| IC31 | 28466/029 | IC-DIGITAL AND-GATE 74HCT21... 4 INPUT, DUAL, CMOS-H/SPEED+TTL, 14 PIN, SMALL-OUTLINE. | PHILIPS | 74HCT21D |
| L1 | 23642/801 | FILTER RFI-SUPPRESSION, 3A RATING, SURFACE MOUNT, MULTILAYER IMPEDER, 95R IMPEDANCE @ 10MHz, 0.04R | TDK UK LTD | HF50ACC-575032-T |

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
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## A4 PPH, RTP and TTP (contd.)

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|---|---|---|---|---|
| PLA | 23437/061 | CONNECTOR MULTIWAY, PCB HEADER, 10 WAY, STAGGERED 2-ROW, 2.54mm PITCH, SURFACE MOUNTING, TIN PLATED | LUMBERG UK LTD | MICS/SMD10RP |
| PLB | 23437/064 | CONNECTOR MULTIWAY, PCB HEADER, 20 WAY, STAGGERED 2-ROW, 2.54mm PITCH, SURFACE MOUNTING, TIN PLATED | LUMBERG UK LTD | MICS/SMD20RP |
| PLC | 23437/062 | CONNECTOR MULTIWAY, PCB HEADER, 14 WAY, STAGGERED 2-ROW, 2.54mm PITCH, SURFACE MOUNTING, TIN PLATED | LUMBERG UK LTD | MICS/SMD14RP |
| PLD | 23437/063 | CONNECTOR MULTIWAY, PCB HEADER, 16 WAY, STAGGERED 2-ROW, 2.54mm PITCH, SURFACE MOUNTING, TIN PLATED | LUMBERG UK LTD | MICS/SMD16RP |
| PLE | 23437/061 | CONNECTOR MULTIWAY, PCB HEADER, 10 WAY, STAGGERED 2-ROW, 2.54mm PITCH, SURFACE MOUNTING, TIN PLATED | LUMBERG UK LTD | MICS/SMD10RP |
| PLF | 23437/064 | CONNECTOR MULTIWAY, PCB HEADER, 20 WAY, STAGGERED 2-ROW, 2.54mm PITCH, SURFACE MOUNTING, TIN PLATED | LUMBERG UK LTD | MICS/SMD20RP |
| PLG | 23437/064 | CONNECTOR MULTIWAY, PCB HEADER, 20 WAY, STAGGERED 2-ROW, 2.54mm PITCH, SURFACE MOUNTING, TIN PLATED | LUMBERG UK LTD | MICS/SMD20RP |
| PLH | 23437/062 | CONNECTOR MULTIWAY, PCB HEADER, 14 WAY, STAGGERED 2-ROW, 2.54mm PITCH, SURFACE MOUNTING, TIN PLATED | LUMBERG UK LTD | MICS/SMD14RP |
| PLN | 23437/064 | CONNECTOR MULTIWAY, PCB HEADER, 20 WAY, STAGGERED 2-ROW, 2.54mm PITCH, SURFACE MOUNTING, TIN PLATED | LUMBERG UK LTD | MICS/SMD20RP |
| PLW | 23437/062 | CONNECTOR MULTIWAY, PCB HEADER, 14 WAY, STAGGERED 2-ROW, 2.54mm PITCH, SURFACE MOUNTING, TIN PLATED | LUMBERG UK LTD | MICS/SMD14RP |
| PLAQ | 23437/069 | CONNECTOR MULTIWAY, PCB HEADER, 50 WAY, STRAIGHT, 2-ROW, 2mm GRID, STACKABLE, SURFACE MOUNTING, PINS | MOLEX ELECTRONICS | 87267-5050 |
| PLJK | 23437/064 | CONNECTOR MULTIWAY, PCB HEADER, 20 WAY, STAGGERED 2-ROW, 2.54mm PITCH, SURFACE MOUNTING, TIN PLATED | LUMBERG UK LTD | MICS/SMD20RP |
| R101 to R103 | 24811/165 | RESISTOR-FIXED METAL-FILM 475R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-475R-1%50ppm |
| R104 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R107 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R108 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R109 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R111 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R112 | 24811/135 | RESISTOR-FIXED METAL-FILM 27R4 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-27R4-1%50ppm |
| R113 | 24811/228 | RESISTOR-FIXED METAL-FILM 200K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-200K-1%50ppm |
| R115 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R116 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R117 | 24811/165 | RESISTOR-FIXED METAL-FILM 475R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-475R-1%50ppm |
| R118 | 24811/165 | RESISTOR-FIXED METAL-FILM 475R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-475R-1%50ppm |

## A4 PPH, RTP and TTP (contd.)

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| R119 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R120 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R121 to R130 | 24811/165 | RESISTOR-FIXED METAL-FILM 475R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-475R-1%50ppm |
| R201 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R202 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R203 to R207 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R209 | 24811/135 | RESISTOR-FIXED METAL-FILM 27R4 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-27R4-1%50ppm |
| R210 | 24681/549 | RESISTOR-NETWORK BUSSED, THICK-FILM, 22K 2% 600mW 50V 200 ppm/DEG.C, 15 RESISTORS, SURFACE MOUNTED, | VISHAY COMPONENTS | SOMC16-01-223-G-TUBE |
| R211 | 24811/165 | RESISTOR-FIXED METAL-FILM 475R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-475R-1%50ppm |
| R301 | 24811/165 | RESISTOR-FIXED METAL-FILM 475R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-475R-1%50ppm |
| R302 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R303 to R306 | 24811/135 | RESISTOR-FIXED METAL-FILM 27R4 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-27R4-1%50ppm |
| R307 | 24811/165 | RESISTOR-FIXED METAL-FILM 475R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-475R-1%50ppm |
| R308 | 24681/549 | RESISTOR-NETWORK BUSSED, THICK-FILM, 22K 2% 600mW 50V 200 ppm/DEG.C, 15 RESISTORS, SURFACE MOUNTED, | VISHAY COMPONENTS | SOMC16-01-223-G-TUBE |
| R309 | 24811/165 | RESISTOR-FIXED METAL-FILM 475R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-475R-1%50ppm |
| R310 to R312 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R313 | 24811/165 | RESISTOR-FIXED METAL-FILM 475R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-475R-1%50ppm |
| R314 to R320 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R321 | 24811/165 | RESISTOR-FIXED METAL-FILM 475R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-475R-1%50ppm |
| R322 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R323 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R401 | 24811/165 | RESISTOR-FIXED METAL-FILM 475R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-475R-1%50ppm |
| R402 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R403 to R406 | 24811/135 | RESISTOR-FIXED METAL-FILM 27R4 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-27R4-1%50ppm |
| R407 | 24681/549 | RESISTOR-NETWORK BUSSED, THICK-FILM, 22K 2% 600mW 50V 200 ppm/DEG.C, 15 RESISTORS, SURFACE MOUNTED, | VISHAY COMPONENTS | SOMC16-01-223-G-TUBE |

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
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## A4 PPH, RTP and TTP (contd.)

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| R408 | 24811/165 | RESISTOR-FIXED METAL-FILM 475R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-475R-1%50ppm |
| R409 | 24811/165 | RESISTOR-FIXED METAL-FILM 475R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-475R-1%50ppm |
| R410 to R412 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R413 | 24811/165 | RESISTOR-FIXED METAL-FILM 475R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-475R-1%50ppm |
| R414 to R420 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R421 | 24811/165 | RESISTOR-FIXED METAL-FILM 475R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-475R-1%50ppm |
| R422 to R501 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R502 to R504 | 24811/135 | RESISTOR-FIXED METAL-FILM 27R4 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-27R4-1%50ppm |
| R505 to R507 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R508 to R510 | 24811/135 | RESISTOR-FIXED METAL-FILM 27R4 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-27R4-1%50ppm |
| R511 | 24811/165 | RESISTOR-FIXED METAL-FILM 475R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-475R-1%50ppm |
| R512 | 24811/165 | RESISTOR-FIXED METAL-FILM 475R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-475R-1%50ppm |
| R513 to R516 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R517 | 24811/165 | RESISTOR-FIXED METAL-FILM 475R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-475R-1%50ppm |
| SKA | 23445/502 | CONNECTOR-RF MMCX-TYPE FEMALE, JACK, 50 OHMS, SURFACE MOUNTING, HORIZONTAL, DC-6GHz, GOLD PLATD | HUBER & SUHNER | 85MMCX-S50-0-51 |
| SKB | 23445/502 | CONNECTOR-RF MMCX-TYPE FEMALE, JACK, 50 OHMS, SURFACE MOUNTING, HORIZONTAL, DC-6GHz, GOLD PLATD | HUBER & SUHNER | 85MMCX-S50-0-51 |

## A5 Display

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| | 44829-835 | Complete unit | Issue 34 | |
| C1 to C5 | 26386/887 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-104-KP |
| C6 | 26421/112 | CAPACITOR-FIXED ALUMINIUM 10uF +/-20% 35V ELECTROLYTIC, RADIAL, 5mm PWP, (TAPED). | PANASONIC INDUSTRIAL | ECE-A-1V-KA-100-B |
| C7 to C12 | 26386/887 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-104-KP |
| C13 | 26421/112 | CAPACITOR-FIXED ALUMINIUM 10uF +/-20% 35V ELECTROLYTIC, RADIAL, 5mm PWP, (TAPED). | PANASONIC INDUSTRIAL | ECE-A-1V-KA-100-B |
| C14 | 26386/887 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-104-KP |
| C15 | 26386/832 | CAPACITOR-FIXED CERAMIC 470pF +/-5% 50V NPO MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-471-JP |
| C16 | 26421/112 | CAPACITOR-FIXED ALUMINIUM 10uF +/-20% 35V ELECTROLYTIC, RADIAL, 5mm PWP, (TAPED). | PANASONIC INDUSTRIAL | ECE-A-1V-KA-100-B |
| C17 | 26386/883 | CAPACITOR-FIXED CERAMIC 47nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-473-KP |
| C18 | 26421/112 | CAPACITOR-FIXED ALUMINIUM 10uF +/-20% 35V ELECTROLYTIC, RADIAL, 5mm PWP, (TAPED). | PANASONIC INDUSTRIAL | ECE-A-1V-KA-100-B |
| C19 to C22 | 26386/883 | CAPACITOR-FIXED CERAMIC 47nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-473-KP |
| C23 | 26386/832 | CAPACITOR-FIXED CERAMIC 470pF +/-5% 50V NPO MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-471-JP |
| C24 | 26386/759 | CAPACITOR-FIXED CERAMIC 22nF +/-20% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | PHILIPS | 1206-2R-223-K9-BBC |
| C25 | 26386/863 | CAPACITOR-FIXED CERAMIC 1nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-102-KP |
| C26 | 26386/832 | CAPACITOR-FIXED CERAMIC 470pF +/-5% 50V NPO MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-471-JP |
| C27 to C29 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C30 | 26386/824 | CAPACITOR-FIXED CERAMIC 100pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-101-JP |
| C31 to C33 | 26386/823 | CAPACITOR-FIXED CERAMIC 82pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-820-JP |
| C34 | 26386/817 | CAPACITOR-FIXED CERAMIC 27pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-270-JP |
| C35 | 26386/818 | CAPACITOR-FIXED CERAMIC 33pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-330-JP |
| C36 | 26386/809 | CAPACITOR-FIXED CERAMIC 5.6pF +/-0.5pF 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-5R6-DP |
| C37 | 26538/576 | CAPACITOR-FIXED POLYSTYRENE 160pF +/-1% 63V 150 ppm/DEG.C, RADIAL, 7.6mm PWP, (LOOSE OR TAPED). | LCR COMPONENTS | EP9-160pF-1%-63V |
| C38 | 26538/576 | CAPACITOR-FIXED POLYSTYRENE 160pF +/-1% 63V 150 ppm/DEG.C, RADIAL, 7.6mm PWP, (LOOSE OR TAPED). | LCR COMPONENTS | EP9-160pF-1%-63V |
| C39 | 26386/818 | CAPACITOR-FIXED CERAMIC 33pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-330-JP |
| C40 | 26386/828 | CAPACITOR-FIXED CERAMIC 220pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-221-JP |

| Cir. Ref. | MI part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| **A5 Display (contd.)** | | | | |
| C41 | 26386/824 | CAPACITOR-FIXED CERAMIC 100pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-101-JP |
| C42 | 26421/112 | CAPACITOR-FIXED ALUMINIUM 10uF +/-20% 35V ELECTROLYTIC, RADIAL, 5mm PWP, (TAPED). | PANASONIC INDUSTRIAL | ECE-A-1V-KA-100-B |
| C43 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C44 | 26421/112 | CAPACITOR-FIXED ALUMINIUM 10uF +/-20% 35V ELECTROLYTIC, RADIAL, 5mm PWP, (TAPED). | PANASONIC INDUSTRIAL | ECE-A-1V-KA-100-B |
| C45 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C47 | 26386/887 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-104-KP |
| C48 | 26386/887 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-104-KP |
| C49 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C50 | 26386/818 | CAPACITOR-FIXED CERAMIC 33pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-330-JP |
| C51 to C54 | 26582/428 | CAPACITOR-FIXED POLYESTER 47nF +/-10% 63V 330 ppm/DEG.C, RADIAL, 5mm PWP, (TAPED). | VISHAY COMPONENTS | MKT-1817-347/065TA18 |
| C55 | 26421/112 | CAPACITOR-FIXED ALUMINIUM 10uF +/-20% 35V ELECTROLYTIC, RADIAL, 5mm PWP, (TAPED). | PANASONIC INDUSTRIAL | ECE-A-1V-KA-100-B |
| C56 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C57 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C58 | 26386/819 | CAPACITOR-FIXED CERAMIC 39pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-390-JP |
| C59 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C60 | 26421/116 | CAPACITOR-FIXED ALUMINIUM 47uF +/-20% 16V ELECTROLYTIC, RADIAL, 5mm PWP, (LOOSE OR TAPED). | PANASONIC INDUSTRIAL | ECE-A-1C-KA-470-B |
| C61 | 26386/887 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-104-KP |
| C62 | 26421/118 | CAPACITOR-FIXED ALUMINIUM 100uF +/-20% 6.3V ELECTROLYTIC, RADIAL, 5mm PWP, (TAPED). | PANASONIC INDUSTRIAL | ECE-A-0J-KA-101-B |
| C63 | 26386/887 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-104-KP |
| C64 | 26421/118 | CAPACITOR-FIXED ALUMINIUM 100uF +/-20% 6.3V ELECTROLYTIC, RADIAL, 5mm PWP, (TAPED). | PANASONIC INDUSTRIAL | ECE-A-0J-KA-101-B |
| C65 | 26386/887 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-104-KP |
| C66 | 26421/116 | CAPACITOR-FIXED ALUMINIUM 47uF +/-20% 16V ELECTROLYTIC, RADIAL, 5mm PWP, (LOOSE OR TAPED). | PANASONIC INDUSTRIAL | ECE-A-1C-KA-470-B |
| C67 | 26386/887 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-104-KP |
| C68 to C71 | 26582/432 | CAPACITOR-FIXED POLYESTER 1uF +/-10% 50V 330 ppm/DEG.C, RADIAL, 5mm PWP, (TAPED). | VISHAY COMPONENTS | MKT-1826-510/065 |
| C72 | 26343/913 | CAPACITOR-FIXED CERAMIC 560pF +/-1% 63V NP0 MULTILAYER, RADIAL, 5.08mm PWP, (LOOSE OR TAPED). | AVX LTD | SR21-5A-561-FAA |

## A5 Display (contd.)

| Cir. Ref. | MI part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| C73 | 26343/913 | CAPACITOR-FIXED CERAMIC 560pF +/-1% 63V NP0 MULTILAYER, RADIAL, 5.08mm PWP, (LOOSE OR TAPED). | AVX LTD | SR21-5A-561-FAA |
| C74 | 26538/630 | CAPACITOR-FIXED POLYSTYRENE 680pF +/-2% 63V 150 ppm/DEG.C, RADIAL, 7.6mm PWP, (TAPED). | LCR COMPONENTS | EP9-680pF-2%-63V |
| C75 | 26538/603 | CAPACITOR-FIXED POLYSTYRENE 330pF +/-2% 63V 150 ppm/DEG.C, RADIAL, 7.6mm PWP, (LOOSE OR TAPED). | LCR COMPONENTS | EP9-330pF-2%-63V |
| C76 | 26538/910 | CAPACITOR-FIXED POLYSTYRENE 2.2nF +/-1% 63V 125 ppm/DEG.C, RADIAL, 5.08mm PWP, SQUARE, WIRES ON | LCR COMPONENTS | EXFS/HR-2200pF-63V |
| C77 | 26538/571 | CAPACITOR-FIXED POLYSTYRENE 150pF +/-2% 63V 150 ppm/DEG.C, RADIAL, 7.6mm PWP, (TAPED). | LCR COMPONENTS | EP9-150pF-2%-63V |
| C78 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C79 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C101 to C172 | 26386/887 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-104-KP |
| D3 | 28355/168 | DIODE RECTIFIER, SCHOTTKY, 1N5818... 30V 1A 0.55Vf @ 1A, AXIAL, DO-41, (TAPED). | MOTOROLA INC. | 1N5818 |
| D4 | 28355/168 | DIODE RECTIFIER, SCHOTTKY, 1N5818... 30V 1A 0.55Vf @ 1A, AXIAL, DO-41, (TAPED). | MOTOROLA INC. | 1N5818 |
| D5 | 28381/132 | DIODE VARIABLE CAPACITNCE, BB809... 28V 20mA 29pF @ 3V, CAPAC RATIO 5.0 MIN, AXIAL, DO-34, (TAPED). | PHILIPS | BB809 |
| D6 | 28349/022 | DIODE SMALL-SIGNAL, SCHOTTKY, HSMS-2812... DUAL, 20V 1.2pF 410mVf @ 1mA, IN SERIES, MARKING CODE | HEWLETT-PACKARD | HSMS-2812-L31 |
| D7 | 28383/930 | DIODE SMALL-SIGNAL, BAS16... 330mW 75V 250mA 2pF 1Vf @ 50mA, MARKING CODE A6, SURFACE MOUNTED, | PHILIPS | BAS16 |
| D8 | 28383/930 | DIODE SMALL-SIGNAL, BAS16... 330mW 75V 250mA 2pF 1Vf @ 50mA, MARKING CODE A6, SURFACE MOUNTED, | PHILIPS | BAS16 |
| D9 | 28349/029 | DIODE SMALL-SIGNAL, SCHOTTKY, HSMS-2810... 20V 1.2pF 410mVf @ 1mA, MARKNG CODE B0, LOW PROFILE, | HEWLETT-PACKARD | HSMS-2810-L31 |
| D10 to D16 | 28624/136 | LED RED, SIZE T1, 3mm DIA, HLMP-1301... 2.4 Vf TYP, 90 mA If MAX, 2.5 mcd @ 10mA - 60 DEG, | HEWLETT-PACKARD | HLMP-1301 |
| IC1 | 44535/250 | IC-PROGRAMMED PAL, SET OF 1, 2965, A5 BLANKING LOGIC. | | |
| IC2 | 28469/051 | IC-DIGITAL INVERTER 74AC04... HEX, CMOS-ADVANCED, 14 PIN, SMALL-OUTLINE. | NAT. SEMICONDUCTOR | 74AC04SC |
| IC3 | 28467/099 | IC-MICRO GRAPHICS, 476... COLOUR PALETTE, 256 x 18 RAM, SINGLE, RS343A/RS170 OUTPUTS, STANDARD MPU | ANALOG DEVICES LTD | ADV476KP35 |
| IC4 | 28467/099 | IC-MICRO GRAPHICS, 476... COLOUR PALETTE, 256 x 18 RAM, SINGLE, RS343A/RS170 OUTPUTS, STANDARD MPU | ANALOG DEVICES LTD | ADV476KP35 |
| IC5 | 28461/397 | IC-ANALOGUE OPERATIONAL AMP EL2020C... SLEW RATE 300V/uS MIN, CURRENT-FEEDBACK, 8 PIN, | ELANTEC INC | EL2020CN |
| IC6 | 28469/069 | IC-DIGITAL TRANSCEIVER 74ACT245... OCTAL, TRI-STATE, NON-INVERTING, BI-DIRECTIONAL, | NAT. SEMICONDUCTOR | 74ACT245SC |
| IC7 | 28467/063 | IC-MICRO GRAPHICS, A82786... CO-PROCESSOR, 25MHz, 88 PIN, PIN-GRID-ARRAY. | INTEL CORP (UK) LTD | A82786-SX365 |

| Cir. Ref. | MI part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| **A5 Display (contd.)** | | | | |
| IC8 to IC11 | 28469/337 | IC-MICRO DYNAMIC-RAM, 256K x 4BIT, 514256... 100nS ACCESS TIME, 1mA STANDBY CURRENT, CMOS, 26 PIN, | TOSHIBA (UK) LTD | TC514256BJ-10 |
| IC12 | 28469/069 | IC-DIGITAL TRANSCEIVER 74ACT245... OCTAL, TRI-STATE, NON-INVERTING, BI-DIRECTIONAL, | NAT. SEMICONDUCTOR | 74ACT245SC |
| IC13 | 28467/096 | IC-MICRO PROCESSOR, 16 BIT, 68000... 10MHz, CHMOS, 68 PIN, PLCC. | SGS-THOMSON | EF68000/FN/10 |
| IC14 | 28467/117 | IC-MICRO STATIC-RAM, 128K x 8 BIT, HM628128... 5V, 100nS, 50uA MAX STANDBY CURRENT, CMOS, 32 PIN, | TOSHIBA (UK) LTD | TC551001BFL-10L |
| IC15 | 28469/559 | IC-DIGITAL FIELDPROG-GATE-ARRAY XC2064... 1200 GATES, 64 LOGIC BLOCKS, 58 INPUT/OUTPUTS, ZERO RAM | XILINX (USA) | XC2064-70PC68C |
| IC16 | 28469/559 | IC-DIGITAL FIELDPROG-GATE-ARRAY XC2064... 1200 GATES, 64 LOGIC BLOCKS, 58 INPUT/OUTPUTS, ZERO RAM | XILINX (USA) | XC2064-70PC68C |
| IC18 | 28469/072 | IC-DIGITAL INVERTER 74AC05... HEX, OPEN COLLECTOR, CMOS-ADVANCED, 14 PIN, DUAL-IN-LINE. | HARRIS SEMICONDUCTOR | CD74AC05E |
| IC19 | 28467/117 | IC-MICRO STATIC-RAM, 128K x 8 BIT, HM628128... 5V, 100nS, 50uA MAX STANDBY CURRENT, CMOS, 32 PIN, | TOSHIBA (UK) LTD | TC551001BFL-10L |
| IC21 | 28464/173 | IC-DIGITAL COUNTER 74AC161... 4 INPUT, 4 BIT, SINGLE, BINARY, SYNCHRONOUS, PRESETTABLE + RESET, | NAT. SEMICONDUCTOR | 74AC161SC |
| IC22 | 28461/888 | IC-ANALOGUE SWITCH DG419... SINGLE, 15V SPDT, ON-RESISTANCE<35R, CHANGEOVER, TTL COMPATIBLE, | TEMIC UK LTD | DG419DY |
| IC23 | 28469/053 | IC-ANALOGUE BUFFER-AMPLIFIER EL2001... 18V UNITY GAIN, SLEW-RATE 1200 V/uS MIN, BANDWIDTH 70MHz @ | ELANTEC INC | EL2001CN |
| IC24 | 28461/817 | IC-ANALOGUE A/D CONVERTER MP7684... SINGLE, 5V 8 BIT, BUFFERED FLASH CONVERTER, CMOS, 28 PIN, | HARRIS SEMICONDUCTOR | HI3-5700J-5 |
| IC25 | 28462/639 | IC-DIGITAL FLIP-FLOP/D-TYPE 74AC374... OCTAL, NON-INVERTING, POS EDGE TRIGGER, TRI-STATE, | NAT. SEMICONDUCTOR | 74AC374SC |
| IC26 | 28469/555 | IC-DIGITAL FIELDPROG-GATE-ARRAY XC3030... 3000 GATES, 100 LOGIC BLOCKS, 74 INPUT/OUTPUTS, ZERO | XILINX (USA) | XC3030-100PC84C |
| IC28 | 28469/534 | IC-DIGITAL REGISTER CY7C421... 9 BIT, SINGLE, FIFO 512 WORD, ASYNCHRONOUS MODE, TRI-STATE OUTPUTS, | ADVANCED MICRO DEV | AM7201-50JC |
| IC29 | 28469/070 | IC-DIGITAL BUFFER/LINE-DRIVER 74ACT240... OCTAL, TRI-STATE, INVERTING, CMOS-ADVANCED+TTL, 20 PIN, | NAT. SEMICONDUCTOR | 74ACT240SC |
| IC30 | 28469/534 | IC-DIGITAL REGISTER CY7C421... 9 BIT, SINGLE, FIFO 512 WORD, ASYNCHRONOUS MODE, TRI-STATE OUTPUTS, | ADVANCED MICRO DEV | AM7201-50JC |
| IC31 | 28469/070 | IC-DIGITAL BUFFER/LINE-DRIVER 74ACT240... OCTAL, TRI-STATE, INVERTING, CMOS-ADVANCED+TTL, 20 PIN, | NAT. SEMICONDUCTOR | 74ACT240SC |
| IC32 | 28461/411 | IC-ANALOGUE OPERATIONAL AMP TL071... SINGLE, JFET INPUT, LOW NOISE, 8 PIN, SMALL-OUTLINE. | MOTOROLA INC. | TL071CD |
| IC33 | 28467/126 | IC-MICRO CONTROLLER, 82C54... PROGRAMMABLE INTERVAL TIMER, 12.5MHz, CMOS, 28 PIN, PLCC. | | |
| IC34 | 28461/874 | IC-ANALOGUE SWITCH DG411... QUAD, 15V SPST, ON-RESISTANCE<35R, 4 x N/O @ LOGIC 1, TTL | ANALOG DEVICES LTD | ADG411BR |
| IC35 | 28461/806 | IC-ANALOGUE OPERATIONAL AMP OP-249... DUAL, PRECISION HI SPEED, SETTLING TIME-1.2uS, GAIN | ANALOG DEVICES LTD | OP-249GS |
| IC36 | 28461/813 | IC-ANALOGUE FILTER LTC1064... QUAD, SWITCHED CAPACITOR, ACTIVE, CLOCK FREQUENCY 7MHz TYP, CMOS, | LINEAR TECHNOLOGY | LTC1064CS |
| IC37 | 28461/888 | IC-ANALOGUE SWITCH DG419... SINGLE, 15V SPDT, ON-RESISTANCE<35R, CHANGEOVER, TTL COMPATIBLE, | TEMIC UK LTD | DG419DY |
| IC38 | 28461/897 | IC-ANALOGUE OPERATIONAL AMP OP-27GS... 22V LOW NOISE, 8 PIN, SMALL-OUTLINE. | ANALOG DEVICES LTD | OP-27GS |

## A5 Display (contd.)

| Cir. Ref. | MI part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| IC39 | 28461/814 | IC-ANALOGUE A/D CONVERTER AD7870... 5V 12 BIT, WITH ON CHIP REFERENCE, TRACK/HOLD AMP AND | ANALOG DEVICES LTD | AD7870LN |
| IC40 | 28467/118 | IC-MICRO STATIC-RAM, 32K x 8 BIT, 62256... 100nS, 100uA STANDBY CURRENT, 0.45in PITCH, CMOS, 28 PIN, | TOSHIBA (UK) LTD | TC55257BFL-10 |
| IC41 | 28467/118 | IC-MICRO STATIC-RAM, 32K x 8 BIT, 62256... 100nS, 100uA STANDBY CURRENT, 0.45in PITCH, CMOS, 28 PIN, | TOSHIBA (UK) LTD | TC55257BFL-10 |
| IC42 | 28467/120 | IC-MICRO DIGIT/SGNL PROCESSR, ADSP2101... 10MHz, DIGITAL SIGNAL PROCESSING, 2K PROGRAM & 0.5K DATA | ANALOG DEVICES LTD | ADSP2101KP-40 REV3+ |
| IC43 | 28469/559 | IC-DIGITAL FIELDPROG-GATE-ARRAY XC2064... 1200 GATES, 64 LOGIC BLOCKS, 58 INPUT/OUTPUTS, ZERO RAM | XILINX (USA) | XC2064-70PC68C |
| IC44 | 28469/028 | IC-DIGITAL BUFFER/LINE-DRIVER 74HCT244... OCTAL, NON-INVERTING, TRI-STATE BUS, CMOS-H/SPEED+TTL, 20 | PHILIPS | 74HCT244D |
| IC45 | 28469/028 | IC-DIGITAL BUFFER/LINE-DRIVER 74HCT244... OCTAL, NON-INVERTING, TRI-STATE BUS, CMOS-H/SPEED+TTL, 20 | PHILIPS | 74HCT244D |
| IC46 | 28469/070 | IC-DIGITAL BUFFER/LINE-DRIVER 74ACT240... OCTAL, TRI-STATE, INVERTING, CMOS-ADVANCED+TTL, 20 PIN, | NAT. SEMICONDUCTOR | 74ACT240SC |
| IC47 | 28469/436 | IC-ANALOGUE D/A-CONVERTER 7545... 15V 12 BIT, BUFFERED, MULTIPLYING, REL-ACC +/-2 LSB, GAIN-ERR | ANALOG DEVICES LTD | AD7545JN |
| IC48 | 28461/819 | IC-ANALOGUE OPERATIONAL AMP OP177... SINGLE, 22V OFFSET VOLTAGE 25uV, OFFSET CURRENT 1.5nA, | ANALOG DEVICES LTD | OP177GS |
| IC49 | 28461/413 | IC-ANALOGUE OPERATIONAL AMP TL074... QUAD, JFET INPUT, LOW NOISE, SLEW RATE 8V/uS MIN, GAIN | MOTOROLA INC. | TL074CD |
| IC50 | 28461/803 | IC-ANALOGUE VOLTAGE-REFERENCE LT1019... 5V PRECISION, OUTPUT VOLTAGE DRIFT 20ppm/DEG.C MAX, | LINEAR TECHNOLOGY | LT1019CS8-5 |
| IC51 | 28462/141 | IC-DIGITAL FLIP-FLOP/D-TYPE 74HCT377... OCTAL, POS EDGE TRIGGER WITH DATA ENABLE, CMOS-H/SPEED+TTL, | PHILIPS | 74HCT377D |
| IC52 | 28462/141 | IC-DIGITAL FLIP-FLOP/D-TYPE 74HCT377... OCTAL, POS EDGE TRIGGER WITH DATA ENABLE, CMOS-H/SPEED+TTL, | PHILIPS | 74HCT377D |
| IC53 | 28461/804 | IC-ANALOGUE D/A-CONVERTER DAC-312... SINGLE, 12 BIT, HIGH SPEED MULTIPLYING, BIPOLAR, 20 PIN, | ANALOG DEVICES LTD | DAC-312HS |
| IC54 | 28461/806 | IC-ANALOGUE OPERATIONAL AMP OP-249... DUAL, PRECISION HI SPEED, SETTLING TIME-1.2uS, GAIN | ANALOG DEVICES LTD | OP-249GS |
| IC55 | 28461/741 | IC-ANALOGUE VOLTAGE-REGULATOR LM317L... 37V 100mA POSITIVE ADJUSTABLE, LINEAR, MONOLITHIC, 3 PIN, | NAT. SEMICONDUCTOR | LM317LZ |
| IC56 | 28461/748 | IC-ANALOGUE VOLTAGE-REGULATOR LM337L... 37V 100mA NEGATIVE ADJUSTABLE, LINEAR, MONOLITHIC, 3 PIN, | NAT. SEMICONDUCTOR | LM337LZ |
| IC57 | 28461/806 | IC-ANALOGUE OPERATIONAL AMP OP-249... DUAL, PRECISION HI SPEED, SETTLING TIME-1.2uS, GAIN | ANALOG DEVICES LTD | OP-249GS |
| IC58 | 28461/762 | IC-ANALOGUE VOLTAGE-REFERENCE LM385... SINGLE, 1.2V 8uA LINEAR, MONOLITHIC, 8 PIN, SMALL-OUTLINE. | NAT. SEMICONDUCTOR | LM385M-1.2 |
| IC59 | 28461/762 | IC-ANALOGUE VOLTAGE-REFERENCE LM385... SINGLE, 1.2V 8uA LINEAR, MONOLITHIC, 8 PIN, SMALL-OUTLINE. | NAT. SEMICONDUCTOR | LM385M-1.2 |
| IC60 | 28461/411 | IC-ANALOGUE OPERATIONAL AMP TL071... SINGLE, JFET INPUT, LOW NOISE, 8 PIN, SMALL-OUTLINE. | MOTOROLA INC. | TL071CD |
| L1 | 23642/909 | WOUND-PART INDUCTOR, WIDEBAND HF CHOKE, BEAD-CORE, 4B1 GRADE MATERIAL, 2.5 TURNS, TINNED COPPER WIRE. | PHILIPS | 4312-020-36700 |
| L2 | 23642/909 | WOUND-PART INDUCTOR, WIDEBAND HF CHOKE, BEAD-CORE, 4B1 GRADE MATERIAL, 2.5 TURNS, TINNED COPPER WIRE. | PHILIPS | 4312-020-36700 |

| Cir. Ref. | MI part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| **A5 Display (contd.)** | | | | |
| L3 | 23642/512 | INDUCTOR-FIXED 22uH +/- 5% EPOXY-MOULD, 110mA 3R7 MAX, 30 Q @ 2.5 MHz, 25 MHz SRF, SURFACE MOUNTED, | MEGGITT ELECTRONICS | 3612-T-220-J |
| L4 | 23642/510 | INDUCTOR-FIXED 0.1uH +/- 5% EPOXY-MOULD, 450mA 0R44 MAX, 28 Q @ 100 MHz, 700 MHz SRF, SURFACE | MEGGITT ELECTRONICS | 3612-T-R10-J |
| L5 | 23642/510 | INDUCTOR-FIXED 0.1uH +/- 5% EPOXY-MOULD, 450mA 0R44 MAX, 28 Q @ 100 MHz, 700 MHz SRF, SURFACE | MEGGITT ELECTRONICS | 3612-T-R10-J |
| L6 | 23642/561 | INDUCTOR-FIXED 100uH +/- 10% COATED-LACQUER, MINIATURE, 140mA 11R MAX, 50 Q @ 2.5 MHz, 7 MHz | MEGGITT ELECTRONICS | C12-406/8/27471/004 |
| L7 | 23642/561 | INDUCTOR-FIXED 100uH +/- 10% COATED-LACQUER, MINIATURE, 140mA 11R MAX, 50 Q @ 2.5 MHz, 7 MHz | MEGGITT ELECTRONICS | C12-406/8/27471/004 |
| L8 to L11 | 23642/909 | WOUND-PART INDUCTOR, WIDEBAND HF CHOKE, BEAD-CORE, 4B1 GRADE MATERIAL, 2.5 TURNS, TINNED COPPER WIRE. | PHILIPS | 4312-020-36700 |
| L12 | 23642/517 | INDUCTOR-FIXED 0.047uH +/- 5% EPOXY-MOULD, 450mA 0R3 MAX, 26 Q @ 100 MHz, 1.2K MHz SRF, SURFACE | MEGGITT ELECTRONICS | 3612-T-047-J |
| L13 | 23642/510 | INDUCTOR-FIXED 0.1uH +/- 5% EPOXY-MOULD, 450mA 0R44 MAX, 28 Q @ 100 MHz, 700 MHz SRF, SURFACE | MEGGITT ELECTRONICS | 3612-T-R10-J |
| PLA to PLH | 23435/120 | CONNECTOR MULTIWAY, PCB HEADER, 36 WAY, RIGHT ANGLED, 2.54mm PITCH, PINS GOLD PLATED TO CLASS 2, | BERG ELECTRONICS | 75168-101-36 |
| PLJ | 23436/900 | CONNECTOR MULTIWAY, PCB HEADER, 10 WAY, RIGHT ANGLED, 2-ROW, 2.54mm GRID, POLARISED, SHROUDED, | MOLEX ELECTRONICS | 39-26-7108 |
| PLK | 23435/120 | CONNECTOR MULTIWAY, PCB HEADER, 36 WAY, RIGHT ANGLED, 2.54mm PITCH, PINS GOLD PLATED TO CLASS 2, | BERG ELECTRONICS | 75168-101-36 |
| PLL | 23435/950 | CONNECTOR MULTIWAY, PCB HEADER, 20 WAY, RIGHT ANGLED, 2-ROW, 2.54mm GRID, POLARISED, SHROUDED, | MOLEX ELECTRONICS | 39-26-7208 |
| PLM | 23436/900 | CONNECTOR MULTIWAY, PCB HEADER, 10 WAY, RIGHT ANGLED, 2-ROW, 2.54mm GRID, POLARISED, SHROUDED, | MOLEX ELECTRONICS | 39-26-7108 |
| PLN to PLQ | 23435/120 | CONNECTOR MULTIWAY, PCB HEADER, 36 WAY, RIGHT ANGLED, 2.54mm PITCH, PINS GOLD PLATED TO CLASS 2, | BERG ELECTRONICS | 75168-101-36 |
| R1 to R3 | 24811/146 | RESISTOR-FIXED METAL-FILM 75R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-75R0-1%50ppm |
| R4 | 24811/153 | RESISTOR-FIXED METAL-FILM 150R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-150R-1%50ppm |
| R5 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R6 | 24811/141 | RESISTOR-FIXED METAL-FILM 47R5 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-47R5-1%50ppm |
| R7 | 24811/169 | RESISTOR-FIXED METAL-FILM 681R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-681R-1%50ppm |
| R8 | 24811/166 | RESISTOR-FIXED METAL-FILM 511R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-511R-1%50ppm |
| R9 | 24811/146 | RESISTOR-FIXED METAL-FILM 75R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-75R0-1%50ppm |
| R10 | 24811/149 | RESISTOR-FIXED METAL-FILM 100R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100R-1%50ppm |
| R11 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |

## A5 Display (contd.)

| Cir. Ref. | MI part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| R12 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R17 to R21 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R22 to R24 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R26 | 24811/169 | RESISTOR-FIXED METAL-FILM 681R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-681R-1%50ppm |
| R27 | 24811/141 | RESISTOR-FIXED METAL-FILM 47R5 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-47R5-1%50ppm |
| R28 | 24811/221 | RESISTOR-FIXED METAL-FILM 100K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100K-1%50ppm |
| R30 | 24811/146 | RESISTOR-FIXED METAL-FILM 75R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-75R0-1%50ppm |
| R31 | 24811/146 | RESISTOR-FIXED METAL-FILM 75R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-75R0-1%50ppm |
| R32 | 24811/221 | RESISTOR-FIXED METAL-FILM 100K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100K-1%50ppm |
| R33 | 24811/221 | RESISTOR-FIXED METAL-FILM 100K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100K-1%50ppm |
| R34 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R35 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R36 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R37 | 24811/141 | RESISTOR-FIXED METAL-FILM 47R5 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-47R5-1%50ppm |
| R38 | 24811/221 | RESISTOR-FIXED METAL-FILM 100K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100K-1%50ppm |
| R39 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R40 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R41 | 24811/153 | RESISTOR-FIXED METAL-FILM 150R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-150R-1%50ppm |
| R42 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R43 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R44 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R45 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R46 | 24811/178 | RESISTOR-FIXED METAL-FILM 1K62 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-1K62-1%50ppm |
| R47 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R48 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |

## A5 Display (contd.)

| Cir. Ref. | MI part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| R49 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R50 to R53 | 24811/221 | RESISTOR-FIXED METAL-FILM 100K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100K-1%50ppm |
| R54 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R55 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R56 | 24811/199 | RESISTOR-FIXED METAL-FILM 12K1 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-12K1-1%50ppm |
| R57 | 24811/210 | RESISTOR-FIXED METAL-FILM 36K5 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-36K5-1%50ppm |
| R58 | 24811/192 | RESISTOR-FIXED METAL-FILM 6K19 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-6K19-1%50ppm |
| R59 | 24811/208 | RESISTOR-FIXED METAL-FILM 30K1 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-30K1-1%50ppm |
| R60 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R61 | 24811/630 | RESISTOR-FIXED METAL-FILM 93K1 +/- 0.1% 250mW 200V 15 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-93K1-0.1%-15 |
| R62 | 24811/628 | RESISTOR-FIXED METAL-FILM 90K9 +/- 0.1% 250mW 200V 15 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-90K9-0.1%-15 |
| R63 | 24811/620 | RESISTOR-FIXED METAL-FILM 10K7 +/- 0.1% 250mW 200V 15 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-10K7-0.1%-15 |
| R64 | 24811/602 | RESISTOR-FIXED METAL-FILM 10K +/- 0.1% 250mW 200V 15 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-10K0-0.1%-15 |
| R65 | 24811/622 | RESISTOR-FIXED METAL-FILM 11K3 +/- 0.1% 250mW 200V 15 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-11K3-0.1%-15 |
| R66 | 24811/627 | RESISTOR-FIXED METAL-FILM 26K7 +/- 0.1% 250mW 200V 15 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-26K7-0.1%-15 |
| R67 | 24811/623 | RESISTOR-FIXED METAL-FILM 12K1 +/- 0.1% 250mW 200V 15 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-12K1-0.1%-15 |
| R68 | 24811/602 | RESISTOR-FIXED METAL-FILM 10K +/- 0.1% 250mW 200V 15 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-10K0-0.1%-15 |
| R69 | 24811/626 | RESISTOR-FIXED METAL-FILM 25K5 +/- 0.1% 250mW 200V 15 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-25K5-0.1%-15 |
| R70 | 24811/601 | RESISTOR-FIXED METAL-FILM 33K2 +/- 0.1% 250mW 200V 15 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-33K2-0.1%-15 |
| R71 | 24811/602 | RESISTOR-FIXED METAL-FILM 10K +/- 0.1% 250mW 200V 15 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-10K0-0.1%-15 |
| R72 | 24811/629 | RESISTOR-FIXED METAL-FILM 34K +/- 0.1% 250mW 200V 15 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-34K0-0.1%-15 |
| R73 | 24811/625 | RESISTOR-FIXED METAL-FILM 14K7 +/- 0.1% 250mW 200V 15 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-14K7-0.1%-15 |
| R74 | 24811/607 | RESISTOR-FIXED METAL-FILM 20K +/- 0.1% 250mW 200V 15 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-20K0-0.1%-15 |
| R75 | 24811/631 | RESISTOR-FIXED METAL-FILM 95K3 +/- 0.1% 250mW 200V 15 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-95K3-0.1%-15 |
| R76 | 24811/602 | RESISTOR-FIXED METAL-FILM 10K +/- 0.1% 250mW 200V 15 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-10K0-0.1%-15 |

## A5 Display (contd.)

| Cir. Ref. | MI part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| R77 | 24811/626 | RESISTOR-FIXED METAL-FILM 25K5 +/- 0.1% 250mW 200V 15 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-25K5-0.1%-15 |
| R78 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R79 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R80 to R84 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R85 | 24681/528 | RESISTOR-NETWORK ISOLATED, THICK-FILM, 10K 2% 600mW 50V 200 ppm/DEG.C, 8 RESISTORS, SURFACE | VISHAY COMPONENTS | SOMC16-03-103-G-REEL |
| R86 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R87 to R89 | 24811/165 | RESISTOR-FIXED METAL-FILM 475R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-475R-1%50ppm |
| R90 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R94 to R97 | 24811/135 | RESISTOR-FIXED METAL-FILM 27R4 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-27R4-1%50ppm |
| R98 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R99 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R100 | 24811/204 | RESISTOR-FIXED METAL-FILM 20K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-20K-1%50ppm |
| R101 | 24811/187 | RESISTOR-FIXED METAL-FILM 3K92 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-3K92-1%50ppm |
| R102 | 24811/195 | RESISTOR-FIXED METAL-FILM 8K25 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-8K25-1%50ppm |
| R103 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R104 | 24811/232 | RESISTOR-FIXED METAL-FILM 301K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-301K-1%50ppm |
| R105 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R106 | 24811/228 | RESISTOR-FIXED METAL-FILM 200K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-200K-1%50ppm |
| R107 | 24811/223 | RESISTOR-FIXED METAL-FILM 121K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-121K-1%50ppm |
| R108 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R109 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R110 | 24811/212 | RESISTOR-FIXED METAL-FILM 43K2 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-43K2-1%50ppm |
| R111 | 24811/195 | RESISTOR-FIXED METAL-FILM 8K25 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-8K25-1%50ppm |
| R112 | 24811/204 | RESISTOR-FIXED METAL-FILM 20K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-20K-1%50ppm |
| R113 | 24811/209 | RESISTOR-FIXED METAL-FILM 33K2 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-33K2-1%50ppm |

| Cir. Ref. | MI part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| **A5 Display (contd.)** | | | | |
| R114 | 24811/204 | RESISTOR-FIXED METAL-FILM 20K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-20K-1%50ppm |
| R115 | 24811/209 | RESISTOR-FIXED METAL-FILM 33K2 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-33K2-1%50ppm |
| R116 | 24811/125 | RESISTOR-FIXED METAL-FILM 10R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10R-1%-50ppm |
| R117 | 24811/190 | RESISTOR-FIXED METAL-FILM 5K11 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-5K11-1%50ppm |
| R118 | 24811/190 | RESISTOR-FIXED METAL-FILM 5K11 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-5K11-1%50ppm |
| R119 | 24811/619 | RESISTOR-FIXED METAL-FILM 2K55 +/- 0.1% 250mW 200V 15 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-2K55-0.1%-15 |
| R120 | 24811/619 | RESISTOR-FIXED METAL-FILM 2K55 +/- 0.1% 250mW 200V 15 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-2K55-0.1%-15 |
| R121 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R122 | 24811/175 | RESISTOR-FIXED METAL-FILM 1K21 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-1K21-1%50ppm |
| R123 | 24811/158 | RESISTOR-FIXED METAL-FILM 243R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-243R-1%50ppm |
| R124 | 24811/175 | RESISTOR-FIXED METAL-FILM 1K21 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-1K21-1%50ppm |
| R125 | 24811/158 | RESISTOR-FIXED METAL-FILM 243R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-243R-1%50ppm |
| R126 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R127 | 24811/621 | RESISTOR-FIXED METAL-FILM 11K +/- 0.1% 250mW 200V 15 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-11K0-0.1%-15 |
| R128 | 24811/621 | RESISTOR-FIXED METAL-FILM 11K +/- 0.1% 250mW 200V 15 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-11K0-0.1%-15 |
| R129 | 24811/205 | RESISTOR-FIXED METAL-FILM 22K1 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-22K1-1%50ppm |
| R130 | 24811/624 | RESISTOR-FIXED METAL-FILM 13K +/- 0.1% 250mW 200V 15 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-13K0-0.1%-15 |
| R131 | 24811/624 | RESISTOR-FIXED METAL-FILM 13K +/- 0.1% 250mW 200V 15 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-13K0-0.1%-15 |
| R132 | 24811/206 | RESISTOR-FIXED METAL-FILM 24K3 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-24K3-1%50ppm |
| R133 | 24811/621 | RESISTOR-FIXED METAL-FILM 11K +/- 0.1% 250mW 200V 15 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-11K0-0.1%-15 |
| R134 | 24811/621 | RESISTOR-FIXED METAL-FILM 11K +/- 0.1% 250mW 200V 15 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-11K0-0.1%-15 |
| R135 | 24811/205 | RESISTOR-FIXED METAL-FILM 22K1 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-22K1-1%50ppm |
| R141 to R143 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R144 to R147 | 24811/141 | RESISTOR-FIXED METAL-FILM 47R5 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-47R5-1%50ppm |
| R148 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |

## A5 Display (contd.)

| Cir. Ref. | MI part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| R149 | 24811/187 | RESISTOR-FIXED METAL-FILM 3K92 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-3K92-1%50ppm |
| R150 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R151 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R152 | 24811/221 | RESISTOR-FIXED METAL-FILM 100K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100K-1%50ppm |
| R153 | 24811/221 | RESISTOR-FIXED METAL-FILM 100K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100K-1%50ppm |
| R154 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R155 to R162 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R163 | 24811/219 | RESISTOR-FIXED METAL-FILM 82K5 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-82K5-1%50ppm |
| R164 to R166 | 24811/221 | RESISTOR-FIXED METAL-FILM 100K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100K-1%50ppm |
| R167 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| TR1 | 28452/167 | TRANSISTOR NPN BIPOLAR BFR90... 15V 5GHz 180mW 25mA 40hFE @ 14mA, SURFACE MOUNTED, SOT-37. | PHILIPS | BFR90 |

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|

## A5/2 Display

When ordering, prefix circuit reference with A5/2.

| | | | | |
|---|---|---|---|---|
| | 448830/090 | Complete unit | Issue 8 | |
| C1 | 26386/887 | CAPACITOR CERAMIC 100nF+/-10% 50V 1210 | AVX | 1210-5C-104-KAT-1A o |
| to C5 | | | | |
| C6 | 26451/003 | CAPACITOR ALUM 10uF+/-20% 16V 4.3mmSQ | RUBYCON | 16-REV-10-M-0450 |
| C7 | 26386/887 | CAPACITOR CERAMIC 100nF+/-10% 50V 1210 | AVX | 1210-5C-104-KAT-1A o |
| to C12 | | | | |
| C13 | 26451/003 | CAPACITOR ALUM 10uF+/-20% 16V 4.3mmSQ | RUBYCON | 16-REV-10-M-0450 |
| C14 | 26386/887 | CAPACITOR CERAMIC 100nF+/-10% 50V 1210 | AVX | 1210-5C-104-KAT-1A o |
| C15 | 26386/832 | CAPACITOR CERAMIC 470pF+/-5% 50V 0805 | AVX | 0805-5A-471-JAT-1A o |
| C16 | 26451/003 | CAPACITOR ALUM 10uF+/-20% 16V 4.3mmSQ | RUBYCON | 16-REV-10-M-0450 |
| C18 | 26451/003 | CAPACITOR ALUM 10uF+/-20% 16V 4.3mmSQ | RUBYCON | 16-REV-10-M-0450 |
| C19 | 26386/883 | CAPACITOR CERAMIC 47nF+/-10% 50V 1210 | SYFER | 1210-J-050-0473K-X-T |
| to C22 | | | | |
| C23 | 26386/832 | CAPACITOR CERAMIC 470pF+/-5% 50V 0805 | AVX | 0805-5A-471-JAT-1A o |
| C24 | 26386/759 | CAPACITOR CERAMIC 22nF+/-20% 50V 1206 | PHILIPS | 1206-2R-223-K9-BBC |
| C25 | 26386/863 | CAPACITOR CERAMIC 1nF+/-10% 50V 0805 | AVX | 0805-5C-102-KAT-1A o |
| C26 | 26386/832 | CAPACITOR CERAMIC 470pF+/-5% 50V 0805 | AVX | 0805-5A-471-JAT-1A o |
| C27 | 26386/875 | CAPACITOR CERAMIC 10nF+/-10% 50V 0805 | AVX | 0805-5C-103-KAT-1A o |
| to C29 | | | | |
| C30 | 26386/824 | CAPACITOR CERAMIC 100pF+/-5% 50V 0805 | AVX | 0805-5A-101-JAT-1A o |
| C31 | 26386/823 | CAPACITOR CERAMIC 82pF+/-5% 50V 0805 | AVX | 0805-5A-820-JAT-1A o |
| to C33 | | | | |
| C34 | 26386/813 | CAPACITOR CERAMIC 12pF+/-5% 50V 0805 | AVX | 0805-5A-120-JAT-1A o |
| C35 | 26386/818 | CAPACITOR CERAMIC 33pF+/-5% 50V 0805 | AVX | 0805-5A-330-JAT-1A o |
| C36 | 26386/809 | CAPACITOR CERAMIC 5.6pF+/-0.5pF 50V 0805 | AVX | 0805-5A-5R6-DAT-1A o |
| C38 | 26386/783 | CAPACITOR CERAMIC 330pF+/-1% 50V 0805 | AVX | 0805-5A-331-FAT-1A |
| C40 | 26386/828 | CAPACITOR CERAMIC 220pF+/-5% 50V 0805 | AVX | 0805-5A-221-JAT-1A o |
| C41 | 26386/824 | CAPACITOR CERAMIC 100pF+/-5% 50V 0805 | AVX | 0805-5A-101-JAT-1A o |
| C42 | 26451/003 | CAPACITOR ALUM 10uF+/-20% 16V 4.3mmSQ | RUBYCON | 16-REV-10-M-0450 |
| C43 | 26386/875 | CAPACITOR CERAMIC 10nF+/-10% 50V 0805 | AVX | 0805-5C-103-KAT-1A o |
| C44 | 26451/003 | CAPACITOR ALUM 10uF+/-20% 16V 4.3mmSQ | RUBYCON | 16-REV-10-M-0450 |
| C45 | 26386/875 | CAPACITOR CERAMIC 10nF+/-10% 50V 0805 | AVX | 0805-5C-103-KAT-1A o |
| C47 | 26386/887 | CAPACITOR CERAMIC 100nF+/-10% 50V 1210 | AVX | 1210-5C-104-KAT-1A o |
| to C48 | | | | |
| C49 | 26386/875 | CAPACITOR CERAMIC 10nF+/-10% 50V 0805 | AVX | 0805-5C-103-KAT-1A o |
| C50 | 26386/818 | CAPACITOR CERAMIC 33pF+/-5% 50V 0805 | AVX | 0805-5A-330-JAT-1A o |
| C51 | 26386/777 | CAPACITOR CERAMIC 47nF+/-20% 63V 1206 | PHILIPS | 1206-2R-473-K9-BBC |
| to C54 | | | | |
| C55 | 26451/003 | CAPACITOR ALUM 10uF+/-20% 16V 4.3mmSQ | RUBYCON | 16-REV-10-M-0450 |
| C56 | 26386/875 | CAPACITOR CERAMIC 10nF+/-10% 50V 0805 | AVX | 0805-5C-103-KAT-1A o |
| to C57 | | | | |

## A5/2 Display (contd.)

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| C58 | 26386/819 | CAPACITOR CERAMIC 39pF+/-5% 50V 0805 | AVX | 0805-5A-390-JAT-1A o |
| C59 | 26386/875 | CAPACITOR CERAMIC 10nF+/-10% 50V 0805 | AVX | 0805-5C-103-KAT-1A o |
| C60 | 26451/009 | CAPACITOR ALUM 47uF+/-20% 16V 6.6mmSQ | RUBYCON | 16-REV-47 |
| C61 | 26386/887 | CAPACITOR CERAMIC 100nF+/-10% 50V 1210 | AVX | 1210-5C-104-KAT-1A o |
| C62 | 26451/010 | CAPACITOR ALUM 100uF+/-20% 6.3V 6.6mmSQ | RUBYCON | 6.3-REV-100 |
| C63 | 26386/887 | CAPACITOR CERAMIC 100nF+/-10% 50V 1210 | AVX | 1210-5C-104-KAT-1A o |
| C64 | 26451/010 | CAPACITOR ALUM 100uF+/-20% 6.3V 6.6mmSQ | RUBYCON | 6.3-REV-100 |
| C65 | 26386/887 | CAPACITOR CERAMIC 100nF+/-10% 50V 1210 | AVX | 1210-5C-104-KAT-1A o |
| C66 | 26451/009 | CAPACITOR ALUM 47uF+/-20% 16V 6.6mmSQ | RUBYCON | 16-REV-47 |
| C67 | 26386/887 | CAPACITOR CERAMIC 100nF+/-10% 50V 1210 | AVX | 1210-5C-104-KAT-1A o |
| C68 | 26585/001 | CAPACITOR POLYESTR 1uF+/-10% 63V 7.3x10mm | WIMA | SMD7.3-1uF10%-63V-TR |
| to C71 | | | | |
| C72 | 26343/767 | CAPACITOR CERAMIC 10pF+/-5% 50V 0805 | AVX | 0805-5A-100-JAT-1A o |
| to C73 | | | | |
| C74 | 26386/816 | CAPACITOR CERAMIC 22pF+/-5% 50V 0805 | AVX | 0805-5A-220-JAT-1A o |
| C75 | 26386/783 | CAPACITOR CERAMIC 330pF+/-1% 50V 0805 | AVX | 0805-5A-331-FAT-1A |
| C76 | 26386/932 | CAPACITOR CERAMIC 1nF+/-1% 50V 1206 | AVX | 1206-5A-102-FAT-1A |
| C77 | 26386/817 | CAPACITOR CERAMIC 27pF+/-5% 50V 0805 | AVX | 0805-5A-270-JAT-1A o |
| C78 | 26386/875 | CAPACITOR CERAMIC 10nF+/-10% 50V 0805 | AVX | 0805-5C-103-KAT-1A o |
| to C79 | | | | |
| C101 | 26386/887 | CAPACITOR CERAMIC 100nF+/-10% 50V 1210 | AVX | 1210-5C-104-KAT-1A o |
| to C172 | | | | |
| C200 | 26386/783 | CAPACITOR CERAMIC 330pF+/-1% 50V 0805 | AVX | 0805-5A-331-FAT-1A |
| to C201 | | | | |
| C202 | 26386/782 | CAPACITOR CERAMIC 120pF+/-1% 50V 0805 | AVX | 0805-5A-121-FAT-1A |
| C203 | 26386/933 | CAPACITOR CERAMIC 1.2nF+/-1% 50V 1206 | AVX | 1206-5A-122-FAT-1A |
| C204 | 26386/783 | CAPACITOR CERAMIC 330pF+/-1% 50V 0805 | AVX | 0805-5A-331-FAT-1A |
| C205 | 26386/934 | CAPACITOR CERAMIC 220pF+/-1% 50V 0805 | AVX | 0805-5A-221-FAT-1A |
| C206 | 26386/783 | CAPACITOR CERAMIC 330pF+/-1% 50V 0805 | AVX | 0805-5A-331-FAT-1A |
| C207 | 26386/934 | CAPACITOR CERAMIC 220pF+/-1% 50V 0805 | AVX | 0805-5A-221-FAT-1A |
| C208 | 26386/817 | CAPACITOR CERAMIC 27pF+/-5% 50V 0805 | AVX | 0805-5A-270-JAT-1A o |
| C209 | 26386/824 | CAPACITOR CERAMIC 100pF+/-5% 50V 0805 | AVX | 0805-5A-101-JAT-1A o |
| C210 | 26847/151 | CAPACITOR-VAR CERAMIC5-20pF 25V SURFACE-MTG | AVX | CTZ3S-20C-W1-PF |
| | | | | |
| D1 | 28349/022 | DIODE HSMS-2812.. SMALLSIG DUAL MKD-B2L SOT-23 | HEWLETT-PACKARD | HSMS-2812-TR1 |
| D5 | 28381/341 | DIODE BBY40.. VARI-CAP4.3pF@25V MKD-S2 SOT-23 | PHILIPS | BBY40 |
| D6 | 28349/022 | DIODE HSMS-2812.. SMALLSIG DUAL MKD-B2L SOT-23 | HEWLETT-PACKARD | HSMS-2812-TR1 |
| D7 | 28383/930 | DIODE BAS16.. SMALL-SIG75V MKD-A6 SOT-23 | PHILIPS | BAS16 |
| to D8 | | | | |
| D9 | 28349/029 | DIODE HSMS-2810.. SMALLSIG SCHTKY MK-B0L SOT-23 | HEWLETT-PACKARD | HSMS-2810-TR1 |
| D10 | 28624/136 | LED RED HLMP-1301..2.4V T1 3mmDIA | HEWLETT-PACKARD | HLMP-1301 |
| to D16 | | | | |
| IC1 | 44535/250 | IC-PROGRAM PAL x1 2965,A5 BLANKING LOGIC. | | |
| IC2 | 28469/051 | IC-DIGITAL INVERTER74AC04.. HEX SO-14 | FAIRCHILD | 74AC04SC |

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| **A5/2 Display (contd.)** | | | | |
| IC3 | 28467/099 | IC-MICRO GRAPHICS476.. PLCC-44 | ANALOG | ADV476KP35 |
| to IC4 | | | | |
| IC5 | 28461/523 | IC-ANALOG OP AMPEL2020C.. SO-20 | ELANTEC | EL2020CM |
| IC6 | 28469/069 | IC-DIGITAL TRANSCEIVER74ACT245.. OCT SO-20 | HARRIS | D74ACT245MC |
| IC7 | 28467/063 | IC-MICRO GRAPHICSA82786.. PGA-88 | | |
| IC8 | 28469/337 | IC-MICRO DYNAMIC-RAM514256.. 256Kx4 SO-26 | HITACHI | HM514256ALJP-10 |
| to IC11 | | | | |
| IC12 | 28469/069 | IC-DIGITAL TRANSCEIVER74ACT245.. OCT SO-20 | HARRIS | D74ACT245MC |
| IC13 | 28467/096 | IC-MICRO PROCESSOR68000.. 16-BIT PLCC-68 | ST MICRO | EF68000/FN/10 |
| IC14 | 28467/117 | IC-MICRO STATIC-RAMHM628128.. 128Kx8 SO-32 | HITACHI | HM628128LFP-10SL |
| IC15 | 28469/559 | IC-DIGITAL FP-GATE-ARRAYXC2064.. PLCC-68 | | |
| to IC16 | | | | |
| IC17 | 44533/407(A) | IC-PROGRAM PROM-NONERASE x2 2965, DISPLAY CPU. Supplied as a set; See IC20 | | |
| IC18 | 28469/072 | IC-DIGITAL INVERTER74AC05.. HEX DIL-14 | HARRIS | D74AC05E |
| IC19 | 28467/117 | IC-MICRO STATIC-RAMHM628128.. 128Kx8 SO-32 | HITACHI | HM628128LFP-10SL |
| IC20 | 44533/407(B) | IC-PROGRAM PROM-NONERASE x2 2965, DISPLAY CPU. Supplied as a set; See IC17 | | |
| IC21 | 28464/173 | IC-DIGITAL COUNTER74AC161.. SO-16 | FAIRCHILD | 74AC161SC |
| IC22 | 28461/888 | IC-ANALOG SWITCHDG419.. SO-8 | MAXIM | DG419DY |
| IC23 | 28461/514 | IC-ANALOG BUFFER-AMPEL2001.. SO-20 | ELANTEC | EL2001CM |
| IC24 | 28461/055 | IC-ANALOG A/D CONVERTERMP7684.. SO-28 | EXAR | MP7684AJS |
| IC25 | 28462/639 | IC-DIGITAL FLIP-FLOP-D74AC374.. OCT SO-20 | FAIRCHILD | 74AC374SC |
| IC26 | 28469/555 | IC-DIGITAL FP-GATE-ARRAYXC3030.. PLCC-84 | LUCENT | ATT3030-100M84 |
| IC27 | 44533/406 | IC-PROGRAM PROM-NONERASE x1 2965, A5 LCA CODE. | | |
| IC28 | 28469/534 | IC-DIGITAL REGISTERCY7C421.. PLCC-32 | IDT | 7201-SA-65J |
| IC29 | 28469/070 | IC-DIGITAL BFR/LINE-DRVR74ACT240.. OCT SO-20 | FAIRCHILD | 74ACT240SC |
| IC30 | 28469/534 | IC-DIGITAL REGISTERCY7C421.. PLCC-32 | IDT | 7201-SA-65J |
| IC31 | 28469/070 | IC-DIGITAL BFR/LINE-DRVR74ACT240.. OCT SO-20 | FAIRCHILD | 74ACT240SC |
| IC32 | 28461/411 | IC-ANALOG OP AMPTL071.. SO-8 | MOTOROLA | TL071CD |
| IC33 | 28467/126 | IC-MICRO CONTROLLER82C54.. PLCC-28 | HARRIS | S82C54-10 |
| IC34 | 28461/874 | IC-ANALOG SWITCHDG411.. QUAD S0-16 | ANALOG | ADG411BR |
| IC35 | 28461/806 | IC-ANALOG OP AMPOP-249.. DUAL SO-8 | ANALOG | OP-249GS |
| IC36 | 28461/813 | IC-ANALOG FILTERLTC1064.. QUAD SO-24 | LINEAR TECH | LTC1064CSW |
| IC37 | 28461/888 | IC-ANALOG SWITCHDG419.. SO-8 | MAXIM | DG419DY |
| IC38 | 28461/897 | IC-ANALOG OP AMPOP-27GS.. SO-8 | ANALOG | OP-27GS |
| IC39 | 28461/054 | IC-ANALOG A/D CONVERTERAD7870.. PLCC-28 | ANALOG | D7870LP |
| IC40 | 28467/118 | IC-MICRO STATIC-RAM62256.. 32Kx8 SO-28 | HITACHI | HM62256LFP-10T or AL |
| to IC41 | | | | |
| IC42 | 28467/143 | IC-MICRO DIGIT/SGNL PROCADSP2101.. PLCC-68 | ANALOG | ADSP2101KP-66 |
| IC43 | 28469/559 | IC-DIGITAL FP-GATE-ARRAYXC2064.. PLCC-68 | | |
| IC44 | 28469/028 | IC-DIGITAL BFR/LINE-DRVR74HCT244.. OCT SO-20 | PHILIPS | 74HCT244D |
| to IC45 | | | | |
| IC46 | 28469/070 | IC-DIGITAL BFR/LINE-DRVR74ACT240.. OCT SO-20 | FAIRCHILD | 74ACT240SC |
| IC47 | 28461/846 | IC-ANALOG D/A-CONVERTER7545.. SO-20 | ANALOG | AD7545AKR |
| IC48 | 28461/819 | IC-ANALOG OP AMPOP177.. SO-8 | ANALOG | OP177GS |

## A5/2 Display (contd.)

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| IC49 | 28461/413 | IC-ANALOG OP AMPTL074.. QUAD SO-14 | MOTOROLA | TL074CD |
| IC50 | 28461/803 | IC-ANALOG VOLTAGE-REFLT1019.. SO-8 | LINEAR TECH | LT1019CS8-5 |
| IC51 | 28462/141 | IC-DIGITAL FLIP-FLOP-D74HCT377.. OCTAL SO-20 | PHILIPS | 74HCT377D |
| to IC52 | | | | |
| IC53 | 28461/804 | IC-ANALOG D/A-CONVERTERDAC-312.. SO-20 | ANALOG | DAC-312HS |
| IC54 | 28461/806 | IC-ANALOG OP AMPOP-249.. DUAL SO-8 | ANALOG | OP-249GS |
| IC55 | 28461/792 | IC-ANALOG VOLTAGE-REGLM317L.. SO-8 | MOTOROLA | LM317LD |
| IC56 | 28461/797 | IC-ANALOG VOLTAGE-REGLM337L.. SO-8 | NATIONAL SEMI | LM337LM |
| IC57 | 28461/806 | IC-ANALOG OP AMPOP-249.. DUAL SO-8 | ANALOG | OP-249GS |
| IC58 | 28461/762 | IC-ANALOG VOLTAGE-REFLM385.. SO-8 | MOTOROLA | LM385D/1.2 |
| to IC59 | | | | |
| IC60 | 28461/411 | IC-ANALOG OP AMPTL071.. SO-8 | MOTOROLA | TL071CD |
| | | | | |
| L1 | 23642/801 | FILTER RFI-SUPPRESSION3A SURFACE MTG 5.7x5mm | TDK | HF50ACC-575032-T |
| to L2 | | | | |
| L3 | 23642/512 | INDUCTOR 22uH 5%MOULDED 3.2x2.5mm | MEGGITT | 3612-T-220-J |
| L4 | 23642/510 | INDUCTOR 0.1uH 5%MOULDED 3.2x2.5mm | MEGGITT | 3612-T-R10-J |
| to L5 | | | | |
| L6 | 23642/726 | INDUCTOR 100uH 10%MOULDED 3.2x4.5mm | MEGGITT | 3613-A-101-K |
| to L7 | | | | |
| L8 | 23642/801 | FILTER RFI-SUPPRESSION3A SURFACE MTG 5.7x5mm | TDK | HF50ACC-575032-T |
| to L11 | | | | |
| L12 | 23642/517 | INDUCTOR 0.047uH 5%MOULDED 3.2x2.5mm | MEGGITT | 3612-T-047-J |
| L13 | 23642/510 | INDUCTOR 0.1uH 5%MOULDED 3.2x2.5mm | MEGGITT | 3612-T-R10-J |
| L20 | 23642/701 | INDUCTOR 2.2uH 5%MOULDED 3.2x2.5mm | MEGGITT | 3612-T-2R2-J |
| L21 | 23642/520 | INDUCTOR 0.15uH 20%MOULDED 3.2x2.5mm | TDK | NL322522T-R15M |
| | | | | |
| PLA to | | | | |
| PLH | 23435/120 | CONNECTOR PCB HEADER36-WAY 0.64mmSQ RT-ANG | FCI | 75168-101-36 |
| PLJ | 23436/900 | CONNECTOR PCB-HEADER10-WAY RT-ANG 2-ROW | MOLEX | 39-26-7108 |
| PLK | 23435/120 | CONNECTOR PCB HEADER36-WAY 0.64mmSQ RT-ANG | FCI | 75168-101-36 |
| PLL | 23435/950 | CONNECTOR PCB-HEADER20-WAY RT-ANG 2-ROW | MOLEX | 9-26-7208 |
| PLM | 23436/900 | CONNECTOR PCB-HEADER10-WAY RT-ANG 2-ROW | MOLEX | 39-26-7108 |
| PLN | 23435/112 | CONNECTOR PCB HEADER36-WAY 0.64mmSQ RT-ANG | FCI | 75168-107-36 |
| | 23435/120 | CONNECTOR PCB HEADER36-WAY 0.64mmSQ RT-ANG | FCI | 75168-101-36 |
| | | | | |
| R1 | 24811/146 | RESISTOR 75R 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-75R0-1%-50ppm |
| to R3 | | | | |
| R4 | 24811/153 | RESISTOR 150R 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-150R-1%-50ppm |
| R5 | 24811/173 | RESISTOR 1K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-1K0-1%-50ppm |
| R6 | 24811/141 | RESISTOR 47R5 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-47R5-1%-50ppm |
| R7 | 24811/169 | RESISTOR 681R 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-681R-1%-50ppm |
| R8 | 24811/166 | RESISTOR 511R 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-511R-1%-50ppm |

## A5/2 Display (contd.)

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| R9 | 24811/146 | RESISTOR 75R 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-75R0-1%-50ppm |
| R10 | 24811/149 | RESISTOR 100R 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-100R-1%-50ppm |
| R11 | 24811/173 | RESISTOR 1K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-1K0-1%-50ppm |
| R12 | 24811/197 | RESISTOR 10K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-10K-1%-50ppm |
| R17 | 24811/173 | RESISTOR 1K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-1K0-1%-50ppm |
| to R21 | | | | |
| R22 | 24811/197 | RESISTOR 10K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-10K-1%-50ppm |
| to R24 | | | | |
| R26 | 24811/169 | RESISTOR 681R 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-681R-1%-50ppm |
| R27 | 24811/141 | RESISTOR 47R5 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-47R5-1%-50ppm |
| R28 | 24811/221 | RESISTOR 100K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-100K-1%-50ppm |
| R32 | 24811/221 | RESISTOR 100K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-100K-1%-50ppm |
| to R33 | | | | |
| R34 | 24811/173 | RESISTOR 1K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-1K0-1%-50ppm |
| R35 | 24811/197 | RESISTOR 10K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-10K-1%-50ppm |
| to R36 | | | | |
| R37 | 24811/141 | RESISTOR 47R5 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-47R5-1%-50ppm |
| R38 | 24811/221 | RESISTOR 100K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-100K-1%-50ppm |
| R39 | 24811/173 | RESISTOR 1K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-1K0-1%-50ppm |
| to R40 | | | | |
| R41 | 24811/153 | RESISTOR 150R 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-150R-1%-50ppm |
| R42 | 24811/197 | RESISTOR 10K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-10K-1%-50ppm |
| to R43 | | | | |
| R44 | 24811/173 | RESISTOR 1K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-1K0-1%-50ppm |
| to R45 | | | | |
| R46 | 24811/178 | RESISTOR 1K62 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-1K62-1%-50ppm |
| R47 | 24811/173 | RESISTOR 1K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-1K0-1%-50ppm |
| R48 | 24811/197 | RESISTOR 10K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-10K-1%-50ppm |
| R49 | 24811/173 | RESISTOR 1K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-1K0-1%-50ppm |
| R50 | 24811/221 | RESISTOR 100K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-100K-1%-50ppm |
| to R53 | | | | |
| R54 | 24811/620 | RESISTOR 10K7 0.1% 250mW200V 15ppm MINI-MELF | VTM | 501-0-10K7-0.1%-15 |
| R55 | 24811/197 | RESISTOR 10K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-10K-1%-50ppm |
| R56 | 24811/199 | RESISTOR 12K1 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-12K1-1%-50ppm |
| R57 | 24811/210 | RESISTOR 36K5 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-36K5-1%-50ppm |
| R58 | 24811/192 | RESISTOR 6K19 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-6K19-1%-50ppm |
| R59 | 24811/208 | RESISTOR 30K1 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-30K1-1%-50ppm |
| R60 | 24811/197 | RESISTOR 10K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-10K-1%-50ppm |
| R61 | 24811/630 | RESISTOR 93K1 0.1% 250mW200V 15ppm MINI-MELF | VTM | 501-0-93K1-0.1%-15 |
| R62 | 24811/628 | RESISTOR 90K9 0.1% 250mW200V 15ppm MINI-MELF | VTM | 501-0-90K9-0.1%-15 |
| R63 | 24811/620 | RESISTOR 10K7 0.1% 250mW200V 15ppm MINI-MELF | VTM | 501-0-10K7-0.1%-15 |
| R64 | 24811/602 | RESISTOR 10K 0.1% 250mW200V 15ppm MINI-MELF | VTM | 501-0-10K0-0.1%-15 |
| R65 | 24811/622 | RESISTOR 11K3 0.1% 250mW200V 15ppm MINI-MELF | VTM | 501-0-11K3-0.1%-15 |
| R66 | 24811/627 | RESISTOR 26K7 0.1% 250mW200V 15ppm MINI-MELF | VTM | 501-0-26K7-0.1%-15 |
| R67 | 24811/623 | RESISTOR 12K1 0.1% 250mW200V 15ppm MINI-MELF | VTM | 501-0-12K1-0.1%-15 |
| R68 | 24811/602 | RESISTOR 10K 0.1% 250mW200V 15ppm MINI-MELF | VTM | 501-0-10K0-0.1%-15 |

## A5/2 Display (contd.)

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| R69 | 24811/626 | RESISTOR 25K5 0.1% 250mW200V 15ppm MINI-MELF | VTM | 501-0-25K5-0.1%-15 |
| R70 | 24811/601 | RESISTOR 33K2 0.1% 250mW200V 15ppm MINI-MELF | VTM | 501-0-33K2-0.1%-15 |
| R71 | 24811/602 | RESISTOR 10K 0.1% 250mW200V 15ppm MINI-MELF | VTM | 501-0-10K0-0.1%-15 |
| R72 | 24811/629 | RESISTOR 34K 0.1% 250mW200V 15ppm MINI-MELF | VTM | 501-0-34K0-0.1%-15 |
| R73 | 24811/625 | RESISTOR 14K7 0.1% 250mW200V 15ppm MINI-MELF | VTM | 501-0-14K7-0.1%-15 |
| R74 | 24811/607 | RESISTOR 20K 0.1% 250mW200V 15ppm MINI-MELF | VTM | 501-0-20K0-0.1%-15 |
| R75 | 24811/631 | RESISTOR 95K3 0.1% 250mW200V 15ppm MINI-MELF | VTM | 501-0-95K3-0.1%-15 |
| R76 | 24811/602 | RESISTOR 10K 0.1% 250mW200V 15ppm MINI-MELF | VTM | 501-0-10K0-0.1%-15 |
| R77 | 24811/626 | RESISTOR 25K5 0.1% 250mW200V 15ppm MINI-MELF | VTM | 501-0-25K5-0.1%-15 |
| R78 | 24811/197 | RESISTOR 10K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-10K-1%-50ppm |
| to R79 | | | | |
| R80 | 24811/173 | RESISTOR 1K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-1K0-1%-50ppm |
| to R84 | | | | |
| R85 | 24681/528 | RESISTOR-NTWK ISOLATED10K 2% x8 SO-16 | BOURNS | 4816P-001-103 |
| R86 | 24811/197 | RESISTOR 10K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-10K-1%-50ppm |
| R87 | 24811/165 | RESISTOR 475R 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-475R-1%-50ppm |
| to R89 | | | | |
| R90 | 24811/173 | RESISTOR 1K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-1K0-1%-50ppm |
| R94 | 24811/135 | RESISTOR 27R4 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-27R4-1%-50ppm |
| to R97 | | | | |
| R98 | 24811/173 | RESISTOR 1K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-1K0-1%-50ppm |
| R99 | 24811/197 | RESISTOR 10K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-10K-1%-50ppm |
| R100 | 24811/204 | RESISTOR 20K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-20K-1%-50ppm |
| R101 | 24811/187 | RESISTOR 3K92 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-3K92-1%-50ppm |
| R102 | 24811/195 | RESISTOR 8K25 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-8K25-1%-50ppm |
| R103 | 24811/197 | RESISTOR 10K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-10K-1%-50ppm |
| R104 | 24811/232 | RESISTOR 301K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-301K-1%-50ppm |
| R105 | 24811/197 | RESISTOR 10K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-10K-1%-50ppm |
| R106 | 24811/228 | RESISTOR 200K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-200K-1%-50ppm |
| R107 | 24811/223 | RESISTOR 121K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-121K-1%-50ppm |
| R108 | 24811/197 | RESISTOR 10K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-10K-1%-50ppm |
| to R109 | | | | |
| R110 | 24811/212 | RESISTOR 43K2 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-43K2-1%-50ppm |
| R111 | 24811/195 | RESISTOR 8K25 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-8K25-1%-50ppm |
| R112 | 24811/204 | RESISTOR 20K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-20K-1%-50ppm |
| R113 | 24811/209 | RESISTOR 33K2 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-33K2-1%-50ppm |
| R114 | 24811/204 | RESISTOR 20K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-20K-1%-50ppm |
| R115 | 24811/209 | RESISTOR 33K2 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-33K2-1%-50ppm |
| R116 | 24811/125 | RESISTOR 10R 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-10R-1%-50ppm |
| R117 | 24811/190 | RESISTOR 5K11 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-5K11-1%-50ppm |
| to R118 | | | | |
| R119 | 24811/619 | RESISTOR 2K55 0.1% 250mW200V 15ppm MINI-MELF | VTM | 501-0-2K55-0.1%-15 |
| to R120 | | | | |
| R121 | 24811/173 | RESISTOR 1K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-1K0-1%-50ppm |
| R122 | 24811/175 | RESISTOR 1K21 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-1K21-1%-50ppm |
| R123 | 24811/158 | RESISTOR 243R 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-243R-1%-50ppm |

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| **A5/2 Display (contd.)** | | | | |
| R124 | 24811/175 | RESISTOR 1K21 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-1K21-1%-50ppm |
| R125 | 24811/158 | RESISTOR 243R 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-243R-1%-50ppm |
| R126 | 24811/173 | RESISTOR 1K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-1K0-1%-50ppm |
| R127 | 24811/621 | RESISTOR 11K 0.1% 250mW200V 15ppm MINI-MELF | VTM | 501-0-11K0-0.1%-15 |
| to R128 | | | | |
| R129 | 24811/205 | RESISTOR 22K1 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-22K1-1%-50ppm |
| R130 | 24811/624 | RESISTOR 13K 0.1% 250mW200V 15ppm MINI-MELF | VTM | 501-0-13K0-0.1%-15 |
| to R131 | | | | |
| R132 | 24811/206 | RESISTOR 24K3 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-24K3-1%-50ppm |
| R133 | 24811/621 | RESISTOR 11K 0.1% 250mW200V 15ppm MINI-MELF | VTM | 501-0-11K0-0.1%-15 |
| to R134 | | | | |
| R135 | 24811/205 | RESISTOR 22K1 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-22K1-1%-50ppm |
| R141 | 24811/197 | RESISTOR 10K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-10K-1%-50ppm |
| to R143 | | | | |
| R144 | 24811/141 | RESISTOR 47R5 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-47R5-1%-50ppm |
| to R147 | | | | |
| R148 | 24811/197 | RESISTOR 10K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-10K-1%-50ppm |
| R149 | 24811/187 | RESISTOR 3K92 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-3K92-1%-50ppm |
| R150 | 24811/197 | RESISTOR 10K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-10K-1%-50ppm |
| R151 | 24811/173 | RESISTOR 1K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-1K0-1%-50ppm |
| R152 | 24811/221 | RESISTOR 100K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-100K-1%-50ppm |
| to R153 | | | | |
| R154 | 24811/197 | RESISTOR 10K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-10K-1%-50ppm |
| R155 | 24811/173 | RESISTOR 1K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-1K0-1%-50ppm |
| to R162 | | | | |
| R163 | 24811/219 | RESISTOR 82K5 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-82K5-1%-50ppm |
| R164 | 24811/221 | RESISTOR 100K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-100K-1%-50ppm |
| to R166 | | | | |
| R167 | 24811/173 | RESISTOR 1K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-1K0-1%-50ppm |
| R200 | 24811/145 | RESISTOR 68R1 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-68R1-1%-50ppm |
| to R201 | | | | |
| R202 | 24811/135 | RESISTOR 27R4 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-27R4-1%-50ppm |
| to R203 | | | | |
| R204 | 24811/142 | RESISTOR 51R1 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-51R1-1%-50ppm |
| to R205 | | | | |
| R206 | 25711/664 | RESISTOR-VAR 20K 30%100mW 1-TURN SURFACE-MTG | BI TECHNOLOGIES | 21XR20KTR |
| R207 | 24811/221 | RESISTOR 100K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-100K-1%-50ppm |
| TR1 | 28487/809 | TRANSISTOR NPN BFR93A..12V 5GHz MKD-R2 SOT-23 | PHILIPS | BFR93A |

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|

## A6 CPU

When ordering, prefix circuit reference with A6.

| | | | | |
|---|---|---|---|---|
| | 44829-836 | Complete unit | Issue 15 | |
| C3 | 26386/887 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-104-KP |
| C4 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C5 | 26386/887 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-104-KP |
| C6 to C8 | 26386/824 | CAPACITOR-FIXED CERAMIC 100pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-101-JP |
| C9 to C16 | 26386/867 | CAPACITOR-FIXED CERAMIC 2.2nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-222-KP |
| C17 to C20 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C21 | 26421/143 | CAPACITOR-FIXED ALUMINIUM 470uF +/-20% 6.3V ELECTROLYTIC, RADIAL, 5mm PWP, (TAPED). | PANASONIC INDUSTRIAL | ECE-A-0J-U-471-B |
| C22 | 26421/108 | CAPACITOR-FIXED ALUMINIUM 4.7uF +/-20% 35V ELECTROLYTIC, RADIAL, 5mm PWP, (TAPED). | PANASONIC INDUSTRIAL | ECE-A-1V-KA-4R7-B |
| C23 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C24 | 26421/114 | CAPACITOR-FIXED ALUMINIUM 22uF +/-20% 25V ELECTROLYTIC, RADIAL, 5mm PWP, (TAPED). | PANASONIC INDUSTRIAL | ECE-A-1E-KA-220-B |
| C25 | 26386/887 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-104-KP |
| C26 | 26421/141 | CAPACITOR-FIXED ALUMINIUM 100uF +/-20% 35V ELECTROLYTIC, RADIAL, 5mm PWP, (TAPED). | PANASONIC INDUSTRIAL | ECE-A-1VU-101B |
| C27 | 26421/118 | CAPACITOR-FIXED ALUMINIUM 100uF +/-20% 6.3V ELECTROLYTIC, RADIAL, 5mm PWP, (TAPED). | PANASONIC INDUSTRIAL | ECE-A-0J-KA-101-B |
| C28 | 26421/118 | CAPACITOR-FIXED ALUMINIUM 100uF +/-20% 6.3V ELECTROLYTIC, RADIAL, 5mm PWP, (TAPED). | PANASONIC INDUSTRIAL | ECE-A-0J-KA-101-B |
| C29 | 26421/141 | CAPACITOR-FIXED ALUMINIUM 100uF +/-20% 35V ELECTROLYTIC, RADIAL, 5mm PWP, (TAPED). | PANASONIC INDUSTRIAL | ECE-A-1VU-101B |
| C30 to C115 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C116 | 26386/887 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-104-KP |
| C117 to C173 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C174 | 26386/813 | CAPACITOR-FIXED CERAMIC 12pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-120-JP |
| D1 | 28383/901 | DIODE SMALL-SIGNAL, BAV70... DUAL, 70V 100mA 1.1Vf @ 50mA, COMMON CATHODE, MARKING CODE A4, SURFACE | PHILIPS | BAV70 |
| D2 | 28371/412 | DIODE ZENER, BZX84-C5V1... 350mW 5.1V 5% 250mA MARKING CODE Z2, SURFACE MOUNTED, SOT-23, (TAPED). | PHILIPS | BZX84-C5V1 |

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| **A6 CPU (contd.)** | | | | |
| D3 to D9 | 28383/901 | DIODE SMALL-SIGNAL, BAV70... DUAL, 70V 100mA 1.1Vf @ 50mA, COMMON CATHODE, MARKING CODE A4, SURFACE | PHILIPS | BAV70 |
| FS1 | 25685/418 | THERMISTOR POSITIVE-TC DISC, 7.4mm 2R67 @ 20 DEG.C, 400mW 5mm PWP, FAULT VOLTAGE 60V, TRIP | BOURNS ELECTRONICS | MF-R020 |
| FS2 | 25685/418 | THERMISTOR POSITIVE-TC DISC, 7.4mm 2R67 @ 20 DEG.C, 400mW 5mm PWP, FAULT VOLTAGE 60V, TRIP | BOURNS ELECTRONICS | MF-R020 |
| IC1 | 28467/096 | IC-MICRO PROCESSOR, 16 BIT, 68000... 10MHz, CHMOS, 68 PIN, PLCC. | SGS-THOMSON | EF68000/FN/10 |
| IC2 | 28469/049 | IC-DIGITAL TRANSCEIVER 74HCT245... OCTAL, BI-DIRECTIONAL, TRI-STATE BUS, CMOS-H/SPEED+TTL, | PHILIPS | 74HCT245D |
| IC3 | 28469/049 | IC-DIGITAL TRANSCEIVER 74HCT245... OCTAL, BI-DIRECTIONAL, TRI-STATE BUS, CMOS-H/SPEED+TTL, | PHILIPS | 74HCT245D |
| IC4 | 28467/117 | IC-MICRO STATIC-RAM, 128K x 8 BIT, HM628128... 5V, 100nS, 50uA MAX STANDBY CURRENT, CMOS, 32 PIN, | TOSHIBA (UK) LTD | TC551001BFL-10L |
| IC5 | 28467/117 | IC-MICRO STATIC-RAM, 128K x 8 BIT, HM628128... 5V, 100nS, 50uA MAX STANDBY CURRENT, CMOS, 32 PIN, | TOSHIBA (UK) LTD | TC551001BFL-10L |
| IC8 | 28469/909 | IC-MICRO STATIC-RAM, 32K x 8 BIT, MK48Z32... 5V +/-5%, 150nS, NON-VOLATILE, WITH INTERNAL LITHIUM | SGS-THOMSON | MK48Z32-100PC1 |
| IC9 | 28469/909 | IC-MICRO STATIC-RAM, 32K x 8 BIT, MK48Z32... 5V +/-5%, 150nS, NON-VOLATILE, WITH INTERNAL LITHIUM | SGS-THOMSON | MK48Z32-100PC1 |
| IC16 | 28461/862 | IC-ANALOGUE SWITCH 74HC4066... QUAD, BILATERAL SWITCH, CMOS-H/SPEED, 14 PIN, SMALL-OUTLINE. | PHILIPS | 74HC4066D |
| IC17 | 28471/051 | IC-MICRO EEPROM, 32K x 8 BIT, 28C256... 200nS, 5V, 200uA MAX STANDBY CURRENT, PAGE MODE, CMOS, 32 | ATMEL CORPORATION | AT28C256-20JC |
| IC18 | 28471/051 | IC-MICRO EEPROM, 32K x 8 BIT, 28C256... 200nS, 5V, 200uA MAX STANDBY CURRENT, PAGE MODE, CMOS, 32 | ATMEL CORPORATION | AT28C256-20JC |
| IC19 | 28471/047 | IC-MICRO EEPROM, 128K x 8 BIT, 28F010... 120nS, 5V & 12V, FLASH MEMORY, 10000 ERASE/PROGRAMME CYCLES, | ADVANCED MICRO DEV | AM28F010-120JC |
| IC20 | 28471/047 | IC-MICRO EEPROM, 128K x 8 BIT, 28F010... 120nS, 5V & 12V, FLASH MEMORY, 10000 ERASE/PROGRAMME CYCLES, | ADVANCED MICRO DEV | AM28F010-120JC |
| IC21 | 28462/638 | IC-DIGITAL FLIP-FLOP/D-TYPE 74HC74... 2 BIT, DUAL, POS EDGE TRIGGER, PLUS SET & CLEAR, CMOS-H/SPEED, | PHILIPS | 74HC74D |
| IC22 | 28467/027 | IC-MICRO CONTROLLER, 8291A/7210... INTERFACE BUS TALKER/LISTENER, NMOS, 40 PIN, DUAL-IN-LINE. | NEC ELECTRONICS LTD | uPD7210C |
| IC23 | 28469/114 | IC-DIGITAL TRANSCEIVER 75160... OCTAL, GPIB DATA, TTL-SCHOTTKY-L/PWR, 20 PIN, DUAL-IN-LINE. | NAT. SEMICONDUCTOR | DS75160AN |
| IC24 | 28469/115 | IC-DIGITAL TRANSCEIVER 75161... OCTAL, GPIB-CONTROLLER, TTL-SCHOTTKY-L/PWR, 20 PIN, | NAT. SEMICONDUCTOR | DS75161AN |
| IC25 | 28469/057 | IC-DIGITAL INVERTER 74HC04... HEX, CMOS-H/SPEED, 14 PIN, SMALL-OUTLINE. | PHILIPS | 74HC04D |
| IC26 | 28467/123 | IC-MICRO PERIPHERAL, 16C452... DUAL ASYNCHRONOUS COMMUNICATIONS ELEMENT WITH PARALLEL PRINTER PORT, | TEXAS INSTRUMENTS | TL16C452FN |
| IC27 | 28469/045 | IC-DIGITAL RECEIVER 1489... 4 INPUT, 4 BIT, QUAD, RS 232 RECEIVER, MOS, 14 PIN, SMALL-OUTLINE. | NAT. SEMICONDUCTOR | DS1489M |
| IC28 | 28469/045 | IC-DIGITAL RECEIVER 1489... 4 INPUT, 4 BIT, QUAD, RS 232 RECEIVER, MOS, 14 PIN, SMALL-OUTLINE. | NAT. SEMICONDUCTOR | DS1489M |

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| **A6 CPU (contd.)** | | | | |
| IC29 | 28469/044 | IC-DIGITAL BUFFER/LINE-DRIVER 1488... QUAD, UNBALANCED, INVERTING, TO RS-232D AND CCITT V.24, | NAT. SEMICONDUCTOR | DS1488M |
| IC30 | 28467/113 | IC-MICRO CONTROLLER, 8584... INTERFACE, PARALLEL-BUS MICROCONTROLLER OR PROCESSOR TO | PHILIPS | PCF8584T |
| IC31 | 28469/049 | IC-DIGITAL TRANSCEIVER 74HCT245... OCTAL, BI-DIRECTIONAL, TRI-STATE BUS, CMOS-H/SPEED+TTL, | PHILIPS | 74HCT245D |
| IC36 | 44535/248 | IC-PROGRAMMED PAL, SET OF 1, 2965, A6 BRIDGE LOGIC. | IFR LTD | |
| IC42 | 28469/049 | IC-DIGITAL TRANSCEIVER 74HCT245... OCTAL, BI-DIRECTIONAL, TRI-STATE BUS, CMOS-H/SPEED+TTL, | PHILIPS | 74HCT245D |
| IC43 | 28469/030 | IC-DIGITAL BUFFER/LINE-DRIVER 74HCT541... OCTAL, TRI-STATE, NON-INVERTING, CMOS-H/SPEED+TTL, 20 | PHILIPS | 74HCT541D |
| IC44 | 28467/119 | IC-MICRO REAL-TIME-CLOCK, DS1287... NON-VOLATILE, WITH INTEGRAL BATTERY & CRYSTAL, WITHOUT RAM CLEAR | SGS-THOMSON | MK48T87B24 |
| IC45 | 28466/390 | IC-DIGITAL NAND-GATE 74HC00... 2 INPUT, QUAD, CMOS-H/SPEED, 14 PIN, SMALL-OUTLINE. | PHILIPS | 74HC00D |
| IC46 | 28466/241 | IC-DIGITAL NOR-GATE 74HC02... 2 INPUT, QUAD, CMOS-H/SPEED, 14 PIN, SMALL-OUTLINE. | PHILIPS | 74HC02D |
| IC47 | 28461/963 | IC-ANALOGUE COMPARATOR LT1016... RESPONSE-TIME 14nS MAX, PRECISION, 8 PIN, DUAL-IN-LINE. | MAXIM INTEG PRODUCTS | LT1016CN8 |
| IC48 | 28464/148 | IC-DIGITAL COUNTER 74HC590... 8 BIT, BINARY TRI-STATE, CMOS-H/SPEED, 16 PIN, DUAL-IN-LINE. | NAT. SEMICONDUCTOR | MM74HC590N |
| IC49 | 28469/556 | IC-DIGITAL REGISTER CY7C425... 9 BIT, SINGLE, FIFO 1024 WORD, ASYNCHRONOUS MODE, TRI-STATE, 65nS | ADVANCED MICRO DEV | AM7202A-50JC |
| IC50 | 28462/638 | IC-DIGITAL FLIP-FLOP/D-TYPE 74HC74... 2 BIT, DUAL, POS EDGE TRIGGER, PLUS SET & CLEAR, CMOS-H/SPEED, | PHILIPS | 74HC74D |
| IC51 | 28461/995 | IC-ANALOGUE PHASE-LOCKED-LOOP 74HC4046... MAX Vco OPERATING FREQUENCY 12MHz, CMOS-H/SPEED, 16 PIN, | PHILIPS | 74HC4046AN |
| IC52 | 28461/412 | IC-ANALOGUE OPERATIONAL AMP TL072... DUAL, 18V UNITY GAIN BNDWDTH 3MHz, OFFSET VOLTAGE 10mV, SLEW | MOTOROLA INC. | TL072CD |
| IC53 | 28462/638 | IC-DIGITAL FLIP-FLOP/D-TYPE 74HC74... 2 BIT, DUAL, POS EDGE TRIGGER, PLUS SET & CLEAR, CMOS-H/SPEED, | PHILIPS | 74HC74D |
| IC54 | 28462/152 | IC-DIGITAL FLIP-FLOP/D-TYPE 74HC273... 8 INPUT, 8 BIT, OCTAL, WITH RESET, CMOS-H/SPEED, 20 PIN, | PHILIPS | 74HC273D |
| IC55 | 28462/152 | IC-DIGITAL FLIP-FLOP/D-TYPE 74HC273... 8 INPUT, 8 BIT, OCTAL, WITH RESET, CMOS-H/SPEED, 20 PIN, | PHILIPS | 74HC273D |
| IC56 | 28462/155 | IC-DIGITAL FLIP-FLOP/MONOSTABLE 74HC221... DUAL, NON-RETRIGGERABLE, tW = 0.7RC, WITH RESET, | PHILIPS | 74HC221D |
| IC57 | 28469/056 | IC-DIGITAL INVERTER 74AC14... HEX, SCHMITT-TRIGGER OPERATION, CMOS-ADVANCED, 14 PIN, SMALL-OUTLINE. | NAT. SEMICONDUCTOR | 74AC14SC |
| IC58 | 28467/110 | IC-MICRO PERIPHERAL, PCF8574A... REMOTE 8-BIT I/O EXPANDER, I.IC BUS, UP TO 16 DEVICE ADDRESS | PHILIPS | PCF8574AT |
| IC59 | 28461/862 | IC-ANALOGUE SWITCH 74HC4066... QUAD, BILATERAL SWITCH, CMOS-H/SPEED, 14 PIN, SMALL-OUTLINE. | PHILIPS | 74HC4066D |
| IC60 | 44535/237 | IC-PROGRAMMED PAL, SET OF 1, 2965, A6 INTERRUPT LOGIC. | IFR LTD | |
| IC61 | 28469/030 | IC-DIGITAL BUFFER/LINE-DRIVER 74HCT541... OCTAL, TRI-STATE, NON-INVERTING, CMOS-H/SPEED+TTL, 20 | PHILIPS | 74HCT541D |
| IC62 | 28469/030 | IC-DIGITAL BUFFER/LINE-DRIVER 74HCT541... OCTAL, TRI-STATE, NON-INVERTING, CMOS-H/SPEED+TTL, 20 | PHILIPS | 74HCT541D |

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
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| **A6 CPU (contd.)** | | | | |
| IC63 | 44535/238 | IC-PROGRAMMED PAL, SET OF 1, 2965, A6 DECODE LOGIC. | IFR LTD | |
| IC64 | 28469/036 | IC-DIGITAL BUFFER/LINE-DRIVER 7407... HEX, OPEN-COLLECTOR, NON-INVERTING, TTL, 14 PIN, | TEXAS INSTRUMENTS | SN7407D |
| IC65 | 28462/152 | IC-DIGITAL FLIP-FLOP/D-TYPE 74HC273... 8 INPUT, 8 BIT, OCTAL, WITH RESET, CMOS-H/SPEED, 20 PIN, | PHILIPS | 74HC273D |
| IC66 | 28469/030 | IC-DIGITAL BUFFER/LINE-DRIVER 74HCT541... OCTAL, TRI-STATE, NON-INVERTING, CMOS-H/SPEED+TTL, 20 | PHILIPS | 74HCT541D |
| IC67 | 28464/173 | IC-DIGITAL COUNTER 74AC161... 4 INPUT, 4 BIT, SINGLE, BINARY, SYNCHRONOUS, PRESETTABLE + RESET, | NAT. SEMICONDUCTOR | 74AC161SC |
| IC68 | 28466/030 | IC-DIGITAL AND-GATE 74ACT08... 2 INPUT, QUAD, CMOS-ADVANCED+TTL, 14 PIN, SMALL-OUTLINE. | NAT. SEMICONDUCTOR | DM74ACT08M |
| IC69 | 28462/147 | IC-DIGITAL FLIP-FLOP/D-TYPE 74ACT74... 2 BIT, DUAL, POS EDGE TRIGGER, PLUS SET & CLEAR, | NAT. SEMICONDUCTOR | 74ACT74SC |
| IC70 | 28462/147 | IC-DIGITAL FLIP-FLOP/D-TYPE 74ACT74... 2 BIT, DUAL, POS EDGE TRIGGER, PLUS SET & CLEAR, | NAT. SEMICONDUCTOR | 74ACT74SC |
| IC71 | 28469/543 | IC-DIGITAL COUNTER 74HC390... 4 BIT, DUAL, DECADE RIPPLE, CMOS-H/SPEED, 16 PIN, SMALL-OUTLINE. | PHILIPS | 74HC390D |
| IC72 | 28462/638 | IC-DIGITAL FLIP-FLOP/D-TYPE 74HC74... 2 BIT, DUAL, POS EDGE TRIGGER, PLUS SET & CLEAR, CMOS-H/SPEED, | PHILIPS | 74HC74D |
| IC73 | 28461/807 | IC-ANALOGUE VOLTAGE-REGULATOR TL7705BCP... 5V SUPPLY MONITOR, VOLTAGE SUPERVISOR, 8 PIN, | TEXAS INSTRUMENTS | TL7705BCP |
| L1 to L4 | 23642/909 | WOUND-PART INDUCTOR, WIDEBAND HF CHOKE, BEAD-CORE, 4B1 GRADE MATERIAL, 2.5 TURNS, TINNED COPPER WIRE. | PHILIPS | 4312-020-36700 |
| PLA to PLC | 23435/120 | CONNECTOR MULTIWAY, PCB HEADER, 36 WAY, RIGHT ANGLED, 2.54mm PITCH, PINS GOLD PLATED TO CLASS 2, | BERG ELECTRONICS | 75168-101-36 |
| PLD | 23436/902 | CONNECTOR MULTIWAY, PCB HEADER, 26 WAY, RIGHT ANGLED, 2-ROW, 2.54mm GRID, POLARISED, SHROUDED, | MOLEX ELECTRONICS | 39-26-7268 |
| PLE | 23436/774 | CONNECTOR MULTIWAY, PCB HEADER, 40 WAY, RIGHT ANGLED, 2-ROW, 2.54mm GRID, POLARISED, SHROUDED, | MOLEX ELECTRONICS | 39-26-7408 |
| PLF | 23436/900 | CONNECTOR MULTIWAY, PCB HEADER, 10 WAY, RIGHT ANGLED, 2-ROW, 2.54mm GRID, POLARISED, SHROUDED, | MOLEX ELECTRONICS | 39-26-7108 |
| PLG | 23436/901 | CONNECTOR MULTIWAY, PCB HEADER, 16 WAY, RIGHT ANGLED, 2-ROW, 2.54mm GRID, POLARISED, SHROUDED, | THOMAS & BETTS LTD | 609-1607 |
| PLH | 23436/777 | CONNECTOR MULTIWAY, PCB HEADER, 6 WAY, RIGHT ANGLED, 3.96mm PITCH, WITH FRICTION LOCK, GOLD | MOLEX ELECTRONICS | 26-48-2066 |
| PLJ | 23435/120 | CONNECTOR MULTIWAY, PCB HEADER, 36 WAY, RIGHT ANGLED, 2.54mm PITCH, PINS GOLD PLATED TO CLASS 2, | BERG ELECTRONICS | 75168-101-36 |
| PLK | 23436/970 | CONNECTOR MULTIWAY, PCB HEADER, 34 WAY, RIGHT ANGLED, 2-ROW, 2.54mm GRID, POLARISED, SHROUDED, | MOLEX ELECTRONICS | 39-26-7348 |
| PLN | 23435/860 | CONNECTOR MULTIWAY, PCB TRANSITION, 20 WAY, IDC TYPE, 4-ROW, 2.54mm ROW SPACING, 3.1-3.6mm PIN | MCMURDO INSTRUMENT | TC434-20-N-T |
| PLP | 23435/951 | CONNECTOR MULTIWAY, PCB HEADER, 20 WAY, STRAIGHT, 2-ROW, 2.54mm GRID, POLARISED, SHROUDED. | THOMAS & BETTS LTD | 609-2027 |
| PLQ | 23436/903 | CONNECTOR MULTIWAY, PCB HEADER, 16 WAY, STRAIGHT, 2-ROW, 2.54mm GRID, POLARISED, SHROUDED. | THOMAS & BETTS LTD | 609-1627 |

## A6 CPU (contd.)

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| R1 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R2 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R3 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R4 | 24811/181 | RESISTOR-FIXED METAL-FILM 2K21 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-2K21-1%50ppm |
| R5 | 24811/181 | RESISTOR-FIXED METAL-FILM 2K21 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-2K21-1%50ppm |
| R6 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R7 to R11 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R12 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R13 | 24811/191 | RESISTOR-FIXED METAL-FILM 5K62 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-5K62-1%50ppm |
| R14 | 24811/205 | RESISTOR-FIXED METAL-FILM 22K1 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-22K1-1%50ppm |
| R15 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R16 | 24811/205 | RESISTOR-FIXED METAL-FILM 22K1 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-22K1-1%50ppm |
| R17 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R18 | 24681/548 | RESISTOR-NETWORK ISOLATED, THICK-FILM, 100K 2% 600mW 50V 200 ppm/DEG.C, 8 RESISTORS, SURFACE | VISHAY COMPONENTS | 836C-104-X2-SR-TUBE |
| R19 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R20 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R21 to R29 | 24811/137 | RESISTOR-FIXED METAL-FILM 33R2 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-33R2-1%50ppm |
| R30 | 24811/181 | RESISTOR-FIXED METAL-FILM 2K21 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-2K21-1%50ppm |
| R31 | 24681/540 | RESISTOR-NETWORK ISOLATED, THICK-FILM, 4K7 2% 600mW 50V 200 ppm/DEG.C, 8 RESISTORS, SURFACE | VISHAY COMPONENTS | 836C-472-X2-SR-TUBE |
| R32 | 24811/181 | RESISTOR-FIXED METAL-FILM 2K21 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-2K21-1%50ppm |
| R33 | 24811/181 | RESISTOR-FIXED METAL-FILM 2K21 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-2K21-1%50ppm |
| R34 | 24681/528 | RESISTOR-NETWORK ISOLATED, THICK-FILM, 10K 2% 600mW 50V 200 ppm/DEG.C, 8 RESISTORS, SURFACE | VISHAY COMPONENTS | 836C-103-X2-SR-TUBE |
| R35 | 24811/181 | RESISTOR-FIXED METAL-FILM 2K21 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-2K21-1%50ppm |
| R36 | 24811/181 | RESISTOR-FIXED METAL-FILM 2K21 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-2K21-1%50ppm |
| R37 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |

## A6 CPU (contd.)

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| R38 to R41 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R43 | 24811/141 | RESISTOR-FIXED METAL-FILM 47R5 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-47R5-1%50ppm |
| R44 | 24811/142 | RESISTOR-FIXED METAL-FILM 51R1 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-51R1-1%50ppm |
| R45 to R47 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R48 | 24811/193 | RESISTOR-FIXED METAL-FILM 6K81 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-6K81-1%50ppm |
| R49 | 24811/213 | RESISTOR-FIXED METAL-FILM 47K5 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-47K5-1%50ppm |
| R50 to R52 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R53 | 24811/195 | RESISTOR-FIXED METAL-FILM 8K25 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-8K25-1%50ppm |
| R54 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R55 | 24811/195 | RESISTOR-FIXED METAL-FILM 8K25 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-8K25-1%50ppm |
| R56 | 24681/534 | RESISTOR-NETWORK ISOLATED, THICK-FILM, 470R 2% 600mW 50V 200 ppm/DEG.C, 8 RESISTORS, SURFACE | VISHAY COMPONENTS | 836C-471-X2-SR-TUBE |
| R57 | 24681/534 | RESISTOR-NETWORK ISOLATED, THICK-FILM, 470R 2% 600mW 50V 200 ppm/DEG.C, 8 RESISTORS, SURFACE | VISHAY COMPONENTS | 836C-471-X2-SR-TUBE |
| R58 | 24811/195 | RESISTOR-FIXED METAL-FILM 8K25 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-8K25-1%50ppm |
| R59 | 24811/141 | RESISTOR-FIXED METAL-FILM 47R5 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-47R5-1%50ppm |
| R60 | 24681/540 | RESISTOR-NETWORK ISOLATED, THICK-FILM, 4K7 2% 600mW 50V 200 ppm/DEG.C, 8 RESISTORS, SURFACE | VISHAY COMPONENTS | 836C-472-X2-SR-TUBE |
| R62 | 24811/221 | RESISTOR-FIXED METAL-FILM 100K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100K-1%50ppm |
| R63 | 24811/221 | RESISTOR-FIXED METAL-FILM 100K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100K-1%50ppm |
| R64 | 24681/528 | RESISTOR-NETWORK ISOLATED, THICK-FILM, 10K 2% 600mW 50V 200 ppm/DEG.C, 8 RESISTORS, SURFACE | VISHAY COMPONENTS | 836C-103-X2-SR-TUBE |
| R65 to R67 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R68 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R69 | 24681/528 | RESISTOR-NETWORK ISOLATED, THICK-FILM, 10K 2% 600mW 50V 200 ppm/DEG.C, 8 RESISTORS, SURFACE | VISHAY COMPONENTS | 836C-103-X2-SR-TUBE |
| R70 | 24811/146 | RESISTOR-FIXED METAL-FILM 75R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-75R0-1%50ppm |
| R71 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R72 | 24811/141 | RESISTOR-FIXED METAL-FILM 47R5 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-47R5-1%50ppm |
| R73 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |

## A6 CPU (contd.)

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| R74 | 24811/141 | RESISTOR-FIXED METAL-FILM 47R5 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-47R5-1%50ppm |
| R75 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R76 to R78 | 24811/141 | RESISTOR-FIXED METAL-FILM 47R5 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-47R5-1%50ppm |
| R79 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R80 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R81 | 24681/536 | RESISTOR-NETWORK ISOLATED, THICK-FILM, 1K 2% 600mW 50V 200 ppm/DEG.C, 8 RESISTORS, SURFACE MOUNTED, | VISHAY COMPONENTS | 836C-102-X2-SR-TUBE |
| R82 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R85 to R110 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| TR1 | 28435/241 | TRANSISTOR PNP BIPOLAR BCX17... 45V 100MHz 425mW 500mA 100hFE MIN @ 100mA, MARKING CODE T1, SURFACE | PHILIPS | BCX17 |
| TR2 | 28453/829 | TRANSISTOR NPN BIPOLAR BC848B... 30V 200MHz 200mW 100mA 290hFE TYP @ 2mA, NOISE 2dB @ 1KHz, MARKING | PHILIPS | BC848B |
| TR3 | 28453/829 | TRANSISTOR NPN BIPOLAR BC848B... 30V 200MHz 200mW 100mA 290hFE TYP @ 2mA, NOISE 2dB @ 1KHz, MARKING | PHILIPS | BC848B |
| TR4 to TR17 | 28455/302 | TRANSISTOR NPN BIPOLAR BCX54... 45V 130MHz 1W 1A 40hFE MIN @ 150mA, MARKING CODE BA/BB/BC/BD, | PHILIPS | BCX54 |

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|

## A6/2 CPU

When ordering, prefix circuit reference with A6/2.

| | | | | |
|---|---|---|---|---|
| | 44830-041 | Complete unit | Issue 11 | |
| C1 | 26386/875 | CAPACITOR CERAMIC 10nF+/-10% 50V 0805 | AVX | 0805-5C-103-KAT-1A o |
| C2 | 26386/899 | CAPACITOR CERAMIC 100nF+/-10% 50V 1206 | AVX | 1206-5C-104-KAT-1A o |
| to C6 | | | | |
| C7 | 26451/002 | CAPACITOR ALUM 4.7uF+/-20% 35V 4.3mmSQ | RUBYCON | 35-REV-4R7 |
| to C8 | | | | |
| C9 | 26386/867 | CAPACITOR CERAMIC 2.2nF+/-10% 50V 0805 | AVX | 0805-5C-222-KAT-1A o |
| to C16 | | | | |
| C17 | 26451/002 | CAPACITOR ALUM 4.7uF+/-20% 35V 4.3mmSQ | RUBYCON | 35-REV-4R7 |
| C18 | 26451/010 | CAPACITOR ALUM 100uF+/-20% 6.3V 6.6mmSQ | RUBYCON | 6.3-REV-100 |
| to C21 | | | | |
| C22 | 26386/875 | CAPACITOR CERAMIC 10nF+/-10% 50V 0805 | AVX | 0805-5C-103-KAT-1A o |
| to C24 | | | | |
| C25 | 26386/813 | CAPACITOR CERAMIC 12pF+/-5% 50V 0805 | AVX | 0805-5A-120-JAT-1A o |
| C26 | 26386/875 | CAPACITOR CERAMIC 10nF+/-10% 50V 0805 | AVX | 0805-5C-103-KAT-1A o |
| to C30 | | | | |
| C31 | 26386/899 | CAPACITOR CERAMIC 100nF+/-10% 50V 1206 | AVX | 1206-5C-104-KAT-1A o |
| C32 | 26451/012 | CAPACITOR ALUM 100uF+/-20% 16V 8.3mmSQ | DUBILIER | DVC-100/16-T/R |
| C33 | 26451/010 | CAPACITOR ALUM 100uF+/-20% 6.3V 6.6mmSQ | RUBYCON | 6.3-REV-100 |
| to C34 | | | | |
| C35 | 26451/012 | CAPACITOR ALUM 100uF+/-20% 16V 8.3mmSQ | DUBILIER | DVC-100/16-T/R |
| C36 | 26386/875 | CAPACITOR CERAMIC 10nF+/-10% 50V 0805 | AVX | 0805-5C-103-KAT-1A o |
| to C39 | | | | |
| C50 | 26386/899 | CAPACITOR CERAMIC 100nF+/-10% 50V 1206 | AVX | 1206-5C-104-KAT-1A o |
| to C103 | | | | |
| C105 | 26386/817 | CAPACITOR CERAMIC 27pF+/-5% 50V 0805 | AVX | 0805-5A-270-JAT-1A o |
| C106 | 26386/875 | CAPACITOR CERAMIC 10nF+/-10% 50V 0805 | AVX | 0805-5C-103-KAT-1A o |
| D1 | 28624/134 | LED RED HLMP-1700..1.8V T1 3mmDIA | HEWLETT-PACKARD | HLMP-1700 |
| to D4 | | | | |
| D5 | 28383/901 | DIODE BAV70.. SMALL-SIGDUAL 70V MKD-A4 SOT-23 | PHILIPS | BAV70 |
| to D13 | | | | |
| D14 | 28371/412 | DIODE BZX84-C5V1.. ZENER5.1V MKD-Z2 SOT-23 | PHILIPS | BZX84-C5V1 |
| FL1 | 23642/801 | FILTER RFI-SUPPRESSION3A SURFACE MTG 5.7x5mm | TDK | HF50ACC-575032-T |
| to FL4 | | | | |
| FS1 | 25685/418 | THERMISTOR POS-TC DISC2R67 @ 20 DEG.C RADIAL | BOURNS | MF-R020 |
| to FS2 | | | | |

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| **A6/2 CPU (contd.)** | | | | |
| IC1 | 28469/051 | IC-DIGITAL INVERTER74AC04.. HEX SO-14 | FAIRCHILD | 74AC04SC |
| IIC2 | 44535/296 | IC-PROGRAM PAL x1 2965,CLOCKS & COUNTER A6/2. | | |
| C3 | 28467/158 | IC-MICRO PERIPHERALMAX1232.. SO-8 | DALLAS | DS1232LPS-2 |
| IC4 | 44535/298 | IC-PROGRAM PAL x1 2965,INTERRUPT ENCODER A6/2. | | |
| IC5 | 28467/096 | IC-MICRO PROCESSOR68000.. 16-BIT PLCC-68 | ST MICRO | EF68000/FN/10 |
| IC6 | 28469/049 | IC-DIGITAL TRANSCEIVER74HCT245.. OCT SO-20 | PHILIPS | 74HCT245D |
| to IC7 | | | | |
| IC8 | 44535/294 | IC-PROGRAM PAL x1 2965,MEMORY DECODE. | | |
| IC9 | 44535/295 | IC-PROGRAM PAL x1 2965,I/O DECODE A6/2. | | |
| IC10 | 28471/067 | IC-MICRO EEPROM29F040.. 512Kx8 TSO-32 | FUJITSU | MBM29F040C-90PFTN |
| to IC17 | | | | |
| IC18 | 28471/051 | IC-MICRO EEPROM28C256.. 32Kx8 PLCC-32 | ATMEL | AT28C256-20JC |
| to IC19 | | | | |
| IC22 | 28461/862 | IC-ANALOG SWITCH74HC4066.. QUAD SO-14 | PHILIPS | 74HC4066D |
| IC23 | 28467/154 | IC-MICRO PERIPHERALMXD1210.. SO-8 | MAXIM | MXD1210CSA |
| IC25 | 28467/154 | IC-MICRO PERIPHERALMXD1210.. SO-8 | MAXIM | MXD1210CSA |
| IC27 | 28467/155 | IC-MICRO STATIC-RAMHM628128.. 128Kx8 TSO-32 | HITACHI | HM628128LT-10SL |
| to IC28 | | | | |
| IC31 | 28467/155 | IC-MICRO STATIC-RAMHM628128.. 128Kx8 TSO-32 | HITACHI | HM628128LT-10SL |
| to IC34 | | | | |
| IC39 | 44535/297 | IC-PROGRAM PAL x1 2965,BRIDGE LOGIC A6/2. | | |
| IC40 | 28469/049 | IC-DIGITAL TRANSCEIVER74HCT245.. OCT SO-20 | PHILIPS | 74HCT245D |
| to IC41 | | | | |
| IC42 | 28469/030 | IC-DIGITAL BFR/LINE-DRVR74HCT541.. OCT SO-20 | PHILIPS | 74HCT541D |
| IC43 | 28467/160 | IC-MICRO REAL-TIME-CLOCKDS12885.. PLCC-28 | DALLAS | DS12885Q |
| IC44 | 28467/113 | IC-MICRO CONTROLLER8584.. SO-20 | PHILIPS | PCF8584T |
| IC45 | 28469/100 | IC-DIGITAL BFR/LINE-DRVRAD239.. SO-24 | ANALOG | AD239JR or LJR |
| IC46 | 28467/123 | IC-MICRO PERIPHERAL16C452.. PLCC-68 | TEXAS | TL16C452FN |
| IC47 | 28462/155 | IC-DIGITAL FLIP-FLOP-MON74HC221.. DUAL SO-16 | PHILIPS | 74HC221D |
| IC48 | 28462/152 | IC-DIGITAL FLIP-FLOP-D74HC273.. OCTAL SO-20 | PHILIPS | 74HC273D |
| to IC49 | | | | |
| IC50 | 28469/030 | IC-DIGITAL BFR/LINE-DRVR74HCT541.. OCT SO-20 | PHILIPS | 74HCT541D |
| IC51 | 28462/152 | IC-DIGITAL FLIP-FLOP-D74HC273.. OCTAL SO-20 | PHILIPS | 74HC273D |
| IC52 | 28467/025 | IC-MICRO CONTROLLER7210.. DIL-40 | | |
| IC53 | 28469/114 | IC-DIGITAL TRANSCEIVER75160.. OCT DIL-20 | NATIONAL SEMI | DS75160AN |
| IC54 | 28469/115 | IC-DIGITAL TRANSCEIVER75161.. OCT DIL-20 | NATIONAL SEMI | DS75161AN |
| IC55 | 28461/042 | IC-ANALOG COMPARATORLT1016.. SO-16 | LINEAR TECH | LT1016CS8 |
| IC56 | 28469/556 | IC-DIGITAL REGISTERCY7C425.. PLCC-32 | AMD | AM7202A-50JC |
| IC57 | 28461/059 | IC-ANALOG PHASE-LCK-LOOP74HC4046A.. SO-16 | PHILIPS | 74HC4046AD |
| IC58 | 28461/412 | IC-ANALOG OP AMPTL072.. DUAL SO-8 | MOTOROLA | TL072CD |
| IC59 | 28467/110 | IC-MICRO PERIPHERALPCF8574A.. SO-16 | PHILIPS | PCF8574AT |
| IC60 | 28461/862 | IC-ANALOG SWITCH74HC4066.. QUAD SO-14 | PHILIPS | 74HC4066D |
| L1 | 23642/701 | INDUCTOR 2.2uH 5%MOULDED 3.2x2.5mm | MEGGITT | 3612-T-2R2-J |

## A6/2 CPU (contd.)

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| PLA | 23435/120 | CONNECTOR PCB HEADER36-WAY 0.64mmSQ RT-ANG | FCI | 75168-101-36 |
| PLC | 23435/120 | CONNECTOR PCB HEADER36-WAY 0.64mmSQ RT-ANG | FCI | 75168-101-36 |
| PLD | 23436/902 | CONNECTOR PCB-HEADER26-WAY RT-ANG 2-ROW | MOLEX | 9-26-7268 |
| PLE | 23436/774 | CONNECTOR PCB-HEADER40-WAY RT-ANG 2-ROW | MOLEX | 39-26-7408 |
| PLF | 23436/900 | CONNECTOR PCB-HEADER10-WAY RT-ANG 2-ROW | MOLEX | 39-26-7108 |
| PLG | 23436/901 | CONNECTOR PCB-HEADER16-WAY RT-ANG 2-ROW | THOMAS & BETTS | 609-1607 |
| PLH | 23436/777 | CONNECTOR PCB-HEADER6-WAY RT-ANG | MOLEX | 26-48-2066 |
| PLJ | 23435/120 | CONNECTOR PCB HEADER36-WAY 0.64mmSQ RT-ANG | FCI | 75168-101-36 |
| PLK | 23437/064 | CONNECTOR PCB-HEADER20-WAY 2-ROW SURFACE MTG | MOLEX | 0814-0220 |
| PLL | 23435/120 | CONNECTOR PCB HEADER36-WAY 0.64mmSQ RT-ANG | FCI | 75168-101-36 |
| PLM | 23437/062 | CONNECTOR PCB-HEADER14-WAY 2-ROW SURFACE MTG | MOLEX | 0814-0214 |
| PLP | 23437/064 | CONNECTOR PCB-HEADER20-WAY 2-ROW SURFACE MTG | MOLEX | 0814-0220 |
| R2 | 24811/221 | RESISTOR 100K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-100K-1%-50ppm |
| R3 to R8 | 24811/141 | RESISTOR 47R5 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-47R5-1%-50ppm |
| R9 to R17 | 24811/197 | RESISTOR 10K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-10K-1%-50ppm |
| R18 to R25 | 24811/173 | RESISTOR 1K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-1K0-1%-50ppm |
| R26 to R29 | 24811/177 | RESISTOR 1K5 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-1K5-1%-50ppm |
| R30 to R39 | 24811/173 | RESISTOR 1K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-1K0-1%-50ppm |
| R40 to R43 | 24811/181 | RESISTOR 2K21 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-2K21-1%-50ppm |
| R44 to R47 | 24811/173 | RESISTOR 1K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-1K0-1%-50ppm |
| R48 | 24681/528 | RESISTOR-NTWK ISOLATED10K 2% x8 SO-16 | BOURNS | 4816P-001-103 |
| R49 to R53 | 24811/197 | RESISTOR 10K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-10K-1%-50ppm |
| R54 to R61 | 24811/137 | RESISTOR 33R2 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-33R2-1%-50ppm |
| R62 to R64 | 24811/181 | RESISTOR 2K21 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-2K21-1%-50ppm |
| R65 | 24681/540 | RESISTOR-NTWK ISOLATED4K7 2% x8 SO-16 | BOURNS | 4816P-T01-472-TUBE |
| R66 | 24811/137 | RESISTOR 33R2 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-33R2-1%-50ppm |
| R67 | 24681/536 | RESISTOR-NTWK ISOLATED1K 2% x8 SO-16 | BOURNS | 4816P-T01-102-TUBE |
| R68 | 24811/173 | RESISTOR 1K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-1K0-1%-50ppm |
| R69 | 24811/197 | RESISTOR 10K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-10K-1%-50ppm |
| R70 to R77 | 24811/165 | RESISTOR 475R 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-475R-1%-50ppm |
| R78 | 24681/528 | RESISTOR-NTWK ISOLATED10K 2% x8 SO-16 | BOURNS | 4816P-001-103 |

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| **A6/2 CPU (contd.)** | | | | |
| R79 to R84 | 24811/165 | RESISTOR 475R 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-475R-1%-50ppm |
| R85 | 24811/142 | RESISTOR 51R1 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-51R1-1%-50ppm |
| R86 | 24811/141 | RESISTOR 47R5 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-47R5-1%-50ppm |
| R87 to R89 | 24811/173 | RESISTOR 1K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-1K0-1%-50ppm |
| R90 | 24811/193 | RESISTOR 6K81 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-6K81-1%-50ppm |
| R92 | 24811/173 | RESISTOR 1K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-1K0-1%-50ppm |
| R93 to R95 | 24811/197 | RESISTOR 10K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-10K-1%-50ppm |
| R96 | 24811/195 | RESISTOR 8K25 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-8K25-1%-50ppm |
| R97 | 24811/197 | RESISTOR 10K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-10K-1%-50ppm |
| R98 | 24811/195 | RESISTOR 8K25 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-8K25-1%-50ppm |
| R99 | 24811/145 | RESISTOR 68R1 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-68R1-1%-50ppm |
| R100 | 24681/540 | RESISTOR-NTWK ISOLATED4K7 2% x8 SO-16 | BOURNS | 4816P-T01-472-TUBE |
| R101 to R102 | 24811/221 | RESISTOR 100K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-100K-1%-50ppm |
| R104 to R107 | 24811/197 | RESISTOR 10K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-10K-1%-50ppm |
| R108 to R111 | 24811/173 | RESISTOR 1K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-1K0-1%-50ppm |
| R112 | 24811/101 | RESISTOR 1R 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-1R0-1%-50ppm |
| R113 | 24811/173 | RESISTOR 1K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-1K0-1%-50ppm |
| R114 to R115 | 24811/165 | RESISTOR 475R 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-475R-1%-50ppm |
| R116 | 24811/135 | RESISTOR 27R4 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-27R4-1%-50ppm |
| R117 | 24811/197 | RESISTOR 10K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-10K-1%-50ppm |
| R118 | 24811/142 | RESISTOR 51R1 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-51R1-1%-50ppm |
| R119 | 24811/221 | RESISTOR 100K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-100K-1%-50ppm |
| SKN | 43138/097 | RIBBON-LEAD 20 WAY SKT - PCB TRANS 120mm LG | | |
| SKS | 23437/525 | CONNECTOR SKT 50-WAYSTRT 2-ROW SURFACE MTG | SAMTEC | SMM-125-02-S-D-P |
| SKT | 23437/524 | CONNECTOR SKT 8-WAY STRT2-ROW SURFACE MTG | SAMTEC | SMM-104-02-S-D-P |
| SKU | 23437/524 | CONNECTOR SKT 8-WAY STRT2-ROW SURFACE MTG | SAMTEC | SMM-104-02-S-D-P |
| SKX | 23437/524 | CONNECTOR SKT 8-WAY STRT2-ROW SURFACE MTG | SAMTEC | SMM-104-02-S-D-P |
| TR1 to TR14 | 28455/302 | TRANSISTOR NPN BCX54..45V 130MHz MKD-BA SOT-89 | PHILIPS | BCX54 |
| XL1 | 28312/301 | CRYSTAL 0.032768MHz90SMX SURFACE MTG | ADVANCED CRYSTAL TEC | 90SMX/32.768K/SP-T1A |

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|

## Front panel assembly

No user replaceable parts.

| | |
|---|---|
| 46662-446 | Complete unit ENGLISH |
| 46662-447 | Complete unit FRENCH |
| 46662-448 | Complete unit SPANISH |
| 46662-449 | Complete unit GERMAN |

The front panel assembly does not include the instrument identity strip. This must be ordered as a separate item.

| | |
|---|---|
| 46662-486 | 2965 Identity strip ENGLISH |
| 46662-511 | 2965 Identity strip FRENCH |
| 46662-512 | 2965 Identity strip SPANISH |
| 46662-513 | 2965 Identity strip GERMAN |
| 46662-599 | 2965A Identity strip English only |
| 46662-600 | 2966A Identity strip English only |
| 46662-622 | 2967 Identity strip English only |
| 46662-635 | 2968 Identity strip English only |

## A7 Front panel interface

When ordering, prefix circuit reference with A7.

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| | 44829-837 | Complete unit | Issue 10 | |
| C1 to C3 | 26386/899 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | ROHM ELECTRONICS LTD | MCH31-5C-104-KP |
| C4 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C5 | 26386/899 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | ROHM ELECTRONICS LTD | MCH31-5C-104-KP |
| C6 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C7 | 26386/828 | CAPACITOR-FIXED CERAMIC 220pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-221-JP |
| C8 | 26386/759 | CAPACITOR-FIXED CERAMIC 22nF +/-20% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | PHILIPS | 1206-2R-223-K9-BB |
| C9 to C12 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C13 | 26386/824 | CAPACITOR-FIXED CERAMIC 100pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-101-JP |
| C15 | 26386/815 | CAPACITOR-FIXED CERAMIC 18pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-180-JP |
| C16 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C17 | 26386/824 | CAPACITOR-FIXED CERAMIC 100pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-101-JP |
| C18 | 26343/784 | CAPACITOR-FIXED CERAMIC 68pF +/-5% 50V NPO MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-680-JP |
| C19 | 26386/813 | CAPACITOR-FIXED CERAMIC 12pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-120-JP |
| C20 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C21 | 26386/819 | CAPACITOR-FIXED CERAMIC 39pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-390-JP |
| C22 | 26386/814 | CAPACITOR-FIXED CERAMIC 15pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-150-JP |
| C23 to C25 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C26 | 26421/112 | CAPACITOR-FIXED ALUMINIUM 10uF +/-20% 35V ELECTROLYTIC, RADIAL, 5mm PWP, (TAPED). | PANASONIC INDUSTRIAL | ECE-A-1V-KA-100-B |
| C27 | 26386/899 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | ROHM ELECTRONICS LTD | MCH31-5C-104-KP |
| C28 | 26386/899 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | ROHM ELECTRONICS LTD | MCH31-5C-104-KP |
| C29 | 26421/112 | CAPACITOR-FIXED ALUMINIUM 10uF +/-20% 35V ELECTROLYTIC, RADIAL, 5mm PWP, (TAPED). | PANASONIC INDUSTRIAL | ECE-A-1V-KA-100-B |
| C30 | 26386/899 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | ROHM ELECTRONICS LTD | MCH31-5C-104-KP |
| C31 | 26421/112 | CAPACITOR-FIXED ALUMINIUM 10uF +/-20% 35V ELECTROLYTIC, RADIAL, 5mm PWP, (TAPED). | PANASONIC INDUSTRIAL | ECE-A-1V-KA-100-B |

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| **A7 Front panel interface (contd.)** | | | | |
| C32 | 26421/118 | CAPACITOR-FIXED ALUMINIUM 100uF +/-20% 6.3V ELECTROLYTIC, RADIAL, 5mm PWP, (TAPED). | PANASONIC INDUSTRIAL | ECE-A-0J-KA-101-B |
| C33 | 26421/118 | CAPACITOR-FIXED ALUMINIUM 100uF +/-20% 6.3V ELECTROLYTIC, RADIAL, 5mm PWP, (TAPED). | PANASONIC INDUSTRIAL | ECE-A-0J-KA-101-B |
| C34 | 26421/112 | CAPACITOR-FIXED ALUMINIUM 10uF +/-20% 35V ELECTROLYTIC, RADIAL, 5mm PWP, (TAPED). | PANASONIC INDUSTRIAL | ECE-A-1V-KA-100-B |
| C35 to C38 | 26386/899 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | ROHM ELECTRONICS LTD | MCH31-5C-104-KP |
| C39 | 26386/863 | CAPACITOR-FIXED CERAMIC 1nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-102-KP |
| C40 to C87 | 26386/899 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | ROHM ELECTRONICS LTD | MCH31-5C-104-KP |
| C88 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C89 | 26386/899 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | ROHM ELECTRONICS LTD | MCH31-5C-104-KP |
| D1 | 28383/910 | DIODE SMALL-SIGNAL, BAS28... DUAL, 330mW 75V 250mA ELECTRICALLY ISOLATED, MARKING CODE A61 OR JT, | PHILIPS | BAS28 |
| D2 | 28383/901 | DIODE SMALL-SIGNAL, BAV70... DUAL, 70V 100mA 1.1Vf @ 50mA, COMMON CATHODE, MARKING CODE A4, SURFACE | PHILIPS | BAV70 |
| D3 | 28383/901 | DIODE SMALL-SIGNAL, BAV70... DUAL, 70V 100mA 1.1Vf @ 50mA, COMMON CATHODE, MARKING CODE A4, SURFACE | PHILIPS | BAV70 |
| D4 | 28383/910 | DIODE SMALL-SIGNAL, BAS28... DUAL, 330mW 75V 250mA ELECTRICALLY ISOLATED, MARKING CODE A61 OR JT, | PHILIPS | BAS28 |
| D7 | 28372/103 | DIODE ZENER, BZX84-C11... 350mW 11V 5% 250mA MARKING CODE Y1, SURFACE MOUNTED, SOT-23, (TAPED). | PHILIPS | BZX84-C11 |
| D8 | 28373/273 | DIODE ZENER, BZX84-C22... 350mW 22V 5% 250mA MARKING CODE Y8, SURFACE MOUNTED, SOT-23, (TAPED). | PHILIPS | BZX84-C22 |
| D9 to D11 | 28383/910 | DIODE SMALL-SIGNAL, BAS28... DUAL, 330mW 75V 250mA ELECTRICALLY ISOLATED, MARKING CODE A61 OR JT, | PHILIPS | BAS28 |
| D12 | 28349/011 | DIODE SMALL-SIGNAL, SCHOTTKY, 5082-2826... 250mW 15V 1.2pF 1Vf @ 20mA, BATCH MATCHED TO WITHIN 10mV | HEWLETT-PACKARD | 5082-2826-T25 |
| D13 | 28349/011 | DIODE SMALL-SIGNAL, SCHOTTKY, 5082-2826... 250mW 15V 1.2pF 1Vf @ 20mA, BATCH MATCHED TO WITHIN 10mV | HEWLETT-PACKARD | 5082-2826-T25 |
| D14 | 28383/901 | DIODE SMALL-SIGNAL, BAV70... DUAL, 70V 100mA 1.1Vf @ 50mA, COMMON CATHODE, MARKING CODE A4, SURFACE | PHILIPS | BAV70 |
| IC1 | 28467/122 | IC-MICRO CONTROLLER, 80C552... 8 BIT, 12MHz, 256 BYTE RAM, ZERO ROM, I.IC BUS, DUPLEX UART, 6 x 8 | PHILIPS | PCB80C552-5 16WP |
| IC2 | 28462/431 | IC-DIGITAL LATCH 74HCT373... OCTAL, TRANSPARENT WITH TRI-STATE BUS, CMOS-H/SPEED+TTL, 20 PIN, | PHILIPS | 74HCT373D |
| IC3 | 28465/053 | IC-DIGITAL DECODER/DEMULTIPLEX 74HCT138... 3 INPUT, 8 BIT, SINGLE, INVERTING, 3 BIT ADDRESS, | PHILIPS | 74HCT138D |
| IC5 | 28467/121 | IC-MICRO STATIC-RAM, 8K x 8 BIT, TC5565AFL-10... 100nS ACCESS, 10uW STANDBY, CMOS, 28 PIN, | TOSHIBA (UK) LTD | TC5565AFL-10 |
| IC6 | 28466/412 | IC-DIGITAL EXCLUSIVE-OR 74HCT86... 2 INPUT, QUAD, CMOS-H/SPEED+TTL, 14 PIN, SMALL-OUTLINE. | PHILIPS | 74HCT86D |

## A7 Front panel interface (contd.)

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| IC7 | 28462/141 | IC-DIGITAL FLIP-FLOP/D-TYPE 74HCT377... OCTAL, POS EDGE TRIGGER WITH DATA ENABLE, CMOS-H/SPEED+TTL, | PHILIPS | 74HCT377D |
| IC8 | 28469/028 | IC-DIGITAL BUFFER/LINE-DRIVER 74HCT244... OCTAL, NON-INVERTING, TRI-STATE BUS, CMOS-H/SPEED+TTL, 20 | PHILIPS | 74HCT244D |
| IC9 | 28469/028 | IC-DIGITAL BUFFER/LINE-DRIVER 74HCT244... OCTAL, NON-INVERTING, TRI-STATE BUS, CMOS-H/SPEED+TTL, 20 | PHILIPS | 74HCT244D |
| IC10 | 28462/430 | IC-DIGITAL FLIP-FLOP/D-TYPE 74HCT374... 1 INPUT, OCTAL, NON-INVERTING, POS EDGE TRIGGER, TRI-STATE, | PHILIPS | 74HCT374D |
| IC11 | 28469/049 | IC-DIGITAL TRANSCEIVER 74HCT245... OCTAL, BI-DIRECTIONAL, TRI-STATE BUS, CMOS-H/SPEED+TTL, | PHILIPS | 74HCT245D |
| IC12 | 28469/028 | IC-DIGITAL BUFFER/LINE-DRIVER 74HCT244... OCTAL, NON-INVERTING, TRI-STATE BUS, CMOS-H/SPEED+TTL, 20 | PHILIPS | 74HCT244D |
| IC13 | 28462/136 | IC-DIGITAL FLIP-FLOP/D-TYPE 74HCT74... 2 BIT, DUAL, POS EDGE TRIGGER, PLUS SET & CLEAR, | PHILIPS | 74HCT74D |
| IC14 | 28462/159 | IC-DIGITAL FLIP-FLOP/D-TYPE 74HCT273... OCTAL, POS EDGE TRIGGER, RESET, CMOS-H/SPEED+TTL, 20 PIN, | PHILIPS | 74HCT273D |
| IC15 | 28462/136 | IC-DIGITAL FLIP-FLOP/D-TYPE 74HCT74... 2 BIT, DUAL, POS EDGE TRIGGER, PLUS SET & CLEAR, | PHILIPS | 74HCT74D |
| IC16 | 28461/811 | IC-ANALOGUE VOLTAGE-REFERENCE LT1019... 10V PRECISION, OUTPUT VOLTAGE DRIFT 20ppm/DEG.C MAX, | LINEAR TECHNOLOGY | LT1019CS8-10 |
| IC17 | 28461/888 | IC-ANALOGUE SWITCH DG419... SINGLE, 15V SPDT, ON-RESISTANCE<35R, CHANGEOVER, TTL COMPATIBLE, | SILICONIX LTD | DG419DY |
| IC18 | 28461/819 | IC-ANALOGUE OPERATIONAL AMP OP177... SINGLE, 22V OFFSET VOLTAGE 25uV, OFFSET CURRENT 1.5nA, | ANALOG DEVICES LTD | OP177GS |
| IC19 | 28461/673 | IC-ANALOGUE COMPARATOR LM339... QUAD, SINGLE SUPPLY, BIPOLAR, 14 PIN, SMALL-OUTLINE. | PHILIPS | LM339D |
| IC20 | 28461/812 | IC-ANALOGUE OPERATIONAL AMP AD705... SINGLE, 15V OFFSET VOLTAGE 150uV, OFFSET CURRENT 150pA, | ANALOG DEVICES LTD | AD705JR |
| IC21 | 28385/996 | RELAY SOLID-STATE, OPTO-COUPLED, 3VDC CONTROL, 150mA AC/DC MAX LOAD, MOS FET O/P, PCB MOUNTING, 6 | NEC ELECTRONICS LTD | PFA141A |
| IC22 | 28385/996 | RELAY SOLID-STATE, OPTO-COUPLED, 3VDC CONTROL, 150mA AC/DC MAX LOAD, MOS FET O/P, PCB MOUNTING, 6 | NEC ELECTRONICS LTD | PFA141A |
| IC23 | 28461/819 | IC-ANALOGUE OPERATIONAL AMP OP177... SINGLE, 22V OFFSET VOLTAGE 25uV, OFFSET CURRENT 1.5nA, | ANALOG DEVICES LTD | OP177GS |
| IC24 | 28461/819 | IC-ANALOGUE OPERATIONAL AMP OP177... SINGLE, 22V OFFSET VOLTAGE 25uV, OFFSET CURRENT 1.5nA, | ANALOG DEVICES LTD | OP177GS |
| IC25 | 28461/896 | IC-ANALOGUE SWITCH DG413... QUAD, 15V SPST, ON-RESISTANCE<35R, 2 x N/O & 2 x N/C @ LOGIC 1, | SILICONIX LTD | DG413DY |
| IC26 | 28461/819 | IC-ANALOGUE OPERATIONAL AMP OP177... SINGLE, 22V OFFSET VOLTAGE 25uV, OFFSET CURRENT 1.5nA, | ANALOG DEVICES LTD | OP177GS |
| IC27 | 28461/819 | IC-ANALOGUE OPERATIONAL AMP OP177... SINGLE, 22V OFFSET VOLTAGE 25uV, OFFSET CURRENT 1.5nA, | ANALOG DEVICES LTD | OP177GS |
| IC28 | 28462/155 | IC-DIGITAL FLIP-FLOP/MONOSTABLE 74HC221... DUAL, NON-RETRIGGERABLE, tW = 0.7RC, WITH RESET, | PHILIPS | 74HC221D |
| IC29 | 28466/117 | IC-DIGITAL OR-GATE 74HCT32... 2 INPUT, QUAD, CMOS-H/SPEED+TTL, 14 PIN, SMALL-OUTLINE. | PHILIPS | 74HCT32D |
| IC30 | 28466/241 | IC-DIGITAL NOR-GATE 74HC02... 2 INPUT, QUAD, CMOS-H/SPEED, 14 PIN, SMALL-OUTLINE. | PHILIPS | 74HC02D |
| IC31 | 28466/385 | IC-DIGITAL NAND-GATE 74HCT00... 2 INPUT, QUAD, CMOS-H/SPEED+TTL, 14 PIN, SMALL-OUTLINE. | PHILIPS | 74HCT00D |

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|

## A7 Front panel interface (contd.)

| | | | | |
|---|---|---|---|---|
| L1 to L4 | 23642/535 | INDUCTOR-FIXED 1uH +/- 5% MOULDED-EPOXY, 400mA 0R7 MAX, 30 Q @ 7.96 MHz, 120 MHz SRF, SURFACE | MEGGITT ELECTRONICS | 3612-T-1R0-J |
| L5 | 23642/537 | INDUCTOR-FIXED 4.7uH +/- 5% MOULDED-EPOXY, 220mA 1R5 MAX, 30 Q @ 7.96 MHz, 50 MHz SRF, SURFACE | MEGGITT ELECTRONICS | 3612-T-4R7-J |
| L6 | 23642/707 | INDUCTOR-FIXED 100uH +/- 5% MOULDED-EPOXY, 40mA 10R MAX, 20 Q @ 0.796 MHz, 10 MHz SRF, SURFACE | MEGGITT ELECTRONICS | 3612-T-101-J |
| L7 | 23642/706 | INDUCTOR-FIXED 15uH +/- 5% MOULDED-EPOXY, 130mA 2R8 MAX, 30 Q @ 2.52 MHz, 30 MHz SRF, SURFACE | MEGGITT ELECTRONICS | 3612-T-150-J |
| L10 | 23642/535 | INDUCTOR-FIXED 1uH +/- 5% MOULDED-EPOXY, 400mA 0R7 MAX, 30 Q @ 7.96 MHz, 120 MHz SRF, SURFACE | MEGGITT ELECTRONICS | 3612-T-1R0-J |
| PLA | 23435/950 | CONNECTOR MULTIWAY, PCB HEADER, 20 WAY, RIGHT ANGLED, 2-ROW, 2.54mm GRID, POLARISED, SHROUDED, | MOLEX ELECTRONICS | 39-26-7208 |
| PLC | 23435/112 | CONNECTOR MULTIWAY, PCB HEADER, 36 WAY, RIGHT ANGLED, 2.54mm PITCH, PINS GOLD PLATED TO CLASS 2, | BERG ELECTRONICS | 75168-107-36 |
| PLD | 23444/388 | CONNECTOR-RF SMC-TYPE MALE, RECEPTACLE, 50 OHMS, ELBOW, PCB-MOUNTING, NICKEL PLATED BODY. | ITT CANNON (UK) | 050-053-0000-910 |
| PLE | 23435/120 | CONNECTOR MULTIWAY, PCB HEADER, 36 WAY, RIGHT ANGLED, 2.54mm PITCH, PINS GOLD PLATED TO CLASS 2, | BERG ELECTRONICS | 75168-101-36 |
| PLF | 23436/725 | CONNECTOR MULTIWAY, SOCKET, 68 WAY, RIGHT ANGLED, 2-ROW, 2.54mm PITCH, 1.9mm ROW SPACING, FOR MEMORY | ITT CANNON (UK) | DICMJ-68-P-RPC |
| R1 to R3 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R4 | 24681/671 | RESISTOR-NETWORK BUSSED, THICK-FILM, 10K 2% 1W 50V 100 ppm/DEG.C, 9 RESISTORS, LOW PROFILE, 10 PIN, | VISHAY COMPONENTS | LC0-001-1002G |
| R9 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R10 to R14 | 24811/221 | RESISTOR-FIXED METAL-FILM 100K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100K-1%50ppm |
| R15 | 24681/671 | RESISTOR-NETWORK BUSSED, THICK-FILM, 10K 2% 1W 50V 100 ppm/DEG.C, 9 RESISTORS, LOW PROFILE, 10 PIN, | VISHAY COMPONENTS | LC0-001-1002G |
| R23 | 24811/221 | RESISTOR-FIXED METAL-FILM 100K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100K-1%50ppm |
| R24 | 24811/221 | RESISTOR-FIXED METAL-FILM 100K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100K-1%50ppm |
| R25 to R28 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R29 to R32 | 24811/153 | RESISTOR-FIXED METAL-FILM 150R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-150R-1%50ppm |
| R33 to R40 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R41 to R61 | 24811/221 | RESISTOR-FIXED METAL-FILM 100K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100K-1%50ppm |
| R62 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |

## A7 Front panel interface (contd.)

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| R63 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R64 | 24811/146 | RESISTOR-FIXED METAL-FILM 75R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-75R0-1%50ppm |
| R65 to R69 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R70 | 24811/185 | RESISTOR-FIXED METAL-FILM 3K32 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-3K32-1%50ppm |
| R71 | 24811/205 | RESISTOR-FIXED METAL-FILM 22K1 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-22K1-1%50ppm |
| R72 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R73 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R74 | 24811/205 | RESISTOR-FIXED METAL-FILM 22K1 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-22K1-1%50ppm |
| R75 | 24811/159 | RESISTOR-FIXED METAL-FILM 274R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-274R-1%50ppm |
| R76 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R77 | 24811/205 | RESISTOR-FIXED METAL-FILM 22K1 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-22K1-1%50ppm |
| R78 | 24811/159 | RESISTOR-FIXED METAL-FILM 274R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-274R-1%50ppm |
| R79 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R80 to R82 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R83 | 24811/602 | RESISTOR-FIXED METAL-FILM 10K +/- 0.1% 250mW 200V 15 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-10K0-0.1%-15 |
| R84 | 24811/189 | RESISTOR-FIXED METAL-FILM 4K75 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-4K75-1%50ppm |
| R85 | 24811/602 | RESISTOR-FIXED METAL-FILM 10K +/- 0.1% 250mW 200V 15 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-10K0-0.1%-15 |
| R86 | 24811/201 | RESISTOR-FIXED METAL-FILM 15K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-15K-1%50ppm |
| R92 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R93 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R95 | 24811/602 | RESISTOR-FIXED METAL-FILM 10K +/- 0.1% 250mW 200V 15 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-10K0-0.1%-15 |
| R96 | 24811/602 | RESISTOR-FIXED METAL-FILM 10K +/- 0.1% 250mW 200V 15 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-10K0-0.1%-15 |
| R97 | 24753/229 | RESISTOR-FIXED METAL-FILM 1M +/- 0.1% 250mW 200V 25 ppm/DEG.C, AXIAL, (TAPED). | VISHAY COMPONENTS | EE.10-1M0-B-T-9 |
| R98 | 24753/229 | RESISTOR-FIXED METAL-FILM 1M +/- 0.1% 250mW 200V 25 ppm/DEG.C, AXIAL, (TAPED). | VISHAY COMPONENTS | EE.10-1M0-B-T-9 |
| R99 | 24811/189 | RESISTOR-FIXED METAL-FILM 4K75 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-4K75-1%50ppm |

## A7 Front panel interface (contd.)

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| R100 | 24811/189 | RESISTOR-FIXED METAL-FILM 4K75 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-4K75-1%50ppm |
| R101 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R102 | 24811/195 | RESISTOR-FIXED METAL-FILM 8K25 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-8K25-1%50ppm |
| R103 | 24811/157 | RESISTOR-FIXED METAL-FILM 221R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-221R-1%50ppm |
| R104 | 24811/149 | RESISTOR-FIXED METAL-FILM 100R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100R-1%50ppm |
| R105 | 24811/149 | RESISTOR-FIXED METAL-FILM 100R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100R-1%50ppm |
| R106 to R111 | 24753/229 | RESISTOR-FIXED METAL-FILM 1M +/- 0.1% 250mW 200V 25 ppm/DEG.C, AXIAL, (TAPED). | VISHAY COMPONENTS | EE.10-1M0-B-T-9 |
| R112 | 24811/604 | RESISTOR-FIXED METAL-FILM 75K +/- 0.1% 250mW 200V 15 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-75K0-0.1%-15 |
| R113 | 24811/604 | RESISTOR-FIXED METAL-FILM 75K +/- 0.1% 250mW 200V 15 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-75K0-0.1%-15 |
| R114 | 24811/603 | RESISTOR-FIXED METAL-FILM 100K +/- 0.1% 250mW 200V 15 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100K-0.1%-15 |
| R115 | 24811/603 | RESISTOR-FIXED METAL-FILM 100K +/- 0.1% 250mW 200V 15 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100K-0.1%-15 |
| R116 to R118 | 24753/229 | RESISTOR-FIXED METAL-FILM 1M +/- 0.1% 250mW 200V 25 ppm/DEG.C, AXIAL, (TAPED). | VISHAY COMPONENTS | EE.10-1M0-B-T-9 |
| R119 | 24811/633 | RESISTOR-FIXED METAL-FILM 30K1 +/- 0.1% 250mW 200V 15 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-30K1-0.1%-15 |
| R120 | 24811/633 | RESISTOR-FIXED METAL-FILM 30K1 +/- 0.1% 250mW 200V 15 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-30K1-0.1%-15 |
| R121 to R123 | 24753/229 | RESISTOR-FIXED METAL-FILM 1M +/- 0.1% 250mW 200V 25 ppm/DEG.C, AXIAL, (TAPED). | VISHAY COMPONENTS | EE.10-1M0-B-T-9 |
| R124 | 24811/601 | RESISTOR-FIXED METAL-FILM 33K2 +/- 0.1% 250mW 200V 15 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-33K2-0.1%-15 |
| R125 | 24811/634 | RESISTOR-FIXED METAL-FILM 2K21 +/- 0.1% 250mW 200V 15 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-2K21-0.1%-15 |
| R126 | 25748/572 | RESISTOR-VARIABLE CERMET LINEAR, 100K 10% 500mW 200V 100 ppm/DEG.C, MULTI-TURN, VERTICAL-PCB, | BOURNS ELECTRONICS | 3299W-1-104 |
| R127 | 24811/243 | RESISTOR-FIXED METAL-FILM 825K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-825K-1%50ppm |
| R128 | 24811/635 | RESISTOR-FIXED METAL-FILM 68K1 +/- 0.1% 250mW 200V 15 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-68K1-0.1%-15 |
| R129 | 24811/198 | RESISTOR-FIXED METAL-FILM 11K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-11K-1%50ppm |
| R130 | 24811/221 | RESISTOR-FIXED METAL-FILM 100K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100K-1%50ppm |
| R131 | 24811/204 | RESISTOR-FIXED METAL-FILM 20K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-20K-1%50ppm |
| R132 | 24811/221 | RESISTOR-FIXED METAL-FILM 100K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100K-1%50ppm |
| R133 | 24811/180 | RESISTOR-FIXED METAL-FILM 2K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-2K0-1%50ppm |

## A7 Front panel interface (contd.)

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| R134 | 24811/171 | RESISTOR-FIXED METAL-FILM 825R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-825R-1%50ppm |
| R135 | 24811/181 | RESISTOR-FIXED METAL-FILM 2K21 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-2K21-1%50ppm |
| R136 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R137 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R138 | 24811/154 | RESISTOR-FIXED METAL-FILM 162R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-162R-1%50ppm |
| R139 | 24811/172 | RESISTOR-FIXED METAL-FILM 909R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-909R-1%50ppm |
| R140 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R141 | 24811/178 | RESISTOR-FIXED METAL-FILM 1K62 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-1K62-1%50ppm |
| R142 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R143 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R144 | 24811/158 | RESISTOR-FIXED METAL-FILM 243R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-243R-1%50ppm |
| R145 | 24811/149 | RESISTOR-FIXED METAL-FILM 100R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100R-1%50ppm |
| R146 | 24811/142 | RESISTOR-FIXED METAL-FILM 51R1 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-51R1-1%50ppm |
| R147 | 24811/142 | RESISTOR-FIXED METAL-FILM 51R1 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-51R1-1%50ppm |
| R148 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R149 | 24811/181 | RESISTOR-FIXED METAL-FILM 2K21 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-2K21-1%50ppm |
| R150 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R151 | 24811/229 | RESISTOR-FIXED METAL-FILM 221K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-221K-1%50ppm |
| R152 | 24811/229 | RESISTOR-FIXED METAL-FILM 221K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-221K-1%50ppm |
| R153 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R154 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R155 | 24811/149 | RESISTOR-FIXED METAL-FILM 100R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100R-1%50ppm |
| R156 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R157 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R158 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| **A7 Front panel interface (contd.)** | | | | |
| R159 | 24811/618 | RESISTOR-FIXED METAL-FILM 100R +/- 0.1% 250mW 200V 15 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100R-0.1%-15 |
| R160 | 24811/610 | RESISTOR-FIXED METAL-FILM 909R +/- 0.1% 250mW 200V 15 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-909R-0.1%-15 |
| R161 | 24811/137 | RESISTOR-FIXED METAL-FILM 33R2 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-33R2-1%50ppm |
| R162 | 24811/137 | RESISTOR-FIXED METAL-FILM 33R2 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-33R2-1%50ppm |
| R163 | 24811/142 | RESISTOR-FIXED METAL-FILM 51R1 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-51R1-1%50ppm |
| R164 | 24811/142 | RESISTOR-FIXED METAL-FILM 51R1 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-51R1-1%50ppm |
| R165 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| RLA | 23486/183 | RELAY MAGNETIC, DOUBLE-POLE N/O & N/C, 5V COIL, 84R - POLARISED, CONTACTS 5A @ 30VDC, PCB | MATSUSHITA CONTROLS | DSP1-5V |
| RLB | 23486/184 | RELAY MAGNETIC, DOUBLE-POLE N/O, POLARISED, 5V COIL, 84R - CONTACTS 5A @ 30VDC, PCB MOUNTING, 6 | MATSUSHITA CONTROLS | DSP2a-5V |
| RLC | 23486/183 | RELAY MAGNETIC, DOUBLE-POLE N/O & N/C, 5V COIL, 84R - POLARISED, CONTACTS 5A @ 30VDC, PCB | MATSUSHITA CONTROLS | DSP1-5V |
| RLD | 23486/181 | RELAY MAGNETIC, SINGLE-POLE CHANGEOVER, POLARISED DUAL 5V COIL, 62R - LATCHING, ISOL 60dB @ 1.8GHz, | MATSUSHITA CONTROLS | RK1-L2-5V-H23 |
| RLE | 23486/184 | RELAY MAGNETIC, DOUBLE-POLE N/O, POLARISED, 5V COIL, 84R - CONTACTS 5A @ 30VDC, PCB MOUNTING, 6 | MATSUSHITA CONTROLS | DSP2a-5V |
| SKA | 23436/727 | CONNECTOR MULTIWAY, SOCKET, 22 WAY, RIGHT ANGLED, 2-ROW, 2.54mm GRID, PCB MOUNTING, CONTACTS GOLD | BERG ELECTRONICS | 89883-311 |
| SKB | 23436/726 | CONNECTOR MULTIWAY, SOCKET, 6 WAY, RIGHT ANGLED, 2-ROW, 2.54mm GRID, PCB MOUNTING, CONTACTS GOLD | BERG ELECTRONICS | 89883-303 |
| TR1 | 28453/829 | TRANSISTOR NPN BIPOLAR BC848B... 30V 200MHz 200mW 100mA 290hFE TYP @ 2mA, NOISE 2dB @ 1KHz, MARKING | PHILIPS | BC848B |
| TR2 | 28453/829 | TRANSISTOR NPN BIPOLAR BC848B... 30V 200MHz 200mW 100mA 290hFE TYP @ 2mA, NOISE 2dB @ 1KHz, MARKING | PHILIPS | BC848B |
| TR3 to TR5 | 28455/302 | TRANSISTOR NPN BIPOLAR BCX54... 45V 130MHz 1W 1A 40hFE MIN @ 150mA, MARKING CODE BA/BB/BC/BD, | PHILIPS | BCX54 |
| TR6 | 28461/864 | TRANSISTOR NPN BIPOLAR 3046... ARRAY, 20V 50mA 5-TRANSISTORS, 3-SINGLES & 1-PAIR, SURFACE | NAT. SEMICONDUCTOR | LM3046M |
| TR7 | 28453/829 | TRANSISTOR NPN BIPOLAR BC848B... 30V 200MHz 200mW 100mA 290hFE TYP @ 2mA, NOISE 2dB @ 1KHz, MARKING | PHILIPS | BC848B |
| TR8 | 28453/829 | TRANSISTOR NPN BIPOLAR BC848B... 30V 200MHz 200mW 100mA 290hFE TYP @ 2mA, NOISE 2dB @ 1KHz, MARKING | PHILIPS | BC848B |
| TR9 | 28435/241 | TRANSISTOR PNP BIPOLAR BCX17... 45V 100MHz 425mW 500mA 100hFE MIN @ 100mA, MARKING CODE T1, SURFACE | PHILIPS | BCX17 |
| TR10 | 28455/302 | TRANSISTOR NPN BIPOLAR BCX54... 45V 130MHz 1W 1A 40hFE MIN @ 150mA, MARKING CODE BA/BB/BC/BD, | PHILIPS | BCX54 |
| TR11 | 28455/302 | TRANSISTOR NPN BIPOLAR BCX54... 45V 130MHz 1W 1A 40hFE MIN @ 150mA, MARKING CODE BA/BB/BC/BD, | PHILIPS | BCX54 |

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| **A7 Front panel interface (contd.)** | | | | |
| TR12 | 28453/829 | TRANSISTOR NPN BIPOLAR BC848B... 30V 200MHz 200mW 100mA 290hFE TYP @ 2mA, NOISE 2dB @ 1KHz, MARKING | PHILIPS | BC848B |
| TR13 | 28455/302 | TRANSISTOR NPN BIPOLAR BCX54... 45V 130MHz 1W 1A 40hFE MIN @ 150mA, MARKING CODE BA/BB/BC/BD, | PHILIPS | BCX54 |

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|

## A8 Complex modem and IF

When ordering, prefix circuit reference with A8.

| | | | | |
|---|---|---|---|---|
| | 44829-838 | Complete unit | Issue 07 | |
| C1 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C2 | 26386/824 | CAPACITOR-FIXED CERAMIC 100pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-101-JP |
| C3 | 26386/992 | CAPACITOR-FIXED CERAMIC 330nF +/-10% 50V X7R, MULTILAYER, SURFACE-MOUNTED, SIZE 1812, NICKEL | PHILIPS | 1812-2B-334-K9BB |
| C4 to C9 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C10 to C12 | 26386/863 | CAPACITOR-FIXED CERAMIC 1nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-102-KP |
| C13 | 26386/819 | CAPACITOR-FIXED CERAMIC 39pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-390-JP |
| C14 | 26386/823 | CAPACITOR-FIXED CERAMIC 82pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-820-JP |
| C15 | 26386/819 | CAPACITOR-FIXED CERAMIC 39pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-390-JP |
| C16 to C18 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C19 | 26386/863 | CAPACITOR-FIXED CERAMIC 1nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-102-KP |
| C20 to C36 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C37 | 26386/899 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | ROHM ELECTRONICS LTD | MCH31-5C-104-KP |
| C38 | 26386/827 | CAPACITOR-FIXED CERAMIC 180pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-181-JP |
| C39 | 26386/831 | CAPACITOR-FIXED CERAMIC 390pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-391-JP |
| C40 | 26386/831 | CAPACITOR-FIXED CERAMIC 390pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-391-JP |
| C41 | 26386/827 | CAPACITOR-FIXED CERAMIC 180pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-181-JP |
| C42 to C50 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C51 | 26386/899 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | ROHM ELECTRONICS LTD | MCH31-5C-104-KP |
| C52 to C55 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C56 | 26386/827 | CAPACITOR-FIXED CERAMIC 180pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-181-JP |
| C57 | 26386/831 | CAPACITOR-FIXED CERAMIC 390pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-391-JP |
| C58 | 26386/831 | CAPACITOR-FIXED CERAMIC 390pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-391-JP |
| C59 | 26386/827 | CAPACITOR-FIXED CERAMIC 180pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-181-JP |

## A8 Complex modem and IF (contd.)

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| C60 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C61 | 26386/815 | CAPACITOR-FIXED CERAMIC 18pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-180-JP |
| C62 | 26386/899 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | ROHM ELECTRONICS LTD | MCH31-5C-104-KP |
| C63 | 26386/815 | CAPACITOR-FIXED CERAMIC 18pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-180-JP |
| C64 to C66 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C67 | 26386/833 | CAPACITOR-FIXED CERAMIC 560pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-561-JP |
| C68 | 26386/867 | CAPACITOR-FIXED CERAMIC 2.2nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-222-KP |
| C69 | 26386/867 | CAPACITOR-FIXED CERAMIC 2.2nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-222-KP |
| C70 | 26451/003 | CAPACITOR-FIXED ALUMINIUM 10uF +/-20% 16V ELECTROLYTIC, SURFACE-MOUNTED, SIZE 4.3 x 4.3mm, | PANASONIC INDUSTRIAL | ECE-V-1CA-100R |
| C71 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C72 | 26451/003 | CAPACITOR-FIXED ALUMINIUM 10uF +/-20% 16V ELECTROLYTIC, SURFACE-MOUNTED, SIZE 4.3 x 4.3mm, | PANASONIC INDUSTRIAL | ECE-V-1CA-100R |
| C73 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C74 | 26386/824 | CAPACITOR-FIXED CERAMIC 100pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-101-JP |
| C75 | 26386/899 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | ROHM ELECTRONICS LTD | MCH31-5C-104-KP |
| C76 | 26386/899 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | ROHM ELECTRONICS LTD | MCH31-5C-104-KP |
| C77 | 26343/767 | CAPACITOR-FIXED CERAMIC 10pF +/-5% 50V NPO MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-100-DP |
| C78 | 26386/783 | CAPACITOR-FIXED CERAMIC 330pF +/-1% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | AVX LTD | 0805-5A-331-FAT-1A |
| C79 | 26343/767 | CAPACITOR-FIXED CERAMIC 10pF +/-5% 50V NPO MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-100-DP |
| C80 | 26386/783 | CAPACITOR-FIXED CERAMIC 330pF +/-1% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | AVX LTD | 0805-5A-331-FAT-1A |
| C81 | 26386/783 | CAPACITOR-FIXED CERAMIC 330pF +/-1% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | AVX LTD | 0805-5A-331-FAT-1A |
| C82 | 26386/818 | CAPACITOR-FIXED CERAMIC 33pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-330-JP |
| C83 | 26386/934 | CAPACITOR-FIXED CERAMIC 220pF +/-1% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | AVX LTD | 0805-5A-221-FAT-1A |
| C84 | 26386/931 | CAPACITOR-FIXED CERAMIC 470pF +/-1% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | AVX LTD | 0805-5A-471-FAT-1A |
| C85 | 26386/816 | CAPACITOR-FIXED CERAMIC 22pF +/-5% 50V NPO MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-220-JP |
| C86 | 26386/782 | CAPACITOR-FIXED CERAMIC 120pF +/-1% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | AVX LTD | 0805-5A-121-FAT-1A |

## A8 Complex modem and IF (contd.)

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| C87 | 26386/783 | CAPACITOR-FIXED CERAMIC 330pF +/-1% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | AVX LTD | 0805-5A-331-FAT-1A |
| C88 | 26386/818 | CAPACITOR-FIXED CERAMIC 33pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-330-JP |
| C89 | 26386/934 | CAPACITOR-FIXED CERAMIC 220pF +/-1% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | AVX LTD | 0805-5A-221-FAT-1A |
| C90 | 26386/931 | CAPACITOR-FIXED CERAMIC 470pF +/-1% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | AVX LTD | 0805-5A-471-FAT-1A |
| C91 | 26386/816 | CAPACITOR-FIXED CERAMIC 22pF +/-5% 50V NPO MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-220-JP |
| C92 | 26386/782 | CAPACITOR-FIXED CERAMIC 120pF +/-1% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | AVX LTD | 0805-5A-121-FAT-1A |
| C93 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C94 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C95 | 26386/899 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | ROHM ELECTRONICS LTD | MCH31-5C-104-KP |
| C96 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C97 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C98 to C100 | 26386/899 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | ROHM ELECTRONICS LTD | MCH31-5C-104-KP |
| C101 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C102 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C103 | 26386/899 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | ROHM ELECTRONICS LTD | MCH31-5C-104-KP |
| C104 | 26386/899 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | ROHM ELECTRONICS LTD | MCH31-5C-104-KP |
| C105 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C106 | 26386/821 | CAPACITOR-FIXED CERAMIC 56pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-560-JP |
| C107 | 26386/897 | CAPACITOR-FIXED CERAMIC 4.7pF +/-0.1pF 50V 60 ppm/DEG.C, HIGH-Q, SINGLELAYER, SURFACE-MOUNTED, | AVX LTD | 0805-5K4R7-BAW-TR |
| C108 | 26386/816 | CAPACITOR-FIXED CERAMIC 22pF +/-5% 50V NPO MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-220-JP |
| C109 | 26386/816 | CAPACITOR-FIXED CERAMIC 22pF +/-5% 50V NPO MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-220-JP |
| C110 | 26386/821 | CAPACITOR-FIXED CERAMIC 56pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-560-JP |
| C111 | 26386/863 | CAPACITOR-FIXED CERAMIC 1nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-102-KP |
| C112 | 26386/863 | CAPACITOR-FIXED CERAMIC 1nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-102-KP |
| C113 | 26386/899 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | ROHM ELECTRONICS LTD | MCH31-5C-104-KP |

## A8 Complex modem and IF (contd.)

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| C114 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C115 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C116 | 26386/863 | CAPACITOR-FIXED CERAMIC 1nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-102-KP |
| C117 | 26386/863 | CAPACITOR-FIXED CERAMIC 1nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-102-KP |
| C118 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C119 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C120 | 26386/899 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | ROHM ELECTRONICS LTD | MCH31-5C-104-KP |
| C121 | 26386/899 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | ROHM ELECTRONICS LTD | MCH31-5C-104-KP |
| C122 | 26386/777 | CAPACITOR-FIXED CERAMIC 47nF +/-20% 63V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | PHILIPS | 1206-2R-473-K9-BBC |
| C123 | 26386/867 | CAPACITOR-FIXED CERAMIC 2.2nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-222-KP |
| C124 | 26451/003 | CAPACITOR-FIXED ALUMINIUM 10uF +/-20% 16V ELECTROLYTIC, SURFACE-MOUNTED, SIZE 4.3 x 4.3mm, | PANASONIC INDUSTRIAL | ECE-V-1CA-100R |
| C125 | 26451/003 | CAPACITOR-FIXED ALUMINIUM 10uF +/-20% 16V ELECTROLYTIC, SURFACE-MOUNTED, SIZE 4.3 x 4.3mm, | PANASONIC INDUSTRIAL | ECE-V-1CA-100R |
| C126 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C127 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C128 | 26386/777 | CAPACITOR-FIXED CERAMIC 47nF +/-20% 63V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | PHILIPS | 1206-2R-473-K9-BBC |
| C129 | 26386/829 | CAPACITOR-FIXED CERAMIC 270pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-271-JP |
| C130 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C150 | 26386/899 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | ROHM ELECTRONICS LTD | MCH31-5C-104-KP |
| C151 | 26386/899 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | ROHM ELECTRONICS LTD | MCH31-5C-104-KP |
| C152 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C153 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C154 | 26386/899 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | ROHM ELECTRONICS LTD | MCH31-5C-104-KP |
| C155 | 26386/899 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | ROHM ELECTRONICS LTD | MCH31-5C-104-KP |
| C156 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C157 | 26386/899 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | ROHM ELECTRONICS LTD | MCH31-5C-104-KP |

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| **A8 Complex modem and IF (contd.)** | | | | |
| C158 | 26386/899 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | ROHM ELECTRONICS LTD | MCH31-5C-104-KP |
| C160 | 26451/003 | CAPACITOR-FIXED ALUMINIUM 10uF +/-20% 16V ELECTROLYTIC, SURFACE-MOUNTED, SIZE 4.3 x 4.3mm, | PANASONIC INDUSTRIAL | ECE-V-1CA-100R |
| C161 | 26451/003 | CAPACITOR-FIXED ALUMINIUM 10uF +/-20% 16V ELECTROLYTIC, SURFACE-MOUNTED, SIZE 4.3 x 4.3mm, | PANASONIC INDUSTRIAL | ECE-V-1CA-100R |
| C162 | 26386/899 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | ROHM ELECTRONICS LTD | MCH31-5C-104-KP |
| C163 to C170 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C171 | 26386/899 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | ROHM ELECTRONICS LTD | MCH31-5C-104-KP |
| C172 | 26386/816 | CAPACITOR-FIXED CERAMIC 22pF +/-5% 50V NPO MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-220-JP |
| C173 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C174 | 26386/899 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | ROHM ELECTRONICS LTD | MCH31-5C-104-KP |
| C175 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C177 | 26343/767 | CAPACITOR-FIXED CERAMIC 10pF +/-5% 50V NPO MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-100-DP |
| C178 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C179 | 26343/767 | CAPACITOR-FIXED CERAMIC 10pF +/-5% 50V NPO MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-100-DP |
| C181 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C182 | 26451/003 | CAPACITOR-FIXED ALUMINIUM 10uF +/-20% 16V ELECTROLYTIC, SURFACE-MOUNTED, SIZE 4.3 x 4.3mm, | PANASONIC INDUSTRIAL | ECE-V-1CA-100R |
| C183 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C184 | 26451/003 | CAPACITOR-FIXED ALUMINIUM 10uF +/-20% 16V ELECTROLYTIC, SURFACE-MOUNTED, SIZE 4.3 x 4.3mm, | PANASONIC INDUSTRIAL | ECE-V-1CA-100R |
| C185 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C191 | 26451/003 | CAPACITOR-FIXED ALUMINIUM 10uF +/-20% 16V ELECTROLYTIC, SURFACE-MOUNTED, SIZE 4.3 x 4.3mm, | PANASONIC INDUSTRIAL | ECE-V-1CA-100R |
| C192 | 26451/003 | CAPACITOR-FIXED ALUMINIUM 10uF +/-20% 16V ELECTROLYTIC, SURFACE-MOUNTED, SIZE 4.3 x 4.3mm, | PANASONIC INDUSTRIAL | ECE-V-1CA-100R |
| C193 to C196 | 26386/899 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | ROHM ELECTRONICS LTD | MCH31-5C-104-KP |
| C197 | 26451/003 | CAPACITOR-FIXED ALUMINIUM 10uF +/-20% 16V ELECTROLYTIC, SURFACE-MOUNTED, SIZE 4.3 x 4.3mm, | PANASONIC INDUSTRIAL | ECE-V-1CA-100R |
| C198 to C200 | 26386/899 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | ROHM ELECTRONICS LTD | MCH31-5C-104-KP |
| C202 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C203 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |

## A8 Complex modem and IF (contd.)

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| C204 | 26451/003 | CAPACITOR-FIXED ALUMINIUM 10uF +/-20% 16V ELECTROLYTIC, SURFACE-MOUNTED, SIZE 4.3 x 4.3mm, | PANASONIC INDUSTRIAL | ECE-V-1CA-100R |
| C205 to C274 | 26386/899 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | ROHM ELECTRONICS LTD | MCH31-5C-104-KP |
| C275 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C276 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C277 to C281 | 26386/899 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | ROHM ELECTRONICS LTD | MCH31-5C-104-KP |
| C282 | 26451/003 | CAPACITOR-FIXED ALUMINIUM 10uF +/-20% 16V ELECTROLYTIC, SURFACE-MOUNTED, SIZE 4.3 x 4.3mm, | PANASONIC INDUSTRIAL | ECE-V-1CA-100R |
| C283 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C284 | 26451/003 | CAPACITOR-FIXED ALUMINIUM 10uF +/-20% 16V ELECTROLYTIC, SURFACE-MOUNTED, SIZE 4.3 x 4.3mm, | PANASONIC INDUSTRIAL | ECE-V-1CA-100R |
| C285 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C286 | 26451/003 | CAPACITOR-FIXED ALUMINIUM 10uF +/-20% 16V ELECTROLYTIC, SURFACE-MOUNTED, SIZE 4.3 x 4.3mm, | PANASONIC INDUSTRIAL | ECE-V-1CA-100R |
| C287 to C302 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C305 | 26386/899 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | ROHM ELECTRONICS LTD | MCH31-5C-104-KP |
| C306 | 26386/899 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | ROHM ELECTRONICS LTD | MCH31-5C-104-KP |
| C307 | 26451/003 | CAPACITOR-FIXED ALUMINIUM 10uF +/-20% 16V ELECTROLYTIC, SURFACE-MOUNTED, SIZE 4.3 x 4.3mm, | PANASONIC INDUSTRIAL | ECE-V-1CA-100R |
| C308 | 26451/003 | CAPACITOR-FIXED ALUMINIUM 10uF +/-20% 16V ELECTROLYTIC, SURFACE-MOUNTED, SIZE 4.3 x 4.3mm, | PANASONIC INDUSTRIAL | ECE-V-1CA-100R |
| C309 to C313 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C314 | 26386/899 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | ROHM ELECTRONICS LTD | MCH31-5C-104-KP |
| C315 to C319 | 26451/003 | CAPACITOR-FIXED ALUMINIUM 10uF +/-20% 16V ELECTROLYTIC, SURFACE-MOUNTED, SIZE 4.3 x 4.3mm, | PANASONIC INDUSTRIAL | ECE-V-1CA-100R |
| C320 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C321 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C322 to C324 | 26386/899 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | ROHM ELECTRONICS LTD | MCH31-5C-104-KP |
| D1 | 28381/532 | DIODE VARIABLE CAPACITNCE, BB619... 30V 20mA 2.9pF @ 28V, CAPAC RATIO 12.5 MIN, SURFACE MOUNTED, | PHILIPS | BB619 |
| D2 | 28383/930 | DIODE SMALL-SIGNAL, BAS16... 330mW 75V 250mA 2pF 1Vf @ 50mA, MARKING CODE A6, SURFACE MOUNTED, | PHILIPS | BAS16 |
| D3 | 28383/962 | DIODE PIN, BAR60... TRIPLE, 100V 0.25pF 1.05Vf @ 100mA, T-CIRCUIT, MARKING CODE 60, SURFACE | SIEMENS LTD | BAR60 |

## A8 Complex modem and IF (contd.)

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| D4 | 28349/036 | DIODE SMALL-SIGNAL, SCHOTTKY, HSMS-2825... DUAL, 8V 1pF 340mVf @ 1mA, ISOLATED, MARKING CODE C5, | HEWLETT-PACKARD | HSMS-2825-L31 |
| D5 | 28383/962 | DIODE PIN, BAR60... TRIPLE, 100V 0.25pF 1.05Vf @ 100mA, T-CIRCUIT, MARKING CODE 60, SURFACE | SIEMENS LTD | BAR60 |
| D6 | 28383/930 | DIODE SMALL-SIGNAL, BAS16... 330mW 75V 250mA 2pF 1Vf @ 50mA, MARKING CODE A6, SURFACE MOUNTED, | PHILIPS | BAS16 |
| D7 | 28383/930 | DIODE SMALL-SIGNAL, BAS16... 330mW 75V 250mA 2pF 1Vf @ 50mA, MARKING CODE A6, SURFACE MOUNTED, | PHILIPS | BAS16 |
| D8 | 28383/962 | DIODE PIN, BAR60... TRIPLE, 100V 0.25pF 1.05Vf @ 100mA, T-CIRCUIT, MARKING CODE 60, SURFACE | SIEMENS LTD | BAR60 |
| D9 | 28383/930 | DIODE SMALL-SIGNAL, BAS16... 330mW 75V 250mA 2pF 1Vf @ 50mA, MARKING CODE A6, SURFACE MOUNTED, | PHILIPS | BAS16 |
| D10 | 28383/930 | DIODE SMALL-SIGNAL, BAS16... 330mW 75V 250mA 2pF 1Vf @ 50mA, MARKING CODE A6, SURFACE MOUNTED, | PHILIPS | BAS16 |
| IC1 | 28464/173 | IC-DIGITAL COUNTER 74AC161... 4 INPUT, 4 BIT, SINGLE, BINARY, SYNCHRONOUS, PRESETTABLE + RESET, | NAT. SEMICONDUCTOR | 74AC161SC |
| IC2 | 28461/819 | IC-ANALOGUE OPERATIONAL AMP OP177... SINGLE, 22V OFFSET VOLTAGE 25uV, OFFSET CURRENT 1.5nA, | ANALOG DEVICES LTD | OP177GS |
| IC3 | 28461/459 | IC-ANALOGUE OPERATIONAL AMP TL032... DUAL, 15V U/GAIN BANDWDTH 1.1MHz, OFFSET VOLTAGE 2.0mV, SLEW | TEXAS INSTRUMENTS | TL032CD(TUBE) |
| IC4 | 28461/044 | IC-ANALOGUE D/A-CONVERTER 7543... 12 BIT, MULTIPLYING, SERIAL INPUT, NON-LIN ERR +/-1 LSB, | ANALOG DEVICES LTD | PM7543FS |
| IC5 | 28461/806 | IC-ANALOGUE OPERATIONAL AMP OP-249... DUAL, PRECISION HI SPEED, SETTLING TIME-1.2uS, GAIN | ANALOG DEVICES LTD | OP-249GS |
| IC6 | 28461/447 | IC-ANALOGUE MICROWAVE-AMP MSA-0886... 7.8V 36mA GAIN 22.5dB @1GHz, 25dB BNDWIDTH DC-5GHz, BIPOLAR, | HEWLETT-PACKARD | MSA-0886-TR1 |
| IC7 | 28461/801 | IC-ANALOGUE MICROWAVE-AMP MSA-1105... 5.5V 60mA GAIN 10.5dB @1GHz, 3dB B/WTH 0.05-1.3GHz, BIPOLAR, | HEWLETT-PACKARD | MSA-1105 |
| IC8 | 28469/051 | IC-DIGITAL INVERTER 74AC04... HEX, CMOS-ADVANCED, 14 PIN, SMALL-OUTLINE. | NAT. SEMICONDUCTOR | 74AC04SC |
| IC9 | 28461/448 | IC-ANALOGUE MICROWAVE-AMP MSA-0386... 5V 35mA GAIN 12dB @ 1GHz, 3dB BANDWIDTH DC-2.4GHz, BIPOLAR, 4 | HEWLETT-PACKARD | MSA-0386-TR1 |
| IC10 | 28461/447 | IC-ANALOGUE MICROWAVE-AMP MSA-0886... 7.8V 36mA GAIN 22.5dB @1GHz, 25dB BNDWIDTH DC-5GHz, BIPOLAR, | HEWLETT-PACKARD | MSA-0886-TR1 |
| IC11 | 28461/508 | IC-ANALOGUE WIDEBAND-AMPLIFIER AD600... DUAL, 2dB NOISE @ MAX GAIN, VOLTAGE CONTROLLED GAIN, 10mm | ANALOG DEVICES LTD | AD600JR |
| IC12 | 28461/803 | IC-ANALOGUE VOLTAGE-REFERENCE LT1019... 5V PRECISION, OUTPUT VOLTAGE DRIFT 20ppm/DEG.C MAX, | LINEAR TECHNOLOGY | LT1019CS8-5 |
| IC13 | 28461/005 | IC-ANALOGUE D/A-CONVERTER 7524... 15V 8 BIT, BUFFERED, MULTIPLYING, REL-ACC +/-1/2LSB, GAIN-ERR | ANALOG DEVICES LTD | PM7524FS |
| IC14 | 28461/005 | IC-ANALOGUE D/A-CONVERTER 7524... 15V 8 BIT, BUFFERED, MULTIPLYING, REL-ACC +/-1/2LSB, GAIN-ERR | ANALOG DEVICES LTD | PM7524FS |
| IC15 | 28461/506 | IC-ANALOGUE OPERATIONAL AMP OPA2604... DUAL, 25V BNDWIDTH PROD 20MHz, OFFSET VOLTAGE 3mV, SLEW RATE | BURR-BROWN INTERNAT | OPA2604AU |
| IC16 | 28461/506 | IC-ANALOGUE OPERATIONAL AMP OPA2604... DUAL, 25V BNDWIDTH PROD 20MHz, OFFSET VOLTAGE 3mV, SLEW RATE | BURR-BROWN INTERNAT | OPA2604AU |
| IC17 | 28461/413 | IC-ANALOGUE OPERATIONAL AMP TL074... QUAD, JFET INPUT, LOW NOISE, SLEW RATE 8V/uS MIN, GAIN | MOTOROLA INC. | TL074CD |

## A8 Complex modem and IF (contd.)

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| IC18 | 28461/844 | IC-ANALOGUE MODULATR/DEMODULATOR 1496... 30V BALANCED, SUPPRESSION 50dB @ 10MHz, 3dB SIGNAL | NAT. SEMICONDUCTOR | LM1496M |
| IC19 | 28461/844 | IC-ANALOGUE MODULATR/DEMODULATOR 1496... 30V BALANCED, SUPPRESSION 50dB @ 10MHz, 3dB SIGNAL | NAT. SEMICONDUCTOR | LM1496M |
| IC20 | 28462/133 | IC-DIGITAL FLIP-FLOP/D-TYPE 74F74... 2 BIT, DUAL, POS EDGE TRIGGER, PLUS SET & CLEAR, | PHILIPS | N74F74D |
| IC21 | 28461/792 | IC-ANALOGUE VOLTAGE-REGULATOR LM317L... 32V 100mA POSITIVE ADJUSTABLE, LINEAR, MONOLITHIC, 8 PIN, | NAT. SEMICONDUCTOR | LM317LM |
| IC22 | 28461/774 | IC-ANALOGUE VOLTAGE-REGULATOR 78L05AC... 5V +/-5%, POSITIVE, LINEAR, BIPOLAR, 8 PIN, SMALL-OUTLINE. | NAT. SEMICONDUCTOR | LM78L05ACM |
| IC23 | 28464/043 | IC-DIGITAL FREQ SYNTHESIZER MC145170... SERIAL DATA PORTS, 160MHz MAX, SINGLE MODULUS, DUAL PHASE | MOTOROLA INC. | MC145170D |
| IC24 | 28461/897 | IC-ANALOGUE OPERATIONAL AMP OP-27GS... 22V LOW NOISE, 8 PIN, SMALL-OUTLINE. | ANALOG DEVICES LTD | OP-27GS |
| IC25 | 28461/437 | IC-ANALOGUE OPERATIONAL AMP 5534... 2 INPUT, SINGLE, 10V 16mA LOW NOISE, 10MHz, BIPOLAR, 8 PIN, | PHILIPS | NE5534D |
| IC26 | 28467/159 | IC-MICRO DIGIT/SGNL PROCESSR, ADSP2115... 16.7MHz, DIGITAL SIGNAL PROCESSING, 1K PROGRAM & 512 WORD | ANALOG DEVICES LTD | ADSP-2115KP-66 |
| IC27 | 28467/157 | IC-MICRO STATIC-RAM, 32K x 8 BIT, KM68257B... 15nS ACCESS, STANDBY CURRENT 40mA MAX, J-LEADS, CMOS, | INTEG DEVICE TECH | IDT71256SA-15Y(TUBE) |
| IC28 | 28467/157 | IC-MICRO STATIC-RAM, 32K x 8 BIT, KM68257B... 15nS ACCESS, STANDBY CURRENT 40mA MAX, J-LEADS, CMOS, | INTEG DEVICE TECH | IDT71256SA-15Y(TUBE) |
| IC29 | 28467/156 | IC-MICRO STATIC-RAM, 8K x 8 BIT, KM6865B... 15nS ACCESS, STANDBY CURRENT 40mA MAX, J-LEADS, CMOS, | INTEG DEVICE TECH | IDT7164S-15Y(TUBE) |
| IC30 | 28469/619 | IC-DIGITAL FIELDPROG-GATE-ARRAY FX740... 80MHz, 40 MACROCELLS, 3.3V/5V O/P, tPD 10nS, BOUNDARY SCAN & | ALTERA (US) | EPX740LC68-10 |
| IC31 | 28469/556 | IC-DIGITAL REGISTER CY7C425... 9 BIT, SINGLE, FIFO 1024 WORD, ASYNCHRONOUS MODE, TRI-STATE, 65nS | ADVANCED MICRO DEV | AM7202A-50JC |
| IC32 | 28467/159 | IC-MICRO DIGIT/SGNL PROCESSR, ADSP2115... 16.7MHz, DIGITAL SIGNAL PROCESSING, 1K PROGRAM & 512 WORD | ANALOG DEVICES LTD | ADSP-2115KP-66 |
| IC33 | 28467/157 | IC-MICRO STATIC-RAM, 32K x 8 BIT, KM68257B... 15nS ACCESS, STANDBY CURRENT 40mA MAX, J-LEADS, CMOS, | INTEG DEVICE TECH | IDT71256SA-15Y(TUBE) |
| IC34 | 28467/157 | IC-MICRO STATIC-RAM, 32K x 8 BIT, KM68257B... 15nS ACCESS, STANDBY CURRENT 40mA MAX, J-LEADS, CMOS, | INTEG DEVICE TECH | IDT71256SA-15Y(TUBE) |
| IC35 | 28467/156 | IC-MICRO STATIC-RAM, 8K x 8 BIT, KM6865B... 15nS ACCESS, STANDBY CURRENT 40mA MAX, J-LEADS, CMOS, | INTEG DEVICE TECH | IDT7164S-15Y(TUBE) |
| IC36 | 28469/619 | IC-DIGITAL FIELDPROG-GATE-ARRAY FX740... 80MHz, 40 MACROCELLS, 3.3V/5V O/P, tPD 10nS, BOUNDARY SCAN & | ALTERA (US) | EPX740LC68-10 |
| IC37 | 28469/556 | IC-DIGITAL REGISTER CY7C425... 9 BIT, SINGLE, FIFO 1024 WORD, ASYNCHRONOUS MODE, TRI-STATE, 65nS | ADVANCED MICRO DEV | AM7202A-50JC |
| IC38 | 28467/159 | IC-MICRO DIGIT/SGNL PROCESSR, ADSP2115... 16.7MHz, DIGITAL SIGNAL PROCESSING, 1K PROGRAM & 512 WORD | ANALOG DEVICES LTD | ADSP-2115KP-66 |
| IC39 to IC43 | 28467/157 | IC-MICRO STATIC-RAM, 32K x 8 BIT, KM68257B... 15nS ACCESS, STANDBY CURRENT 40mA MAX, J-LEADS, CMOS, | INTEG DEVICE TECH | IDT71256SA-15Y(TUBE) |
| IC44 | 28469/619 | IC-DIGITAL FIELDPROG-GATE-ARRAY FX740... 80MHz, 40 MACROCELLS, 3.3V/5V O/P, tPD 10nS, BOUNDARY SCAN & | ALTERA (US) | EPX740LC68-10 |
| IC45 | 28467/157 | IC-MICRO STATIC-RAM, 32K x 8 BIT, KM68257B... 15nS ACCESS, STANDBY CURRENT 40mA MAX, J-LEADS, CMOS, | INTEG DEVICE TECH | IDT71256SA-15Y(TUBE) |
| IC46 | 28467/157 | IC-MICRO STATIC-RAM, 32K x 8 BIT, KM68257B... 15nS ACCESS, STANDBY CURRENT 40mA MAX, J-LEADS, CMOS, | INTEG DEVICE TECH | IDT71256SA-15Y(TUBE) |

## A8 Complex modem and IF (contd.)

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| IC47 | 28467/159 | IC-MICRO DIGIT/SGNL PROCESSR, ADSP2115... 16.7MHz, DIGITAL SIGNAL PROCESSING, 1K PROGRAM & 512 WORD | ANALOG DEVICES LTD | ADSP-2115KP-66 |
| IC48 to IC52 | 28467/157 | IC-MICRO STATIC-RAM, 32K x 8 BIT, KM68257B... 15nS ACCESS, STANDBY CURRENT 40mA MAX, J-LEADS, CMOS, | INTEG DEVICE TECH | IDT71256SA-15Y(TUBE) |
| IC53 | 28469/619 | IC-DIGITAL FIELDPROG-GATE-ARRAY FX740... 80MHz, 40 MACROCELLS, 3.3V/5V O/P, tPD 10nS, BOUNDARY SCAN & | ALTERA (US) | EPX740LC68-10 |
| IC54 | 28467/157 | IC-MICRO STATIC-RAM, 32K x 8 BIT, KM68257B... 15nS ACCESS, STANDBY CURRENT 40mA MAX, J-LEADS, CMOS, | INTEG DEVICE TECH | IDT71256SA-15Y(TUBE) |
| IC55 | 28467/157 | IC-MICRO STATIC-RAM, 32K x 8 BIT, KM68257B... 15nS ACCESS, STANDBY CURRENT 40mA MAX, J-LEADS, CMOS, | INTEG DEVICE TECH | IDT71256SA-15Y(TUBE) |
| IC56 | 28461/045 | IC-ANALOGUE A/D CONVERTER AD871... +/-5V, 12 BIT, 5MHz, ON-CHIP TRACK & HOLD, VOLTAGE REF, DIFF | ANALOG DEVICES LTD | AD871JE |
| IC57 | 28469/623 | IC-DIGITAL FIELDPROG-GATE-ARRAY XC4003A... 3000 GATES, 100 LOGIC BLOCKS, 77 INPUT/OUTPUTS, 3.2K | XILINX (USA) | XC4003A-6PQ100C |
| IC58 | 28461/897 | IC-ANALOGUE OPERATIONAL AMP OP-27GS... 22V LOW NOISE, 8 PIN, SMALL-OUTLINE. | ANALOG DEVICES LTD | OP-27GS |
| IC59 | 28461/898 | IC-ANALOGUE D/A-CONVERTER 7528... 8 INPUT, DUAL, 8-BIT, BUFFERED, MULTIPLYING, CMOS, 20 PIN, | ANALOG DEVICES LTD | AD7528JR |
| IC60 | 28461/505 | IC-ANALOGUE OPERATIONAL AMP OP482... QUAD, JFET INPUT, LOW SUPPLY CURRENT, SLEW RATE 7V/uS MIN, | ANALOG DEVICES LTD | OP-482GS |
| IC61 | 28469/624 | IC-DIGITAL FIELDPROG-GATE-ARRAY XC4005... 5000 GATES, 196 LOGIC BLOCKS, 112 INPUT/OUTPUTS, 6.2K | XILINX (USA) | XC4005-5PQ160C |
| IC62 | 28469/057 | IC-DIGITAL INVERTER 74HC04... HEX, CMOS-H/SPEED, 14 PIN, SMALL-OUTLINE. | PHILIPS | 74HC04D |
| IC63 | 28461/046 | IC-ANALOGUE SWITCH DG540... QUAD, 20mA RF VIDEO T-SWITCH, BANDWIDTH 500MHz, ISOLATION 80dB @ 5MHz, | TEMIC UK LTD | DG540DN |
| IC64 | 28461/046 | IC-ANALOGUE SWITCH DG540... QUAD, 20mA RF VIDEO T-SWITCH, BANDWIDTH 500MHz, ISOLATION 80dB @ 5MHz, | TEMIC UK LTD | DG540DN |
| IC65 | 28461/042 | IC-ANALOGUE COMPARATOR LT1016... I/P-OFFSET 3mV MAX, RESPONSE TIME 14nS MAX, TTL, 8 PIN, | MAXIM INTEG PRODUCTS | LT1016CS8 |
| IC66 | 28531/015 | RF-MIXER DOUBLE-BALANCED, DIODE RING, RMS-2... 5-1000MHz, 50R 1 dBm RF-1dB COMPRESS, 9.5 dB LOSS, | MINI-CIRCUITS | RMS-2 |
| IC67 | 23642/950 | FILTER BANDPASS, PCB-MOUNT, SAW, 50R, 70MHz, 10.4MHz PASSBAND @ 3dB, 15.4MHz STOPBAND @ 35dB, | SIEMENS LTD | OFWX6950M |
| IC68 | 28531/081 | RF-MIXER DOUBLE-BALANCED, DIODE RING, RMS-1... 0.5 - 500MHz, 50R 1 dBm RF-1dB COMPRESS, 8.5 dB LOSS, | MINI-CIRCUITS | RMS-1 |
| IC69 | 28469/051 | IC-DIGITAL INVERTER 74AC04... HEX, CMOS-ADVANCED, 14 PIN, SMALL-OUTLINE. | NAT. SEMICONDUCTOR | 74AC04SC |
| L1 to L3 | 23642/537 | INDUCTOR-FIXED 4.7uH +/- 5% EPOXY-MOULD, 220mA 1R5 MAX, 30 Q @ 7.96 MHz, 50 MHz SRF, SURFACE MOUNTED, | MEGGITT ELECTRONICS | 3612-T-4R7-J |
| L4 | 23642/729 | INDUCTOR-FIXED 0.18uH +/- 5% EPOXY-MOULD, 450mA 0R28 MAX, 30 Q @ 25.2 MHz, 400 MHz SRF, SURFACE | MEGGITT ELECTRONICS | 3612-T-R18-J |
| L5 | 23642/729 | INDUCTOR-FIXED 0.18uH +/- 5% EPOXY-MOULD, 450mA 0R28 MAX, 30 Q @ 25.2 MHz, 400 MHz SRF, SURFACE | MEGGITT ELECTRONICS | 3612-T-R18-J |
| L6 | 23642/537 | INDUCTOR-FIXED 4.7uH +/- 5% EPOXY-MOULD, 220mA 1R5 MAX, 30 Q @ 7.96 MHz, 50 MHz SRF, SURFACE MOUNTED, | MEGGITT ELECTRONICS | 3612-T-4R7-J |
| L7 | 23642/537 | INDUCTOR-FIXED 4.7uH +/- 5% EPOXY-MOULD, 220mA 1R5 MAX, 30 Q @ 7.96 MHz, 50 MHz SRF, SURFACE MOUNTED, | MEGGITT ELECTRONICS | 3612-T-4R7-J |

## A8 Complex modem and IF (contd.)

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| L9 | 23642/535 | INDUCTOR-FIXED 1uH +/- 5% EPOXY-MOULD, 400mA 0R7 MAX, 30 Q @ 7.96 MHz, 120 MHz SRF, SURFACE | MEGGITT ELECTRONICS | 3612-T-1R0-J |
| L10 | 23642/732 | INDUCTOR-FIXED 0.82uH +/- 5% EPOXY-MOULD, 450mA 0R65 MAX, 30 Q @ 25.2 MHz, 140 MHz SRF, SURFACE | MEGGITT ELECTRONICS | 3612-T-R82-J |
| L11 | 23642/535 | INDUCTOR-FIXED 1uH +/- 5% EPOXY-MOULD, 400mA 0R7 MAX, 30 Q @ 7.96 MHz, 120 MHz SRF, SURFACE | MEGGITT ELECTRONICS | 3612-T-1R0-J |
| L12 | 23642/732 | INDUCTOR-FIXED 0.82uH +/- 5% EPOXY-MOULD, 450mA 0R65 MAX, 30 Q @ 25.2 MHz, 140 MHz SRF, SURFACE | MEGGITT ELECTRONICS | 3612-T-R82-J |
| L13 | 23642/535 | INDUCTOR-FIXED 1uH +/- 5% EPOXY-MOULD, 400mA 0R7 MAX, 30 Q @ 7.96 MHz, 120 MHz SRF, SURFACE | MEGGITT ELECTRONICS | 3612-T-1R0-J |
| L14 | 23642/535 | INDUCTOR-FIXED 1uH +/- 5% EPOXY-MOULD, 400mA 0R7 MAX, 30 Q @ 7.96 MHz, 120 MHz SRF, SURFACE | MEGGITT ELECTRONICS | 3612-T-1R0-J |
| L15 | 23642/537 | INDUCTOR-FIXED 4.7uH +/- 5% EPOXY-MOULD, 220mA 1R5 MAX, 30 Q @ 7.96 MHz, 50 MHz SRF, SURFACE MOUNTED, | MEGGITT ELECTRONICS | 3612-T-4R7-J |
| L16 | 23642/732 | INDUCTOR-FIXED 0.82uH +/- 5% EPOXY-MOULD, 450mA 0R65 MAX, 30 Q @ 25.2 MHz, 140 MHz SRF, SURFACE | MEGGITT ELECTRONICS | 3612-T-R82-J |
| L17 | 23642/535 | INDUCTOR-FIXED 1uH +/- 5% EPOXY-MOULD, 400mA 0R7 MAX, 30 Q @ 7.96 MHz, 120 MHz SRF, SURFACE | MEGGITT ELECTRONICS | 3612-T-1R0-J |
| L18 | 23642/732 | INDUCTOR-FIXED 0.82uH +/- 5% EPOXY-MOULD, 450mA 0R65 MAX, 30 Q @ 25.2 MHz, 140 MHz SRF, SURFACE | MEGGITT ELECTRONICS | 3612-T-R82-J |
| L19 | 23642/537 | INDUCTOR-FIXED 4.7uH +/- 5% EPOXY-MOULD, 220mA 1R5 MAX, 30 Q @ 7.96 MHz, 50 MHz SRF, SURFACE MOUNTED, | MEGGITT ELECTRONICS | 3612-T-4R7-J |
| L20 | 23642/710 | INDUCTOR-FIXED 3.9uH +/- 5% EPOXY-MOULD, 250mA 1R3 MAX, 30 Q @ 7.96 MHz, 55 MHz SRF, SURFACE MOUNTED, | MEGGITT ELECTRONICS | 3612-T-3R9-J |
| L21 | 23642/733 | INDUCTOR-FIXED 6.8uH +/- 5% EPOXY-MOULD, 180mA 1R8 MAX, 30 Q @ 7.96 MHz, 430 MHz SRF, SURFACE | MEGGITT ELECTRONICS | 3612-T-6R8-J |
| L22 | 23642/533 | INDUCTOR-FIXED 10uH +/- 5% EPOXY-MOULD, 150mA 2R1 MAX, 30 Q @ 2.52 MHz, 36 MHz SRF, SURFACE MOUNTED, | MEGGITT ELECTRONICS | 3612-T-100-J |
| L23 | 23642/533 | INDUCTOR-FIXED 10uH +/- 5% EPOXY-MOULD, 150mA 2R1 MAX, 30 Q @ 2.52 MHz, 36 MHz SRF, SURFACE MOUNTED, | MEGGITT ELECTRONICS | 3612-T-100-J |
| L24 to L26 | 23642/731 | INDUCTOR-FIXED 0.33uH +/- 5% EPOXY-MOULD, 450mA 0R4 MAX, 30 Q @ 25.2 MHz, 300 MHz SRF, SURFACE | MEGGITT ELECTRONICS | 3612-T-R33-J |
| L27 to L30 | 23642/535 | INDUCTOR-FIXED 1uH +/- 5% EPOXY-MOULD, 400mA 0R7 MAX, 30 Q @ 7.96 MHz, 120 MHz SRF, SURFACE | MEGGITT ELECTRONICS | 3612-T-1R0-J |
| L31 | 23642/731 | INDUCTOR-FIXED 0.33uH +/- 5% EPOXY-MOULD, 450mA 0R4 MAX, 30 Q @ 25.2 MHz, 300 MHz SRF, SURFACE | MEGGITT ELECTRONICS | 3612-T-R33-J |
| L32 | 23642/731 | INDUCTOR-FIXED 0.33uH +/- 5% EPOXY-MOULD, 450mA 0R4 MAX, 30 Q @ 25.2 MHz, 300 MHz SRF, SURFACE | MEGGITT ELECTRONICS | 3612-T-R33-J |
| L33 | 23642/535 | INDUCTOR-FIXED 1uH +/- 5% EPOXY-MOULD, 400mA 0R7 MAX, 30 Q @ 7.96 MHz, 120 MHz SRF, SURFACE | MEGGITT ELECTRONICS | 3612-T-1R0-J |
| L37 | 23642/537 | INDUCTOR-FIXED 4.7uH +/- 5% EPOXY-MOULD, 220mA 1R5 MAX, 30 Q @ 7.96 MHz, 50 MHz SRF, SURFACE MOUNTED, | MEGGITT ELECTRONICS | 3612-T-4R7-J |
| L38 to L40 | 23642/535 | INDUCTOR-FIXED 1uH +/- 5% EPOXY-MOULD, 400mA 0R7 MAX, 30 Q @ 7.96 MHz, 120 MHz SRF, SURFACE | MEGGITT ELECTRONICS | 3612-T-1R0-J |
| L41 | 23642/731 | INDUCTOR-FIXED 0.33uH +/- 5% EPOXY-MOULD, 450mA 0R4 MAX, 30 Q @ 25.2 MHz, 300 MHz SRF, SURFACE | MEGGITT ELECTRONICS | 3612-T-R33-J |
| L42 | 23642/537 | INDUCTOR-FIXED 4.7uH +/- 5% EPOXY-MOULD, 220mA 1R5 MAX, 30 Q @ 7.96 MHz, 50 MHz SRF, SURFACE MOUNTED, | MEGGITT ELECTRONICS | 3612-T-4R7-J |
| L44 | 23642/537 | INDUCTOR-FIXED 4.7uH +/- 5% EPOXY-MOULD, 220mA 1R5 MAX, 30 Q @ 7.96 MHz, 50 MHz SRF, SURFACE MOUNTED, | MEGGITT ELECTRONICS | 3612-T-4R7-J |

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| **A8 Complex modem and IF (contd.)** | | | | |
| L46 | 23642/731 | INDUCTOR-FIXED 0.33uH +/- 5% EPOXY-MOULD, 450mA 0R4 MAX, 30 Q @ 25.2 MHz, 300 MHz SRF, SURFACE | MEGGITT ELECTRONICS | 3612-T-R33-J |
| L47 | 23642/537 | INDUCTOR-FIXED 4.7uH +/- 5% EPOXY-MOULD, 220mA 1R5 MAX, 30 Q @ 7.96 MHz, 50 MHz SRF, SURFACE MOUNTED, | MEGGITT ELECTRONICS | 3612-T-4R7-J |
| L48 | 23642/537 | INDUCTOR-FIXED 4.7uH +/- 5% EPOXY-MOULD, 220mA 1R5 MAX, 30 Q @ 7.96 MHz, 50 MHz SRF, SURFACE MOUNTED, | MEGGITT ELECTRONICS | 3612-T-4R7-J |
| PLA | 23437/061 | CONNECTOR MULTIWAY, PCB HEADER, 10 WAY, STAGGERED 2-ROW, 2.54mm PITCH, SURFACE MOUNTING, TIN PLATED | LUMBERG UK LTD | MICS/SMD10RP |
| PLB | 23437/064 | CONNECTOR MULTIWAY, PCB HEADER, 20 WAY, STAGGERED 2-ROW, 2.54mm PITCH, SURFACE MOUNTING, TIN PLATED | LUMBERG UK LTD | MICS/SMD20RP |
| PLC | 23437/062 | CONNECTOR MULTIWAY, PCB HEADER, 14 WAY, STAGGERED 2-ROW, 2.54mm PITCH, SURFACE MOUNTING, TIN PLATED | LUMBERG UK LTD | MICS/SMD14RP |
| PLD | 23437/063 | CONNECTOR MULTIWAY, PCB HEADER, 16 WAY, STAGGERED 2-ROW, 2.54mm PITCH, SURFACE MOUNTING, TIN PLATED | LUMBERG UK LTD | MICS/SMD16RP |
| PLE | 23437/061 | CONNECTOR MULTIWAY, PCB HEADER, 10 WAY, STAGGERED 2-ROW, 2.54mm PITCH, SURFACE MOUNTING, TIN PLATED | LUMBERG UK LTD | MICS/SMD10RP |
| PLF | 23437/064 | CONNECTOR MULTIWAY, PCB HEADER, 20 WAY, STAGGERED 2-ROW, 2.54mm PITCH, SURFACE MOUNTING, TIN PLATED | LUMBERG UK LTD | MICS/SMD20RP |
| PLJK | 23437/064 | CONNECTOR MULTIWAY, PCB HEADER, 20 WAY, STAGGERED 2-ROW, 2.54mm PITCH, SURFACE MOUNTING, TIN PLATED | LUMBERG UK LTD | MICS/SMD20RP |
| R1 | 24811/213 | RESISTOR-FIXED METAL-FILM 47K5 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-47K5-1%50ppm |
| R2 | 24811/194 | RESISTOR-FIXED METAL-FILM 7K5 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-7K5-1%50ppm |
| R3 | 24811/193 | RESISTOR-FIXED METAL-FILM 6K81 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-6K81-1%50ppm |
| R4 | 24811/225 | RESISTOR-FIXED METAL-FILM 150K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-150K-1%50ppm |
| R5 | 24811/153 | RESISTOR-FIXED METAL-FILM 150R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-150R-1%50ppm |
| R6 | 24811/225 | RESISTOR-FIXED METAL-FILM 150K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-150K-1%50ppm |
| R7 | 24811/149 | RESISTOR-FIXED METAL-FILM 100R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100R-1%50ppm |
| R8 | 24811/213 | RESISTOR-FIXED METAL-FILM 47K5 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-47K5-1%50ppm |
| R9 | 24811/213 | RESISTOR-FIXED METAL-FILM 47K5 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-47K5-1%50ppm |
| R10 | 24811/153 | RESISTOR-FIXED METAL-FILM 150R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-150R-1%50ppm |
| R11 | 24811/125 | RESISTOR-FIXED METAL-FILM 10R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10R-1%-50ppm |
| R12 | 24811/164 | RESISTOR-FIXED METAL-FILM 432R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-432R-1%50ppm |
| R13 | 24811/166 | RESISTOR-FIXED METAL-FILM 511R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-511R-1%50ppm |

## A8 Complex modem and IF (contd.)

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| R14 | 24811/125 | RESISTOR-FIXED METAL-FILM 10R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10R-1%-50ppm |
| R15 | 24811/166 | RESISTOR-FIXED METAL-FILM 511R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-511R-1%50ppm |
| R16 | 24811/153 | RESISTOR-FIXED METAL-FILM 150R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-150R-1%50ppm |
| R17 | 24811/158 | RESISTOR-FIXED METAL-FILM 243R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-243R-1%50ppm |
| R18 | 24811/158 | RESISTOR-FIXED METAL-FILM 243R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-243R-1%50ppm |
| R19 | 24811/142 | RESISTOR-FIXED METAL-FILM 51R1 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-51R1-1%50ppm |
| R20 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R21 | 24811/185 | RESISTOR-FIXED METAL-FILM 3K32 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-3K32-1%50ppm |
| R22 | 24811/141 | RESISTOR-FIXED METAL-FILM 47R5 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-47R5-1%50ppm |
| R23 | 24811/166 | RESISTOR-FIXED METAL-FILM 511R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-511R-1%50ppm |
| R24 | 24811/149 | RESISTOR-FIXED METAL-FILM 100R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100R-1%50ppm |
| R25 | 24811/141 | RESISTOR-FIXED METAL-FILM 47R5 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-47R5-1%50ppm |
| R26 | 24811/141 | RESISTOR-FIXED METAL-FILM 47R5 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-47R5-1%50ppm |
| R27 | 24811/166 | RESISTOR-FIXED METAL-FILM 511R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-511R-1%50ppm |
| R28 | 24811/125 | RESISTOR-FIXED METAL-FILM 10R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10R-1%-50ppm |
| R29 | 24811/166 | RESISTOR-FIXED METAL-FILM 511R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-511R-1%50ppm |
| R30 | 24811/125 | RESISTOR-FIXED METAL-FILM 10R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10R-1%-50ppm |
| R31 | 24811/164 | RESISTOR-FIXED METAL-FILM 432R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-432R-1%50ppm |
| R32 | 24811/125 | RESISTOR-FIXED METAL-FILM 10R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10R-1%-50ppm |
| R33 | 24811/164 | RESISTOR-FIXED METAL-FILM 432R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-432R-1%50ppm |
| R34 | 24811/166 | RESISTOR-FIXED METAL-FILM 511R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-511R-1%50ppm |
| R35 | 24811/125 | RESISTOR-FIXED METAL-FILM 10R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10R-1%-50ppm |
| R36 | 24811/166 | RESISTOR-FIXED METAL-FILM 511R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-511R-1%50ppm |
| R37 | 24811/141 | RESISTOR-FIXED METAL-FILM 47R5 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-47R5-1%50ppm |
| R38 | 24811/142 | RESISTOR-FIXED METAL-FILM 51R1 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-51R1-1%50ppm |

## A8 Complex modem and IF (contd.)

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| R39 | 24811/132 | RESISTOR-FIXED METAL-FILM 20R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-20R-1%-50ppm |
| R40 | 24811/153 | RESISTOR-FIXED METAL-FILM 150R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-150R-1%50ppm |
| R41 to R43 | 24811/143 | RESISTOR-FIXED METAL-FILM 56R2 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-56R2-1%50ppm |
| R44 | 24811/153 | RESISTOR-FIXED METAL-FILM 150R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-150R-1%50ppm |
| R45 | 24811/141 | RESISTOR-FIXED METAL-FILM 47R5 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-47R5-1%50ppm |
| R46 | 24811/163 | RESISTOR-FIXED METAL-FILM 392R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-392R-1%50ppm |
| R47 | 24811/221 | RESISTOR-FIXED METAL-FILM 100K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100K-1%50ppm |
| R48 | 24811/221 | RESISTOR-FIXED METAL-FILM 100K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100K-1%50ppm |
| R49 | 24811/143 | RESISTOR-FIXED METAL-FILM 56R2 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-56R2-1%50ppm |
| R50 | 24811/153 | RESISTOR-FIXED METAL-FILM 150R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-150R-1%50ppm |
| R51 | 24811/160 | RESISTOR-FIXED METAL-FILM 301R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-301R-1%50ppm |
| R52 | 24811/131 | RESISTOR-FIXED METAL-FILM 18R2 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-18R2-1%50ppm |
| R53 | 24811/160 | RESISTOR-FIXED METAL-FILM 301R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-301R-1%50ppm |
| R54 | 24811/165 | RESISTOR-FIXED METAL-FILM 475R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-475R-1%50ppm |
| R55 | 24811/160 | RESISTOR-FIXED METAL-FILM 301R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-301R-1%50ppm |
| R56 | 24811/194 | RESISTOR-FIXED METAL-FILM 7K5 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-7K5-1%50ppm |
| R57 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R58 | 24811/165 | RESISTOR-FIXED METAL-FILM 475R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-475R-1%50ppm |
| R59 | 24811/165 | RESISTOR-FIXED METAL-FILM 475R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-475R-1%50ppm |
| R60 | 24811/185 | RESISTOR-FIXED METAL-FILM 3K32 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-3K32-1%50ppm |
| R61 | 24811/142 | RESISTOR-FIXED METAL-FILM 51R1 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-51R1-1%50ppm |
| R62 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R63 | 24811/189 | RESISTOR-FIXED METAL-FILM 4K75 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-4K75-1%50ppm |
| R64 | 24811/142 | RESISTOR-FIXED METAL-FILM 51R1 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-51R1-1%50ppm |
| R65 | 24811/135 | RESISTOR-FIXED METAL-FILM 27R4 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-27R4-1%50ppm |

## A8 Complex modem and IF (contd.)

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| R66 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R67 | 24811/189 | RESISTOR-FIXED METAL-FILM 4K75 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-4K75-1%50ppm |
| R68 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R69 | 24811/149 | RESISTOR-FIXED METAL-FILM 100R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100R-1%50ppm |
| R70 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R72 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R73 | 24811/169 | RESISTOR-FIXED METAL-FILM 681R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-681R-1%50ppm |
| R74 | 24811/169 | RESISTOR-FIXED METAL-FILM 681R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-681R-1%50ppm |
| R75 | 24811/141 | RESISTOR-FIXED METAL-FILM 47R5 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-47R5-1%50ppm |
| R76 | 24811/113 | RESISTOR-FIXED METAL-FILM 3R32 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-3R32-1%50ppm |
| R77 | 24811/113 | RESISTOR-FIXED METAL-FILM 3R32 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-3R32-1%50ppm |
| R78 | 24811/142 | RESISTOR-FIXED METAL-FILM 51R1 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-51R1-1%50ppm |
| R79 | 24811/180 | RESISTOR-FIXED METAL-FILM 2K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-2K0-1%50ppm |
| R80 to R83 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R84 | 24811/641 | RESISTOR-FIXED METAL-FILM 2K +/- 0.1% 250mW 200V 15 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-2K0-0.1%-15 |
| R85 | 24811/606 | RESISTOR-FIXED METAL-FILM 1K +/- 0.1% 250mW 200V 15 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-1K0-0.1%-15 |
| R86 | 24811/606 | RESISTOR-FIXED METAL-FILM 1K +/- 0.1% 250mW 200V 15 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-1K0-0.1%-15 |
| R87 | 24811/641 | RESISTOR-FIXED METAL-FILM 2K +/- 0.1% 250mW 200V 15 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-2K0-0.1%-15 |
| R88 to R97 | 24811/606 | RESISTOR-FIXED METAL-FILM 1K +/- 0.1% 250mW 200V 15 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-1K0-0.1%-15 |
| R98 to R101 | 24811/165 | RESISTOR-FIXED METAL-FILM 475R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-475R-1%50ppm |
| R102 | 24811/606 | RESISTOR-FIXED METAL-FILM 1K +/- 0.1% 250mW 200V 15 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-1K0-0.1%-15 |
| R103 | 24811/141 | RESISTOR-FIXED METAL-FILM 47R5 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-47R5-1%50ppm |
| R104 | 24811/155 | RESISTOR-FIXED METAL-FILM 182R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-182R-1%50ppm |
| R105 | 24811/141 | RESISTOR-FIXED METAL-FILM 47R5 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-47R5-1%50ppm |
| R106 | 24811/141 | RESISTOR-FIXED METAL-FILM 47R5 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-47R5-1%50ppm |

## A8 Complex modem and IF (contd.)

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| R107 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R108 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R109 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R110 | 24811/157 | RESISTOR-FIXED METAL-FILM 221R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-221R-1%50ppm |
| R111 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R112 | 24811/157 | RESISTOR-FIXED METAL-FILM 221R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-221R-1%50ppm |
| R113 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R114 | 24811/149 | RESISTOR-FIXED METAL-FILM 100R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100R-1%50ppm |
| R115 to R118 | 24811/165 | RESISTOR-FIXED METAL-FILM 475R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-475R-1%50ppm |
| R119 | 24811/606 | RESISTOR-FIXED METAL-FILM 1K +/- 0.1% 250mW 200V 15 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-1K0-0.1%-15 |
| R120 | 24811/159 | RESISTOR-FIXED METAL-FILM 274R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-274R-1%50ppm |
| R121 | 24811/177 | RESISTOR-FIXED METAL-FILM 1K5 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K5-1%50ppm |
| R122 | 24811/193 | RESISTOR-FIXED METAL-FILM 6K81 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-6K81-1%50ppm |
| R123 | 24811/185 | RESISTOR-FIXED METAL-FILM 3K32 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-3K32-1%50ppm |
| R124 | 24811/169 | RESISTOR-FIXED METAL-FILM 681R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-681R-1%50ppm |
| R125 | 24811/163 | RESISTOR-FIXED METAL-FILM 392R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-392R-1%50ppm |
| R126 | 24811/153 | RESISTOR-FIXED METAL-FILM 150R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-150R-1%50ppm |
| R127 | 24811/135 | RESISTOR-FIXED METAL-FILM 27R4 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-27R4-1%50ppm |
| R128 | 24811/125 | RESISTOR-FIXED METAL-FILM 10R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10R-1%-50ppm |
| R129 | 24811/245 | RESISTOR-FIXED METAL-FILM 1M +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1M0-1%50ppm |
| R130 to R135 | 24811/177 | RESISTOR-FIXED METAL-FILM 1K5 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K5-1%50ppm |
| R136 | 24811/193 | RESISTOR-FIXED METAL-FILM 6K81 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-6K81-1%50ppm |
| R137 | 24811/193 | RESISTOR-FIXED METAL-FILM 6K81 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-6K81-1%50ppm |
| R138 | 24811/149 | RESISTOR-FIXED METAL-FILM 100R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100R-1%50ppm |
| R139 | 24811/149 | RESISTOR-FIXED METAL-FILM 100R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100R-1%50ppm |

## A8 Complex modem and IF (contd.)

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| R140 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R141 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R142 to R156 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R157 | 24811/165 | RESISTOR-FIXED METAL-FILM 475R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-475R-1%50ppm |
| R158 | 24811/165 | RESISTOR-FIXED METAL-FILM 475R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-475R-1%50ppm |
| R159 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R160 | 24811/165 | RESISTOR-FIXED METAL-FILM 475R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-475R-1%50ppm |
| R161 | 24811/165 | RESISTOR-FIXED METAL-FILM 475R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-475R-1%50ppm |
| R162 to R167 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R168 | 24811/165 | RESISTOR-FIXED METAL-FILM 475R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-475R-1%50ppm |
| R169 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R170 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R171 | 24811/165 | RESISTOR-FIXED METAL-FILM 475R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-475R-1%50ppm |
| R172 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R173 | 24811/165 | RESISTOR-FIXED METAL-FILM 475R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-475R-1%50ppm |
| R174 | 24811/165 | RESISTOR-FIXED METAL-FILM 475R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-475R-1%50ppm |
| R175 to R180 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R181 | 24811/165 | RESISTOR-FIXED METAL-FILM 475R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-475R-1%50ppm |
| R182 to R184 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R185 | 24811/165 | RESISTOR-FIXED METAL-FILM 475R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-475R-1%50ppm |
| R186 | 24811/165 | RESISTOR-FIXED METAL-FILM 475R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-475R-1%50ppm |
| R187 to R191 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R192 | 24811/165 | RESISTOR-FIXED METAL-FILM 475R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-475R-1%50ppm |
| R193 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R194 | 24811/165 | RESISTOR-FIXED METAL-FILM 475R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-475R-1%50ppm |

## A8 Complex modem and IF (contd.)

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| R195 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R196 | 24811/165 | RESISTOR-FIXED METAL-FILM 475R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-475R-1%50ppm |
| R197 to R200 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R201 | 24811/185 | RESISTOR-FIXED METAL-FILM 3K32 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-3K32-1%50ppm |
| R202 | 24811/606 | RESISTOR-FIXED METAL-FILM 1K +/- 0.1% 250mW 200V 15 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-1K0-0.1%-15 |
| R203 | 24811/166 | RESISTOR-FIXED METAL-FILM 511R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-511R-1%50ppm |
| R204 | 24811/641 | RESISTOR-FIXED METAL-FILM 2K +/- 0.1% 250mW 200V 15 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-2K0-0.1%-15 |
| R205 | 24811/166 | RESISTOR-FIXED METAL-FILM 511R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-511R-1%50ppm |
| R206 | 24811/606 | RESISTOR-FIXED METAL-FILM 1K +/- 0.1% 250mW 200V 15 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-1K0-0.1%-15 |
| R207 | 24811/166 | RESISTOR-FIXED METAL-FILM 511R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-511R-1%50ppm |
| R208 | 24811/641 | RESISTOR-FIXED METAL-FILM 2K +/- 0.1% 250mW 200V 15 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-2K0-0.1%-15 |
| R209 | 24811/166 | RESISTOR-FIXED METAL-FILM 511R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-511R-1%50ppm |
| R212 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R213 to R227 | 24811/135 | RESISTOR-FIXED METAL-FILM 27R4 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-27R4-1%50ppm |
| R228 to R233 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R236 | 24811/132 | RESISTOR-FIXED METAL-FILM 20R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-20R-1%-50ppm |
| R237 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R238 | 24811/193 | RESISTOR-FIXED METAL-FILM 6K81 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-6K81-1%50ppm |
| R239 | 24811/142 | RESISTOR-FIXED METAL-FILM 51R1 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-51R1-1%50ppm |
| R241 | 24811/165 | RESISTOR-FIXED METAL-FILM 475R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-475R-1%50ppm |
| R242 | 24811/113 | RESISTOR-FIXED METAL-FILM 3R32 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-3R32-1%50ppm |
| R243 | 24811/135 | RESISTOR-FIXED METAL-FILM 27R4 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-27R4-1%50ppm |
| R245 to R248 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R249 | 24811/165 | RESISTOR-FIXED METAL-FILM 475R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-475R-1%50ppm |
| R250 | 24811/160 | RESISTOR-FIXED METAL-FILM 301R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-301R-1%50ppm |

## A8 Complex modem and IF (contd.)

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| R251 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R252 | 24811/183 | RESISTOR-FIXED METAL-FILM 2K74 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-2K74-1%50ppm |
| R253 | 24811/193 | RESISTOR-FIXED METAL-FILM 6K81 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-6K81-1%50ppm |
| R254 to R258 | 24811/165 | RESISTOR-FIXED METAL-FILM 475R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-475R-1%50ppm |
| R260 | 24811/125 | RESISTOR-FIXED METAL-FILM 10R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10R-1%-50ppm |
| R265 to R275 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R277 | 24811/135 | RESISTOR-FIXED METAL-FILM 27R4 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-27R4-1%50ppm |
| R278 | 24811/165 | RESISTOR-FIXED METAL-FILM 475R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-475R-1%50ppm |
| R280 to R287 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R290 to R292 | 24811/213 | RESISTOR-FIXED METAL-FILM 47K5 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-47K5-1%50ppm |
| R300 | 24811/125 | RESISTOR-FIXED METAL-FILM 10R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10R-1%-50ppm |
| R301 | 24811/125 | RESISTOR-FIXED METAL-FILM 10R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10R-1%-50ppm |
| R302 | 24811/221 | RESISTOR-FIXED METAL-FILM 100K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100K-1%50ppm |
| R304 | 24811/165 | RESISTOR-FIXED METAL-FILM 475R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-475R-1%50ppm |
| R305 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R306 | 24811/165 | RESISTOR-FIXED METAL-FILM 475R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-475R-1%50ppm |
| R307 | 24811/132 | RESISTOR-FIXED METAL-FILM 20R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-20R-1%-50ppm |
| R308 | 24811/132 | RESISTOR-FIXED METAL-FILM 20R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-20R-1%-50ppm |
| R309 | 24811/125 | RESISTOR-FIXED METAL-FILM 10R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10R-1%-50ppm |
| R310 | 24811/113 | RESISTOR-FIXED METAL-FILM 3R32 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-3R32-1%50ppm |
| R311 | 24811/132 | RESISTOR-FIXED METAL-FILM 20R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-20R-1%-50ppm |
| R312 to R314 | 24811/125 | RESISTOR-FIXED METAL-FILM 10R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10R-1%-50ppm |
| R315 | 24811/113 | RESISTOR-FIXED METAL-FILM 3R32 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-3R32-1%50ppm |
| R316 | 24811/165 | RESISTOR-FIXED METAL-FILM 475R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-475R-1%50ppm |
| R317 | 24811/165 | RESISTOR-FIXED METAL-FILM 475R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-475R-1%50ppm |

## A8 Complex modem and IF (contd.)

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| R318 to R320 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R321 to R324 | 24811/165 | RESISTOR-FIXED METAL-FILM 475R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-475R-1%50ppm |
| R325 to R327 | 24811/221 | RESISTOR-FIXED METAL-FILM 100K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100K-1%50ppm |
| R328 | 24811/166 | RESISTOR-FIXED METAL-FILM 511R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-511R-1%50ppm |
| R329 | 24811/221 | RESISTOR-FIXED METAL-FILM 100K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100K-1%50ppm |
| R330 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R331 | 24811/155 | RESISTOR-FIXED METAL-FILM 182R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-182R-1%50ppm |
| R332 | 24811/143 | RESISTOR-FIXED METAL-FILM 56R2 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-56R2-1%50ppm |
| R333 to R337 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R338 | 24811/165 | RESISTOR-FIXED METAL-FILM 475R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-475R-1%50ppm |
| SKA to SKK | 23445/501 | CONNECTOR-RF MMCX-TYPE FEMALE, JACK, 50 OHMS, SURFACE MOUNTING, VERTICAL, DC-6GHz, GOLD PLATD | HUBER & SUHNER | 82MMCX-S50-0-51 |
| T1 | 23622/909 | TRANSFORMER RF MATCHING, TURNS RATIO 1:1:1, MOULDED BODY, 7.62x6.86x5.84mm, INSERTION LOSS 3dB | MINI-CIRCUITS | T-622-KK81 |
| TR1 | 28455/302 | TRANSISTOR NPN BIPOLAR BCX54... 45V 130MHz 1W 1A 40hFE MIN @ 150mA, MARKING CODE BA, SURFACE | PHILIPS | BCX54 |
| TR2 | 28435/229 | TRANSISTOR PNP BIPOLAR BCX51... 45V 50MHz 1W 1A 40hFE @ 250mA, SURFACE MOUNTED, SOT-89, (12mm TAPE | PHILIPS | BCX51 |
| TR3 | 28455/302 | TRANSISTOR NPN BIPOLAR BCX54... 45V 130MHz 1W 1A 40hFE MIN @ 150mA, MARKING CODE BA, SURFACE | PHILIPS | BCX54 |
| TR4 | 28435/229 | TRANSISTOR PNP BIPOLAR BCX51... 45V 50MHz 1W 1A 40hFE @ 250mA, SURFACE MOUNTED, SOT-89, (12mm TAPE | PHILIPS | BCX51 |
| TR5 | 28487/824 | TRANSISTOR NPN BIPOLAR BFQ67... 10V 7.5GHz 300mW 50mA 100hFE @ 15mA, MARKING CODE V2, SURFACE | PHILIPS | BFQ67 |
| TR6 | 28487/809 | TRANSISTOR NPN BIPOLAR BFR93A... 12V 5GHz 250mW 35mA 40hFE MIN @ 30mA, MARKING CODE R2, SURFACE | PHILIPS | BFR93A |
| TR7 | 28487/809 | TRANSISTOR NPN BIPOLAR BFR93A... 12V 5GHz 250mW 35mA 40hFE MIN @ 30mA, MARKING CODE R2, SURFACE | PHILIPS | BFR93A |
| TR8 | 28457/851 | TRANSISTOR NPN BIPOLAR BFS17... 15V 1.3GHz 250mW 50mA 20hFE MIN @ 2mA, MARKING CODE E1, SURFACE | PHILIPS | BFS17 |
| TR9 | 28457/851 | TRANSISTOR NPN BIPOLAR BFS17... 15V 1.3GHz 250mW 50mA 20hFE MIN @ 2mA, MARKING CODE E1, SURFACE | PHILIPS | BFS17 |
| TR10 | 28487/809 | TRANSISTOR NPN BIPOLAR BFR93A... 12V 5GHz 250mW 35mA 40hFE MIN @ 30mA, MARKING CODE R2, SURFACE | PHILIPS | BFR93A |

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| **A8 Complex modem and IF (contd.)** | | | | |
| TR11 | 28487/818 | TRANSISTOR NPN BIPOLAR BFS20... 20V 450MHz 200mW 25mA 40hFE MIN @ 7mA, MARKING CODE G1, SURFACE | PHILIPS | BFS20 |
| TR12 | 28487/824 | TRANSISTOR NPN BIPOLAR BFQ67... 10V 7.5GHz 300mW 50mA 100hFE @ 15mA, MARKING CODE V2, SURFACE | PHILIPS | BFQ67 |
| TR13 | 28487/809 | TRANSISTOR NPN BIPOLAR BFR93A... 12V 5GHz 250mW 35mA 40hFE MIN @ 30mA, MARKING CODE R2, SURFACE | PHILIPS | BFR93A |
| TR14 | 28487/809 | TRANSISTOR NPN BIPOLAR BFR93A... 12V 5GHz 250mW 35mA 40hFE MIN @ 30mA, MARKING CODE R2, SURFACE | PHILIPS | BFR93A |
| XL1 | 28312/302 | CRYSTAL 10 MHz +/- 30 ppm, 16pF PARALLEL RESONANCE, 70R ESR MAX, STABILITY 50ppm/DEG.C, | IQD LTD | A143G-(TAPE) |
| XL2 | 23642/801 | FILTER RFI-SUPPRESSION, 3A RATING, SURFACE MOUNT, MULTILAYER IMPEDER, 95R IMPEDANCE @ 10MHz, 0.04R | TDK UK LTD | HF50ACC-575032-T |
| XL3 | 23642/801 | FILTER RFI-SUPPRESSION, 3A RATING, SURFACE MOUNT, MULTILAYER IMPEDER, 95R IMPEDANCE @ 10MHz, 0.04R | TDK UK LTD | HF50ACC-575032-T |
| XL4 | 23642/801 | FILTER RFI-SUPPRESSION, 3A RATING, SURFACE MOUNT, MULTILAYER IMPEDER, 95R IMPEDANCE @ 10MHz, 0.04R | TDK UK LTD | HF50ACC-575032-T |
| XL5 | 23642/801 | FILTER RFI-SUPPRESSION, 3A RATING, SURFACE MOUNT, MULTILAYER IMPEDER, 95R IMPEDANCE @ 10MHz, 0.04R | TDK UK LTD | HF50ACC-575032-T |

## AE1 Fractional-N control

When ordering, prefix circuit reference with AE1.

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| | 44829-841 | Complete unit | Issue 27 | |
| C1 | 26386/875 | CAPACITOR CERAMIC 10nF+/-10% 50V 0805 | AVX | 0805-5C-103-KAT-1A o |
| to C3 | | | | |
| C4 | 26386/883 | CAPACITOR CERAMIC 47nF+/-10% 50V 1210 | SYFER | 1210-J-050-0473K-X-T |
| to C5 | | | | |
| C6 | 26386/875 | CAPACITOR CERAMIC 10nF+/-10% 50V 0805 | AVX | 0805-5C-103-KAT-1A o |
| to C8 | | | | |
| C9 | 26386/883 | CAPACITOR CERAMIC 47nF+/-10% 50V 1210 | SYFER | 1210-J-050-0473K-X-T |
| C10 | 26386/875 | CAPACITOR CERAMIC 10nF+/-10% 50V 0805 | AVX | 0805-5C-103-KAT-1A o |
| C11 | 26421/112 | CAPACITOR ALUM 10uF+/-20% 35V RADIAL | RUBYCON | 35-MS7-10-M |
| C12 | 26386/863 | CAPACITOR CERAMIC 1nF+/-10% 50V 0805 | AVX | 0805-5C-102-KAT-1A o |
| C13 | 26421/112 | CAPACITOR ALUM 10uF+/-20% 35V RADIAL | RUBYCON | 35-MS7-10-M |
| C14 | 26386/863 | CAPACITOR CERAMIC 1nF+/-10% 50V 0805 | AVX | 0805-5C-102-KAT-1A o |
| C15 | 26386/875 | CAPACITOR CERAMIC 10nF+/-10% 50V 0805 | AVX | 0805-5C-103-KAT-1A o |
| to C17 | | | | |
| C18 | 26421/153 | CAPACITOR ALUM 470uF+/-20% 6.3V RADIAL | PHILIPS | 2222-116-23471 |
| C19 | 26386/863 | CAPACITOR CERAMIC 1nF+/-10% 50V 0805 | AVX | 0805-5C-102-KAT-1A o |
| C20 | 26421/112 | CAPACITOR ALUM 10uF+/-20% 35V RADIAL | RUBYCON | 35-MS7-10-M |
| C21 | 26386/863 | CAPACITOR CERAMIC 1nF+/-10% 50V 0805 | AVX | 0805-5C-102-KAT-1A o |
| C22 | 26451/003 | CAPACITOR ALUM 10uF+/-20% 16V 4.3mmSQ | RUBYCON | 16-REV-10-M-0450 |
| C24 | 26386/875 | CAPACITOR CERAMIC 10nF+/-10% 50V 0805 | AVX | 0805-5C-103-KAT-1A o |
| C25 | 26386/863 | CAPACITOR CERAMIC 1nF+/-10% 50V 0805 | AVX | 0805-5C-102-KAT-1A o |
| to C26 | | | | |
| C27 | 26421/112 | CAPACITOR ALUM 10uF+/-20% 35V RADIAL | RUBYCON | 35-MS7-10-M |
| C28 | 26386/899 | CAPACITOR CERAMIC 100nF+/-10% 50V 1206 | AVX | 1206-5C-104-KAT-1A o |
| C29 | 26421/151 | CAPACITOR ALUM 100uF+/-20% 35V RADIAL | PHILIPS | 2222-116-30101 |
| to C30 | | | | |
| C31 | 26386/867 | CAPACITOR CERAMIC 2.2nF+/-10% 50V 0805 | AVX | 0805-5C-222-KAT-1A o |
| C32 | 26386/875 | CAPACITOR CERAMIC 10nF+/-10% 50V 0805 | AVX | 0805-5C-103-KAT-1A o |
| C33 | 26386/863 | CAPACITOR CERAMIC 1nF+/-10% 50V 0805 | AVX | 0805-5C-102-KAT-1A o |
| to C34 | | | | |
| C35 | 26386/875 | CAPACITOR CERAMIC 10nF+/-10% 50V 0805 | AVX | 0805-5C-103-KAT-1A o |
| C36 | 26386/863 | CAPACITOR CERAMIC 1nF+/-10% 50V 0805 | AVX | 0805-5C-102-KAT-1A o |
| to C37 | | | | |
| C38 | 26421/112 | CAPACITOR ALUM 10uF+/-20% 35V RADIAL | RUBYCON | 35-MS7-10-M |
| C39 | 26386/899 | CAPACITOR CERAMIC 100nF+/-10% 50V 1206 | AVX | 1206-5C-104-KAT-1A o |
| C40 | 26421/153 | CAPACITOR ALUM 470uF+/-20% 6.3V RADIAL | PHILIPS | 2222-116-23471 |
| C41 | 26421/151 | CAPACITOR ALUM 100uF+/-20% 35V RADIAL | PHILIPS | 2222-116-30101 |
| C42 | 26421/153 | CAPACITOR ALUM 470uF+/-20% 6.3V RADIAL | PHILIPS | 2222-116-23471 |
| to C43 | | | | |
| C44 | 26343/447 | CAPACITOR CERAMIC 330pF+/-2% 63V RADIAL | PHILIPS | 2222-678-58331 |
| C47 | 26421/112 | CAPACITOR ALUM 10uF+/-20% 35V RADIAL | RUBYCON | 35-MS7-10-M |
| C48 | 26386/875 | CAPACITOR CERAMIC 10nF+/-10% 50V 0805 | AVX | 0805-5C-103-KAT-1A o |
| C49 | 26421/112 | CAPACITOR ALUM 10uF+/-20% 35V RADIAL | RUBYCON | 35-MS7-10-M |

## AE1 Fractional-N control (contd.)

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| C50 to C54 | 26386/875 | CAPACITOR CERAMIC 10nF+/-10% 50V 0805 | AVX | 0805-5C-103-KAT-1A o |
| C55 | 26421/112 | CAPACITOR ALUM 10uF+/-20% 35V RADIAL | RUBYCON | 35-MS7-10-M |
| C56 | 26386/863 | CAPACITOR CERAMIC 1nF+/-10% 50V 0805 | AVX | 0805-5C-102-KAT-1A o |
| C57 | 26421/153 | CAPACITOR ALUM 470uF+/-20% 6.3V RADIAL | PHILIPS | 2222-116-23471 |
| C58 to C60 | 26386/875 | CAPACITOR CERAMIC 10nF+/-10% 50V 0805 | AVX | 0805-5C-103-KAT-1A o |
| C61 | 26386/863 | CAPACITOR CERAMIC 1nF+/-10% 50V 0805 | AVX | 0805-5C-102-KAT-1A o |
| C62 to C65 | 26386/899 | CAPACITOR CERAMIC 100nF+/-10% 50V 1206 | AVX | 1206-5C-104-KAT-1A o |
| C66 to C69 | 26451/006 | CAPACITOR ALUM 22uF+/-20% 16V 5.3mmSQ | RUBYCON | 16-REV-22 |
| D1 to D2 | 28371/412 | DIODE BZX84-C5V1.. ZENER5.1V MKD-Z2 SOT-23 | PHILIPS | BZX84-C5V1 |
| D3 | 28383/910 | DIODE BAS28.. SMALL-SIGDUAL MKD-A61/JT SOT-143 | PHILIPS | BAS28 |
| D4 to D5 | 28349/032 | DIODE HSMS-2820.. SMALLSIG SCHTKY MK-C0L SOT-23 | HEWLETT-PACKARD | HSMS-2820-TR1 |
| D6 | 28383/910 | DIODE BAS28.. SMALL-SIGDUAL MKD-A61/JT SOT-143 | PHILIPS | BAS28 |
| D7 to D8 | 28349/032 | DIODE HSMS-2820.. SMALLSIG SCHTKY MK-C0L SOT-23 | HEWLETT-PACKARD | HSMS-2820-TR1 |
| IC1 | 28466/393 | IC-DIGITAL NAND-GATE74HC132.. QUAD SO-14 | HARRIS | D74HC132M |
| IC2 | 28462/431 | IC-DIGITAL LATCH74HCT373.. OCT SO-20 | PHILIPS | 74HCT373D |
| IC3 | 28465/053 | IC-DIGITAL DECDR/DEMPLEX74HCT138.. SO-16 | PHILIPS | 74HCT138D |
| IC4 | 28467/161 | IC-MICRO CONTROLLER80C652.. PLCC-44 | PHILIPS | P80C652FBA |
| IC5 | 44533/402 | IC-PROGRAM EPROM x1 2965, RF TRAY CONTROL. | | |
| IC6 | 28467/113 | IC-MICRO CONTROLLER8584.. SO-20 | PHILIPS | PCF8584T |
| IC7 | 28469/542 | IC-DIGITAL BFR/LINE-DRVR74ACT541.. OCT SO-20 | HARRIS | CD74ACT541M |
| IC8 | 28469/027 | IC-DIGITAL INVERTER74HCT14.. HEX SO-14 | PHILIPS | 74HCT14D |
| IC9 | 28467/118 | IC-MICRO STATIC-RAM62256.. 32Kx8 SO-28 | HITACHI | HM62256LFP-10T or AL |
| IC10 | 28469/621 | IC-DIGITAL ARRAY-LOGICAMI6562-040.. PLCC-68 | AMERICAN MICROSYSTEM | 28469/621-AMI-6562- |
| IC11 | 28469/568 | IC-DIGITAL DIVIDERSP8400.. SO-28 | MITEL | SP8400-KG-MPES |
| IC12 | 28469/057 | IC-DIGITAL INVERTER74HC04.. HEX SO-14 | HARRIS | CD74HC04M |
| IC13 | 28466/414 | IC-DIGITAL EXCLUSIVE-OR74HC86.. QUAD SO-14 | PHILIPS | 74HC86D |
| IC15 | 28461/413 | IC-ANALOG OP AMPTL074.. QUAD SO-14 | MOTOROLA | TL074CD |
| IC16 | 28462/136 | IC-DIGITAL FLIP-FLOP-D74HCT74.. DUAL SO-14 | PHILIPS | 74HCT74D |
| IC17 | 28469/621 | IC-DIGITAL ARRAY-LOGICAMI6562-040.. PLCC-68 | AMERICAN MICROSYSTEM | 28469/621-AMI-6562- |
| IC18 | 28469/568 | IC-DIGITAL DIVIDERSP8400.. SO-28 | MITEL | SP8400-KG-MPES |
| IC19 | 28469/057 | IC-DIGITAL INVERTER74HC04.. HEX SO-14 | HARRIS | CD74HC04M |
| IC20 | 28466/414 | IC-DIGITAL EXCLUSIVE-OR74HC86.. QUAD SO-14 | PHILIPS | 74HC86D |

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| **AE1 Fractional-N control (contd.)** | | | | |
| L1 | 44291/049 | WOUND INDUCTOR RING CORE 14 TURNS | AMETHYST DESIGNS LTD | AD5320 |
| R2 | 24811/173 | RESISTOR 1K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-1K0-1%-50ppm |
| R3 | 24811/221 | RESISTOR 100K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-100K-1%-50ppm |
| to R4 | | | | |
| R5 | 24811/173 | RESISTOR 1K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-1K0-1%-50ppm |
| R6 | 24811/221 | RESISTOR 100K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-100K-1%-50ppm |
| to R7 | | | | |
| R8 | 24811/173 | RESISTOR 1K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-1K0-1%-50ppm |
| to R9 | | | | |
| R10 | 24811/149 | RESISTOR 100R 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-100R-1%-50ppm |
| to R17 | | | | |
| R18 | 24811/142 | RESISTOR 51R1 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-51R1-1%-50ppm |
| R19 | 24811/173 | RESISTOR 1K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-1K0-1%-50ppm |
| to R30 | | | | |
| R31 | 24811/161 | RESISTOR 332R 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-332R-1%-50ppm |
| R32 | 24811/197 | RESISTOR 10K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-10K-1%-50ppm |
| to R33 | | | | |
| R34 | 24811/174 | RESISTOR 1K1 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-1K1-1%-50ppm |
| to R35 | | | | |
| R36 | 24811/173 | RESISTOR 1K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-1K0-1%-50ppm |
| to R37 | | | | |
| R38 | 24811/180 | RESISTOR 2K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-2K0-1%-50ppm |
| R39 | 24811/182 | RESISTOR 2K43 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-2K43-1%-50ppm |
| R40 | 24811/221 | RESISTOR 100K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-100K-1%-50ppm |
| R41 | 24811/192 | RESISTOR 6K19 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-6K19-1%-50ppm |
| to R42 | | | | |
| R43 | 24811/173 | RESISTOR 1K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-1K0-1%-50ppm |
| to R46 | | | | |
| R47 | 24811/142 | RESISTOR 51R1 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-51R1-1%-50ppm |
| R48 | 24811/173 | RESISTOR 1K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-1K0-1%-50ppm |
| to R59 | | | | |
| R60 | 24811/161 | RESISTOR 332R 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-332R-1%-50ppm |
| R61 | 24811/125 | RESISTOR 10R 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-10R-1%-50ppm |
| to R62 | | | | |
| R63 | 24811/180 | RESISTOR 2K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-2K0-1%-50ppm |
| to R64 | | | | |
| R66 | 24811/161 | RESISTOR 332R 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-332R-1%-50ppm |
| R67 | 24811/142 | RESISTOR 51R1 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-51R1-1%-50ppm |
| R68 | 24811/161 | RESISTOR 332R 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-332R-1%-50ppm |
| R69 | 24811/142 | RESISTOR 51R1 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-51R1-1%-50ppm |
| R70 | 24811/153 | RESISTOR 150R 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-150R-1%-50ppm |
| R71 | 24811/161 | RESISTOR 332R 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-332R-1%-50ppm |
| R72 | 24811/149 | RESISTOR 100R 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-100R-1%-50ppm |
| to R76 | | | | |

## AE1 Fractional-N control (contd.)

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| R78 | 24811/161 | RESISTOR 332R 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-332R-1%-50ppm |
| R79 | 24811/142 | RESISTOR 51R1 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-51R1-1%-50ppm |
| R80 | 24811/161 | RESISTOR 332R 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-332R-1%-50ppm |
| R81 | 24811/142 | RESISTOR 51R1 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-51R1-1%-50ppm |
| R82 | 24811/153 | RESISTOR 150R 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-150R-1%-50ppm |
| R83 | 24811/161 | RESISTOR 332R 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-332R-1%-50ppm |
| R84 to R88 | 24811/149 | RESISTOR 100R 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-100R-1%-50ppm |
| R89 | 24811/211 | RESISTOR 39K2 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-39K2-1%-50ppm |
| R90 | 24811/221 | RESISTOR 100K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-100K-1%-50ppm |
| R91 | 24811/173 | RESISTOR 1K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-1K0-1%-50ppm |
| R92 to R93 | 24811/153 | RESISTOR 150R 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-150R-1%-50ppm |
| R94 to R95 | 24772/001 | RESISTOR 1R 2% 125mW150V 100ppm AXIAL | BEYSCHLAG | MBA0204-00-BX-1R-2% |
| TP1 to TP2 | 23435/188 | TERMINAL CONNECTOR-PIN0.64mmSQ 5.97mmHI | FCI | 75401-001 |
| TR1 to TR2 | 28487/809 | TRANSISTOR NPN BFR93A..12V 5GHz MKD-R2 SOT-23 | PHILIPS | BFR93A |
| TR3 | 28487/810 | TRANSISTOR NPN BSV52..12V 400MHz MKD-B2 SOT-23 | PHILIPS | BSV52 |
| TR4 to TR5 | 28487/809 | TRANSISTOR NPN BFR93A..12V 5GHz MKD-R2 SOT-23 | PHILIPS | BFR93A |
| TR6 | 28457/854 | TRANSISTOR PNP BFT93..12V 5GHz MKD-X1 SOT-23 | PHILIPS | BFT93 |
| TR7 to TR8 | 28457/852 | TRANSISTOR PNP BSR15..40V MKD-CH/T7p SOT-23 | PHILIPS | BSR15 or BSR16 |
| TR9 | 28457/854 | TRANSISTOR PNP BFT93..12V 5GHz MKD-X1 SOT-23 | PHILIPS | BFT93 |

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|

## AE2 1st LO synthesizer

When ordering, prefix circuit reference with AE2.

| | | | | |
|---|---|---|---|---|
| | 44829-842 | Complete unit | Issue 22 | |
| C1 | 26386/893 | CAPACITOR CERAMIC 330nF+/-10% 50V 2220 | SYFER | 2220-J-050-0334K-X-T |
| to C2 | | | | |
| C3 | 26582/432 | CAPACITOR POLYESTR 1uF+/-10% 50V RADIAL | AVX | F074-D-0105-KDC |
| C4 | 26421/106 | CAPACITOR ALUM 1uF+/-20% 50V RADIAL | RUBYCON | 50-MS7-1-M |
| C5 | 26386/887 | CAPACITOR CERAMIC 100nF+/-10% 50V 1210 | AVX | 1210-5C-104-KAT-1A o |
| C6 | 26421/106 | CAPACITOR ALUM 1uF+/-20% 50V RADIAL | RUBYCON | 50-MS7-1-M |
| C7 | 26386/887 | CAPACITOR CERAMIC 100nF+/-10% 50V 1210 | AVX | 1210-5C-104-KAT-1A o |
| C8 | 26451/006 | CAPACITOR ALUM 22uF+/-20% 16V 5.3mmSQ | RUBYCON | 16-REV-22 |
| to C9 | | | | |
| C10 | 26582/432 | CAPACITOR POLYESTR 1uF+/-10% 50V RADIAL | AVX | F074-D-0105-KDC |
| C11 | 26421/106 | CAPACITOR ALUM 1uF+/-20% 50V RADIAL | RUBYCON | 50-MS7-1-M |
| C12 | 26386/887 | CAPACITOR CERAMIC 100nF+/-10% 50V 1210 | AVX | 1210-5C-104-KAT-1A o |
| C13 | 26421/106 | CAPACITOR ALUM 1uF+/-20% 50V RADIAL | RUBYCON | 50-MS7-1-M |
| C14 | 26386/887 | CAPACITOR CERAMIC 100nF+/-10% 50V 1210 | AVX | 1210-5C-104-KAT-1A o |
| C15 | 26386/893 | CAPACITOR CERAMIC 330nF+/-10% 50V 2220 | SYFER | 2220-J-050-0334K-X-T |
| to C18 | | | | |
| C19 | 26386/887 | CAPACITOR CERAMIC 100nF+/-10% 50V 1210 | AVX | 1210-5C-104-KAT-1A o |
| to C21 | | | | |
| C22 | 26386/820 | CAPACITOR CERAMIC 47pF+/-5% 50V 0805 | AVX | 0805-5A-470-JAT-1A o |
| to C23 | | | | |
| C24 | 26421/116 | CAPACITOR ALUM 47uF+/-20% 16V RADIAL | RUBYCON | 16-MS7-47-M |
| C25 | 26386/887 | CAPACITOR CERAMIC 100nF+/-10% 50V 1210 | AVX | 1210-5C-104-KAT-1A o |
| C26 | 26421/116 | CAPACITOR ALUM 47uF+/-20% 16V RADIAL | RUBYCON | 16-MS7-47-M |
| C27 | 26386/887 | CAPACITOR CERAMIC 100nF+/-10% 50V 1210 | AVX | 1210-5C-104-KAT-1A o |
| to C28 | | | | |
| C29 | 26386/885 | CAPACITOR CERAMIC 68nF+/-10% 50V 1210 | AVX | 1210-5C-683-KAT-1A o |
| C30 | 26386/871 | CAPACITOR CERAMIC 4.7nF+/-10% 50V 0805 | AVX | 0805-5C-472-KAT-1A o |
| C31 | 26386/885 | CAPACITOR CERAMIC 68nF+/-10% 50V 1210 | AVX | 1210-5C-683-KAT-1A o |
| C32 | 26386/871 | CAPACITOR CERAMIC 4.7nF+/-10% 50V 0805 | AVX | 0805-5C-472-KAT-1A o |
| C33 | 26421/106 | CAPACITOR ALUM 1uF+/-20% 50V RADIAL | RUBYCON | 50-MS7-1-M |
| C34 | 26386/887 | CAPACITOR CERAMIC 100nF+/-10% 50V 1210 | AVX | 1210-5C-104-KAT-1A o |
| C35 | 26421/106 | CAPACITOR ALUM 1uF+/-20% 50V RADIAL | RUBYCON | 50-MS7-1-M |
| C36 | 26386/887 | CAPACITOR CERAMIC 100nF+/-10% 50V 1210 | AVX | 1210-5C-104-KAT-1A o |
| C37 | 26386/778 | CAPACITOR CERAMIC 22nF+/-10% 50V 1210 | PHILIPS | 1210-2R-223-K9-BBC |
| C38 | 26386/875 | CAPACITOR CERAMIC 10nF+/-10% 50V 0805 | AVX | 0805-5C-103-KAT-1A o |
| C39 | 26421/106 | CAPACITOR ALUM 1uF+/-20% 50V RADIAL | RUBYCON | 50-MS7-1-M |
| C40 | 26386/887 | CAPACITOR CERAMIC 100nF+/-10% 50V 1210 | AVX | 1210-5C-104-KAT-1A o |
| C41 | 26421/106 | CAPACITOR ALUM 1uF+/-20% 50V RADIAL | RUBYCON | 50-MS7-1-M |
| C42 | 26386/887 | CAPACITOR CERAMIC 100nF+/-10% 50V 1210 | AVX | 1210-5C-104-KAT-1A o |
| to C43 | | | | |
| C44 | 26386/828 | CAPACITOR CERAMIC 220pF+/-5% 50V 0805 | AVX | 0805-5A-221-JAT-1A o |
| C45 | 26421/106 | CAPACITOR ALUM 1uF+/-20% 50V RADIAL | RUBYCON | 50-MS7-1-M |

## AE2 1st LO synthesizer (contd.)

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| C46 | 26386/887 | CAPACITOR CERAMIC 100nF+/-10% 50V 1210 | AVX | 1210-5C-104-KAT-1A o |
| C49 | 26386/887 | CAPACITOR CERAMIC 100nF+/-10% 50V 1210 | AVX | 1210-5C-104-KAT-1A o |
| C50 | 26421/116 | CAPACITOR ALUM 47uF+/-20% 16V RADIAL | RUBYCON | 16-MS7-47-M |
| C51 | 26386/875 | CAPACITOR CERAMIC 10nF+/-10% 50V 0805 | AVX | 0805-5C-103-KAT-1A o |
| C52 | 26386/955 | CAPACITOR CERAMIC 10pF+/-2% 100V 0805 | AVX | 0805-1K-100-GAW-TR |
| C53 | 26386/897 | CAPACITOR CERAMIC 4.7pF+/-0.1pF 50V 0805 | AVX | 0805-5K-4R7-BAW-TR |
| C54 | 26386/875 | CAPACITOR CERAMIC 10nF+/-10% 50V 0805 | AVX | 0805-5C-103-KAT-1A o |
| to C58 | | | | |
| C59 | 26386/863 | CAPACITOR CERAMIC 1nF+/-10% 50V 0805 | AVX | 0805-5C-102-KAT-1A o |
| C60 | 26386/887 | CAPACITOR CERAMIC 100nF+/-10% 50V 1210 | AVX | 1210-5C-104-KAT-1A o |
| C61 | 26386/863 | CAPACITOR CERAMIC 1nF+/-10% 50V 0805 | AVX | 0805-5C-102-KAT-1A o |
| C62 | 26386/887 | CAPACITOR CERAMIC 100nF+/-10% 50V 1210 | AVX | 1210-5C-104-KAT-1A o |
| C63 | 26386/875 | CAPACITOR CERAMIC 10nF+/-10% 50V 0805 | AVX | 0805-5C-103-KAT-1A o |
| to C65 | | | | |
| C66 | 26386/887 | CAPACITOR CERAMIC 100nF+/-10% 50V 1210 | AVX | 1210-5C-104-KAT-1A o |
| C67 | 26386/875 | CAPACITOR CERAMIC 10nF+/-10% 50V 0805 | AVX | 0805-5C-103-KAT-1A o |
| C68 | 26386/820 | CAPACITOR CERAMIC 47pF+/-5% 50V 0805 | AVX | 0805-5A-470-JAT-1A o |
| to C69 | | | | |
| C70 | 26421/116 | CAPACITOR ALUM 47uF+/-20% 16V RADIAL | RUBYCON | 16-MS7-47-M |
| | | | | |
| D1 | 28383/930 | DIODE BAS16.. SMALL-SIG75V MKD-A6 SOT-23 | PHILIPS | BAS16 |
| D2 | 28371/303 | DIODE BZX84-C6V2.. ZENER6.2V MKD-Z4 SOT-23 | PHILIPS | BZX84-C6V2 |
| D3 | 28383/930 | DIODE BAS16.. SMALL-SIG75V MKD-A6 SOT-23 | PHILIPS | BAS16 |
| to D5 | | | | |
| D6 | 28371/303 | DIODE BZX84-C6V2.. ZENER6.2V MKD-Z4 SOT-23 | PHILIPS | BZX84-C6V2 |
| D7 | 28383/930 | DIODE BAS16.. SMALL-SIG75V MKD-A6 SOT-23 | PHILIPS | BAS16 |
| to D10 | | | | |
| D11 | 28372/301 | DIODE BZX84-C13.. ZENER13V MKD-Y3 SOT-23 | PHILIPS | BZX84-C13 |
| D12 | 28381/530 | DIODE BB215.. VARI-CAP2.2pF@28V MK-GREEN SOD80 | | |
| to D13 | | | | |
| | | | | |
| IC1 | 28461/897 | IC-ANALOG OP AMPOP-27GS.. SO-8 | ANALOG | OP-27GS |
| to IC2 | | | | |
| IC3 | 28462/638 | IC-DIGITAL FLIP-FLOP-D74HC74.. DUAL SO-14 | PHILIPS | 74HC74D |
| to IC4 | | | | |
| IC5 | 28466/385 | IC-DIGITAL NAND-GATE74HCT00.. QUAD SO-14 | PHILIPS | 74HCT00D |
| IC6 | 28461/897 | IC-ANALOG OP AMPOP-27GS.. SO-8 | ANALOG | OP-27GS |
| to IC7 | | | | |
| IC8 | 28461/388 | IC-ANALOG OP AMPLM324D.. QUAD SO-14 | MOTOROLA | LM324D |
| IC9 | 28461/447 | IC-ANALOG MICROWAVE-AMPMSA-0886.. 4-PIN AV-86 | MINI-CIRCUITS | MAR-8-SM |
| IC10 | 28461/454 | IC-ANALOG MICROWAVE-AMPMSA-0786.. 4-PIN AV-86 | MINI-CIRCUITS | MAR-7-SM |
| IC11 | 28469/522 | IC-DIGITAL DIVIDERSP4902.. DIL-8 | | |
| IC12 | 28461/535 | IC-ANALOG MICROWAVE-AMPERA-4SM.. 4-PIN WW107 | MINI-CIRCUITS | ERA-4SM |
| IC13 | 28461/774 | IC-ANALOG VOLTAGE-REG78L05AC.. SO-8 | NATIONAL SEMI | LM78L05ACM |

## AE2 1st LO synthesizer (contd.)

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| L1 | 23642/512 | INDUCTOR 22uH 5%MOULDED 3.2x2.5mm | MEGGITT | 3612-T-220-J |
| L2 | 23642/733 | INDUCTOR 6.8uH 5%MOULDED 3.2x2.5mm | MEGGITT | 3612-T-6R8-J |
| L3 | 23642/706 | INDUCTOR 15uH 5%MOULDED 3.2x2.5mm | MEGGITT | 3612-T-150-J |
| L4 | 23642/512 | INDUCTOR 22uH 5%MOULDED 3.2x2.5mm | MEGGITT | 3612-T-220-J |
| L7 | 23642/518 | INDUCTOR 0.56uH 20%MOULDED 3.2x2.5mm | MEGGITT | 3612-T-R56-M |
| to L10 | | | | |
| L11 | 23642/524 | INDUCTOR 1mH 10%MOULDED 3.2x4.5mm | MEGGITT | 3613-T-102-K |
| L12 | 23642/518 | INDUCTOR 0.56uH 20%MOULDED 3.2x2.5mm | MEGGITT | 3612-T-R56-M |
| L13 | 23642/525 | INDUCTOR 680uH 10%MOULDED 3.2x4.5mm | MEGGITT | 3613-T-681-K |
| R1 | 24811/125 | RESISTOR 10R 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-10R-1%-50ppm |
| R2 | 24811/217 | RESISTOR 68K1 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-68K1-1%-50ppm |
| R3 | 24811/227 | RESISTOR 182K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-182K-1%-50ppm |
| R4 | 24811/245 | RESISTOR 1M 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-1M0-1%-50ppm |
| R5 | 24811/189 | RESISTOR 4K75 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-4K75-1%-50ppm |
| R6 | 24338/010 | RESISTOR 470R 5% 1W100V 350ppm 2512 | VTM | 509-0-470R-5%-V5 |
| R7 | 24681/085 | RESISTOR 68R 5% 1W100V 350ppm 2512 | VTM | 509-0-68R-5%-V5 |
| R8 | 24811/141 | RESISTOR 47R5 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-47R5-1%-50ppm |
| to R9 | | | | |
| R10 | 24811/117 | RESISTOR 4R75 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-4R7-1%-50ppm |
| R11 | 24811/219 | RESISTOR 82K5 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-82K5-1%-50ppm |
| R12 | 24811/207 | RESISTOR 27K4 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-27K4-1%-50ppm |
| R13 | 24811/245 | RESISTOR 1M 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-1M0-1%-50ppm |
| R14 | 24811/171 | RESISTOR 825R 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-825R-1%-50ppm |
| R15 | 24811/153 | RESISTOR 150R 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-150R-1%-50ppm |
| R16 | 24811/141 | RESISTOR 47R5 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-47R5-1%-50ppm |
| to R17 | | | | |
| R18 | 24811/173 | RESISTOR 1K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-1K0-1%-50ppm |
| to R19 | | | | |
| R20 | 24811/189 | RESISTOR 4K75 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-4K75-1%-50ppm |
| to R21 | | | | |
| R22 | 24811/144 | RESISTOR 61R9 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-61R9-1%-50ppm |
| R23 | 24811/157 | RESISTOR 221R 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-221R-1%-50ppm |
| R24 | 24811/144 | RESISTOR 61R9 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-61R9-1%-50ppm |
| R25 | 24811/157 | RESISTOR 221R 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-221R-1%-50ppm |
| R26 | 24811/167 | RESISTOR 562R 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-562R-1%-50ppm |
| to R29 | | | | |
| R30 | 24811/158 | RESISTOR 243R 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-243R-1%-50ppm |
| to R31 | | | | |
| R32 | 24811/187 | RESISTOR 3K92 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-3K92-1%-50ppm |
| R33 | 24811/197 | RESISTOR 10K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-10K-1%-50ppm |
| to R35 | | | | |
| R36 | 24811/172 | RESISTOR 909R 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-909R-1%-50ppm |
| R37 | 24811/101 | RESISTOR 1R 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-1R0-1%-50ppm |

## AE2 1st LO synthesizer (contd.)

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| R38 | 24811/170 | RESISTOR 750R 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-750R-1%-50ppm |
| R39 | 24811/181 | RESISTOR 2K21 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-2K21-1%-50ppm |
| R40 | 24811/178 | RESISTOR 1K62 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-1K62-1%-50ppm |
| R41 | 24811/184 | RESISTOR 3K01 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-3K01-1%-50ppm |
| R42 | 24811/917 | RESISTOR 332R 1% 250mW200V 50ppm L-I MINI-MELF | BEYSCHLAG | MMA0204-50HF-1%-332R |
| R43 | 24811/902 | RESISTOR 16R2 1% 250mW200V 50ppm L-I MINI-MELF | BEYSCHLAG | MMA0204-50HF-1%-16R2 |
| to R44 | | | | |
| R45 | 24811/151 | RESISTOR 121R 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-121R-1%-50ppm |
| R46 | 24811/908 | RESISTOR 43R2 1% 250mW200V 50ppm L-I MINI-MELF | BEYSCHLAG | MMA0204-50HF-1%-43R2 |
| R47 | 24811/906 | RESISTOR 36R5 1% 250mW200V 50ppm L-I MINI-MELF | BEYSCHLAG | MMA0204-50HF-1%-36R5 |
| R48 | 24811/135 | RESISTOR 27R4 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-27R4-1%-50ppm |
| R49 | 24811/140 | RESISTOR 43R2 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-43R2-1%-50ppm |
| R50 | 24811/909 | RESISTOR 51R1 1% 250mW200V 50ppm L-I MINI-MELF | BEYSCHLAG | MMA0204-50HF-1%-51R1 |
| R51 | 24811/129 | RESISTOR 15R 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-15R-1%-50ppm |
| R52 | 24811/113 | RESISTOR 3R32 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-3R32-1%-50ppm |
| R54 | 24811/187 | RESISTOR 3K92 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-3K92-1%-50ppm |
| R55 | 24811/149 | RESISTOR 100R 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-100R-1%-50ppm |
| R56 | 24811/144 | RESISTOR 61R9 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-61R9-1%-50ppm |
| R57 | 24811/149 | RESISTOR 100R 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-100R-1%-50ppm |
| R58 | 24772/074 | RESISTOR 1K1 2% 125mW150V 100ppm AXIAL | VTM | GP/490-0/1K1-F-T2 |
| | | | | |
| SKD | 23435/990 | CONNECTOR SHORTING SKT2-WAY 0.64mm FREE | FCI | 65474-001 |
| SKE | 23435/990 | CONNECTOR SHORTING SKT2-WAY 0.64mm FREE | FCI | 65474-001 |
| | | | | |
| TR1 | 28455/302 | TRANSISTOR NPN BCX54..45V 130MHz MKD-BA SOT-89 | PHILIPS | BCX54 |
| TR2 | 28453/829 | TRANSISTOR NPN BC848B..30V 200MHz MKD-1K SOT-23 | PHILIPS | BC848B |
| TR3 | 28452/771 | TRANSISTOR NPN BC209C..20V 150MHz TO-92 | GENERAL SEMI | BC549C |
| TR4 | 28457/850 | TRANSISTOR NPN FMMT2369.40V 600MHz MKD-*1J SOT23 | MOTOROLA | MMBT2369LT1 |
| to TR5 | | | | |
| TR6 | 28487/824 | TRANSISTOR NPN BFQ67..10V 7.5GHz MKD-V2 SOT-23 | PHILIPS | BFQ67 |
| TR7 | 28452/771 | TRANSISTOR NPN BC209C..20V 150MHz TO-92 | GENERAL SEMI | BC549C |

## AE3/2 1st mixer

When ordering, prefix circuit reference with AE3/2.

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| | 44830-089 | Complete unit | Issue 03 | |
| C1 to C5 | 26841/502 | CAPACITOR-VARIABLE SAPPHIRE 0.6pF to 4.5pF 500V 350 ppm/DEG.C, +/-100ppm/DEG.C, HORIZONTAL-PC | MURATA ELECTRONICS | TTG12A4R5A |
| C6 | 26386/804 | CAPACITOR-FIXED CERAMIC 2.2pF +/-0.5pF 50V NPO MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-2R2-DP |
| C7 | 26386/804 | CAPACITOR-FIXED CERAMIC 2.2pF +/-0.5pF 50V NPO MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-2R2-DP |
| C8 to C10 | 26386/993 | CAPACITOR-FIXED CERAMIC 1uF -20/+80% 25V Y5V/Z5U, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | VISHAY COMPONENTS | VJ1210-U-105Z-XXT |
| C11 | 26451/009 | CAPACITOR-FIXED ALUMINIUM 47uF +/-20% 16V ELECTROLYTIC, SURFACE-MOUNTED, SIZE 6.6 x 6.6mm, | PANASONIC INDUSTRIAL | ECE-V-1CA-470P |
| C12 | 26451/009 | CAPACITOR-FIXED ALUMINIUM 47uF +/-20% 16V ELECTROLYTIC, SURFACE-MOUNTED, SIZE 6.6 x 6.6mm, | PANASONIC INDUSTRIAL | ECE-V-1CA-470P |
| C13 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C14 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C16 to C23 | 26386/804 | CAPACITOR-FIXED CERAMIC 2.2pF +/-0.5pF 50V NPO MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-2R2-DP |
| D1 | 28383/930 | DIODE SMALL-SIGNAL, BAS16... 330mW 75V 250mA 2pF 1Vf @ 50mA, MARKING CODE A6, SURFACE MOUNTED, | PHILIPS | BAS16 |
| D2 | 28383/941 | DIODE BAND SWITCHING, BA682... 35V 100mA 1.2pF MAX @ 3V, SURFACE MOUNTED, SOD-80, (8mm TAPE - | PHILIPS | BA682 |
| D3 | 28383/941 | DIODE BAND SWITCHING, BA682... 35V 100mA 1.2pF MAX @ 3V, SURFACE MOUNTED, SOD-80, (8mm TAPE - | PHILIPS | BA682 |
| IC1 | 28461/448 | IC-ANALOGUE MICROWAVE-AMP MSA-0386... 5V 35mA GAIN 12dB @ 1GHz, 3dB BANDWIDTH DC-2.4GHz, BIPOLAR, 4 | HEWLETT-PACKARD | MSA-0386-TR1 |
| IC2 | 28461/450 | IC-ANALOGUE MICROWAVE-AMP MSA-0486... 5.25V 50mA GAIN 8dB @ 1GHz, 3dB BANDWIDTH DC-3.2GHz, BIPOLAR, | HEWLETT-PACKARD | MSA-0486-TR1 |
| IC3 | 28531/001 | RF-MIXER DOUBLE-BALANCED, DIODE RING, M4G... 800-3500MHz, 50R 1 dBm RF-1dB COMPRESS, 8 dB LOSS, | M/A COM LTD | DR1/0487/23 |
| L8 | 23642/518 | INDUCTOR-FIXED 0.56uH +/- 20% EPOXY-MOULD, 450mA 0R55 MAX, 30 Q @ 25.2 MHz, 180 MHz SRF, SURFACE | MEGGITT ELECTRONICS | 3612-T-R56-M |
| L9 | 23642/518 | INDUCTOR-FIXED 0.56uH +/- 20% EPOXY-MOULD, 450mA 0R55 MAX, 30 Q @ 25.2 MHz, 180 MHz SRF, SURFACE | MEGGITT ELECTRONICS | 3612-T-R56-M |
| L10 | 23642/533 | INDUCTOR-FIXED 10uH +/- 5% EPOXY-MOULD, 150mA 2R1 MAX, 30 Q @ 2.52 MHz, 36 MHz SRF, SURFACE MOUNTED, | MEGGITT ELECTRONICS | 3612-T-100-J |
| R1 | 24773/249 | RESISTOR-FIXED METAL-FILM 100R +/- 2% 250mW 250V 100 ppm/DEG.C, 1%-100R-ACCEPTABLE, AXIAL, (TAPED). | VISHAY COMPONENTS | EE.10-100R-G-T-1 |

## AE3/2 1st mixer board (contd.)

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| R2 | 24773/249 | RESISTOR-FIXED METAL-FILM 100R +/- 2% 250mW 250V 100 ppm/DEG.C, 1%-100R-ACCEPTABLE, AXIAL, (TAPED). | VISHAY COMPONENTS | EE.10-100R-G-T-1 |
| R3 | 24811/181 | RESISTOR-FIXED METAL-FILM 2K21 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-2K21-1%50ppm |
| R4 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R5 to R8 | 24811/916 | RESISTOR-FIXED METAL-FILM 301R +/- 1% 250mW 200V 50 ppm/DEG.C, LOW-INDUCTANCE, SURFACE MOUNTED, | VISHAY COMPONENTS | SMM0204-HF-301R-1% |
| R9 | 24811/903 | RESISTOR-FIXED METAL-FILM 18R2 +/- 1% 250mW 200V 50 ppm/DEG.C, LOW-INDUCTANCE, SURFACE MOUNTED, | VISHAY COMPONENTS | SMM0204-HF-18R2-1% |
| R10 | 24811/903 | RESISTOR-FIXED METAL-FILM 18R2 +/- 1% 250mW 200V 50 ppm/DEG.C, LOW-INDUCTANCE, SURFACE MOUNTED, | VISHAY COMPONENTS | SMM0204-HF-18R2-1% |
| R11 | 24811/147 | RESISTOR-FIXED METAL-FILM 82R5 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-82R5-1%50ppm |
| R12 | 24811/149 | RESISTOR-FIXED METAL-FILM 100R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100R-1%50ppm |
| R13 | 24764/707 | RESISTOR-FIXED METAL-FILM 220R +/- 2% 400mW 200V 50 ppm/DEG.C, LOW-INDUCTANCE, AXIAL, (LOOSE OR | VISHAY COMPONENTS | SMA0204HF-50-220R-2% |
| RLA | 23486/101 | RELAY MAGNETIC, DOUBLE-POLE CHANGEOVER, 5V COIL, 62R - CONTACTS 1A @ 28VDC, 9.5mmSQ, 9.6mm HIGH, | TELEDYNE LTD | 172-5 |
| RLB | 23486/101 | RELAY MAGNETIC, DOUBLE-POLE CHANGEOVER, 5V COIL, 62R - CONTACTS 1A @ 28VDC, 9.5mmSQ, 9.6mm HIGH, | TELEDYNE LTD | 172-5 |
| TR1 | 28435/241 | TRANSISTOR PNP BIPOLAR BCX17... 45V 100MHz 425mW 500mA 100hFE MIN @ 100mA, MARKING CODE T1, SURFACE | PHILIPS | BCX17 |

## AE4 1st and 2nd IF, 2nd and 3rd mixers

When ordering, prefix circuit reference with AE4.

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| | 44829-844 | Complete unit | Issue 09 | |
| C5 | 26386/869 | CAPACITOR-FIXED CERAMIC 3.3nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-332-KP |
| C6 | 26878/402 | CAPACITOR-VARIABLE PTFE 2pF to 15pF 200 ppm/DEG.C, VERTICAL-PCB MOUNT, 5mm DIA, 5mm PWP, 2 PIN, CODED | DAU COMPONENTS LTD | 105-3901-015 |
| C7 | 26878/402 | CAPACITOR-VARIABLE PTFE 2pF to 15pF 200 ppm/DEG.C, VERTICAL-PCB MOUNT, 5mm DIA, 5mm PWP, 2 PIN, CODED | DAU COMPONENTS LTD | 105-3901-015 |
| C8 | 26386/824 | CAPACITOR-FIXED CERAMIC 100pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-101-JP |
| C9 | 26386/808 | CAPACITOR-FIXED CERAMIC 4.7pF +/-0.5pF 50V NPO MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-4R7-DP |
| C10 | 26386/827 | CAPACITOR-FIXED CERAMIC 180pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-181-JP |
| C11 | 26386/808 | CAPACITOR-FIXED CERAMIC 4.7pF +/-0.5pF 50V NPO MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-4R7-DP |
| C12 to C14 | 26878/402 | CAPACITOR-VARIABLE PTFE 2pF to 15pF 200 ppm/DEG.C, VERTICAL-PCB MOUNT, 5mm DIA, 5mm PWP, 2 PIN, CODED | DAU COMPONENTS LTD | 105-3901-015 |
| C15 | 26343/784 | CAPACITOR-FIXED CERAMIC 68pF +/-5% 50V NPO MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-680-JP |
| C16 to C18 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C19 | 26386/887 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-104-KP |
| C20 | 26386/887 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-104-KP |
| C21 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C22 to C26 | 26386/887 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-104-KP |
| C27 to C29 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C30 | 26421/116 | CAPACITOR-FIXED ALUMINIUM 47uF +/-20% 16V ELECTROLYTIC, RADIAL, 5mm PWP, (LOOSE OR TAPED). | PANASONIC INDUSTRIAL | ECE-A-1C-KA-470-B |
| C31 | 26421/116 | CAPACITOR-FIXED ALUMINIUM 47uF +/-20% 16V ELECTROLYTIC, RADIAL, 5mm PWP, (LOOSE OR TAPED). | PANASONIC INDUSTRIAL | ECE-A-1C-KA-470-B |
| C32 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C33 | 26386/818 | CAPACITOR-FIXED CERAMIC 33pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-330-JP |
| C34 | 26386/820 | CAPACITOR-FIXED CERAMIC 47pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-470-JP |
| D1 | 28371/735 | DIODE ZENER, BZX84-C8V2... 350mW 8.2V 5% 250mA MARKING CODE Z7, SURFACE MOUNTED, SOT-23, (8mm | PHILIPS | BZX84-C8V2 |

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| **AE4 1st and 2nd IF, 2nd and 3rd mixers (contd.)** | | | | |
| FL1 | 23642/953 | FILTER BANDPASS, PCB-MOUNT, CERAMIC, 1355MHz 300MHz BANDWIDTH @ 3dB, 50 OHM, 4 POLE. | RACAL-MESL LTD | LQ2425 |
| IC1 | 28461/447 | IC-ANALOGUE MICROWAVE-AMP MSA-0886... 7.8V 36mA GAIN 22.5dB @1GHz, 25dB BNDWIDTH DC-5GHz, BIPOLAR, | HEWLETT-PACKARD | MSA-0886-TR1 |
| IC2 | 28531/007 | RF-MIXER DOUBLE-BALANCED, DIODE RING, SRA220... 0.05-2000MHz, 50R 4 dBm RF-1dB COMPRESS, 6 dB | MINI-CIRCUITS | SRA-220 |
| IC3 | 28531/021 | RF-MIXER DOUBLE-BALANCED, SL6440C... 150MHz MAX, 15 dBm RF-1dB COMPRESS, +30dBm INTERCEPT, | | |
| L5 | 23642/518 | INDUCTOR-FIXED 0.56uH +/- 20% EPOXY-MOULD, 450mA 0R55 MAX, 30 Q @ 25.2 MHz, 180 MHz SRF, SURFACE | MEGGITT ELECTRONICS | 3612-T-R56-M |
| L6 | 44291/045 | WOUND-PART INDUCTOR, 0.9uH, AIR-CORE, ON M4 x 0.5mm FORMER, 22.75 TURNS. | AMETHYST DESIGNS LTD | AD5317 |
| L7 | 44291/045 | WOUND-PART INDUCTOR, 0.9uH, AIR-CORE, ON M4 x 0.5mm FORMER, 22.75 TURNS. | AMETHYST DESIGNS LTD | AD5317 |
| L8 | 23642/539 | INDUCTOR-FIXED 0.03uH +/- 10% UNSCREENED, AIR-CORED, 2 PIN, 135 Q @ 100 MHz, 6.7mm x 4.3mm | TOKO (UK) LTD | E514GNE-150024S12 |
| L9 | 23642/540 | INDUCTOR-FIXED 0.05uH +/- 10% UNSCREENED, AIR-CORED, 2 PIN, 155 Q @ 100 MHz, 6.7mm x 4.3mm | TOKO (UK) LTD | E514GNE-150014S14 |
| L10 | 23642/540 | INDUCTOR-FIXED 0.05uH +/- 10% UNSCREENED, AIR-CORED, 2 PIN, 155 Q @ 100 MHz, 6.7mm x 4.3mm | TOKO (UK) LTD | E514GNE-150014S14 |
| L11 | 23642/533 | INDUCTOR-FIXED 10uH +/- 5% EPOXY-MOULD, 150mA 2R1 MAX, 30 Q @ 2.52 MHz, 36 MHz SRF, SURFACE MOUNTED, | MEGGITT ELECTRONICS | 3612-T-100-J |
| L12 | 23642/537 | INDUCTOR-FIXED 4.7uH +/- 5% EPOXY-MOULD, 220mA 1R5 MAX, 30 Q @ 7.96 MHz, 50 MHz SRF, SURFACE MOUNTED, | MEGGITT ELECTRONICS | 3612-T-4R7-J |
| PLD | 23435/990 | CONNECTOR SHORTING, SOCKET, 2 WAY, FOR 0.64mm SQ PINS, 2.54mm PITCH, 9.6mm HIGH, FREE MOUNTING, | BERG ELECTRONICS | 65474-001 |
| R1 | 24811/901 | RESISTOR-FIXED METAL-FILM 10R +/- 1% 250mW 200V 50 ppm/DEG.C, LOW-INDUCTANCE, SURFACE MOUNTED, SIZE | VISHAY COMPONENTS | SMM0204-HF-10R-1% |
| R2 | 24811/147 | RESISTOR-FIXED METAL-FILM 82R5 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-82R5-1%50ppm |
| R3 | 24811/181 | RESISTOR-FIXED METAL-FILM 2K21 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-2K21-1%50ppm |
| R4 | 24811/142 | RESISTOR-FIXED METAL-FILM 51R1 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-51R1-1%50ppm |
| R5 | 24811/183 | RESISTOR-FIXED METAL-FILM 2K74 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-2K74-1%50ppm |
| R6 | 24811/157 | RESISTOR-FIXED METAL-FILM 221R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-221R-1%50ppm |
| R7 | 24811/157 | RESISTOR-FIXED METAL-FILM 221R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-221R-1%50ppm |
| R8 | 24811/167 | RESISTOR-FIXED METAL-FILM 562R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-562R-1%50ppm |

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| **AE4 1st and 2nd IF, 2nd and 3rd mixers (contd.)** | | | | |
| R9 | 24811/137 | RESISTOR-FIXED METAL-FILM 33R2 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-33R2-1%50ppm |
| R10 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R11 | 24811/201 | RESISTOR-FIXED METAL-FILM 15K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-15K-1%50ppm |
| R12 | 24811/161 | RESISTOR-FIXED METAL-FILM 332R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-332R-1%50ppm |
| R13 | 24811/161 | RESISTOR-FIXED METAL-FILM 332R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-332R-1%50ppm |
| R14 | 24811/156 | RESISTOR-FIXED METAL-FILM 200R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-200R-1%50ppm |
| R15 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R16 | 24811/199 | RESISTOR-FIXED METAL-FILM 12K1 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-12K1-1%50ppm |
| R17 | 24811/169 | RESISTOR-FIXED METAL-FILM 681R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-681R-1%50ppm |
| R19 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R20 | 24811/199 | RESISTOR-FIXED METAL-FILM 12K1 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-12K1-1%50ppm |
| R21 | 24811/169 | RESISTOR-FIXED METAL-FILM 681R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-681R-1%50ppm |
| R22 | 24811/101 | RESISTOR-FIXED METAL-FILM 1R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1R-1%-50ppm |
| R23 | 24772/039 | RESISTOR-FIXED METAL-FILM 39R +/- 2% 125mW 150V 100 ppm/DEG.C, AXIAL, (TAPED). | VISHAY COMPONENTS | NK3-39R-2% |
| R24 | 24811/125 | RESISTOR-FIXED METAL-FILM 10R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10R-1%-50ppm |
| TR1 | 28457/851 | TRANSISTOR NPN BIPOLAR BFS17... 15V 1.3GHz 250mW 50mA 20hFE MIN @ 2mA, MARKING CODE E1, SURFACE | PHILIPS | BFS17 |
| TR2 | 28457/850 | TRANSISTOR NPN BIPOLAR FMMT2369... 40V 600MHz 300mW 500mA 40hFE MIN @ 10mA, MARKING CODE *1J, | PHILIPS | PMBT2369 |
| TR3 | 28457/850 | TRANSISTOR NPN BIPOLAR FMMT2369... 40V 600MHz 300mW 500mA 40hFE MIN @ 10mA, MARKING CODE *1J, | PHILIPS | PMBT2369 |

## AE4/2 1st and 2nd IF, 2nd and 3rd mixers

When ordering, prefix circuit reference with AE4/2.

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| | 44830-096 | Complete unit | Issue 05 | |
| C5 | 26386/869 | CAPACITOR-FIXED CERAMIC 3.3nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-332-KP |
| C6 | 26878/402 | CAPACITOR-VARIABLE PTFE 2pF to 15pF 200 ppm/DEG.C, VERTICAL-PCB MOUNT, 5mm DIA, 5mm PWP, 2 PIN, CODED | DAU COMPONENTS LTD | 105-3901-015 |
| C7 | 26878/402 | CAPACITOR-VARIABLE PTFE 2pF to 15pF 200 ppm/DEG.C, VERTICAL-PCB MOUNT, 5mm DIA, 5mm PWP, 2 PIN, CODED | DAU COMPONENTS LTD | 105-3901-015 |
| C8 | 26386/824 | CAPACITOR-FIXED CERAMIC 100pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-101-JP |
| C9 | 26386/808 | CAPACITOR-FIXED CERAMIC 4.7pF +/-0.5pF 50V NPO MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-4R7-DP |
| C10 | 26386/827 | CAPACITOR-FIXED CERAMIC 180pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-181-JP |
| C11 | 26386/808 | CAPACITOR-FIXED CERAMIC 4.7pF +/-0.5pF 50V NPO MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-4R7-DP |
| C12 to C14 | 26878/402 | CAPACITOR-VARIABLE PTFE 2pF to 15pF 200 ppm/DEG.C, VERTICAL-PCB MOUNT, 5mm DIA, 5mm PWP, 2 PIN, CODED | DAU COMPONENTS LTD | 105-3901-015 |
| C15 | 26343/784 | CAPACITOR-FIXED CERAMIC 68pF +/-5% 50V NPO MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-680-JP |
| C16 to C18 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C19 | 26386/899 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | ROHM ELECTRONICS LTD | MCH31-5C-104-KP |
| C20 | 26386/899 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | ROHM ELECTRONICS LTD | MCH31-5C-104-KP |
| C21 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C22 to C26 | 26386/899 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | ROHM ELECTRONICS LTD | MCH31-5C-104-KP |
| C27 to C29 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C30 | 26421/116 | CAPACITOR-FIXED ALUMINIUM 47uF +/-20% 16V ELECTROLYTIC, RADIAL, 5mm PWP, (LOOSE OR TAPED). | PANASONIC INDUSTRIAL | ECE-A-1C-KA-470-B |
| C31 | 26421/116 | CAPACITOR-FIXED ALUMINIUM 47uF +/-20% 16V ELECTROLYTIC, RADIAL, 5mm PWP, (LOOSE OR TAPED). | PANASONIC INDUSTRIAL | ECE-A-1C-KA-470-B |
| C32 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C33 | 26386/818 | CAPACITOR-FIXED CERAMIC 33pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-330-JP |
| C34 | 26386/820 | CAPACITOR-FIXED CERAMIC 47pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-470-JP |
| D1 | 28371/735 | DIODE ZENER, BZX84-C8V2... 250mW 8.2V 5% 250mA MARKING CODE Z7, SURFACE MOUNTED, SOT-23, (8mm | PHILIPS | BZX84-C8V2 |

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| **AE4/2 1st and 2nd IF, 2nd and 3rd mixers (contd.)** | | | | |
| FL1 | 23642/953 | FILTER BANDPASS, PCB-MOUNT, CERAMIC, 1355MHz 300MHz BANDWIDTH @ 3dB, 50 OHM, 4 POLE. | RACAL-MESL LTD | LQ2425 |
| IC1 | 28461/447 | IC-ANALOGUE MICROWAVE-AMP MSA-0886... 7.8V 36mA GAIN 22.5dB @1GHz, 25dB BNDWIDTH DC-5GHz, BIPOLAR, | HEWLETT-PACKARD | MSA-0886-TR1 |
| IC2 | 28531/007 | RF-MIXER DOUBLE-BALANCED, DIODE RING, SRA220... 0.05-2000MHz, 50R 4 dBm RF-1dB COMPRESS, 6 dB | MINI-CIRCUITS | SRA-220 |
| IC3 | 28531/021A | RF-MIXER DOUBLE-BALANCED, SL6440C... 150MHz MAX, 15 dBm RF-1dB COMPRESS, +30dBm INTERCEPT, | | |
| L5 | 23642/518 | INDUCTOR-FIXED 0.56uH +/- 20% EPOXY-MOULD, 450mA 0R55 MAX, 30 Q @ 25.2 MHz, 180 MHz SRF, SURFACE | MEGGITT ELECTRONICS | 3612-T-R56-M |
| L6 | 44291/045 | WOUND-PART INDUCTOR, 0.9uH, AIR-CORE, ON M4 x 0.5mm FORMER, 22.75 TURNS. | AMETHYST DESIGNS LTD | AD5317 |
| L7 | 44291/045 | WOUND-PART INDUCTOR, 0.9uH, AIR-CORE, ON M4 x 0.5mm FORMER, 22.75 TURNS. | AMETHYST DESIGNS LTD | AD5317 |
| L8 | 23642/539 | INDUCTOR-FIXED 0.03uH +/- 10% UNSCREENED, AIR-CORED, 2 PIN, 135 Q @ 100 MHz, 6.7mm x 4.3mm | TOKO (UK) LTD | E514GNE-150024S12 |
| L9 | 23642/540 | INDUCTOR-FIXED 0.05uH +/- 10% UNSCREENED, AIR-CORED, 2 PIN, 155 Q @ 100 MHz, 6.7mm x 4.3mm | TOKO (UK) LTD | E514GNE-150014S14 |
| L10 | 23642/540 | INDUCTOR-FIXED 0.05uH +/- 10% UNSCREENED, AIR-CORED, 2 PIN, 155 Q @ 100 MHz, 6.7mm x 4.3mm | TOKO (UK) LTD | E514GNE-150014S14 |
| L11 | 23642/533 | INDUCTOR-FIXED 10uH +/- 5% EPOXY-MOULD, 150mA 2R1 MAX, 30 Q @ 2.52 MHz, 36 MHz SRF, SURFACE MOUNTED, | MEGGITT ELECTRONICS | 3612-T-100-J |
| L12 | 23642/537 | INDUCTOR-FIXED 4.7uH +/- 5% EPOXY-MOULD, 220mA 1R5 MAX, 30 Q @ 7.96 MHz, 50 MHz SRF, SURFACE MOUNTED, | MEGGITT ELECTRONICS | 3612-T-4R7-J |
| R1 | 24811/901 | RESISTOR-FIXED METAL-FILM 10R +/- 1% 250mW 200V 50 ppm/DEG.C, LOW-INDUCTANCE, SURFACE MOUNTED, SIZE | VISHAY COMPONENTS | SMM0204-HF-10R-1% |
| R2 | 24811/147 | RESISTOR-FIXED METAL-FILM 82R5 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-82R5-1%50ppm |
| R3 | 24811/181 | RESISTOR-FIXED METAL-FILM 2K21 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-2K21-1%50ppm |
| R4 | 24811/142 | RESISTOR-FIXED METAL-FILM 51R1 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-51R1-1%50ppm |
| R5 | 24811/183 | RESISTOR-FIXED METAL-FILM 2K74 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-2K74-1%50ppm |
| R6 | 24811/157 | RESISTOR-FIXED METAL-FILM 221R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-221R-1%50ppm |
| R7 | 24811/157 | RESISTOR-FIXED METAL-FILM 221R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-221R-1%50ppm |
| R8 | 24811/167 | RESISTOR-FIXED METAL-FILM 562R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-562R-1%50ppm |
| R9 | 24811/137 | RESISTOR-FIXED METAL-FILM 33R2 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-33R2-1%50ppm |
| R10 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |

## AE4/2 1st and 2nd IF, 2nd and 3rd mixers (contd.)

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| R11 | 24811/201 | RESISTOR-FIXED METAL-FILM 15K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-15K-1%50ppm |
| R12 | 24811/161 | RESISTOR-FIXED METAL-FILM 332R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-332R-1%50ppm |
| R13 | 24811/161 | RESISTOR-FIXED METAL-FILM 332R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-332R-1%50ppm |
| R14 | 24811/156 | RESISTOR-FIXED METAL-FILM 200R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-200R-1%50ppm |
| R15 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R16 | 24811/199 | RESISTOR-FIXED METAL-FILM 12K1 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-12K1-1%50ppm |
| R17 | 24811/169 | RESISTOR-FIXED METAL-FILM 681R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-681R-1%50ppm |
| R19 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R20 | 24811/199 | RESISTOR-FIXED METAL-FILM 12K1 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-12K1-1%50ppm |
| R21 | 24811/169 | RESISTOR-FIXED METAL-FILM 681R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-681R-1%50ppm |
| R22 | 24811/101 | RESISTOR-FIXED METAL-FILM 1R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1R-1%-50ppm |
| R23 | 24772/039 | RESISTOR-FIXED METAL-FILM 39R +/- 2% 125mW 150V 100 ppm/DEG.C, AXIAL, (TAPED). | VISHAY COMPONENTS | NK3-39R-2% |
| R24 | 24811/125 | RESISTOR-FIXED METAL-FILM 10R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10R-1%-50ppm |
| TR1 | 28457/851 | TRANSISTOR NPN BIPOLAR BFS17... 15V 1.3GHz 250mW 50mA 20hFE MIN @ 2mA, MARKING CODE E1, SURFACE | PHILIPS | BFS17 |
| TR2 | 28457/850 | TRANSISTOR NPN BIPOLAR FMMT2369... 40V 600MHz 300mW 500mA 40hFE MIN @ 10mA, MARKING CODE *1J, | PHILIPS | PMBT2369 |
| TR3 | 28457/850 | TRANSISTOR NPN BIPOLAR FMMT2369... 40V 600MHz 300mW 500mA 40hFE MIN @ 10mA, MARKING CODE *1J, | PHILIPS | PMBT2369 |

## AE5 2nd and 3rd LO

When ordering, prefix circuit reference with AE5.

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| | 44829-845 | Complete unit | Issue 16 | |
| C1 to C3 | 26421/116 | CAPACITOR-FIXED ALUMINIUM 47uF +/-20% 16V ELECTROLYTIC, RADIAL, 5mm PWP, (LOOSE OR TAPED). | PANASONIC INDUSTRIAL | ECE-A-1C-KA-470-B |
| C4 | 26386/982 | CAPACITOR-FIXED CERAMIC 2.2uF -20/+80% 16V Y5V MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | TDK UK LTD | CC1206C-Y5V-225Z-T&R |
| C5 | 26386/982 | CAPACITOR-FIXED CERAMIC 2.2uF -20/+80% 16V Y5V MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | TDK UK LTD | CC1206C-Y5V-225Z-T&R |
| C6 | 26421/112 | CAPACITOR-FIXED ALUMINIUM 10uF +/-20% 35V ELECTROLYTIC, RADIAL, 5mm PWP, (TAPED). | PANASONIC INDUSTRIAL | ECE-A-1V-KA-100-B |
| C7 | 26582/427 | CAPACITOR-FIXED POLYESTER 470nF +/-10% 63V 330 ppm/DEG.C, RADIAL, 5mm PWP, (TAPED). | VISHAY COMPONENTS | MKT-1826-447/065 |
| C8 | 26386/863 | CAPACITOR-FIXED CERAMIC 1nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-102-KP |
| C9 | 26386/830 | CAPACITOR-FIXED CERAMIC 330pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-331-JP |
| C10 | 26386/971 | CAPACITOR-FIXED CERAMIC 2.2pF +/-0.1pF 50V 60 ppm/DEG.C, HIGH-Q, SINGLELAYER, SURFACE-MOUNTED, | AVX LTD | 0805-5K-2R2-BAW-TR |
| C11 | 26343/758 | CAPACITOR-FIXED CERAMIC 3.9pF +/-0.5pF 50V NPO MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-3R9-DP |
| C12 | 26386/830 | CAPACITOR-FIXED CERAMIC 330pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-331-JP |
| C13 | 26386/830 | CAPACITOR-FIXED CERAMIC 330pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-331-JP |
| C14 | 26386/824 | CAPACITOR-FIXED CERAMIC 100pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-101-JP |
| C15 | 26386/863 | CAPACITOR-FIXED CERAMIC 1nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-102-KP |
| C16 | 26386/824 | CAPACITOR-FIXED CERAMIC 100pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-101-JP |
| C17 | 26386/804 | CAPACITOR-FIXED CERAMIC 2.2pF +/-0.5pF 50V NPO MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-2R2-DP |
| C18 | 26343/755 | CAPACITOR-FIXED CERAMIC 1.5pF +/-0.5pF 50V NPO MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-1R5-DP |
| C19 | 26386/824 | CAPACITOR-FIXED CERAMIC 100pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-101-JP |
| C20 | 26386/824 | CAPACITOR-FIXED CERAMIC 100pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-101-JP |
| C21 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C23 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C24 to C26 | 26386/863 | CAPACITOR-FIXED CERAMIC 1nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-102-KP |
| C27 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |

## AE5 2nd and 3rd LO (contd.)

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| C28 | 26386/863 | CAPACITOR-FIXED CERAMIC 1nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-102-KP |
| C29 | 26386/863 | CAPACITOR-FIXED CERAMIC 1nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-102-KP |
| C31 | 26386/887 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-104-KP |
| C32 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C33 | 26421/116 | CAPACITOR-FIXED ALUMINIUM 47uF +/-20% 16V ELECTROLYTIC, RADIAL, 5mm PWP, (LOOSE OR TAPED). | PANASONIC INDUSTRIAL | ECE-A-1C-KA-470-B |
| C34 | 26421/112 | CAPACITOR-FIXED ALUMINIUM 10uF +/-20% 35V ELECTROLYTIC, RADIAL, 5mm PWP, (TAPED). | PANASONIC INDUSTRIAL | ECE-A-1V-KA-100-B |
| C35 | 26386/863 | CAPACITOR-FIXED CERAMIC 1nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-102-KP |
| C36 | 26386/863 | CAPACITOR-FIXED CERAMIC 1nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-102-KP |
| C37 | 26421/112 | CAPACITOR-FIXED ALUMINIUM 10uF +/-20% 35V ELECTROLYTIC, RADIAL, 5mm PWP, (TAPED). | PANASONIC INDUSTRIAL | ECE-A-1V-KA-100-B |
| C38 | 26386/863 | CAPACITOR-FIXED CERAMIC 1nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-102-KP |
| C39 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C40 | 26421/143 | CAPACITOR-FIXED ALUMINIUM 470uF +/-20% 6.3V ELECTROLYTIC, RADIAL, 5mm PWP, (TAPED). | PANASONIC INDUSTRIAL | ECE-A-0J-U-471-B |
| C41 | 26386/824 | CAPACITOR-FIXED CERAMIC 100pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-101-JP |
| C42 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C43 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C44 | 26582/432 | CAPACITOR-FIXED POLYESTER 1uF +/-10% 50V 330 ppm/DEG.C, RADIAL, 5mm PWP, (TAPED). | VISHAY COMPONENTS | MKT-1826-510/065 |
| C45 | 26582/432 | CAPACITOR-FIXED POLYESTER 1uF +/-10% 50V 330 ppm/DEG.C, RADIAL, 5mm PWP, (TAPED). | VISHAY COMPONENTS | MKT-1826-510/065 |
| C46 | 26421/112 | CAPACITOR-FIXED ALUMINIUM 10uF +/-20% 35V ELECTROLYTIC, RADIAL, 5mm PWP, (TAPED). | PANASONIC INDUSTRIAL | ECE-A-1V-KA-100-B |
| C48 | 26421/112 | CAPACITOR-FIXED ALUMINIUM 10uF +/-20% 35V ELECTROLYTIC, RADIAL, 5mm PWP, (TAPED). | PANASONIC INDUSTRIAL | ECE-A-1V-KA-100-B |
| C49 | 26386/887 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-104-KP |
| C50 | 26386/817 | CAPACITOR-FIXED CERAMIC 27pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-270-JP |
| C51 | 26878/402 | CAPACITOR-VARIABLE PTFE 2pF to 15pF 200 ppm/DEG.C, VERTICAL-PCB MOUNT, 5mm DIA, 5mm PWP, 2 PIN, CODED | DAU COMPONENTS LTD | 105-3901-015 |
| C52 | 26386/818 | CAPACITOR-FIXED CERAMIC 33pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-330-JP |
| C53 | 26386/863 | CAPACITOR-FIXED CERAMIC 1nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-102-KP |
| C54 | 26386/863 | CAPACITOR-FIXED CERAMIC 1nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-102-KP |

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| **AE5 2nd and 3rd LO (contd.)** | | | | |
| C55 | 26386/887 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-104-KP |
| C56 | 26421/116 | CAPACITOR-FIXED ALUMINIUM 47uF +/-20% 16V ELECTROLYTIC, RADIAL, 5mm PWP, (LOOSE OR TAPED). | PANASONIC INDUSTRIAL | ECE-A-1C-KA-470-B |
| C57 | 26386/863 | CAPACITOR-FIXED CERAMIC 1nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-102-KP |
| C58 to C60 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C61 | 26386/863 | CAPACITOR-FIXED CERAMIC 1nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-102-KP |
| C62 | 26386/816 | CAPACITOR-FIXED CERAMIC 22pF +/-5% 50V NPO MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-220-JP |
| C63 | 26386/816 | CAPACITOR-FIXED CERAMIC 22pF +/-5% 50V NPO MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-220-JP |
| C64 | 26386/863 | CAPACITOR-FIXED CERAMIC 1nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-102-KP |
| C65 to C67 | 26386/887 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-104-KP |
| C68 | 26421/116 | CAPACITOR-FIXED ALUMINIUM 47uF +/-20% 16V ELECTROLYTIC, RADIAL, 5mm PWP, (LOOSE OR TAPED). | PANASONIC INDUSTRIAL | ECE-A-1C-KA-470-B |
| C69 | 26421/116 | CAPACITOR-FIXED ALUMINIUM 47uF +/-20% 16V ELECTROLYTIC, RADIAL, 5mm PWP, (LOOSE OR TAPED). | PANASONIC INDUSTRIAL | ECE-A-1C-KA-470-B |
| C70 | 26386/804 | CAPACITOR-FIXED CERAMIC 2.2pF +/-0.5pF 50V NPO MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-2R2-DP |
| C71 | 26386/804 | CAPACITOR-FIXED CERAMIC 2.2pF +/-0.5pF 50V NPO MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-2R2-DP |
| D1 | 28383/930 | DIODE SMALL-SIGNAL, BAS16... 330mW 75V 250mA 2pF 1Vf @ 50mA, MARKING CODE A6, SURFACE MOUNTED, | PHILIPS | BAS16 |
| D2 | 28383/930 | DIODE SMALL-SIGNAL, BAS16... 330mW 75V 250mA 2pF 1Vf @ 50mA, MARKING CODE A6, SURFACE MOUNTED, | PHILIPS | BAS16 |
| D3 | 28381/530 | DIODE VARIABLE CAPACITNCE, BB215... 30V 20mA 2.2pF @ 28V, CAPAC RATIO 7.6 MIN, MARKING GREEN, SURFACE | PHILIPS | BB215 |
| D4 | 28381/341 | DIODE VARIABLE CAPACITNCE, BBY40... 350mW 28V 20mA 4.3pF @ 25V, CAPAC RATIO 5.0 MIN, MARKING CODE S2, | PHILIPS | BBY40 |
| IC1 | 28461/363 | IC-ANALOGUE OPERATIONAL AMP NE5532... DUAL, LINEAR, SLEW-RATE 9V/uS TYP, MONOLITHIC, 8 PIN, | PHILIPS | NE5532N |
| IC2 | 28461/448 | IC-ANALOGUE MICROWAVE-AMP MSA-0386... 5V 35mA GAIN 12dB @ 1GHz, 3dB BANDWIDTH DC-2.4GHz, BIPOLAR, 4 | HEWLETT-PACKARD | MSA-0386-TR1 |
| IC3 | 28461/450 | IC-ANALOGUE MICROWAVE-AMP MSA-0486... 5.25V 50mA GAIN 8dB @ 1GHz, 3dB BANDWIDTH DC-3.2GHz, BIPOLAR, | HEWLETT-PACKARD | MSA-0486-TR1 |
| IC4 | 28469/522 | IC-DIGITAL DIVIDER SP4902... DIVIDE BY 2, 2.54ghz, PRESCALER, ECL, 8 PIN, DUAL-IN-LINE. | - | |
| IC5 | 28469/547 | IC-DIGITAL DIVIDER SP4908... DIVIDE BY 8, 2.5ghz, PRESCALER, ECL, 8 PIN, DUAL-IN-LINE. | - | |
| IC6 | 28531/021A | RF-MIXER DOUBLE-BALANCED, SL6440C... 150MHz MAX, 15 dBm RF-1dB COMPRESS, +30dBm INTERCEPT, | - | |

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
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| **AE5 2nd and 3rd LO (contd.)** | | | | |
| IC7 | 28464/173 | IC-DIGITAL COUNTER 74AC161... 4 INPUT, 4 BIT, SINGLE, BINARY, SYNCHRONOUS, PRESETTABLE + RESET, | NAT. SEMICONDUCTOR | 74AC161SC |
| IC8 | 28462/146 | IC-DIGITAL FLIP-FLOP/D-TYPE 74AC74... 2 BIT, DUAL, POS EDGE TRIGGER, PLUS SET & CLEAR, CMOS-ADVANCED, | NAT. SEMICONDUCTOR | 74AC74SC |
| IC9 | 28466/394 | IC-DIGITAL NAND-GATE 74AC00... 2 INPUT, QUAD, CMOS-ADVANCED, 14 PIN, SMALL-OUTLINE. | NAT. SEMICONDUCTOR | 74AC00SC |
| IC10 | 28461/411 | IC-ANALOGUE OPERATIONAL AMP TL071... SINGLE, JFET INPUT, LOW NOISE, 8 PIN, SMALL-OUTLINE. | MOTOROLA INC. | TL071CD |
| L1 | 23642/333 | INDUCTOR-FIXED 470uH +/- 10% SCREENED, EPOXY-MOULD, 310mA 3R3 MAX, 90 Q @ 0.79 MHz, 3 MHz | VISHAY COMPONENTS | VL471K |
| L2 | 23642/325 | INDUCTOR-FIXED 100uH +/- 10% SCREENED, EPOXY-MOULD, 500mA 1R3 MAX, 80 Q @ 2.5 MHz, 7 MHz | VISHAY COMPONENTS | VL101K |
| L3 | 23642/333 | INDUCTOR-FIXED 470uH +/- 10% SCREENED, EPOXY-MOULD, 310mA 3R3 MAX, 90 Q @ 0.79 MHz, 3 MHz | VISHAY COMPONENTS | VL471K |
| L4 to L10 | 23642/518 | INDUCTOR-FIXED 0.56uH +/- 20% EPOXY-MOULD, 450mA 0R55 MAX, 30 Q @ 25.2 MHz, 180 MHz SRF, SURFACE | MEGGITT ELECTRONICS | 3612-T-R56-M |
| L11 | 23642/510 | INDUCTOR-FIXED 0.1uH +/- 5% EPOXY-MOULD, 450mA 0R44 MAX, 28 Q @ 100 MHz, 700 MHz SRF, SURFACE | MEGGITT ELECTRONICS | 3612-T-R10-J |
| L12 | 23642/518 | INDUCTOR-FIXED 0.56uH +/- 20% EPOXY-MOULD, 450mA 0R55 MAX, 30 Q @ 25.2 MHz, 180 MHz SRF, SURFACE | MEGGITT ELECTRONICS | 3612-T-R56-M |
| L13 | 23642/536 | INDUCTOR-FIXED 0.33uH +/- 20% EPOXY-MOULD, 450mA 0R4 MAX, 30 Q @ 25.2 MHz, 300 MHz SRF, SURFACE | MEGGITT ELECTRONICS | 3612-T-R33-M |
| L14 | 23642/535 | INDUCTOR-FIXED 1uH +/- 5% EPOXY-MOULD, 400mA 0R7 MAX, 30 Q @ 7.96 MHz, 120 MHz SRF, SURFACE | MEGGITT ELECTRONICS | 3612-T-1R0-J |
| L15 | 23642/535 | INDUCTOR-FIXED 1uH +/- 5% EPOXY-MOULD, 400mA 0R7 MAX, 30 Q @ 7.96 MHz, 120 MHz SRF, SURFACE | MEGGITT ELECTRONICS | 3612-T-1R0-J |
| L16 | 23642/532 | INDUCTOR-FIXED 0.22uH +/- 20% EPOXY-MOULD, 450mA 0R32 MAX, 30 Q @ 25.2 MHz, 350 MHz SRF, SURFACE | MEGGITT ELECTRONICS | 3612-T-R22-M |
| L17 | 23642/516 | INDUCTOR-FIXED 0.022uH +/- 10% EPOXY-MOULD, 450mA 0R2 MAX, 23 Q @ 100 MHz, 1.7K MHz SRF, SURFACE | MEGGITT ELECTRONICS | 3612-T-022-K |
| R1 | 24811/185 | RESISTOR-FIXED METAL-FILM 3K32 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-3K32-1%50ppm |
| R2 | 24811/169 | RESISTOR-FIXED METAL-FILM 681R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-681R-1%50ppm |
| R3 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R4 | 24811/149 | RESISTOR-FIXED METAL-FILM 100R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100R-1%50ppm |
| R5 | 24811/169 | RESISTOR-FIXED METAL-FILM 681R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-681R-1%50ppm |
| R6 | 24811/183 | RESISTOR-FIXED METAL-FILM 2K74 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-2K74-1%50ppm |
| R7 | 24811/169 | RESISTOR-FIXED METAL-FILM 681R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-681R-1%50ppm |
| R8 | 24811/185 | RESISTOR-FIXED METAL-FILM 3K32 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-3K32-1%50ppm |

## AE5 2nd and 3rd LO (contd.)

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| R9 | 24811/177 | RESISTOR-FIXED METAL-FILM 1K5 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K5-1%50ppm |
| R10 | 24811/133 | RESISTOR-FIXED METAL-FILM 22R1 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-22R1-1%50ppm |
| R11 | 24772/049 | RESISTOR-FIXED METAL-FILM 100R +/- 2% 125mW 150V 100 ppm/DEG.C, AXIAL, (TAPED). | VISHAY COMPONENTS | NK3-100R-2% |
| R12 | 24811/901 | RESISTOR-FIXED METAL-FILM 10R +/- 1% 250mW 200V 50 ppm/DEG.C, LOW-INDUCTANCE, SURFACE MOUNTED, SIZE | VISHAY COMPONENTS | SMM0204-HF-10R-1% |
| R13 | 24811/905 | RESISTOR-FIXED METAL-FILM 33R2 +/- 1% 250mW 200V 50 ppm/DEG.C, LOW-INDUCTANCE, SURFACE MOUNTED, | VISHAY COMPONENTS | SMM0204-HF-33R2-1% |
| R14 | 24772/061 | RESISTOR-FIXED METAL-FILM 330R +/- 2% 125mW 150V 100 ppm/DEG.C, AXIAL, (TAPED). | VISHAY COMPONENTS | NK3-330R-2% |
| R15 | 24772/057 | RESISTOR-FIXED METAL-FILM 220R +/- 2% 125mW 150V 100 ppm/DEG.C, AXIAL, (TAPED). | VISHAY COMPONENTS | NK3-220R-2% |
| R16 | 24338/006 | RESISTOR-FIXED METAL-GLAZE 220R +/- 5% 1W 100V 350 ppm/DEG.C, SURFACE MOUNTED, SIZE 2512, (12mm | VISHAY COMPONENTS | CR2512-220R-5%-P4 |
| R17 | 24811/149 | RESISTOR-FIXED METAL-FILM 100R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100R-1%50ppm |
| R18 | 24811/904 | RESISTOR-FIXED METAL-FILM 24R3 +/- 1% 250mW 200V 50 ppm/DEG.C, LOW-INDUCTANCE, SURFACE MOUNTED, | VISHAY COMPONENTS | SMM0204-HF-24R3-1% |
| R19 | 24811/906 | RESISTOR-FIXED METAL-FILM 36R5 +/- 1% 250mW 200V 50 ppm/DEG.C, LOW-INDUCTANCE, SURFACE MOUNTED, | VISHAY COMPONENTS | SMM0204-HF-36R5-1% |
| R20 | 24811/904 | RESISTOR-FIXED METAL-FILM 24R3 +/- 1% 250mW 200V 50 ppm/DEG.C, LOW-INDUCTANCE, SURFACE MOUNTED, | VISHAY COMPONENTS | SMM0204-HF-24R3-1% |
| R21 | 24338/003 | RESISTOR-FIXED METAL-GLAZE 120R +/- 5% 1W 100V 350 ppm/DEG.C, SURFACE MOUNTED, SIZE 2512, (12mm | VISHAY COMPONENTS | CR2512-120R-5%-P4 |
| R22 | 24811/909 | RESISTOR-FIXED METAL-FILM 51R1 +/- 1% 250mW 200V 50 ppm/DEG.C, LOW-INDUCTANCE, SURFACE MOUNTED, | VISHAY COMPONENTS | SMM0204-HF-51R1-1% |
| R24 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R25 | 24811/161 | RESISTOR-FIXED METAL-FILM 332R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-332R-1%50ppm |
| R26 | 24811/161 | RESISTOR-FIXED METAL-FILM 332R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-332R-1%50ppm |
| R27 | 24811/125 | RESISTOR-FIXED METAL-FILM 10R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10R-1%-50ppm |
| R28 | 24811/149 | RESISTOR-FIXED METAL-FILM 100R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100R-1%50ppm |
| R29 to R32 | 24811/177 | RESISTOR-FIXED METAL-FILM 1K5 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K5-1%50ppm |
| R33 | 24811/189 | RESISTOR-FIXED METAL-FILM 4K75 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-4K75-1%50ppm |
| R34 | 24811/189 | RESISTOR-FIXED METAL-FILM 4K75 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-4K75-1%50ppm |
| R35 | 24811/149 | RESISTOR-FIXED METAL-FILM 100R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100R-1%50ppm |
| R36 | 24811/157 | RESISTOR-FIXED METAL-FILM 221R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-221R-1%50ppm |
| R37 | 24811/193 | RESISTOR-FIXED METAL-FILM 6K81 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-6K81-1%50ppm |

## AE5 2nd and 3rd LO (contd.)

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| R38 | 24811/137 | RESISTOR-FIXED METAL-FILM 33R2 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-33R2-1%50ppm |
| R39 | 24811/157 | RESISTOR-FIXED METAL-FILM 221R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-221R-1%50ppm |
| R40 | 24811/149 | RESISTOR-FIXED METAL-FILM 100R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100R-1%50ppm |
| R41 | 24811/185 | RESISTOR-FIXED METAL-FILM 3K32 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-3K32-1%50ppm |
| R42 | 24811/149 | RESISTOR-FIXED METAL-FILM 100R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100R-1%50ppm |
| R43 | 24811/225 | RESISTOR-FIXED METAL-FILM 150K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-150K-1%50ppm |
| R44 | 24811/165 | RESISTOR-FIXED METAL-FILM 475R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-475R-1%50ppm |
| R45 to R48 | 24811/203 | RESISTOR-FIXED METAL-FILM 18K2 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-18K2-1%50ppm |
| R49 | 24811/225 | RESISTOR-FIXED METAL-FILM 150K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-150K-1%50ppm |
| R50 | 24811/225 | RESISTOR-FIXED METAL-FILM 150K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-150K-1%50ppm |
| R51 | 24811/149 | RESISTOR-FIXED METAL-FILM 100R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100R-1%50ppm |
| R52 | 24811/149 | RESISTOR-FIXED METAL-FILM 100R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100R-1%50ppm |
| R53 | 24811/195 | RESISTOR-FIXED METAL-FILM 8K25 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-8K25-1%50ppm |
| R54 | 24811/187 | RESISTOR-FIXED METAL-FILM 3K92 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-3K92-1%50ppm |
| R55 | 24811/137 | RESISTOR-FIXED METAL-FILM 33R2 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-33R2-1%50ppm |
| R56 | 24811/169 | RESISTOR-FIXED METAL-FILM 681R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-681R-1%50ppm |
| R57 | 24811/185 | RESISTOR-FIXED METAL-FILM 3K32 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-3K32-1%50ppm |
| R58 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R59 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R60 | 24811/189 | RESISTOR-FIXED METAL-FILM 4K75 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-4K75-1%50ppm |
| R61 | 24811/189 | RESISTOR-FIXED METAL-FILM 4K75 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-4K75-1%50ppm |
| R62 | 24811/169 | RESISTOR-FIXED METAL-FILM 681R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-681R-1%50ppm |
| R63 | 24811/137 | RESISTOR-FIXED METAL-FILM 33R2 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-33R2-1%50ppm |
| R64 | 24811/195 | RESISTOR-FIXED METAL-FILM 8K25 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-8K25-1%50ppm |
| R65 | 24811/187 | RESISTOR-FIXED METAL-FILM 3K92 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-3K92-1%50ppm |

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| **AE5 2nd and 3rd LO (contd.)** | | | | |
| R66 | 24811/149 | RESISTOR-FIXED METAL-FILM 100R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100R-1%50ppm |
| R67 | 24811/193 | RESISTOR-FIXED METAL-FILM 6K81 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-6K81-1%50ppm |
| R68 | 24811/137 | RESISTOR-FIXED METAL-FILM 33R2 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-33R2-1%50ppm |
| R69 | 24811/189 | RESISTOR-FIXED METAL-FILM 4K75 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-4K75-1%50ppm |
| R70 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R71 | 24811/137 | RESISTOR-FIXED METAL-FILM 33R2 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-33R2-1%50ppm |
| R72 | 24811/137 | RESISTOR-FIXED METAL-FILM 33R2 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-33R2-1%50ppm |
| R74 | 24811/171 | RESISTOR-FIXED METAL-FILM 825R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-825R-1%50ppm |
| R75 | 24811/171 | RESISTOR-FIXED METAL-FILM 825R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-825R-1%50ppm |
| R76 | 24811/157 | RESISTOR-FIXED METAL-FILM 221R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-221R-1%50ppm |
| R77 | 24811/137 | RESISTOR-FIXED METAL-FILM 33R2 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-33R2-1%50ppm |
| R78 | 24811/171 | RESISTOR-FIXED METAL-FILM 825R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-825R-1%50ppm |
| SKC | 23435/990 | CONNECTOR SHORTING, SOCKET, 2 WAY, FOR 0.64mm SQ PINS, 2.54mm PITCH, 9.6mm HIGH, FREE MOUNTING, | BERG ELECTRONICS | 65474-001 |
| SKSKF | 23435/990 | CONNECTOR SHORTING, SOCKET, 2 WAY, FOR 0.64mm SQ PINS, 2.54mm PITCH, 9.6mm HIGH, FREE MOUNTING, | BERG ELECTRONICS | 65474-001 |
| TR1 | 28487/809 | TRANSISTOR NPN BIPOLAR BFR93A... 12V 5GHz 250mW 35mA 40hFE MIN @ 30mA, MARKING CODE R2, SURFACE | PHILIPS | BFR93A |
| TR2 to TR8 | 28457/851 | TRANSISTOR NPN BIPOLAR BFS17... 15V 1.3GHz 250mW 50mA 20hFE MIN @ 2mA, MARKING CODE E1, SURFACE | PHILIPS | BFS17 |
| XL1 | 28311/974 | CRYSTAL 80.0004 MHz +/- 10 ppm, SERIES RESONANCE, 60R ESR MAX, 5th OVERTONE, STABILITY +/-10ppm, | IQD LTD | 80.0004M10/10/-5+70S |

## AE5/1 2nd and 3rd LO

## AK1 1280MHz Local oscillator (same as AE5/1)

When ordering, prefix circuit reference with AE5/1 (or AK1)

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| | 44830-184 | Complete unit | Issue 10 | |
| C1 to C3 | 26451/009 | CAPACITOR ALUM 47uF+/-20% 16V 6.6mmSQ | RUBYCON | 16-REV-47 |
| C4 to C5 | 26386/982 | CAPACITOR CERAMIC 2.2uF-20/+80% 16V 1206 | TDK | CC1206C-Y5V-225Z-T&R |
| C6 | 26451/004 | CAPACITOR ALUM 10uF+/-20% 35V 5.3mmSQ | RUBYCON | 35-REV-10 |
| C7 | 26585/003 | CAPACITOR POLYESTR 470nF+/-10% 25V 7.3x9mm | PHILIPS | 394-28474 |
| C8 | 26386/863 | CAPACITOR CERAMIC 1nF+/-10% 50V 0805 | AVX | 0805-5C-102-KAT-1A o |
| C9 | 26386/830 | CAPACITOR CERAMIC 330pF+/-5% 50V 0805 | AVX | 0805-5A-331-JAT-1A o |
| C10 | 26386/971 | CAPACITOR CERAMIC 2.2pF+/-0.1pF 50V 0805 | AVX | 0805-5K-2R2-BAW-TR |
| C11 | 26343/758 | CAPACITOR CERAMIC 3.9pF+/-0.5pF 50V 0805 | AVX | 0805-5A-3R9-DAT-1A o |
| C12 to C13 | 26386/830 | CAPACITOR CERAMIC 330pF+/-5% 50V 0805 | AVX | 0805-5A-331-JAT-1A o |
| C14 | 26386/824 | CAPACITOR CERAMIC 100pF+/-5% 50V 0805 | AVX | 0805-5A-101-JAT-1A o |
| C15 | 26386/863 | CAPACITOR CERAMIC 1nF+/-10% 50V 0805 | AVX | 0805-5C-102-KAT-1A o |
| C16 | 26386/824 | CAPACITOR CERAMIC 100pF+/-5% 50V 0805 | AVX | 0805-5A-101-JAT-1A o |
| C17 | 26386/804 | CAPACITOR CERAMIC 2.2pF+/-0.5pF 50V 0805 | AVX | 0805-5A-2R2-DAT-1A o |
| C18 | 26343/755 | CAPACITOR CERAMIC 1.5pF+/-0.5pF 50V 0805 | AVX | 0805-5A-1R5-DAT-1A o |
| C19 to C20 | 26386/824 | CAPACITOR CERAMIC 100pF+/-5% 50V 0805 | AVX | 0805-5A-101-JAT-1A o |
| C21 | 26386/875 | CAPACITOR CERAMIC 10nF+/-10% 50V 0805 | AVX | 0805-5C-103-KAT-1A o |
| C23 | 26386/875 | CAPACITOR CERAMIC 10nF+/-10% 50V 0805 | AVX | 0805-5C-103-KAT-1A o |
| C24 to C26 | 26386/863 | CAPACITOR CERAMIC 1nF+/-10% 50V 0805 | AVX | 0805-5C-102-KAT-1A o |
| C27 to C29 | 26386/875 | CAPACITOR CERAMIC 10nF+/-10% 50V 0805 | AVX | 0805-5C-103-KAT-1A o |
| C32 to C36 | 26386/875 | CAPACITOR CERAMIC 10nF+/-10% 50V 0805 | AVX | 0805-5C-103-KAT-1A o |
| C37 | 26451/004 | CAPACITOR ALUM 10uF+/-20% 35V 5.3mmSQ | RUBYCON | 35-REV-10 |
| C38 | 26386/863 | CAPACITOR CERAMIC 1nF+/-10% 50V 0805 | AVX | 0805-5C-102-KAT-1A o |
| C39 | 26386/875 | CAPACITOR CERAMIC 10nF+/-10% 50V 0805 | AVX | 0805-5C-103-KAT-1A o |
| C40 | 26451/015 | CAPACITOR ALUM 470uF+/-20% 10V 10.3mmSQ | RUBYCON | 10-REV-470-M-(10mm) |
| C41 | 26386/824 | CAPACITOR CERAMIC 100pF+/-5% 50V 0805 | AVX | 0805-5A-101-JAT-1A o |
| C42 to C43 | 26386/875 | CAPACITOR CERAMIC 10nF+/-10% 50V 0805 | AVX | 0805-5C-103-KAT-1A o |
| C44 to C45 | 26386/602 | CAPACITOR CERAMIC 1uF+/-10% 25V 1210 | PHILIPS | 1210-2R-105-K8-BBC |
| C46 | 26451/004 | CAPACITOR ALUM 10uF+/-20% 35V 5.3mmSQ | RUBYCON | 35-REV-10 |
| C48 | 26451/004 | CAPACITOR ALUM 10uF+/-20% 35V 5.3mmSQ | RUBYCON | 35-REV-10 |
| C49 | 26386/899 | CAPACITOR CERAMIC 100nF+/-10% 50V 1206 | AVX | 1206-5C-104-KAT-1A o |
| C50 | 26386/816 | CAPACITOR CERAMIC 22pF+/-5% 50V 0805 | AVX | 0805-5A-220-JAT-1A o |

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| **AE5/1 2nd and 3rd LO (contd.)** | | | | |
| C51 | 26878/402 | CAPACITOR-VAR PTFE2-15pF VERT-PCB | DAU | 105-3901-015 |
| C52 | 26386/818 | CAPACITOR CERAMIC 33pF+/-5% 50V 0805 | AVX | 0805-5A-330-JAT-1A o |
| C53 | 26386/863 | CAPACITOR CERAMIC 1nF+/-10% 50V 0805 | AVX | 0805-5C-102-KAT-1A o |
| to C54 | | | | |
| C55 | 26386/899 | CAPACITOR CERAMIC 100nF+/-10% 50V 1206 | AVX | 1206-5C-104-KAT-1A o |
| C56 | 26451/009 | CAPACITOR ALUM 47uF+/-20% 16V 6.6mmSQ | RUBYCON | 16-REV-47 |
| C57 | 26386/863 | CAPACITOR CERAMIC 1nF+/-10% 50V 0805 | AVX | 0805-5C-102-KAT-1A o |
| C58 | 26386/875 | CAPACITOR CERAMIC 10nF+/-10% 50V 0805 | AVX | 0805-5C-103-KAT-1A o |
| to C60 | | | | |
| C61 | 26386/863 | CAPACITOR CERAMIC 1nF+/-10% 50V 0805 | AVX | 0805-5C-102-KAT-1A o |
| C62 | 26386/816 | CAPACITOR CERAMIC 22pF+/-5% 50V 0805 | AVX | 0805-5A-220-JAT-1A o |
| to C63 | | | | |
| C64 | 26386/819 | CAPACITOR CERAMIC 39pF+/-5% 50V 0805 | AVX | 0805-5A-390-JAT-1A o |
| C65 | 26386/899 | CAPACITOR CERAMIC 100nF+/-10% 50V 1206 | AVX | 1206-5C-104-KAT-1A o |
| to C67 | | | | |
| C68 | 26451/009 | CAPACITOR ALUM 47uF+/-20% 16V 6.6mmSQ | RUBYCON | 16-REV-47 |
| to C69 | | | | |
| C70 | 26343/755 | CAPACITOR CERAMIC 1.5pF+/-0.5pF 50V 0805 | AVX | 0805-5A-1R5-DAT-1A o |
| to C71 | | | | |
| C72 | 26386/875 | CAPACITOR CERAMIC 10nF+/-10% 50V 0805 | AVX | 0805-5C-103-KAT-1A o |
| to C78 | | | | |
| C79 | 26386/819 | CAPACITOR CERAMIC 39pF+/-5% 50V 0805 | AVX | 0805-5A-390-JAT-1A o |
| C80 | 26386/875 | CAPACITOR CERAMIC 10nF+/-10% 50V 0805 | AVX | 0805-5C-103-KAT-1A o |
| C81 | 26386/819 | CAPACITOR CERAMIC 39pF+/-5% 50V 0805 | AVX | 0805-5A-390-JAT-1A o |
| C82 | 26386/982 | CAPACITOR CERAMIC 2.2uF-20/+80% 16V 1206 | TDK | CC1206C-Y5V-225Z-T&R |
| to C83 | | | | |
| D1 | 28383/901 | DIODE BAV70.. SMALL-SIGDUAL 70V MKD-A4 SOT-23 | PHILIPS | BAV70 |
| D3 | 28381/530 | DIODE BB215.. VARI-CAP2.2pF@28V MK-GREEN SOD80 | | |
| D4 | 28381/341 | DIODE BBY40.. VARI-CAP4.3pF@25V MKD-S2 SOT-23 | PHILIPS | BBY40 |
| IC1 | 28461/511 | IC-ANALOG OP AMPOP275.. DUAL SO-8 | ANALOG | OP275GS |
| IC2 | 28461/448 | IC-ANALOG MICROWAVE-AMPMSA-0386.. 4-PIN AV-86 | MINI-CIRCUITS | MAR-3-SM |
| IC3 | 28461/801 | IC-ANALOG MICROWAVE-AMPMSA-1105.. 4-PIN AV-05 | MINI-CIRCUITS | MAV-11-SM |
| IC4 | 28461/448 | IC-ANALOG MICROWAVE-AMPMSA-0386.. 4-PIN AV-86 | MINI-CIRCUITS | MAR-3-SM |
| IC5 | 28469/568 | IC-DIGITAL DIVIDERSP8400.. SO-28 | MITEL | SP8400-KG-MPES |
| IC6 | 28531/085 | RF-MIXER DBLE BALANCEDAD831.. PLCC-20 | ANALOG | AD831AP |
| IC7 | 28464/173 | IC-DIGITAL COUNTER74AC161.. SO-16 | FAIRCHILD | 74AC161SC |
| IC8 | 28462/146 | IC-DIGITAL FLIP-FLOP-D74AC74.. DUAL SO-14 | FAIRCHILD | 74AC74SC |
| IC9 | 28466/394 | IC-DIGITAL NAND-GATE74AC00.. QUAD SO-14 | FAIRCHILD | 74AC00SC |
| IC10 | 28461/897 | IC-ANALOG OP AMPOP-27GS.. SO-8 | ANALOG | OP-27GS |
| IC11 | 28461/780 | IC-ANALOG VOLTAGE-REG79L05AC.. SO-8 | ST MICRO | L79L05ACZ |

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| **AE5/1 2nd and 3rd LO (contd.)** | | | | |
| L1 | 23642/333 | INDUCTOR 470uH 10%SCRNED MOULDED RADIAL | WEARNES HOLLINGSWRTH | 553-3635-33-02-00 |
| L2 | 23642/325 | INDUCTOR 100uH 10%SCRNED MOULDED RADIAL | WEARNES HOLLINGSWRTH | 553-3635-25-02-00 |
| L3 | 23642/333 | INDUCTOR 470uH 10%SCRNED MOULDED RADIAL | WEARNES HOLLINGSWRTH | 553-3635-33-02-00 |
| L4 | 23642/518 | INDUCTOR 0.56uH 20%MOULDED 3.2x2.5mm | MEGGITT | 3612-T-R56-M |
| L7 | 23642/518 | INDUCTOR 0.56uH 20%MOULDED 3.2x2.5mm | MEGGITT | 3612-T-R56-M |
| L10 | 23642/518 | INDUCTOR 0.56uH 20%MOULDED 3.2x2.5mm | MEGGITT | 3612-T-R56-M |
| L11 | 23642/510 | INDUCTOR 0.1uH 5%MOULDED 3.2x2.5mm | MEGGITT | 3612-T-R10-J |
| L12 | 23642/518 | INDUCTOR 0.56uH 20%MOULDED 3.2x2.5mm | MEGGITT | 3612-T-R56-M |
| L13 | 23642/536 | INDUCTOR 0.33uH 20%MOULDED 3.2x2.5mm | MEGGITT | 3612-T-R33-M |
| L14 | 23642/510 | INDUCTOR 0.1uH 5%MOULDED 3.2x2.5mm | MEGGITT | 3612-T-R10-J |
| to L15 | | | | |
| L16 | 23642/532 | INDUCTOR 0.22uH 20%MOULDED 3.2x2.5mm | MEGGITT | 3612-T-R22-M |
| L17 | 23642/744 | INDUCTOR 0.0033uH 20%EPOXY-COAT 0805 | COILCRAFT | 0805CS-030XMBC |
| L18 | 23642/518 | INDUCTOR 0.56uH 20%MOULDED 3.2x2.5mm | MEGGITT | 3612-T-R56-M |
| L19 | 23642/510 | INDUCTOR 0.1uH 5%MOULDED 3.2x2.5mm | MEGGITT | 3612-T-R10-J |
| R1 | 24811/185 | RESISTOR 3K32 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-3K32-1%-50ppm |
| R2 | 24811/169 | RESISTOR 681R 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-681R-1%-50ppm |
| R3 | 24811/197 | RESISTOR 10K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-10K-1%-50ppm |
| R4 | 24811/149 | RESISTOR 100R 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-100R-1%-50ppm |
| R5 | 24811/169 | RESISTOR 681R 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-681R-1%-50ppm |
| R6 | 24811/185 | RESISTOR 3K32 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-3K32-1%-50ppm |
| R7 | 24811/171 | RESISTOR 825R 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-825R-1%-50ppm |
| R8 | 24811/185 | RESISTOR 3K32 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-3K32-1%-50ppm |
| R9 | 24811/177 | RESISTOR 1K5 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-1K5-1%-50ppm |
| R10 | 24811/133 | RESISTOR 22R1 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-22R-1%-50ppm |
| R11 | 24772/049 | RESISTOR 100R 2% 125mW150V 100ppm AXIAL | VTM | GP/490-0/100R-F-T2 |
| R12 | 24811/901 | RESISTOR 10R 1% 250mW200V 50ppm L-I MINI-MELF | BEYSCHLAG | MMA0204-50HF-1%-10R |
| R13 | 24811/905 | RESISTOR 33R2 1% 250mW200V 50ppm L-I MINI-MELF | BEYSCHLAG | MMA0204-50HF-1%-33R2 |
| R14 | 24772/061 | RESISTOR 330R 2% 125mW150V 100ppm AXIAL | VTM | GP/490-0/332R-F-T2 |
| R15 | 24772/057 | RESISTOR 220R 2% 125mW150V 100ppm AXIAL | VTM | GP/490-0/221R-F-T2 |
| R16 | 24338/006 | RESISTOR 220R 5% 1W100V 350ppm 2512 | VTM | 509-0-220R-5%-V5 |
| R17 | 24811/912 | RESISTOR 100R 1% 250mW200V 50ppm L-I MINI-MELF | BEYSCHLAG | MMA0204-50HF-1%-100R |
| R18 | 24811/911 | RESISTOR 75R 1% 250mW200V 50ppm L-I MINI-MELF | BEYSCHLAG | MMA0204-50HF-1%-75R |
| R19 | 24811/912 | RESISTOR 100R 1% 250mW200V 50ppm L-I MINI-MELF | BEYSCHLAG | MMA0204-50HF-1%-100R |
| R20 | 24811/911 | RESISTOR 75R 1% 250mW200V 50ppm L-I MINI-MELF | BEYSCHLAG | MMA0204-50HF-1%-75R |
| R21 | 24338/004 | RESISTOR 150R 5% 1W100V 350ppm 2512 | VTM | 509-0-150R-5%-V5 |
| R22 | 24338/005 | RESISTOR 180R 5% 1W100V 350ppm 2512 | VTM | 509-0-180R-5%-V5 |
| R24 | 24811/165 | RESISTOR 475R 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-475R-1%-50ppm |
| R25 | 24811/161 | RESISTOR 332R 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-332R-1%-50ppm |
| R26 | 24811/137 | RESISTOR 33R2 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-33R2-1%-50ppm |
| R27 | 24811/165 | RESISTOR 475R 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-475R-1%-50ppm |

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| **AE5/1 2nd and 3rd LO (contd.)** | | | | |
| R28 | 24811/181 | RESISTOR 2K21 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-2K21-1%-50ppm |
| R29 | 24811/149 | RESISTOR 100R 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-100R-1%-50ppm |
| R32 | 24811/177 | RESISTOR 1K5 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-1K5-1%-50ppm |
| to R33 | | | | |
| R34 | 24811/203 | RESISTOR 18K2 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-18K2-1%-50ppm |
| R35 | 24811/149 | RESISTOR 100R 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-100R-1%-50ppm |
| R36 | 24811/157 | RESISTOR 221R 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-221R-1%-50ppm |
| R37 | 24811/193 | RESISTOR 6K81 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-6K81-1%-50ppm |
| R38 | 24811/137 | RESISTOR 33R2 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-33R2-1%-50ppm |
| R39 | 24811/157 | RESISTOR 221R 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-221R-1%-50ppm |
| R40 | 24811/165 | RESISTOR 475R 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-475R-1%-50ppm |
| to R41 | | | | |
| R42 | 24811/149 | RESISTOR 100R 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-100R-1%-50ppm |
| R43 | 24811/225 | RESISTOR 150K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-150K-1%-50ppm |
| R44 | 24811/165 | RESISTOR 475R 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-475R-1%-50ppm |
| R45 | 24811/203 | RESISTOR 18K2 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-18K2-1%-50ppm |
| to R48 | | | | |
| R49 | 24811/225 | RESISTOR 150K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-150K-1%-50ppm |
| to R50 | | | | |
| R51 | 24811/149 | RESISTOR 100R 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-100R-1%-50ppm |
| to R52 | | | | |
| R53 | 24811/195 | RESISTOR 8K25 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-8K25-1%-50ppm |
| R54 | 24811/187 | RESISTOR 3K92 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-3K92-1%-50ppm |
| R55 | 24811/137 | RESISTOR 33R2 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-33R2-1%-50ppm |
| R56 | 24811/169 | RESISTOR 681R 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-681R-1%-50ppm |
| R57 | 24811/185 | RESISTOR 3K32 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-3K32-1%-50ppm |
| R58 | 24811/197 | RESISTOR 10K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-10K-1%-50ppm |
| to R59 | | | | |
| R60 | 24811/189 | RESISTOR 4K75 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-4K75-1%-50ppm |
| to R61 | | | | |
| R62 | 24811/167 | RESISTOR 562R 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-562R-1%-50ppm |
| R63 | 24811/137 | RESISTOR 33R2 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-33R2-1%-50ppm |
| R64 | 24811/195 | RESISTOR 8K25 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-8K25-1%-50ppm |
| R65 | 24811/187 | RESISTOR 3K92 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-3K92-1%-50ppm |
| R66 | 24811/149 | RESISTOR 100R 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-100R-1%-50ppm |
| R67 | 24811/193 | RESISTOR 6K81 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-6K81-1%-50ppm |
| R68 | 24811/137 | RESISTOR 33R2 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-33R2-1%-50ppm |
| R69 | 24811/189 | RESISTOR 4K75 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-4K75-1%-50ppm |
| R70 | 24811/157 | RESISTOR 221R 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-221R-1%-50ppm |
| R71 | 24811/137 | RESISTOR 33R2 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-33R2-1%-50ppm |
| to R72 | | | | |
| R74 | 24811/171 | RESISTOR 825R 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-825R-1%-50ppm |
| to R75 | | | | |
| R76 | 24811/159 | RESISTOR 274R 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-274R-1%-50ppm |
| R77 | 24811/137 | RESISTOR 33R2 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-33R2-1%-50ppm |
| R78 | 24811/163 | RESISTOR 392R 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-392R-1%-50ppm |

## AE5/1 2nd and 3rd LO (contd.)

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| R79 | 24811/129 | RESISTOR 15R 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-15R-1%-50ppm |
| R80 | 24811/149 | RESISTOR 100R 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-100R-1%-50ppm |
| R81 | 24811/152 | RESISTOR 130R 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-130R-1%-50ppm |
| R82 | 24811/225 | RESISTOR 150K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-150K-1%-50ppm |
| R83 to R84 | 24811/203 | RESISTOR 18K2 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-18K2-1%-50ppm |
| R85 | 24811/197 | RESISTOR 10K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-10K-1%-50ppm |
| R86 | 24811/225 | RESISTOR 150K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-150K-1%-50ppm |
| R87 | 24811/149 | RESISTOR 100R 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-100R-1%-50ppm |
| SKC | 23435/990 | CONNECTOR SHORTING SKT2-WAY 0.64mm FREE | FCI | 65474-001 |
| SKF | 23435/990 | CONNECTOR SHORTING SKT2-WAY 0.64mm FREE | FCI | 65474-001 |
| TR1 | 28487/809 | TRANSISTOR NPN BFR93A..12V 5GHz MKD-R2 SOT-23 | PHILIPS | BFR93A |
| TR2 to TR4 | 28457/851 | TRANSISTOR NPN BFS17..15V 1.3GHz MKD-E1 SOT-23 | PHILIPS | BFS17 |
| TR5 to TR6 | 28457/850 | TRANSISTOR NPN FMMT2369.40V 600MHz MKD-*1J SOT23 | MOTOROLA | MMBT2369LT1 |
| TR7 to TR8 | 28457/851 | TRANSISTOR NPN BFS17..15V 1.3GHz MKD-E1 SOT-23 | PHILIPS | BFS17 |
| TR10 | 28459/104 | TRANSISTOR P-ENH MOSFETBSS84.. 50V MKD-SP SOT23 | PHILIPS | BSS84 |
| TR11 | 28459/084 | TRANSISTOR N-ENH MOSFETBST82.. 80V MKD-02 SOT23 | PHILIPS | BST82(TAPE & REEL) |
| XL1 | 28311/974 | CRYSTAL 80.0004MHzHC-49/U WIRE LEADS | CFP | 0.0004M10/10/-5+70S |

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|

## AE6 Spectrum analyzer

When ordering, prefix circuit reference with AE6.

| | | | | |
|---|---|---|---|---|
| | 44829-846 | Complete unit | Issue 19 | |
| C1 to C3 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C4 | 26878/402 | CAPACITOR-VARIABLE PTFE 2pF to 15pF 200 ppm/DEG.C, VERTICAL-PCB MOUNT, 5mm DIA, 5mm PWP, 2 PIN, CODED | DAU COMPONENTS LTD | 105-3901-015 |
| C5 | 26343/767 | CAPACITOR-FIXED CERAMIC 10pF +/-5% 50V NPO MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-100-DP |
| C6 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C7 | 26386/804 | CAPACITOR-FIXED CERAMIC 2.2pF +/-0.5pF 50V NPO MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-2R2-DP |
| C8 to C12 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C13 | 26878/402 | CAPACITOR-VARIABLE PTFE 2pF to 15pF 200 ppm/DEG.C, VERTICAL-PCB MOUNT, 5mm DIA, 5mm PWP, 2 PIN, CODED | DAU COMPONENTS LTD | 105-3901-015 |
| C14 | 26343/767 | CAPACITOR-FIXED CERAMIC 10pF +/-5% 50V NPO MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-100-DP |
| C15 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C16 | 26386/808 | CAPACITOR-FIXED CERAMIC 4.7pF +/-0.5pF 50V NPO MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-4R7-DP |
| C17 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C18 | 26878/402 | CAPACITOR-VARIABLE PTFE 2pF to 15pF 200 ppm/DEG.C, VERTICAL-PCB MOUNT, 5mm DIA, 5mm PWP, 2 PIN, CODED | DAU COMPONENTS LTD | 105-3901-015 |
| C19 | 26343/767 | CAPACITOR-FIXED CERAMIC 10pF +/-5% 50V NPO MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-100-DP |
| C20 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C21 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C22 | 26386/804 | CAPACITOR-FIXED CERAMIC 2.2pF +/-0.5pF 50V NPO MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-2R2-DP |
| C23 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C24 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C25 | 26878/402 | CAPACITOR-VARIABLE PTFE 2pF to 15pF 200 ppm/DEG.C, VERTICAL-PCB MOUNT, 5mm DIA, 5mm PWP, 2 PIN, CODED | DAU COMPONENTS LTD | 105-3901-015 |
| C26 | 26343/767 | CAPACITOR-FIXED CERAMIC 10pF +/-5% 50V NPO MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-100-DP |
| C27 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C28 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C29 | 26386/808 | CAPACITOR-FIXED CERAMIC 4.7pF +/-0.5pF 50V NPO MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-4R7-DP |

## AE6 Spectrum analyzer (contd.)

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| C30 to C33 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C34 | 26878/402 | CAPACITOR-VARIABLE PTFE 2pF to 15pF 200 ppm/DEG.C, VERTICAL-PCB MOUNT, 5mm DIA, 5mm PWP, 2 PIN, CODED | DAU COMPONENTS LTD | 105-3901-015 |
| C35 | 26343/767 | CAPACITOR-FIXED CERAMIC 10pF +/-5% 50V NPO MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-100-DP |
| C36 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C37 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C38 | 26386/804 | CAPACITOR-FIXED CERAMIC 2.2pF +/-0.5pF 50V NPO MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-2R2-DP |
| C39 to C41 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C42 | 26878/402 | CAPACITOR-VARIABLE PTFE 2pF to 15pF 200 ppm/DEG.C, VERTICAL-PCB MOUNT, 5mm DIA, 5mm PWP, 2 PIN, CODED | DAU COMPONENTS LTD | 105-3901-015 |
| C43 | 26343/767 | CAPACITOR-FIXED CERAMIC 10pF +/-5% 50V NPO MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-100-DP |
| C44 | 26386/808 | CAPACITOR-FIXED CERAMIC 4.7pF +/-0.5pF 50V NPO MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-4R7-DP |
| C45 to C47 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C48 | 26878/402 | CAPACITOR-VARIABLE PTFE 2pF to 15pF 200 ppm/DEG.C, VERTICAL-PCB MOUNT, 5mm DIA, 5mm PWP, 2 PIN, CODED | DAU COMPONENTS LTD | 105-3901-015 |
| C49 | 26343/767 | CAPACITOR-FIXED CERAMIC 10pF +/-5% 50V NPO MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-100-DP |
| C50 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C51 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C52 | 26386/804 | CAPACITOR-FIXED CERAMIC 2.2pF +/-0.5pF 50V NPO MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-2R2-DP |
| C53 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C54 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C55 | 26878/402 | CAPACITOR-VARIABLE PTFE 2pF to 15pF 200 ppm/DEG.C, VERTICAL-PCB MOUNT, 5mm DIA, 5mm PWP, 2 PIN, CODED | DAU COMPONENTS LTD | 105-3901-015 |
| C56 | 26343/767 | CAPACITOR-FIXED CERAMIC 10pF +/-5% 50V NPO MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-100-DP |
| C57 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C58 | 26386/808 | CAPACITOR-FIXED CERAMIC 4.7pF +/-0.5pF 50V NPO MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-4R7-DP |
| C59 to C64 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C65 | 26878/402 | CAPACITOR-VARIABLE PTFE 2pF to 15pF 200 ppm/DEG.C, VERTICAL-PCB MOUNT, 5mm DIA, 5mm PWP, 2 PIN, CODED | DAU COMPONENTS LTD | 105-3901-015 |
| C66 | 26343/767 | CAPACITOR-FIXED CERAMIC 10pF +/-5% 50V NPO MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-100-DP |

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| **AE6 Spectrum analyzer (contd.)** | | | | |
| C67 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C68 | 26386/804 | CAPACITOR-FIXED CERAMIC 2.2pF +/-0.5pF 50V NPO MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-2R2-DP |
| C69 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C70 | 26878/402 | CAPACITOR-VARIABLE PTFE 2pF to 15pF 200 ppm/DEG.C, VERTICAL-PCB MOUNT, 5mm DIA, 5mm PWP, 2 PIN, CODED | DAU COMPONENTS LTD | 105-3901-015 |
| C71 | 26343/767 | CAPACITOR-FIXED CERAMIC 10pF +/-5% 50V NPO MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-100-DP |
| C72 to C74 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C75 | 26386/808 | CAPACITOR-FIXED CERAMIC 4.7pF +/-0.5pF 50V NPO MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-4R7-DP |
| C76 to C84 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C85 | 26386/819 | CAPACITOR-FIXED CERAMIC 39pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-390-JP |
| C86 | 26386/819 | CAPACITOR-FIXED CERAMIC 39pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-390-JP |
| C87 | 26343/767 | CAPACITOR-FIXED CERAMIC 10pF +/-5% 50V NPO MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-100-DP |
| C88 to C94 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C101 | 26386/823 | CAPACITOR-FIXED CERAMIC 82pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-820-JP |
| C102 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C103 | 26386/887 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-104-KP |
| C104 | 26386/887 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-104-KP |
| C105 | 26386/883 | CAPACITOR-FIXED CERAMIC 47nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-473-KP |
| C106 | 26386/883 | CAPACITOR-FIXED CERAMIC 47nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-473-KP |
| C107 | 26386/887 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-104-KP |
| C108 | 26386/883 | CAPACITOR-FIXED CERAMIC 47nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-473-KP |
| C109 | 26386/883 | CAPACITOR-FIXED CERAMIC 47nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-473-KP |
| C110 | 26386/887 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-104-KP |
| C111 | 26386/883 | CAPACITOR-FIXED CERAMIC 47nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-473-KP |
| C112 | 26386/883 | CAPACITOR-FIXED CERAMIC 47nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-473-KP |
| C113 to C123 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| **AE6 Spectrum analyzer (contd.)** | | | | |
| C127 to C131 | 26386/824 | CAPACITOR-FIXED CERAMIC 100pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-101-JP |
| C132 | 26386/887 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-104-KP |
| C133 | 26386/871 | CAPACITOR-FIXED CERAMIC 4.7nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-472-KP |
| C134 | 26386/887 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-104-KP |
| C135 to C137 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C138 to C140 | 26421/116 | CAPACITOR-FIXED ALUMINIUM 47uF +/-20% 16V ELECTROLYTIC, RADIAL, 5mm PWP, (LOOSE OR TAPED). | PANASONIC INDUSTRIAL | ECE-A-1C-KA-470-B |
| C141 to C180 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C181 to C183 | 26421/116 | CAPACITOR-FIXED ALUMINIUM 47uF +/-20% 16V ELECTROLYTIC, RADIAL, 5mm PWP, (LOOSE OR TAPED). | PANASONIC INDUSTRIAL | ECE-A-1C-KA-470-B |
| C184 | 26386/883 | CAPACITOR-FIXED CERAMIC 47nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-473-KP |
| C185 to C190 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C191 | 26343/767 | CAPACITOR-FIXED CERAMIC 10pF +/-5% 50V NPO MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-100-DP |
| D1 to D7 | 28383/931 | DIODE PIN, BAR14-1... DUAL, 140mW 100V 100mA 0.5pF 1.25Vf @ 100mA, IN SERIES, MARKING CODE L7, | SIEMENS LTD | BAR14-1-E6327 |
| D9 to D18 | 28381/531 | DIODE VARIABLE CAPACITNCE, BBY31... 28V 20mA 2pF @ 28V, CAPAC RATIO 9.7 TYP, MARKING CODE S1, SURFACE | PHILIPS | BBY31 |
| D19 to D22 | 28335/670 | DIODE BAND SWITCHING, BAT18... 35V 100mA 1pF MAX @ 20V, 1.2Vf @ 100mA, MARKING CODE A2, SURFACE | PHILIPS | BAT18/T1 |
| D23 to D27 | 28383/931 | DIODE PIN, BAR14-1... DUAL, 140mW 100V 100mA 0.5pF 1.25Vf @ 100mA, IN SERIES, MARKING CODE L7, | SIEMENS LTD | BAR14-1-E6327 |
| D28 | 28335/670 | DIODE BAND SWITCHING, BAT18... 35V 100mA 1pF MAX @ 20V, 1.2Vf @ 100mA, MARKING CODE A2, SURFACE | PHILIPS | BAT18/T1 |
| D29 | 28335/670 | DIODE BAND SWITCHING, BAT18... 35V 100mA 1pF MAX @ 20V, 1.2Vf @ 100mA, MARKING CODE A2, SURFACE | PHILIPS | BAT18/T1 |
| D31 | 28383/930 | DIODE SMALL-SIGNAL, BAS16... 330mW 75V 250mA 2pF 1Vf @ 50mA, MARKING CODE A6, SURFACE MOUNTED, | PHILIPS | BAS16 |
| D32 | 28383/930 | DIODE SMALL-SIGNAL, BAS16... 330mW 75V 250mA 2pF 1Vf @ 50mA, MARKING CODE A6, SURFACE MOUNTED, | PHILIPS | BAS16 |
| D33 to D40 | 28335/670 | DIODE BAND SWITCHING, BAT18... 35V 100mA 1pF MAX @ 20V, 1.2Vf @ 100mA, MARKING CODE A2, SURFACE | PHILIPS | BAT18/T1 |
| D41 to D43 | 28383/930 | DIODE SMALL-SIGNAL, BAS16... 330mW 75V 250mA 2pF 1Vf @ 50mA, MARKING CODE A6, SURFACE MOUNTED, | PHILIPS | BAS16 |
| D44 | 28371/412 | DIODE ZENER, BZX84-C5V1... 350mW 5.1V 5% 250mA MARKING CODE Z2, SURFACE MOUNTED, SOT-23, (8mm | PHILIPS | BZX84-C5V1 |
| IC1 to IC10 | 28461/886 | IC-ANALOGUE LIMITING-AMPLIFIER SL1613... 9V 20mA 8 PIN, SMALL-OUTLINE. | | |

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| **AE6 Spectrum analyzer (contd.)** | | | | |
| IC11 | 28461/413 | IC-ANALOGUE OPERATIONAL AMP TL074... QUAD, JFET INPUT, LOW NOISE, SLEW RATE 8V/uS MIN, GAIN | MOTOROLA INC. | TL074CD |
| IC12 | 28461/727 | IC-ANALOGUE VOLTAGE-REGULATOR LM337T... 37V 1.5A NEGATIVE ADJUSTABLE, LINEAR, MONOLITHIC, 3 PIN, | NAT. SEMICONDUCTOR | LM337T |
| IC13 to IC15 | 28461/413 | IC-ANALOGUE OPERATIONAL AMP TL074... QUAD, JFET INPUT, LOW NOISE, SLEW RATE 8V/uS MIN, GAIN | MOTOROLA INC. | TL074CD |
| IC16 | 28461/885 | IC-ANALOGUE D/A-CONVERTER TDA8444... 18V 10mA I.IC BUS CONTROL OF 8x6 BIT CONVERTERS, CMOS, 16 PIN, | PHILIPS | TDA8444-N2 |
| IC17 | 28467/111 | IC-MICRO PERIPHERAL, PCF8574... REMOTE 8-BIT I/O EXPANDER, I.IC BUS, UP TO 8 DEVICE ADDRESS | PHILIPS | PCF8574T |
| L1 | 23642/537 | INDUCTOR-FIXED 4.7uH +/- 5% EPOXY-MOULD, 220mA 1R5 MAX, 30 Q @ 7.96 MHz, 50 MHz SRF, SURFACE MOUNTED, | MEGGITT ELECTRONICS | 3612-T-4R7-J |
| L2 | 23642/555 | INDUCTOR-FIXED 10uH +/- 10% COATED-LACQUER, MINIATURE, 470mA 0R9 MAX, 45 Q @ 7.9 MHz, 45 MHz | MEGGITT ELECTRONICS | C11-406/8/27520/006 |
| L3 | 23642/533 | INDUCTOR-FIXED 10uH +/- 5% EPOXY-MOULD, 150mA 2R1 MAX, 30 Q @ 2.52 MHz, 36 MHz SRF, SURFACE MOUNTED, | MEGGITT ELECTRONICS | 3612-T-100-J |
| L4 | 23642/533 | INDUCTOR-FIXED 10uH +/- 5% EPOXY-MOULD, 150mA 2R1 MAX, 30 Q @ 2.52 MHz, 36 MHz SRF, SURFACE MOUNTED, | MEGGITT ELECTRONICS | 3612-T-100-J |
| L5 | 23642/555 | INDUCTOR-FIXED 10uH +/- 10% COATED-LACQUER, MINIATURE, 470mA 0R9 MAX, 45 Q @ 7.9 MHz, 45 MHz | MEGGITT ELECTRONICS | C11-406/8/27520/006 |
| L6 | 23642/555 | INDUCTOR-FIXED 10uH +/- 10% COATED-LACQUER, MINIATURE, 470mA 0R9 MAX, 45 Q @ 7.9 MHz, 45 MHz | MEGGITT ELECTRONICS | C11-406/8/27520/006 |
| L7 | 23642/533 | INDUCTOR-FIXED 10uH +/- 5% EPOXY-MOULD, 150mA 2R1 MAX, 30 Q @ 2.52 MHz, 36 MHz SRF, SURFACE MOUNTED, | MEGGITT ELECTRONICS | 3612-T-100-J |
| L8 | 23642/555 | INDUCTOR-FIXED 10uH +/- 10% COATED-LACQUER, MINIATURE, 470mA 0R9 MAX, 45 Q @ 7.9 MHz, 45 MHz | MEGGITT ELECTRONICS | C11-406/8/27520/006 |
| L9 | 23642/555 | INDUCTOR-FIXED 10uH +/- 10% COATED-LACQUER, MINIATURE, 470mA 0R9 MAX, 45 Q @ 7.9 MHz, 45 MHz | MEGGITT ELECTRONICS | C11-406/8/27520/006 |
| L10 | 23642/537 | INDUCTOR-FIXED 4.7uH +/- 5% EPOXY-MOULD, 220mA 1R5 MAX, 30 Q @ 7.96 MHz, 50 MHz SRF, SURFACE MOUNTED, | MEGGITT ELECTRONICS | 3612-T-4R7-J |
| L11 to L21 | 23642/533 | INDUCTOR-FIXED 10uH +/- 5% EPOXY-MOULD, 150mA 2R1 MAX, 30 Q @ 2.52 MHz, 36 MHz SRF, SURFACE MOUNTED, | MEGGITT ELECTRONICS | 3612-T-100-J |
| L24 to L27 | 23642/537 | INDUCTOR-FIXED 4.7uH +/- 5% EPOXY-MOULD, 220mA 1R5 MAX, 30 Q @ 7.96 MHz, 50 MHz SRF, SURFACE MOUNTED, | MEGGITT ELECTRONICS | 3612-T-4R7-J |
| L28 to L39 | 23642/533 | INDUCTOR-FIXED 10uH +/- 5% EPOXY-MOULD, 150mA 2R1 MAX, 30 Q @ 2.52 MHz, 36 MHz SRF, SURFACE MOUNTED, | MEGGITT ELECTRONICS | 3612-T-100-J |
| L41 | 23642/537 | INDUCTOR-FIXED 4.7uH +/- 5% EPOXY-MOULD, 220mA 1R5 MAX, 30 Q @ 7.96 MHz, 50 MHz SRF, SURFACE MOUNTED, | MEGGITT ELECTRONICS | 3612-T-4R7-J |
| L42 | 23642/535 | INDUCTOR-FIXED 1uH +/- 5% EPOXY-MOULD, 400mA 0R7 MAX, 30 Q @ 7.96 MHz, 120 MHz SRF, SURFACE | MEGGITT ELECTRONICS | 3612-T-1R0-J |
| R1 | 24811/149 | RESISTOR-FIXED METAL-FILM 100R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100R-1%50ppm |
| R2 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R3 | 24811/169 | RESISTOR-FIXED METAL-FILM 681R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-681R-1%50ppm |

## AE6 Spectrum analyzer (contd.)

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
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| R4 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R5 | 24811/157 | RESISTOR-FIXED METAL-FILM 221R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-221R-1%50ppm |
| R6 | 24811/245 | RESISTOR-FIXED METAL-FILM 1M +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1M0-1%50ppm |
| R7 | 24811/179 | RESISTOR-FIXED METAL-FILM 1K82 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-1K82-1%50ppm |
| R8 | 24811/149 | RESISTOR-FIXED METAL-FILM 100R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100R-1%50ppm |
| R9 | 25748/564 | RESISTOR-VARIABLE CERMET LINEAR, 500R 10% 500mW 200V 100 ppm/DEG.C, MULTI-TURN, VERTICAL-PCB, | MEGGITT ELECTRONICS | 4290W404/8/06411/501 |
| R10 | 24811/245 | RESISTOR-FIXED METAL-FILM 1M +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1M0-1%50ppm |
| R11 | 24811/165 | RESISTOR-FIXED METAL-FILM 475R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-475R-1%50ppm |
| R12 | 24811/165 | RESISTOR-FIXED METAL-FILM 475R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-475R-1%50ppm |
| R13 | 24811/168 | RESISTOR-FIXED METAL-FILM 619R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-619R-1%50ppm |
| R14 | 24811/179 | RESISTOR-FIXED METAL-FILM 1K82 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-1K82-1%50ppm |
| R15 | 24811/157 | RESISTOR-FIXED METAL-FILM 221R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-221R-1%50ppm |
| R16 | 24811/245 | RESISTOR-FIXED METAL-FILM 1M +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1M0-1%50ppm |
| R17 | 24811/179 | RESISTOR-FIXED METAL-FILM 1K82 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-1K82-1%50ppm |
| R18 | 24811/149 | RESISTOR-FIXED METAL-FILM 100R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100R-1%50ppm |
| R19 | 25748/564 | RESISTOR-VARIABLE CERMET LINEAR, 500R 10% 500mW 200V 100 ppm/DEG.C, MULTI-TURN, VERTICAL-PCB, | MEGGITT ELECTRONICS | 4290W404/8/06411/501 |
| R20 | 24811/165 | RESISTOR-FIXED METAL-FILM 475R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-475R-1%50ppm |
| R21 | 24811/179 | RESISTOR-FIXED METAL-FILM 1K82 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-1K82-1%50ppm |
| R22 | 24811/165 | RESISTOR-FIXED METAL-FILM 475R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-475R-1%50ppm |
| R23 | 24811/245 | RESISTOR-FIXED METAL-FILM 1M +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1M0-1%50ppm |
| R24 | 24811/193 | RESISTOR-FIXED METAL-FILM 6K81 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-6K81-1%50ppm |
| R25 | 24811/175 | RESISTOR-FIXED METAL-FILM 1K21 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-1K21-1%50ppm |
| R26 | 24811/165 | RESISTOR-FIXED METAL-FILM 475R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-475R-1%50ppm |
| R27 | 24811/180 | RESISTOR-FIXED METAL-FILM 2K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-2K0-1%50ppm |
| R28 | 24811/245 | RESISTOR-FIXED METAL-FILM 1M +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1M0-1%50ppm |

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| **AE6 Spectrum analyzer (contd.)** | | | | |
| R29 | 24811/157 | RESISTOR-FIXED METAL-FILM 221R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-221R-1%50ppm |
| R30 | 24811/183 | RESISTOR-FIXED METAL-FILM 2K74 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-2K74-1%50ppm |
| R31 | 24811/149 | RESISTOR-FIXED METAL-FILM 100R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100R-1%50ppm |
| R32 | 25748/564 | RESISTOR-VARIABLE CERMET LINEAR, 500R 10% 500mW 200V 100 ppm/DEG.C, MULTI-TURN, VERTICAL-PCB, | MEGGITT ELECTRONICS | 4290W404/8/06411/501 |
| R33 | 24811/245 | RESISTOR-FIXED METAL-FILM 1M +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1M0-1%50ppm |
| R34 | 24811/165 | RESISTOR-FIXED METAL-FILM 475R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-475R-1%50ppm |
| R35 | 24811/165 | RESISTOR-FIXED METAL-FILM 475R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-475R-1%50ppm |
| R36 | 24811/168 | RESISTOR-FIXED METAL-FILM 619R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-619R-1%50ppm |
| R37 | 24811/179 | RESISTOR-FIXED METAL-FILM 1K82 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-1K82-1%50ppm |
| R38 | 24811/157 | RESISTOR-FIXED METAL-FILM 221R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-221R-1%50ppm |
| R39 | 24811/245 | RESISTOR-FIXED METAL-FILM 1M +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1M0-1%50ppm |
| R40 | 24811/179 | RESISTOR-FIXED METAL-FILM 1K82 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-1K82-1%50ppm |
| R41 | 24811/149 | RESISTOR-FIXED METAL-FILM 100R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100R-1%50ppm |
| R42 | 25748/564 | RESISTOR-VARIABLE CERMET LINEAR, 500R 10% 500mW 200V 100 ppm/DEG.C, MULTI-TURN, VERTICAL-PCB, | MEGGITT ELECTRONICS | 4290W404/8/06411/501 |
| R43 | 24811/245 | RESISTOR-FIXED METAL-FILM 1M +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1M0-1%50ppm |
| R44 | 24811/165 | RESISTOR-FIXED METAL-FILM 475R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-475R-1%50ppm |
| R45 | 24811/175 | RESISTOR-FIXED METAL-FILM 1K21 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-1K21-1%50ppm |
| R46 | 24811/165 | RESISTOR-FIXED METAL-FILM 475R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-475R-1%50ppm |
| R47 | 24811/179 | RESISTOR-FIXED METAL-FILM 1K82 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-1K82-1%50ppm |
| R48 | 24811/193 | RESISTOR-FIXED METAL-FILM 6K81 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-6K81-1%50ppm |
| R49 | 24811/165 | RESISTOR-FIXED METAL-FILM 475R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-475R-1%50ppm |
| R50 | 24811/180 | RESISTOR-FIXED METAL-FILM 2K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-2K0-1%50ppm |
| R51 | 24811/245 | RESISTOR-FIXED METAL-FILM 1M +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1M0-1%50ppm |
| R52 | 24811/157 | RESISTOR-FIXED METAL-FILM 221R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-221R-1%50ppm |
| R53 | 24811/149 | RESISTOR-FIXED METAL-FILM 100R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100R-1%50ppm |

## AE6 Spectrum analyzer (contd.)

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| R54 | 24811/183 | RESISTOR-FIXED METAL-FILM 2K74 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-2K74-1%50ppm |
| R55 | 25748/564 | RESISTOR-VARIABLE CERMET LINEAR, 500R 10% 500mW 200V 100 ppm/DEG.C, MULTI-TURN, VERTICAL-PCB, | MEGGITT ELECTRONICS | 4290W404/8/06411/501 |
| R56 | 24811/165 | RESISTOR-FIXED METAL-FILM 475R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-475R-1%50ppm |
| R57 | 24811/245 | RESISTOR-FIXED METAL-FILM 1M +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1M0-1%50ppm |
| R58 | 24811/165 | RESISTOR-FIXED METAL-FILM 475R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-475R-1%50ppm |
| R59 | 24811/125 | RESISTOR-FIXED METAL-FILM 10R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10R-1%-50ppm |
| R61 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R64 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R65 | 24811/149 | RESISTOR-FIXED METAL-FILM 100R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100R-1%50ppm |
| R66 | 24811/149 | RESISTOR-FIXED METAL-FILM 100R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100R-1%50ppm |
| R67 | 24811/146 | RESISTOR-FIXED METAL-FILM 75R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-75R0-1%50ppm |
| R68 | 24811/149 | RESISTOR-FIXED METAL-FILM 100R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100R-1%50ppm |
| R73 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R74 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R75 | 24811/181 | RESISTOR-FIXED METAL-FILM 2K21 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-2K21-1%50ppm |
| R77 | 24811/161 | RESISTOR-FIXED METAL-FILM 332R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-332R-1%50ppm |
| R78 | 24811/221 | RESISTOR-FIXED METAL-FILM 100K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100K-1%50ppm |
| R79 to R83 | 24811/125 | RESISTOR-FIXED METAL-FILM 10R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10R-1%-50ppm |
| R84 to R88 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R89 | 24811/149 | RESISTOR-FIXED METAL-FILM 100R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100R-1%50ppm |
| R90 | 24811/149 | RESISTOR-FIXED METAL-FILM 100R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100R-1%50ppm |
| R92 to R96 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R97 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R98 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R100 | 24811/142 | RESISTOR-FIXED METAL-FILM 51R1 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-51R1-1%50ppm |

## AE6 Spectrum analyzer (contd.)

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| R102 to R121 | 24811/165 | RESISTOR-FIXED METAL-FILM 475R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-475R-1%50ppm |
| R122 | 24811/175 | RESISTOR-FIXED METAL-FILM 1K21 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-1K21-1%50ppm |
| R123 | 24811/149 | RESISTOR-FIXED METAL-FILM 100R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100R-1%50ppm |
| R124 to R131 | 24811/145 | RESISTOR-FIXED METAL-FILM 68R1 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-68R1-1%50ppm |
| R132 | 24811/183 | RESISTOR-FIXED METAL-FILM 2K74 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-2K74-1%50ppm |
| R133 | 24811/177 | RESISTOR-FIXED METAL-FILM 1K5 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K5-1%50ppm |
| R134 | 24811/153 | RESISTOR-FIXED METAL-FILM 150R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-150R-1%50ppm |
| R135 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R136 | 24811/201 | RESISTOR-FIXED METAL-FILM 15K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-15K-1%50ppm |
| R137 | 24811/205 | RESISTOR-FIXED METAL-FILM 22K1 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-22K1-1%50ppm |
| R138 | 24811/213 | RESISTOR-FIXED METAL-FILM 47K5 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-47K5-1%50ppm |
| R139 | 24811/213 | RESISTOR-FIXED METAL-FILM 47K5 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-47K5-1%50ppm |
| R140 | 25748/566 | RESISTOR-VARIABLE CERMET LINEAR, 10K 10% 500mW 200V 100 ppm/DEG.C, MULTI-TURN, VERTICAL-PCB, | MEGGITT ELECTRONICS | 4290W404/8/06411/103 |
| R141 | 25748/570 | RESISTOR-VARIABLE CERMET LINEAR, 50K 10% 500mW 200V 100 ppm/DEG.C, MULTI-TURN, VERTICAL-PCB, | MEGGITT ELECTRONICS | 4290W404/8/06411/503 |
| R142 | 24811/209 | RESISTOR-FIXED METAL-FILM 33K2 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-33K2-1%50ppm |
| R144 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R145 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R146 | 24811/208 | RESISTOR-FIXED METAL-FILM 30K1 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-30K1-1%50ppm |
| R147 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R148 | 24811/221 | RESISTOR-FIXED METAL-FILM 100K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100K-1%50ppm |
| R149 | 24811/165 | RESISTOR-FIXED METAL-FILM 475R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-475R-1%50ppm |
| R151 | 24811/142 | RESISTOR-FIXED METAL-FILM 51R1 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-51R1-1%50ppm |
| R152 | 24811/167 | RESISTOR-FIXED METAL-FILM 562R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-562R-1%50ppm |
| R153 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R154 | 24811/181 | RESISTOR-FIXED METAL-FILM 2K21 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-2K21-1%50ppm |

## AE6 Spectrum analyzer (contd.)

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| R155 | 24811/149 | RESISTOR-FIXED METAL-FILM 100R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100R-1%50ppm |
| R156 | 24811/141 | RESISTOR-FIXED METAL-FILM 47R5 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-47R5-1%50ppm |
| R157 | 25748/564 | RESISTOR-VARIABLE CERMET LINEAR, 500R 10% 500mW 200V 100 ppm/DEG.C, MULTI-TURN, VERTICAL-PCB, | MEGGITT ELECTRONICS | 4290W404/8/06411/501 |
| R158 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R159 | 24811/142 | RESISTOR-FIXED METAL-FILM 51R1 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-51R1-1%50ppm |
| R160 | 24811/177 | RESISTOR-FIXED METAL-FILM 1K5 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K5-1%50ppm |
| R161 | 24811/161 | RESISTOR-FIXED METAL-FILM 332R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-332R-1%50ppm |
| R162 | 24811/149 | RESISTOR-FIXED METAL-FILM 100R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100R-1%50ppm |
| R163 | 24811/181 | RESISTOR-FIXED METAL-FILM 2K21 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-2K21-1%50ppm |
| R164 | 24811/161 | RESISTOR-FIXED METAL-FILM 332R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-332R-1%50ppm |
| R165 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R166 | 24811/181 | RESISTOR-FIXED METAL-FILM 2K21 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-2K21-1%50ppm |
| R167 | 24811/142 | RESISTOR-FIXED METAL-FILM 51R1 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-51R1-1%50ppm |
| R168 | 24811/177 | RESISTOR-FIXED METAL-FILM 1K5 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K5-1%50ppm |
| R169 | 24811/161 | RESISTOR-FIXED METAL-FILM 332R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-332R-1%50ppm |
| R170 | 24811/142 | RESISTOR-FIXED METAL-FILM 51R1 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-51R1-1%50ppm |
| R171 | 24811/181 | RESISTOR-FIXED METAL-FILM 2K21 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-2K21-1%50ppm |
| R172 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R173 | 24811/161 | RESISTOR-FIXED METAL-FILM 332R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-332R-1%50ppm |
| R174 | 24811/181 | RESISTOR-FIXED METAL-FILM 2K21 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-2K21-1%50ppm |
| R175 | 24811/142 | RESISTOR-FIXED METAL-FILM 51R1 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-51R1-1%50ppm |
| R176 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R177 | 24811/167 | RESISTOR-FIXED METAL-FILM 562R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-562R-1%50ppm |
| R178 | 24811/137 | RESISTOR-FIXED METAL-FILM 33R2 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-33R2-1%50ppm |
| R179 | 24811/181 | RESISTOR-FIXED METAL-FILM 2K21 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-2K21-1%50ppm |

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| **AE6 Spectrum analyzer (contd.)** | | | | |
| R180 | 24811/125 | RESISTOR-FIXED METAL-FILM 10R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10R-1%-50ppm |
| R181 | 24811/157 | RESISTOR-FIXED METAL-FILM 221R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-221R-1%50ppm |
| R182 | 24811/165 | RESISTOR-FIXED METAL-FILM 475R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-475R-1%50ppm |
| R183 | 24811/165 | RESISTOR-FIXED METAL-FILM 475R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-475R-1%50ppm |
| R184 | 24811/142 | RESISTOR-FIXED METAL-FILM 51R1 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-51R1-1%50ppm |
| R185 | 24811/181 | RESISTOR-FIXED METAL-FILM 2K21 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-2K21-1%50ppm |
| R186 | 24811/149 | RESISTOR-FIXED METAL-FILM 100R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100R-1%50ppm |
| R187 | 24811/165 | RESISTOR-FIXED METAL-FILM 475R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-475R-1%50ppm |
| R188 to R195 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R196 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R197 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R198 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R199 to R201 | 24811/245 | RESISTOR-FIXED METAL-FILM 1M +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1M0-1%50ppm |
| R202 | 24811/207 | RESISTOR-FIXED METAL-FILM 27K4 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-27K4-1%50ppm |
| R203 | 24811/199 | RESISTOR-FIXED METAL-FILM 12K1 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-12K1-1%50ppm |
| R204 | 24811/189 | RESISTOR-FIXED METAL-FILM 4K75 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-4K75-1%50ppm |
| R205 | 24811/232 | RESISTOR-FIXED METAL-FILM 301K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-301K-1%50ppm |
| R206 | 24811/189 | RESISTOR-FIXED METAL-FILM 4K75 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-4K75-1%50ppm |
| R207 | 24811/181 | RESISTOR-FIXED METAL-FILM 2K21 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-2K21-1%50ppm |
| R208 | 24811/189 | RESISTOR-FIXED METAL-FILM 4K75 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-4K75-1%50ppm |
| R209 | 24811/232 | RESISTOR-FIXED METAL-FILM 301K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-301K-1%50ppm |
| R210 | 24811/189 | RESISTOR-FIXED METAL-FILM 4K75 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-4K75-1%50ppm |
| R211 | 24811/181 | RESISTOR-FIXED METAL-FILM 2K21 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-2K21-1%50ppm |
| R212 | 24811/189 | RESISTOR-FIXED METAL-FILM 4K75 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-4K75-1%50ppm |
| R213 | 24811/232 | RESISTOR-FIXED METAL-FILM 301K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-301K-1%50ppm |

## AE6 Spectrum analyzer (contd.)

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| R214 | 24811/189 | RESISTOR-FIXED METAL-FILM 4K75 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-4K75-1%50ppm |
| R215 | 24811/181 | RESISTOR-FIXED METAL-FILM 2K21 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-2K21-1%50ppm |
| R216 | 24811/189 | RESISTOR-FIXED METAL-FILM 4K75 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-4K75-1%50ppm |
| R217 | 24811/232 | RESISTOR-FIXED METAL-FILM 301K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-301K-1%50ppm |
| R218 | 24811/189 | RESISTOR-FIXED METAL-FILM 4K75 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-4K75-1%50ppm |
| R219 | 24811/181 | RESISTOR-FIXED METAL-FILM 2K21 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-2K21-1%50ppm |
| R220 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R221 | 24811/205 | RESISTOR-FIXED METAL-FILM 22K1 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-22K1-1%50ppm |
| R222 | 24811/193 | RESISTOR-FIXED METAL-FILM 6K81 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-6K81-1%50ppm |
| R223 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R224 | 24811/205 | RESISTOR-FIXED METAL-FILM 22K1 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-22K1-1%50ppm |
| R225 | 24811/193 | RESISTOR-FIXED METAL-FILM 6K81 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-6K81-1%50ppm |
| R226 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R227 | 24811/205 | RESISTOR-FIXED METAL-FILM 22K1 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-22K1-1%50ppm |
| R228 | 24811/193 | RESISTOR-FIXED METAL-FILM 6K81 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-6K81-1%50ppm |
| R229 | 24811/181 | RESISTOR-FIXED METAL-FILM 2K21 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-2K21-1%50ppm |
| R230 | 24811/147 | RESISTOR-FIXED METAL-FILM 82R5 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-82R5-1%50ppm |
| R231 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R232 | 24811/205 | RESISTOR-FIXED METAL-FILM 22K1 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-22K1-1%50ppm |
| R233 | 24811/193 | RESISTOR-FIXED METAL-FILM 6K81 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-6K81-1%50ppm |
| R234 | 24811/245 | RESISTOR-FIXED METAL-FILM 1M +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1M0-1%50ppm |
| R235 | 24811/142 | RESISTOR-FIXED METAL-FILM 51R1 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-51R1-1%50ppm |
| R236 | 24811/142 | RESISTOR-FIXED METAL-FILM 51R1 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-51R1-1%50ppm |
| R237 | 24811/151 | RESISTOR-FIXED METAL-FILM 121R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-121R-1%50ppm |
| R238 | 24811/221 | RESISTOR-FIXED METAL-FILM 100K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100K-1%50ppm |

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| **AE6 Spectrum analyzer (contd.)** | | | | |
| R239 to R242 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R243 to R247 | 24811/205 | RESISTOR-FIXED METAL-FILM 22K1 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-22K1-1%50ppm |
| R248 | 24811/177 | RESISTOR-FIXED METAL-FILM 1K5 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K5-1%50ppm |
| R249 | 24811/165 | RESISTOR-FIXED METAL-FILM 475R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-475R-1%50ppm |
| R250 | 24811/193 | RESISTOR-FIXED METAL-FILM 6K81 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-6K81-1%50ppm |
| R251 | 24772/117 | RESISTOR-FIXED METAL-FILM 68K +/- 2% 125mW 150V 100 ppm/DEG.C, AXIAL, (TAPED). | VISHAY COMPONENTS | NK3-68K-2% |
| R252 | 24772/097 | RESISTOR-FIXED METAL-FILM 10K +/- 2% 125mW 150V 100 ppm/DEG.C, AXIAL, (TAPED). | VISHAY COMPONENTS | NK3-10K-2% |
| T1 | 43590/236 | WOUND-PART TRANSFORMER, RING-CORE, 10:10 TURNS, TWISTED BIFILAR WOUND, MOUNTED ON 6-PIN TOROID | AMETHYST DESIGNS LTD | AD5324 |
| TR1 to TR26 | 28457/850 | TRANSISTOR NPN BIPOLAR FMMT2369... 40V 600MHz 300mW 500mA 40hFE MIN @ 10mA, MARKING CODE *1J, | PHILIPS | PMBT2369 |
| TR27 | 28459/061 | TRANSISTOR N-CHANNEL-DEPLETION JFET BSR56... 40V 250mW 50mA MARKING CODE M4, SURFACE MOUNTED, | PHILIPS | BSR56 |
| TR28 | 28459/061 | TRANSISTOR N-CHANNEL-DEPLETION JFET BSR56... 40V 250mW 50mA MARKING CODE M4, SURFACE MOUNTED, | PHILIPS | BSR56 |
| TR29 to TR40 | 28457/850 | TRANSISTOR NPN BIPOLAR FMMT2369... 40V 600MHz 300mW 500mA 40hFE MIN @ 10mA, MARKING CODE *1J, | PHILIPS | PMBT2369 |
| XL1 to XL5 | 28312/125 | CRYSTAL 10.7 MHz +/- 20 ppm, 30pF SERIES RESONANCE, 25mH - 16R ESR MAX, HC-43/U, WIRE | C-MAC CRYSTALS LTD | C5742 |
| XL6 | 23642/944 | FILTER HF, PCB-MOUNT, CERAMIC, RADIAL, 10.7MHz, 280KHz B/WIDTH @ -3dB, 650KHz B/WIDTH @ -20dB, 330 | MURATA ELECTRONICS | SFE10.7MA5-A |
| XL7 | 23642/945 | FILTER HF, PCB-MOUNT, CERAMIC, RADIAL, 10.7MHz, 110KHz B/WIDTH @ -3dB, 350KHz B/WIDTH @ -20dB, 330 | MURATA ELECTRONICS | SFE10.7MHY-A |

## AE6/2 Spectrum analyzer

When ordering, prefix circuit reference with AE6/2.

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| | 44830-094 | Complete unit | Issue 04 | |
| C1 to C3 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C4 | 26878/402 | CAPACITOR-VARIABLE PTFE 2pF to 15pF 200 ppm/DEG.C, VERTICAL-PCB MOUNT, 5mm DIA, 5mm PWP, 2 PIN, CODED | DAU COMPONENTS LTD | 105-3901-015 |
| C5 | 26343/767 | CAPACITOR-FIXED CERAMIC 10pF +/-5% 50V NPO MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-100-DP |
| C6 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C7 | 26386/804 | CAPACITOR-FIXED CERAMIC 2.2pF +/-0.5pF 50V NPO MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-2R2-DP |
| C8 to C12 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C13 | 26878/402 | CAPACITOR-VARIABLE PTFE 2pF to 15pF 200 ppm/DEG.C, VERTICAL-PCB MOUNT, 5mm DIA, 5mm PWP, 2 PIN, CODED | DAU COMPONENTS LTD | 105-3901-015 |
| C14 | 26343/767 | CAPACITOR-FIXED CERAMIC 10pF +/-5% 50V NPO MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-100-DP |
| C15 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C16 | 26386/808 | CAPACITOR-FIXED CERAMIC 4.7pF +/-0.5pF 50V NPO MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-4R7-DP |
| C17 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C18 | 26878/402 | CAPACITOR-VARIABLE PTFE 2pF to 15pF 200 ppm/DEG.C, VERTICAL-PCB MOUNT, 5mm DIA, 5mm PWP, 2 PIN, CODED | DAU COMPONENTS LTD | 105-3901-015 |
| C19 | 26343/767 | CAPACITOR-FIXED CERAMIC 10pF +/-5% 50V NPO MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-100-DP |
| C20 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C21 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C22 | 26386/804 | CAPACITOR-FIXED CERAMIC 2.2pF +/-0.5pF 50V NPO MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-2R2-DP |
| C23 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C24 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C25 | 26878/402 | CAPACITOR-VARIABLE PTFE 2pF to 15pF 200 ppm/DEG.C, VERTICAL-PCB MOUNT, 5mm DIA, 5mm PWP, 2 PIN, CODED | DAU COMPONENTS LTD | 105-3901-015 |
| C26 | 26343/767 | CAPACITOR-FIXED CERAMIC 10pF +/-5% 50V NPO MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-100-DP |
| C27 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C28 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C29 | 26386/808 | CAPACITOR-FIXED CERAMIC 4.7pF +/-0.5pF 50V NPO MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-4R7-DP |

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|

## AE6/2 Spectrum analyzer (contd.)

| | | | | |
|---|---|---|---|---|
| C30 to C33 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C34 | 26878/402 | CAPACITOR-VARIABLE PTFE 2pF to 15pF 200 ppm/DEG.C, VERTICAL-PCB MOUNT, 5mm DIA, 5mm PWP, 2 PIN, CODED | DAU COMPONENTS LTD | 105-3901-015 |
| C35 | 26343/767 | CAPACITOR-FIXED CERAMIC 10pF +/-5% 50V NPO MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-100-DP |
| C36 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C37 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C38 | 26386/804 | CAPACITOR-FIXED CERAMIC 2.2pF +/-0.5pF 50V NPO MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-2R2-DP |
| C39 to C41 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C42 | 26878/402 | CAPACITOR-VARIABLE PTFE 2pF to 15pF 200 ppm/DEG.C, VERTICAL-PCB MOUNT, 5mm DIA, 5mm PWP, 2 PIN, CODED | DAU COMPONENTS LTD | 105-3901-015 |
| C43 | 26343/767 | CAPACITOR-FIXED CERAMIC 10pF +/-5% 50V NPO MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-100-DP |
| C44 | 26386/808 | CAPACITOR-FIXED CERAMIC 4.7pF +/-0.5pF 50V NPO MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-4R7-DP |
| C45 to C47 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C48 | 26878/402 | CAPACITOR-VARIABLE PTFE 2pF to 15pF 200 ppm/DEG.C, VERTICAL-PCB MOUNT, 5mm DIA, 5mm PWP, 2 PIN, CODED | DAU COMPONENTS LTD | 105-3901-015 |
| C49 | 26343/767 | CAPACITOR-FIXED CERAMIC 10pF +/-5% 50V NPO MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-100-DP |
| C50 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C51 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C52 | 26386/804 | CAPACITOR-FIXED CERAMIC 2.2pF +/-0.5pF 50V NPO MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-2R2-DP |
| C53 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C54 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C55 | 26878/402 | CAPACITOR-VARIABLE PTFE 2pF to 15pF 200 ppm/DEG.C, VERTICAL-PCB MOUNT, 5mm DIA, 5mm PWP, 2 PIN, CODED | DAU COMPONENTS LTD | 105-3901-015 |
| C56 | 26343/767 | CAPACITOR-FIXED CERAMIC 10pF +/-5% 50V NPO MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-100-DP |
| C57 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C58 | 26386/808 | CAPACITOR-FIXED CERAMIC 4.7pF +/-0.5pF 50V NPO MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-4R7-DP |
| C59 to C64 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C65 | 26878/402 | CAPACITOR-VARIABLE PTFE 2pF to 15pF 200 ppm/DEG.C, VERTICAL-PCB MOUNT, 5mm DIA, 5mm PWP, 2 PIN, CODED | DAU COMPONENTS LTD | 105-3901-015 |
| C66 | 26343/767 | CAPACITOR-FIXED CERAMIC 10pF +/-5% 50V NPO MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-100-DP |

## AE6/2 Spectrum analyzer (contd.)

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| C67 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C68 | 26386/804 | CAPACITOR-FIXED CERAMIC 2.2pF +/-0.5pF 50V NPO MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-2R2-DP |
| C69 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C70 | 26878/402 | CAPACITOR-VARIABLE PTFE 2pF to 15pF 200 ppm/DEG.C, VERTICAL-PCB MOUNT, 5mm DIA, 5mm PWP, 2 PIN, CODED | DAU COMPONENTS LTD | 105-3901-015 |
| C71 | 26343/767 | CAPACITOR-FIXED CERAMIC 10pF +/-5% 50V NPO MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-100-DP |
| C72 to C74 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C75 | 26386/808 | CAPACITOR-FIXED CERAMIC 4.7pF +/-0.5pF 50V NPO MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-4R7-DP |
| C76 to C82 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C83 | 26386/899 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | ROHM ELECTRONICS LTD | MCH31-5C-104-KP |
| C84 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C86 | 26386/818 | CAPACITOR-FIXED CERAMIC 33pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-330-JP |
| C87 | 26343/767 | CAPACITOR-FIXED CERAMIC 10pF +/-5% 50V NPO MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-100-DP |
| C88 to C94 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C103 | 26386/815 | CAPACITOR-FIXED CERAMIC 18pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-180-JP |
| C104 | 26386/932 | CAPACITOR-FIXED CERAMIC 1nF +/-1% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | AVX LTD | 1206-5A-102-FAT-1A |
| C105 | 26386/932 | CAPACITOR-FIXED CERAMIC 1nF +/-1% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | AVX LTD | 1206-5A-102-FAT-1A |
| C106 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C107 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C108 | 26386/899 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | ROHM ELECTRONICS LTD | MCH31-5C-104-KP |
| C109 | 26451/009 | CAPACITOR-FIXED ALUMINIUM 47uF +/-20% 16V ELECTROLYTIC, SURFACE-MOUNTED, SIZE 6.6 x 6.6mm, | PANASONIC INDUSTRIAL | ECE-V-1CA-470P |
| C110 to C120 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C136 | 26386/871 | CAPACITOR-FIXED CERAMIC 4.7nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-472-KP |
| C137 | 26878/402 | CAPACITOR-VARIABLE PTFE 2pF to 15pF 200 ppm/DEG.C, VERTICAL-PCB MOUNT, 5mm DIA, 5mm PWP, 2 PIN, CODED | DAU COMPONENTS LTD | 105-3901-015 |
| C138 | 26451/009 | CAPACITOR-FIXED ALUMINIUM 47uF +/-20% 16V ELECTROLYTIC, SURFACE-MOUNTED, SIZE 6.6 x 6.6mm, | PANASONIC INDUSTRIAL | ECE-V-1CA-470P |
| C139 | 26451/009 | CAPACITOR-FIXED ALUMINIUM 47uF +/-20% 16V ELECTROLYTIC, SURFACE-MOUNTED, SIZE 6.6 x 6.6mm, | PANASONIC INDUSTRIAL | ECE-V-1CA-470P |

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| **AE6/2 Spectrum analyzer (contd.)** | | | | |
| C142 | 26878/402 | CAPACITOR-VARIABLE PTFE 2pF to 15pF 200 ppm/DEG.C, VERTICAL-PCB MOUNT, 5mm DIA, 5mm PWP, 2 PIN, CODED | DAU COMPONENTS LTD | 105-3901-015 |
| C151 to C180 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C181 to C183 | 26451/009 | CAPACITOR-FIXED ALUMINIUM 47uF +/-20% 16V ELECTROLYTIC, SURFACE-MOUNTED, SIZE 6.6 x 6.6mm, | PANASONIC INDUSTRIAL | ECE-V-1CA-470P |
| C184 | 26386/777 | CAPACITOR-FIXED CERAMIC 47nF +/-20% 63V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | PHILIPS | 1206-2R-473-K9-BBC |
| C185 to C191 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C500 | 26386/824 | CAPACITOR-FIXED CERAMIC 100pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-101-JP |
| D1 to D7 | 28383/931 | DIODE PIN, BAR14-1... DUAL, 140mW 100V 100mA 0.5pF 1.25Vf @ 100mA, IN SERIES, MARKING CODE L7, | SIEMENS LTD | BAR14-1-E6327 |
| D9 to D18 | 28381/531 | DIODE VARIABLE CAPACITNCE, BBY31... 28V 20mA 2pF @ 28V, CAPAC RATIO 9.7 TYP, MARKING CODE S1, SURFACE | PHILIPS | BBY31 |
| D19 to D22 | 28335/670 | DIODE BAND SWITCHING, BAT18... 35V 100mA 1pF MAX @ 20V, 1.2Vf @ 100mA, MARKING CODE A2, SURFACE | PHILIPS | BAT18/T1 |
| D23 to D27 | 28383/931 | DIODE PIN, BAR14-1... DUAL, 140mW 100V 100mA 0.5pF 1.25Vf @ 100mA, IN SERIES, MARKING CODE L7, | SIEMENS LTD | BAR14-1-E6327 |
| D28 to D40 | 28335/670 | DIODE BAND SWITCHING, BAT18... 35V 100mA 1pF MAX @ 20V, 1.2Vf @ 100mA, MARKING CODE A2, SURFACE | PHILIPS | BAT18/T1 |
| D41 to D43 | 28383/930 | DIODE SMALL-SIGNAL, BAS16... 330mW 75V 250mA 2pF 1Vf @ 50mA, MARKING CODE A6, SURFACE MOUNTED, | PHILIPS | BAS16 |
| D44 | 28371/412 | DIODE ZENER, BZX84-C5V1... 350mW 5.1V 5% 250mA MARKING CODE Z2, SURFACE MOUNTED, SOT-23, (8mm | PHILIPS | BZX84-C5V1 |
| IC1 | 28461/522 | IC-ANALOGUE LIMITING-AMPLIFIER AD606... 5V 20mA 9-STAGE, LOG AMP FREQ 50MHz MAX, LIMITER OUTPUT | ANALOG DEVICES LTD | AD606JR |
| IC2 | 28461/412 | IC-ANALOGUE OPERATIONAL AMP TL072... DUAL, 18V UNITY GAIN BNDWDTH 3MHz, OFFSET VOLTAGE 10mV, SLEW | MOTOROLA INC. | TL072CD |
| IC3 | 28461/803 | IC-ANALOGUE VOLTAGE-REFERENCE LT1019... 5V PRECISION, OUTPUT VOLTAGE DRIFT 20ppm/DEG.C MAX, | LINEAR TECHNOLOGY | LT1019CS8-5 |
| IC4 | 28461/896 | IC-ANALOGUE SWITCH DG413... QUAD, 15V SPST, ON-RESISTANCE<35R, 2 x N/O & 2 x N/C @ LOGIC 1, | TEMIC UK LTD | DG413DY |
| IC13 to IC15 | 28461/413 | IC-ANALOGUE OPERATIONAL AMP TL074... QUAD, JFET INPUT, LOW NOISE, SLEW RATE 8V/uS MIN, GAIN | MOTOROLA INC. | TL074CD |
| IC16 | 28461/885 | IC-ANALOGUE D/A-CONVERTER TDA8444... 18V 10mA I.IC BUS CONTROL OF 8x6 BIT CONVERTERS, CMOS, 16 PIN, | PHILIPS | TDA8444-N2 |
| IC17 | 28467/111 | IC-MICRO PERIPHERAL, PCF8574... REMOTE 8-BIT I/O EXPANDER, I.IC BUS, UP TO 8 DEVICE ADDRESS | PHILIPS | PCF8574T |
| L1 | 23642/537 | INDUCTOR-FIXED 4.7uH +/- 5% EPOXY-MOULD, 220mA 1R5 MAX, 30 Q @ 7.96 MHz, 50 MHz SRF, SURFACE MOUNTED, | MEGGITT ELECTRONICS | 3612-T-4R7-J |
| L2 | 23642/555 | INDUCTOR-FIXED 10uH +/- 10% COATED-LACQUER, MINIATURE, 470mA 0R9 MAX, 45 Q @ 7.9 MHz, 45 MHz | MEGGITT ELECTRONICS | C11-406/8/27520/006 |

## AE6/2 Spectrum analyzer (contd.)

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| L3 | 23642/533 | INDUCTOR-FIXED 10uH +/- 5% EPOXY-MOULD, 150mA 2R1 MAX, 30 Q @ 2.52 MHz, 36 MHz SRF, SURFACE MOUNTED, | MEGGITT ELECTRONICS | 3612-T-100-J |
| L4 | 23642/533 | INDUCTOR-FIXED 10uH +/- 5% EPOXY-MOULD, 150mA 2R1 MAX, 30 Q @ 2.52 MHz, 36 MHz SRF, SURFACE MOUNTED, | MEGGITT ELECTRONICS | 3612-T-100-J |
| L5 | 23642/555 | INDUCTOR-FIXED 10uH +/- 10% COATED-LACQUER, MINIATURE, 470mA 0R9 MAX, 45 Q @ 7.9 MHz, 45 MHz | MEGGITT ELECTRONICS | C11-406/8/27520/006 |
| L6 | 23642/555 | INDUCTOR-FIXED 10uH +/- 10% COATED-LACQUER, MINIATURE, 470mA 0R9 MAX, 45 Q @ 7.9 MHz, 45 MHz | MEGGITT ELECTRONICS | C11-406/8/27520/006 |
| L7 | 23642/533 | INDUCTOR-FIXED 10uH +/- 5% EPOXY-MOULD, 150mA 2R1 MAX, 30 Q @ 2.52 MHz, 36 MHz SRF, SURFACE MOUNTED, | MEGGITT ELECTRONICS | 3612-T-100-J |
| L8 | 23642/555 | INDUCTOR-FIXED 10uH +/- 10% COATED-LACQUER, MINIATURE, 470mA 0R9 MAX, 45 Q @ 7.9 MHz, 45 MHz | MEGGITT ELECTRONICS | C11-406/8/27520/006 |
| L9 | 23642/555 | INDUCTOR-FIXED 10uH +/- 10% COATED-LACQUER, MINIATURE, 470mA 0R9 MAX, 45 Q @ 7.9 MHz, 45 MHz | MEGGITT ELECTRONICS | C11-406/8/27520/006 |
| L10 | 23642/537 | INDUCTOR-FIXED 4.7uH +/- 5% EPOXY-MOULD, 220mA 1R5 MAX, 30 Q @ 7.96 MHz, 50 MHz SRF, SURFACE MOUNTED, | MEGGITT ELECTRONICS | 3612-T-4R7-J |
| L11 to L24 | 23642/533 | INDUCTOR-FIXED 10uH +/- 5% EPOXY-MOULD, 150mA 2R1 MAX, 30 Q @ 2.52 MHz, 36 MHz SRF, SURFACE MOUNTED, | MEGGITT ELECTRONICS | 3612-T-100-J |
| L25 | 23642/537 | INDUCTOR-FIXED 4.7uH +/- 5% EPOXY-MOULD, 220mA 1R5 MAX, 30 Q @ 7.96 MHz, 50 MHz SRF, SURFACE MOUNTED, | MEGGITT ELECTRONICS | 3612-T-4R7-J |
| L27 | 23642/537 | INDUCTOR-FIXED 4.7uH +/- 5% EPOXY-MOULD, 220mA 1R5 MAX, 30 Q @ 7.96 MHz, 50 MHz SRF, SURFACE MOUNTED, | MEGGITT ELECTRONICS | 3612-T-4R7-J |
| L28 to L39 | 23642/533 | INDUCTOR-FIXED 10uH +/- 5% EPOXY-MOULD, 150mA 2R1 MAX, 30 Q @ 2.52 MHz, 36 MHz SRF, SURFACE MOUNTED, | MEGGITT ELECTRONICS | 3612-T-100-J |
| L41 | 23642/537 | INDUCTOR-FIXED 4.7uH +/- 5% EPOXY-MOULD, 220mA 1R5 MAX, 30 Q @ 7.96 MHz, 50 MHz SRF, SURFACE MOUNTED, | MEGGITT ELECTRONICS | 3612-T-4R7-J |
| R1 | 24811/149 | RESISTOR-FIXED METAL-FILM 100R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100R-1%50ppm |
| R2 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R3 | 24811/169 | RESISTOR-FIXED METAL-FILM 681R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-681R-1%50ppm |
| R4 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R5 | 24811/157 | RESISTOR-FIXED METAL-FILM 221R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-221R-1%50ppm |
| R6 | 24811/245 | RESISTOR-FIXED METAL-FILM 1M +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1M0-1%50ppm |
| R7 | 24811/179 | RESISTOR-FIXED METAL-FILM 1K82 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-1K82-1%50ppm |
| R8 | 24811/149 | RESISTOR-FIXED METAL-FILM 100R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100R-1%50ppm |
| R9 | 25748/564 | RESISTOR-VARIABLE CERMET LINEAR, 500R 10% 500mW 200V 100 ppm/DEG.C, MULTI-TURN, VERTICAL-PCB, | MEGGITT ELECTRONICS | 4290W404/8/06411/501 |
| R10 | 24811/245 | RESISTOR-FIXED METAL-FILM 1M +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1M0-1%50ppm |
| R11 | 24811/165 | RESISTOR-FIXED METAL-FILM 475R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-475R-1%50ppm |

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
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## AE6/2 Spectrum analyzer (contd.)

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| R12 | 24811/165 | RESISTOR-FIXED METAL-FILM 475R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-475R-1%50ppm |
| R13 | 24811/168 | RESISTOR-FIXED METAL-FILM 619R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-619R-1%50ppm |
| R14 | 24811/179 | RESISTOR-FIXED METAL-FILM 1K82 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-1K82-1%50ppm |
| R15 | 24811/157 | RESISTOR-FIXED METAL-FILM 221R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-221R-1%50ppm |
| R16 | 24811/245 | RESISTOR-FIXED METAL-FILM 1M +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1M0-1%50ppm |
| R17 | 24811/179 | RESISTOR-FIXED METAL-FILM 1K82 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-1K82-1%50ppm |
| R18 | 24811/149 | RESISTOR-FIXED METAL-FILM 100R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100R-1%50ppm |
| R19 | 25748/564 | RESISTOR-VARIABLE CERMET LINEAR, 500R 10% 500mW 200V 100 ppm/DEG.C, MULTI-TURN, VERTICAL-PCB, | MEGGITT ELECTRONICS | 4290W404/8/06411/501 |
| R20 | 24811/165 | RESISTOR-FIXED METAL-FILM 475R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-475R-1%50ppm |
| R21 | 24811/179 | RESISTOR-FIXED METAL-FILM 1K82 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-1K82-1%50ppm |
| R22 | 24811/165 | RESISTOR-FIXED METAL-FILM 475R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-475R-1%50ppm |
| R23 | 24811/245 | RESISTOR-FIXED METAL-FILM 1M +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1M0-1%50ppm |
| R24 | 24811/193 | RESISTOR-FIXED METAL-FILM 6K81 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-6K81-1%50ppm |
| R25 | 24811/168 | RESISTOR-FIXED METAL-FILM 619R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-619R-1%50ppm |
| R26 | 24811/165 | RESISTOR-FIXED METAL-FILM 475R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-475R-1%50ppm |
| R27 | 24811/180 | RESISTOR-FIXED METAL-FILM 2K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-2K0-1%50ppm |
| R28 | 24811/245 | RESISTOR-FIXED METAL-FILM 1M +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1M0-1%50ppm |
| R29 | 24811/157 | RESISTOR-FIXED METAL-FILM 221R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-221R-1%50ppm |
| R30 | 24811/183 | RESISTOR-FIXED METAL-FILM 2K74 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-2K74-1%50ppm |
| R31 | 24811/149 | RESISTOR-FIXED METAL-FILM 100R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100R-1%50ppm |
| R32 | 25748/564 | RESISTOR-VARIABLE CERMET LINEAR, 500R 10% 500mW 200V 100 ppm/DEG.C, MULTI-TURN, VERTICAL-PCB, | MEGGITT ELECTRONICS | 4290W404/8/06411/501 |
| R33 | 24811/245 | RESISTOR-FIXED METAL-FILM 1M +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1M0-1%50ppm |
| R34 | 24811/165 | RESISTOR-FIXED METAL-FILM 475R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-475R-1%50ppm |
| R35 | 24811/165 | RESISTOR-FIXED METAL-FILM 475R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-475R-1%50ppm |
| R36 | 24811/168 | RESISTOR-FIXED METAL-FILM 619R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-619R-1%50ppm |

## AE6/2 Spectrum analyzer (contd.)

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| R37 | 24811/179 | RESISTOR-FIXED METAL-FILM 1K82 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-1K82-1%50ppm |
| R38 | 24811/157 | RESISTOR-FIXED METAL-FILM 221R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-221R-1%50ppm |
| R39 | 24811/245 | RESISTOR-FIXED METAL-FILM 1M +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1M0-1%50ppm |
| R40 | 24811/179 | RESISTOR-FIXED METAL-FILM 1K82 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-1K82-1%50ppm |
| R41 | 24811/149 | RESISTOR-FIXED METAL-FILM 100R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100R-1%50ppm |
| R42 | 25748/564 | RESISTOR-VARIABLE CERMET LINEAR, 500R 10% 500mW 200V 100 ppm/DEG.C, MULTI-TURN, VERTICAL-PCB, | MEGGITT ELECTRONICS | 4290W404/8/06411/501 |
| R43 | 24811/245 | RESISTOR-FIXED METAL-FILM 1M +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1M0-1%50ppm |
| R44 | 24811/165 | RESISTOR-FIXED METAL-FILM 475R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-475R-1%50ppm |
| R45 | 24811/161 | RESISTOR-FIXED METAL-FILM 332R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-332R-1%50ppm |
| R46 | 24811/165 | RESISTOR-FIXED METAL-FILM 475R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-475R-1%50ppm |
| R47 | 24811/166 | RESISTOR-FIXED METAL-FILM 511R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-511R-1%50ppm |
| R48 | 24811/181 | RESISTOR-FIXED METAL-FILM 2K21 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-2K21-1%50ppm |
| R49 | 24811/165 | RESISTOR-FIXED METAL-FILM 475R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-475R-1%50ppm |
| R50 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R51 | 24811/245 | RESISTOR-FIXED METAL-FILM 1M +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1M0-1%50ppm |
| R52 | 24811/157 | RESISTOR-FIXED METAL-FILM 221R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-221R-1%50ppm |
| R53 | 24811/149 | RESISTOR-FIXED METAL-FILM 100R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100R-1%50ppm |
| R54 | 24811/183 | RESISTOR-FIXED METAL-FILM 2K74 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-2K74-1%50ppm |
| R55 | 25748/564 | RESISTOR-VARIABLE CERMET LINEAR, 500R 10% 500mW 200V 100 ppm/DEG.C, MULTI-TURN, VERTICAL-PCB, | MEGGITT ELECTRONICS | 4290W404/8/06411/501 |
| R56 | 24811/165 | RESISTOR-FIXED METAL-FILM 475R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-475R-1%50ppm |
| R57 | 24811/245 | RESISTOR-FIXED METAL-FILM 1M +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1M0-1%50ppm |
| R58 | 24811/165 | RESISTOR-FIXED METAL-FILM 475R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-475R-1%50ppm |
| R59 | 24811/125 | RESISTOR-FIXED METAL-FILM 10R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10R-1%-50ppm |
| R61 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R64 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
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## AE6/2 Spectrum analyzer (contd.)

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|---|---|---|---|---|
| R66 | 24811/149 | RESISTOR-FIXED METAL-FILM 100R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100R-1%50ppm |
| R67 | 24811/146 | RESISTOR-FIXED METAL-FILM 75R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-75R0-1%50ppm |
| R68 | 24811/149 | RESISTOR-FIXED METAL-FILM 100R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100R-1%50ppm |
| R73 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R74 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R75 | 24811/181 | RESISTOR-FIXED METAL-FILM 2K21 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-2K21-1%50ppm |
| R77 | 24811/161 | RESISTOR-FIXED METAL-FILM 332R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-332R-1%50ppm |
| R78 | 24811/221 | RESISTOR-FIXED METAL-FILM 100K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100K-1%50ppm |
| R79 to R83 | 24811/125 | RESISTOR-FIXED METAL-FILM 10R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10R-1%-50ppm |
| R84 to R88 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R89 | 24811/149 | RESISTOR-FIXED METAL-FILM 100R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100R-1%50ppm |
| R90 | 24811/149 | RESISTOR-FIXED METAL-FILM 100R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100R-1%50ppm |
| R92 to R96 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R97 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R98 | 24811/166 | RESISTOR-FIXED METAL-FILM 511R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-511R-1%50ppm |
| R100 | 24811/142 | RESISTOR-FIXED METAL-FILM 51R1 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-51R1-1%50ppm |
| R102 | 24811/140 | RESISTOR-FIXED METAL-FILM 43R2 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-43R2-1%50ppm |
| R103 to R105 | 24811/165 | RESISTOR-FIXED METAL-FILM 475R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-475R-1%50ppm |
| R106 | 24811/180 | RESISTOR-FIXED METAL-FILM 2K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-2K0-1%50ppm |
| R107 | 24811/157 | RESISTOR-FIXED METAL-FILM 221R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-221R-1%50ppm |
| R108 | 24811/147 | RESISTOR-FIXED METAL-FILM 82R5 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-82R5-1%50ppm |
| R109 | 24811/123 | RESISTOR-FIXED METAL-FILM 8R25 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-8R25-1%50ppm |
| R110 | 24811/236 | RESISTOR-FIXED METAL-FILM 432K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-432K-1%50ppm |
| R111 | 24811/227 | RESISTOR-FIXED METAL-FILM 182K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-182K-1%50ppm |
| R112 | 24811/181 | RESISTOR-FIXED METAL-FILM 2K21 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-2K21-1%50ppm |

## AE6/2 Spectrum analyzer (contd.)

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
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| R113 | 24811/181 | RESISTOR-FIXED METAL-FILM 2K21 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-2K21-1%50ppm |
| R114 | 24811/149 | RESISTOR-FIXED METAL-FILM 100R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100R-1%50ppm |
| R115 | 24811/149 | RESISTOR-FIXED METAL-FILM 100R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100R-1%50ppm |
| R116 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R117 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R118 | 24811/189 | RESISTOR-FIXED METAL-FILM 4K75 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-4K75-1%50ppm |
| R119 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R140 | 25748/570 | RESISTOR-VARIABLE CERMET LINEAR, 50K 10% 500mW 200V 100 ppm/DEG.C, MULTI-TURN, VERTICAL-PCB, | MEGGITT ELECTRONICS | 4290W404/8/06411/503 |
| R141 | 25748/570 | RESISTOR-VARIABLE CERMET LINEAR, 50K 10% 500mW 200V 100 ppm/DEG.C, MULTI-TURN, VERTICAL-PCB, | MEGGITT ELECTRONICS | 4290W404/8/06411/503 |
| R146 | 24811/157 | RESISTOR-FIXED METAL-FILM 221R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-221R-1%50ppm |
| R147 | 24811/157 | RESISTOR-FIXED METAL-FILM 221R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-221R-1%50ppm |
| R151 | 24811/142 | RESISTOR-FIXED METAL-FILM 51R1 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-51R1-1%50ppm |
| R152 | 24811/167 | RESISTOR-FIXED METAL-FILM 562R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-562R-1%50ppm |
| R153 | 24811/165 | RESISTOR-FIXED METAL-FILM 475R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-475R-1%50ppm |
| R154 | 24811/181 | RESISTOR-FIXED METAL-FILM 2K21 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-2K21-1%50ppm |
| R155 | 24811/149 | RESISTOR-FIXED METAL-FILM 100R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100R-1%50ppm |
| R156 | 24811/133 | RESISTOR-FIXED METAL-FILM 22R1 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-22R1-1%50ppm |
| R157 | 25748/564 | RESISTOR-VARIABLE CERMET LINEAR, 500R 10% 500mW 200V 100 ppm/DEG.C, MULTI-TURN, VERTICAL-PCB, | MEGGITT ELECTRONICS | 4290W404/8/06411/501 |
| R158 | 24811/157 | RESISTOR-FIXED METAL-FILM 221R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-221R-1%50ppm |
| R159 | 24811/142 | RESISTOR-FIXED METAL-FILM 51R1 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-51R1-1%50ppm |
| R160 | 24811/177 | RESISTOR-FIXED METAL-FILM 1K5 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K5-1%50ppm |
| R161 | 24811/161 | RESISTOR-FIXED METAL-FILM 332R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-332R-1%50ppm |
| R162 | 24811/149 | RESISTOR-FIXED METAL-FILM 100R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100R-1%50ppm |
| R163 | 24811/181 | RESISTOR-FIXED METAL-FILM 2K21 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-2K21-1%50ppm |
| R164 | 24811/161 | RESISTOR-FIXED METAL-FILM 332R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-332R-1%50ppm |

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| **AE6/2 Spectrum analyzer (contd.)** | | | | |
| R165 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R166 | 24811/181 | RESISTOR-FIXED METAL-FILM 2K21 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-2K21-1%50ppm |
| R167 | 24811/142 | RESISTOR-FIXED METAL-FILM 51R1 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-51R1-1%50ppm |
| R168 | 24811/177 | RESISTOR-FIXED METAL-FILM 1K5 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K5-1%50ppm |
| R169 | 24811/161 | RESISTOR-FIXED METAL-FILM 332R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-332R-1%50ppm |
| R170 | 24811/144 | RESISTOR-FIXED METAL-FILM 61R9 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-61R9-1%50ppm |
| R171 | 24811/181 | RESISTOR-FIXED METAL-FILM 2K21 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-2K21-1%50ppm |
| R172 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R173 | 24811/161 | RESISTOR-FIXED METAL-FILM 332R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-332R-1%50ppm |
| R174 | 24811/181 | RESISTOR-FIXED METAL-FILM 2K21 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-2K21-1%50ppm |
| R175 | 24811/142 | RESISTOR-FIXED METAL-FILM 51R1 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-51R1-1%50ppm |
| R176 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R177 | 24811/167 | RESISTOR-FIXED METAL-FILM 562R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-562R-1%50ppm |
| R178 | 24811/137 | RESISTOR-FIXED METAL-FILM 33R2 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-33R2-1%50ppm |
| R179 | 24811/181 | RESISTOR-FIXED METAL-FILM 2K21 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-2K21-1%50ppm |
| R180 | 24811/125 | RESISTOR-FIXED METAL-FILM 10R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10R-1%-50ppm |
| R181 | 24811/157 | RESISTOR-FIXED METAL-FILM 221R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-221R-1%50ppm |
| R182 | 24811/165 | RESISTOR-FIXED METAL-FILM 475R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-475R-1%50ppm |
| R183 | 24811/165 | RESISTOR-FIXED METAL-FILM 475R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-475R-1%50ppm |
| R184 | 24811/142 | RESISTOR-FIXED METAL-FILM 51R1 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-51R1-1%50ppm |
| R185 | 24811/181 | RESISTOR-FIXED METAL-FILM 2K21 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-2K21-1%50ppm |
| R186 | 24811/149 | RESISTOR-FIXED METAL-FILM 100R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100R-1%50ppm |
| R187 | 24811/165 | RESISTOR-FIXED METAL-FILM 475R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-475R-1%50ppm |
| R188 to R195 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R196 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |

## AE6/2 Spectrum analyzer (contd.)

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| R197 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R198 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R199 | 24811/245 | RESISTOR-FIXED METAL-FILM 1M +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1M0-1%50ppm |
| R200 | 24811/245 | RESISTOR-FIXED METAL-FILM 1M +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1M0-1%50ppm |
| R202 | 24811/207 | RESISTOR-FIXED METAL-FILM 27K4 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-27K4-1%50ppm |
| R203 | 24811/199 | RESISTOR-FIXED METAL-FILM 12K1 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-12K1-1%50ppm |
| R204 | 24811/189 | RESISTOR-FIXED METAL-FILM 4K75 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-4K75-1%50ppm |
| R205 | 24811/232 | RESISTOR-FIXED METAL-FILM 301K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-301K-1%50ppm |
| R206 | 24811/189 | RESISTOR-FIXED METAL-FILM 4K75 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-4K75-1%50ppm |
| R207 | 24811/181 | RESISTOR-FIXED METAL-FILM 2K21 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-2K21-1%50ppm |
| R208 | 24811/189 | RESISTOR-FIXED METAL-FILM 4K75 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-4K75-1%50ppm |
| R209 | 24811/232 | RESISTOR-FIXED METAL-FILM 301K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-301K-1%50ppm |
| R210 | 24811/189 | RESISTOR-FIXED METAL-FILM 4K75 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-4K75-1%50ppm |
| R211 | 24811/181 | RESISTOR-FIXED METAL-FILM 2K21 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-2K21-1%50ppm |
| R212 | 24811/189 | RESISTOR-FIXED METAL-FILM 4K75 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-4K75-1%50ppm |
| R213 | 24811/232 | RESISTOR-FIXED METAL-FILM 301K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-301K-1%50ppm |
| R214 | 24811/189 | RESISTOR-FIXED METAL-FILM 4K75 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-4K75-1%50ppm |
| R215 | 24811/181 | RESISTOR-FIXED METAL-FILM 2K21 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-2K21-1%50ppm |
| R216 | 24811/189 | RESISTOR-FIXED METAL-FILM 4K75 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-4K75-1%50ppm |
| R217 | 24811/232 | RESISTOR-FIXED METAL-FILM 301K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-301K-1%50ppm |
| R218 | 24811/189 | RESISTOR-FIXED METAL-FILM 4K75 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-4K75-1%50ppm |
| R219 | 24811/181 | RESISTOR-FIXED METAL-FILM 2K21 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-2K21-1%50ppm |
| R220 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R221 | 24811/205 | RESISTOR-FIXED METAL-FILM 22K1 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-22K1-1%50ppm |
| R222 | 24811/193 | RESISTOR-FIXED METAL-FILM 6K81 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-6K81-1%50ppm |

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
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| **AE6/2 Spectrum analyzer (contd.)** | | | | |
| R223 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R224 | 24811/205 | RESISTOR-FIXED METAL-FILM 22K1 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-22K1-1%50ppm |
| R225 | 24811/193 | RESISTOR-FIXED METAL-FILM 6K81 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-6K81-1%50ppm |
| R226 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R227 | 24811/205 | RESISTOR-FIXED METAL-FILM 22K1 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-22K1-1%50ppm |
| R228 | 24811/193 | RESISTOR-FIXED METAL-FILM 6K81 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-6K81-1%50ppm |
| R229 | 24811/181 | RESISTOR-FIXED METAL-FILM 2K21 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-2K21-1%50ppm |
| R230 | 24811/147 | RESISTOR-FIXED METAL-FILM 82R5 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-82R5-1%50ppm |
| R231 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R232 | 24811/205 | RESISTOR-FIXED METAL-FILM 22K1 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-22K1-1%50ppm |
| R233 | 24811/193 | RESISTOR-FIXED METAL-FILM 6K81 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-6K81-1%50ppm |
| R234 | 24811/245 | RESISTOR-FIXED METAL-FILM 1M +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1M0-1%50ppm |
| R235 | 24811/142 | RESISTOR-FIXED METAL-FILM 51R1 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-51R1-1%50ppm |
| R236 | 24811/142 | RESISTOR-FIXED METAL-FILM 51R1 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-51R1-1%50ppm |
| R238 | 24811/221 | RESISTOR-FIXED METAL-FILM 100K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100K-1%50ppm |
| R239 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R240 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R243 to R247 | 24811/205 | RESISTOR-FIXED METAL-FILM 22K1 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-22K1-1%50ppm |
| R248 | 24811/177 | RESISTOR-FIXED METAL-FILM 1K5 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K5-1%50ppm |
| R249 | 24811/142 | RESISTOR-FIXED METAL-FILM 51R1 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-51R1-1%50ppm |
| R251 | 24811/217 | RESISTOR-FIXED METAL-FILM 68K1 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-68K1-1%50ppm |
| R252 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R500 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| TR1 to TR12 | 28457/850 | TRANSISTOR NPN BIPOLAR FMMT2369... 40V 600MHz 300mW 500mA 40hFE MIN @ 10mA, MARKING CODE *1J, | PHILIPS | PMBT2369 |

## AE6/2 Spectrum analyzer (contd.)

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
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| TR13 | 28487/809 | TRANSISTOR NPN BIPOLAR BFR93A... 12V 5GHz 250mW 35mA 40hFE MIN @ 30mA, MARKING CODE R2, SURFACE | PHILIPS | BFR93A |
| TR17 to TR21 | 28457/850 | TRANSISTOR NPN BIPOLAR FMMT2369... 40V 600MHz 300mW 500mA 40hFE MIN @ 10mA, MARKING CODE *1J, | PHILIPS | PMBT2369 |
| TR22 | 28487/809 | TRANSISTOR NPN BIPOLAR BFR93A... 12V 5GHz 250mW 35mA 40hFE MIN @ 30mA, MARKING CODE R2, SURFACE | PHILIPS | BFR93A |
| TR23 | 28457/850 | TRANSISTOR NPN BIPOLAR FMMT2369... 40V 600MHz 300mW 500mA 40hFE MIN @ 10mA, MARKING CODE *1J, | PHILIPS | PMBT2369 |
| TR26 | 28487/809 | TRANSISTOR NPN BIPOLAR BFR93A... 12V 5GHz 250mW 35mA 40hFE MIN @ 30mA, MARKING CODE R2, SURFACE | PHILIPS | BFR93A |
| TR27 | 28487/809 | TRANSISTOR NPN BIPOLAR BFR93A... 12V 5GHz 250mW 35mA 40hFE MIN @ 30mA, MARKING CODE R2, SURFACE | PHILIPS | BFR93A |
| TR29 to TR39 | 28457/850 | TRANSISTOR NPN BIPOLAR FMMT2369... 40V 600MHz 300mW 500mA 40hFE MIN @ 10mA, MARKING CODE *1J, | PHILIPS | PMBT2369 |
| TR40 | 28435/241 | TRANSISTOR PNP BIPOLAR BCX17... 45V 100MHz 425mW 500mA 100hFE MIN @ 100mA, MARKING CODE T1, SURFACE | PHILIPS | BCX17 |
| XL1 to XL5 | 28312/125 | CRYSTAL 10.7 MHz +/- 20 ppm, 30pF SERIES RESONANCE, 25mH - 16R ESR MAX, HC-43/U, WIRE | C-MAC CRYSTALS LTD | C5742 |
| XL6 | 23642/944 | FILTER HF, PCB-MOUNT, CERAMIC, RADIAL, 10.7MHz, 280KHz B/WIDTH @ -3dB, 650KHz B/WIDTH @ -20dB, 330 | MURATA ELECTRONICS | SFE10.7MA5-A |
| XL7 | 23642/945 | FILTER HF, PCB-MOUNT, CERAMIC, RADIAL, 10.7MHz, 110KHz B/WIDTH @ -3dB, 350KHz B/WIDTH @ -20dB, 330 | MURATA ELECTRONICS | SFE10.7MHY-A |

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|

## AE7 Demodulation filter block

When ordering, prefix circuit reference with AE7.

| | | | | |
|---|---|---|---|---|
| | 44829-847 | Complete unit | Issue 22 | |
| C1 | 26421/142 | CAPACITOR-FIXED ALUMINIUM 220uF +/-20% 16V ELECTROLYTIC, RADIAL, 5mm PWP, (TAPED). | PANASONIC INDUSTRIAL | ECE-A-1CU-221B |
| C2 | 26421/116 | CAPACITOR-FIXED ALUMINIUM 47uF +/-20% 16V ELECTROLYTIC, RADIAL, 5mm PWP, (LOOSE OR TAPED). | PANASONIC INDUSTRIAL | ECE-A-1C-KA-470-B |
| C3 | 26421/141 | CAPACITOR-FIXED ALUMINIUM 100uF +/-20% 35V ELECTROLYTIC, RADIAL, 5mm PWP, (TAPED). | PANASONIC INDUSTRIAL | ECE-A-1VU-101B |
| C4 | 26421/141 | CAPACITOR-FIXED ALUMINIUM 100uF +/-20% 35V ELECTROLYTIC, RADIAL, 5mm PWP, (TAPED). | PANASONIC INDUSTRIAL | ECE-A-1VU-101B |
| C5 | 26421/142 | CAPACITOR-FIXED ALUMINIUM 220uF +/-20% 16V ELECTROLYTIC, RADIAL, 5mm PWP, (TAPED). | PANASONIC INDUSTRIAL | ECE-A-1CU-221B |
| C6 | 26421/116 | CAPACITOR-FIXED ALUMINIUM 47uF +/-20% 16V ELECTROLYTIC, RADIAL, 5mm PWP, (LOOSE OR TAPED). | PANASONIC INDUSTRIAL | ECE-A-1C-KA-470-B |
| C7 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C8 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C9 | 26386/887 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-104-KP |
| C10 to C13 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C14 | 26386/804 | CAPACITOR-FIXED CERAMIC 2.2pF +/-0.5pF 50V NPO MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-2R2-DP |
| C15 | 26386/804 | CAPACITOR-FIXED CERAMIC 2.2pF +/-0.5pF 50V NPO MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-2R2-DP |
| C16 to C24 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C25 | 26386/804 | CAPACITOR-FIXED CERAMIC 2.2pF +/-0.5pF 50V NPO MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-2R2-DP |
| C26 | 26386/804 | CAPACITOR-FIXED CERAMIC 2.2pF +/-0.5pF 50V NPO MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-2R2-DP |
| C27 to C47 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C48 | 26421/116 | CAPACITOR-FIXED ALUMINIUM 47uF +/-20% 16V ELECTROLYTIC, RADIAL, 5mm PWP, (LOOSE OR TAPED). | PANASONIC INDUSTRIAL | ECE-A-1C-KA-470-B |
| C49 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C50 | 26386/833 | CAPACITOR-FIXED CERAMIC 560pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | VISHAY COMPONENTS | VJ0805-A-561J-XAT |
| C51 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C52 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C53 | 26386/887 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-104-KP |
| C54 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C55 | 26386/828 | CAPACITOR-FIXED CERAMIC 220pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-221-JP |

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| **AE7 Demodulation filter block (contd.)** | | | | |
| C56 | 26343/788 | CAPACITOR-FIXED CERAMIC 680pF +/-5% 50V NPO MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-681-JP |
| C60 | 26386/887 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-104-KP |
| C61 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C62 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C63 | 26386/887 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-104-KP |
| C64 | 26386/824 | CAPACITOR-FIXED CERAMIC 100pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-101-JP |
| C65 | 26386/887 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-104-KP |
| C66 | 26386/887 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-104-KP |
| C67 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C68 | 26386/887 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-104-KP |
| C69 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C70 to C73 | 26386/887 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-104-KP |
| C74 | 26386/826 | CAPACITOR-FIXED CERAMIC 150pF +/-5% 50V NPO MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-151-JP |
| C75 | 26386/887 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-104-KP |
| C76 | 26386/826 | CAPACITOR-FIXED CERAMIC 150pF +/-5% 50V NPO MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-151-JP |
| C77 | 26343/788 | CAPACITOR-FIXED CERAMIC 680pF +/-5% 50V NPO MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-681-JP |
| C78 | 26386/867 | CAPACITOR-FIXED CERAMIC 2.2nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-222-KP |
| C79 | 26386/871 | CAPACITOR-FIXED CERAMIC 4.7nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-472-KP |
| C80 | 26386/871 | CAPACITOR-FIXED CERAMIC 4.7nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-472-KP |
| C82 | 26386/887 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-104-KP |
| C84 | 26386/992 | CAPACITOR-FIXED CERAMIC 330nF +/-10% 50V X7R, MULTILAYER, SURFACE-MOUNTED, SIZE 1812, NICKEL | PHILIPS | 1812-2B-334-K9BB |
| C85 | 26386/887 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-104-KP |
| C86 | 26386/760 | CAPACITOR-FIXED CERAMIC 220nF +/-10% 50V X7R MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | PHILIPS | 1210-2R-224-K9-BBC |
| C87 | 26386/992 | CAPACITOR-FIXED CERAMIC 330nF +/-10% 50V X7R, MULTILAYER, SURFACE-MOUNTED, SIZE 1812, NICKEL | PHILIPS | 1812-2B-334-K9BB |
| C88 to C91 | 26386/887 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-104-KP |

## AE7 Demodulation filter block (contd.)

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| C92 | 26386/824 | CAPACITOR-FIXED CERAMIC 100pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-101-JP |
| C93 | 26386/824 | CAPACITOR-FIXED CERAMIC 100pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-101-JP |
| C94 | 26386/808 | CAPACITOR-FIXED CERAMIC 4.7pF +/-0.5pF 50V NPO MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-4R7-DP |
| C95 | 26386/808 | CAPACITOR-FIXED CERAMIC 4.7pF +/-0.5pF 50V NPO MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-4R7-DP |
| C96 | 26386/992 | CAPACITOR-FIXED CERAMIC 330nF +/-10% 50V X7R, MULTILAYER, SURFACE-MOUNTED, SIZE 1812, NICKEL | PHILIPS | 1812-2B-334-K9BB |
| C97 to C100 | 26386/887 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-104-KP |
| C101 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C102 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C104 | 26386/887 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-104-KP |
| C105 | 26386/887 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-104-KP |
| C106 | 26386/828 | CAPACITOR-FIXED CERAMIC 220pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-221-JP |
| C107 to C110 | 26386/887 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-104-KP |
| C111 to C132 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C133 to C137 | 26386/887 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-104-KP |
| C138 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C140 | 26386/887 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-104-KP |
| C141 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C145 | 26386/863 | CAPACITOR-FIXED CERAMIC 1nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-102-KP |
| C146 | 26386/833 | CAPACITOR-FIXED CERAMIC 560pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | VISHAY COMPONENTS | VJ0805-A-561J-XAT |
| C150 | 26386/887 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-104-KP |
| C152 | 26343/767 | CAPACITOR-FIXED CERAMIC 10pF +/-5% 50V NPO MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-100-DP |
| C153 to C156 | 26386/887 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-104-KP |
| C157 to C159 | 26386/830 | CAPACITOR-FIXED CERAMIC 330pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-331-JP |
| C160 | 26386/828 | CAPACITOR-FIXED CERAMIC 220pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-221-JP |
| C161 to C165 | 26386/887 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-104-KP |

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| **AE7 Demodulation filter block (contd.)** | | | | |
| C166 | 26386/820 | CAPACITOR-FIXED CERAMIC 47pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-470-JP |
| C167 | 26386/820 | CAPACITOR-FIXED CERAMIC 47pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-470-JP |
| C168 | 26386/830 | CAPACITOR-FIXED CERAMIC 330pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-331-JP |
| C169 to C171 | 26386/887 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-104-KP |
| C172 | 26386/865 | CAPACITOR-FIXED CERAMIC 1.5nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-152-KP |
| D1 | 28383/930 | DIODE SMALL-SIGNAL, BAS16... 330mW 75V 250mA 2pF 1Vf @ 50mA, MARKING CODE A6, SURFACE MOUNTED, | PHILIPS | BAS16 |
| D2 to D11 | 28383/932 | DIODE PIN, HSMP-3810... 250mW 100V 1A 0.35pF Rs 4R0 MAX @ 100mA, MARKING CODE E0, LOW PROFILE, | HEWLETT-PACKARD | HSMP-3810-L31 |
| D12 | 28371/303 | DIODE ZENER, BZX84-C6V2... 250mW 6.2V 5% 250mA MARKING CODE Z4, SURFACE MOUNTED, SOT-23, (8mm | PHILIPS | BZX84-C6V2 |
| D13 | 28371/303 | DIODE ZENER, BZX84-C6V2... 250mW 6.2V 5% 250mA MARKING CODE Z4, SURFACE MOUNTED, SOT-23, (8mm | PHILIPS | BZX84-C6V2 |
| D14 | 28371/302 | DIODE ZENER, BZX84-C4V7... 250mW 4.7V 5% 250mA MARKING CODE Z1, SURFACE MOUNTED, SOT-23, (8mm | PHILIPS | BZX84-C4V7 |
| D15 | 28371/303 | DIODE ZENER, BZX84-C6V2... 250mW 6.2V 5% 250mA MARKING CODE Z4, SURFACE MOUNTED, SOT-23, (8mm | PHILIPS | BZX84-C6V2 |
| D16 to D21 | 28349/029 | DIODE SMALL-SIGNAL, SCHOTTKY, HSMS-2810... 20V 1.2pF 410mVf @ 1mA, MARKNG CODE B0, LOW PROFILE, | HEWLETT-PACKARD | HSMS-2810-L31 |
| D22 | 28371/494 | DIODE VOLTAGE REFERENCE, 1N825... 250mW 6.2V 5% 50mA 20ppm/DEG.C, AXIAL, DO-7, (TAPED). | PHILIPS | 1N825 |
| D23 | 28371/494 | DIODE VOLTAGE REFERENCE, 1N825... 250mW 6.2V 5% 50mA 20ppm/DEG.C, AXIAL, DO-7, (TAPED). | PHILIPS | 1N825 |
| D25 | 28371/443 | DIODE ZENER, BZX84-C5V6... 250mW 5.6V 5% 250mA MARKING CODE Z3, SURFACE MOUNTED, SOT-23, (8mm | PHILIPS | BZX84-C5V6 |
| D26 to D28 | 28383/930 | DIODE SMALL-SIGNAL, BAS16... 330mW 75V 250mA 2pF 1Vf @ 50mA, MARKING CODE A6, SURFACE MOUNTED, | PHILIPS | BAS16 |
| D29 | 28371/443 | DIODE ZENER, BZX84-C5V6... 250mW 5.6V 5% 250mA MARKING CODE Z3, SURFACE MOUNTED, SOT-23, (8mm | PHILIPS | BZX84-C5V6 |
| D30 | 28383/930 | DIODE SMALL-SIGNAL, BAS16... 330mW 75V 250mA 2pF 1Vf @ 50mA, MARKING CODE A6, SURFACE MOUNTED, | PHILIPS | BAS16 |
| D31 | 28349/029 | DIODE SMALL-SIGNAL, SCHOTTKY, HSMS-2810... 20V 1.2pF 410mVf @ 1mA, MARKNG CODE B0, LOW PROFILE, | HEWLETT-PACKARD | HSMS-2810-L31 |
| D32 | 28383/930 | DIODE SMALL-SIGNAL, BAS16... 330mW 75V 250mA 2pF 1Vf @ 50mA, MARKING CODE A6, SURFACE MOUNTED, | PHILIPS | BAS16 |
| D33 | 28371/494 | DIODE VOLTAGE REFERENCE, 1N825... 250mW 6.2V 5% 50mA 20ppm/DEG.C, AXIAL, DO-7, (TAPED). | PHILIPS | 1N825 |
| IC1 | 28467/111 | IC-MICRO PERIPHERAL, PCF8574... REMOTE 8-BIT I/O EXPANDER, I.IC BUS, UP TO 8 DEVICE ADDRESS | PHILIPS | PCF8574T |
| IC2 | 28461/891 | IC-ANALOGUE SWITCH DG540... QUAD, 20mA RF VIDEO T-SWITCH, BANDWIDTH 500MHz, ISOLATION 80dB @ 5MHz, | TEMIC UK LTD | DG540DJ |

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| **AE7 Demodulation filter block (contd.)** | | | | |
| IC3 | 28461/891 | IC-ANALOGUE SWITCH DG540... QUAD, 20mA RF VIDEO T-SWITCH, BANDWIDTH 500MHz, ISOLATION 80dB @ 5MHz, | TEMIC UK LTD | DG540DJ |
| IC4 | 28461/888 | IC-ANALOGUE SWITCH DG419... SINGLE, 15V SPDT, ON-RESISTANCE<35R, CHANGEOVER, TTL COMPATIBLE, | TEMIC UK LTD | DG419DY |
| IC5 | 28461/890 | IC-ANALOGUE VIDEO DIFF AMPLIFIER 592B... 2 INPUT, SINGLE, 8V INPUT NOISE 3uV, MONOLITHIC, 8 PIN, | TEXAS INSTRUMENTS | TL592BP |
| IC6 | 28531/021A | RF-MIXER DOUBLE-BALANCED, SL6440C... 150MHz MAX, 15 dBm RF-1dB COMPRESS, +30dBm INTERCEPT, | | |
| IC7 | 28461/892 | IC-ANALOGUE OPERATIONAL AMP MC34082... DUAL, 44V JFET INPUT, SLEW RATE 20V/uS, GAIN BANDWIDTH PROD | MOTOROLA INC. | MC34082P |
| IC8 | 28461/893 | IC-ANALOGUE LIMITING-AMPLIFIER NE614A... 8V LOW POWER FM IF SYSTEM, MONOLITHIC, 16 PIN, | PHILIPS | NE614AN |
| IC9 | 28469/197 | IC-DIGITAL RECEIVER 75108... DUAL, LINE, OPEN-COLLECTOR, TTL, 14 PIN, DUAL-IN-LINE. | NAT. SEMICONDUCTOR | DS75108N |
| IC10 | 28461/458 | IC-ANALOGUE OPERATIONAL AMP OP37... 15V LOW NOISE, HI-SPEED, PRECISION, BIPOLAR, 8 PIN, | ANALOG DEVICES LTD | OP37GS |
| IC11 | 28461/924 | IC-ANALOGUE MODULATR/DEMODULATOR 1496... 30V BALANCED, SUPPRESSION 50dB @ 10MHz, 3dB SIGNAL | PHILIPS | MC1496N |
| IC12 | 28461/413 | IC-ANALOGUE OPERATIONAL AMP TL074... QUAD, JFET INPUT, LOW NOISE, SLEW RATE 8V/uS MIN, GAIN | MOTOROLA INC. | TL074CD |
| IC13 | 28461/459 | IC-ANALOGUE OPERATIONAL AMP TL032... DUAL, 15V U/GAIN BANDWDTH 1.1MHz, OFFSET VOLTAGE 2.0mV, SLEW | TEXAS INSTRUMENTS | TL032CD(TUBE) |
| IC14 | 28461/413 | IC-ANALOGUE OPERATIONAL AMP TL074... QUAD, JFET INPUT, LOW NOISE, SLEW RATE 8V/uS MIN, GAIN | MOTOROLA INC. | TL074CD |
| IC15 | 28461/896 | IC-ANALOGUE SWITCH DG413... QUAD, 15V SPST, ON-RESISTANCE<35R, 2 x N/O & 2 x N/C @ LOGIC 1, | TEMIC UK LTD | DG413DY |
| IC16 | 28461/888 | IC-ANALOGUE SWITCH DG419... SINGLE, 15V SPDT, ON-RESISTANCE<35R, CHANGEOVER, TTL COMPATIBLE, | TEMIC UK LTD | DG419DY |
| IC17 | 28461/741 | IC-ANALOGUE VOLTAGE-REGULATOR LM317L... 37V 100mA POSITIVE ADJUSTABLE, LINEAR, MONOLITHIC, 3 PIN, | NAT. SEMICONDUCTOR | LM317LZ |
| IC18 | 28461/896 | IC-ANALOGUE SWITCH DG413... QUAD, 15V SPST, ON-RESISTANCE<35R, 2 x N/O & 2 x N/C @ LOGIC 1, | TEMIC UK LTD | DG413DY |
| IC19 | 28461/458 | IC-ANALOGUE OPERATIONAL AMP OP37... 15V LOW NOISE, HI-SPEED, PRECISION, BIPOLAR, 8 PIN, | ANALOG DEVICES LTD | OP37GS |
| L1 | 23642/701 | INDUCTOR-FIXED 2.2uH +/- 5% EPOXY-MOULD, 320mA 1R MAX, 30 Q @ 7.96 MHz, 75 MHz SRF, SURFACE MOUNTED, | MEGGITT ELECTRONICS | 3612-T-2R2-J |
| L2 | 23642/537 | INDUCTOR-FIXED 4.7uH +/- 5% EPOXY-MOULD, 220mA 1R5 MAX, 30 Q @ 7.96 MHz, 50 MHz SRF, SURFACE MOUNTED, | MEGGITT ELECTRONICS | 3612-T-4R7-J |
| L3 | 23642/533 | INDUCTOR-FIXED 10uH +/- 5% EPOXY-MOULD, 150mA 2R1 MAX, 30 Q @ 2.52 MHz, 36 MHz SRF, SURFACE MOUNTED, | MEGGITT ELECTRONICS | 3612-T-100-J |
| L4 | 23642/533 | INDUCTOR-FIXED 10uH +/- 5% EPOXY-MOULD, 150mA 2R1 MAX, 30 Q @ 2.52 MHz, 36 MHz SRF, SURFACE MOUNTED, | MEGGITT ELECTRONICS | 3612-T-100-J |
| L5 | 23642/537 | INDUCTOR-FIXED 4.7uH +/- 5% EPOXY-MOULD, 220mA 1R5 MAX, 30 Q @ 7.96 MHz, 50 MHz SRF, SURFACE MOUNTED, | MEGGITT ELECTRONICS | 3612-T-4R7-J |
| L6 | 23642/533 | INDUCTOR-FIXED 10uH +/- 5% EPOXY-MOULD, 150mA 2R1 MAX, 30 Q @ 2.52 MHz, 36 MHz SRF, SURFACE MOUNTED, | MEGGITT ELECTRONICS | 3612-T-100-J |
| L7 | 23642/527 | INDUCTOR-FIXED 33uH +/- 5% EPOXY-MOULD, 70mA 5R6 MAX, 30 Q @ 2.52 MHz, 17 MHz SRF, SURFACE MOUNTED, | MEGGITT ELECTRONICS | 3612-T-330-J |

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| **AE7 Demodulation filter block (contd.)** | | | | |
| L8 | 23642/529 | INDUCTOR-FIXED 68uH +/- 5% EPOXY-MOULD, 50mA 9R MAX, 30 Q @ 2.52 MHz, 11 MHz SRF, SURFACE MOUNTED, | MEGGITT ELECTRONICS | 3612-T-680-J |
| L9 | 23642/527 | INDUCTOR-FIXED 33uH +/- 5% EPOXY-MOULD, 70mA 5R6 MAX, 30 Q @ 2.52 MHz, 17 MHz SRF, SURFACE MOUNTED, | MEGGITT ELECTRONICS | 3612-T-330-J |
| L10 | 23642/529 | INDUCTOR-FIXED 68uH +/- 5% EPOXY-MOULD, 50mA 9R MAX, 30 Q @ 2.52 MHz, 11 MHz SRF, SURFACE MOUNTED, | MEGGITT ELECTRONICS | 3612-T-680-J |
| L11 | 23642/533 | INDUCTOR-FIXED 10uH +/- 5% EPOXY-MOULD, 150mA 2R1 MAX, 30 Q @ 2.52 MHz, 36 MHz SRF, SURFACE MOUNTED, | MEGGITT ELECTRONICS | 3612-T-100-J |
| L12 | 23642/538 | INDUCTOR-FIXED 0.47uH +/- 20% EPOXY-MOULD, 450mA 0R5 MAX, 30 Q @ 25.2 MHz, 220 MHz SRF, SURFACE | MEGGITT ELECTRONICS | 3612-T-R47-M |
| L13 | 23642/528 | INDUCTOR-FIXED 47uH +/- 5% EPOXY-MOULD, 60mA 7R MAX, 30 Q @ 2.52 MHz, 15 MHz SRF, SURFACE MOUNTED, | MEGGITT ELECTRONICS | 3612-T-470-J |
| L14 | 23642/528 | INDUCTOR-FIXED 47uH +/- 5% EPOXY-MOULD, 60mA 7R MAX, 30 Q @ 2.52 MHz, 15 MHz SRF, SURFACE MOUNTED, | MEGGITT ELECTRONICS | 3612-T-470-J |
| L16 | 23642/526 | INDUCTOR-FIXED 470uH +/- 10% EPOXY-MOULD, 62mA 26R MAX, 40 Q @ 0.796 MHz, 3 MHz SRF, SURFACE MOUNTED, | MEGGITT ELECTRONICS | 3613-T-471-K |
| L17 | 23642/537 | INDUCTOR-FIXED 4.7uH +/- 5% EPOXY-MOULD, 220mA 1R5 MAX, 30 Q @ 7.96 MHz, 50 MHz SRF, SURFACE MOUNTED, | MEGGITT ELECTRONICS | 3612-T-4R7-J |
| L18 | 23642/524 | INDUCTOR-FIXED 1mH +/- 10% EPOXY-MOULD, 30mA 40R MAX, 30 Q @ 0.252 MHz, 2.5 MHz SRF, SURFACE | MEGGITT ELECTRONICS | 3613-T-102-K |
| L19 | 23642/524 | INDUCTOR-FIXED 1mH +/- 10% EPOXY-MOULD, 30mA 40R MAX, 30 Q @ 0.252 MHz, 2.5 MHz SRF, SURFACE | MEGGITT ELECTRONICS | 3613-T-102-K |
| L20 | 23642/526 | INDUCTOR-FIXED 470uH +/- 10% EPOXY-MOULD, 62mA 26R MAX, 40 Q @ 0.796 MHz, 3 MHz SRF, SURFACE MOUNTED, | MEGGITT ELECTRONICS | 3613-T-471-K |
| L21 | 23642/524 | INDUCTOR-FIXED 1mH +/- 10% EPOXY-MOULD, 30mA 40R MAX, 30 Q @ 0.252 MHz, 2.5 MHz SRF, SURFACE | MEGGITT ELECTRONICS | 3613-T-102-K |
| L22 | 23642/525 | INDUCTOR-FIXED 680uH +/- 10% EPOXY-MOULD, 50mA 30R MAX, 30 Q @ 0.796 MHz, 3 MHz SRF, SURFACE MOUNTED, | MEGGITT ELECTRONICS | 3613-T-681-K |
| L23 | 23642/528 | INDUCTOR-FIXED 47uH +/- 5% EPOXY-MOULD, 60mA 7R MAX, 30 Q @ 2.52 MHz, 15 MHz SRF, SURFACE MOUNTED, | MEGGITT ELECTRONICS | 3612-T-470-J |
| L24 | 23642/528 | INDUCTOR-FIXED 47uH +/- 5% EPOXY-MOULD, 60mA 7R MAX, 30 Q @ 2.52 MHz, 15 MHz SRF, SURFACE MOUNTED, | MEGGITT ELECTRONICS | 3612-T-470-J |
| L25 | 23642/525 | INDUCTOR-FIXED 680uH +/- 10% EPOXY-MOULD, 50mA 30R MAX, 30 Q @ 0.796 MHz, 3 MHz SRF, SURFACE MOUNTED, | MEGGITT ELECTRONICS | 3613-T-681-K |
| R1 to R3 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R4 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R6 | 24811/217 | RESISTOR-FIXED METAL-FILM 68K1 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-68K1-1%50ppm |
| R7 | 24811/209 | RESISTOR-FIXED METAL-FILM 33K2 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-33K2-1%50ppm |
| R8 | 24811/125 | RESISTOR-FIXED METAL-FILM 10R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10R-1%-50ppm |
| R9 | 24811/185 | RESISTOR-FIXED METAL-FILM 3K32 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-3K32-1%50ppm |

## AE7 Demodulation filter block (contd.)

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| R10 | 24811/185 | RESISTOR-FIXED METAL-FILM 3K32 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-3K32-1%50ppm |
| R11 | 24811/179 | RESISTOR-FIXED METAL-FILM 1K82 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-1K82-1%50ppm |
| R13 | 24811/185 | RESISTOR-FIXED METAL-FILM 3K32 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-3K32-1%50ppm |
| R14 | 24811/149 | RESISTOR-FIXED METAL-FILM 100R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100R-1%50ppm |
| R15 | 24811/169 | RESISTOR-FIXED METAL-FILM 681R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-681R-1%50ppm |
| R16 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R17 | 24811/217 | RESISTOR-FIXED METAL-FILM 68K1 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-68K1-1%50ppm |
| R18 | 24811/209 | RESISTOR-FIXED METAL-FILM 33K2 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-33K2-1%50ppm |
| R19 | 24811/125 | RESISTOR-FIXED METAL-FILM 10R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10R-1%-50ppm |
| R20 | 24811/185 | RESISTOR-FIXED METAL-FILM 3K32 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-3K32-1%50ppm |
| R21 | 24811/185 | RESISTOR-FIXED METAL-FILM 3K32 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-3K32-1%50ppm |
| R22 | 24811/171 | RESISTOR-FIXED METAL-FILM 825R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-825R-1%50ppm |
| R23 | 24811/183 | RESISTOR-FIXED METAL-FILM 2K74 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-2K74-1%50ppm |
| R24 | 24811/177 | RESISTOR-FIXED METAL-FILM 1K5 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K5-1%50ppm |
| R25 | 24811/149 | RESISTOR-FIXED METAL-FILM 100R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100R-1%50ppm |
| R26 | 24811/169 | RESISTOR-FIXED METAL-FILM 681R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-681R-1%50ppm |
| R27 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R28 | 24811/217 | RESISTOR-FIXED METAL-FILM 68K1 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-68K1-1%50ppm |
| R29 | 24811/209 | RESISTOR-FIXED METAL-FILM 33K2 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-33K2-1%50ppm |
| R30 | 24811/185 | RESISTOR-FIXED METAL-FILM 3K32 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-3K32-1%50ppm |
| R31 | 24811/185 | RESISTOR-FIXED METAL-FILM 3K32 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-3K32-1%50ppm |
| R32 | 24811/165 | RESISTOR-FIXED METAL-FILM 475R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-475R-1%50ppm |
| R33 | 24811/217 | RESISTOR-FIXED METAL-FILM 68K1 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-68K1-1%50ppm |
| R34 | 24811/209 | RESISTOR-FIXED METAL-FILM 33K2 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-33K2-1%50ppm |
| R35 | 24811/125 | RESISTOR-FIXED METAL-FILM 10R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10R-1%-50ppm |

## AE7 Demodulation filter block (contd.)

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| R36 | 24811/183 | RESISTOR-FIXED METAL-FILM 2K74 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-2K74-1%50ppm |
| R37 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R38 | 24811/157 | RESISTOR-FIXED METAL-FILM 221R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-221R-1%50ppm |
| R39 | 24811/169 | RESISTOR-FIXED METAL-FILM 681R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-681R-1%50ppm |
| R40 | 24811/165 | RESISTOR-FIXED METAL-FILM 475R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-475R-1%50ppm |
| R41 | 24811/149 | RESISTOR-FIXED METAL-FILM 100R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100R-1%50ppm |
| R42 | 24811/169 | RESISTOR-FIXED METAL-FILM 681R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-681R-1%50ppm |
| R43 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R44 | 24811/160 | RESISTOR-FIXED METAL-FILM 301R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-301R-1%50ppm |
| R45 | 24811/142 | RESISTOR-FIXED METAL-FILM 51R1 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-51R1-1%50ppm |
| R46 | 24811/160 | RESISTOR-FIXED METAL-FILM 301R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-301R-1%50ppm |
| R47 | 24811/193 | RESISTOR-FIXED METAL-FILM 6K81 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-6K81-1%50ppm |
| R48 | 24811/193 | RESISTOR-FIXED METAL-FILM 6K81 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-6K81-1%50ppm |
| R49 | 24811/160 | RESISTOR-FIXED METAL-FILM 301R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-301R-1%50ppm |
| R50 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R51 | 24811/155 | RESISTOR-FIXED METAL-FILM 182R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-182R-1%50ppm |
| R52 | 24811/155 | RESISTOR-FIXED METAL-FILM 182R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-182R-1%50ppm |
| R53 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R54 | 24811/175 | RESISTOR-FIXED METAL-FILM 1K21 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-1K21-1%50ppm |
| R55 | 24811/161 | RESISTOR-FIXED METAL-FILM 332R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-332R-1%50ppm |
| R56 | 24811/165 | RESISTOR-FIXED METAL-FILM 475R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-475R-1%50ppm |
| R57 to R59 | 24811/160 | RESISTOR-FIXED METAL-FILM 301R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-301R-1%50ppm |
| R60 | 24811/161 | RESISTOR-FIXED METAL-FILM 332R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-332R-1%50ppm |
| R61 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R62 | 24811/148 | RESISTOR-FIXED METAL-FILM 90R9 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-90R9-1%50ppm |

## AE7 Demodulation filter block (contd.)

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| R63 | 24811/167 | RESISTOR-FIXED METAL-FILM 562R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-562R-1%50ppm |
| R64 | 24811/177 | RESISTOR-FIXED METAL-FILM 1K5 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K5-1%50ppm |
| R65 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R66 | 24811/149 | RESISTOR-FIXED METAL-FILM 100R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100R-1%50ppm |
| R68 | 24811/177 | RESISTOR-FIXED METAL-FILM 1K5 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K5-1%50ppm |
| R69 | 24811/165 | RESISTOR-FIXED METAL-FILM 475R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-475R-1%50ppm |
| R70 to R72 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R73 | 24811/188 | RESISTOR-FIXED METAL-FILM 4K32 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-4K32-1%50ppm |
| R74 | 24811/159 | RESISTOR-FIXED METAL-FILM 274R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-274R-1%50ppm |
| R75 | 24811/157 | RESISTOR-FIXED METAL-FILM 221R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-221R-1%50ppm |
| R76 | 24811/157 | RESISTOR-FIXED METAL-FILM 221R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-221R-1%50ppm |
| R77 | 24811/171 | RESISTOR-FIXED METAL-FILM 825R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-825R-1%50ppm |
| R78 | 24811/171 | RESISTOR-FIXED METAL-FILM 825R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-825R-1%50ppm |
| R79 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R80 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R81 | 24811/224 | RESISTOR-FIXED METAL-FILM 130K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-130K-1%50ppm |
| R82 | 24811/208 | RESISTOR-FIXED METAL-FILM 30K1 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-30K1-1%50ppm |
| R83 | 24811/185 | RESISTOR-FIXED METAL-FILM 3K32 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-3K32-1%50ppm |
| R84 | 25748/564 | RESISTOR-VARIABLE CERMET LINEAR, 500R 10% 500mW 200V 100 ppm/DEG.C, MULTI-TURN, VERTICAL-PCB, | MEGGITT ELECTRONICS | 4290W404/8/06411/501 |
| R85 | 24811/166 | RESISTOR-FIXED METAL-FILM 511R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-511R-1%50ppm |
| R86 | 24811/223 | RESISTOR-FIXED METAL-FILM 121K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-121K-1%50ppm |
| R87 | 24811/195 | RESISTOR-FIXED METAL-FILM 8K25 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-8K25-1%50ppm |
| R88 | 24811/147 | RESISTOR-FIXED METAL-FILM 82R5 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-82R5-1%50ppm |
| R89 | 24811/180 | RESISTOR-FIXED METAL-FILM 2K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-2K0-1%50ppm |
| R90 | 25748/569 | RESISTOR-VARIABLE CERMET LINEAR, 1K 10% 500mW 200V 100 ppm/DEG.C, MULTI-TURN, VERTICAL-PCB, 0.375in | MEGGITT ELECTRONICS | 4290W404/8/06411/102 |

## AE7 Demodulation filter block (contd.)

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| R91 | 24811/178 | RESISTOR-FIXED METAL-FILM 1K62 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-1K62-1%50ppm |
| R92 | 24811/155 | RESISTOR-FIXED METAL-FILM 182R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-182R-1%50ppm |
| R93 | 24811/202 | RESISTOR-FIXED METAL-FILM 16K2 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-16K2-1%50ppm |
| R94 | 24811/221 | RESISTOR-FIXED METAL-FILM 100K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100K-1%50ppm |
| R95 | 24811/158 | RESISTOR-FIXED METAL-FILM 243R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-243R-1%50ppm |
| R96 | 24811/180 | RESISTOR-FIXED METAL-FILM 2K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-2K0-1%50ppm |
| R97 | 24811/125 | RESISTOR-FIXED METAL-FILM 10R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10R-1%-50ppm |
| R99 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R100 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R101 | 24811/162 | RESISTOR-FIXED METAL-FILM 365R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-365R-1%50ppm |
| R102 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R103 | 24811/175 | RESISTOR-FIXED METAL-FILM 1K21 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-1K21-1%50ppm |
| R104 | 24811/171 | RESISTOR-FIXED METAL-FILM 825R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-825R-1%50ppm |
| R105 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R106 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R107 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R108 | 24811/185 | RESISTOR-FIXED METAL-FILM 3K32 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-3K32-1%50ppm |
| R109 | 24811/185 | RESISTOR-FIXED METAL-FILM 3K32 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-3K32-1%50ppm |
| R110 | 24811/219 | RESISTOR-FIXED METAL-FILM 82K5 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-82K5-1%50ppm |
| R111 | 24811/219 | RESISTOR-FIXED METAL-FILM 82K5 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-82K5-1%50ppm |
| R112 | 24811/221 | RESISTOR-FIXED METAL-FILM 100K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100K-1%50ppm |
| R113 | 24811/221 | RESISTOR-FIXED METAL-FILM 100K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100K-1%50ppm |
| R114 | 24811/163 | RESISTOR-FIXED METAL-FILM 392R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-392R-1%50ppm |
| R115 | 24811/172 | RESISTOR-FIXED METAL-FILM 909R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-909R-1%50ppm |
| R116 | 25748/564 | RESISTOR-VARIABLE CERMET LINEAR, 500R 10% 500mW 200V 100 ppm/DEG.C, MULTI-TURN, VERTICAL-PCB, | MEGGITT ELECTRONICS | 4290W404/8/06411/501 |

## AE7 Demodulation filter block (contd.)

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| R117 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R118 | 24811/184 | RESISTOR-FIXED METAL-FILM 3K01 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-3K01-1%50ppm |
| R119 | 24811/199 | RESISTOR-FIXED METAL-FILM 12K1 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-12K1-1%50ppm |
| R120 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R121 to R124 | 24811/221 | RESISTOR-FIXED METAL-FILM 100K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100K-1%50ppm |
| R125 | 24811/226 | RESISTOR-FIXED METAL-FILM 162K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VTM (UK) LTD | 501-0-162K-1%-50ppm |
| R126 | 24811/226 | RESISTOR-FIXED METAL-FILM 162K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VTM (UK) LTD | 501-0-162K-1%-50ppm |
| R127 to | 24811/221 | RESISTOR-FIXED METAL-FILM 100K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100K-1%50ppm |
| R128 to | 24811/221 | RESISTOR-FIXED METAL-FILM 100K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100K-1%50ppm |
| R129 | 24811/157 | RESISTOR-FIXED METAL-FILM 221R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-221R-1%50ppm |
| R130 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R131 | 24811/149 | RESISTOR-FIXED METAL-FILM 100R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100R-1%50ppm |
| R132 | 24811/201 | RESISTOR-FIXED METAL-FILM 15K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-15K-1%50ppm |
| R133 | 24811/209 | RESISTOR-FIXED METAL-FILM 33K2 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-33K2-1%50ppm |
| R134 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R135 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R136 | 24811/221 | RESISTOR-FIXED METAL-FILM 100K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100K-1%50ppm |
| R137 | 24811/244 | RESISTOR-FIXED METAL-FILM 909K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-909K-1%50ppm |
| R138 | 24811/215 | RESISTOR-FIXED METAL-FILM 56K2 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-56K2-1%50ppm |
| R139 | 25748/570 | RESISTOR-VARIABLE CERMET LINEAR, 50K 10% 500mW 200V 100 ppm/DEG.C, MULTI-TURN, VERTICAL-PCB, | MEGGITT ELECTRONICS | 4290W404/8/06411/503 |
| R140 | 24811/221 | RESISTOR-FIXED METAL-FILM 100K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100K-1%50ppm |
| R141 | 24811/241 | RESISTOR-FIXED METAL-FILM 681K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-681K-1%50ppm |
| R142 | 24811/241 | RESISTOR-FIXED METAL-FILM 681K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-681K-1%50ppm |
| R143 | 24811/172 | RESISTOR-FIXED METAL-FILM 909R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-909R-1%50ppm |
| R145 | 25748/567 | RESISTOR-VARIABLE CERMET LINEAR, 200R 10% 500mW 200V 100 ppm/DEG.C, MULTI-TURN, VERTICAL-PCB, | MEGGITT ELECTRONICS | 4290W404/8/06411/201 |

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| **AE7 Demodulation filter block (contd.)** | | | | |
| R146 | 24811/159 | RESISTOR-FIXED METAL-FILM 274R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-274R-1%50ppm |
| R147 | 24811/188 | RESISTOR-FIXED METAL-FILM 4K32 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-4K32-1%50ppm |
| R148 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R149 | 24811/183 | RESISTOR-FIXED METAL-FILM 2K74 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-2K74-1%50ppm |
| R150 | 24811/163 | RESISTOR-FIXED METAL-FILM 392R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-392R-1%50ppm |
| R151 | 24811/200 | RESISTOR-FIXED METAL-FILM 13K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-13K-1%50ppm |
| R152 | 24811/189 | RESISTOR-FIXED METAL-FILM 4K75 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-4K75-1%50ppm |
| R153 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R154 | 25748/569 | RESISTOR-VARIABLE CERMET LINEAR, 1K 10% 500mW 200V 100 ppm/DEG.C, MULTI-TURN, VERTICAL-PCB, 0.375in | MEGGITT ELECTRONICS | 4290W404/8/06411/102 |
| R155 | 24811/198 | RESISTOR-FIXED METAL-FILM 11K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-11K-1%50ppm |
| R156 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R157 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R158 | 24811/215 | RESISTOR-FIXED METAL-FILM 56K2 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-56K2-1%50ppm |
| R159 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R160 | 24811/221 | RESISTOR-FIXED METAL-FILM 100K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100K-1%50ppm |
| R161 | 24811/167 | RESISTOR-FIXED METAL-FILM 562R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-562R-1%50ppm |
| R162 | 24811/178 | RESISTOR-FIXED METAL-FILM 1K62 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-1K62-1%50ppm |
| R165 | 24811/200 | RESISTOR-FIXED METAL-FILM 13K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-13K-1%50ppm |
| R166 | 24811/181 | RESISTOR-FIXED METAL-FILM 2K21 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-2K21-1%50ppm |
| R167 | 24811/159 | RESISTOR-FIXED METAL-FILM 274R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-274R-1%50ppm |
| R168 | 24811/168 | RESISTOR-FIXED METAL-FILM 619R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-619R-1%50ppm |
| TR2 to TR8 | 28457/850 | TRANSISTOR NPN BIPOLAR FMMT2369... 40V 600MHz 300mW 500mA 40hFE MIN @ 10mA, MARKING CODE *1J, | PHILIPS | PMBT2369 |
| TR9 to TR12 | 28457/852 | TRANSISTOR PNP BIPOLAR BSR15... 40V 200MHz 300mW 600mA MARKING CODE CH/T7p, SURFACE MOUNTED, | PHILIPS | BSR15 |
| TR14 | 28459/061 | TRANSISTOR N-CHANNEL-DEPLETION JFET BSR56... 40V 250mW 50mA MARKING CODE M4, SURFACE MOUNTED, | PHILIPS | BSR56 |

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| **AE7 Demodulation filter block (contd.)** | | | | |
| TR17 | 28455/302 | TRANSISTOR NPN BIPOLAR BCX54... 45V 130MHz 1W 1A 40hFE MIN @ 150mA, MARKING CODE BA, SURFACE | PHILIPS | BCX54 |
| X1 | 28312/127 | FILTER CRYSTAL, PCB-MOUNT, 10.7MHz, MONOLITHIC, 6dB PASSBND +/-7.5kHz, 65dB STOPBND 17kHz, 8 | IQD LTD | 10M15D |
| X2 | 28312/128 | FILTER CRYSTAL, PCB-MOUNT, 10.7MHz, MONOLITHIC, 6dB PASSBND +/-3.75kHz, 65dB STOPBND 8.7kHz, 8 | IQD LTD | 10M08D |
| X3 | 28312/126 | FILTER CRYSTAL, PCB-MOUNT, 10.7MHz, MONOLITHIC, SSB, 6dB PASSBND +/-1.1kHz, 20dB STOPBND 1.5kHz, 8 | IQD LTD | 10M22D |

## AE8 SSB BFO

When ordering, prefix circuit reference with AE8.

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| | 44829/997 | Complete unit | Issue 02 | |
| C1 | 26451/003 | CAPACITOR-FIXED ALUMINIUM 10uF +/-20% 16V ELECTROLYTIC, SURFACE-MOUNTED, SIZE 4.3 x 4.3mm, | PANASONIC INDUSTRIAL | ECE-V-1CA-100R |
| C2 | 26386/899 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | ROHM ELECTRONICS LTD | MCH31-5C-104-KP |
| C3 | 26451/003 | CAPACITOR-FIXED ALUMINIUM 10uF +/-20% 16V ELECTROLYTIC, SURFACE-MOUNTED, SIZE 4.3 x 4.3mm, | PANASONIC INDUSTRIAL | ECE-V-1CA-100R |
| C4 | 26386/899 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | ROHM ELECTRONICS LTD | MCH31-5C-104-KP |
| C5 | 26451/003 | CAPACITOR-FIXED ALUMINIUM 10uF +/-20% 16V ELECTROLYTIC, SURFACE-MOUNTED, SIZE 4.3 x 4.3mm, | PANASONIC INDUSTRIAL | ECE-V-1CA-100R |
| C6 | 26386/899 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | ROHM ELECTRONICS LTD | MCH31-5C-104-KP |
| C7 | 26451/003 | CAPACITOR-FIXED ALUMINIUM 10uF +/-20% 16V ELECTROLYTIC, SURFACE-MOUNTED, SIZE 4.3 x 4.3mm, | PANASONIC INDUSTRIAL | ECE-V-1CA-100R |
| C8 | 26386/899 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | ROHM ELECTRONICS LTD | MCH31-5C-104-KP |
| C9 | 26451/003 | CAPACITOR-FIXED ALUMINIUM 10uF +/-20% 16V ELECTROLYTIC, SURFACE-MOUNTED, SIZE 4.3 x 4.3mm, | PANASONIC INDUSTRIAL | ECE-V-1CA-100R |
| C10 | 26386/899 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | ROHM ELECTRONICS LTD | MCH31-5C-104-KP |
| C12 | 26386/863 | CAPACITOR-FIXED CERAMIC 1nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-102-KP |
| C13 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C14 | 26451/003 | CAPACITOR-FIXED ALUMINIUM 10uF +/-20% 16V ELECTROLYTIC, SURFACE-MOUNTED, SIZE 4.3 x 4.3mm, | PANASONIC INDUSTRIAL | ECE-V-1CA-100R |
| C15 | 26386/899 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | ROHM ELECTRONICS LTD | MCH31-5C-104-KP |
| C16 | 26451/003 | CAPACITOR-FIXED ALUMINIUM 10uF +/-20% 16V ELECTROLYTIC, SURFACE-MOUNTED, SIZE 4.3 x 4.3mm, | PANASONIC INDUSTRIAL | ECE-V-1CA-100R |
| C17 | 26386/899 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | ROHM ELECTRONICS LTD | MCH31-5C-104-KP |
| C22 | 26451/003 | CAPACITOR-FIXED ALUMINIUM 10uF +/-20% 16V ELECTROLYTIC, SURFACE-MOUNTED, SIZE 4.3 x 4.3mm, | PANASONIC INDUSTRIAL | ECE-V-1CA-100R |
| C23 | 26386/899 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | ROHM ELECTRONICS LTD | MCH31-5C-104-KP |
| C24 | 26451/003 | CAPACITOR-FIXED ALUMINIUM 10uF +/-20% 16V ELECTROLYTIC, SURFACE-MOUNTED, SIZE 4.3 x 4.3mm, | PANASONIC INDUSTRIAL | ECE-V-1CA-100R |
| C25 | 26386/899 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | ROHM ELECTRONICS LTD | MCH31-5C-104-KP |
| C26 | 26386/869 | CAPACITOR-FIXED CERAMIC 3.3nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-332-KP |
| C27 | 26386/827 | CAPACITOR-FIXED CERAMIC 180pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-181-JP |
| C28 | 26386/877 | CAPACITOR-FIXED CERAMIC 15nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-153-KP |

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| **AE8 SSB BFO (contd.)** | | | | |
| C30 | 26386/899 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | ROHM ELECTRONICS LTD | MCH31-5C-104-KP |
| C31 to C33 | 26386/934 | CAPACITOR-FIXED CERAMIC 220pF +/-1% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | VISHAY COMPONENTS | VJ0805-A-221F-XAT |
| C34 | 26386/931 | CAPACITOR-FIXED CERAMIC 470pF +/-1% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | VISHAY COMPONENTS | VJ0805-A-471F-XAT |
| C35 | 26386/899 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | ROHM ELECTRONICS LTD | MCH31-5C-104-KP |
| C36 | 26386/863 | CAPACITOR-FIXED CERAMIC 1nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-102-KP |
| C37 | 26386/863 | CAPACITOR-FIXED CERAMIC 1nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-102-KP |
| C38 | 26386/899 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | ROHM ELECTRONICS LTD | MCH31-5C-104-KP |
| C39 | 26451/010 | CAPACITOR-FIXED ALUMINIUM 100uF +/-20% 6.3V ELECTROLYTIC, SURFACE-MOUNTED, SIZE 6.6 x 6.6mm, | PANASONIC INDUSTRIAL | ECE-V-0JA-101P |
| C40 | 26386/824 | CAPACITOR-FIXED CERAMIC 100pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-101-JP |
| C41 | 26386/863 | CAPACITOR-FIXED CERAMIC 1nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-102-KP |
| C42 | 26386/863 | CAPACITOR-FIXED CERAMIC 1nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-102-KP |
| C43 | 26386/899 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | ROHM ELECTRONICS LTD | MCH31-5C-104-KP |
| D2 | 28383/930 | DIODE SMALL-SIGNAL, BAS16... 330mW 75V 250mA 2pF 1Vf @ 50mA, MARKING CODE A6, SURFACE MOUNTED, | PHILIPS | BAS16 |
| D3 | 28381/342 | DIODE VARIABLE CAPACITNCE, KV1226... DUAL, 30V 565pF @ 1V, 21pF @ 25V, CAPAC RATIO 20 MIN, | TOKO (UK) LTD | KV1226 |
| IC1 | 28469/543 | IC-DIGITAL COUNTER 74HC390... 4 BIT, DUAL, DECADE RIPPLE, CMOS-H/SPEED, 16 PIN, SMALL-OUTLINE. | PHILIPS | 74HC390D |
| IC2 | 28462/638 | IC-DIGITAL FLIP-FLOP/D-TYPE 74HC74... 2 BIT, DUAL, POS EDGE TRIGGER, PLUS SET & CLEAR, CMOS-H/SPEED, | PHILIPS | 74HC74D |
| IC3 | 28466/390 | IC-DIGITAL NAND-GATE 74HC00... 2 INPUT, QUAD, CMOS-H/SPEED, 14 PIN, SMALL-OUTLINE. | PHILIPS | 74HC00D |
| IC4 | 28461/437 | IC-ANALOGUE OPERATIONAL AMP 5534... 2 INPUT, SINGLE, 10V 16mA LOW NOISE, 10MHz, BIPOLAR, 8 PIN, | PHILIPS | NE5534D |
| IC5 | 28461/437 | IC-ANALOGUE OPERATIONAL AMP 5534... 2 INPUT, SINGLE, 10V 16mA LOW NOISE, 10MHz, BIPOLAR, 8 PIN, | PHILIPS | NE5534D |
| IC7 | 28464/184 | IC-DIGITAL COUNTER 74HC161... 4 INPUT, 4 BIT, SINGLE, BINARY, PRESETTABLE, SYNCHRONOUS, | PHILIPS | 74HC161D |
| IC8 | 28464/189 | IC-DIGITAL COUNTER 74HC393... 4 BIT, DUAL, BINARY RIPPLE, CMOS-H/SPEED, 14 PIN, SMALL-OUTLINE. | PHILIPS | 74HC393D |
| L1 | 23642/512 | INDUCTOR-FIXED 22uH +/- 5% EPOXY-MOULD, 110mA 3R7 MAX, 30 Q @ 2.5 MHz, 25 MHz SRF, SURFACE MOUNTED, | MEGGITT ELECTRONICS | 3612-T-220-J |

## AE8 SSB BFO (contd.)

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| PLA | 23435/120 | CONNECTOR MULTIWAY, PCB HEADER, 36 WAY, RIGHT ANGLED, 2.54mm PITCH, PINS GOLD PLATED TO CLASS 2, | BERG ELECTRONICS | 75168-101-36 |
| PLJ | 23435/120 | CONNECTOR MULTIWAY, PCB HEADER, 36 WAY, RIGHT ANGLED, 2.54mm PITCH, PINS GOLD PLATED TO CLASS 2, | BERG ELECTRONICS | 75168-101-36 |
| R1 to R3 | 24811/142 | RESISTOR-FIXED METAL-FILM 51R1 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-51R1-1%50ppm |
| R4 | 24811/175 | RESISTOR-FIXED METAL-FILM 1K21 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-1K21-1%50ppm |
| R6 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R7 | 24811/175 | RESISTOR-FIXED METAL-FILM 1K21 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-1K21-1%50ppm |
| R9 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R10 to R12 | 24811/189 | RESISTOR-FIXED METAL-FILM 4K75 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-4K75-1%50ppm |
| R13 to R15 | 24811/165 | RESISTOR-FIXED METAL-FILM 475R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-475R-1%50ppm |
| R20 | 24811/161 | RESISTOR-FIXED METAL-FILM 332R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-332R-1%50ppm |
| R21 | 24811/145 | RESISTOR-FIXED METAL-FILM 68R1 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-68R1-1%50ppm |
| R22 | 24811/142 | RESISTOR-FIXED METAL-FILM 51R1 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-51R1-1%50ppm |
| R23 | 24811/181 | RESISTOR-FIXED METAL-FILM 2K21 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-2K21-1%50ppm |
| R24 | 24811/162 | RESISTOR-FIXED METAL-FILM 365R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-365R-1%50ppm |
| R25 to R28 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R29 | 24811/189 | RESISTOR-FIXED METAL-FILM 4K75 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-4K75-1%50ppm |
| R30 | 24811/221 | RESISTOR-FIXED METAL-FILM 100K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100K-1%50ppm |
| R41 | 24811/133 | RESISTOR-FIXED METAL-FILM 22R1 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-22R1-1%50ppm |
| R42 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R43 | 24811/189 | RESISTOR-FIXED METAL-FILM 4K75 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-4K75-1%50ppm |
| R44 | 24811/189 | RESISTOR-FIXED METAL-FILM 4K75 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-4K75-1%50ppm |
| R45 | 24811/221 | RESISTOR-FIXED METAL-FILM 100K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100K-1%50ppm |
| R46 | 24811/157 | RESISTOR-FIXED METAL-FILM 221R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-221R-1%50ppm |
| R47 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| **AE8 SSB BFO (contd.)** | | | | |
| R48 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R50 | 24811/189 | RESISTOR-FIXED METAL-FILM 4K75 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-4K75-1%50ppm |
| R51 | 24811/189 | RESISTOR-FIXED METAL-FILM 4K75 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-4K75-1%50ppm |
| R52 | 24811/209 | RESISTOR-FIXED METAL-FILM 33K2 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-33K2-1%50ppm |
| SKG to SKN | 23436/754 | CONNECTOR MULTIWAY, SOCKET, 3 WAY, STRAIGHT, 2.54mm PITCH, PCB MOUNTING, CONTACTS GOLD PLATED | BERG ELECTRONICS | 76308-103 |
| TR1 | 28453/829 | TRANSISTOR NPN BIPOLAR BC848B... 30V 200MHz 200mW 100mA 290hFE @ 2mA, NOISE 2dB @ 1KHz, MARKING CODE | PHILIPS | BC848B |
| TR2 | 28433/828 | TRANSISTOR PNP BIPOLAR BC858B... 30V 150MHz 200mW 100mA 220hFE MIN @ 2mA, MARKING CODE 3K, SURFACE | PHILIPS | BC858B |
| TR3 | 28433/828 | TRANSISTOR PNP BIPOLAR BC858B... 30V 150MHz 200mW 100mA 220hFE MIN @ 2mA, MARKING CODE 3K, SURFACE | PHILIPS | BC858B |

## AA1/1 Input switch

When ordering, prefix circuit reference with AA1/1.

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| | 44991/180 | 1 GHz input switch, complete unit | | |
| | 44830/040 | PCB assembly only | Issue 6 | |
| C1 | 26386/875 | CAPACITOR CERAMIC 10nF+/-10% 50V 0805 | AVX | 0805-5C-103-KAT-1A o |
| C2 | 26451/008 | CAPACITOR ALUM 47uF+/-20% 6.3V 5.3mmSQ | DUBILIER | DVC-47/6.3-T/R |
| C3 | 26386/887 | CAPACITOR CERAMIC 100nF+/-10% 50V 1210 | AVX | 1210-5C-104-KAT-1A o |
| C4 | 26386/875 | CAPACITOR CERAMIC 10nF+/-10% 50V 0805 | AVX | 0805-5C-103-KAT-1A o |
| C5 | 26451/008 | CAPACITOR ALUM 47uF+/-20% 6.3V 5.3mmSQ | DUBILIER | DVC-47/6.3-T/R |
| C6 | 26386/887 | CAPACITOR CERAMIC 100nF+/-10% 50V 1210 | AVX | 1210-5C-104-KAT-1A o |
| C7 to C9 | 26386/875 | CAPACITOR CERAMIC 10nF+/-10% 50V 0805 | AVX | 0805-5C-103-KAT-1A o |
| C10 | 26386/887 | CAPACITOR CERAMIC 100nF+/-10% 50V 1210 | AVX | 1210-5C-104-KAT-1A o |
| C11 | 26386/875 | CAPACITOR CERAMIC 10nF+/-10% 50V 0805 | AVX | 0805-5C-103-KAT-1A o |
| C12 | 26386/887 | CAPACITOR CERAMIC 100nF+/-10% 50V 1210 | AVX | 1210-5C-104-KAT-1A o |
| C13 to C24 | 26386/875 | CAPACITOR CERAMIC 10nF+/-10% 50V 0805 | AVX | 0805-5C-103-KAT-1A o |
| C28 to C44 | 26386/828 | CAPACITOR CERAMIC 220pF+/-5% 50V 0805 | AVX | 0805-5A-221-JAT-1A o |
| C45 to C46 | 26386/887 | CAPACITOR CERAMIC 100nF+/-10% 50V 1210 | AVX | 1210-5C-104-KAT-1A o |
| C47 | 26386/828 | CAPACITOR CERAMIC 220pF+/-5% 50V 0805 | AVX | 0805-5A-221-JAT-1A o |
| C50 | 26386/875 | CAPACITOR CERAMIC 10nF+/-10% 50V 0805 | AVX | 0805-5C-103-KAT-1A o |
| C51 to C68 | 26386/828 | CAPACITOR CERAMIC 220pF+/-5% 50V 0805 | AVX | 0805-5A-221-JAT-1A o |
| C69 | 26386/824 | CAPACITOR CERAMIC 100pF+/-5% 50V 0805 | AVX | 0805-5A-101-JAT-1A o |
| C70 to C71 | 26386/875 | CAPACITOR CERAMIC 10nF+/-10% 50V 0805 | AVX | 0805-5C-103-KAT-1A o |
| C72 to C77 | 26386/999 | CAPACITOR CERAMIC 0.5pF+/- 0.1pF 100V 0805 | AVX | 0805-1K-0R5-BAW-TR |
| D1 to D2 | 28349/029 | DIODE HSMS-2810.. SMALLSIG SCHTKY MK-B0L SOT-23 | HEWLETT-PACKARD | HSMS-2810-TR1 |
| D3 to D4 | 28349/032 | DIODE HSMS-2820.. SMALLSIG SCHTKY MK-C0L SOT-23 | HEWLETT-PACKARD | HSMS-2820-TR1 |
| D5 to D7 | 28371/302 | DIODE BZX84-C4V7.. ZENER4.7V MKD-Z1 SOT-23 | PHILIPS | BZX84-C4V7 |
| D8 to D23 | 28383/930 | DIODE BAS16.. SMALL-SIG75V MKD-A6 SOT-23 | PHILIPS | BAS16 |
| D24 | 28371/301 | DIODE BZX84-C4V3.. ZENER4.3V MKD-Z17/W9 SOT-23 | PHILIPS | BZX84-C4V3 |
| D25 to D26 | 28383/941 | DIODE BA682.. BAND SWTCH35V MKD-RED SOD-80 | PHILIPS | BA682 |
| D27 | 28371/301 | DIODE BZX84-C4V3.. ZENER4.3V MKD-Z17/W9 SOT-23 | PHILIPS | BZX84-C4V3 |

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| **AA1/1 Input switch (contd.)** | | | | |
| IC1 | 28467/110 | IC-MICRO PERIPHERALPCF8574A.. SO-16 | PHILIPS | PCF8574AT |
| to IC2 | | | | |
| IC3 | 28461/412 | IC-ANALOG OP AMPTL072.. DUAL SO-8 | MOTOROLA | TL072CD |
| IC4 | 28466/390 | IC-DIGITAL NAND-GATE74HC00... QUAD SO-14 | HARRIS | D74HC00M |
| to IC5 | | | | |
| IC6 | 28469/057 | IC-DIGITAL INVERTER74HC04.. HEX SO-14 | HARRIS | CD74HC04M |
| IC7 | 28466/390 | IC-DIGITAL NAND-GATE74HC00... QUAD SO-14 | HARRIS | D74HC00M |
| to IC9 | | | | |
| IC10 | 28469/057 | IC-DIGITAL INVERTER74HC04.. HEX SO-14 | HARRIS | CD74HC04M |
| IC11 | 28461/412 | IC-ANALOG OP AMPTL072.. DUAL SO-8 | MOTOROLA | TL072CD |
| IC12 | 28471/060 | IC-MICRO EEPROM24C04.. 512x8 SO-8 | ATMEL | AT24C04N-10SC-2.7 |
| IC13 | 28462/638 | IC-DIGITAL FLIP-FLOP-D74HC74.. DUAL SO-14 | PHILIPS | 74HC74D |
| L1 | 23642/533 | INDUCTOR 10uH 5%MOULDED 3.2x2.5mm | MEGGITT | 612-T-100-J |
| to L3 | | | | |
| L4 | 23642/535 | INDUCTOR 1uH 5%MOULDED 3.2x2.5mm | MEGGITT | 3612-T-1R0-J |
| PLA | 23436/900 | CONNECTOR PCB-HEADER10-WAY RT-ANG 2-ROW | MOLEX | 39-26-7108 |
| PLC | 23436/117 | CONNECTOR FLEXIBLE CCTJUMPER 8-WAY 6"LG | THOMAS & BETTS | FST-2-6.0-A08 |
| R1 | 24811/203 | RESISTOR 18K2 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-18K2-1%-50ppm |
| R2 | 24811/197 | RESISTOR 10K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-10K-1%-50ppm |
| to R3 | | | | |
| R4 | 24811/253 | RESISTOR 2M21 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-2M21-1%-50ppm |
| R5 | 24811/191 | RESISTOR 5K62 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-5K62-1%-50ppm |
| R6 | 24811/173 | RESISTOR 1K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-1K0-1%-50ppm |
| to R11 | | | | |
| R12 | 24811/181 | RESISTOR 2K21 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-2K21-1%-50ppm |
| to R21 | | | | |
| R22 | 24811/173 | RESISTOR 1K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-1K0-1%-50ppm |
| to R27 | | | | |
| R28 | 24811/181 | RESISTOR 2K21 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-2K21-1%-50ppm |
| to R31 | | | | |
| R32 | 24811/173 | RESISTOR 1K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-1K0-1%-50ppm |
| to R35 | | | | |
| R36 | 24811/197 | RESISTOR 10K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-10K-1%-50ppm |
| to R39 | | | | |
| R40 | 24811/204 | RESISTOR 20K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-20K-1%-50ppm |
| R41 | 24811/173 | RESISTOR 1K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-1K0-1%-50ppm |
| R42 | 24811/245 | RESISTOR 1M 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-1M0-1%-50ppm |
| R43 | 24811/161 | RESISTOR 332R 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-332R-1%-50ppm |
| to R44 | | | | |

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part numbe |
|---|---|---|---|---|
| **AA1/1 Input switch (contd.)** | | | | |
| R45 to R46 | 24811/215 | RESISTOR 56K2 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-56K2-1%-50ppm |
| R47 | 24811/149 | RESISTOR 100R 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-100R-1%-50ppm |
| R48 | 24811/245 | RESISTOR 1M 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-1M0-1%-50ppm |
| R49 | 24811/173 | RESISTOR 1K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-1K0-1%-50ppm |
| R50 | 24811/149 | RESISTOR 100R 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-100R-1%-50ppm |
| R51 to R53 | 24811/904 | RESISTOR 24R3 1% 250mW200V 50ppm L-I MINI-MELF | BEYSCHLAG | MMA0204-50HF-1%-24R |
| R54 to R56 | 24811/909 | RESISTOR 51R1 1% 250mW200V 50ppm L-I MINI-MELF | BEYSCHLAG | MMA0204-50HF-1%-51R1 |
| R57 to R58 | 24811/181 | RESISTOR 2K21 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-2K21-1%-50ppm |
| R60 to R61 | 24811/189 | RESISTOR 4K75 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-4K75-1%-50ppm |
| R66 | 24811/197 | RESISTOR 10K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-10K-1%-50ppm |
| R67 | 24811/149 | RESISTOR 100R 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-100R-1%-50ppm |
| R69 | 24811/204 | RESISTOR 20K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-20K-1%-50ppm |
| R70 | 24811/173 | RESISTOR 1K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-1K0-1%-50ppm |
| R71 to R73 | 24811/149 | RESISTOR 100R 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-100R-1%-50ppm |
| RLA | 23486/181 | RELAY MAGNETIC SPCO 5V62R PCB-MTG DIL-14 | MATSUSHITA | RK1-L2-5V-H23 |
| RLB | 23486/181 | RELAY MAGNETIC SPCO 5V62R PCB-MTG DIL-14 | MATSUSHITA | RK1-L2-5V-H23 |
| RLC | 23486/181 | RELAY MAGNETIC SPCO 5V62R PCB-MTG DIL-14 | MATSUSHITA | RK1-L2-5V-H23 |
| RLD | 23486/181 | RELAY MAGNETIC SPCO 5V62R PCB-MTG DIL-14 | MATSUSHITA | RK1-L2-5V-H23 |
| RLE | 23486/181 | RELAY MAGNETIC SPCO 5V62R PCB-MTG DIL-14 | MATSUSHITA | RK1-L2-5V-H23 |
| RLF | 23486/182 | RELAY MAGNETIC SPCO 5V125R PCB-MTG DIL-14 | OMRON | G5Y-1H-5V |
| RLG | 23486/181 | RELAY MAGNETIC SPCO 5V62R PCB-MTG DIL-14 | MATSUSHITA | RK1-L2-5V-H23 |
| RLH | 23486/182 | RELAY MAGNETIC SPCO 5V125R PCB-MTG DIL-14 | OMRON | G5Y-1H-5V |
| RLJ | 23486/181 | RELAY MAGNETIC SPCO 5V62R PCB-MTG DIL-14 | MATSUSHITA | RK1-L2-5V-H23 |
| SKA | 23436/724 | CONNECTOR SKT 8-WAYPCB MTG | THOMAS & BETTS | 744-8 |
| TR1 to TR16 | 28435/241 | TRANSISTOR PNP BCX17..45V 100MHz MKD-T1 SOT-23 | PHILIPS | BCX17 |

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|

## AA2 Input switch, 2.5 GHz

When ordering, prefix circuit reference with AA2.

| | | | | |
|---|---|---|---|---|
| | 44830-187 | Complete unit | Issue 02 | |
| C1 | 26386/899 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | ROHM ELECTRONICS LTD | MCH31-5C-104-KP |
| C2 | 26386/899 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | ROHM ELECTRONICS LTD | MCH31-5C-104-KP |
| C3 | 26451/015 | CAPACITOR-FIXED ALUMINIUM 470uF +/-20% 10V ELECTROLYTIC, SURFACE-MOUNTED, SIZE 10.3 x 10.3mm, | PANASONIC INDUSTRIAL | ECE-V-1A-A-471-P |
| C4 | 26451/015 | CAPACITOR-FIXED ALUMINIUM 470uF +/-20% 10V ELECTROLYTIC, SURFACE-MOUNTED, SIZE 10.3 x 10.3mm, | PANASONIC INDUSTRIAL | ECE-V-1A-A-471-P |
| C5 | 26451/009 | CAPACITOR-FIXED ALUMINIUM 47uF +/-20% 16V ELECTROLYTIC, SURFACE-MOUNTED, SIZE 6.6 x 6.6mm, | PANASONIC INDUSTRIAL | ECE-V-1CA-470P |
| C6 to C10 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C11 | 26386/899 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | ROHM ELECTRONICS LTD | MCH31-5C-104-KP |
| C12 | 26386/899 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | ROHM ELECTRONICS LTD | MCH31-5C-104-KP |
| C13 to C23 | 26386/830 | CAPACITOR-FIXED CERAMIC 330pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-331-JP |
| C24 | 26386/863 | CAPACITOR-FIXED CERAMIC 1nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-102-KP |
| C25 | 26386/863 | CAPACITOR-FIXED CERAMIC 1nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-102-KP |
| C26 to C29 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C30 | 26343/767 | CAPACITOR-FIXED CERAMIC 10pF +/-5% 50V NPO MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-100-DP |
| C32 to C34 | 26386/830 | CAPACITOR-FIXED CERAMIC 330pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-331-JP |
| C35 | 26386/863 | CAPACITOR-FIXED CERAMIC 1nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-102-KP |
| C36 | 26386/863 | CAPACITOR-FIXED CERAMIC 1nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-102-KP |
| C37 to C45 | 26386/830 | CAPACITOR-FIXED CERAMIC 330pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-331-JP |
| D1 to D6 | 28383/936 | DIODE SMALL-SIGNAL, SCHOTTKY, LL103B... 300mW 30V 1A 0.7Vf @ 500mA, SURFACE MOUNTED, MINI-MELF, (8mm | SGS-THOMSON | TMMBAT48 |
| D7 | 28383/941 | DIODE BAND SWITCHING, BA682... 35V 100mA 1.2pF MAX @ 3V, SURFACE MOUNTED, SOD-80, (8mm TAPE - | PHILIPS | BA682 |
| D8 to D16 | 28383/930 | DIODE SMALL-SIGNAL, BAS16... 330mW 75V 250mA 2pF 1Vf @ 50mA, MARKING CODE A6, SURFACE MOUNTED, | PHILIPS | BAS16 |
| D17 | 28383/909 | DIODE SMALL-SIGNAL, SCHOTTKY, HSMS-2822... DUAL, 8V 1pF 340mVf @ 1mA, IN SERIES, MARKING CODE C2, | HEWLETT-PACKARD | HSMS-2822-L31 |
| D18 to D21 | 28383/941 | DIODE BAND SWITCHING, BA682... 35V 100mA 1.2pF MAX @ 3V, SURFACE MOUNTED, SOD-80, (8mm TAPE - | PHILIPS | BA682 |

## AA2 Input switch, 2.5 GHz(contd.)

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| D22 | 28371/215 | DIODE ZENER, BZX84-C2V7... 250mW 2.7V 5% 250mA MARKING CODE Z12/W4, SURFACE MOUNTED, SOT-23, (8mm | PHILIPS | BZX84-C2V7 |
| D23 | 28371/215 | DIODE ZENER, BZX84-C2V7... 250mW 2.7V 5% 250mA MARKING CODE Z12/W4, SURFACE MOUNTED, SOT-23, (8mm | PHILIPS | BZX84-C2V7 |
| D25 | 28383/909 | DIODE SMALL-SIGNAL, SCHOTTKY, HSMS-2822... DUAL, 8V 1pF 340mVf @ 1mA, IN SERIES, MARKING CODE C2, | HEWLETT-PACKARD | HSMS-2822-L31 |
| D26 | 28383/936 | DIODE SMALL-SIGNAL, SCHOTTKY, LL103B... 300mW 30V 1A 0.7Vf @ 500mA, SURFACE MOUNTED, MINI-MELF, (8mm | SGS-THOMSON | TMMBAT48 |
| IC1 | 28467/110 | IC-MICRO PERIPHERAL, PCF8574A... REMOTE 8-BIT I/O EXPANDER, I.IC BUS, UP TO 16 DEVICE ADDRESS | PHILIPS | PCF8574AT |
| IC2 | 28467/110 | IC-MICRO PERIPHERAL, PCF8574A... REMOTE 8-BIT I/O EXPANDER, I.IC BUS, UP TO 16 DEVICE ADDRESS | PHILIPS | PCF8574AT |
| IC3 | 28471/060 | IC-MICRO EEPROM, 512 x 8 BIT, 24C04... 5V SUPPLY, 2-WIRE SERIAL INTERFACE, COMMON I/O, OPEN-DRAIN | ATMEL CORPORATION | AT24C04N-10SC-2.7 |
| IC4 | 28461/774 | IC-ANALOGUE VOLTAGE-REGULATOR 78L05AC... 5V +/-5%, POSITIVE, LINEAR, BIPOLAR, 8 PIN, SMALL-OUTLINE. | NAT. SEMICONDUCTOR | LM78L05ACM |
| IC5 | 28461/613 | IC-ANALOGUE COMPARATOR LM393... DUAL, 36V 800uA I/P-OFFSET 5.0mV MAX, RESPONSE TIME 1.3 uS TYP, | PHILIPS | LM393D |
| IC6 | 28461/613 | IC-ANALOGUE COMPARATOR LM393... DUAL, 36V 800uA I/P-OFFSET 5.0mV MAX, RESPONSE TIME 1.3 uS TYP, | PHILIPS | LM393D |
| IC7 | 28462/638 | IC-DIGITAL FLIP-FLOP/D-TYPE 74HC74... 2 BIT, DUAL, POS EDGE TRIGGER, PLUS SET & CLEAR, CMOS-H/SPEED, | PHILIPS | 74HC74D |
| IC8 | 28468/321 | IC-DIGITAL FLIP-FLOP/MONOSTABLE 74HC123... DUAL, RETRIGGERABLE, tW = 0.45RC, WITH RESET, | PHILIPS | 74HC123D |
| IC9 | 28466/390 | IC-DIGITAL NAND-GATE 74HC00... 2 INPUT, QUAD, CMOS-H/SPEED, 14 PIN, SMALL-OUTLINE. | PHILIPS | 74HC00D |
| IC10 | 28466/390 | IC-DIGITAL NAND-GATE 74HC00... 2 INPUT, QUAD, CMOS-H/SPEED, 14 PIN, SMALL-OUTLINE. | PHILIPS | 74HC00D |
| IC11 | 28469/057 | IC-DIGITAL INVERTER 74HC04... HEX, CMOS-H/SPEED, 14 PIN, SMALL-OUTLINE. | PHILIPS | 74HC04D |
| IC12 | DETAILS | | | |
| PLA | 23436/900 | CONNECTOR MULTIWAY, PCB HEADER, 10 WAY, RIGHT ANGLED, 2-ROW, 2.54mm GRID, POLARISED, SHROUDED, | MOLEX ELECTRONICS | 39-26-7108 |
| R1 | 24811/182 | RESISTOR-FIXED METAL-FILM 2K43 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-2K43-1%50ppm |
| R2 to R4 | 24811/165 | RESISTOR-FIXED METAL-FILM 475R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-475R-1%50ppm |
| R5 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R6 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R7 | 24811/165 | RESISTOR-FIXED METAL-FILM 475R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-475R-1%50ppm |
| R8 | 24811/208 | RESISTOR-FIXED METAL-FILM 30K1 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-30K1-1%50ppm |

## AA2 Input switch, 2.5 GHz (contd.)

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| R9 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R10 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R11 | 24811/205 | RESISTOR-FIXED METAL-FILM 22K1 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-22K1-1%50ppm |
| R12 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R13 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R14 | 24811/221 | RESISTOR-FIXED METAL-FILM 100K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100K-1%50ppm |
| R15 | 24811/182 | RESISTOR-FIXED METAL-FILM 2K43 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-2K43-1%50ppm |
| R16 | 24811/182 | RESISTOR-FIXED METAL-FILM 2K43 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-2K43-1%50ppm |
| R17 | 24811/221 | RESISTOR-FIXED METAL-FILM 100K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100K-1%50ppm |
| R18 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R19 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R20 to R23 | 24811/165 | RESISTOR-FIXED METAL-FILM 475R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-475R-1%50ppm |
| R24 | 24811/229 | RESISTOR-FIXED METAL-FILM 221K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-221K-1%50ppm |
| R25 | 24811/165 | RESISTOR-FIXED METAL-FILM 475R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-475R-1%50ppm |
| R26 | 24811/229 | RESISTOR-FIXED METAL-FILM 221K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-221K-1%50ppm |
| R27 to R29 | 24811/165 | RESISTOR-FIXED METAL-FILM 475R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-475R-1%50ppm |
| R30 | 24811/909 | RESISTOR-FIXED METAL-FILM 51R1 +/- 1% 250mW 200V 50 ppm/DEG.C, LOW-INDUCTANCE, SURFACE MOUNTED, | VISHAY COMPONENTS | SMM0204-HF-51R1-1% |
| R31 to R33 | 24811/904 | RESISTOR-FIXED METAL-FILM 24R3 +/- 1% 250mW 200V 50 ppm/DEG.C, LOW-INDUCTANCE, SURFACE MOUNTED, | VISHAY COMPONENTS | SMM0204-HF-24R3-1% |
| R34 | 24811/142 | RESISTOR-FIXED METAL-FILM 51R1 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-51R1-1%50ppm |
| R35 | 24811/142 | RESISTOR-FIXED METAL-FILM 51R1 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-51R1-1%50ppm |
| R36 | 24811/909 | RESISTOR-FIXED METAL-FILM 51R1 +/- 1% 250mW 200V 50 ppm/DEG.C, LOW-INDUCTANCE, SURFACE MOUNTED, | VISHAY COMPONENTS | SMM0204-HF-51R1-1% |
| R37 | 24811/189 | RESISTOR-FIXED METAL-FILM 4K75 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-4K75-1%50ppm |
| R38 | 24811/189 | RESISTOR-FIXED METAL-FILM 4K75 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-4K75-1%50ppm |
| R39 | 24321/777 | RESISTOR-FIXED METAL-GLAZE 1K5 +/- 2% 125mW 200V 200 ppm/DEG.C, 1%-1K50-ACCEPTABLE, SURFACE | VISHAY COMPONENTS | CRCW-1206-1501-FT |
| R40 to R43 | 24811/125 | RESISTOR-FIXED METAL-FILM 10R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10R-1%-50ppm |

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| **AA2 Input switch, 2.5 GHz(contd.)** | | | | |
| R44 | 24321/777 | RESISTOR-FIXED METAL-GLAZE 1K5 +/- 2% 125mW 200V 200 ppm/DEG.C, 1%-1K50-ACCEPTABLE, SURFACE | VISHAY COMPONENTS | CRCW-1206-1501-FT |
| R45 | 24811/909 | RESISTOR-FIXED METAL-FILM 51R1 +/- 1% 250mW 200V 50 ppm/DEG.C, LOW-INDUCTANCE, SURFACE MOUNTED, | VISHAY COMPONENTS | SMM0204-HF-51R1-1% |
| R46 | 24811/221 | RESISTOR-FIXED METAL-FILM 100K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100K-1%50ppm |
| R47 | 24811/221 | RESISTOR-FIXED METAL-FILM 100K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100K-1%50ppm |
| RLA to RLD | 23486/198 | RELAY MAGNETIC, DOUBLE-POLE CHANGEOVER, POLARISED DUAL 5V COIL, 72R - LATCHING, ISOL>40dB & INS-LOSS | MATSUSHITA CONTROLS | RM2-L2-5V |
| RLE | 23486/101 | RELAY MAGNETIC, DOUBLE-POLE CHANGEOVER, 5V COIL, 62R - CONTACTS 1A @ 28VDC, 9.5mmSQ, 9.6mm HIGH, | TELEDYNE LTD | 172-5 |
| TR1 | 28459/104 | TRANSISTOR P-CHANNEL-ENHANCE MOSFET BSS84... 50V 360mW 130mA 10R MARKING CODE SP, SURFACE MOUNTED, | PHILIPS | BSS84 |
| TR2 | 28459/104 | TRANSISTOR P-CHANNEL-ENHANCE MOSFET BSS84... 50V 360mW 130mA 10R MARKING CODE SP, SURFACE MOUNTED, | PHILIPS | BSS84 |
| TR3 | 28459/104 | TRANSISTOR P-CHANNEL-ENHANCE MOSFET BSS84... 50V 360mW 130mA 10R MARKING CODE SP, SURFACE MOUNTED, | PHILIPS | BSS84 |
| TR4 | 28459/104 | TRANSISTOR P-CHANNEL-ENHANCE MOSFET BSS84... 50V 360mW 130mA 10R MARKING CODE SP, SURFACE MOUNTED, | PHILIPS | BSS84 |
| TR5 | 28459/104 | TRANSISTOR P-CHANNEL-ENHANCE MOSFET BSS84... 50V 360mW 130mA 10R MARKING CODE SP, SURFACE MOUNTED, | PHILIPS | BSS84 |
| TR6 | 28459/104 | TRANSISTOR P-CHANNEL-ENHANCE MOSFET BSS84... 50V 360mW 130mA 10R MARKING CODE SP, SURFACE MOUNTED, | PHILIPS | BSS84 |
| TR7 | 28459/104 | TRANSISTOR P-CHANNEL-ENHANCE MOSFET BSS84... 50V 360mW 130mA 10R MARKING CODE SP, SURFACE MOUNTED, | PHILIPS | BSS84 |
| TR8 | 28459/104 | TRANSISTOR P-CHANNEL-ENHANCE MOSFET BSS84... 50V 360mW 130mA 10R MARKING CODE SP, SURFACE MOUNTED, | PHILIPS | BSS84 |
| TR9 | 28459/104 | TRANSISTOR P-CHANNEL-ENHANCE MOSFET BSS84... 50V 360mW 130mA 10R MARKING CODE SP, SURFACE MOUNTED, | PHILIPS | BSS84 |
| TR10 | 28459/104 | TRANSISTOR P-CHANNEL-ENHANCE MOSFET BSS84... 50V 360mW 130mA 10R MARKING CODE SP, SURFACE MOUNTED, | PHILIPS | BSS84 |
| TR11 | 28459/104 | TRANSISTOR P-CHANNEL-ENHANCE MOSFET BSS84... 50V 360mW 130mA 10R MARKING CODE SP, SURFACE MOUNTED, | PHILIPS | BSS84 |
| TR12 | 28459/104 | TRANSISTOR P-CHANNEL-ENHANCE MOSFET BSS84... 50V 360mW 130mA 10R MARKING CODE SP, SURFACE MOUNTED, | PHILIPS | BSS84 |
| TR13 | 28459/104 | TRANSISTOR P-CHANNEL-ENHANCE MOSFET BSS84... 50V 360mW 130mA 10R MARKING CODE SP, SURFACE MOUNTED, | PHILIPS | BSS84 |

## AB1 3 GHz Power sensor (AB2 RF input asembly)

When ordering, prefix circuit reference with AB1.

| | |
|---|---|
| 44991-024 | Complete unit |

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|

## AB2 Power meter

When ordering, prefix circuit reference with AB2.

| | | | | |
|---|---|---|---|---|
| | 44829-850 | Complete unit | Issue 08 | |
| C1 | 26421/112 | CAPACITOR-FIXED ALUMINIUM 10uF +/-20% 35V ELECTROLYTIC, RADIAL, 5mm PWP, (TAPED). | PANASONIC INDUSTRIAL | ECE-A-1V-KA-100-B |
| C2 | 26386/887 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-104-KP |
| C3 | 26421/112 | CAPACITOR-FIXED ALUMINIUM 10uF +/-20% 35V ELECTROLYTIC, RADIAL, 5mm PWP, (TAPED). | PANASONIC INDUSTRIAL | ECE-A-1V-KA-100-B |
| C4 | 26386/887 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-104-KP |
| C5 | 26421/112 | CAPACITOR-FIXED ALUMINIUM 10uF +/-20% 35V ELECTROLYTIC, RADIAL, 5mm PWP, (TAPED). | PANASONIC INDUSTRIAL | ECE-A-1V-KA-100-B |
| C6 | 26386/887 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-104-KP |
| C7 | 26421/112 | CAPACITOR-FIXED ALUMINIUM 10uF +/-20% 35V ELECTROLYTIC, RADIAL, 5mm PWP, (TAPED). | PANASONIC INDUSTRIAL | ECE-A-1V-KA-100-B |
| C8 | 26386/887 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-104-KP |
| C9 | 26421/112 | CAPACITOR-FIXED ALUMINIUM 10uF +/-20% 35V ELECTROLYTIC, RADIAL, 5mm PWP, (TAPED). | PANASONIC INDUSTRIAL | ECE-A-1V-KA-100-B |
| C10 | 26386/887 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-104-KP |
| C11 | 26421/112 | CAPACITOR-FIXED ALUMINIUM 10uF +/-20% 35V ELECTROLYTIC, RADIAL, 5mm PWP, (TAPED). | PANASONIC INDUSTRIAL | ECE-A-1V-KA-100-B |
| C12 | 26386/887 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-104-KP |
| C13 | 26386/830 | CAPACITOR-FIXED CERAMIC 330pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-331-JP |
| C15 | 26386/830 | CAPACITOR-FIXED CERAMIC 330pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-331-JP |
| C16 | 26421/112 | CAPACITOR-FIXED ALUMINIUM 10uF +/-20% 35V ELECTROLYTIC, RADIAL, 5mm PWP, (TAPED). | PANASONIC INDUSTRIAL | ECE-A-1V-KA-100-B |
| C17 | 26386/887 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-104-KP |
| C18 | 26421/112 | CAPACITOR-FIXED ALUMINIUM 10uF +/-20% 35V ELECTROLYTIC, RADIAL, 5mm PWP, (TAPED). | PANASONIC INDUSTRIAL | ECE-A-1V-KA-100-B |
| C19 | 26386/887 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-104-KP |
| C20 | 26386/823 | CAPACITOR-FIXED CERAMIC 82pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-820-JP |
| C21 | 26582/432 | CAPACITOR-FIXED POLYESTER 1uF +/-10% 50V 330 ppm/DEG.C, RADIAL, 5mm PWP, (TAPED). | VISHAY COMPONENTS | MKT-1826-510/065 |
| C22 | 26386/823 | CAPACITOR-FIXED CERAMIC 82pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-820-JP |
| C23 | 26386/887 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-104-KP |
| C24 | 26386/887 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-104-KP |
| C25 | 26582/426 | CAPACITOR-FIXED POLYESTER 10nF +/-10% 63V 330 ppm/DEG.C, RADIAL, 5mm PWP, (TAPED). | DUBILIER CAPACITORS | MMP-10nF-K-63V-T/R |

## AB2 Power meter (contd.)

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| C26 | 26582/426 | CAPACITOR-FIXED POLYESTER 10nF +/-10% 63V 330 ppm/DEG.C, RADIAL, 5mm PWP, (TAPED). | DUBILIER CAPACITORS | MMP-10nF-K-63V-T/R |
| C27 | 26421/112 | CAPACITOR-FIXED ALUMINIUM 10uF +/-20% 35V ELECTROLYTIC, RADIAL, 5mm PWP, (TAPED). | PANASONIC INDUSTRIAL | ECE-A-1V-KA-100-B |
| C28 | 26386/887 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-104-KP |
| C29 | 26421/112 | CAPACITOR-FIXED ALUMINIUM 10uF +/-20% 35V ELECTROLYTIC, RADIAL, 5mm PWP, (TAPED). | PANASONIC INDUSTRIAL | ECE-A-1V-KA-100-B |
| C30 | 26386/887 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-104-KP |
| C31 | 26386/819 | CAPACITOR-FIXED CERAMIC 39pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-390-JP |
| C32 | 26582/432 | CAPACITOR-FIXED POLYESTER 1uF +/-10% 50V 330 ppm/DEG.C, RADIAL, 5mm PWP, (TAPED). | VISHAY COMPONENTS | MKT-1826-510/065 |
| C33 | 26386/819 | CAPACITOR-FIXED CERAMIC 39pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-390-JP |
| C34 | 26386/887 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-104-KP |
| C35 | 26386/887 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-104-KP |
| C36 | 26421/112 | CAPACITOR-FIXED ALUMINIUM 10uF +/-20% 35V ELECTROLYTIC, RADIAL, 5mm PWP, (TAPED). | PANASONIC INDUSTRIAL | ECE-A-1V-KA-100-B |
| C37 | 26386/887 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-104-KP |
| C38 | 26421/112 | CAPACITOR-FIXED ALUMINIUM 10uF +/-20% 35V ELECTROLYTIC, RADIAL, 5mm PWP, (TAPED). | PANASONIC INDUSTRIAL | ECE-A-1V-KA-100-B |
| C39 | 26386/887 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-104-KP |
| C40 | 26386/819 | CAPACITOR-FIXED CERAMIC 39pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-390-JP |
| C41 | 26582/432 | CAPACITOR-FIXED POLYESTER 1uF +/-10% 50V 330 ppm/DEG.C, RADIAL, 5mm PWP, (TAPED). | VISHAY COMPONENTS | MKT-1826-510/065 |
| C42 | 26386/819 | CAPACITOR-FIXED CERAMIC 39pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-390-JP |
| C43 | 26386/830 | CAPACITOR-FIXED CERAMIC 330pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-331-JP |
| C44 | 26386/830 | CAPACITOR-FIXED CERAMIC 330pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-331-JP |
| C45 | 26421/112 | CAPACITOR-FIXED ALUMINIUM 10uF +/-20% 35V ELECTROLYTIC, RADIAL, 5mm PWP, (TAPED). | PANASONIC INDUSTRIAL | ECE-A-1V-KA-100-B |
| C46 | 26386/887 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-104-KP |
| C47 | 26421/112 | CAPACITOR-FIXED ALUMINIUM 10uF +/-20% 35V ELECTROLYTIC, RADIAL, 5mm PWP, (TAPED). | PANASONIC INDUSTRIAL | ECE-A-1V-KA-100-B |
| C48 | 26386/887 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-104-KP |
| C49 | 26386/778 | CAPACITOR-FIXED CERAMIC 22nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | PHILIPS | 1210-2R-223-K9-BBC |
| C50 | 26386/887 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-104-KP |

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| **AB2 Power meter (contd.)** | | | | |
| C51 | 26421/112 | CAPACITOR-FIXED ALUMINIUM 10uF +/-20% 35V ELECTROLYTIC, RADIAL, 5mm PWP, (TAPED). | PANASONIC INDUSTRIAL | ECE-A-1V-KA-100-B |
| C52 | 26421/112 | CAPACITOR-FIXED ALUMINIUM 10uF +/-20% 35V ELECTROLYTIC, RADIAL, 5mm PWP, (TAPED). | PANASONIC INDUSTRIAL | ECE-A-1V-KA-100-B |
| C53 | 26386/887 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-104-KP |
| C54 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C55 | 26421/112 | CAPACITOR-FIXED ALUMINIUM 10uF +/-20% 35V ELECTROLYTIC, RADIAL, 5mm PWP, (TAPED). | PANASONIC INDUSTRIAL | ECE-A-1V-KA-100-B |
| C56 | 26386/887 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-104-KP |
| C57 to C62 | 26386/881 | CAPACITOR-FIXED CERAMIC 33nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-333-KP |
| IC1 | 28461/368 | IC-ANALOGUE OPERATIONAL AMP OP27... SINGLE, ULTRA LOW NOISE, SLEW-RATE 2.8V/uS TYP, MONOLITHIC, 8 | HARRIS SEMICONDUCTOR | HA3-5127-5 |
| IC2 | 28461/368 | IC-ANALOGUE OPERATIONAL AMP OP27... SINGLE, ULTRA LOW NOISE, SLEW-RATE 2.8V/uS TYP, MONOLITHIC, 8 | HARRIS SEMICONDUCTOR | HA3-5127-5 |
| IC3 | 28461/412 | IC-ANALOGUE OPERATIONAL AMP TL072... DUAL, 18V UNITY GAIN BNDWDTH 3MHz, OFFSET VOLTAGE 10mV, SLEW | MOTOROLA INC. | TL072CD |
| IC4 | 28469/762 | IC-ANALOGUE MULTIPLEXER DG409... 8 INPUT, DUAL, 15V 35uA DIFFERENTIAL 4 CHANNEL, RDS<100R, CMOS, | TEMIC UK LTD | DG409DY |
| IC5 | 28461/412 | IC-ANALOGUE OPERATIONAL AMP TL072... DUAL, 18V UNITY GAIN BNDWDTH 3MHz, OFFSET VOLTAGE 10mV, SLEW | MOTOROLA INC. | TL072CD |
| IC6 | 28469/762 | IC-ANALOGUE MULTIPLEXER DG409... 8 INPUT, DUAL, 15V 35uA DIFFERENTIAL 4 CHANNEL, RDS<100R, CMOS, | TEMIC UK LTD | DG409DY |
| IC7 | 28461/521 | IC-ANALOGUE OPERATIONAL AMP LM6144... QUAD, 24V RAIL TO RAIL I/P & O/P, SLEW RATE 11V/uS, GAIN | NAT. SEMICONDUCTOR | LM6144BIM |
| IC8 | 28461/888 | IC-ANALOGUE SWITCH DG419... SINGLE, 15V SPDT, ON-RESISTANCE<35R, CHANGEOVER, TTL COMPATIBLE, | TEMIC UK LTD | DG419DY |
| IC9 | 28468/307 | IC-DIGITAL FLIP-FLOP/MONOSTABLE 4047... MONO/ASTABLE MULTIVIBRATOR, tW = 2.48RC, CMOS, 14 | PHILIPS | HEF4047BP |
| IC10 | 28466/414 | IC-DIGITAL EXCLUSIVE-OR 74HC86... 2 INPUT, QUAD, CMOS-H/SPEED, 14 PIN, SMALL-OUTLINE. | PHILIPS | 74HC86D |
| IC11 | 28461/676 | IC-ANALOGUE COMPARATOR LM311... 2 INPUT, SINGLE, 15V I/P-OFFSET 7.5mV MAX, RESPONSE-TIME 200nS TYP, | PHILIPS | LM311D |
| L1 to L3 | 23642/701 | INDUCTOR-FIXED 2.2uH +/- 5% EPOXY-MOULD, 320mA 1R MAX, 30 Q @ 7.96 MHz, 75 MHz SRF, SURFACE MOUNTED, | MEGGITT ELECTRONICS | 3612-T-2R2-J |
| PLA | 28488/004 | SOCKET SINGLE CONTACT, FOR 0.41-0.48mm DIA LEADS, COPPER BODY, GOLD PLATE OVER COPPER PLATE. | WEARNES HOLLINGSWRTH | 450-3772-01-03-00 |
| R1 | 24811/141 | RESISTOR-FIXED METAL-FILM 47R5 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-47R5-1%50ppm |

## AB2 Power meter (contd.)

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| R2 | 24811/141 | RESISTOR-FIXED METAL-FILM 47R5 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-47R5-1%50ppm |
| R3 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R4 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R5 to R8 | 24811/141 | RESISTOR-FIXED METAL-FILM 47R5 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-47R5-1%50ppm |
| R9 | 24811/201 | RESISTOR-FIXED METAL-FILM 15K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-15K-1%50ppm |
| R11 | 24811/176 | RESISTOR-FIXED METAL-FILM 1K3 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K3-1%50ppm |
| R15 | 24811/201 | RESISTOR-FIXED METAL-FILM 15K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-15K-1%50ppm |
| R16 | 24811/141 | RESISTOR-FIXED METAL-FILM 47R5 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-47R5-1%50ppm |
| R17 | 24811/141 | RESISTOR-FIXED METAL-FILM 47R5 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-47R5-1%50ppm |
| R18 | 24811/218 | RESISTOR-FIXED METAL-FILM 75K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-75K-1%50ppm |
| R19 | 24811/192 | RESISTOR-FIXED METAL-FILM 6K19 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-6K19-1%50ppm |
| R20 | 24811/218 | RESISTOR-FIXED METAL-FILM 75K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-75K-1%50ppm |
| R21 | 24811/613 | RESISTOR-FIXED METAL-FILM 8K06 +/- 0.1% 250mW 200V 15 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-8K06-0.1%-15 |
| R22 | 24811/614 | RESISTOR-FIXED METAL-FILM 1K62 +/- 0.1% 250mW 200V 15 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-1K62-0.1%-15 |
| R23 | 24811/616 | RESISTOR-FIXED METAL-FILM 324R +/- 0.1% 250mW 200V 15 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-324R-0.1%-15 |
| R24 | 24811/615 | RESISTOR-FIXED METAL-FILM 162R +/- 0.1% 250mW 200V 15 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-162R-0.1%-15 |
| R25 | 24811/616 | RESISTOR-FIXED METAL-FILM 324R +/- 0.1% 250mW 200V 15 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-324R-0.1%-15 |
| R26 | 24811/614 | RESISTOR-FIXED METAL-FILM 1K62 +/- 0.1% 250mW 200V 15 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-1K62-0.1%-15 |
| R27 | 24811/613 | RESISTOR-FIXED METAL-FILM 8K06 +/- 0.1% 250mW 200V 15 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-8K06-0.1%-15 |
| R28 to R31 | 24811/141 | RESISTOR-FIXED METAL-FILM 47R5 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-47R5-1%50ppm |
| R32 | 24811/225 | RESISTOR-FIXED METAL-FILM 150K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-150K-1%50ppm |
| R33 | 24811/202 | RESISTOR-FIXED METAL-FILM 16K2 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-16K2-1%50ppm |
| R34 | 24811/225 | RESISTOR-FIXED METAL-FILM 150K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-150K-1%50ppm |
| R35 | 24811/613 | RESISTOR-FIXED METAL-FILM 8K06 +/- 0.1% 250mW 200V 15 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-8K06-0.1%-15 |
| R36 | 24811/614 | RESISTOR-FIXED METAL-FILM 1K62 +/- 0.1% 250mW 200V 15 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-1K62-0.1%-15 |

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| **AB2 Power meter (contd.)** | | | | |
| R37 | 24811/616 | RESISTOR-FIXED METAL-FILM 324R +/- 0.1% 250mW 200V 15 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-324R-0.1%-15 |
| R38 | 24811/615 | RESISTOR-FIXED METAL-FILM 162R +/- 0.1% 250mW 200V 15 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-162R-0.1%-15 |
| R39 | 24811/616 | RESISTOR-FIXED METAL-FILM 324R +/- 0.1% 250mW 200V 15 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-324R-0.1%-15 |
| R40 | 24811/614 | RESISTOR-FIXED METAL-FILM 1K62 +/- 0.1% 250mW 200V 15 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-1K62-0.1%-15 |
| R41 | 24811/613 | RESISTOR-FIXED METAL-FILM 8K06 +/- 0.1% 250mW 200V 15 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-8K06-0.1%-15 |
| R42 to R45 | 24811/141 | RESISTOR-FIXED METAL-FILM 47R5 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-47R5-1%50ppm |
| R46 | 24811/225 | RESISTOR-FIXED METAL-FILM 150K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-150K-1%50ppm |
| R47 | 24811/202 | RESISTOR-FIXED METAL-FILM 16K2 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-16K2-1%50ppm |
| R48 | 24811/225 | RESISTOR-FIXED METAL-FILM 150K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-150K-1%50ppm |
| R49 to R52 | 24811/607 | RESISTOR-FIXED METAL-FILM 20K +/- 0.1% 250mW 200V 15 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-20K0-0.1%-15 |
| R53 | 24811/141 | RESISTOR-FIXED METAL-FILM 47R5 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-47R5-1%50ppm |
| R54 | 24811/141 | RESISTOR-FIXED METAL-FILM 47R5 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-47R5-1%50ppm |
| R55 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R56 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R57 | 24811/213 | RESISTOR-FIXED METAL-FILM 47K5 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-47K5-1%50ppm |
| R58 | 24811/195 | RESISTOR-FIXED METAL-FILM 8K25 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-8K25-1%50ppm |
| R59 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R60 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R61 | 24811/221 | RESISTOR-FIXED METAL-FILM 100K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100K-1%50ppm |
| R62 to R64 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R65 | 25683/651 | THERMISTOR POSITIVE-TC ROD, 7.62mm 10K @ 25 DEG.C, 0.7 %/DEG.C +/- 10% 125mW @ 100 DEG.C, AXIAL. | AMETEK (USA) | DG125-103K |

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|

## AB3 Mixer module

When ordering, prefix circuit reference with AB3.

| | | | | |
|---|---|---|---|---|
| | 44830-011 | Complete unit | Issue 03 | |
| C1 to C13 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C14 to C25 | 26386/828 | CAPACITOR-FIXED CERAMIC 220pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-221-JP |
| C26 to C43 | 26386/899 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | ROHM ELECTRONICS LTD | MCH31-5C-104-KP |
| C44 to C47 | 26451/006 | CAPACITOR-FIXED ALUMINIUM 22uF +/-20% 16V ELECTROLYTIC, SURFACE-MOUNTED, SIZE 5.3 x 5.3mm, | RUBYCON CAPACITORS | 16-REV-22 |
| C50 to C53 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| D1 to D17 | 28383/930 | DIODE SMALL-SIGNAL, BAS16... 330mW 75V 250mA 2pF 1Vf @ 50mA, MARKING CODE A6, SURFACE MOUNTED, | PHILIPS | BAS16 |
| FL1 | 23642/945 | FILTER HF, PCB-MOUNT, CERAMIC, RADIAL, 10.7MHz, 110KHz B/WIDTH @ -3dB, 350KHz B/WIDTH @ -20dB, 330 | MURATA ELECTRONICS | SFE10.7MHY-A |
| IC1 | 28467/110 | IC-MICRO PERIPHERAL, PCF8574A... REMOTE 8-BIT I/O EXPANDER, I.IC BUS, UP TO 16 DEVICE ADDRESS | PHILIPS | PCF8574AT |
| IC3 to IC5 | 28466/390 | IC-DIGITAL NAND-GATE 74HC00... 2 INPUT, QUAD, CMOS-H/SPEED, 14 PIN, SMALL-OUTLINE. | PHILIPS | 74HC00D |
| IC6 | 28469/057 | IC-DIGITAL INVERTER 74HC04... HEX, CMOS-H/SPEED, 14 PIN, SMALL-OUTLINE. | PHILIPS | 74HC04D |
| IC7 | 28531/029 | RF-MIXER DOUBLE-BALANCED, DIODE RING, LMX-149... 10-1500MHz, 50R 1 dBm RF-1dB COMPRESS, 9 dB LOSS, | MINI-CIRCUITS | LMX-149 |
| L1 | 23642/533 | INDUCTOR-FIXED 10uH +/- 5% EPOXY-MOULD, 150mA 2R1 MAX, 30 Q @ 2.52 MHz, 36 MHz SRF, SURFACE MOUNTED, | MEGGITT ELECTRONICS | 3612-T-100-J |
| L2 | 23642/535 | INDUCTOR-FIXED 1uH +/- 5% EPOXY-MOULD, 400mA 0R7 MAX, 30 Q @ 7.96 MHz, 120 MHz SRF, SURFACE | MEGGITT ELECTRONICS | 3612-T-1R0-J |
| L4 | 23642/529 | INDUCTOR-FIXED 68uH +/- 5% EPOXY-MOULD, 50mA 9R MAX, 30 Q @ 2.52 MHz, 11 MHz SRF, SURFACE MOUNTED, | MEGGITT ELECTRONICS | 3612-T-680-J |
| PLA | 23437/008 | CONNECTOR MULTIWAY, PCB HEADER, 6 WAY, STRAIGHT, 2.5mm PITCH, SHROUDED, POLARISED, FRICTION LOCK, | MOLEX ELECTRONICS | 22-03-5065 |
| R1 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R5 | 24681/536 | RESISTOR-NETWORK ISOLATED, THICK-FILM, 1K 2% 600mW 50V 200 ppm/DEG.C, 8 RESISTORS, SURFACE MOUNTED, | VISHAY COMPONENTS | SOMC16-03-102-G-TUBE |
| R6 | 24681/536 | RESISTOR-NETWORK ISOLATED, THICK-FILM, 1K 2% 600mW 50V 200 ppm/DEG.C, 8 RESISTORS, SURFACE MOUNTED, | VISHAY COMPONENTS | SOMC16-03-102-G-TUBE |

## AB3 Mixer module (contd.)

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| R7 | 24811/181 | RESISTOR-FIXED METAL-FILM 2K21 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-2K21-1%50ppm |
| R8 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R9 | 24811/181 | RESISTOR-FIXED METAL-FILM 2K21 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-2K21-1%50ppm |
| R10 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R11 to R13 | 24811/165 | RESISTOR-FIXED METAL-FILM 475R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-475R-1%50ppm |
| R17 | 24811/902 | RESISTOR-FIXED METAL-FILM 16R2 +/- 1% 250mW 200V 50 ppm/DEG.C, LOW-INDUCTANCE, SURFACE MOUNTED, | VISHAY COMPONENTS | SMM0204-HF-16R2-1% |
| R19 | 24811/902 | RESISTOR-FIXED METAL-FILM 16R2 +/- 1% 250mW 200V 50 ppm/DEG.C, LOW-INDUCTANCE, SURFACE MOUNTED, | VISHAY COMPONENTS | SMM0204-HF-16R2-1% |
| R24 | 24811/905 | RESISTOR-FIXED METAL-FILM 33R2 +/- 1% 250mW 200V 50 ppm/DEG.C, LOW-INDUCTANCE, SURFACE MOUNTED, | VISHAY COMPONENTS | SMM0204-HF-33R2-1% |
| R25 | 24811/905 | RESISTOR-FIXED METAL-FILM 33R2 +/- 1% 250mW 200V 50 ppm/DEG.C, LOW-INDUCTANCE, SURFACE MOUNTED, | VISHAY COMPONENTS | SMM0204-HF-33R2-1% |
| R26 | 24811/909 | RESISTOR-FIXED METAL-FILM 51R1 +/- 1% 250mW 200V 50 ppm/DEG.C, LOW-INDUCTANCE, SURFACE MOUNTED, | VISHAY COMPONENTS | SMM0204-HF-51R1-1% |
| R27 | 24811/193 | RESISTOR-FIXED METAL-FILM 6K81 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-6K81-1%50ppm |
| R28 | 24811/184 | RESISTOR-FIXED METAL-FILM 3K01 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-3K01-1%50ppm |
| R29 | 24811/161 | RESISTOR-FIXED METAL-FILM 332R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-332R-1%50ppm |
| R30 | 24811/929 | RESISTOR-FIXED METAL-FILM 27R4 +/- 1% 250mW 200V 50 ppm/DEG.C, LOW-INDUCTANCE, SURFACE MOUNTED, | VISHAY COMPONENTS | SMM0204-HF-27R4-1% |
| R31 | 24811/157 | RESISTOR-FIXED METAL-FILM 221R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-221R-1%50ppm |
| R32 | 24811/167 | RESISTOR-FIXED METAL-FILM 562R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-562R-1%50ppm |
| R33 | 24811/183 | RESISTOR-FIXED METAL-FILM 2K74 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-2K74-1%50ppm |
| R34 | 24811/181 | RESISTOR-FIXED METAL-FILM 2K21 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-2K21-1%50ppm |
| R35 | 24811/139 | RESISTOR-FIXED METAL-FILM 39R2 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-39R2-1%50ppm |
| R36 | 24811/161 | RESISTOR-FIXED METAL-FILM 332R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-332R-1%50ppm |
| R37 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R38 | 24811/184 | RESISTOR-FIXED METAL-FILM 3K01 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-3K01-1%50ppm |
| R39 | 24811/159 | RESISTOR-FIXED METAL-FILM 274R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-274R-1%50ppm |
| R40 | 24811/905 | RESISTOR-FIXED METAL-FILM 33R2 +/- 1% 250mW 200V 50 ppm/DEG.C, LOW-INDUCTANCE, SURFACE MOUNTED, | VISHAY COMPONENTS | SMM0204-HF-33R2-1% |
| R41 to R44 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| **AB3 Mixer module (contd.)** | | | | |
| R46 | 24811/903 | RESISTOR-FIXED METAL-FILM 18R2 +/- 1% 250mW 200V 50 ppm/DEG.C, LOW-INDUCTANCE, SURFACE MOUNTED, | VISHAY COMPONENTS | SMM0204-HF-18R2-1% |
| R47 | 24811/916 | RESISTOR-FIXED METAL-FILM 301R +/- 1% 250mW 200V 50 ppm/DEG.C, LOW-INDUCTANCE, SURFACE MOUNTED, | VISHAY COMPONENTS | SMM0204-HF-301R-1% |
| R48 | 24811/916 | RESISTOR-FIXED METAL-FILM 301R +/- 1% 250mW 200V 50 ppm/DEG.C, LOW-INDUCTANCE, SURFACE MOUNTED, | VISHAY COMPONENTS | SMM0204-HF-301R-1% |
| R49 | 24811/906 | RESISTOR-FIXED METAL-FILM 36R5 +/- 1% 250mW 200V 50 ppm/DEG.C, LOW-INDUCTANCE, SURFACE MOUNTED, | VISHAY COMPONENTS | SMM0204-HF-36R5-1% |
| R50 | 24811/916 | RESISTOR-FIXED METAL-FILM 301R +/- 1% 250mW 200V 50 ppm/DEG.C, LOW-INDUCTANCE, SURFACE MOUNTED, | VISHAY COMPONENTS | SMM0204-HF-301R-1% |
| R51 | 24811/916 | RESISTOR-FIXED METAL-FILM 301R +/- 1% 250mW 200V 50 ppm/DEG.C, LOW-INDUCTANCE, SURFACE MOUNTED, | VISHAY COMPONENTS | SMM0204-HF-301R-1% |
| R54 to R56 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R69 | 24811/906 | RESISTOR-FIXED METAL-FILM 36R5 +/- 1% 250mW 200V 50 ppm/DEG.C, LOW-INDUCTANCE, SURFACE MOUNTED, | VISHAY COMPONENTS | SMM0204-HF-36R5-1% |
| RLA to RLF | 23486/181 | RELAY MAGNETIC, SINGLE-POLE CHANGEOVER, POLARISED DUAL 5V COIL, 62R - LATCHING, ISOL 60dB @ 1.8GHz, | MATSUSHITA CONTROLS | RK1-L2-5V-H23 |
| TR1 to TR10 | 28435/241 | TRANSISTOR PNP BIPOLAR BCX17... 45V 100MHz 425mW 500mA 100hFE MIN @ 100mA, MARKING CODE T1, SURFACE | PHILIPS | BCX17 |
| TR11 | 28457/850 | TRANSISTOR NPN BIPOLAR FMMT2369... 40V 600MHz 300mW 500mA 40hFE MIN @ 10mA, MARKING CODE *1J, | PHILIPS | PMBT2369 |
| TR12 | 28457/850 | TRANSISTOR NPN BIPOLAR FMMT2369... 40V 600MHz 300mW 500mA 40hFE MIN @ 10mA, MARKING CODE *1J, | PHILIPS | PMBT2369 |
| TR13 | 28457/850 | TRANSISTOR NPN BIPOLAR FMMT2369... 40V 600MHz 300mW 500mA 40hFE MIN @ 10mA, MARKING CODE *1J, | PHILIPS | PMBT2369 |

## AB4 Warp oscillator board

When ordering, prefix circuit reference with AB4.

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| | 44829-182 | Complete unit | Issue 01 | |
| C1 | 26451/007 | CAPACITOR-FIXED ALUMINIUM 22uF +/-20% 35V ELECTROLYTIC, SURFACE-MOUNTED, SIZE 6.6 x 6.6mm, | PANASONIC INDUSTRIAL | ECE-V-1VA-220P |
| C2 | 26386/899 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | ROHM ELECTRONICS LTD | MCH31-5C-104-KP |
| C3 | 26386/899 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | ROHM ELECTRONICS LTD | MCH31-5C-104-KP |
| C4 | 26451/007 | CAPACITOR-FIXED ALUMINIUM 22uF +/-20% 35V ELECTROLYTIC, SURFACE-MOUNTED, SIZE 6.6 x 6.6mm, | PANASONIC INDUSTRIAL | ECE-V-1VA-220P |
| C5 | 26386/899 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | ROHM ELECTRONICS LTD | MCH31-5C-104-KP |
| C6 | 26386/899 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | ROHM ELECTRONICS LTD | MCH31-5C-104-KP |
| C7 | 26451/007 | CAPACITOR-FIXED ALUMINIUM 22uF +/-20% 35V ELECTROLYTIC, SURFACE-MOUNTED, SIZE 6.6 x 6.6mm, | PANASONIC INDUSTRIAL | ECE-V-1VA-220P |
| C8 to C11 | 26386/899 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | ROHM ELECTRONICS LTD | MCH31-5C-104-KP |
| C12 | 26451/007 | CAPACITOR-FIXED ALUMINIUM 22uF +/-20% 35V ELECTROLYTIC, SURFACE-MOUNTED, SIZE 6.6 x 6.6mm, | PANASONIC INDUSTRIAL | ECE-V-1VA-220P |
| C13 | 26451/007 | CAPACITOR-FIXED ALUMINIUM 22uF +/-20% 35V ELECTROLYTIC, SURFACE-MOUNTED, SIZE 6.6 x 6.6mm, | PANASONIC INDUSTRIAL | ECE-V-1VA-220P |
| C14 to C16 | 26386/899 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | ROHM ELECTRONICS LTD | MCH31-5C-104-KP |
| C17 | 26451/007 | CAPACITOR-FIXED ALUMINIUM 22uF +/-20% 35V ELECTROLYTIC, SURFACE-MOUNTED, SIZE 6.6 x 6.6mm, | PANASONIC INDUSTRIAL | ECE-V-1VA-220P |
| C18 | 26386/899 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | ROHM ELECTRONICS LTD | MCH31-5C-104-KP |
| C19 | 26451/007 | CAPACITOR-FIXED ALUMINIUM 22uF +/-20% 35V ELECTROLYTIC, SURFACE-MOUNTED, SIZE 6.6 x 6.6mm, | PANASONIC INDUSTRIAL | ECE-V-1VA-220P |
| C20 to C22 | 26386/899 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | ROHM ELECTRONICS LTD | MCH31-5C-104-KP |
| D1 | 28371/735 | DIODE ZENER, BZX84-C8V2... 250mW 8.2V 5% 250mA MARKING CODE Z7, SURFACE MOUNTED, SOT-23, (8mm | PHILIPS | BZX84-C8V2 |
| D2 | 28383/934 | DIODE SMALL-SIGNAL, LL4148... 500mW 50V 150mA 1Vf @ 10mA, SURFACE MOUNTED, MINI-MELF, (8mm TAPE - | PHILIPS | PMLL4148L |
| D3 | 28383/934 | DIODE SMALL-SIGNAL, LL4148... 500mW 50V 150mA 1Vf @ 10mA, SURFACE MOUNTED, MINI-MELF, (8mm TAPE - | PHILIPS | PMLL4148L |
| D4 | 28371/443 | DIODE ZENER, BZX84-C5V6... 250mW 5.6V 5% 250mA MARKING CODE Z3, SURFACE MOUNTED, SOT-23, (8mm | PHILIPS | BZX84-C5V6 |
| IC1 | 28461/774 | IC-ANALOGUE VOLTAGE-REGULATOR 78L05AC... 5V +/-5%, POSITIVE, LINEAR, BIPOLAR, 8 PIN, SMALL-OUTLINE. | NAT. SEMICONDUCTOR | LM78L05ACM |
| IC2 | 28461/803 | IC-ANALOGUE VOLTAGE-REFERENCE LT1019... 5V PRECISION, OUTPUT VOLTAGE DRIFT 20ppm/DEG.C MAX, | LINEAR TECHNOLOGY | LT1019CS8-5 |
| IC3 | 28467/111 | IC-MICRO PERIPHERAL, PCF8574... REMOTE 8-BIT I/O EXPANDER, I.IC BUS, UP TO 8 DEVICE ADDRESS | PHILIPS | PCF8574T |

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| IC4 | 28461/065 | IC-ANALOGUE D/A-CONVERTER MAX518... DUAL, 5V 8-BIT, TOTAL ERROR +/-1LSB, I.IC SERIAL INTERFACE, | MAXIM INTEG PRODUCTS | MAX518ACSA |

## AB4 Warp oscillator board (contd.)

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| IC5 | 28461/819 | IC-ANALOGUE OPERATIONAL AMP OP177... SINGLE, 22V OFFSET VOLTAGE 25uV, OFFSET CURRENT 1.5nA, | ANALOG DEVICES LTD | OP177GS |
| IC6 | 28312/122 | OSCILLATOR CRYSTAL, 10 MHz +/- 250 ppm, PULL, VCXO, CONTROL 0-5.0V, STABILITY +/-50ppm, 21mm | C-MAC CRYSTALS LTD | # |
| IC7 | 28469/063 | IC-DIGITAL BUFFER/LINE-DRIVER 74HC125... QUAD, TRI-STATE, LOW ENABLE, CMOS-H/SPEED, 14 PIN, | PHILIPS | 74HC125D |
| L1 to L3 | 23642/533 | INDUCTOR-FIXED 10uH +/- 5% EPOXY-MOULD, 150mA 2R1 MAX, 30 Q @ 2.52 MHz, 36 MHz SRF, SURFACE MOUNTED, | MEGGITT ELECTRONICS | 3612-T-100-J |
| PLA | 23437/061 | CONNECTOR MULTIWAY, PCB HEADER, 10 WAY, STAGGERED 2-ROW, 2.54mm PITCH, SURFACE MOUNTING, TIN PLATED | MOLEX ELECTRONICS | 90814-0210 |
| R1 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R2 | 24811/185 | RESISTOR-FIXED METAL-FILM 3K32 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-3K32-1%50ppm |
| R3 to R5 | 24811/165 | RESISTOR-FIXED METAL-FILM 475R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-475R-1%50ppm |
| R6 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R7 | 24811/221 | RESISTOR-FIXED METAL-FILM 100K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100K-1%50ppm |
| R8 | 24811/225 | RESISTOR-FIXED METAL-FILM 150K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-150K-1%50ppm |
| R9 to R12 | 24811/641 | RESISTOR-FIXED METAL-FILM 2K +/- 0.1% 250mW 200V 15 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-2K0-0.1%-15 |
| R13 | 24811/142 | RESISTOR-FIXED METAL-FILM 51R1 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-51R1-1%50ppm |
| R14 | 24811/177 | RESISTOR-FIXED METAL-FILM 1K5 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K5-1%50ppm |
| R15 | 24811/142 | RESISTOR-FIXED METAL-FILM 51R1 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-51R1-1%50ppm |
| R16 | 24811/165 | RESISTOR-FIXED METAL-FILM 475R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-475R-1%50ppm |
| R17 | 24811/165 | RESISTOR-FIXED METAL-FILM 475R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-475R-1%50ppm |
| SKA | 23437/534 | CONNECTOR MULTIWAY, SOCKET, 22 WAY, RIGHT ANGLED, 2-ROW, 2.54mm GRID, SURFACE MOUNTING, CONTACTS | BERG ELECTRONICS | 71609-311 |
| SKB | 23445/501 | CONNECTOR-RF MMCX-TYPE FEMALE, JACK, 50 OHMS, SURFACE MOUNTING, VERTICAL, DC-6GHz, GOLD PLATD | HUBER & SUHNER | 82MMCX-S50-0-51 |
| SKC | 23445/501 | CONNECTOR-RF MMCX-TYPE FEMALE, JACK, 50 OHMS, SURFACE MOUNTING, VERTICAL, DC-6GHz, GOLD PLATD | HUBER & SUHNER | 82MMCX-S50-0-51 |
| TR1 | 28435/229 | TRANSISTOR PNP BIPOLAR BCX51... 45V 50MHz 1W 1A 40hFE @ 250mA, SURFACE MOUNTED, SOT-89, (12mm TAPE | PHILIPS | BCX51 |

## AF1 VCXO and PLL

When ordering, prefix circuit reference with AF1.

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| | 44829-851 | Complete unit | Issue 08 | |
| C1 | 26386/887 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-104-KP |
| C2 | 26386/863 | CAPACITOR-FIXED CERAMIC 1nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-102-KP |
| C3 | 26386/816 | CAPACITOR-FIXED CERAMIC 22pF +/-5% 50V NPO MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-220-JP |
| C4 | 26878/407 | CAPACITOR-VARIABLE POLYPROPYLENE 2pF to 22pF 100V VERTICAL-PCB MOUNT, 7.5mm DIA, 10mm LONG, 3 PIN, | PHILIPS | 2222-808-11229 |
| C5 to C14 | 26386/863 | CAPACITOR-FIXED CERAMIC 1nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-102-KP |
| C16 | 26386/832 | CAPACITOR-FIXED CERAMIC 470pF +/-5% 50V NPO MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-471-JP |
| C17 | 26421/116 | CAPACITOR-FIXED ALUMINIUM 47uF +/-20% 16V ELECTROLYTIC, RADIAL, 5mm PWP, (LOOSE OR TAPED). | PANASONIC INDUSTRIAL | ECE-A-1C-KA-470-B |
| C18 | 26421/116 | CAPACITOR-FIXED ALUMINIUM 47uF +/-20% 16V ELECTROLYTIC, RADIAL, 5mm PWP, (LOOSE OR TAPED). | PANASONIC INDUSTRIAL | ECE-A-1C-KA-470-B |
| C19 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C20 | 26582/432 | CAPACITOR-FIXED POLYESTER 1uF +/-10% 50V 330 ppm/DEG.C, RADIAL, 5mm PWP, (TAPED). | VISHAY COMPONENTS | MKT-1826-510/065 |
| C21 | 26386/883 | CAPACITOR-FIXED CERAMIC 47nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-473-KP |
| C22 | 26386/887 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-104-KP |
| C23 | 26582/432 | CAPACITOR-FIXED POLYESTER 1uF +/-10% 50V 330 ppm/DEG.C, RADIAL, 5mm PWP, (TAPED). | VISHAY COMPONENTS | MKT-1826-510/065 |
| C24 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C25 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C26 | 26383/590 | CAPACITOR-FIXED CERAMIC 3.9nF +/-10% 63V 2C2 SINGLELAYER, RADIAL, 2.5mm PWP, (TAPED). | PHILIPS | 2222-630-51392 |
| C27 to C29 | 26386/863 | CAPACITOR-FIXED CERAMIC 1nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-102-KP |
| C30 | 26386/887 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-104-KP |
| C31 to C35 | 26386/863 | CAPACITOR-FIXED CERAMIC 1nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-102-KP |
| C40 | 26386/813 | CAPACITOR-FIXED CERAMIC 12pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-120-JP |
| C41 to C47 | 26386/863 | CAPACITOR-FIXED CERAMIC 1nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-102-KP |
| C48 | 26343/753 | CAPACITOR-FIXED CERAMIC 6.8pF +/-0.5pF 50V NPO MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-6R8-DP |
| C49 | 26386/863 | CAPACITOR-FIXED CERAMIC 1nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-102-KP |

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| **AF1 VCXO and PLL (contd.)** | | | | |
| C50 | 26582/432 | CAPACITOR-FIXED POLYESTER 1uF +/-10% 50V 330 ppm/DEG.C, RADIAL, 5mm PWP, (TAPED). | VISHAY COMPONENTS | MKT-1826-510/065 |
| C51 | 26421/112 | CAPACITOR-FIXED ALUMINIUM 10uF +/-20% 35V ELECTROLYTIC, RADIAL, 5mm PWP, (TAPED). | PANASONIC INDUSTRIAL | ECE-A-1V-KA-100-B |
| C52 | 26421/112 | CAPACITOR-FIXED ALUMINIUM 10uF +/-20% 35V ELECTROLYTIC, RADIAL, 5mm PWP, (TAPED). | PANASONIC INDUSTRIAL | ECE-A-1V-KA-100-B |
| C53 | 26386/760 | CAPACITOR-FIXED CERAMIC 220nF +/-10% 50V X7R MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | PHILIPS | 1210-2R-224-K9-BBC |
| C54 | 26421/116 | CAPACITOR-FIXED ALUMINIUM 47uF +/-20% 16V ELECTROLYTIC, RADIAL, 5mm PWP, (LOOSE OR TAPED). | PANASONIC INDUSTRIAL | ECE-A-1C-KA-470-B |
| C55 | 26421/116 | CAPACITOR-FIXED ALUMINIUM 47uF +/-20% 16V ELECTROLYTIC, RADIAL, 5mm PWP, (LOOSE OR TAPED). | PANASONIC INDUSTRIAL | ECE-A-1C-KA-470-B |
| C56 | 26421/143 | CAPACITOR-FIXED ALUMINIUM 470uF +/-20% 6.3V ELECTROLYTIC, RADIAL, 5mm PWP, (TAPED). | PANASONIC INDUSTRIAL | ECE-A-0J-U-471-B |
| C57 | 26421/116 | CAPACITOR-FIXED ALUMINIUM 47uF +/-20% 16V ELECTROLYTIC, RADIAL, 5mm PWP, (LOOSE OR TAPED). | PANASONIC INDUSTRIAL | ECE-A-1C-KA-470-B |
| C58 | 26386/887 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-104-KP |
| C59 | 26386/887 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-104-KP |
| C60 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C61 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C62 | 26386/760 | CAPACITOR-FIXED CERAMIC 220nF +/-10% 50V X7R MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | PHILIPS | 1210-2R-224-K9-BBC |
| C63 | 26386/887 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-104-KP |
| C64 | 26386/887 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-104-KP |
| C65 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C66 | 26421/116 | CAPACITOR-FIXED ALUMINIUM 47uF +/-20% 16V ELECTROLYTIC, RADIAL, 5mm PWP, (LOOSE OR TAPED). | PANASONIC INDUSTRIAL | ECE-A-1C-KA-470-B |
| C67 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C68 | 26421/143 | CAPACITOR-FIXED ALUMINIUM 470uF +/-20% 6.3V ELECTROLYTIC, RADIAL, 5mm PWP, (TAPED). | PANASONIC INDUSTRIAL | ECE-A-0J-U-471-B |
| C69 | 26343/753 | CAPACITOR-FIXED CERAMIC 6.8pF +/-0.5pF 50V NPO MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-6R8-DP |
| C70 | 26386/863 | CAPACITOR-FIXED CERAMIC 1nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-102-KP |
| C71 | 26421/143 | CAPACITOR-FIXED ALUMINIUM 470uF +/-20% 6.3V ELECTROLYTIC, RADIAL, 5mm PWP, (TAPED). | PANASONIC INDUSTRIAL | ECE-A-0J-U-471-B |
| C72 | 26343/767 | CAPACITOR-FIXED CERAMIC 10pF +/-5% 50V NPO MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-100-DP |
| C73 | 26421/143 | CAPACITOR-FIXED ALUMINIUM 470uF +/-20% 6.3V ELECTROLYTIC, RADIAL, 5mm PWP, (TAPED). | PANASONIC INDUSTRIAL | ECE-A-0J-U-471-B |

## AF1 VCXO and PLL (contd.)

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| D1 | 28381/530 | DIODE VARIABLE CAPACITNCE, BB215... 30V 20mA 2.2pF @ 28V, CAPAC RATIO 7.6 MIN, MARKING GREEN, SURFACE | PHILIPS | BB215 |
| D2 to D6 | 28383/930 | DIODE SMALL-SIGNAL, BAS16... 330mW 75V 250mA 2pF 1Vf @ 50mA, MARKING CODE A6, SURFACE MOUNTED, | PHILIPS | BAS16 |
| D7 to D10 | 28349/022 | DIODE SMALL-SIGNAL, SCHOTTKY, HSMS-2812... DUAL, 20V 1.2pF 410mVf @ 1mA, IN SERIES, MARKING CODE | HEWLETT-PACKARD | HSMS-2812-L31 |
| D11 | 28383/930 | DIODE SMALL-SIGNAL, BAS16... 330mW 75V 250mA 2pF 1Vf @ 50mA, MARKING CODE A6, SURFACE MOUNTED, | PHILIPS | BAS16 |
| D12 | 28371/443 | DIODE ZENER, BZX84-C5V6... 350mW 5.6V 5% 250mA MARKING CODE Z3, SURFACE MOUNTED, SOT-23, (8mm | PHILIPS | BZX84-C5V6 |
| D13 | 28383/930 | DIODE SMALL-SIGNAL, BAS16... 330mW 75V 250mA 2pF 1Vf @ 50mA, MARKING CODE A6, SURFACE MOUNTED, | PHILIPS | BAS16 |
| IC1 | 28464/034 | IC-DIGITAL DIVIDER SP8789... DIVIDE BY 20/21, 225MHz, TWO MODULUS, ECL, 8 PIN, DUAL-IN-LINE. | | |
| IC2 | 44535/191 | IC-PROGRAMMED PAL, SET OF 1, 2031, 104.8576MHz DIVIDER. | | |
| IC3 | 28462/638 | IC-DIGITAL FLIP-FLOP/D-TYPE 74HC74... 2 BIT, DUAL, POS EDGE TRIGGER, PLUS SET & CLEAR, CMOS-H/SPEED, | PHILIPS | 74HC74D |
| IC4 | 28466/393 | IC-DIGITAL NAND-GATE 74HC132... 2 INPUT, QUAD, SCHMITT TRIGGER, CMOS-H/SPEED, 14 PIN, | PHILIPS | 74HC132D |
| IC5 | 28461/412 | IC-ANALOGUE OPERATIONAL AMP TL072... DUAL, 18V UNITY GAIN BNDWDTH 3MHz, OFFSET VOLTAGE 10mV, SLEW | MOTOROLA INC. | TL072CD |
| IC6 | 28464/038 | IC-DIGITAL COUNTER 74F160A... 4 INPUT, 4 BIT, SINGLE, BCD, PRESETTABLE, SYNCHRONOUS, | NAT. SEMICONDUCTOR | 74F160ASC |
| IC7 | 28464/176 | IC-DIGITAL COUNTER 74ACT161... 4 BIT, SINGLE, BINARY MODULO-16, WITH PRESET & RESET, | NAT. SEMICONDUCTOR | 74ACT161SC |
| IC8 | 28464/038 | IC-DIGITAL COUNTER 74F160A... 4 INPUT, 4 BIT, SINGLE, BCD, PRESETTABLE, SYNCHRONOUS, | NAT. SEMICONDUCTOR | 74F160ASC |
| IC9 | 28464/176 | IC-DIGITAL COUNTER 74ACT161... 4 BIT, SINGLE, BINARY MODULO-16, WITH PRESET & RESET, | NAT. SEMICONDUCTOR | 74ACT161SC |
| IC10 | 28469/066 | IC-DIGITAL INVERTER 74ACT04... HEX, CMOS-ADVANCED+TTL, 14 PIN, SMALL-OUTLINE. | NAT. SEMICONDUCTOR | 74ACT04SC |
| IC11 | 28461/454 | IC-ANALOGUE MICROWAVE-AMP MSA-0786... 4V 22mA GAIN 12.5dB @ 1GHz, 3dB BANDWIDTH DC-2GHz, BIPOLAR, 4 | HEWLETT-PACKARD | MSA-0786-TR1 |
| IC12 | 28461/412 | IC-ANALOGUE OPERATIONAL AMP TL072... DUAL, 18V UNITY GAIN BNDWDTH 3MHz, OFFSET VOLTAGE 10mV, SLEW | MOTOROLA INC. | TL072CD |
| L1 | 23642/520 | INDUCTOR-FIXED 0.15uH +/- 20% EPOXY-MOULD, 450mA 0R25 MAX, 30 Q @ 25.2 MHz, 450 MHz SRF, SURFACE | TDK UK LTD | NL322522T-R15M |
| L2 | 23642/521 | INDUCTOR-FIXED 0.39uH +/- 20% EPOXY-MOULD, 450mA 0R45 MAX, 30 Q @ 25.2 MHz, 250 MHz SRF, SURFACE | TDK UK LTD | NL322522T-R39M |
| L5 | 23642/535 | INDUCTOR-FIXED 1uH +/- 5% EPOXY-MOULD, 400mA 0R7 MAX, 30 Q @ 7.96 MHz, 120 MHz SRF, SURFACE | MEGGITT ELECTRONICS | 3612-T-1R0-J |
| L6 | 23642/535 | INDUCTOR-FIXED 1uH +/- 5% EPOXY-MOULD, 400mA 0R7 MAX, 30 Q @ 7.96 MHz, 120 MHz SRF, SURFACE | MEGGITT ELECTRONICS | 3612-T-1R0-J |
| L7 | 23642/533 | INDUCTOR-FIXED 10uH +/- 5% EPOXY-MOULD, 150mA 2R1 MAX, 30 Q @ 2.52 MHz, 36 MHz SRF, SURFACE MOUNTED, | MEGGITT ELECTRONICS | 3612-T-100-J |

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| **AF1 VCXO and PLL (contd.)** | | | | |
| L8 | 23642/535 | INDUCTOR-FIXED 1uH +/- 5% EPOXY-MOULD, 400mA 0R7 MAX, 30 Q @ 7.96 MHz, 120 MHz SRF, SURFACE | MEGGITT ELECTRONICS | 3612-T-1R0-J |
| L9 | 23642/533 | INDUCTOR-FIXED 10uH +/- 5% EPOXY-MOULD, 150mA 2R1 MAX, 30 Q @ 2.52 MHz, 36 MHz SRF, SURFACE MOUNTED, | MEGGITT ELECTRONICS | 3612-T-100-J |
| L10 | 23642/518 | INDUCTOR-FIXED 0.56uH +/- 20% EPOXY-MOULD, 450mA 0R55 MAX, 30 Q @ 25.2 MHz, 180 MHz SRF, SURFACE | MEGGITT ELECTRONICS | 3612-T-R56-M |
| L11 | 23642/518 | INDUCTOR-FIXED 0.56uH +/- 20% EPOXY-MOULD, 450mA 0R55 MAX, 30 Q @ 25.2 MHz, 180 MHz SRF, SURFACE | MEGGITT ELECTRONICS | 3612-T-R56-M |
| L12 | 23642/705 | INDUCTOR-FIXED 0.027uH +/- 10% EPOXY-MOULD, 450mA 0R22 MAX, 23 Q @ 100 MHz, 1.5K MHz SRF, SURFACE | MEGGITT ELECTRONICS | 3612-T-027-K |
| L15 | 23642/518 | INDUCTOR-FIXED 0.56uH +/- 20% EPOXY-MOULD, 450mA 0R55 MAX, 30 Q @ 25.2 MHz, 180 MHz SRF, SURFACE | MEGGITT ELECTRONICS | 3612-T-R56-M |
| L16 | 23642/518 | INDUCTOR-FIXED 0.56uH +/- 20% EPOXY-MOULD, 450mA 0R55 MAX, 30 Q @ 25.2 MHz, 180 MHz SRF, SURFACE | MEGGITT ELECTRONICS | 3612-T-R56-M |
| L17 | 23642/535 | INDUCTOR-FIXED 1uH +/- 5% EPOXY-MOULD, 400mA 0R7 MAX, 30 Q @ 7.96 MHz, 120 MHz SRF, SURFACE | MEGGITT ELECTRONICS | 3612-T-1R0-J |
| L18 | 23642/946 | FILTER BANDPASS, PCB-MOUNT, HELICAL, 420MHz, 10.5MHz BANDWIDTH @ -1dB, 50R, DOUBLE TUNED, | TOKO (UK) LTD | 7HW.252MXPR-2536A |
| L20 | 23642/704 | INDUCTOR-FIXED 0.015uH +/- 10% EPOXY-MOULD, 450mA 0R14 MAX, 19 Q @ 100 MHz, 2.1K MHz SRF, SURFACE | MEGGITT ELECTRONICS | 3612-T-015-K |
| L22 | 23642/520 | INDUCTOR-FIXED 0.15uH +/- 20% EPOXY-MOULD, 450mA 0R25 MAX, 30 Q @ 25.2 MHz, 450 MHz SRF, SURFACE | TDK UK LTD | NL322522T-R15M |
| R1 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R2 | 24811/221 | RESISTOR-FIXED METAL-FILM 100K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100K-1%50ppm |
| R3 | 24811/161 | RESISTOR-FIXED METAL-FILM 332R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-332R-1%50ppm |
| R4 | 24811/157 | RESISTOR-FIXED METAL-FILM 221R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-221R-1%50ppm |
| R5 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R6 | 24811/181 | RESISTOR-FIXED METAL-FILM 2K21 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-2K21-1%50ppm |
| R7 | 24811/181 | RESISTOR-FIXED METAL-FILM 2K21 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-2K21-1%50ppm |
| R8 | 24811/142 | RESISTOR-FIXED METAL-FILM 51R1 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-51R1-1%50ppm |
| R9 | 24811/129 | RESISTOR-FIXED METAL-FILM 15R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-15R-1%-50ppm |
| R10 | 24811/153 | RESISTOR-FIXED METAL-FILM 150R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-150R-1%50ppm |
| R11 | 24811/163 | RESISTOR-FIXED METAL-FILM 392R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-392R-1%50ppm |
| R12 | 24811/163 | RESISTOR-FIXED METAL-FILM 392R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-392R-1%50ppm |
| R13 | 24811/149 | RESISTOR-FIXED METAL-FILM 100R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100R-1%50ppm |

## AF1 VCXO and PLL (contd.)

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| R14 | 24811/149 | RESISTOR-FIXED METAL-FILM 100R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100R-1%50ppm |
| R15 | 24811/185 | RESISTOR-FIXED METAL-FILM 3K32 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-3K32-1%50ppm |
| R16 | 24811/159 | RESISTOR-FIXED METAL-FILM 274R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-274R-1%50ppm |
| R17 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R18 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R19 | 24811/149 | RESISTOR-FIXED METAL-FILM 100R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100R-1%50ppm |
| R20 | 24811/149 | RESISTOR-FIXED METAL-FILM 100R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100R-1%50ppm |
| R21 | 24811/185 | RESISTOR-FIXED METAL-FILM 3K32 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-3K32-1%50ppm |
| R22 | 24811/159 | RESISTOR-FIXED METAL-FILM 274R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-274R-1%50ppm |
| R23 | 24811/149 | RESISTOR-FIXED METAL-FILM 100R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100R-1%50ppm |
| R24 | 24811/221 | RESISTOR-FIXED METAL-FILM 100K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100K-1%50ppm |
| R25 | 24811/189 | RESISTOR-FIXED METAL-FILM 4K75 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-4K75-1%50ppm |
| R26 | 24811/189 | RESISTOR-FIXED METAL-FILM 4K75 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-4K75-1%50ppm |
| R27 | 24811/149 | RESISTOR-FIXED METAL-FILM 100R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100R-1%50ppm |
| R28 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R29 | 24811/222 | RESISTOR-FIXED METAL-FILM 110K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-110K-1%50ppm |
| R30 | 24811/224 | RESISTOR-FIXED METAL-FILM 130K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-130K-1%50ppm |
| R31 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R32 | 24811/181 | RESISTOR-FIXED METAL-FILM 2K21 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-2K21-1%50ppm |
| R33 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R34 | 24811/149 | RESISTOR-FIXED METAL-FILM 100R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100R-1%50ppm |
| R35 | 24811/223 | RESISTOR-FIXED METAL-FILM 121K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-121K-1%50ppm |
| R36 to R38 | 24811/207 | RESISTOR-FIXED METAL-FILM 27K4 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-27K4-1%50ppm |
| R39 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R40 | 24811/177 | RESISTOR-FIXED METAL-FILM 1K5 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K5-1%50ppm |

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| **AF1 VCXO and PLL (contd.)** | | | | |
| R41 | 24811/164 | RESISTOR-FIXED METAL-FILM 432R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-432R-1%50ppm |
| R42 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R43 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R44 | 24811/149 | RESISTOR-FIXED METAL-FILM 100R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100R-1%50ppm |
| R45 | 24811/135 | RESISTOR-FIXED METAL-FILM 27R4 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-27R4-1%50ppm |
| R46 | 24811/135 | RESISTOR-FIXED METAL-FILM 27R4 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-27R4-1%50ppm |
| R47 | 24811/185 | RESISTOR-FIXED METAL-FILM 3K32 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-3K32-1%50ppm |
| R48 | 24811/159 | RESISTOR-FIXED METAL-FILM 274R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-274R-1%50ppm |
| R49 | 24811/185 | RESISTOR-FIXED METAL-FILM 3K32 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-3K32-1%50ppm |
| R50 | 24811/155 | RESISTOR-FIXED METAL-FILM 182R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-182R-1%50ppm |
| R51 | 24811/213 | RESISTOR-FIXED METAL-FILM 47K5 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-47K5-1%50ppm |
| R52 | 24811/225 | RESISTOR-FIXED METAL-FILM 150K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-150K-1%50ppm |
| R53 | 24811/245 | RESISTOR-FIXED METAL-FILM 1M +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1M0-1%50ppm |
| R54 | 24811/175 | RESISTOR-FIXED METAL-FILM 1K21 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-1K21-1%50ppm |
| R55 | 24811/149 | RESISTOR-FIXED METAL-FILM 100R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100R-1%50ppm |
| R56 | 24811/149 | RESISTOR-FIXED METAL-FILM 100R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100R-1%50ppm |
| R57 | 24811/137 | RESISTOR-FIXED METAL-FILM 33R2 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-33R2-1%50ppm |
| R58 | 24811/181 | RESISTOR-FIXED METAL-FILM 2K21 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-2K21-1%50ppm |
| R59 | 24811/153 | RESISTOR-FIXED METAL-FILM 150R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-150R-1%50ppm |
| R60 to R63 | 24811/189 | RESISTOR-FIXED METAL-FILM 4K75 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-4K75-1%50ppm |
| R64 to R67 | 24811/141 | RESISTOR-FIXED METAL-FILM 47R5 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-47R5-1%50ppm |
| R68 | 24811/134 | RESISTOR-FIXED METAL-FILM 24R3 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-24R3-1%50ppm |
| R69 | 24811/168 | RESISTOR-FIXED METAL-FILM 619R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-619R-1%50ppm |
| T1 | 43590/232 | WOUND-PART TRANSFORMER, RING-CORE, 6:6 TURNS, TWISTED BIFILAR WOUND, MOUNTED ON 6-PIN TOROID | AMETHYST DESIGNS LTD | AD5313 |

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| **AF1 VCXO and PLL (contd.)** | | | | |
| T2 | 43590/232 | WOUND-PART TRANSFORMER, RING-CORE, 6:6 TURNS, TWISTED BIFILAR WOUND, MOUNTED ON 6-PIN TOROID | AMETHYST DESIGNS LTD | AD5313 |
| TR1 to TR9 | 28487/809 | TRANSISTOR NPN BIPOLAR BFR93A... 12V 5GHz 250mW 35mA 40hFE MIN @ 30mA, MARKING CODE R2, SURFACE | PHILIPS | BFR93A |
| TR10 | 28433/828 | TRANSISTOR PNP BIPOLAR BC858B... 30V 150MHz 200mW 100mA 220hFE MIN @ 2mA, MARKING CODE 3K, SURFACE | PHILIPS | BC858B |
| TR11 | 28457/852 | TRANSISTOR PNP BIPOLAR BSR15... 40V 200MHz 300mW 600mA MARKING CODE CH/T7p, SURFACE MOUNTED, | PHILIPS | BSR15 |
| XL1 | 28312/116 | CRYSTAL 0 MHz +/- 10 ppm, SEE IFR DRG, SERIES RESONANCE, 2.3mH - 40R ESR MAX, EXACT FREQ | HY-Q INTERNATIONAL | HT60966-01 |

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|

## AF2 RF oscillator (earlier version)

When ordering, prefix circuit reference with AF2.

| | | | | |
|---|---|---|---|---|
| | 44829-852 | Complete unit | Issue 12 | |
| C1 | 26421/151 | CAPACITOR-FIXED ALUMINIUM 100uF +/-20% 35V ELECTROLYTIC, RADIAL, 5mm PWP, 9mm MAX BODY DIA, | VISHAY COMPONENTS | EKS-00-CC-310-G-C0 |
| C2 to C4 | 26421/112 | CAPACITOR-FIXED ALUMINIUM 10uF +/-20% 35V ELECTROLYTIC, RADIAL, 5mm PWP, (TAPED). | PANASONIC INDUSTRIAL | ECE-A-1V-KA-100-B |
| C5 | 26421/152 | CAPACITOR-FIXED ALUMINIUM 220uF +/-20% 16V ELECTROLYTIC, RADIAL, 5mm PWP, 9mm MAX BODY DIA, | VISHAY COMPONENTS | EKS-00-CC-322-D-C0 |
| C6 | 26421/114 | CAPACITOR-FIXED ALUMINIUM 22uF +/-20% 25V ELECTROLYTIC, RADIAL, 5mm PWP, (TAPED). | PANASONIC INDUSTRIAL | ECE-A-1E-KA-220-B |
| C7 | 26582/432 | CAPACITOR-FIXED POLYESTER 1uF +/-10% 50V 330 ppm/DEG.C, RADIAL, 5mm PWP, (TAPED). | VISHAY COMPONENTS | MKT-1826-510/065 |
| C8 | 26421/112 | CAPACITOR-FIXED ALUMINIUM 10uF +/-20% 35V ELECTROLYTIC, RADIAL, 5mm PWP, (TAPED). | PANASONIC INDUSTRIAL | ECE-A-1V-KA-100-B |
| C9 | 26421/152 | CAPACITOR-FIXED ALUMINIUM 220uF +/-20% 16V ELECTROLYTIC, RADIAL, 5mm PWP, 9mm MAX BODY DIA, | VISHAY COMPONENTS | EKS-00-CC-322-D-C0 |
| C10 | 26421/114 | CAPACITOR-FIXED ALUMINIUM 22uF +/-20% 25V ELECTROLYTIC, RADIAL, 5mm PWP, (TAPED). | PANASONIC INDUSTRIAL | ECE-A-1E-KA-220-B |
| C11 | 26421/152 | CAPACITOR-FIXED ALUMINIUM 220uF +/-20% 16V ELECTROLYTIC, RADIAL, 5mm PWP, 9mm MAX BODY DIA, | VISHAY COMPONENTS | EKS-00-CC-322-D-C0 |
| C12 | 26421/114 | CAPACITOR-FIXED ALUMINIUM 22uF +/-20% 25V ELECTROLYTIC, RADIAL, 5mm PWP, (TAPED). | PANASONIC INDUSTRIAL | ECE-A-1E-KA-220-B |
| C13 | 26582/432 | CAPACITOR-FIXED POLYESTER 1uF +/-10% 50V 330 ppm/DEG.C, RADIAL, 5mm PWP, (TAPED). | VISHAY COMPONENTS | MKT-1826-510/065 |
| C14 | 26421/112 | CAPACITOR-FIXED ALUMINIUM 10uF +/-20% 35V ELECTROLYTIC, RADIAL, 5mm PWP, (TAPED). | PANASONIC INDUSTRIAL | ECE-A-1V-KA-100-B |
| C15 | 26386/887 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-104-KP |
| C16 | 26386/887 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-104-KP |
| C17 | 26582/435 | CAPACITOR-FIXED POLYESTER 33nF +/-10% 63V 330 ppm/DEG.C, RADIAL, 5mm PWP, (LOOSE OR TAPED). | VISHAY COMPONENTS | MKT-1817-333/015 |
| C18 | 26582/435 | CAPACITOR-FIXED POLYESTER 33nF +/-10% 63V 330 ppm/DEG.C, RADIAL, 5mm PWP, (LOOSE OR TAPED). | VISHAY COMPONENTS | MKT-1817-333/015 |
| C19 | 26582/431 | CAPACITOR-FIXED POLYESTER 22nF +/-10% 63V 330 ppm/DEG.C, RADIAL, 5mm PWP, (TAPED). | VISHAY COMPONENTS | MKT-1817-322/015 |
| C20 | 26582/431 | CAPACITOR-FIXED POLYESTER 22nF +/-10% 63V 330 ppm/DEG.C, RADIAL, 5mm PWP, (TAPED). | VISHAY COMPONENTS | MKT-1817-322/015 |
| C22 | 26386/887 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-104-KP |
| C23 | 26582/439 | CAPACITOR-FIXED POLYESTER 680nF +/-10% 50V 330 ppm/DEG.C, RADIAL, 5mm PWP, (TAPED). | VISHAY COMPONENTS | MKT-1826-468/065 |
| C24 | 26582/439 | CAPACITOR-FIXED POLYESTER 680nF +/-10% 50V 330 ppm/DEG.C, RADIAL, 5mm PWP, (TAPED). | VISHAY COMPONENTS | MKT-1826-468/065 |
| C25 | 26386/887 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-104-KP |

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| **AF2 RF oscillator (earlier version) (contd.)** | | | | |
| C26 | 26386/887 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-104-KP |
| C27 | 26386/975 | CAPACITOR-FIXED CERAMIC 6.8pF +/-0.1pF 50V 60 ppm/DEG.C, HIGH Q, SINGLELAYER, SURFACE-MOUNTED, | AVX LTD | 0805-5K-6R8-BAW-TR |
| C28 | 26386/830 | CAPACITOR-FIXED CERAMIC 330pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-331-JP |
| C29 | 26343/767 | CAPACITOR-FIXED CERAMIC 10pF +/-5% 50V NPO MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-100-DP |
| C30 | 26386/830 | CAPACITOR-FIXED CERAMIC 330pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-331-JP |
| C31 | 26386/954 | CAPACITOR-FIXED CERAMIC 8.2pF +/-0.25pF 50V 60 ppm/DEG.C, HIGH-Q, SINGLELAYER, SURFACE-MOUNTED, | AVX LTD | 0805-5K-8R2-CAW-TR |
| C32 | 26386/830 | CAPACITOR-FIXED CERAMIC 330pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-331-JP |
| C33 | 26386/830 | CAPACITOR-FIXED CERAMIC 330pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-331-JP |
| C34 to C36 | 26386/887 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-104-KP |
| C37 | 26386/830 | CAPACITOR-FIXED CERAMIC 330pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-331-JP |
| C38 | 26386/887 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-104-KP |
| C39 to C41 | 26386/830 | CAPACITOR-FIXED CERAMIC 330pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-331-JP |
| C42 to C45 | 26386/863 | CAPACITOR-FIXED CERAMIC 1nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-102-KP |
| C46 | 26386/887 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-104-KP |
| C47 to C54 | 26421/112 | CAPACITOR-FIXED ALUMINIUM 10uF +/-20% 35V ELECTROLYTIC, RADIAL, 5mm PWP, (TAPED). | PANASONIC INDUSTRIAL | ECE-A-1V-KA-100-B |
| C55 to C65 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C67 | 26421/153 | CAPACITOR-FIXED ALUMINIUM 470uF +/-20% 6.3V ELECTROLYTIC, RADIAL, 5mm PWP, 9mm MAX BODY DIA, | VISHAY COMPONENTS | EKS-00-CC-347-C-C0 |
| C68 | 26421/112 | CAPACITOR-FIXED ALUMINIUM 10uF +/-20% 35V ELECTROLYTIC, RADIAL, 5mm PWP, (TAPED). | PANASONIC INDUSTRIAL | ECE-A-1V-KA-100-B |
| C69 | 26421/152 | CAPACITOR-FIXED ALUMINIUM 220uF +/-20% 16V ELECTROLYTIC, RADIAL, 5mm PWP, 9mm MAX BODY DIA, | VISHAY COMPONENTS | EKS-00-CC-322-D-C0 |
| C70 | 26421/152 | CAPACITOR-FIXED ALUMINIUM 220uF +/-20% 16V ELECTROLYTIC, RADIAL, 5mm PWP, 9mm MAX BODY DIA, | VISHAY COMPONENTS | EKS-00-CC-322-D-C0 |
| C71 | 26386/867 | CAPACITOR-FIXED CERAMIC 2.2nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-222-KP |
| C72 | 26421/152 | CAPACITOR-FIXED ALUMINIUM 220uF +/-20% 16V ELECTROLYTIC, RADIAL, 5mm PWP, 9mm MAX BODY DIA, | VISHAY COMPONENTS | EKS-00-CC-322-D-C0 |
| C73 | 26421/152 | CAPACITOR-FIXED ALUMINIUM 220uF +/-20% 16V ELECTROLYTIC, RADIAL, 5mm PWP, 9mm MAX BODY DIA, | VISHAY COMPONENTS | EKS-00-CC-322-D-C0 |
| C74 | 26386/830 | CAPACITOR-FIXED CERAMIC 330pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-331-JP |
| C80 to C82 | 26386/824 | CAPACITOR-FIXED CERAMIC 100pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-101-JP |

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| **AF2 RF oscillator (earlier version) (contd.)** | | | | |
| C83 | 26386/863 | CAPACITOR-FIXED CERAMIC 1nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-102-KP |
| C84 | 26582/440 | CAPACITOR-FIXED POLYESTER 4.7nF +/-10% 63V 330 ppm/DEG.C, RADIAL, 5mm PWP, (LOOSE OR TAPED). | EVOX-RIFA | MMK5-472K100-TR18 |
| C85 | 26582/440 | CAPACITOR-FIXED POLYESTER 4.7nF +/-10% 63V 330 ppm/DEG.C, RADIAL, 5mm PWP, (LOOSE OR TAPED). | EVOX-RIFA | MMK5-472K100-TR18 |
| D1 | 28383/930 | DIODE SMALL-SIGNAL, BAS16... 330mW 75V 250mA 2pF 1Vf @ 50mA, MARKING CODE A6, SURFACE MOUNTED, | PHILIPS | BAS16 |
| D2 | 28371/443 | DIODE ZENER, BZX84-C5V6... 350mW 5.6V 5% 250mA MARKING CODE Z3, SURFACE MOUNTED, SOT-23, (8mm | PHILIPS | BZX84-C5V6 |
| D3 to D5 | 28383/930 | DIODE SMALL-SIGNAL, BAS16... 330mW 75V 250mA 2pF 1Vf @ 50mA, MARKING CODE A6, SURFACE MOUNTED, | PHILIPS | BAS16 |
| D6 | 28371/443 | DIODE ZENER, BZX84-C5V6... 350mW 5.6V 5% 250mA MARKING CODE Z3, SURFACE MOUNTED, SOT-23, (8mm | PHILIPS | BZX84-C5V6 |
| D7 | 28383/930 | DIODE SMALL-SIGNAL, BAS16... 330mW 75V 250mA 2pF 1Vf @ 50mA, MARKING CODE A6, SURFACE MOUNTED, | PHILIPS | BAS16 |
| D8 | 28383/930 | DIODE SMALL-SIGNAL, BAS16... 330mW 75V 250mA 2pF 1Vf @ 50mA, MARKING CODE A6, SURFACE MOUNTED, | PHILIPS | BAS16 |
| D9 | 28381/133 | DIODE VARIABLE CAPACITNCE, BB515... 30V 11.5pF @ 3V, CAPAC RATIO 8.0 MIN, SURFACE MOUNTED, SOD-123, | SIEMENS LTD | BB515-B |
| D10 | 28335/670 | DIODE BAND SWITCHING, BAT18... 35V 100mA 1pF MAX @ 20V, 1.2Vf @ 100mA, MARKING CODE A2, SURFACE | PHILIPS | BAT18/T1 |
| D11 | 28383/930 | DIODE SMALL-SIGNAL, BAS16... 330mW 75V 250mA 2pF 1Vf @ 50mA, MARKING CODE A6, SURFACE MOUNTED, | PHILIPS | BAS16 |
| D12 | 28383/930 | DIODE SMALL-SIGNAL, BAS16... 330mW 75V 250mA 2pF 1Vf @ 50mA, MARKING CODE A6, SURFACE MOUNTED, | PHILIPS | BAS16 |
| IC1 | 28461/741 | IC-ANALOGUE VOLTAGE-REGULATOR LM317L... 37V 100mA POSITIVE ADJUSTABLE, LINEAR, MONOLITHIC, 3 PIN, | NAT. SEMICONDUCTOR | LM317LZ |
| IC2 | 28461/412 | IC-ANALOGUE OPERATIONAL AMP TL072... DUAL, 18V UNITY GAIN BNDWDTH 3MHz, OFFSET VOLTAGE 10mV, SLEW | MOTOROLA INC. | TL072CD |
| IC3 | 28462/638 | IC-DIGITAL FLIP-FLOP/D-TYPE 74HC74... 2 BIT, DUAL, POS EDGE TRIGGER, PLUS SET & CLEAR, CMOS-H/SPEED, | PHILIPS | 74HC74D |
| IC4 | 28462/638 | IC-DIGITAL FLIP-FLOP/D-TYPE 74HC74... 2 BIT, DUAL, POS EDGE TRIGGER, PLUS SET & CLEAR, CMOS-H/SPEED, | PHILIPS | 74HC74D |
| IC5 | 28466/390 | IC-DIGITAL NAND-GATE 74HC00... 2 INPUT, QUAD, CMOS-H/SPEED, 14 PIN, SMALL-OUTLINE. | PHILIPS | 74HC00D |
| IC6 | 28461/999 | IC-ANALOGUE SWITCH DG441... QUAD, 15V SPST, ON-RESISTANCE<85R, 4 x N/O @ LOGIC 1, TTL | SILICONIX LTD | DG441DY |
| IC7 | 28461/450 | IC-ANALOGUE MICROWAVE-AMPLIFIER MSA-0486... 5.25V 50mA GAIN 8dB @ 1GHz, 3dB BANDWIDTH DC-3.2GHz, | HEWLETT-PACKARD | MSA-0486 |
| IC8 | 28461/454 | IC-ANALOGUE MICROWAVE-AMPLIFIER MSA-0786... 4V 22mA GAIN 12.5dB @ 1GHz, 3dB BANDWIDTH DC-2GHz, | HEWLETT-PACKARD | MSA-0786-TRI |
| IC9 | 28469/522 | IC-DIGITAL DIVIDER SP4902... DIVIDE BY 2, 2.54GHz, PRESCALER, ECL, 8 PIN, DUAL-IN-LINE. | GEC PLESSEY SEMICOND | SP4902DP8 |
| IC10 | 28461/454 | IC-ANALOGUE MICROWAVE-AMPLIFIER MSA-0786... 4V 22mA GAIN 12.5dB @ 1GHz, 3dB BANDWIDTH DC-2GHz, | HEWLETT-PACKARD | MSA-0786-TRI |

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| **AF2** | **RF oscillator (earlier version) (contd.)** | | | |
| IC11 | 28467/110 | IC-MICRO PERIPHERAL, PCF8574A... REMOTE 8-BIT I/O EXPANDER, I.IC BUS, UP TO 16 DEVICE ADDRESS | PHILIPS | PCF8574AT |
| IC12 | 28467/110 | IC-MICRO PERIPHERAL, PCF8574A... REMOTE 8-BIT I/O EXPANDER, I.IC BUS, UP TO 16 DEVICE ADDRESS | PHILIPS | PCF8574AT |
| IC13 | 28461/898 | IC-ANALOGUE D/A-CONVERTER 7528... 8 INPUT, DUAL, 8-BIT, BUFFERED, MULTIPLYING, CMOS, 20 PIN, | ANALOG DEVICES LTD | AD7528JR |
| IC14 | 28461/897 | IC-ANALOGUE OPERATIONAL AMP OP-27GS... 22V LOW NOISE, 8 PIN, SMALL-OUTLINE. | ANALOG DEVICES LTD | OP-27GS |
| IC15 | 28461/897 | IC-ANALOGUE OPERATIONAL AMP OP-27GS... 22V LOW NOISE, 8 PIN, SMALL-OUTLINE. | ANALOG DEVICES LTD | OP-27GS |
| IC16 | 28461/896 | IC-ANALOGUE SWITCH DG413... QUAD, 15V SPST, ON-RESISTANCE<35R, 2 x N/O & 2 x N/C @ LOGIC 1, | SILICONIX LTD | DG413DY |
| IC17 | 28461/896 | IC-ANALOGUE SWITCH DG413... QUAD, 15V SPST, ON-RESISTANCE<35R, 2 x N/O & 2 x N/C @ LOGIC 1, | SILICONIX LTD | DG413DY |
| IC18 | 28461/897 | IC-ANALOGUE OPERATIONAL AMP OP-27GS... 22V LOW NOISE, 8 PIN, SMALL-OUTLINE. | ANALOG DEVICES LTD | OP-27GS |
| IC19 | 28461/897 | IC-ANALOGUE OPERATIONAL AMP OP-27GS... 22V LOW NOISE, 8 PIN, SMALL-OUTLINE. | ANALOG DEVICES LTD | OP-27GS |
| L1 to L4 | 23642/333 | INDUCTOR-FIXED 470uH +/- 10% SCREENED, MOULDED-EPOXY, 310mA 3R3 MAX, 90 Q @ 0.79 MHz, 3 | INTERCONNECTION PROD | 553-3635-33-02-00 |
| L5 | 23642/362 | INDUCTOR-FIXED 10mH +/- 10% SCREENED, MOULDED-EPOXY, 69mA 75R MAX, 70 Q @ 0.25 MHz, 0.7 | INTERCONNECTION PROD | 553-3635-49-02-00 |
| L6 | 23642/362 | INDUCTOR-FIXED 10mH +/- 10% SCREENED, MOULDED-EPOXY, 69mA 75R MAX, 70 Q @ 0.25 MHz, 0.7 | INTERCONNECTION PROD | 553-3635-49-02-00 |
| L8 to L15 | 23642/518 | INDUCTOR-FIXED 0.56uH +/- 20% MOULDED-EPOXY, 450mA 0R55 MAX, 30 Q @ 25.2 MHz, 180 MHz SRF, SURFACE | MEGGITT ELECTRONICS | 3612-T-R56-M |
| PLA | 23436/776 | CONNECTOR MULTIWAY, PLUG, 20 WAY, SNAP OFF STRIP, STRAIGHT, 2.54mm PITCH, PCB MOUNTING, SOLDER PIN | HARWIN ENGINEERS LTD | DO1-9922005 |
| PLB | 23436/776 | CONNECTOR MULTIWAY, PLUG, 20 WAY, SNAP OFF STRIP, STRAIGHT, 2.54mm PITCH, PCB MOUNTING, SOLDER PIN | HARWIN ENGINEERS LTD | DO1-9922005 |
| R1 | 24811/158 | RESISTOR-FIXED METAL-FILM 243R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-243R-1%50ppm |
| R2 | 24811/189 | RESISTOR-FIXED METAL-FILM 4K75 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-4K75-1%50ppm |
| R3 | 24811/125 | RESISTOR-FIXED METAL-FILM 10R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10R-1%-50ppm |
| R4 | 24811/223 | RESISTOR-FIXED METAL-FILM 121K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-121K-1%50ppm |
| R5 | 24811/213 | RESISTOR-FIXED METAL-FILM 47K5 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-47K5-1%50ppm |
| R6 | 24811/245 | RESISTOR-FIXED METAL-FILM 1M +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1M0-1%50ppm |
| R7 | 24811/175 | RESISTOR-FIXED METAL-FILM 1K21 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-1K21-1%50ppm |

## AF2 RF oscillator (earlier version) (contd.)

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| R8 | 24811/149 | RESISTOR-FIXED METAL-FILM 100R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100R-1%50ppm |
| R9 | 24811/157 | RESISTOR-FIXED METAL-FILM 221R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-221R-1%50ppm |
| R10 | 24811/213 | RESISTOR-FIXED METAL-FILM 47K5 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-47K5-1%50ppm |
| R11 | 24811/223 | RESISTOR-FIXED METAL-FILM 121K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-121K-1%50ppm |
| R12 | 24811/134 | RESISTOR-FIXED METAL-FILM 24R3 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-24R3-1%50ppm |
| R13 | 24811/245 | RESISTOR-FIXED METAL-FILM 1M +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1M0-1%50ppm |
| R14 | 24811/175 | RESISTOR-FIXED METAL-FILM 1K21 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-1K21-1%50ppm |
| R15 | 24811/149 | RESISTOR-FIXED METAL-FILM 100R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100R-1%50ppm |
| R16 | 24811/171 | RESISTOR-FIXED METAL-FILM 825R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-825R-1%50ppm |
| R17 to R19 | 24811/181 | RESISTOR-FIXED METAL-FILM 2K21 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-2K21-1%50ppm |
| R20 | 24811/149 | RESISTOR-FIXED METAL-FILM 100R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100R-1%50ppm |
| R21 | 24811/149 | RESISTOR-FIXED METAL-FILM 100R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100R-1%50ppm |
| R22 | 24811/169 | RESISTOR-FIXED METAL-FILM 681R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-681R-1%50ppm |
| R23 | 24811/181 | RESISTOR-FIXED METAL-FILM 2K21 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-2K21-1%50ppm |
| R24 | 24811/149 | RESISTOR-FIXED METAL-FILM 100R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100R-1%50ppm |
| R25 | 24811/149 | RESISTOR-FIXED METAL-FILM 100R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100R-1%50ppm |
| R26 | 24811/170 | RESISTOR-FIXED METAL-FILM 750R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-750R-1%50ppm |
| R27 | 24811/149 | RESISTOR-FIXED METAL-FILM 100R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100R-1%50ppm |
| R30 | 24811/149 | RESISTOR-FIXED METAL-FILM 100R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100R-1%50ppm |
| R31 | 24811/170 | RESISTOR-FIXED METAL-FILM 750R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-750R-1%50ppm |
| R32 | 24811/177 | RESISTOR-FIXED METAL-FILM 1K5 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K5-1%50ppm |
| R33 | 24811/177 | RESISTOR-FIXED METAL-FILM 1K5 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K5-1%50ppm |
| R34 | 24811/185 | RESISTOR-FIXED METAL-FILM 3K32 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-3K32-1%50ppm |
| R35 | 24811/189 | RESISTOR-FIXED METAL-FILM 4K75 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-4K75-1%50ppm |
| R36 | 24811/185 | RESISTOR-FIXED METAL-FILM 3K32 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-3K32-1%50ppm |

## AF2 RF oscillator (earlier version) (contd.)

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| R37 | 24811/155 | RESISTOR-FIXED METAL-FILM 182R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-182R-1%50ppm |
| R38 | 24811/133 | RESISTOR-FIXED METAL-FILM 22R1 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-22R1-1%50ppm |
| R39 | 24811/143 | RESISTOR-FIXED METAL-FILM 56R2 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-56R2-1%50ppm |
| R40 | 24772/057 | RESISTOR-FIXED METAL-FILM 220R +/- 2% 125mW 150V 100 ppm/DEG.C, AXIAL, (TAPED). | VISHAY COMPONENTS | NK3-220R-2% |
| R41 | 24811/901 | RESISTOR-FIXED METAL-FILM 10R +/- 1% 250mW 200V 50 ppm/DEG.C, LOW-INDUCTANCE, SURFACE MOUNTED, SIZE | VISHAY COMPONENTS | SMM0204-HF-10R-1% |
| R42 | 24811/901 | RESISTOR-FIXED METAL-FILM 10R +/- 1% 250mW 200V 50 ppm/DEG.C, LOW-INDUCTANCE, SURFACE MOUNTED, SIZE | VISHAY COMPONENTS | SMM0204-HF-10R-1% |
| R43 | 24772/067 | RESISTOR-FIXED METAL-FILM 560R +/- 2% 125mW 150V 100 ppm/DEG.C, AXIAL, (TAPED). | VISHAY COMPONENTS | NK3-560R-2% |
| R44 to R46 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R47 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R48 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R49 | 24811/902 | RESISTOR-FIXED METAL-FILM 16R2 +/- 1% 250mW 200V 50 ppm/DEG.C, LOW-INDUCTANCE, SURFACE MOUNTED, | VISHAY COMPONENTS | SMM0204-HF-16R2-1% |
| R50 | 24811/910 | RESISTOR-FIXED METAL-FILM 61R9 +/- 1% 250mW 200V 50 ppm/DEG.C, LOW-INDUCTANCE, SURFACE MOUNTED, | VISHAY COMPONENTS | SMM0204-HF-61R9-1% |
| R51 | 24811/910 | RESISTOR-FIXED METAL-FILM 61R9 +/- 1% 250mW 200V 50 ppm/DEG.C, LOW-INDUCTANCE, SURFACE MOUNTED, | VISHAY COMPONENTS | SMM0204-HF-61R9-1% |
| R52 | 24811/175 | RESISTOR-FIXED METAL-FILM 1K21 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-1K21-1%50ppm |
| R53 | 24811/175 | RESISTOR-FIXED METAL-FILM 1K21 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-1K21-1%50ppm |
| R54 | 24338/004 | RESISTOR-FIXED METAL-GLAZE 150R +/- 5% 1W 100V 350 ppm/DEG.C, SURFACE MOUNTED, SIZE 2512, (12mm | VISHAY COMPONENTS | CR2512-150R-5%-P4 |
| R55 | 24811/134 | RESISTOR-FIXED METAL-FILM 24R3 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-24R3-1%50ppm |
| R56 | 24811/134 | RESISTOR-FIXED METAL-FILM 24R3 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-24R3-1%50ppm |
| R57 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R58 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R59 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R60 to R63 | 24811/149 | RESISTOR-FIXED METAL-FILM 100R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100R-1%50ppm |
| R64 | 24811/602 | RESISTOR-FIXED METAL-FILM 10K +/- 0.1% 250mW 200V 15 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-10K0-0.1%-15 |
| R65 | 24811/606 | RESISTOR-FIXED METAL-FILM 1K +/- 0.1% 250mW 200V 15 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-1K0-0.1%-15 |
| R66 | 24811/617 | RESISTOR-FIXED METAL-FILM 110R +/- 0.1% 250mW 200V 15 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-110R-0.1%-15 |

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| **AF2 RF oscillator (earlier version) (contd.)** | | | | |
| R67 | 24811/149 | RESISTOR-FIXED METAL-FILM 100R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100R-1%50ppm |
| R68 | 24811/149 | RESISTOR-FIXED METAL-FILM 100R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100R-1%50ppm |
| R69 | 24811/602 | RESISTOR-FIXED METAL-FILM 10K +/- 0.1% 250mW 200V 15 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-10K0-0.1%-15 |
| R70 | 24811/618 | RESISTOR-FIXED METAL-FILM 100R +/- 0.1% 250mW 200V 15 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100R-0.1%-15 |
| R71 | 24811/149 | RESISTOR-FIXED METAL-FILM 100R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100R-1%50ppm |
| R72 | 24811/149 | RESISTOR-FIXED METAL-FILM 100R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100R-1%50ppm |
| R73 | 24811/170 | RESISTOR-FIXED METAL-FILM 750R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-750R-1%50ppm |
| R74 to R76 | 24811/149 | RESISTOR-FIXED METAL-FILM 100R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100R-1%50ppm |
| R77 to R80 | 24811/125 | RESISTOR-FIXED METAL-FILM 10R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10R-1%-50ppm |
| R81 | 24811/919 | RESISTOR-FIXED METAL-FILM 15R +/- 1% 250mW 200V 50 ppm/DEG.C, LOW-INDUCTANCE, SURFACE MOUNTED, SIZE | VISHAY COMPONENTS | SMM0204-HF-15R0-1% |
| R82 | 24811/902 | RESISTOR-FIXED METAL-FILM 16R2 +/- 1% 250mW 200V 50 ppm/DEG.C, LOW-INDUCTANCE, SURFACE MOUNTED, | VISHAY COMPONENTS | SMM0204-HF-16R2-1% |
| R83 | 24811/919 | RESISTOR-FIXED METAL-FILM 15R +/- 1% 250mW 200V 50 ppm/DEG.C, LOW-INDUCTANCE, SURFACE MOUNTED, SIZE | VISHAY COMPONENTS | SMM0204-HF-15R0-1% |
| R84 | 24811/906 | RESISTOR-FIXED METAL-FILM 36R5 +/- 1% 250mW 200V 50 ppm/DEG.C, LOW-INDUCTANCE, SURFACE MOUNTED, | VISHAY COMPONENTS | SMM0204-HF-36R5-1% |
| R85 | 24811/906 | RESISTOR-FIXED METAL-FILM 36R5 +/- 1% 250mW 200V 50 ppm/DEG.C, LOW-INDUCTANCE, SURFACE MOUNTED, | VISHAY COMPONENTS | SMM0204-HF-36R5-1% |
| R90 to R95 | 24811/225 | RESISTOR-FIXED METAL-FILM 150K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-150K-1%50ppm |
| R96 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R97 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| SKJ | 23435/990 | CONNECTOR SHORTING, SOCKET, 2 WAY, FOR 0.64mm SQ PINS, 2.54mm PITCH, 9.6mm HIGH, FREE MOUNTING, | BERG ELECTRONICS | 65474-001 |
| TR1 | 28453/829 | TRANSISTOR NPN BIPOLAR BC848B... 30V 200MHz 200mW 100mA 290hFE TYP @ 2mA, NOISE 2dB @ 1KHz, MARKING | PHILIPS | BC848B |
| TR2 | 28433/828 | TRANSISTOR PNP BIPOLAR BC858B... 30V 150MHz 200mW 100mA 220hFE MIN @ 2mA, MARKING CODE 3K, SURFACE | PHILIPS | BC858B |
| TR3 | 28457/850 | TRANSISTOR NPN BIPOLAR FMMT2369... 40V 600MHz 300mW 500mA 40hFE MIN @ 10mA, MARKING CODE *1J, | PHILIPS | PMBT2369 |
| TR4 | 28453/829 | TRANSISTOR NPN BIPOLAR BC848B... 30V 200MHz 200mW 100mA 290hFE TYP @ 2mA, NOISE 2dB @ 1KHz, MARKING | PHILIPS | BC848B |
| TR5 | 28433/828 | TRANSISTOR PNP BIPOLAR BC858B... 30V 150MHz 200mW 100mA 220hFE MIN @ 2mA, MARKING CODE 3K, SURFACE | PHILIPS | BC858B |

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| **AF2 RF oscillator (earlier version) (contd.)** | | | | |
| TR6 | 28453/829 | TRANSISTOR NPN BIPOLAR BC848B... 30V 200MHz 200mW 100mA 290hFE TYP @ 2mA, NOISE 2dB @ 1KHz, MARKING | PHILIPS | BC848B |
| TR7 | 28433/828 | TRANSISTOR PNP BIPOLAR BC858B... 30V 150MHz 200mW 100mA 220hFE MIN @ 2mA, MARKING CODE 3K, SURFACE | PHILIPS | BC858B |
| TR8 | 28457/850 | TRANSISTOR NPN BIPOLAR FMMT2369... 40V 600MHz 300mW 500mA 40hFE MIN @ 10mA, MARKING CODE *1J, | PHILIPS | PMBT2369 |
| TR9 | 28433/828 | TRANSISTOR PNP BIPOLAR BC858B... 30V 150MHz 200mW 100mA 220hFE MIN @ 2mA, MARKING CODE 3K, SURFACE | PHILIPS | BC858B |
| TR10 | 28453/829 | TRANSISTOR NPN BIPOLAR BC848B... 30V 200MHz 200mW 100mA 290hFE TYP @ 2mA, NOISE 2dB @ 1KHz, MARKING | PHILIPS | BC848B |
| TR11 | 28453/829 | TRANSISTOR NPN BIPOLAR BC848B... 30V 200MHz 200mW 100mA 290hFE TYP @ 2mA, NOISE 2dB @ 1KHz, MARKING | PHILIPS | BC848B |
| TR12 to TR14 | 28487/809 | TRANSISTOR NPN BIPOLAR BFR93A... 12V 5GHz 250mW 35mA 40hFE MIN @ 30mA, MARKING CODE R2, SURFACE | PHILIPS | BFR93A |

## AF2 RF oscillator (later version)

When ordering, prefix circuit reference with AF2.

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| | 44829-852 | Complete unit | Issue 23 | |
| C1 | 26421/151 | CAPACITOR-FIXED ALUMINIUM 100uF +/-20% 35V ELECTROLYTIC, RADIAL, 5mm PWP, 9mm MAX BODY DIA, | VISHAY COMPONENTS | EKS-00-CC-310-G-C0 |
| C2 to C4 | 26421/112 | CAPACITOR-FIXED ALUMINIUM 10uF +/-20% 35V ELECTROLYTIC, RADIAL, 5mm PWP, (TAPED). | PANASONIC INDUSTRIAL | ECE-A-1V-KA-100-B |
| C5 | 26421/152 | CAPACITOR-FIXED ALUMINIUM 220uF +/-20% 16V ELECTROLYTIC, RADIAL, 5mm PWP, 9mm MAX BODY DIA, | VISHAY COMPONENTS | EKS-00-CC-322-D-C0 |
| C6 | 26421/114 | CAPACITOR-FIXED ALUMINIUM 22uF +/-20% 25V ELECTROLYTIC, RADIAL, 5mm PWP, (TAPED). | PANASONIC INDUSTRIAL | ECE-A-1E-KA-220-B |
| C7 | 26582/432 | CAPACITOR-FIXED POLYESTER 1uF +/-10% 50V 330 ppm/DEG.C, RADIAL, 5mm PWP, (TAPED). | VISHAY COMPONENTS | MKT-1826-510/065 |
| C8 | 26421/112 | CAPACITOR-FIXED ALUMINIUM 10uF +/-20% 35V ELECTROLYTIC, RADIAL, 5mm PWP, (TAPED). | PANASONIC INDUSTRIAL | ECE-A-1V-KA-100-B |
| C9 | 26421/152 | CAPACITOR-FIXED ALUMINIUM 220uF +/-20% 16V ELECTROLYTIC, RADIAL, 5mm PWP, 9mm MAX BODY DIA, | VISHAY COMPONENTS | EKS-00-CC-322-D-C0 |
| C10 | 26421/114 | CAPACITOR-FIXED ALUMINIUM 22uF +/-20% 25V ELECTROLYTIC, RADIAL, 5mm PWP, (TAPED). | PANASONIC INDUSTRIAL | ECE-A-1E-KA-220-B |
| C11 | 26421/152 | CAPACITOR-FIXED ALUMINIUM 220uF +/-20% 16V ELECTROLYTIC, RADIAL, 5mm PWP, 9mm MAX BODY DIA, | VISHAY COMPONENTS | EKS-00-CC-322-D-C0 |
| C12 | 26421/114 | CAPACITOR-FIXED ALUMINIUM 22uF +/-20% 25V ELECTROLYTIC, RADIAL, 5mm PWP, (TAPED). | PANASONIC INDUSTRIAL | ECE-A-1E-KA-220-B |
| C13 | 26582/432 | CAPACITOR-FIXED POLYESTER 1uF +/-10% 50V 330 ppm/DEG.C, RADIAL, 5mm PWP, (TAPED). | VISHAY COMPONENTS | MKT-1826-510/065 |
| C14 | 26421/112 | CAPACITOR-FIXED ALUMINIUM 10uF +/-20% 35V ELECTROLYTIC, RADIAL, 5mm PWP, (TAPED). | PANASONIC INDUSTRIAL | ECE-A-1V-KA-100-B |
| C15 | 26386/887 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-104-KP |
| C16 | 26386/887 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-104-KP |
| C17 | 26582/431 | CAPACITOR-FIXED POLYESTER 22nF +/-10% 63V 330 ppm/DEG.C, RADIAL, 5mm PWP, (TAPED). | VISHAY COMPONENTS | MKT-1817-322/015 |
| C18 | 26582/431 | CAPACITOR-FIXED POLYESTER 22nF +/-10% 63V 330 ppm/DEG.C, RADIAL, 5mm PWP, (TAPED). | VISHAY COMPONENTS | MKT-1817-322/015 |
| C22 | 26386/887 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-104-KP |
| C23 | 26582/439 | CAPACITOR-FIXED POLYESTER 680nF +/-10% 50V 330 ppm/DEG.C, RADIAL, 5mm PWP, (TAPED). | VISHAY COMPONENTS | MKT-1826-468/065 |
| C24 | 26582/427 | CAPACITOR-FIXED POLYESTER 470nF +/-10% 63V 330 ppm/DEG.C, RADIAL, 5mm PWP, (TAPED). | VISHAY COMPONENTS | MKT-1826-447/065 |
| C25 | 26386/887 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-104-KP |
| C26 | 26386/887 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-104-KP |
| C27 | 26386/975 | CAPACITOR-FIXED CERAMIC 6.8pF +/-0.1pF 50V 60 ppm/DEG.C, HIGH-Q, SINGLELAYER, SURFACE-MOUNTED, | AVX LTD | 0805-5K-6R8-BAW-TR |
| C28 | 26386/830 | CAPACITOR-FIXED CERAMIC 330pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-331-JP |
| C29 | 26343/767 | CAPACITOR-FIXED CERAMIC 10pF +/-5% 50V NPO MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-100-DP |

## AF2 RF oscillator (later version) (contd.)

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| C30 | 26386/830 | CAPACITOR-FIXED CERAMIC 330pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-331-JP |
| C31 | 26386/898 | CAPACITOR-FIXED CERAMIC 5.6pF +/-0.1pF 50V 60 ppm/DEG.C, HIGH-Q, SINGLELAYER, SURFACE-MOUNTED, | AVX LTD | 0805-5K5R6-BAW-TR |
| C32 | 26386/830 | CAPACITOR-FIXED CERAMIC 330pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-331-JP |
| C33 | 26386/830 | CAPACITOR-FIXED CERAMIC 330pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-331-JP |
| C34 to C36 | 26386/887 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-104-KP |
| C37 | 26386/830 | CAPACITOR-FIXED CERAMIC 330pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-331-JP |
| C38 | 26386/887 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-104-KP |
| C39 to C41 | 26386/830 | CAPACITOR-FIXED CERAMIC 330pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-331-JP |
| C42 to C45 | 26386/863 | CAPACITOR-FIXED CERAMIC 1nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-102-KP |
| C46 | 26386/887 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-104-KP |
| C47 to C54 | 26421/112 | CAPACITOR-FIXED ALUMINIUM 10uF +/-20% 35V ELECTROLYTIC, RADIAL, 5mm PWP, (TAPED). | PANASONIC INDUSTRIAL | ECE-A-1V-KA-100-B |
| C55 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C56 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C57 to C61 | 26386/887 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-104-KP |
| C62 to C65 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C67 | 26421/153 | CAPACITOR-FIXED ALUMINIUM 470uF +/-20% 6.3V ELECTROLYTIC, RADIAL, 5mm PWP, 9mm MAX BODY DIA, | VISHAY COMPONENTS | EKS-00-CC-347-C-C0 |
| C68 | 26421/112 | CAPACITOR-FIXED ALUMINIUM 10uF +/-20% 35V ELECTROLYTIC, RADIAL, 5mm PWP, (TAPED). | PANASONIC INDUSTRIAL | ECE-A-1V-KA-100-B |
| C69 | 26421/152 | CAPACITOR-FIXED ALUMINIUM 220uF +/-20% 16V ELECTROLYTIC, RADIAL, 5mm PWP, 9mm MAX BODY DIA, | VISHAY COMPONENTS | EKS-00-CC-322-D-C0 |
| C70 | 26421/152 | CAPACITOR-FIXED ALUMINIUM 220uF +/-20% 16V ELECTROLYTIC, RADIAL, 5mm PWP, 9mm MAX BODY DIA, | VISHAY COMPONENTS | EKS-00-CC-322-D-C0 |
| C71 | 26386/867 | CAPACITOR-FIXED CERAMIC 2.2nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-222-KP |
| C72 | 26421/152 | CAPACITOR-FIXED ALUMINIUM 220uF +/-20% 16V ELECTROLYTIC, RADIAL, 5mm PWP, 9mm MAX BODY DIA, | VISHAY COMPONENTS | EKS-00-CC-322-D-C0 |
| C73 | 26421/152 | CAPACITOR-FIXED ALUMINIUM 220uF +/-20% 16V ELECTROLYTIC, RADIAL, 5mm PWP, 9mm MAX BODY DIA, | VISHAY COMPONENTS | EKS-00-CC-322-D-C0 |
| C74 | 26386/830 | CAPACITOR-FIXED CERAMIC 330pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-331-JP |
| C80 to C82 | 26386/824 | CAPACITOR-FIXED CERAMIC 100pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-101-JP |
| C83 | 26386/863 | CAPACITOR-FIXED CERAMIC 1nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-102-KP |

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| **AF2 RF oscillator (later version) (contd.)** | | | | |
| C100 to C102 | 26386/824 | CAPACITOR-FIXED CERAMIC 100pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-101-JP |
| C103 | 26386/887 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-104-KP |
| C104 | 26386/887 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-104-KP |
| D1 | 28383/930 | DIODE SMALL-SIGNAL, BAS16... 330mW 75V 250mA 2pF 1Vf @ 50mA, MARKING CODE A6, SURFACE MOUNTED, | PHILIPS | BAS16 |
| D2 | 28371/443 | DIODE ZENER, BZX84-C5V6... 250mW 5.6V 5% 250mA MARKING CODE Z3, SURFACE MOUNTED, SOT-23, (8mm | PHILIPS | BZX84-C5V6 |
| D3 to D5 | 28383/930 | DIODE SMALL-SIGNAL, BAS16... 330mW 75V 250mA 2pF 1Vf @ 50mA, MARKING CODE A6, SURFACE MOUNTED, | PHILIPS | BAS16 |
| D6 | 28371/443 | DIODE ZENER, BZX84-C5V6... 250mW 5.6V 5% 250mA MARKING CODE Z3, SURFACE MOUNTED, SOT-23, (8mm | PHILIPS | BZX84-C5V6 |
| D7 | 28383/930 | DIODE SMALL-SIGNAL, BAS16... 330mW 75V 250mA 2pF 1Vf @ 50mA, MARKING CODE A6, SURFACE MOUNTED, | PHILIPS | BAS16 |
| D8 | 28383/930 | DIODE SMALL-SIGNAL, BAS16... 330mW 75V 250mA 2pF 1Vf @ 50mA, MARKING CODE A6, SURFACE MOUNTED, | PHILIPS | BAS16 |
| D9 | 28381/133 | DIODE VARIABLE CAPACITNCE, BB515... 30V 20mA 2.1pF @ 28V, CAPAC RATIO 8.0 MIN, SURFACE MOUNTED, | PHILIPS | BB515 |
| D10 | 28335/670 | DIODE BAND SWITCHING, BAT18... 35V 100mA 1pF MAX @ 20V, 1.2Vf @ 100mA, MARKING CODE A2, SURFACE | PHILIPS | BAT18/T1 |
| D13 | 28371/443 | DIODE ZENER, BZX84-C5V6... 250mW 5.6V 5% 250mA MARKING CODE Z3, SURFACE MOUNTED, SOT-23, (8mm | PHILIPS | BZX84-C5V6 |
| D14 | 28371/443 | DIODE ZENER, BZX84-C5V6... 250mW 5.6V 5% 250mA MARKING CODE Z3, SURFACE MOUNTED, SOT-23, (8mm | PHILIPS | BZX84-C5V6 |
| IC1 | 28461/741 | IC-ANALOGUE VOLTAGE-REGULATOR LM317L... 37V 100mA POSITIVE ADJUSTABLE, LINEAR, MONOLITHIC, 3 PIN, | NAT. SEMICONDUCTOR | LM317LZ |
| IC2 | 28461/412 | IC-ANALOGUE OPERATIONAL AMP TL072... DUAL, 18V UNITY GAIN BNDWDTH 3MHz, OFFSET VOLTAGE 10mV, SLEW | MOTOROLA INC. | TL072CD |
| IC3 | 28462/638 | IC-DIGITAL FLIP-FLOP/D-TYPE 74HC74... 2 BIT, DUAL, POS EDGE TRIGGER, PLUS SET & CLEAR, CMOS-H/SPEED, | PHILIPS | 74HC74D |
| IC4 | 28462/638 | IC-DIGITAL FLIP-FLOP/D-TYPE 74HC74... 2 BIT, DUAL, POS EDGE TRIGGER, PLUS SET & CLEAR, CMOS-H/SPEED, | PHILIPS | 74HC74D |
| IC5 | 28466/390 | IC-DIGITAL NAND-GATE 74HC00... 2 INPUT, QUAD, CMOS-H/SPEED, 14 PIN, SMALL-OUTLINE. | PHILIPS | 74HC00D |
| IC6 | 28461/999 | IC-ANALOGUE SWITCH DG441... QUAD, 15V SPST, ON-RESISTANCE<85R, 4 x N/O @ LOGIC 1, TTL | TEMIC UK LTD | DG441DY |
| IC7 | 28461/450 | IC-ANALOGUE MICROWAVE-AMP MSA-0486... 5.25V 50mA GAIN 8dB @ 1GHz, 3dB BANDWIDTH DC-3.2GHz, BIPOLAR, | HEWLETT-PACKARD | MSA-0486-TR1 |
| IC8 | 28461/454 | IC-ANALOGUE MICROWAVE-AMP MSA-0786... 4V 22mA GAIN 12.5dB @ 1GHz, 3dB BANDWIDTH DC-2GHz, BIPOLAR, 4 | HEWLETT-PACKARD | MSA-0786-TR1 |
| IC9 | 28469/522 | IC-DIGITAL DIVIDER SP4902... DIVIDE BY 2, 2.54GHz, PRESCALER, ECL, 8 PIN, DUAL-IN-LINE. | | |
| IC10 | 28461/454 | IC-ANALOGUE MICROWAVE-AMP MSA-0786... 4V 22mA GAIN 12.5dB @ 1GHz, 3dB BANDWIDTH DC-2GHz, BIPOLAR, 4 | HEWLETT-PACKARD | MSA-0786-TR1 |

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| **AF2 RF oscillator (later version) (contd.)** | | | | |
| IC11 | 28467/110 | IC-MICRO PERIPHERAL, PCF8574A... REMOTE 8-BIT I/O EXPANDER, I.IC BUS, UP TO 16 DEVICE ADDRESS | PHILIPS | PCF8574AT |
| IC12 | 28467/110 | IC-MICRO PERIPHERAL, PCF8574A... REMOTE 8-BIT I/O EXPANDER, I.IC BUS, UP TO 16 DEVICE ADDRESS | PHILIPS | PCF8574AT |
| IC13 | 28461/898 | IC-ANALOGUE D/A-CONVERTER 7528... 8 INPUT, DUAL, 8-BIT, BUFFERED, MULTIPLYING, CMOS, 20 PIN, | ANALOG DEVICES LTD | AD7528JR |
| IC14 | 28461/897 | IC-ANALOGUE OPERATIONAL AMP OP-27GS... 22V LOW NOISE, 8 PIN, SMALL-OUTLINE. | ANALOG DEVICES LTD | OP-27GS |
| IC15 | 28461/897 | IC-ANALOGUE OPERATIONAL AMP OP-27GS... 22V LOW NOISE, 8 PIN, SMALL-OUTLINE. | ANALOG DEVICES LTD | OP-27GS |
| IC16 | 28461/896 | IC-ANALOGUE SWITCH DG413... QUAD, 15V SPST, ON-RESISTANCE<35R, 2 x N/O & 2 x N/C @ LOGIC 1, | TEMIC UK LTD | DG413DY |
| IC17 | 28461/896 | IC-ANALOGUE SWITCH DG413... QUAD, 15V SPST, ON-RESISTANCE<35R, 2 x N/O & 2 x N/C @ LOGIC 1, | TEMIC UK LTD | DG413DY |
| IC18 | 28461/897 | IC-ANALOGUE OPERATIONAL AMP OP-27GS... 22V LOW NOISE, 8 PIN, SMALL-OUTLINE. | ANALOG DEVICES LTD | OP-27GS |
| IC19 | 28461/897 | IC-ANALOGUE OPERATIONAL AMP OP-27GS... 22V LOW NOISE, 8 PIN, SMALL-OUTLINE. | ANALOG DEVICES LTD | OP-27GS |
| L1 to L4 | 23642/333 | INDUCTOR-FIXED 470uH +/- 10% SCREENED, EPOXY-MOULD, 310mA 3R3 MAX, 90 Q @ 0.79 MHz, 3 MHz | VISHAY COMPONENTS | VL471K |
| L5 | 23642/362 | INDUCTOR-FIXED 10mH +/- 10% SCREENED, EPOXY-MOULD, 69mA 75R MAX, 70 Q @ 0.25 MHz, 0.7 MHz SRF, | VISHAY COMPONENTS | VL103K |
| L6 | 23642/362 | INDUCTOR-FIXED 10mH +/- 10% SCREENED, EPOXY-MOULD, 69mA 75R MAX, 70 Q @ 0.25 MHz, 0.7 MHz SRF, | VISHAY COMPONENTS | VL103K |
| L8 to L14 | 23642/518 | INDUCTOR-FIXED 0.56uH +/- 20% EPOXY-MOULD, 450mA 0R55 MAX, 30 Q @ 25.2 MHz, 180 MHz SRF, SURFACE | MEGGITT ELECTRONICS | 3612-T-R56-M |
| L15 | 23642/703 | INDUCTOR-FIXED 0.47uH +/- 10% EPOXY-MOULD, 450mA 0R5 MAX, 30 Q @ 25.2 MHz, 220 MHz SRF, SURFACE | MEGGITT ELECTRONICS | 3612-T-R47-K |
| R1 | 24811/158 | RESISTOR-FIXED METAL-FILM 243R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-243R-1%50ppm |
| R2 | 24811/189 | RESISTOR-FIXED METAL-FILM 4K75 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-4K75-1%50ppm |
| R3 | 24811/125 | RESISTOR-FIXED METAL-FILM 10R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10R-1%-50ppm |
| R4 | 24811/223 | RESISTOR-FIXED METAL-FILM 121K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-121K-1%50ppm |
| R5 | 24811/213 | RESISTOR-FIXED METAL-FILM 47K5 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-47K5-1%50ppm |
| R6 | 24811/245 | RESISTOR-FIXED METAL-FILM 1M +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1M0-1%50ppm |
| R7 | 24811/175 | RESISTOR-FIXED METAL-FILM 1K21 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-1K21-1%50ppm |
| R8 | 24811/149 | RESISTOR-FIXED METAL-FILM 100R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100R-1%50ppm |

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| **AF2 RF oscillator (later version) (contd.)** | | | | |
| R9 | 24811/157 | RESISTOR-FIXED METAL-FILM 221R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-221R-1%50ppm |
| R10 | 24811/213 | RESISTOR-FIXED METAL-FILM 47K5 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-47K5-1%50ppm |
| R11 | 24811/223 | RESISTOR-FIXED METAL-FILM 121K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-121K-1%50ppm |
| R12 | 24811/134 | RESISTOR-FIXED METAL-FILM 24R3 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-24R3-1%50ppm |
| R13 | 24811/245 | RESISTOR-FIXED METAL-FILM 1M +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1M0-1%50ppm |
| R14 | 24811/175 | RESISTOR-FIXED METAL-FILM 1K21 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-1K21-1%50ppm |
| R15 | 24811/149 | RESISTOR-FIXED METAL-FILM 100R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100R-1%50ppm |
| R16 | 24811/171 | RESISTOR-FIXED METAL-FILM 825R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-825R-1%50ppm |
| R17 to R19 | 24811/181 | RESISTOR-FIXED METAL-FILM 2K21 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-2K21-1%50ppm |
| R20 | 24811/149 | RESISTOR-FIXED METAL-FILM 100R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100R-1%50ppm |
| R21 | 24811/149 | RESISTOR-FIXED METAL-FILM 100R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100R-1%50ppm |
| R22 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R23 | 24811/181 | RESISTOR-FIXED METAL-FILM 2K21 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-2K21-1%50ppm |
| R24 | 24811/149 | RESISTOR-FIXED METAL-FILM 100R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100R-1%50ppm |
| R25 | 24811/149 | RESISTOR-FIXED METAL-FILM 100R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100R-1%50ppm |
| R26 | 24811/171 | RESISTOR-FIXED METAL-FILM 825R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-825R-1%50ppm |
| R27 | 24811/149 | RESISTOR-FIXED METAL-FILM 100R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100R-1%50ppm |
| R30 | 24811/149 | RESISTOR-FIXED METAL-FILM 100R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100R-1%50ppm |
| R31 | 24811/171 | RESISTOR-FIXED METAL-FILM 825R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-825R-1%50ppm |
| R32 | 24811/176 | RESISTOR-FIXED METAL-FILM 1K3 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K3-1%50ppm |
| R33 | 24811/176 | RESISTOR-FIXED METAL-FILM 1K3 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K3-1%50ppm |
| R34 | 24811/185 | RESISTOR-FIXED METAL-FILM 3K32 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-3K32-1%50ppm |
| R35 | 24811/189 | RESISTOR-FIXED METAL-FILM 4K75 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-4K75-1%50ppm |
| R36 | 24811/185 | RESISTOR-FIXED METAL-FILM 3K32 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-3K32-1%50ppm |
| R37 | 24811/101 | RESISTOR-FIXED METAL-FILM 1R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1R-1%-50ppm |

## AF2 RF oscillator (later version) (contd.)

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| R38 | 24811/133 | RESISTOR-FIXED METAL-FILM 22R1 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-22R1-1%50ppm |
| R39 | 24811/143 | RESISTOR-FIXED METAL-FILM 56R2 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-56R2-1%50ppm |
| R40 | 24772/057 | RESISTOR-FIXED METAL-FILM 220R +/- 2% 125mW 150V 100 ppm/DEG.C, AXIAL, (TAPED). | VISHAY COMPONENTS | NK3-220R-2% |
| R41 | 24811/901 | RESISTOR-FIXED METAL-FILM 10R +/- 1% 250mW 200V 50 ppm/DEG.C, LOW-INDUCTANCE, SURFACE MOUNTED, SIZE | VISHAY COMPONENTS | SMM0204-HF-10R-1% |
| R42 | 24811/901 | RESISTOR-FIXED METAL-FILM 10R +/- 1% 250mW 200V 50 ppm/DEG.C, LOW-INDUCTANCE, SURFACE MOUNTED, SIZE | VISHAY COMPONENTS | SMM0204-HF-10R-1% |
| R43 | 24772/067 | RESISTOR-FIXED METAL-FILM 560R +/- 2% 125mW 150V 100 ppm/DEG.C, AXIAL, (TAPED). | VISHAY COMPONENTS | NK3-560R-2% |
| R44 to R46 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R47 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R48 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R49 | 24811/902 | RESISTOR-FIXED METAL-FILM 16R2 +/- 1% 250mW 200V 50 ppm/DEG.C, LOW-INDUCTANCE, SURFACE MOUNTED, | VISHAY COMPONENTS | SMM0204-HF-16R2-1% |
| R50 | 24811/910 | RESISTOR-FIXED METAL-FILM 61R9 +/- 1% 250mW 200V 50 ppm/DEG.C, LOW-INDUCTANCE, SURFACE MOUNTED, | VISHAY COMPONENTS | SMM0204-HF-61R9-1% |
| R51 | 24811/910 | RESISTOR-FIXED METAL-FILM 61R9 +/- 1% 250mW 200V 50 ppm/DEG.C, LOW-INDUCTANCE, SURFACE MOUNTED, | VISHAY COMPONENTS | SMM0204-HF-61R9-1% |
| R52 | 24811/175 | RESISTOR-FIXED METAL-FILM 1K21 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-1K21-1%50ppm |
| R53 | 24811/175 | RESISTOR-FIXED METAL-FILM 1K21 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-1K21-1%50ppm |
| R54 | 24338/004 | RESISTOR-FIXED METAL-GLAZE 150R +/- 5% 1W 100V 350 ppm/DEG.C, SURFACE MOUNTED, SIZE 2512, (12mm | VISHAY COMPONENTS | CR2512-150R-5%-P4 |
| R55 | 24811/134 | RESISTOR-FIXED METAL-FILM 24R3 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-24R3-1%50ppm |
| R56 | 24811/134 | RESISTOR-FIXED METAL-FILM 24R3 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-24R3-1%50ppm |
| R59 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R60 to R63 | 24811/149 | RESISTOR-FIXED METAL-FILM 100R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100R-1%50ppm |
| R64 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R65 | 24811/606 | RESISTOR-FIXED METAL-FILM 1K +/- 0.1% 250mW 200V 15 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-1K0-0.1%-15 |
| R66 | 24811/617 | RESISTOR-FIXED METAL-FILM 110R +/- 0.1% 250mW 200V 15 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-110R-0.1%-15 |
| R67 | 24811/149 | RESISTOR-FIXED METAL-FILM 100R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100R-1%50ppm |
| R68 | 24811/149 | RESISTOR-FIXED METAL-FILM 100R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100R-1%50ppm |
| R69 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| **AF2 RF oscillator (later version) (contd.)** | | | | |
| R70 | 24811/618 | RESISTOR-FIXED METAL-FILM 100R +/- 0.1% 250mW 200V 15 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100R-0.1%-15 |
| R71 | 24811/149 | RESISTOR-FIXED METAL-FILM 100R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100R-1%50ppm |
| R72 | 24811/149 | RESISTOR-FIXED METAL-FILM 100R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100R-1%50ppm |
| R73 | 24811/171 | RESISTOR-FIXED METAL-FILM 825R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-825R-1%50ppm |
| R74 to R76 | 24811/149 | RESISTOR-FIXED METAL-FILM 100R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100R-1%50ppm |
| R77 to R80 | 24811/125 | RESISTOR-FIXED METAL-FILM 10R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10R-1%-50ppm |
| R81 | 24811/919 | RESISTOR-FIXED METAL-FILM 15R +/- 1% 250mW 200V 50 ppm/DEG.C, LOW-INDUCTANCE, SURFACE MOUNTED, SIZE | VISHAY COMPONENTS | SMM0204-HF-15R0-1% |
| R82 | 24811/902 | RESISTOR-FIXED METAL-FILM 16R2 +/- 1% 250mW 200V 50 ppm/DEG.C, LOW-INDUCTANCE, SURFACE MOUNTED, | VISHAY COMPONENTS | SMM0204-HF-16R2-1% |
| R83 | 24811/919 | RESISTOR-FIXED METAL-FILM 15R +/- 1% 250mW 200V 50 ppm/DEG.C, LOW-INDUCTANCE, SURFACE MOUNTED, SIZE | VISHAY COMPONENTS | SMM0204-HF-15R0-1% |
| R84 | 24811/906 | RESISTOR-FIXED METAL-FILM 36R5 +/- 1% 250mW 200V 50 ppm/DEG.C, LOW-INDUCTANCE, SURFACE MOUNTED, | VISHAY COMPONENTS | SMM0204-HF-36R5-1% |
| R85 | 24811/906 | RESISTOR-FIXED METAL-FILM 36R5 +/- 1% 250mW 200V 50 ppm/DEG.C, LOW-INDUCTANCE, SURFACE MOUNTED, | VISHAY COMPONENTS | SMM0204-HF-36R5-1% |
| R90 to R95 | 24811/225 | RESISTOR-FIXED METAL-FILM 150K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-150K-1%50ppm |
| R96 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R97 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R100 | 24811/101 | RESISTOR-FIXED METAL-FILM 1R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1R-1%-50ppm |
| R101 | 24811/149 | RESISTOR-FIXED METAL-FILM 100R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100R-1%50ppm |
| R102 | 24811/181 | RESISTOR-FIXED METAL-FILM 2K21 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-2K21-1%50ppm |
| R103 | 24811/181 | RESISTOR-FIXED METAL-FILM 2K21 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-2K21-1%50ppm |
| R104 | 24811/163 | RESISTOR-FIXED METAL-FILM 392R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-392R-1%50ppm |
| R105 | 24811/163 | RESISTOR-FIXED METAL-FILM 392R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-392R-1%50ppm |
| R106 | 24811/205 | RESISTOR-FIXED METAL-FILM 22K1 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-22K1-1%50ppm |
| SKJ | 23435/990 | CONNECTOR SHORTING, SOCKET, 2 WAY, FOR 0.64mm SQ PINS, 2.54mm PITCH, 9.6mm HIGH, FREE MOUNTING, | BERG ELECTRONICS | 65474-001 |
| TR1 | 28453/829 | TRANSISTOR NPN BIPOLAR BC848B... 30V 200MHz 200mW 100mA 290hFE @ 2mA, NOISE 2dB @ 1KHz, MARKING CODE | PHILIPS | BC848B |

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| **AF2 RF oscillator (later version) (contd.)** | | | | |
| TR2 | 28433/828 | TRANSISTOR PNP BIPOLAR BC858B... 30V 150MHz 200mW 100mA 220hFE MIN @ 2mA, MARKING CODE 3K, SURFACE | PHILIPS | BC858B |
| TR3 | 28457/850 | TRANSISTOR NPN BIPOLAR FMMT2369... 40V 600MHz 300mW 500mA 40hFE MIN @ 10mA, MARKING CODE *1J, | PHILIPS | PMBT2369 |
| TR4 | 28453/829 | TRANSISTOR NPN BIPOLAR BC848B... 30V 200MHz 200mW 100mA 290hFE @ 2mA, NOISE 2dB @ 1KHz, MARKING CODE | PHILIPS | BC848B |
| TR5 | 28433/828 | TRANSISTOR PNP BIPOLAR BC858B... 30V 150MHz 200mW 100mA 220hFE MIN @ 2mA, MARKING CODE 3K, SURFACE | PHILIPS | BC858B |
| TR6 | 28453/829 | TRANSISTOR NPN BIPOLAR BC848B... 30V 200MHz 200mW 100mA 290hFE @ 2mA, NOISE 2dB @ 1KHz, MARKING CODE | PHILIPS | BC848B |
| TR7 | 28433/828 | TRANSISTOR PNP BIPOLAR BC858B... 30V 150MHz 200mW 100mA 220hFE MIN @ 2mA, MARKING CODE 3K, SURFACE | PHILIPS | BC858B |
| TR8 | 28457/850 | TRANSISTOR NPN BIPOLAR FMMT2369... 40V 600MHz 300mW 500mA 40hFE MIN @ 10mA, MARKING CODE *1J, | PHILIPS | PMBT2369 |
| TR9 | 28433/828 | TRANSISTOR PNP BIPOLAR BC858B... 30V 150MHz 200mW 100mA 220hFE MIN @ 2mA, MARKING CODE 3K, SURFACE | PHILIPS | BC858B |
| TR10 | 28453/829 | TRANSISTOR NPN BIPOLAR BC848B... 30V 200MHz 200mW 100mA 290hFE @ 2mA, NOISE 2dB @ 1KHz, MARKING CODE | PHILIPS | BC848B |
| TR11 | 28453/829 | TRANSISTOR NPN BIPOLAR BC848B... 30V 200MHz 200mW 100mA 290hFE @ 2mA, NOISE 2dB @ 1KHz, MARKING CODE | PHILIPS | BC848B |
| TR12 to TR14 | 28487/809 | TRANSISTOR NPN BIPOLAR BFR93A... 12V 5GHz 250mW 35mA 40hFE MIN @ 30mA, MARKING CODE R2, SURFACE | PHILIPS | BFR93A |
| TR15 | 28433/828 | TRANSISTOR PNP BIPOLAR BC858B... 30V 150MHz 200mW 100mA 220hFE MIN @ 2mA, MARKING CODE 3K, SURFACE | PHILIPS | BC858B |
| TR16 | 28453/829 | TRANSISTOR NPN BIPOLAR BC848B... 30V 200MHz 200mW 100mA 290hFE @ 2mA, NOISE 2dB @ 1KHz, MARKING CODE | PHILIPS | BC848B |

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|

**AF3 VCO (contd.)**

## AF3 VCO

When ordering, prefix circuit reference with AF3.

| | | | | |
|---|---|---|---|---|
| | 44829-853 | Complete unit | Issue 06 | |
| C1 | 26386/897 | CAPACITOR-FIXED CERAMIC 4.7pF +/-0.1pF 50V 60 ppm/DEG.C, HIGH-Q, SINGLELAYER, SURFACE-MOUNTED, | AVX LTD | 0805-5K4R7-BAW-TR |
| C2 | 26386/830 | CAPACITOR-FIXED CERAMIC 330pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-331-JP |
| C3 | 26386/830 | CAPACITOR-FIXED CERAMIC 330pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-331-JP |
| C4 | 26386/975 | CAPACITOR-FIXED CERAMIC 6.8pF +/-0.1pF 50V 60 ppm/DEG.C, HIGH-Q, SINGLELAYER, SURFACE-MOUNTED, | AVX LTD | 0805-5K-6R8-BAW-TR |
| C5 | 26386/830 | CAPACITOR-FIXED CERAMIC 330pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-331-JP |
| C6 | 26386/830 | CAPACITOR-FIXED CERAMIC 330pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-331-JP |
| C7 | 26386/808 | CAPACITOR-FIXED CERAMIC 4.7pF +/-0.5pF 50V NPO MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-4R7-DP |
| C8 | 26343/753 | CAPACITOR-FIXED CERAMIC 6.8pF +/-0.5pF 50V NPO MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-6R8-DP |
| C9 | 26386/803 | CAPACITOR-FIXED CERAMIC 1.8pF +/-0.5pF 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-1R8-DP |
| C10 | 26386/898 | CAPACITOR-FIXED CERAMIC 5.6pF +/-0.1pF 50V 60 ppm/DEG.C, HIGH-Q, SINGLELAYER, SURFACE-MOUNTED, | AVX LTD | 0805-5K5R6-BAW-TR |
| D1 | 28381/133 | DIODE VARIABLE CAPACITNCE, BB515... 30V 20mA 2.1pF @ 28V, CAPAC RATIO 8.0 MIN, SURFACE MOUNTED, | SIEMENS LTD | BB515 |
| D2 | 28381/133 | DIODE VARIABLE CAPACITNCE, BB515... 30V 20mA 2.1pF @ 28V, CAPAC RATIO 8.0 MIN, SURFACE MOUNTED, | SIEMENS LTD | BB515 |
| D3 | 28383/961 | DIODE PIN, BAR16-1... DUAL, 140mW 100V 100mA 0.5pF 1.25Vf @ 100mA, COMMON ANODE, MARKING CODE L9, | SIEMENS LTD | BAR16-1 |
| L1 | 23642/703 | INDUCTOR-FIXED 0.47uH +/- 10% EPOXY-MOULD, 450mA 0R5 MAX, 30 Q @ 25.2 MHz, 220 MHz SRF, SURFACE | MEGGITT ELECTRONICS | 3612-T-R47-K |
| L2 | 23642/703 | INDUCTOR-FIXED 0.47uH +/- 10% EPOXY-MOULD, 450mA 0R5 MAX, 30 Q @ 25.2 MHz, 220 MHz SRF, SURFACE | MEGGITT ELECTRONICS | 3612-T-R47-K |
| R1 | 24772/057 | RESISTOR-FIXED METAL-FILM 220R +/- 2% 125mW 150V 100 ppm/DEG.C, AXIAL, (TAPED). | VISHAY COMPONENTS | NK3-220R-2% |
| R2 | 24772/057 | RESISTOR-FIXED METAL-FILM 220R +/- 2% 125mW 150V 100 ppm/DEG.C, AXIAL, (TAPED). | VISHAY COMPONENTS | NK3-220R-2% |
| R3 to R6 | 24811/901 | RESISTOR-FIXED METAL-FILM 10R +/- 1% 250mW 200V 50 ppm/DEG.C, LOW-INDUCTANCE, SURFACE MOUNTED, SIZE | VISHAY COMPONENTS | SMM0204-HF-10R-1% |
| R7 | 24772/067 | RESISTOR-FIXED METAL-FILM 560R +/- 2% 125mW 150V 100 ppm/DEG.C, AXIAL, (TAPED). | VISHAY COMPONENTS | NK3-560R-2% |

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| R8 | 24772/060 | RESISTOR-FIXED METAL-FILM 300R +/- 2% 125mW 150V 100 ppm/DEG.C, AXIAL, (LOOSE OR TAPED). | VISHAY COMPONENTS | NK3-270R-2% |
| R9 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R10 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R11 | 24811/159 | RESISTOR-FIXED METAL-FILM 274R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-274R-1%50ppm |
| SKA | 23436/740 | CONNECTOR MULTIWAY, SOCKET, 5 WAY, STRAIGHT, 2.54mm PITCH, PCB MOUNTING, CONTACTS GOLD PLATED | BERG ELECTRONICS | 76308-105 |
| SKB | 23436/740 | CONNECTOR MULTIWAY, SOCKET, 5 WAY, STRAIGHT, 2.54mm PITCH, PCB MOUNTING, CONTACTS GOLD PLATED | BERG ELECTRONICS | 76308-105 |
| TR1 | 28487/809 | TRANSISTOR NPN BIPOLAR BFR93A... 12V 5GHz 250mW 35mA 40hFE MIN @ 30mA, MARKING CODE R2, SURFACE | PHILIPS | BFR93A |
| TR2 | 28487/809 | TRANSISTOR NPN BIPOLAR BFR93A... 12V 5GHz 250mW 35mA 40hFE MIN @ 30mA, MARKING CODE R2, SURFACE | PHILIPS | BFR93A |

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|

## AF4 RF divider

When ordering, prefix circuit reference with AF4.

| | | | | |
|---|---|---|---|---|
| | 44829-854 | Complete unit | Issue 08 | |
| C1 to C11 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C12 | 26343/753 | CAPACITOR-FIXED CERAMIC 6.8pF +/-0.5pF 50V NPO MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-6R8-DP |
| C13 to C16 | 26386/863 | CAPACITOR-FIXED CERAMIC 1nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-102-KP |
| C17 to C24 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C25 | 26386/973 | CAPACITOR-FIXED CERAMIC 3.3pF +/-0.1pF 50V 60 ppm/DEG.C, HIGH-Q, SINGLELAYER, SURFACE-MOUNTED, | AVX LTD | 0805-5K-3R3-BAW-TR |
| C26 | 26386/986 | CAPACITOR-FIXED CERAMIC 1.8pF +/-0.1pF 50V 60 ppm/DEG.C, HIGH-Q, SINGLELAYER, SURFACE-MOUNTED, | AVX LTD | 0805-5K-1R8-BAW-TR |
| C27 | 26343/767 | CAPACITOR-FIXED CERAMIC 10pF +/-5% 50V NPO MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-100-DP |
| C28 | 26386/975 | CAPACITOR-FIXED CERAMIC 6.8pF +/-0.1pF 50V 60 ppm/DEG.C, HIGH Q, SINGLELAYER, SURFACE-MOUNTED, | AVX LTD | 0805-5K-6R8-BAW-TR |
| C29 | 26386/970 | CAPACITOR-FIXED CERAMIC 1.5pF +/-0.1pF 50V 60 ppm/DEG.C, HIGH-Q, SINGLELAYER, SURFACE-MOUNTED, | AVX LTD | 0805-5K-1R5-BAW-TR |
| C30 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C31 | 26386/897 | CAPACITOR-FIXED CERAMIC 4.7pF +/-0.1pF 50V 60 ppm/DEG.C, HIGH-Q, SINGLELAYER, SURFACE-MOUNTED, | AVX LTD | 0805-5K4R7-BAW-TR |
| C32 | 26386/985 | CAPACITOR-FIXED CERAMIC 1.2pF +/-0.1pF 50V 60 ppm/DEG.C, HIGH-Q, SINGLELAYER, SURFACE-MOUNTED, | AVX LTD | 0805-5K-1R2-BAW-TR |
| C33 | 26343/753 | CAPACITOR-FIXED CERAMIC 6.8pF +/-0.5pF 50V NPO MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-6R8-DP |
| C34 | 26386/973 | CAPACITOR-FIXED CERAMIC 3.3pF +/-0.1pF 50V 60 ppm/DEG.C, HIGH-Q, SINGLELAYER, SURFACE-MOUNTED, | AVX LTD | 0805-5K-3R3-BAW-TR |
| C35 | 26386/972 | CAPACITOR-FIXED CERAMIC 2.7pF +/-0.1pF 50V 60 ppm/DEG.C, HIGH-Q, SINGLELAYER, SURFACE-MOUNTED, | AVX LTD | 0805-5K-2R7-BAW-TR |
| C36 to C38 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C39 | 26343/753 | CAPACITOR-FIXED CERAMIC 6.8pF +/-0.5pF 50V NPO MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-6R8-DP |
| C40 to C43 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C44 | 26343/767 | CAPACITOR-FIXED CERAMIC 10pF +/-5% 50V NPO MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-100-DP |
| C45 | 26386/971 | CAPACITOR-FIXED CERAMIC 2.2pF +/-0.1pF 50V 60 ppm/DEG.C, HIGH-Q, SINGLELAYER, SURFACE-MOUNTED, | AVX LTD | 0805-5K-2R2-BAW-TR |
| C46 | 26386/815 | CAPACITOR-FIXED CERAMIC 18pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-180-JP |
| C47 | 26343/753 | CAPACITOR-FIXED CERAMIC 6.8pF +/-0.5pF 50V NPO MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-6R8-DP |

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| **AF4 RF divider (contd.)** | | | | |
| C48 | 26343/753 | CAPACITOR-FIXED CERAMIC 6.8pF +/-0.5pF 50V NPO MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-6R8-DP |
| C49 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C50 | 26386/813 | CAPACITOR-FIXED CERAMIC 12pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-120-JP |
| C51 | 26386/971 | CAPACITOR-FIXED CERAMIC 2.2pF +/-0.1pF 50V 60 ppm/DEG.C, HIGH-Q, SINGLELAYER, SURFACE-MOUNTED, | AVX LTD | 0805-5K-2R2-BAW-TR |
| C52 | 26386/815 | CAPACITOR-FIXED CERAMIC 18pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-180-JP |
| C53 | 26386/898 | CAPACITOR-FIXED CERAMIC 5.6pF +/-0.1pF 50V 60 ppm/DEG.C, HIGH-Q, SINGLELAYER, SURFACE-MOUNTED, | AVX LTD | 0805-5K5R6-BAW-TR |
| C54 | 26343/767 | CAPACITOR-FIXED CERAMIC 10pF +/-5% 50V NPO MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-100-DP |
| C55 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C56 | 26386/814 | CAPACITOR-FIXED CERAMIC 15pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-150-JP |
| C57 | 26386/973 | CAPACITOR-FIXED CERAMIC 3.3pF +/-0.1pF 50V 60 ppm/DEG.C, HIGH-Q, SINGLELAYER, SURFACE-MOUNTED, | AVX LTD | 0805-5K-3R3-BAW-TR |
| C58 | 26386/818 | CAPACITOR-FIXED CERAMIC 33pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-330-JP |
| C59 | 26343/767 | CAPACITOR-FIXED CERAMIC 10pF +/-5% 50V NPO MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-100-DP |
| C60 | 26386/814 | CAPACITOR-FIXED CERAMIC 15pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-150-JP |
| C61 to C64 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C65 | 26386/818 | CAPACITOR-FIXED CERAMIC 33pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-330-JP |
| C66 | 26343/753 | CAPACITOR-FIXED CERAMIC 6.8pF +/-0.5pF 50V NPO MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-6R8-DP |
| C67 | 26343/784 | CAPACITOR-FIXED CERAMIC 68pF +/-5% 50V NPO MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-680-JP |
| C68 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C69 | 26386/816 | CAPACITOR-FIXED CERAMIC 22pF +/-5% 50V NPO MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-220-JP |
| C70 | 26386/816 | CAPACITOR-FIXED CERAMIC 22pF +/-5% 50V NPO MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-220-JP |
| C71 to C75 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C76 | 26386/819 | CAPACITOR-FIXED CERAMIC 39pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-390-JP |
| C77 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C78 to C85 | 26386/881 | CAPACITOR-FIXED CERAMIC 33nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-333-KP |
| C86 to C89 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |

## AF4 RF divider (contd.)

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| C90 | 26386/863 | CAPACITOR-FIXED CERAMIC 1nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-102-KP |
| C91 to C95 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C96 | 26386/887 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-104-KP |
| C99 to C105 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C111 | 26386/813 | CAPACITOR-FIXED CERAMIC 12pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-120-JP |
| C112 | 26386/823 | CAPACITOR-FIXED CERAMIC 82pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-820-JP |
| C113 | 26386/764 | CAPACITOR-FIXED CERAMIC 47pF +/-5% 50V 60 ppm/DEG.C, HIGH-Q, SINGLELAYER, SURFACE-MOUNTED, | AVX LTD | 0805-5K-470-JAW |
| C114 | 26386/816 | CAPACITOR-FIXED CERAMIC 22pF +/-5% 50V NPO MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-220-JP |
| C115 | 26386/815 | CAPACITOR-FIXED CERAMIC 18pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-180-JP |
| C116 | 26343/753 | CAPACITOR-FIXED CERAMIC 6.8pF +/-0.5pF 50V NPO MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-6R8-DP |
| C117 | 26386/819 | CAPACITOR-FIXED CERAMIC 39pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-390-JP |
| C118 | 26386/762 | CAPACITOR-FIXED CERAMIC 22pF +/-5% 50V 60 ppm/DEG.C, HIGH-Q, SINGLELAYER, SURFACE-MOUNTED, | AVX LTD | 0805-5K-220-JAW |
| C119 | 26343/767 | CAPACITOR-FIXED CERAMIC 10pF +/-5% 50V NPO MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-100-DP |
| C120 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C121 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| D1 to D53 | 28335/670 | DIODE BAND SWITCHING, BAT18... 35V 100mA 1pF MAX @ 20V, 1.2Vf @ 100mA, MARKING CODE A2, SURFACE | PHILIPS | BAT18/T1 |
| IC1 | 28467/111 | IC-MICRO PERIPHERAL, PCF8574... REMOTE 8-BIT I/O EXPANDER, I.IC BUS, UP TO 8 DEVICE ADDRESS | PHILIPS | PCF8574T |
| IC2 | 28466/390 | IC-DIGITAL NAND-GATE 74HC00... 2 INPUT, QUAD, CMOS-H/SPEED, 14 PIN, SMALL-OUTLINE. | PHILIPS | 74HC00D |
| IC3 | 28465/065 | IC-DIGITAL DECODER/DEMULTIPLEX 74HC154... 4-TO-16 LINE, CMOS-H/SPEED, 24 PIN, SMALL-OUTLINE. | PHILIPS | 74HC154D |
| IC4 to IC6 | 28461/388 | IC-ANALOGUE OPERATIONAL AMP LM324D... QUAD, GEN-PURPOSE, SLEW RATE 0.2V/uS MIN, GAIN BANDWIDTH | PHILIPS | LM324D |
| IC7 | 28469/566 | IC-DIGITAL DIVIDER SP8402... DIVIDE BY 2 TO 256 SELECTABLE BY 2n, 1.5GHz, PHASE NOISE <160 dBc/Hz, | GEC PLESSEY SEMICOND | SP8402 |
| IC8 | 28461/388 | IC-ANALOGUE OPERATIONAL AMP LM324D... QUAD, GEN-PURPOSE, SLEW RATE 0.2V/uS MIN, GAIN BANDWIDTH | PHILIPS | LM324D |
| IC9 | 28461/454 | IC-ANALOGUE MICROWAVE-AMPLIFIER MSA-0786... 4V 22mA GAIN 12.5dB @ 1GHz, 3dB BANDWIDTH DC-2GHz, | HEWLETT-PACKARD | MSA-0786-TRI |

## AF4 RF divider (contd.)

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| L1 | 23642/518 | INDUCTOR-FIXED 0.56uH +/- 20% MOULDED-EPOXY, 450mA 0R55 MAX, 30 Q @ 25.2 MHz, 180 MHz SRF, SURFACE | MEGGITT ELECTRONICS | 3612-T-R56-M |
| L2 | 23642/518 | INDUCTOR-FIXED 0.56uH +/- 20% MOULDED-EPOXY, 450mA 0R55 MAX, 30 Q @ 25.2 MHz, 180 MHz SRF, SURFACE | MEGGITT ELECTRONICS | 3612-T-R56-M |
| L8 | 23642/714 | INDUCTOR-FIXED 1.5uH +/- 5% MOULDED-EPOXY, 370mA 0R85 MAX, 30 Q @ 7.96 MHz, 85 MHz SRF, SURFACE | MEGGITT ELECTRONICS | 3612-T-1R5-J |
| L9 to L19 | 23642/518 | INDUCTOR-FIXED 0.56uH +/- 20% MOULDED-EPOXY, 450mA 0R55 MAX, 30 Q @ 25.2 MHz, 180 MHz SRF, SURFACE | MEGGITT ELECTRONICS | 3612-T-R56-M |
| L22 | 23642/714 | INDUCTOR-FIXED 1.5uH +/- 5% MOULDED-EPOXY, 370mA 0R85 MAX, 30 Q @ 7.96 MHz, 85 MHz SRF, SURFACE | MEGGITT ELECTRONICS | 3612-T-1R5-J |
| L25 | 23642/714 | INDUCTOR-FIXED 1.5uH +/- 5% MOULDED-EPOXY, 370mA 0R85 MAX, 30 Q @ 7.96 MHz, 85 MHz SRF, SURFACE | MEGGITT ELECTRONICS | 3612-T-1R5-J |
| L26 | 23642/519 | INDUCTOR-FIXED 0.068uH +/- 5% MOULDED-EPOXY, 450mA 0R36 MAX, 27 Q @ 100 MHz, 1K MHz SRF, SURFACE | MEGGITT ELECTRONICS | 3612-T-068-J |
| L27 to L31 | 23642/714 | INDUCTOR-FIXED 1.5uH +/- 5% MOULDED-EPOXY, 370mA 0R85 MAX, 30 Q @ 7.96 MHz, 85 MHz SRF, SURFACE | MEGGITT ELECTRONICS | 3612-T-1R5-J |
| L32 | 23642/517 | INDUCTOR-FIXED 0.047uH +/- 5% MOULDED-EPOXY, 450mA 0R3 MAX, 26 Q @ 100 MHz, 1.2K MHz SRF, SURFACE | MEGGITT ELECTRONICS | 3612-T-047-J |
| L33 | 23642/515 | INDUCTOR-FIXED 0.033uH +/- 5% MOULDED-EPOXY, 450mA 0R24 MAX, 25 Q @ 100 MHz, 1.4K MHz SRF, SURFACE | MEGGITT ELECTRONICS | 3612-T-033-J |
| L34 | 23642/714 | INDUCTOR-FIXED 1.5uH +/- 5% MOULDED-EPOXY, 370mA 0R85 MAX, 30 Q @ 7.96 MHz, 85 MHz SRF, SURFACE | MEGGITT ELECTRONICS | 3612-T-1R5-J |
| L37 | 23642/519 | INDUCTOR-FIXED 0.068uH +/- 5% MOULDED-EPOXY, 450mA 0R36 MAX, 27 Q @ 100 MHz, 1K MHz SRF, SURFACE | MEGGITT ELECTRONICS | 3612-T-068-J |
| L38 | 23642/517 | INDUCTOR-FIXED 0.047uH +/- 5% MOULDED-EPOXY, 450mA 0R3 MAX, 26 Q @ 100 MHz, 1.2K MHz SRF, SURFACE | MEGGITT ELECTRONICS | 3612-T-047-J |
| L39 | 23642/714 | INDUCTOR-FIXED 1.5uH +/- 5% MOULDED-EPOXY, 370mA 0R85 MAX, 30 Q @ 7.96 MHz, 85 MHz SRF, SURFACE | MEGGITT ELECTRONICS | 3612-T-1R5-J |
| L40 | 23642/714 | INDUCTOR-FIXED 1.5uH +/- 5% MOULDED-EPOXY, 370mA 0R85 MAX, 30 Q @ 7.96 MHz, 85 MHz SRF, SURFACE | MEGGITT ELECTRONICS | 3612-T-1R5-J |
| L41 | 23642/511 | INDUCTOR-FIXED 0.12uH +/- 20% MOULDED-EPOXY, 450mA 0R22 MAX, 30 Q @ 25.2 MHz, 500 MHz SRF, SURFACE | MEGGITT ELECTRONICS | 3612-T-R12-M |
| L42 | 23642/510 | INDUCTOR-FIXED 0.1uH +/- 5% MOULDED-EPOXY, 450mA 0R44 MAX, 28 Q @ 100 MHz, 700 MHz SRF, SURFACE | MEGGITT ELECTRONICS | 3612-T-R10-J |
| L43 to L45 | 23642/714 | INDUCTOR-FIXED 1.5uH +/- 5% MOULDED-EPOXY, 370mA 0R85 MAX, 30 Q @ 7.96 MHz, 85 MHz SRF, SURFACE | MEGGITT ELECTRONICS | 3612-T-1R5-J |
| L46 to L49 | 23642/701 | INDUCTOR-FIXED 2.2uH +/- 5% MOULDED-EPOXY, 320mA 1R MAX, 30 Q @ 7.96 MHz, 75 MHz SRF, SURFACE | MEGGITT ELECTRONICS | 3612-T-2R2-J |
| L50 | 23642/712 | INDUCTOR-FIXED 0.082uH +/- 5% MOULDED-EPOXY, 450mA 0R4 MAX, 27 Q @ 100 MHz, 900 MHz SRF, SURFACE | MEGGITT ELECTRONICS | 3612-T-082-J |
| L51 | 23642/713 | INDUCTOR-FIXED 0.056uH +/- 5% MOULDED-EPOXY, 450mA 0R33 MAX, 26 Q @ 100 MHz, 1.1K MHz SRF, SURFACE | MEGGITT ELECTRONICS | 3612-T-056-J |
| L52 | 23642/715 | INDUCTOR-FIXED 0.18uH +/- 20% MOULDED-EPOXY, 450mA 0R28 MAX, 30 Q @ 25.2 MHz, 400 MHz SRF, SURFACE | MEGGITT ELECTRONICS | 3612-T-R18-M |
| L53 | 23642/510 | INDUCTOR-FIXED 0.1uH +/- 5% MOULDED-EPOXY, 450mA 0R44 MAX, 28 Q @ 100 MHz, 700 MHz SRF, SURFACE | MEGGITT ELECTRONICS | 3612-T-R10-J |
| L54 | 23642/518 | INDUCTOR-FIXED 0.56uH +/- 20% MOULDED-EPOXY, 450mA 0R55 MAX, 30 Q @ 25.2 MHz, 180 MHz SRF, SURFACE | MEGGITT ELECTRONICS | 3612-T-R56-M |
| L55 | 23642/518 | INDUCTOR-FIXED 0.56uH +/- 20% MOULDED-EPOXY, 450mA 0R55 MAX, 30 Q @ 25.2 MHz, 180 MHz SRF, SURFACE | MEGGITT ELECTRONICS | 3612-T-R56-M |

## AF4 RF divider (contd.)

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| R1 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R2 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R3 | 24811/205 | RESISTOR-FIXED METAL-FILM 22K1 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-22K1-1%50ppm |
| R4 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R5 | 24811/165 | RESISTOR-FIXED METAL-FILM 475R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-475R-1%50ppm |
| R6 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R7 | 24811/165 | RESISTOR-FIXED METAL-FILM 475R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-475R-1%50ppm |
| R8 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R9 | 24811/148 | RESISTOR-FIXED METAL-FILM 90R9 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-90R9-1%50ppm |
| R10 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R11 | 24811/165 | RESISTOR-FIXED METAL-FILM 475R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-475R-1%50ppm |
| R12 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R13 | 24811/142 | RESISTOR-FIXED METAL-FILM 51R1 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-51R1-1%50ppm |
| R14 | 24811/161 | RESISTOR-FIXED METAL-FILM 332R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-332R-1%50ppm |
| R15 | 24811/161 | RESISTOR-FIXED METAL-FILM 332R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-332R-1%50ppm |
| R16 | 24811/160 | RESISTOR-FIXED METAL-FILM 301R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-301R-1%50ppm |
| R17 | 24811/903 | RESISTOR-FIXED METAL-FILM 18R2 +/- 1% 250mW 200V 50 ppm/DEG.C, LOW-INDUCTANCE, SURFACE MOUNTED, | VISHAY COMPONENTS | SMM0204-HF-18R2-1% |
| R18 | 24811/147 | RESISTOR-FIXED METAL-FILM 82R5 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-82R5-1%50ppm |
| R19 | 24811/165 | RESISTOR-FIXED METAL-FILM 475R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-475R-1%50ppm |
| R20 | 24811/184 | RESISTOR-FIXED METAL-FILM 3K01 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-3K01-1%50ppm |
| R21 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R22 | 24811/165 | RESISTOR-FIXED METAL-FILM 475R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-475R-1%50ppm |
| R23 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R24 | 24811/165 | RESISTOR-FIXED METAL-FILM 475R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-475R-1%50ppm |
| R25 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |

## AF4 RF divider (contd.)

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| R26 | 24811/165 | RESISTOR-FIXED METAL-FILM 475R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-475R-1%50ppm |
| R27 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R28 | 24811/165 | RESISTOR-FIXED METAL-FILM 475R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-475R-1%50ppm |
| R29 | 24811/165 | RESISTOR-FIXED METAL-FILM 475R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-475R-1%50ppm |
| R30 | 24811/153 | RESISTOR-FIXED METAL-FILM 150R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-150R-1%50ppm |
| R31 | 24811/149 | RESISTOR-FIXED METAL-FILM 100R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100R-1%50ppm |
| R32 | 24811/165 | RESISTOR-FIXED METAL-FILM 475R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-475R-1%50ppm |
| R33 | 24811/132 | RESISTOR-FIXED METAL-FILM 20R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-20R-1%-50ppm |
| R34 | 24811/130 | RESISTOR-FIXED METAL-FILM 16R2 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-16R2-1%50ppm |
| R35 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R36 | 24811/149 | RESISTOR-FIXED METAL-FILM 100R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100R-1%50ppm |
| R37 | 24811/165 | RESISTOR-FIXED METAL-FILM 475R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-475R-1%50ppm |
| R38 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R39 | 24811/165 | RESISTOR-FIXED METAL-FILM 475R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-475R-1%50ppm |
| R40 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R41 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R42 | 24811/165 | RESISTOR-FIXED METAL-FILM 475R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-475R-1%50ppm |
| R43 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R44 | 24811/165 | RESISTOR-FIXED METAL-FILM 475R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-475R-1%50ppm |
| R45 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R46 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R47 | 24811/165 | RESISTOR-FIXED METAL-FILM 475R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-475R-1%50ppm |
| R48 | 24811/165 | RESISTOR-FIXED METAL-FILM 475R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-475R-1%50ppm |
| R49 | 24811/147 | RESISTOR-FIXED METAL-FILM 82R5 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-82R5-1%50ppm |
| R50 | 24811/160 | RESISTOR-FIXED METAL-FILM 301R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-301R-1%50ppm |

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| **AF4 RF divider (contd.)** | | | | |
| R51 | 24811/165 | RESISTOR-FIXED METAL-FILM 475R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-475R-1%50ppm |
| R52 | 24811/161 | RESISTOR-FIXED METAL-FILM 332R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-332R-1%50ppm |
| T1 | 43590/232 | WOUND-PART TRANSFORMER, RING-CORE, 6:6 TURNS, TWISTED BIFILAR WOUND, MOUNTED ON 6-PIN TOROID | AMETHYST DESIGNS LTD | AD5313 |
| TR1 | 28453/829 | TRANSISTOR NPN BIPOLAR BC848B... 30V 200MHz 200mW 100mA 290hFE TYP @ 2mA, NOISE 2dB @ 1KHz, MARKING | PHILIPS | BC848B |
| TR2 | 28487/809 | TRANSISTOR NPN BIPOLAR BFR93A... 12V 5GHz 250mW 35mA 40hFE MIN @ 30mA, MARKING CODE R2, SURFACE | PHILIPS | BFR93A |
| TR3 | 28453/829 | TRANSISTOR NPN BIPOLAR BC848B... 30V 200MHz 200mW 100mA 290hFE TYP @ 2mA, NOISE 2dB @ 1KHz, MARKING | PHILIPS | BC848B |

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|

## AF5 RF output

When ordering, prefix circuit reference with AF5.

| | | | | |
|---|---|---|---|---|
| | 44829-855 | Complete unit | Issue 15 | |
| C1 to C4 | 26386/863 | CAPACITOR-FIXED CERAMIC 1nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-102-KP |
| C5 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C6 | 26386/863 | CAPACITOR-FIXED CERAMIC 1nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-102-KP |
| C7 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C8 | 26386/863 | CAPACITOR-FIXED CERAMIC 1nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-102-KP |
| C9 | 26386/824 | CAPACITOR-FIXED CERAMIC 100pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-101-JP |
| C10 | 26386/824 | CAPACITOR-FIXED CERAMIC 100pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-101-JP |
| C11 | 26386/887 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-104-KP |
| C12 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C13 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C14 | 26386/829 | CAPACITOR-FIXED CERAMIC 270pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-271-JP |
| C17 | 26386/863 | CAPACITOR-FIXED CERAMIC 1nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-102-KP |
| C18 | 26386/863 | CAPACITOR-FIXED CERAMIC 1nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-102-KP |
| C19 | 26386/971 | CAPACITOR-FIXED CERAMIC 2.2pF +/-0.1pF 50V 60 ppm/DEG.C, HIGH-Q, SINGLELAYER, SURFACE-MOUNTED, | AVX LTD | 0805-5K-2R2-BAW-TR |
| C21 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C22 | 26386/831 | CAPACITOR-FIXED CERAMIC 390pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-391-JP |
| C23 | 26386/831 | CAPACITOR-FIXED CERAMIC 390pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-391-JP |
| C24 | 26386/867 | CAPACITOR-FIXED CERAMIC 2.2nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-222-KP |
| C26 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C27 | 26386/863 | CAPACITOR-FIXED CERAMIC 1nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-102-KP |
| C28 | 26386/867 | CAPACITOR-FIXED CERAMIC 2.2nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-222-KP |
| C30 | 26386/760 | CAPACITOR-FIXED CERAMIC 220nF +/-10% 50V X7R MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | PHILIPS | 1210-2R-224-K9-BBC |
| C31 | 26386/820 | CAPACITOR-FIXED CERAMIC 47pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-470-JP |
| C32 | 26386/826 | CAPACITOR-FIXED CERAMIC 150pF +/-5% 50V NPO MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-151-JP |

## AF5 RF output (contd.)

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| C33 | 26386/821 | CAPACITOR-FIXED CERAMIC 56pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-560-JP |
| C34 | 26386/818 | CAPACITOR-FIXED CERAMIC 33pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-330-JP |
| C35 | 26386/813 | CAPACITOR-FIXED CERAMIC 12pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-120-JP |
| C36 | 26386/760 | CAPACITOR-FIXED CERAMIC 220nF +/-10% 50V X7R MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | PHILIPS | 1210-2R-224-K9-BBC |
| C37 | 26386/760 | CAPACITOR-FIXED CERAMIC 220nF +/-10% 50V X7R MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | PHILIPS | 1210-2R-224-K9-BBC |
| C38 | 26386/883 | CAPACITOR-FIXED CERAMIC 47nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-473-KP |
| C39 to C41 | 26386/760 | CAPACITOR-FIXED CERAMIC 220nF +/-10% 50V X7R MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | PHILIPS | 1210-2R-224-K9-BBC |
| C42 to C46 | 26386/883 | CAPACITOR-FIXED CERAMIC 47nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-473-KP |
| C47 | 26386/760 | CAPACITOR-FIXED CERAMIC 220nF +/-10% 50V X7R MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | PHILIPS | 1210-2R-224-K9-BBC |
| C48 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C49 | 26386/887 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-104-KP |
| C52 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C53 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C54 | 26386/887 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-104-KP |
| C55 | 26386/887 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-104-KP |
| C56 | 26386/760 | CAPACITOR-FIXED CERAMIC 220nF +/-10% 50V X7R MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | PHILIPS | 1210-2R-224-K9-BBC |
| C57 | 26386/883 | CAPACITOR-FIXED CERAMIC 47nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-473-KP |
| C58 | 26386/883 | CAPACITOR-FIXED CERAMIC 47nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-473-KP |
| C59 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C60 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C61 | 26421/112 | CAPACITOR-FIXED ALUMINIUM 10uF +/-20% 35V ELECTROLYTIC, RADIAL, 5mm PWP, (TAPED). | PANASONIC INDUSTRIAL | ECE-A-1V-KA-100-B |
| C62 | 26421/141 | CAPACITOR-FIXED ALUMINIUM 100uF +/-20% 35V ELECTROLYTIC, RADIAL, 5mm PWP, (TAPED). | PANASONIC INDUSTRIAL | ECE-A-1VU-101B |
| C63 | 26386/829 | CAPACITOR-FIXED CERAMIC 270pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-271-JP |
| C64 | 26386/887 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | ROHM ELECTRONICS LTD | MCH32-5C-104-KP |
| C65 | 26386/816 | CAPACITOR-FIXED CERAMIC 22pF +/-5% 50V NPO MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-220-JP |

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| **AF5 RF output (contd.)** | | | | |
| C66 to C68 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C69 | 26386/816 | CAPACITOR-FIXED CERAMIC 22pF +/-5% 50V NPO MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-220-JP |
| C70 | 26343/767 | CAPACITOR-FIXED CERAMIC 10pF +/-5% 50V NPO MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-100-DP |
| C71 | 26343/767 | CAPACITOR-FIXED CERAMIC 10pF +/-5% 50V NPO MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-100-DP |
| C73 | 26386/824 | CAPACITOR-FIXED CERAMIC 100pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-101-JP |
| D1 to D4 | 28383/963 | DIODE PIN, 1N5719... 250mW 150V 0.3pF AXIAL, HP-OUTLINE-15, (LOOSE). | HEWLETT-PACKARD | 1N5719 |
| D5 | 44529/057 | DIODE SMALL-SIGNAL, SCHOTTKY, 5082-2826... SET OF 2, 250mW 15V 1.2pF 1Vf @ 20mA, SPECIAL MATCHED | | |
| D7 | 28383/930 | DIODE SMALL-SIGNAL, BAS16... 330mW 75V 250mA 2pF 1Vf @ 50mA, MARKING CODE A6, SURFACE MOUNTED, | PHILIPS | BAS16 |
| D8 | 28383/931 | DIODE PIN, BAR14-1... DUAL, 140mW 100V 100mA 0.5pF 1.25Vf @ 100mA, IN SERIES, MARKING CODE L7, | SIEMENS LTD | BAR14-1-E6327 |
| D9 | 28383/931 | DIODE PIN, BAR14-1... DUAL, 140mW 100V 100mA 0.5pF 1.25Vf @ 100mA, IN SERIES, MARKING CODE L7, | SIEMENS LTD | BAR14-1-E6327 |
| D10 to D12 | 28383/962 | DIODE PIN, BAR60... TRIPLE, 100V 0.25pF 1.05Vf @ 100mA, T-CIRCUIT, MARKING CODE 60, SURFACE | SIEMENS LTD | BAR60 |
| D13 | 28335/670 | DIODE BAND SWITCHING, BAT18... 35V 100mA 1pF MAX @ 20V, 1.2Vf @ 100mA, MARKING CODE A2, SURFACE | PHILIPS | BAT18/T1 |
| D14 | 44529/057 | DIODE SMALL-SIGNAL, SCHOTTKY, 5082-2826... SET OF 2, 250mW 15V 1.2pF 1Vf @ 20mA, SPECIAL MATCHED | | |
| D16 | 28383/930 | DIODE SMALL-SIGNAL, BAS16... 330mW 75V 250mA 2pF 1Vf @ 50mA, MARKING CODE A6, SURFACE MOUNTED, | PHILIPS | BAS16 |
| D17 | 28383/903 | DIODE SMALL-SIGNAL, BAV99... DUAL, 70V 100mA 1.1Vf @ 50mA, IN SERIES, MARKING CODE A7, SURFACE | PHILIPS | BAV99 (A7) |
| D18 | 28371/443 | DIODE ZENER, BZX84-C5V6... 350mW 5.6V 5% 250mA MARKING CODE Z3, SURFACE MOUNTED, SOT-23, (8mm | PHILIPS | BZX84-C5V6 |
| D19 | 28371/443 | DIODE ZENER, BZX84-C5V6... 350mW 5.6V 5% 250mA MARKING CODE Z3, SURFACE MOUNTED, SOT-23, (8mm | PHILIPS | BZX84-C5V6 |
| D20 | 28383/930 | DIODE SMALL-SIGNAL, BAS16... 330mW 75V 250mA 2pF 1Vf @ 50mA, MARKING CODE A6, SURFACE MOUNTED, | PHILIPS | BAS16 |
| D21 | 28371/555 | DIODE ZENER, BZX84-C6V8... 350mW 6.8V 5% 250mA MARKING CODE Z5, SURFACE MOUNTED, SOT-23, (8mm | PHILIPS | BZX84-C6V8 |
| D22 | 28371/555 | DIODE ZENER, BZX84-C6V8... 350mW 6.8V 5% 250mA MARKING CODE Z5, SURFACE MOUNTED, SOT-23, (8mm | PHILIPS | BZX84-C6V8 |
| IC1 | 28461/461 | IC-ANALOGUE MICROWAVE-AMP MSA-0286... 5V 25mA GAIN 12dB @ 1GHz, 3dB BANDWIDTH DC-2.5GHz, BIPOLAR, 4 | HEWLETT-PACKARD | MSA-0286-TR1 |
| IC2 | 28461/801 | IC-ANALOGUE MICROWAVE-AMP MSA-1105... 5.5V 60mA GAIN 10.5dB @1GHz, 3dB B/WTH 0.05-1.3GHz, BIPOLAR, | HEWLETT-PACKARD | MSA-1105 |
| IC3 | 28461/413 | IC-ANALOGUE OPERATIONAL AMP TL074... QUAD, JFET INPUT, LOW NOISE, SLEW RATE 8V/uS MIN, GAIN | MOTOROLA INC. | TL074CD |

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| **AF5 RF output (contd.)** | | | | |
| IC4 | 28461/448 | IC-ANALOGUE MICROWAVE-AMP MSA-0386... 5V 35mA GAIN 12dB @ 1GHz, 3dB BANDWIDTH DC-2.4GHz, BIPOLAR, 4 | HEWLETT-PACKARD | MSA-0386-TR1 |
| IC5 | 28461/454 | IC-ANALOGUE MICROWAVE-AMP MSA-0786... 4V 22mA GAIN 12.5dB @ 1GHz, 3dB BANDWIDTH DC-2GHz, BIPOLAR, 4 | HEWLETT-PACKARD | MSA-0786-TR1 |
| IC6 | 28531/015 | RF-MIXER DOUBLE-BALANCED, DIODE RING, RMS-2... 5-1000MHz, 50R 1 dBm RF-1dB COMPRESS, 9.5 dB LOSS, | MINI-CIRCUITS | RMS-2 |
| IC7 | 28461/450 | IC-ANALOGUE MICROWAVE-AMP MSA-0486... 5.25V 50mA GAIN 8dB @ 1GHz, 3dB BANDWIDTH DC-3.2GHz, BIPOLAR, | HEWLETT-PACKARD | MSA-0486-TR1 |
| IC8 | 28461/450 | IC-ANALOGUE MICROWAVE-AMP MSA-0486... 5.25V 50mA GAIN 8dB @ 1GHz, 3dB BANDWIDTH DC-3.2GHz, BIPOLAR, | HEWLETT-PACKARD | MSA-0486-TR1 |
| IC9 | 28461/801 | IC-ANALOGUE MICROWAVE-AMP MSA-1105... 5.5V 60mA GAIN 10.5dB @1GHz, 3dB B/WTH 0.05-1.3GHz, BIPOLAR, | HEWLETT-PACKARD | MSA-1105 |
| IC10 | 28461/887 | IC-ANALOGUE MICROWAVE-AMP MSA-0520... 12V 165mA GAIN 8.5dB @ 1GHz, 3dB BANDWIDTH 100MHz-2.8GHz, | HEWLETT-PACKARD | MSA-0520 |
| IC11 | 28461/896 | IC-ANALOGUE SWITCH DG413... QUAD, 15V SPST, ON-RESISTANCE<35R, 2 x N/O & 2 x N/C @ LOGIC 1, | TEMIC UK LTD | DG413DY |
| IC12 | 28461/413 | IC-ANALOGUE OPERATIONAL AMP TL074... QUAD, JFET INPUT, LOW NOISE, SLEW RATE 8V/uS MIN, GAIN | MOTOROLA INC. | TL074CD |
| IC13 | 28461/388 | IC-ANALOGUE OPERATIONAL AMP LM324D... QUAD, GEN-PURPOSE, SLEW RATE 0.2V/uS MIN, GAIN BANDWIDTH | PHILIPS | LM324D |
| IC14 | 28467/111 | IC-MICRO PERIPHERAL, PCF8574... REMOTE 8-BIT I/O EXPANDER, I.IC BUS, UP TO 8 DEVICE ADDRESS | PHILIPS | PCF8574T |
| L1 to L5 | 23642/535 | INDUCTOR-FIXED 1uH +/- 5% EPOXY-MOULD, 400mA 0R7 MAX, 30 Q @ 7.96 MHz, 120 MHz SRF, SURFACE | MEGGITT ELECTRONICS | 3612-T-1R0-J |
| L6 | 23642/514 | INDUCTOR-FIXED 0.039uH +/- 5% EPOXY-MOULD, 450mA 0R27 MAX, 25 Q @ 100 MHz, 1.3K MHz SRF, SURFACE | MEGGITT ELECTRONICS | 3612-T-039-J |
| L7 | 23642/535 | INDUCTOR-FIXED 1uH +/- 5% EPOXY-MOULD, 400mA 0R7 MAX, 30 Q @ 7.96 MHz, 120 MHz SRF, SURFACE | MEGGITT ELECTRONICS | 3612-T-1R0-J |
| L8 | 23642/535 | INDUCTOR-FIXED 1uH +/- 5% EPOXY-MOULD, 400mA 0R7 MAX, 30 Q @ 7.96 MHz, 120 MHz SRF, SURFACE | MEGGITT ELECTRONICS | 3612-T-1R0-J |
| L9 | 23642/536 | INDUCTOR-FIXED 0.33uH +/- 20% EPOXY-MOULD, 450mA 0R4 MAX, 30 Q @ 25.2 MHz, 300 MHz SRF, SURFACE | MEGGITT ELECTRONICS | 3612-T-R33-M |
| L10 | 23642/536 | INDUCTOR-FIXED 0.33uH +/- 20% EPOXY-MOULD, 450mA 0R4 MAX, 30 Q @ 25.2 MHz, 300 MHz SRF, SURFACE | MEGGITT ELECTRONICS | 3612-T-R33-M |
| L11 | 23642/519 | INDUCTOR-FIXED 0.068uH +/- 5% EPOXY-MOULD, 450mA 0R36 MAX, 27 Q @ 100 MHz, 1K MHz SRF, SURFACE | MEGGITT ELECTRONICS | 3612-T-068-J |
| L12 | 23642/519 | INDUCTOR-FIXED 0.068uH +/- 5% EPOXY-MOULD, 450mA 0R36 MAX, 27 Q @ 100 MHz, 1K MHz SRF, SURFACE | MEGGITT ELECTRONICS | 3612-T-068-J |
| L13 | 23642/534 | INDUCTOR-FIXED 8.2uH +/- 5% EPOXY-MOULD, 170mA 2R MAX, 30 Q @ 7.96 MHz, 40 MHz SRF, SURFACE MOUNTED, | MEGGITT ELECTRONICS | 3612-T-8R2-J |
| L14 | 23642/535 | INDUCTOR-FIXED 1uH +/- 5% EPOXY-MOULD, 400mA 0R7 MAX, 30 Q @ 7.96 MHz, 120 MHz SRF, SURFACE | MEGGITT ELECTRONICS | 3612-T-1R0-J |
| L15 | 23642/535 | INDUCTOR-FIXED 1uH +/- 5% EPOXY-MOULD, 400mA 0R7 MAX, 30 Q @ 7.96 MHz, 120 MHz SRF, SURFACE | MEGGITT ELECTRONICS | 3612-T-1R0-J |
| L16 | 23642/561 | INDUCTOR-FIXED 100uH +/- 10% COATED-LACQUER, MINIATURE, 140mA 11R MAX, 50 Q @ 2.5 MHz, 7 MHz | MEGGITT ELECTRONICS | C12-406/8/27471/004 |
| L17 | 23642/535 | INDUCTOR-FIXED 1uH +/- 5% EPOXY-MOULD, 400mA 0R7 MAX, 30 Q @ 7.96 MHz, 120 MHz SRF, SURFACE | MEGGITT ELECTRONICS | 3612-T-1R0-J |

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
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| **AF5 RF output (contd.)** | | | | |
| L19 | 23642/533 | INDUCTOR-FIXED 10uH +/- 5% EPOXY-MOULD, 150mA 2R1 MAX, 30 Q @ 2.52 MHz, 36 MHz SRF, SURFACE MOUNTED, | MEGGITT ELECTRONICS | 3612-T-100-J |
| L20 | 23642/519 | INDUCTOR-FIXED 0.068uH +/- 5% EPOXY-MOULD, 450mA 0R36 MAX, 27 Q @ 100 MHz, 1K MHz SRF, SURFACE | MEGGITT ELECTRONICS | 3612-T-068-J |
| R1 | 24811/153 | RESISTOR-FIXED METAL-FILM 150R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-150R-1%50ppm |
| R2 | 24811/907 | RESISTOR-FIXED METAL-FILM 39R2 +/- 1% 250mW 200V 50 ppm/DEG.C, LOW-INDUCTANCE, SURFACE MOUNTED, | VISHAY COMPONENTS | SMM0204-HF-39R2-1% |
| R3 | 24811/153 | RESISTOR-FIXED METAL-FILM 150R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-150R-1%50ppm |
| R4 to R6 | 24811/157 | RESISTOR-FIXED METAL-FILM 221R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-221R-1%50ppm |
| R7 | 24811/159 | RESISTOR-FIXED METAL-FILM 274R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-274R-1%50ppm |
| R8 | 24811/149 | RESISTOR-FIXED METAL-FILM 100R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100R-1%50ppm |
| R9 | 24338/003 | RESISTOR-FIXED METAL-GLAZE 120R +/- 5% 1W 100V 350 ppm/DEG.C, SURFACE MOUNTED, SIZE 2512, (12mm | VISHAY COMPONENTS | CR2512-120R-5%-P4 |
| R10 | 24811/169 | RESISTOR-FIXED METAL-FILM 681R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-681R-1%50ppm |
| R11 | 24811/149 | RESISTOR-FIXED METAL-FILM 100R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100R-1%50ppm |
| R12 | 24811/237 | RESISTOR-FIXED METAL-FILM 475K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-475K-1%50ppm |
| R13 | 24811/237 | RESISTOR-FIXED METAL-FILM 475K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-475K-1%50ppm |
| R16 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R17 | 24811/213 | RESISTOR-FIXED METAL-FILM 47K5 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-47K5-1%50ppm |
| R18 | 24811/211 | RESISTOR-FIXED METAL-FILM 39K2 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-39K2-1%50ppm |
| R19 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R22 | 24811/142 | RESISTOR-FIXED METAL-FILM 51R1 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-51R1-1%50ppm |
| R23 | 24811/153 | RESISTOR-FIXED METAL-FILM 150R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-150R-1%50ppm |
| R24 | 24811/907 | RESISTOR-FIXED METAL-FILM 39R2 +/- 1% 250mW 200V 50 ppm/DEG.C, LOW-INDUCTANCE, SURFACE MOUNTED, | VISHAY COMPONENTS | SMM0204-HF-39R2-1% |
| R25 | 24811/153 | RESISTOR-FIXED METAL-FILM 150R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-150R-1%50ppm |
| R26 | 24811/153 | RESISTOR-FIXED METAL-FILM 150R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-150R-1%50ppm |
| R27 | 24811/139 | RESISTOR-FIXED METAL-FILM 39R2 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-39R2-1%50ppm |
| R28 | 24811/153 | RESISTOR-FIXED METAL-FILM 150R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-150R-1%50ppm |

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| **AF5 RF output (contd.)** | | | | |
| R29 | 24338/008 | RESISTOR-FIXED METAL-GLAZE 330R +/- 5% 1W 100V 350 ppm/DEG.C, SURFACE MOUNTED, SIZE 2512, (12mm | VISHAY COMPONENTS | CR2512-330R-5%-P4 |
| R30 | 24811/157 | RESISTOR-FIXED METAL-FILM 221R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-221R-1%50ppm |
| R31 | 24811/167 | RESISTOR-FIXED METAL-FILM 562R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-562R-1%50ppm |
| R32 | 24811/167 | RESISTOR-FIXED METAL-FILM 562R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-562R-1%50ppm |
| R33 | 24338/003 | RESISTOR-FIXED METAL-GLAZE 120R +/- 5% 1W 100V 350 ppm/DEG.C, SURFACE MOUNTED, SIZE 2512, (12mm | VISHAY COMPONENTS | CR2512-120R-5%-P4 |
| R34 to R37 | 24811/167 | RESISTOR-FIXED METAL-FILM 562R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-562R-1%50ppm |
| R38 | 24811/180 | RESISTOR-FIXED METAL-FILM 2K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-2K0-1%50ppm |
| R39 | 24811/171 | RESISTOR-FIXED METAL-FILM 825R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-825R-1%50ppm |
| R40 | 24811/157 | RESISTOR-FIXED METAL-FILM 221R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-221R-1%50ppm |
| R41 | 24811/156 | RESISTOR-FIXED METAL-FILM 200R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-200R-1%50ppm |
| R42 | 24811/153 | RESISTOR-FIXED METAL-FILM 150R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-150R-1%50ppm |
| R43 | 24811/126 | RESISTOR-FIXED METAL-FILM 11R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-11R-1%-50ppm |
| R44 | 24338/002 | RESISTOR-FIXED METAL-GLAZE 100R +/- 5% 1W 100V 350 ppm/DEG.C, SURFACE MOUNTED, SIZE 2512, (12mm | VISHAY COMPONENTS | CR2512-100R-5%-P4 |
| R45 | 24338/002 | RESISTOR-FIXED METAL-GLAZE 100R +/- 5% 1W 100V 350 ppm/DEG.C, SURFACE MOUNTED, SIZE 2512, (12mm | VISHAY COMPONENTS | CR2512-100R-5%-P4 |
| R46 | 24573/034 | RESISTOR-FIXED METAL-OXIDE 24R +/- 2% 500mW 350V 250 ppm/DEG.C, AXIAL, (LOOSE OR TAPED). | VISHAY COMPONENTS | TR5-24R-2% |
| R47 | 24811/912 | RESISTOR-FIXED METAL-FILM 100R +/- 1% 250mW 200V 50 ppm/DEG.C, LOW-INDUCTANCE, SURFACE MOUNTED, | VISHAY COMPONENTS | SMM0204-HF-100R-1% |
| R48 | 24811/189 | RESISTOR-FIXED METAL-FILM 4K75 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-4K75-1%50ppm |
| R49 | 24811/189 | RESISTOR-FIXED METAL-FILM 4K75 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-4K75-1%50ppm |
| R50 | 24811/911 | RESISTOR-FIXED METAL-FILM 75R +/- 1% 250mW 200V 50 ppm/DEG.C, LOW-INDUCTANCE, SURFACE MOUNTED, SIZE | VISHAY COMPONENTS | SMM0204-HF-75R0-1% |
| R51 | 24811/261 | RESISTOR-FIXED METAL-FILM 4M75 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | WELWYN ELECTRONICS | WRM0204-C-4M75-F-P2 |
| R54 | 24811/223 | RESISTOR-FIXED METAL-FILM 121K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-121K-1%50ppm |
| R56 | 24811/236 | RESISTOR-FIXED METAL-FILM 432K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-432K-1%50ppm |
| R58 | 25748/568 | RESISTOR-VARIABLE CERMET LINEAR, 500K 10% 500mW 200V 100 ppm/DEG.C, MULTI-TURN, VERTICAL-PCB, | MEGGITT ELECTRONICS | 4290W404/8/06411/504 |
| R60 | 24811/223 | RESISTOR-FIXED METAL-FILM 121K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-121K-1%50ppm |
| R61 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |

## AF5 RF output (contd.)

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| R62 | 24811/182 | RESISTOR-FIXED METAL-FILM 2K43 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-2K43-1%50ppm |
| R63 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R64 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R65 | 24811/217 | RESISTOR-FIXED METAL-FILM 68K1 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-68K1-1%50ppm |
| R66 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R67 | 24811/169 | RESISTOR-FIXED METAL-FILM 681R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-681R-1%50ppm |
| R68 | 24811/912 | RESISTOR-FIXED METAL-FILM 100R +/- 1% 250mW 200V 50 ppm/DEG.C, LOW-INDUCTANCE, SURFACE MOUNTED, | VISHAY COMPONENTS | SMM0204-HF-100R-1% |
| R69 | 24811/185 | RESISTOR-FIXED METAL-FILM 3K32 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-3K32-1%50ppm |
| R70 | 24811/185 | RESISTOR-FIXED METAL-FILM 3K32 +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-3K32-1%50ppm |
| R71 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R72 | 24811/149 | RESISTOR-FIXED METAL-FILM 100R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100R-1%50ppm |
| R73 | 24811/149 | RESISTOR-FIXED METAL-FILM 100R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100R-1%50ppm |
| R74 | 24811/153 | RESISTOR-FIXED METAL-FILM 150R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-150R-1%50ppm |
| SKA | 23435/990 | CONNECTOR SHORTING, SOCKET, 2 WAY, FOR 0.64mm SQ PINS, 2.54mm PITCH, 9.6mm HIGH, FREE MOUNTING, | BERG ELECTRONICS | 65474-001 |
| SKSKB | 23435/990 | CONNECTOR SHORTING, SOCKET, 2 WAY, FOR 0.64mm SQ PINS, 2.54mm PITCH, 9.6mm HIGH, FREE MOUNTING, | BERG ELECTRONICS | 65474-001 |
| TR1 | 28457/851 | TRANSISTOR NPN BIPOLAR BFS17... 15V 1.3GHz 250mW 50mA 20hFE MIN @ 2mA, MARKING CODE E1, SURFACE | PHILIPS | BFS17 |

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|

## AF6 Up converter board

When ordering, prefix circuit reference with AF6.

| | | | | |
|---|---|---|---|---|
| | 448830-185 | Complete unit | Issue 6 | |
| C2 | 26386/863 | CAPACITOR CERAMIC 1nF+/-10% 50V 0805 | AVX | 0805-5C-102-KAT-1A o |
| C3 | 26386/800 | CAPACITOR CERAMIC 1pF+/-0.5pF 50V 0805 | AVX | 0805-5A-1R0-DAT-1A o |
| C4 | 26386/863 | CAPACITOR CERAMIC 1nF+/-10% 50V 0805 | AVX | 0805-5C-102-KAT-1A o |
| C5 | 26386/875 | CAPACITOR CERAMIC 10nF+/-10% 50V 0805 | AVX | 0805-5C-103-KAT-1A o |
| to C7 | | | | |
| C8 | 26386/863 | CAPACITOR CERAMIC 1nF+/-10% 50V 0805 | AVX | 0805-5C-102-KAT-1A o |
| C9 | 26386/875 | CAPACITOR CERAMIC 10nF+/-10% 50V 0805 | AVX | 0805-5C-103-KAT-1A o |
| C10 | 26386/863 | CAPACITOR CERAMIC 1nF+/-10% 50V 0805 | AVX | 0805-5C-102-KAT-1A o |
| C11 | 26386/875 | CAPACITOR CERAMIC 10nF+/-10% 50V 0805 | AVX | 0805-5C-103-KAT-1A o |
| C12 | 26386/863 | CAPACITOR CERAMIC 1nF+/-10% 50V 0805 | AVX | 0805-5C-102-KAT-1A o |
| to C13 | | | | |
| C14 | 26386/875 | CAPACITOR CERAMIC 10nF+/-10% 50V 0805 | AVX | 0805-5C-103-KAT-1A o |
| C15 | 26386/863 | CAPACITOR CERAMIC 1nF+/-10% 50V 0805 | AVX | 0805-5C-102-KAT-1A o |
| to C16 | | | | |
| C17 | 26386/875 | CAPACITOR CERAMIC 10nF+/-10% 50V 0805 | AVX | 0805-5C-103-KAT-1A o |
| C18 | 26386/863 | CAPACITOR CERAMIC 1nF+/-10% 50V 0805 | AVX | 0805-5C-102-KAT-1A o |
| C19 | 26386/875 | CAPACITOR CERAMIC 10nF+/-10% 50V 0805 | AVX | 0805-5C-103-KAT-1A o |
| to C22 | | | | |
| C23 | 26386/602 | CAPACITOR CERAMIC 1uF+/-10% 25V 1210 | PHILIPS | 1210-2R-105-K8-BBC |
| C24 | 26386/875 | CAPACITOR CERAMIC 10nF+/-10% 50V 0805 | AVX | 0805-5C-103-KAT-1A o |
| to C28 | | | | |
| C29 | 26386/863 | CAPACITOR CERAMIC 1nF+/-10% 50V 0805 | AVX | 0805-5C-102-KAT-1A o |
| C30 | 26386/875 | CAPACITOR CERAMIC 10nF+/-10% 50V 0805 | AVX | 0805-5C-103-KAT-1A o |
| to C33 | | | | |
| C34 | 26451/004 | CAPACITOR ALUM 10uF+/-20% 35V 5.3mmSQ | RUBYCON | 35-REV-10 |
| C35 | 26386/875 | CAPACITOR CERAMIC 10nF+/-10% 50V 0805 | AVX | 0805-5C-103-KAT-1A o |
| C36 | 26451/004 | CAPACITOR ALUM 10uF+/-20% 35V 5.3mmSQ | RUBYCON | 35-REV-10 |
| C37 | 26386/875 | CAPACITOR CERAMIC 10nF+/-10% 50V 0805 | AVX | 0805-5C-103-KAT-1A o |
| C38 | 26451/004 | CAPACITOR ALUM 10uF+/-20% 35V 5.3mmSQ | RUBYCON | 35-REV-10 |
| C39 | 26386/875 | CAPACITOR CERAMIC 10nF+/-10% 50V 0805 | AVX | 0805-5C-103-KAT-1A o |
| C40 | 26451/004 | CAPACITOR ALUM 10uF+/-20% 35V 5.3mmSQ | RUBYCON | 35-REV-10 |
| C41 | 26386/875 | CAPACITOR CERAMIC 10nF+/-10% 50V 0805 | AVX | 0805-5C-103-KAT-1A o |
| to C43 | | | | |
| C50 | 26386/875 | CAPACITOR CERAMIC 10nF+/-10% 50V 0805 | AVX | 0805-5C-103-KAT-1A o |
| to C51 | | | | |
| C52 | 26386/863 | CAPACITOR CERAMIC 1nF+/-10% 50V 0805 | AVX | 0805-5C-102-KAT-1A o |
| to C53 | | | | |
| C200 | 26386/970 | CAPACITOR CERAMIC 1.5pF+/-0.1pF 50V 0805 | AVX | 0805-5K-1R5-BAW-TR |
| C201 | 26386/955 | CAPACITOR CERAMIC 10pF+/-2% 100V 0805 | AVX | 0805-1K-100-GAW-TR |
| C202 | 26386/969 | CAPACITOR CERAMIC 1pF+/- 0.1pF 50V 0805 | AVX | 0805-5K-1R0-BAW-TR |

## AF6 Up converter board (contd)

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| C203 | 26386/972 | CAPACITOR CERAMIC 2.7pF+/-0.1pF 50V 0805 | AVX | 0805-5K-2R7-BAW-TR |
| C204 | 26386/985 | CAPACITOR CERAMIC 1.2pF+/-0.1pF 50V 0805 | AVX | 0805-5K-1R2-BAW-TR |
| C205 | 26386/975 | CAPACITOR CERAMIC 6.8pF+/-0.1pF 50V 0805 | AVX | 0805-5K-6R8-BAW-TR |
| C206 | 26386/971 | CAPACITOR CERAMIC 2.2pF+/-0.1pF 50V 0805 | AVX | 0805-5K-2R2-BAW-TR |
| D1 | 28349/024 | DIODE DME3040.. MIXR/DETSCHTKY QUAD 2.54mmDIA | ALPHA INDUSTRIES | DME2029-255 |
| D2 | 28349/022 | DIODE HSMS-2812.. SMALLSIG DUAL MKD-B2L SOT-23 | HEWLETT-PACKARD | HSMS-2812-TR1 |
| D5 to D6 | 28383/947 | DIODE MA4P1250.. PIN50V SQUARE-MELF | M/A COM | MA4P1250(TAPE) |
| D7 to D8 | 28383/936 | DIODE LL103B.. SMALL-SIGSCHTKY 30V MINI-MELF | GENERAL SEMI | LL103B-7F(TAPE) |
| D9 | 28349/032 | DIODE HSMS-2820.. SMALLSIG SCHTKY MK-C0L SOT-23 | HEWLETT-PACKARD | HSMS-2820-TR1 |
| D10 | 28371/663 | DIODE BZX84-C7V5.. ZENER7.5V MKD-Z6 SOT-23 | PHILIPS | BZX84-C7V5 |
| D11 | 28371/412 | DIODE BZX84-C5V1.. ZENER5.1V MKD-Z2 SOT-23 | PHILIPS | BZX84-C5V1 |
| D12 | 28383/930 | DIODE BAS16.. SMALL-SIG75V MKD-A6 SOT-23 | PHILIPS | BAS16 |
| IC1 to IC2 | 28461/064 | IC-ANALOG SWITCHSW-239.. SO-8 | ALPHA INDUSTRIES | AS002R2-12 |
| IC3 | 28461/819 | IC-ANALOG OP AMPOP177.. SO-8 | ANALOG | OP177GS |
| IC4 | 28461/535 | IC-ANALOG MICROWAVE-AMPERA-4SM.. 4-PIN WW107 | MINI-CIRCUITS | ERA-4SM |
| IC5 | 28461/450 | IC-ANALOG MICROWAVE-AMPMSA-0486.. 4-PIN AV-86 | MINI-CIRCUITS | MAR-4-SM |
| IC6 | 28461/064 | IC-ANALOG SWITCHSW-239.. SO-8 | ALPHA INDUSTRIES | AS002R2-12 |
| IC7 | 28461/450 | IC-ANALOG MICROWAVE-AMPMSA-0486.. 4-PIN AV-86 | MINI-CIRCUITS | MAR-4-SM |
| IC8 | 28531/028 | RF-MIXER DIODE RINGLMX156A-1.. METL-F-PCK-8 | MINI-CIRCUITS | LMX-156A-1 |
| IC9 | 28461/535 | IC-ANALOG MICROWAVE-AMPERA-4SM.. 4-PIN WW107 | MINI-CIRCUITS | ERA-4SM |
| IC10 to IC11 | 28461/064 | IC-ANALOG SWITCHSW-239.. SO-8 | ALPHA INDUSTRIES | AS002R2-12 |
| IC12 | 28462/638 | IC-DIGITAL FLIP-FLOP-D74HC74.. DUAL SO-14 | PHILIPS | 74HC74D |
| IC13 | 28461/676 | IC-ANALOG COMPARATORLM311.. SO-8 | MOTOROLA | LM311D |
| IC14 | 28467/111 | IC-MICRO PERIPHERALPCF8574.. SO-16 | PHILIPS | PCF8574T |
| IC15 | 28461/999 | IC-ANALOG SWITCHDG441.. QUAD SO-16 | MAXIM | DG441DY |
| L1 | 23642/708 | INDUCTOR 0.01uH 10%MOULDED 3.2x2.5mm | MEGGITT | 3612-T-010-K |
| L2 to L5 | 23642/704 | INDUCTOR 0.015uH 10%MOULDED 3.2x2.5mm | MEGGITT | 3612-T-015-K |
| L9 | 23642/533 | INDUCTOR 10uH 5%MOULDED 3.2x2.5mm | MEGGITT | 612-T-100-J |
| L10 to L11 | 23642/535 | INDUCTOR 1uH 5%MOULDED 3.2x2.5mm | MEGGITT | 3612-T-1R0-J |
| L12 | 23642/533 | INDUCTOR 10uH 5%MOULDED 3.2x2.5mm | MEGGITT | 612-T-100-J |
| L13 to L16 | 23642/708 | INDUCTOR 0.01uH 10%MOULDED 3.2x2.5mm | MEGGITT | 3612-T-010-K |

## AF6 Up converter board (contd)

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| P1 | 23437/008 | CONNECTOR PCB-HEADER6-WAY STRT | MOLEX | 2-03-5065 |
| R1 | 24811/215 | RESISTOR 56K2 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-56K2-1%-50ppm |
| R2 | 24811/138 | RESISTOR 36R5 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-36R5-1%-50ppm |
| R3 | 24811/131 | RESISTOR 18R2 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-18R2-1%-50ppm |
| R4 | 24681/085 | RESISTOR 68R 5% 1W100V 350ppm 2512 | VTM | 509-0-68R-5%-V5 |
| R5 | 24811/901 | RESISTOR 10R 1% 250mW200V 50ppm L-I MINI-MELF | BEYSCHLAG | MMA0204-50HF-1%-10R |
| R6 | 24681/085 | RESISTOR 68R 5% 1W100V 350ppm 2512 | VTM | 509-0-68R-5%-V5 |
| R7 | 24811/908 | RESISTOR 43R2 1% 250mW200V 50ppm L-I MINI-MELF | BEYSCHLAG | MMA0204-50HF-1%-43R2 |
| R8 | 24681/085 | RESISTOR 68R 5% 1W100V 350ppm 2512 | VTM | 509-0-68R-5%-V5 |
| R9 | 24811/908 | RESISTOR 43R2 1% 250mW200V 50ppm L-I MINI-MELF | BEYSCHLAG | MMA0204-50HF-1%-43R2 |
| R10 | 24681/085 | RESISTOR 68R 5% 1W100V 350ppm 2512 | VTM | 509-0-68R-5%-V5 |
| R11 | 24811/901 | RESISTOR 10R 1% 250mW200V 50ppm L-I MINI-MELF | BEYSCHLAG | MMA0204-50HF-1%-10R |
| R12 | 24811/165 | RESISTOR 475R 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-475R-1%-50ppm |
| R13 | 24811/173 | RESISTOR 1K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-1K0-1%-50ppm |
| R14 | 24811/165 | RESISTOR 475R 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-475R-1%-50ppm |
| R15 | 24811/197 | RESISTOR 10K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-10K-1%-50ppm |
| R16 to R17 | 24811/167 | RESISTOR 562R 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-562R-1%-50ppm |
| R18 to R21 | 24811/197 | RESISTOR 10K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-10K-1%-50ppm |
| R24 | 24811/197 | RESISTOR 10K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-10K-1%-50ppm |
| R25 | 24811/221 | RESISTOR 100K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-100K-1%-50ppm |
| R26 | 24321/773 | RESISTOR 1K 2% 125mW200V 200ppm 1206 | VISHAY | CRCW-1206-1001-FT |
| R27 | 24811/909 | RESISTOR 51R1 1% 250mW200V 50ppm L-I MINI-MELF | BEYSCHLAG | MMA0204-50HF-1%-51R1 |
| R28 | 24811/221 | RESISTOR 100K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-100K-1%-50ppm |
| R29 | 24811/173 | RESISTOR 1K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-1K0-1%-50ppm |
| R30 | 24811/157 | RESISTOR 221R 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-221R-1%-50ppm |
| R31 | 24811/169 | RESISTOR 681R 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-681R-1%-50ppm |
| R32 to R33 | 24811/197 | RESISTOR 10K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-10K-1%-50ppm |
| R39 | 24811/197 | RESISTOR 10K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-10K-1%-50ppm |
| R40 | 24811/173 | RESISTOR 1K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-1K0-1%-50ppm |
| R41 | 24811/197 | RESISTOR 10K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-10K-1%-50ppm |
| R43 to R45 | 24811/197 | RESISTOR 10K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-10K-1%-50ppm |
| R47 | 24811/197 | RESISTOR 10K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-10K-1%-50ppm |
| R48 | 24811/173 | RESISTOR 1K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-1K0-1%-50ppm |
| R49 | 24811/197 | RESISTOR 10K 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-10K-1%-50ppm |
| R50 to R51 | 24811/165 | RESISTOR 475R 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-475R-1%-50ppm |
| R52 to R53 | 24811/167 | RESISTOR 562R 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-562R-1%-50ppm |
| R54 to R57 | 24811/125 | RESISTOR 10R 1% 250mW200V 50ppm MINI-MELF | VTM | 501-0-10R-1%-50ppm |

## AF6 Up converter board (contd)

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| R100 | 24321/435 | RESISTOR 300R 2% 100mW100V 200ppm 0805 | VTM | 503-0-300R-1%-100ppm |
| R101 | 24321/406 | RESISTOR 18R 1% 100mW100V 100ppm 0805 | VTM | 503-0-18R-1%-100ppm |
| R102 | 24321/435 | RESISTOR 300R 2% 100mW100V 200ppm 0805 | VTM | 503-0-300R-1%-100ppm |
| R200 | 24321/435 | RESISTOR 300R 2% 100mW100V 200ppm 0805 | VTM | 503-0-300R-1%-100ppm |
| R201 | 24321/406 | RESISTOR 18R 1% 100mW100V 100ppm 0805 | VTM | 503-0-18R-1%-100ppm |
| R202 | 24321/435 | RESISTOR 300R 2% 100mW100V 200ppm 0805 | VTM | 503-0-300R-1%-100ppm |
| R300 | 24321/435 | RESISTOR 300R 2% 100mW100V 200ppm 0805 | VTM | 503-0-300R-1%-100ppm |
| R301 | 24321/400 | RESISTOR 10R 1% 100mW100V 100ppm 0805 | VTM | 503-0-10R-1%-100ppm |
| R302 | 24321/435 | RESISTOR 300R 2% 100mW100V 200ppm 0805 | VTM | 503-0-300R-1%-100ppm |
| R400 | 24321/435 | RESISTOR 300R 2% 100mW100V 200ppm 0805 | VTM | 503-0-300R-1%-100ppm |
| R401 | 24321/400 | RESISTOR 10R 1% 100mW100V 100ppm 0805 | VTM | 503-0-10R-1%-100ppm |
| R402 | 24321/435 | RESISTOR 300R 2% 100mW100V 200ppm 0805 | VTM | 503-0-300R-1%-100ppm |
| R500 | 24321/428 | RESISTOR 150R 1% 100mW100V 100ppm 0805 | VTM | 503-0-150R-1%-100ppm |
| R501 | 24321/413 | RESISTOR 36R 2% 100mW100V 200ppm 0805 | VTM | 503-0-36R-1%-100ppm |
| R502 | 24321/428 | RESISTOR 150R 1% 100mW100V 100ppm 0805 | VTM | 503-0-150R-1%-100ppm |
| R800 | 24321/428 | RESISTOR 150R 1% 100mW100V 100ppm 0805 | VTM | 503-0-150R-1%-100ppm |
| R801 | 24321/417 | RESISTOR 51R 1% 100mW100V 100ppm 0805 | VTM | 503-0-51R-1%-100ppm |
| R802 | 24321/428 | RESISTOR 150R 1% 100mW100V 100ppm 0805 | VTM | 503-0-150R-1%-100ppm |
| T1 | 43590/241 | WOUND TRANSFORMER RING CORE 12:12 TURNS, TWISTED | AMETHYST DESIGNS | AD5388 |
| TR1 | 28459/105 | TRANSISTOR NP-ENH MOSFETSI9952.. DUAL 20V SO-8 | FAIRCHILD | NDS9943 |
| TR2 | 28459/084 | TRANSISTOR N-ENH MOSFETBST82.. 80V MKD-02 SOT23 | PHILIPS | BST82(TAPE & REEL) |
| TR3 to TR4 | 28459/104 | TRANSISTOR P-ENH MOSFETBSS84.. 50V MKD-SP SOT23 | PHILIPS | BSS84 |
| TR5 to TR6 | 28459/084 | TRANSISTOR N-ENH MOSFETBST82.. 80V MKD-02 SOT23 | PHILIPS | BST82(TAPE & REEL) |
| TR7 | 28459/104 | TRANSISTOR P-ENH MOSFETBSS84.. 50V MKD-SP SOT23 | PHILIPS | BSS84 |
| TR8 to TR9 | 28459/084 | TRANSISTOR N-ENH MOSFETBST82.. 80V MKD-02 SOT23 | PHILIPS | BST82(TAPE & REEL) |
| TR10 | 28459/104 | TRANSISTOR P-ENH MOSFETBSS84.. 50V MKD-SP SOT23 | PHILIPS | BSS84 |
| TR11 to TR12 | 28459/084 | TRANSISTOR N-ENH MOSFETBST82.. 80V MKD-02 SOT23 | PHILIPS | BST82(TAPE & REEL) |
| TR13 | 28459/104 | TRANSISTOR P-ENH MOSFETBSS84.. 50V MKD-SP SOT23 | PHILIPS | BSS84 |
| TR14 to TR15 | 28459/084 | TRANSISTOR N-ENH MOSFETBST82.. 80V MKD-02 SOT23 | PHILIPS | BST82(TAPE & REEL) |

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|

## AK1 Down converter local oscillator board

See AE5/1 2nd and 3rd LO

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|---|---|---|---|---|
| | 44830-184 | Complete unit | Issue 03 | |

## AK2 Down converter board

When ordering, prefix circuit reference with AK2.

| | | | | |
|---|---|---|---|---|
| | 44830-186 | Complete unit | Issue 01 | |
| C1 | 26451/004 | CAPACITOR-FIXED ALUMINIUM 10uF +/-20% 35V ELECTROLYTIC, SURFACE-MOUNTED, SIZE 5.3 x 5.3mm, | DUBILIER CAPACITORS | DVC-10/35-T/R |
| C2 | 26386/899 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | ROHM ELECTRONICS LTD | MCH31-5C-104-KP |
| C3 | 26451/004 | CAPACITOR-FIXED ALUMINIUM 10uF +/-20% 35V ELECTROLYTIC, SURFACE-MOUNTED, SIZE 5.3 x 5.3mm, | DUBILIER CAPACITORS | DVC-10/35-T/R |
| C4 to C7 | 26386/899 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | ROHM ELECTRONICS LTD | MCH31-5C-104-KP |
| C8 | 26386/863 | CAPACITOR-FIXED CERAMIC 1nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-102-KP |
| C10 to C12 | 26386/602 | CAPACITOR-FIXED CERAMIC 1uF +/-10% 25V X7R, MULTILAYER, SURFACE-MOUNTED, SIZE 1210, NICKEL | PHILIPS | 1210-2R-105-K8-BBC |
| C13 to C16 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C17 | 26386/899 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | ROHM ELECTRONICS LTD | MCH31-5C-104-KP |
| C18 | 26386/899 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | ROHM ELECTRONICS LTD | MCH31-5C-104-KP |
| C19 to C22 | 26451/004 | CAPACITOR-FIXED ALUMINIUM 10uF +/-20% 35V ELECTROLYTIC, SURFACE-MOUNTED, SIZE 5.3 x 5.3mm, | DUBILIER CAPACITORS | DVC-10/35-T/R |
| C23 to C25 | 26386/832 | CAPACITOR-FIXED CERAMIC 470pF +/-5% 50V NPO MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-471-JP |
| C26 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C27 | 26386/832 | CAPACITOR-FIXED CERAMIC 470pF +/-5% 50V NPO MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-471-JP |
| C28 | 26386/832 | CAPACITOR-FIXED CERAMIC 470pF +/-5% 50V NPO MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-471-JP |
| C29 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C30 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5C-103-KP |
| C31 | 26386/899 | CAPACITOR-FIXED CERAMIC 100nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 1206, NICKEL | ROHM ELECTRONICS LTD | MCH31-5C-104-KP |
| C32 | 26386/897 | CAPACITOR-FIXED CERAMIC 4.7pF +/-0.1pF 50V 60 ppm/DEG.C, HIGH-Q, SINGLELAYER, SURFACE-MOUNTED, | AVX LTD | 0805-5K4R7-BAW-TR |
| C33 | 26386/764 | CAPACITOR-FIXED CERAMIC 47pF +/-5% 50V 60 ppm/DEG.C, HIGH-Q, SINGLELAYER, SURFACE-MOUNTED, | AVX LTD | 0805-5K-470-JAW |
| C34 | 26386/824 | CAPACITOR-FIXED CERAMIC 100pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD | MCH21-5A-101-JP |

## AK2 Down converter board (contd)

| Cir. Ref. | IFR part number | Description | |
|---|---|---|---|
| C35 | 26386/824 | CAPACITOR-FIXED CERAMIC 100pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD MCH21-5A-101-JP |
| C36 | 26386/970 | CAPACITOR-FIXED CERAMIC 1.5pF +/-0.1pF 50V 60 ppm/DEG.C, HIGH-Q, SINGLELAYER, SURFACE-MOUNTED, | AVX LTD 0805-5K-1R5-BAW-TR |
| C37 | 26386/955 | CAPACITOR-FIXED CERAMIC 10pF +/-0.25pF 100V 60 ppm/DEG.C, HIGH-Q, SINGLELAYER, SURFACE-MOUNTED, | AVX LTD 0805-1K-100-GAW-TR |
| C38 | 26386/969 | CAPACITOR-FIXED CERAMIC 1pF +/- 0.1pF 50V 60 ppm/DEG.C, HIGH-Q, SINGLELAYER, SURFACE-MOUNTED, | AVX LTD 0805-5K-1R0-BAW-TR |
| C39 | 26386/972 | CAPACITOR-FIXED CERAMIC 2.7pF +/-0.1pF 50V 60 ppm/DEG.C, HIGH-Q, SINGLELAYER, SURFACE-MOUNTED, | AVX LTD 0805-5K-2R7-BAW-TR |
| C40 | 26386/985 | CAPACITOR-FIXED CERAMIC 1.2pF +/-0.1pF 50V 60 ppm/DEG.C, HIGH-Q, SINGLELAYER, SURFACE-MOUNTED, | AVX LTD 0805-5K-1R2-BAW-TR |
| C41 | 26386/975 | CAPACITOR-FIXED CERAMIC 6.8pF +/-0.1pF 50V 60 ppm/DEG.C, HIGH-Q, SINGLELAYER, SURFACE-MOUNTED, | AVX LTD 0805-5K-6R8-BAW-TR |
| C42 | 26386/971 | CAPACITOR-FIXED CERAMIC 2.2pF +/-0.1pF 50V 60 ppm/DEG.C, HIGH-Q, SINGLELAYER, SURFACE-MOUNTED, | AVX LTD 0805-5K-2R2-BAW-TR |
| C43 to C45 | 26386/875 | CAPACITOR-FIXED CERAMIC 10nF +/-10% 50V X7R/2C1, MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD MCH21-5C-103-KP |
| C51 to C54 | 26386/824 | CAPACITOR-FIXED CERAMIC 100pF +/-5% 50V NP0 MULTILAYER, SURFACE-MOUNTED, SIZE 0805, NICKEL | ROHM ELECTRONICS LTD MCH21-5A-101-JP |
| C55 to C58 | 26386/764 | CAPACITOR-FIXED CERAMIC 47pF +/-5% 50V 60 ppm/DEG.C, HIGH-Q, SINGLELAYER, SURFACE-MOUNTED, | AVX LTD 0805-5K-470-JAW |
| D1 | 28371/412 | DIODE ZENER, BZX84-C5V1... 250mW 5.1V 5% 250mA MARKING CODE Z2, SURFACE MOUNTED, SOT-23, (8mm | PHILIPS BZX84-C5V1 |
| D2 | 28371/663 | DIODE ZENER, BZX84-C7V5... 250mW 7.5V 5% 250mA MARKING CODE Z6, SURFACE MOUNTED, SOT-23, (8mm | PHILIPS BZX84-C7V5 |
| D3 | 28383/930 | DIODE SMALL-SIGNAL, BAS16... 330mW 75V 250mA 2pF 1Vf @ 50mA, MARKING CODE A6, SURFACE MOUNTED, | PHILIPS BAS16 |
| D4 | 28383/944 | DIODE MIXER/DETECTOR, SCHOTTKY, HSMS-2852... DUAL, 0.3pF 150mVf @ 100uA, ZERO BIAS TYPE, IN-SERIES, | HEWLETT-PACKARD HSMS-2852-L31 |
| D5 | 28383/947 | DIODE PIN, MA4P1250... 1.5W 50V 1.2pF 1-150MHz, DISTORTION >80dBc @ 100MHz, CARRIER LIFE >2uS, | M/A COM LTD MA4P1250(TAPE) |
| D6 | 28383/947 | DIODE PIN, MA4P1250... 1.5W 50V 1.2pF 1-150MHz, DISTORTION >80dBc @ 100MHz, CARRIER LIFE >2uS, | M/A COM LTD MA4P1250(TAPE) |
| D7 | 28383/936 | DIODE SMALL-SIGNAL, SCHOTTKY, LL103B... 300mW 30V 1A 0.7Vf @ 500mA, SURFACE MOUNTED, MINI-MELF, (8mm | SGS-THOMSON TMMBAT48 |
| D8 | 28383/936 | DIODE SMALL-SIGNAL, SCHOTTKY, LL103B... 300mW 30V 1A 0.7Vf @ 500mA, SURFACE MOUNTED, MINI-MELF, (8mm | SGS-THOMSON TMMBAT48 |
| D9 | 28371/735 | DIODE ZENER, BZX84-C8V2... 250mW 8.2V 5% 250mA MARKING CODE Z7, SURFACE MOUNTED, SOT-23, (8mm | PHILIPS BZX84-C8V2 |
| D10 | 28371/735 | DIODE ZENER, BZX84-C8V2... 250mW 8.2V 5% 250mA MARKING CODE Z7, SURFACE MOUNTED, SOT-23, (8mm | PHILIPS BZX84-C8V2 |
| IC1 | 28467/111 | IC-MICRO PERIPHERAL, PCF8574... REMOTE 8-BIT I/O EXPANDER, I.IC BUS, UP TO 8 DEVICE ADDRESS | PHILIPS PCF8574T |
| IC2 | 28461/676 | IC-ANALOGUE COMPARATOR LM311... 2 INPUT, SINGLE, 15V I/P-OFFSET 7.5mV MAX, RESPONSE-TIME 200nS TYP, | PHILIPS LM311D |

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| **AK2 Down converter board (contd)** | | | | |
| IC3 | 28462/638 | IC-DIGITAL FLIP-FLOP/D-TYPE 74HC74... 2 BIT, DUAL, POS EDGE TRIGGER, PLUS SET & CLEAR, CMOS-H/SPEED, | PHILIPS | 74HC74D |
| IC4 | 28461/064 | IC-ANALOGUE SWITCH SW-239... REFLECTIVE, SPDT, INSERTION LOSS 0.8dB & ISOLATION 22dB @ 2GHz, I/P | ALPHA INDUSTRIES INC | AS002R2-12 |
| IC5 | 28461/064 | IC-ANALOGUE SWITCH SW-239... REFLECTIVE, SPDT, INSERTION LOSS 0.8dB & ISOLATION 22dB @ 2GHz, I/P | ALPHA INDUSTRIES INC | AS002R2-12 |
| IC6 | 28461/450 | IC-ANALOGUE MICROWAVE-AMP MSA-0486... 5.25V 50mA GAIN 8dB @ 1GHz, 3dB BANDWIDTH DC-3.2GHz, BIPOLAR, | HEWLETT-PACKARD | MSA-0486-TR1 |
| IC7 | 28531/028 | RF-MIXER DOUBLE-BALANCED, DIODE RING, LMX156A-1... 1.0-2.8GHz, 50R 1 dBm RF-1dB COMPRESS, 8 dB LOSS, | MINI-CIRCUITS | LMX-156A-1 |
| IC8 | 28461/464 | IC-ANALOGUE MICROWAVE-AMP INA-03184... 4V 10mA GAIN 25dB @ 1.5GHz, 3dB BANDWIDTH DC-2.5GHz, | HEWLETT-PACKARD | INA-03184-TR1 |
| IC9 | 28461/456 | IC-ANALOGUE MICROWAVE-AMP INA-10386... 6V 45mA GAIN 26dB @1.5GHz, 3dB BNDWDTH DC-1.8GHz, BIPOLAR, | HEWLETT-PACKARD | INA-10386-TR1 |
| L4 | 23642/535 | INDUCTOR-FIXED 1uH +/- 5% EPOXY-MOULD, 400mA 0R7 MAX, 30 Q @ 7.96 MHz, 120 MHz SRF, SURFACE | MEGGITT ELECTRONICS | 3612-T-1R0-J |
| L5 | 23642/535 | INDUCTOR-FIXED 1uH +/- 5% EPOXY-MOULD, 400mA 0R7 MAX, 30 Q @ 7.96 MHz, 120 MHz SRF, SURFACE | MEGGITT ELECTRONICS | 3612-T-1R0-J |
| L6 to L38 | 23642/713 | INDUCTOR-FIXED 0.056uH +/- 5% EPOXY-MOULD, 450mA 0R33 MAX, 26 Q @ 100 MHz, 1.1K MHz SRF, SURFACE | MEGGITT ELECTRONICS | 3612-T-056-J |
| R2 | 24811/165 | RESISTOR-FIXED METAL-FILM 475R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-475R-1%50ppm |
| R4 | 24811/165 | RESISTOR-FIXED METAL-FILM 475R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-475R-1%50ppm |
| R7 | 24811/221 | RESISTOR-FIXED METAL-FILM 100K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100K-1%50ppm |
| R8 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R11 | 24321/766 | RESISTOR-FIXED METAL-GLAZE 510R +/- 2% 125mW 200V 200 ppm/DEG.C, 1%-511R-ACCEPTABLE, SURFACE | VISHAY COMPONENTS | CRCW-1206-5110-FT |
| R12 | 24811/149 | RESISTOR-FIXED METAL-FILM 100R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100R-1%50ppm |
| R13 | 24811/221 | RESISTOR-FIXED METAL-FILM 100K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100K-1%50ppm |
| R14 | 24811/160 | RESISTOR-FIXED METAL-FILM 301R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-301R-1%50ppm |
| R15 | 24811/221 | RESISTOR-FIXED METAL-FILM 100K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-100K-1%50ppm |
| R16 to R20 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R21 | 24811/165 | RESISTOR-FIXED METAL-FILM 475R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-475R-1%50ppm |
| R22 | 24811/173 | RESISTOR-FIXED METAL-FILM 1K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-1K0-1%-50ppm |
| R23 to R26 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS | SMM0204-10K-1%50ppm |
| R27 | 24811/167 | RESISTOR-FIXED METAL-FILM 562R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS | SMM0204-562R-1%50ppm |

## AK2 Down converter board (contd)

| Cir. Ref. | IFR part number | Description | |
|---|---|---|---|
| R28 | 24811/167 | RESISTOR-FIXED METAL-FILM 562R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS SMM0204-562R-1%50ppm |
| R29 | 24811/197 | RESISTOR-FIXED METAL-FILM 10K +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, (8mm | VISHAY COMPONENTS SMM0204-10K-1%50ppm |
| R30 | 24811/169 | RESISTOR-FIXED METAL-FILM 681R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS SMM0204-681R-1%50ppm |
| R31 | 24811/165 | RESISTOR-FIXED METAL-FILM 475R +/- 1% 250mW 200V 50 ppm/DEG.C, SURFACE MOUNTED, SIZE MINI-MELF, | VISHAY COMPONENTS SMM0204-475R-1%50ppm |
| R35 | 24811/923 | RESISTOR-FIXED METAL-FILM 68R1 +/- 1% 250mW 200V 50 ppm/DEG.C, LOW-INDUCTANCE, SURFACE MOUNTED, | VISHAY COMPONENTS SMM0204-HF-68R1-1% |
| R36 | 24811/923 | RESISTOR-FIXED METAL-FILM 68R1 +/- 1% 250mW 200V 50 ppm/DEG.C, LOW-INDUCTANCE, SURFACE MOUNTED, | VISHAY COMPONENTS SMM0204-HF-68R1-1% |
| R39 | 24321/755 | RESISTOR-FIXED METAL-GLAZE 180R +/- 2% 125mW 200V 200 ppm/DEG.C, 1%-182R-ACCEPTABLE, SURFACE | VISHAY COMPONENTS CRCW-1206-1820-FT |
| R40 | 24321/768 | RESISTOR-FIXED METAL-GLAZE 620R +/- 2% 125mW 200V 200 ppm/DEG.C, 1%-619R-ACCEPTABLE, SURFACE | VISHAY COMPONENTS CRCW-1206-6190-FT |
| R41 | 24321/428 | RESISTOR-FIXED METAL-GLAZE 150R +/- 2% 100mW 100V 200 ppm/DEG.C, Ni-BARRIER & REFLOW HOT-DIP SOLDER, | VTM (UK) LTD 503-0-150R-1%-100ppm |
| R42 | 24321/413 | RESISTOR-FIXED METAL-GLAZE 36R +/- 2% 100mW 100V 200 ppm/DEG.C, Ni-BARRIER & REFLOW HOT-DIP SOLDER, | VTM (UK) LTD 503-0-36R-1%-100ppm |
| R43 | 24321/428 | RESISTOR-FIXED METAL-GLAZE 150R +/- 2% 100mW 100V 200 ppm/DEG.C, Ni-BARRIER & REFLOW HOT-DIP SOLDER, | VTM (UK) LTD 503-0-150R-1%-100ppm |
| R44 | 24321/435 | RESISTOR-FIXED METAL-GLAZE 300R +/- 2% 100mW 100V 200 ppm/DEG.C, Ni-BARRIER & REFLOW HOT-DIP SOLDER, | VTM (UK) LTD 503-0-300R-1%-100ppm |
| R45 | 24321/406 | RESISTOR-FIXED METAL-GLAZE 18R +/- 2% 100mW 100V 200 ppm/DEG.C, Ni-BARRIER & REFLOW HOT-DIP SOLDER, | VTM (UK) LTD 503-0-18R-1%-100ppm |
| R46 | 24321/435 | RESISTOR-FIXED METAL-GLAZE 300R +/- 2% 100mW 100V 200 ppm/DEG.C, Ni-BARRIER & REFLOW HOT-DIP SOLDER, | VTM (UK) LTD 503-0-300R-1%-100ppm |
| R47 | 24321/440 | RESISTOR-FIXED METAL-GLAZE 470R +/- 2% 100mW 100V 200 ppm/DEG.C, Ni-BARRIER & REFLOW HOT-DIP SOLDER, | VTM (UK) LTD 503-0-470R-1%-100ppm |
| R48 | 24321/400 | RESISTOR-FIXED METAL-GLAZE 10R +/- 2% 100mW 100V 200 ppm/DEG.C, Ni-BARRIER & REFLOW HOT-DIP SOLDER, | VTM (UK) LTD 503-0-10R-1%-100ppm |
| R49 | 24321/440 | RESISTOR-FIXED METAL-GLAZE 470R +/- 2% 100mW 100V 200 ppm/DEG.C, Ni-BARRIER & REFLOW HOT-DIP SOLDER, | VTM (UK) LTD 503-0-470R-1%-100ppm |
| R50 | 24321/435 | RESISTOR-FIXED METAL-GLAZE 300R +/- 2% 100mW 100V 200 ppm/DEG.C, Ni-BARRIER & REFLOW HOT-DIP SOLDER, | VTM (UK) LTD 503-0-300R-1%-100ppm |
| R51 | 24321/406 | RESISTOR-FIXED METAL-GLAZE 18R +/- 2% 100mW 100V 200 ppm/DEG.C, Ni-BARRIER & REFLOW HOT-DIP SOLDER, | VTM (UK) LTD 503-0-18R-1%-100ppm |
| R52 | 24321/435 | RESISTOR-FIXED METAL-GLAZE 300R +/- 2% 100mW 100V 200 ppm/DEG.C, Ni-BARRIER & REFLOW HOT-DIP SOLDER, | VTM (UK) LTD 503-0-300R-1%-100ppm |
| R53 | 24811/923 | RESISTOR-FIXED METAL-FILM 68R1 +/- 1% 250mW 200V 50 ppm/DEG.C, LOW-INDUCTANCE, SURFACE MOUNTED, | VISHAY COMPONENTS SMM0204-HF-68R1-1% |
| R54 | 24811/923 | RESISTOR-FIXED METAL-FILM 68R1 +/- 1% 250mW 200V 50 ppm/DEG.C, LOW-INDUCTANCE, SURFACE MOUNTED, | VISHAY COMPONENTS SMM0204-HF-68R1-1% |
| R55 | 24321/435 | RESISTOR-FIXED METAL-GLAZE 300R +/- 2% 100mW 100V 200 ppm/DEG.C, Ni-BARRIER & REFLOW HOT-DIP SOLDER, | VTM (UK) LTD 503-0-300R-1%-100ppm |
| R56 | 24321/406 | RESISTOR-FIXED METAL-GLAZE 18R +/- 2% 100mW 100V 200 ppm/DEG.C, Ni-BARRIER & REFLOW HOT-DIP SOLDER, | VTM (UK) LTD 503-0-18R-1%-100ppm |
| R57 | 24321/435 | RESISTOR-FIXED METAL-GLAZE 300R +/- 2% 100mW 100V 200 ppm/DEG.C, Ni-BARRIER & REFLOW HOT-DIP SOLDER, | VTM (UK) LTD 503-0-300R-1%-100ppm |

## AK2 Down converter board (contd)

| Cir. Ref. | IFR part number | Description | Manufacturer | Manufacturer's part number |
|---|---|---|---|---|
| TR1 | 28459/104 | TRANSISTOR P-CHANNEL-ENHANCE MOSFET BSS84... 50V 360mW 130mA 10R MARKING CODE SP, SURFACE MOUNTED, | PHILIPS | BSS84 |
| TR2 | 28459/084 | TRANSISTOR N-CHANNEL-ENHANCE MOSFET BST82... 80V 300mW 175mA 7R SWITCH ON & OFF <10nS, MARKING CODE | PHILIPS | BST82(TAPE & REEL) |
| TR3 | 28459/084 | TRANSISTOR N-CHANNEL-ENHANCE MOSFET BST82... 80V 300mW 175mA 7R SWITCH ON & OFF <10nS, MARKING CODE | PHILIPS | BST82(TAPE & REEL) |
| TR4 | 28459/104 | TRANSISTOR P-CHANNEL-ENHANCE MOSFET BSS84... 50V 360mW 130mA 10R MARKING CODE SP, SURFACE MOUNTED, | PHILIPS | BSS84 |
| TR5 | 28459/084 | TRANSISTOR N-CHANNEL-ENHANCE MOSFET BST82... 80V 300mW 175mA 7R SWITCH ON & OFF <10nS, MARKING CODE | PHILIPS | BST82(TAPE & REEL) |
| TR6 | 28459/084 | TRANSISTOR N-CHANNEL-ENHANCE MOSFET BST82... 80V 300mW 175mA 7R SWITCH ON & OFF <10nS, MARKING CODE | PHILIPS | BST82(TAPE & REEL) |
| TR7 | 28459/104 | TRANSISTOR P-CHANNEL-ENHANCE MOSFET BSS84... 50V 360mW 130mA 10R MARKING CODE SP, SURFACE MOUNTED, | PHILIPS | BSS84 |
| TR8 | 28459/084 | TRANSISTOR N-CHANNEL-ENHANCE MOSFET BST82... 80V 300mW 175mA 7R SWITCH ON & OFF <10nS, MARKING CODE | PHILIPS | BST82(TAPE & REEL) |
| TR9 | 28459/104 | TRANSISTOR P-CHANNEL-ENHANCE MOSFET BSS84... 50V 360mW 130mA 10R MARKING CODE SP, SURFACE MOUNTED, | PHILIPS | BSS84 |
| TR10 | 28459/105 | TRANSISTOR N+P-CHANNEL-ENHANCE MOSFET SI9952... DUAL, 20V 2W 2.3A 0R4 GATE THRESHOLD 3V MAX, | NAT. SEMICONDUCTOR | NDS9943 |

| Cir. Ref. | IFR part number | Description |
|---|---|---|

## Monochrome monitor (proprietary)

| | | |
|---|---|---|
| 44991/098 | Complete unit - CRT Assembly | |

## Power supply switch mode units (proprietary)

| | | |
|---|---|---|
| 44991/052 | Complete unit - Power Supply Switched Mode Unit - AC/DC | (earlier version) |
| 44991/221 | Complete unit - Power Supply Switched Mode Unit - AC only | (later version) |

## Programmed ICs

| Part no. | Description | Issue |
|---|---|---|
| 44533/402 | EPROM, AE1 Control | 002 |
| 44533/405 | EPROM, A1 CPU | 003 |
| 44533/406 | PROM, non-erasable, A5 LCA code | 002 |
| 44533/407 | EPROM, A5 CPU | 004 |
| 44533/408 | IC-PROGRAMMED EPROM, | 007 (5.4 SW only) |
| 44533/409 | EPROM, A7 key decoder | 001 |

## Miscellaneous mechanical parts

Item numbers are as show in Fig. 6-1. Omit item number when ordering.

| Item no. | Description | Part No. |
|---|---|---|
| 1 | Top cover | 35907/112 |
| 2 | Retaining screw for top and bottom covers (8 fitted to each cover) | 21264/714 |
| 4 | Rear foot (4 fitted) | 37591/590 |
| 5 | Retaining screw for rear foot (4 fitted | 21837/575 |
| 6 | Washer for rear foot retaining screw (4 fitted) | 21177/652 |
| 9 | Handle Assy | 41590/282 |
| 10 | Bottom foot (4 fitted) | 37591/593 |
| 11 | Stud for bottom foot (4 fitted) | 37591/642 |
| 12 | Retaining screw for bottom foot (4 fitted) | 21836/102 |
| 13 | Lower cover | 35907/111 |
| 14 | Collet retaining screw | 21262/702 |
| 15 | Knob collet | 37591/452 |
| 16 | Knob, large | 37591/397 |
| 17 | Knob, small (4 fitted) | 37591/610 |
| 18 | Knob retaining screw (2 fitted per knob) | 21815/354 |
| 19 | Keyboard See electrical parts list, *Front panel assembly*. | |

## Miscellaneous electrical parts

| | | |
|---|---|---|
| 3 | Loudspeaker, round | 23646/110 |
| 7 | Battery holder. Not fitted to all instruments. | 23711/198 |
| 8 | Battery, 3.5 V Lithium. Not fitted to all instruments. | 23711/106 |
| 20 | 3 GHz power sensor. (RF input connector assembly for AB2) | 44991/024 |

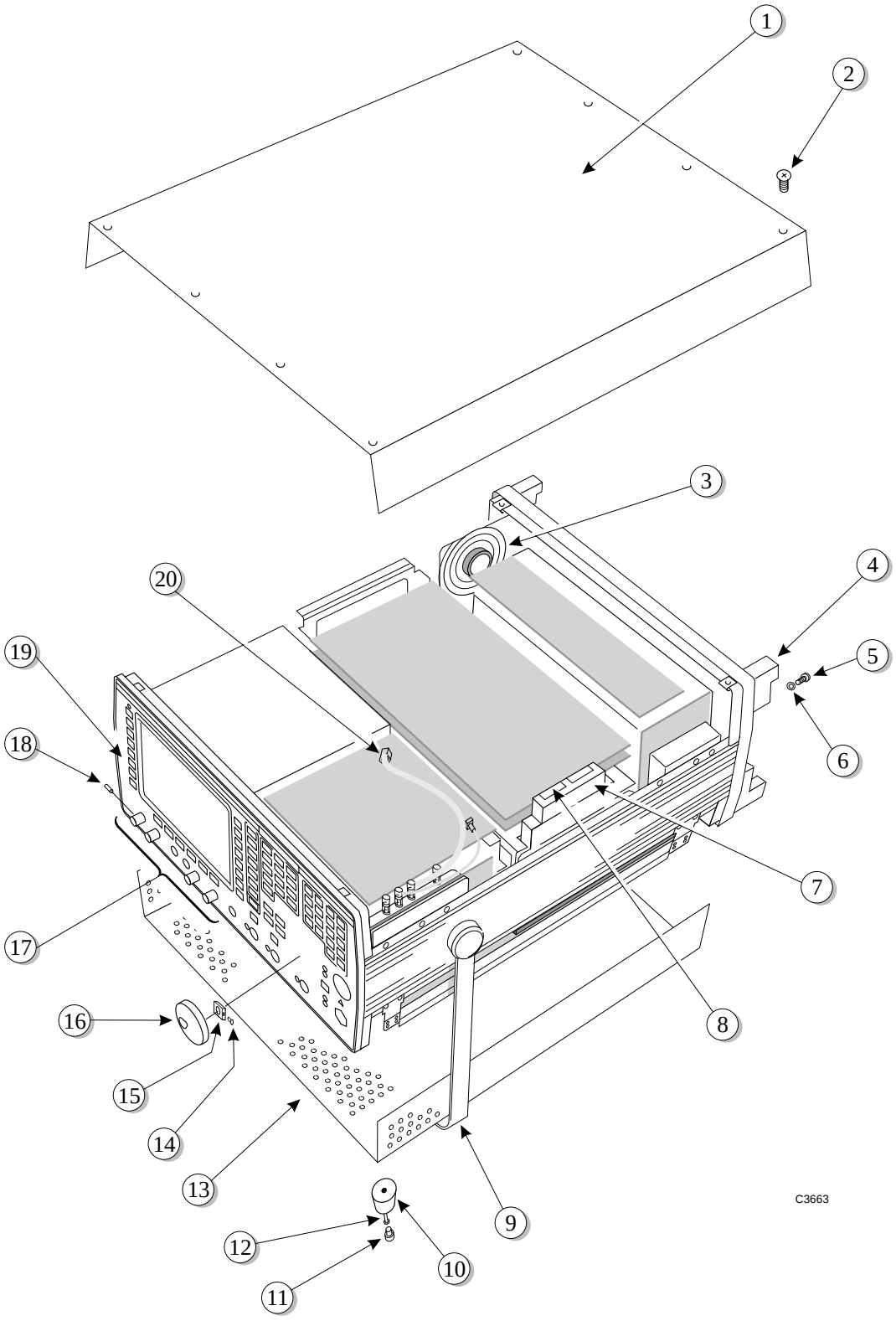


*Fig. 6-1 Miscellaneous mechanical parts*

# Chapter 7
# SERVICING DIAGRAMS

## *The diagrams listed below are not yet available electronically.*

Refer to the printed manual.

## Contents



## List of figures

# Circuit notes

## Component values

| | | | | | |
|---|---|---|---|---|---|
| Resistors : | R | = ohms, | k | = kilohms, | M = megohms. |
| Capacitor : | µ | = microfarads, | n | = nanofarads, | p = picofarads. |
| Inductors : | µ | = microhenries, | m | = millihenries. | |
| SIC : | value selected during test, nominal value shown. In some instances, no component may be fitted. | | | | |

## Symbols

Symbols are to IEC617 (BS 3939) with the following additions :

Static sensitive component


Test point


Unit identification


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