Service Manual

Vector Signal Generator

R&S® SMU200A

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ROHDE&SCHWARZ

Test & Measurement

Dear Customer,

throughout this manual, the Vector Signal Generator R&S® SMU 200A is abbreviated as R&S SMU.

Basic Safety Instructions

Always read through and comply with the following safety instructions!

All plants and locations of the Rohde & Schwarz group of companies make every effort to keep the safety standards of our products up to date and to offer our customers the highest possible degree of safety. Our products and the auxiliary equipment they require are designed, built and tested in accordance with the safety standards that apply in each case. Compliance with these standards is continuously monitored by our quality assurance system. The product described here has been designed, built and tested in accordance with the EC Certificate of Conformity and has left the manufacturer's plant in a condition fully complying with safety standards. To maintain this condition and to ensure safe operation, you must observe all instructions and warnings provided in this manual. If you have any questions regarding these safety instructions, the Rohde & Schwarz group of companies will be happy to answer them.

Furthermore, it is your responsibility to use the product in an appropriate manner. This product is designed for use solely in industrial and laboratory environments or, if expressly permitted, also in the field and must not be used in any way that may cause personal injury or property damage. You are responsible if the product is used for any purpose other than its designated purpose or in disregard of the manufacturer's instructions. The manufacturer shall assume no responsibility for such use of the product.

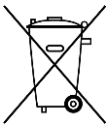
The product is used for its designated purpose if it is used in accordance with its product documentation and within its performance limits (see data sheet, documentation, the following safety instructions). Using the product requires technical skills and, in some cases, a basic knowledge of English. It is therefore essential that only skilled and specialized staff or thoroughly trained personnel with the required skills be allowed to use the product. If personal safety gear is required for using Rohde & Schwarz products, this will be indicated at the appropriate place in the product documentation. Keep the basic safety instructions and the product documentation in a safe place and pass them on to the subsequent users.

Observing the safety instructions will help prevent personal injury or damage of any kind caused by dangerous situations. Therefore, carefully read through and adhere to the following safety instructions before and when using the product. It is also absolutely essential to observe the additional safety instructions on personal safety, for example, that appear in relevant parts of the product documentation. In these safety instructions, the word "product" refers to all merchandise sold and distributed by the Rohde & Schwarz group of companies, including instruments, systems and all accessories. For product-specific information, see the data sheet and the product documentation.

Safety labels on products

The following safety labels are used on products to warn against risks and dangers.

Symbol	Meaning	Symbol	Meaning
	Notice, general danger location Observe product documentation		ON/OFF Power
	Caution when handling heavy equipment		Standby indication
	Danger of electric shock		Direct current (DC)

Symbol	Meaning	Symbol	Meaning
	Caution ! Hot surface		Alternating current (AC)
	Protective conductor terminal To identify any terminal which is intended for connection to an external conductor for protection against electric shock in case of a fault, or the terminal of a protective earth		Direct/alternating current (DC/AC)
	Earth (Ground)		Class II Equipment to identify equipment meeting the safety requirements specified for Class II equipment (device protected by double or reinforced insulation)
	Frame or chassis Ground terminal		EU labeling for batteries and accumulators For additional information, see section "Waste disposal/Environmental protection", item 1.
	Be careful when handling electrostatic sensitive devices		EU labeling for separate collection of electrical and electronic devices For additional information, see section "Waste disposal/Environmental protection", item 2.
	Warning! Laser radiation For additional information, see section "Operation", item 7.		

Signal words and their meaning

The following signal words are used in the product documentation in order to warn the reader about risks and dangers.

DANGER Indicates a hazardous situation which, if not avoided, will result in death or serious injury.

WARNING Indicates a hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

NOTICE Indicates information considered important, but not hazard-related, e.g. messages relating to property damage.
In the product documentation, the word ATTENTION is used synonymously.

These signal words are in accordance with the standard definition for civil applications in the European Economic Area. Definitions that deviate from the standard definition may also exist in other economic areas or military applications. It is therefore essential to make sure that the signal words described here are always used only in connection with the related product documentation and the related product. The use of signal words in connection with unrelated products or documentation can result in misinterpretation and in personal injury or material damage.

Operating states and operating positions

The product may be operated only under the operating conditions and in the positions specified by the manufacturer, without the product's ventilation being obstructed. If the manufacturer's specifications are not observed, this can result in electric shock, fire and/or serious personal injury or death. Applicable local or national safety regulations and rules for the prevention of accidents must be observed in all work performed.

1. Unless otherwise specified, the following requirements apply to Rohde & Schwarz products: predefined operating position is always with the housing floor facing down, IP protection 2X, use only indoors, max. operating altitude 2000 m above sea level, max. transport altitude 4500 m above sea level. A tolerance of ±10 % shall apply to the nominal voltage and ±5 % to the nominal frequency, overvoltage category 2, pollution degree 2.
2. Do not place the product on surfaces, vehicles, cabinets or tables that for reasons of weight or stability are unsuitable for this purpose. Always follow the manufacturer's installation instructions when installing the product and fastening it to objects or structures (e.g. walls and shelves). An installation that is not carried out as described in the product documentation could result in personal injury or even death.
3. Do not place the product on heat-generating devices such as radiators or fan heaters. The ambient temperature must not exceed the maximum temperature specified in the product documentation or in the data sheet. Product overheating can cause electric shock, fire and/or serious personal injury or even death.

Electrical safety

If the information on electrical safety is not observed either at all or to the extent necessary, electric shock, fire and/or serious personal injury or death may occur.

1. Prior to switching on the product, always ensure that the nominal voltage setting on the product matches the nominal voltage of the mains-supply network. If a different voltage is to be set, the power fuse of the product may have to be changed accordingly.
2. In the case of products of safety class I with movable power cord and connector, operation is permitted only on sockets with a protective conductor contact and protective conductor.
3. Intentionally breaking the protective conductor either in the feed line or in the product itself is not permitted. Doing so can result in the danger of an electric shock from the product. If extension cords or connector strips are implemented, they must be checked on a regular basis to ensure that they are safe to use.
4. If there is no power switch for disconnecting the product from the mains, or if the power switch is not suitable for this purpose, use the plug of the connecting cable to disconnect the product from the mains. In such cases, always ensure that the power plug is easily reachable and accessible at all times. For example, if the power plug is the disconnecting device, the length of the connecting cable must not exceed 3 m. Functional or electronic switches are not suitable for providing disconnection from the AC supply network. If products without power switches are integrated into racks or systems, the disconnecting device must be provided at the system level.
5. Never use the product if the power cable is damaged. Check the power cables on a regular basis to ensure that they are in proper operating condition. By taking appropriate safety measures and carefully laying the power cable, ensure that the cable cannot be damaged and that no one can be hurt by, for example, tripping over the cable or suffering an electric shock.

6. The product may be operated only from TN/TT supply networks fuse-protected with max. 16 A (higher fuse only after consulting with the Rohde & Schwarz group of companies).
7. Do not insert the plug into sockets that are dusty or dirty. Insert the plug firmly and all the way into the socket provided for this purpose. Otherwise, sparks that result in fire and/or injuries may occur.
8. Do not overload any sockets, extension cords or connector strips; doing so can cause fire or electric shocks.
9. For measurements in circuits with voltages V_{rms} > 30 V, suitable measures (e.g. appropriate measuring equipment, fuse protection, current limiting, electrical separation, insulation) should be taken to avoid any hazards.
10. Ensure that the connections with information technology equipment, e.g. PCs or other industrial computers, comply with the IEC 60950-1 / EN 60950-1 or IEC 61010-1 / EN 61010-1 standards that apply in each case.
11. Unless expressly permitted, never remove the cover or any part of the housing while the product is in operation. Doing so will expose circuits and components and can lead to injuries, fire or damage to the product.
12. If a product is to be permanently installed, the connection between the protective conductor terminal on site and the product's protective conductor must be made first before any other connection is made. The product may be installed and connected only by a licensed electrician.
13. For permanently installed equipment without built-in fuses, circuit breakers or similar protective devices, the supply circuit must be fuse-protected in such a way that anyone who has access to the product, as well as the product itself, is adequately protected from injury or damage.
14. Use suitable overvoltage protection to ensure that no overvoltage (such as that caused by a bolt of lightning) can reach the product. Otherwise, the person operating the product will be exposed to the danger of an electric shock.
15. Any object that is not designed to be placed in the openings of the housing must not be used for this purpose. Doing so can cause short circuits inside the product and/or electric shocks, fire or injuries.
16. Unless specified otherwise, products are not liquid-proof (see also section "Operating states and operating positions", item 1). Therefore, the equipment must be protected against penetration by liquids. If the necessary precautions are not taken, the user may suffer electric shock or the product itself may be damaged, which can also lead to personal injury.
17. Never use the product under conditions in which condensation has formed or can form in or on the product, e.g. if the product has been moved from a cold to a warm environment. Penetration by water increases the risk of electric shock.
18. Prior to cleaning the product, disconnect it completely from the power supply (e.g. AC supply network or battery). Use a soft, non-linting cloth to clean the product. Never use chemical cleaning agents such as alcohol, acetone or diluents for cellulose lacquers.

Operation

1. Operating the products requires special training and intense concentration. Make sure that persons who use the products are physically, mentally and emotionally fit enough to do so; otherwise, injuries or material damage may occur. It is the responsibility of the employer/operator to select suitable personnel for operating the products.

2. Before you move or transport the product, read and observe the section titled "Transport".
3. As with all industrially manufactured goods, the use of substances that induce an allergic reaction (allergens) such as nickel cannot be generally excluded. If you develop an allergic reaction (such as a skin rash, frequent sneezing, red eyes or respiratory difficulties) when using a Rohde & Schwarz product, consult a physician immediately to determine the cause and to prevent health problems or stress.
4. Before you start processing the product mechanically and/or thermally, or before you take it apart, be sure to read and pay special attention to the section titled "Waste disposal/Environmental protection", item 1.
5. Depending on the function, certain products such as RF radio equipment can produce an elevated level of electromagnetic radiation. Considering that unborn babies require increased protection, pregnant women must be protected by appropriate measures. Persons with pacemakers may also be exposed to risks from electromagnetic radiation. The employer/operator must evaluate workplaces where there is a special risk of exposure to radiation and, if necessary, take measures to avert the potential danger.
6. Should a fire occur, the product may release hazardous substances (gases, fluids, etc.) that can cause health problems. Therefore, suitable measures must be taken, e.g. protective masks and protective clothing must be worn.
7. Laser products are given warning labels that are standardized according to their laser class. Lasers can cause biological harm due to the properties of their radiation and due to their extremely concentrated electromagnetic power. If a laser product (e.g. a CD/DVD drive) is integrated into a Rohde & Schwarz product, absolutely no other settings or functions may be used as described in the product documentation. The objective is to prevent personal injury (e.g. due to laser beams).
8. EMC classes (in line with EN 55011/CISPR 11, and analogously with EN 55022/CISPR 22, EN 55032/CISPR 32)
   - Class A equipment:
     Equipment suitable for use in all environments except residential environments and environments that are directly connected to a low-voltage supply network that supplies residential buildings
     Note: Class A equipment is intended for use in an industrial environment. This equipment may cause radio disturbances in residential environments, due to possible conducted as well as radiated disturbances. In this case, the operator may be required to take appropriate measures to eliminate these disturbances.
   - Class B equipment:
     Equipment suitable for use in residential environments and environments that are directly connected to a low-voltage supply network that supplies residential buildings

Repair and service

1. The product may be opened only by authorized, specially trained personnel. Before any work is performed on the product or before the product is opened, it must be disconnected from the AC supply network. Otherwise, personnel will be exposed to the risk of an electric shock.

2. Adjustments, replacement of parts, maintenance and repair may be performed only by electrical experts authorized by Rohde & Schwarz. Only original parts may be used for replacing parts relevant to safety (e.g. power switches, power transformers, fuses). A safety test must always be performed after parts relevant to safety have been replaced (visual inspection, protective conductor test, insulation resistance measurement, leakage current measurement, functional test). This helps ensure the continued safety of the product.

Batteries and rechargeable batteries/cells

If the information regarding batteries and rechargeable batteries/cells is not observed either at all or to the extent necessary, product users may be exposed to the risk of explosions, fire and/or serious personal injury, and, in some cases, death. Batteries and rechargeable batteries with alkaline electrolytes (e.g. lithium cells) must be handled in accordance with the EN 62133 standard.

1. Cells must not be taken apart or crushed.
2. Cells or batteries must not be exposed to heat or fire. Storage in direct sunlight must be avoided. Keep cells and batteries clean and dry. Clean soiled connectors using a dry, clean cloth.
3. Cells or batteries must not be short-circuited. Cells or batteries must not be stored in a box or in a drawer where they can short-circuit each other, or where they can be short-circuited by other conductive materials. Cells and batteries must not be removed from their original packaging until they are ready to be used.
4. Cells and batteries must not be exposed to any mechanical shocks that are stronger than permitted.
5. If a cell develops a leak, the fluid must not be allowed to come into contact with the skin or eyes. If contact occurs, wash the affected area with plenty of water and seek medical aid.
6. Improperly replacing or charging cells or batteries that contain alkaline electrolytes (e.g. lithium cells) can cause explosions. Replace cells or batteries only with the matching Rohde & Schwarz type (see parts list) in order to ensure the safety of the product.
7. Cells and batteries must be recycled and kept separate from residual waste. Rechargeable batteries and normal batteries that contain lead, mercury or cadmium are hazardous waste. Observe the national regulations regarding waste disposal and recycling.

Transport

1. The product may be very heavy. Therefore, the product must be handled with care. In some cases, the user may require a suitable means of lifting or moving the product (e.g. with a lift-truck) to avoid back or other physical injuries.
2. Handles on the products are designed exclusively to enable personnel to transport the product. It is therefore not permissible to use handles to fasten the product to or on transport equipment such as cranes, fork lifts, wagons, etc. The user is responsible for securely fastening the products to or on the means of transport or lifting. Observe the safety regulations of the manufacturer of the means of transport or lifting. Noncompliance can result in personal injury or material damage.
3. If you use the product in a vehicle, it is the sole responsibility of the driver to drive the vehicle safely and properly. The manufacturer assumes no responsibility for accidents or collisions. Never use the product in a moving vehicle if doing so could distract the driver of the vehicle. Adequately secure the product in the vehicle to prevent injuries or other damage in the event of an accident.

Waste disposal/Environmental protection

1. Specially marked equipment has a battery or accumulator that must not be disposed of with unsorted municipal waste, but must be collected separately. It may only be disposed of at a suitable collection point or via a Rohde & Schwarz customer service center.
2. Waste electrical and electronic equipment must not be disposed of with unsorted municipal waste, but must be collected separately.
   Rohde & Schwarz GmbH & Co. KG has developed a disposal concept and takes full responsibility for take-back obligations and disposal obligations for manufacturers within the EU. Contact your Rohde & Schwarz customer service center for environmentally responsible disposal of the product.
3. If products or their components are mechanically and/or thermally processed in a manner that goes beyond their intended use, hazardous substances (heavy-metal dust such as lead, beryllium, nickel) may be released. For this reason, the product may only be disassembled by specially trained personnel. Improper disassembly may be hazardous to your health. National waste disposal regulations must be observed.
4. If handling the product releases hazardous substances or fuels that must be disposed of in a special way, e.g. coolants or engine oils that must be replenished regularly, the safety instructions of the manufacturer of the hazardous substances or fuels and the applicable regional waste disposal regulations must be observed. Also observe the relevant safety instructions in the product documentation. The improper disposal of hazardous substances or fuels can cause health problems and lead to environmental damage.

For additional information about environmental protection, visit the Rohde & Schwarz website.

Instrucciones de seguridad elementales

¡Es imprescindible leer y cumplir las siguientes instrucciones e informaciones de seguridad!

El principio del grupo de empresas Rohde & Schwarz consiste en tener nuestros productos siempre al día con los estándares de seguridad y de ofrecer a nuestros clientes el máximo grado de seguridad. Nuestros productos y todos los equipos adicionales son siempre fabricados y examinados según las normas de seguridad vigentes. Nuestro sistema de garantía de calidad controla constantemente que sean cumplidas estas normas. El presente producto ha sido fabricado y examinado según el certificado de conformidad de la UE y ha salido de nuestra planta en estado impecable según los estándares técnicos de seguridad. Para poder preservar este estado y garantizar un funcionamiento libre de peligros, el usuario deberá atenerse a todas las indicaciones, informaciones de seguridad y notas de alerta. El grupo de empresas Rohde & Schwarz está siempre a su disposición en caso de que tengan preguntas referentes a estas informaciones de seguridad.

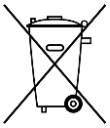
Además queda en la responsabilidad del usuario utilizar el producto en la forma debida. Este producto está destinado exclusivamente al uso en la industria y el laboratorio o, si ha sido expresamente autorizado, para aplicaciones de campo y de ninguna manera deberá ser utilizado de modo que alguna persona/cosa pueda sufrir daño. El uso del producto fuera de sus fines definidos o sin tener en cuenta las instrucciones del fabricante queda en la responsabilidad del usuario. El fabricante no se hace en ninguna forma responsable de consecuencias a causa del mal uso del producto.

Se parte del uso correcto del producto para los fines definidos si el producto es utilizado conforme a las indicaciones de la correspondiente documentación del producto y dentro del margen de rendimiento definido (ver hoja de datos, documentación, informaciones de seguridad que siguen). El uso del producto hace necesarios conocimientos técnicos y ciertos conocimientos del idioma inglés. Por eso se debe tener en cuenta que el producto solo pueda ser operado por personal especializado o personas instruidas en profundidad con las capacidades correspondientes. Si fuera necesaria indumentaria de seguridad para el uso de productos de Rohde & Schwarz, encontraría la información debida en la documentación del producto en el capítulo correspondiente. Guarde bien las informaciones de seguridad elementales, así como la documentación del producto, y entréguelas a usuarios posteriores.

Tener en cuenta las informaciones de seguridad sirve para evitar en lo posible lesiones o daños por peligros de toda clase. Por eso es imprescindible leer detalladamente y comprender por completo las siguientes informaciones de seguridad antes de usar el producto, y respetarlas durante el uso del producto. Deberán tenerse en cuenta todas las demás informaciones de seguridad, como p. ej. las referentes a la protección de personas, que encontrarán en el capítulo correspondiente de la documentación del producto y que también son de obligado cumplimiento. En las presentes informaciones de seguridad se recogen todos los objetos que distribuye el grupo de empresas Rohde & Schwarz bajo la denominación de "producto", entre ellos también aparatos, instalaciones así como toda clase de accesorios. Los datos específicos del producto figuran en la hoja de datos y en la documentación del producto.

Señalización de seguridad de los productos

Las siguientes señales de seguridad se utilizan en los productos para advertir sobre riesgos y peligros.

Símbolo	Significado	Símbolo	Significado
	Aviso: punto de peligro general Observar la documentación del producto		Tensión de alimentación de PUESTA EN MARCHA / PARADA
	Atención en el manejo de dispositivos de peso elevado		Indicación de estado de espera (standby)
	Peligro de choque eléctrico		Corriente continua (DC)
	Advertencia: superficie caliente		Corriente alterna (AC)
	Conexión a conductor de protección		Corriente continua / Corriente alterna (DC/AC)
	Conexión a tierra		El aparato está protegido en su totalidad por un aislamiento doble (reforzado)
	Conexión a masa		Distintivo de la UE para baterías y acumuladores Más información en la sección "Eliminación/protección del medio ambiente", punto 1.

Símbolo	Significado	Símbolo	Significado
	Aviso: Cuidado en el manejo de dispositivos sensibles a la electrostática (ESD)		Distintivo de la UE para la eliminación por separado de dispositivos eléctricos y electrónicos Más información en la sección "Eliminación/protección del medio ambiente", punto 2.
	Advertencia: rayo láser Más información en la sección "Funcionamiento", punto 7.		

Palabras de señal y su significado

En la documentación del producto se utilizan las siguientes palabras de señal con el fin de advertir contra riesgos y peligros.

Indica una situación de peligro que, si no se evita, causa lesiones graves o incluso la muerte.

Indica una situación de peligro que, si no se evita, puede causar lesiones graves o incluso la muerte.

Indica una situación de peligro que, si no se evita, puede causar lesiones leves o moderadas.

Indica información que se considera importante, pero no en relación con situaciones de peligro; p. ej., avisos sobre posibles daños materiales.
En la documentación del producto se emplea de forma sinónima el término CUIDADO.

Las palabras de señal corresponden a la definición habitual para aplicaciones civiles en el área económica europea. Pueden existir definiciones diferentes a esta definición en otras áreas económicas o en aplicaciones militares. Por eso se deberá tener en cuenta que las palabras de señal aquí descritas sean utilizadas siempre solamente en combinación con la correspondiente documentación del producto y solamente en combinación con el producto correspondiente. La utilización de las palabras de señal en combinación con productos o documentaciones que no les correspondan puede llevar a interpretaciones equivocadas y tener por consecuencia daños en personas u objetos.

Estados operativos y posiciones de funcionamiento

El producto solamente debe ser utilizado según lo indicado por el fabricante respecto a los estados operativos y posiciones de funcionamiento sin que se obstruya la ventilación. Si no se siguen las indicaciones del fabricante, pueden producirse choques eléctricos, incendios y/o lesiones graves con posible consecuencia de muerte. En todos los trabajos deberán ser tenidas en cuenta las normas nacionales y locales de seguridad del trabajo y de prevención de accidentes.

1. Si no se convino de otra manera, es para los productos Rohde & Schwarz válido lo que sigue: como posición de funcionamiento se define por principio la posición con el suelo de la caja para abajo, modo de protección IP 2X, uso solamente en estancias interiores, utilización hasta 2000 m sobre el nivel del mar, transporte hasta 4500 m sobre el nivel del mar. Se aplicará una tolerancia de ±10 % sobre el voltaje nominal y de ±5 % sobre la frecuencia nominal. Categoría de sobrecarga eléctrica 2, índice de suciedad 2.
2. No sitúe el producto encima de superficies, vehículos, estantes o mesas, que por sus características de peso o de estabilidad no sean aptos para él. Siga siempre las instrucciones de instalación del fabricante cuando instale y asegure el producto en objetos o estructuras (p. ej. paredes y estantes). Si se realiza la instalación de modo distinto al indicado en la documentación del producto, se pueden causar lesiones o, en determinadas circunstancias, incluso la muerte.
3. No ponga el producto sobre aparatos que generen calor (p. ej. radiadores o calefactores). La temperatura ambiente no debe superar la temperatura máxima especificada en la documentación del producto o en la hoja de datos. En caso de sobrecalentamiento del producto, pueden producirse choques eléctricos, incendios y/o lesiones graves con posible consecuencia de muerte.

Seguridad eléctrica

Si no se siguen (o se siguen de modo insuficiente) las indicaciones del fabricante en cuanto a seguridad eléctrica, pueden producirse choques eléctricos, incendios y/o lesiones graves con posible consecuencia de muerte.

1. Antes de la puesta en marcha del producto se deberá comprobar siempre que la tensión preseleccionada en el producto coincida con la de la red de alimentación eléctrica. Si es necesario modificar el ajuste de tensión, también se deberán cambiar en caso dado los fusibles correspondientes del producto.
2. Los productos de la clase de protección I con alimentación móvil y enchufe individual solamente podrán enchufarse a tomas de corriente con contacto de seguridad y con conductor de protección conectado.
3. Queda prohibida la interrupción intencionada del conductor de protección, tanto en la toma de corriente como en el mismo producto. La interrupción puede tener como consecuencia el riesgo de que el producto sea fuente de choques eléctricos. Si se utilizan cables alargadores o regletas de enchufe, deberá garantizarse la realización de un examen regular de los mismos en cuanto a su estado técnico de seguridad.
4. Si el producto no está equipado con un interruptor para desconectarlo de la red, o bien si el interruptor existente no resulta apropiado para la desconexión de la red, el enchufe del cable de conexión se deberá considerar como un dispositivo de desconexión.
   El dispositivo de desconexión se debe poder alcanzar fácilmente y debe estar siempre bien accesible. Si, p. ej., el enchufe de conexión a la red es el dispositivo de desconexión, la longitud del cable de conexión no debe superar 3 m).
   Los interruptores selectores o electrónicos no son aptos para el corte de la red eléctrica. Si se integran productos sin interruptor en bastidores o instalaciones, se deberá colocar el interruptor en el nivel de la instalación.
5. No utilice nunca el producto si está dañado el cable de conexión a red. Compruebe regularmente el correcto estado de los cables de conexión a red. Asegúrese, mediante las medidas de protección y de instalación adecuadas, de que el cable de conexión a red no pueda ser dañado o de que nadie pueda ser dañado por él, p. ej. al tropezar o por un choque eléctrico.

6. Solamente está permitido el funcionamiento en redes de alimentación TN/TT aseguradas con fusibles de 16 A como máximo (utilización de fusibles de mayor amperaje solo previa consulta con el grupo de empresas Rohde & Schwarz).
7. Nunca conecte el enchufe en tomas de corriente sucias o llenas de polvo. Introduzca el enchufe por completo y fuertemente en la toma de corriente. La no observación de estas medidas puede provocar chispas, fuego y/o lesiones.
8. No sobrecargue las tomas de corriente, los cables alargadores o las regletas de enchufe ya que esto podría causar fuego o choques eléctricos.
9. En las mediciones en circuitos de corriente con una tensión U_{eff} > 30 V se deberán tomar las medidas apropiadas para impedir cualquier peligro (p. ej. medios de medición adecuados, seguros, limitación de tensión, corte protector, aislamiento etc.).
10. Para la conexión con dispositivos informáticos como un PC o un ordenador industrial, debe comprobarse que éstos cumplan los estándares IEC60950-1/EN60950-1 o IEC61010-1/EN 61010-1 válidos en cada caso.
11. A menos que esté permitido expresamente, no retire nunca la tapa ni componentes de la carcasa mientras el producto esté en servicio. Esto pone a descubierto los cables y componentes eléctricos y puede causar lesiones, fuego o daños en el producto.
12. Si un producto se instala en un lugar fijo, se deberá primero conectar el conductor de protección fijo con el conductor de protección del producto antes de hacer cualquier otra conexión. La instalación y la conexión deberán ser efectuadas por un electricista especializado.
13. En el caso de dispositivos fijos que no estén provistos de fusibles, interruptor automático ni otros mecanismos de seguridad similares, el circuito de alimentación debe estar protegido de modo que todas las personas que puedan acceder al producto, así como el producto mismo, estén a salvo de posibles daños.
14. Todo producto debe estar protegido contra sobretensión (debida p. ej. a una caída del rayo) mediante los correspondientes sistemas de protección. Si no, el personal que lo utilice quedará expuesto al peligro de choque eléctrico.
15. No debe introducirse en los orificios de la caja del aparato ningún objeto que no esté destinado a ello. Esto puede producir cortocircuitos en el producto y/o puede causar choques eléctricos, fuego o lesiones.
16. Salvo indicación contraria, los productos no están impermeabilizados (ver también el capítulo "Estados operativos y posiciones de funcionamiento", punto 1). Por eso es necesario tomar las medidas necesarias para evitar la entrada de líquidos. En caso contrario, existe peligro de choque eléctrico para el usuario o de daños en el producto, que también pueden redundar en peligro para las personas.
17. No utilice el producto en condiciones en las que pueda producirse o ya se hayan producido condensaciones sobre el producto o en el interior de éste, como p. ej. al desplazarlo de un lugar frío a otro caliente. La entrada de agua aumenta el riesgo de choque eléctrico.
18. Antes de la limpieza, desconecte por completo el producto de la alimentación de tensión (p. ej. red de alimentación o batería). Realice la limpieza de los aparatos con un paño suave, que no se deshilache. No utilice bajo ningún concepto productos de limpieza químicos como alcohol, acetona o diluyentes para lacas nitrocelulósicas.

Funcionamiento

1. El uso del producto requiere instrucciones especiales y una alta concentración durante el manejo. Debe asegurarse que las personas que manejen el producto estén a la altura de los requerimientos necesarios en cuanto a aptitudes físicas, psíquicas y emocionales, ya que de otra manera no se pueden excluir lesiones o daños de objetos. El empresario u operador es responsable de seleccionar el personal usuario apto para el manejo del producto.
2. Antes de desplazar o transportar el producto, lea y tenga en cuenta el capítulo "Transporte".
3. Como con todo producto de fabricación industrial no puede quedar excluida en general la posibilidad de que se produzcan alergias provocadas por algunos materiales empleados —los llamados alérgenos (p. ej. el níquel)—. Si durante el manejo de productos Rohde & Schwarz se producen reacciones alérgicas, como p. ej. irritaciones cutáneas, estornudos continuos, enrojecimiento de la conjuntiva o dificultades respiratorias, debe avisarse inmediatamente a un médico para investigar las causas y evitar cualquier molestia o daño a la salud.
4. Antes de la manipulación mecánica y/o térmica o el desmontaje del producto, debe tenerse en cuenta imprescindiblemente el capítulo "Eliminación/protección del medio ambiente", punto 1.
5. Ciertos productos, como p. ej. las instalaciones de radiocomunicación RF, pueden a causa de su función natural, emitir una radiación electromagnética aumentada. Deben tomarse todas las medidas necesarias para la protección de las mujeres embarazadas. También las personas con marcapasos pueden correr peligro a causa de la radiación electromagnética. El empresario/operador tiene la obligación de evaluar y señalizar las áreas de trabajo en las que exista un riesgo elevado de exposición a radiaciones.
6. Tenga en cuenta que en caso de incendio pueden desprenderse del producto sustancias tóxicas (gases, líquidos etc.) que pueden generar daños a la salud. Por eso, en caso de incendio deben usarse medidas adecuadas, como p. ej. máscaras antigás e indumentaria de protección.
7. Los productos con láser están provistos de indicaciones de advertencia normalizadas en función de la clase de láser del que se trate. Los rayos láser pueden provocar daños de tipo biológico a causa de las propiedades de su radiación y debido a su concentración extrema de potencia electromagnética. En caso de que un producto Rohde & Schwarz contenga un producto láser (p. ej. un lector de CD/DVD), no debe usarse ninguna otra configuración o función aparte de las descritas en la documentación del producto, a fin de evitar lesiones (p. ej. debidas a irradiación láser).
8. Clases de compatibilidad electromagnética (conforme a EN 55011 / CISPR 11; y en analogía con EN 55022 / CISPR 22, EN 55032 / CISPR 32)
   - Aparato de clase A:
     Aparato adecuado para su uso en todos los entornos excepto en los residenciales y en aquellos conectados directamente a una red de distribución de baja tensión que suministra corriente a edificios residenciales.
     Nota: Los aparatos de clase A están destinados al uso en entornos industriales. Estos aparatos pueden causar perturbaciones radioeléctricas en entornos residenciales debido a posibles perturbaciones guiadas o radiadas. En este caso, se le podrá solicitar al operador que tome las medidas adecuadas para eliminar estas perturbaciones.
   - Aparato de clase B:
     Aparato adecuado para su uso en entornos residenciales, así como en aquellos conectados directamente a una red de distribución de baja tensión que suministra corriente a edificios residenciales.

Reparación y mantenimiento

1. El producto solamente debe ser abierto por personal especializado con autorización para ello. Antes de manipular el producto o abrirlo, es obligatorio desconectarlo de la tensión de alimentación, para evitar toda posibilidad de choque eléctrico.
2. El ajuste, el cambio de partes, el mantenimiento y la reparación deberán ser efectuadas solamente por electricistas autorizados por Rohde & Schwarz. Si se reponen partes con importancia para los aspectos de seguridad (p. ej. el enchufe, los transformadores o los fusibles), solamente podrán ser sustituidos por partes originales. Después de cada cambio de partes relevantes para la seguridad deberá realizarse un control de seguridad (control a primera vista, control del conductor de protección, medición de resistencia de aislamiento, medición de la corriente de fuga, control de funcionamiento). Con esto queda garantizada la seguridad del producto.

Baterías y acumuladores o celdas

Si no se siguen (o se siguen de modo insuficiente) las indicaciones en cuanto a las baterías y acumuladores o celdas, pueden producirse explosiones, incendios y/o lesiones graves con posible consecuencia de muerte. El manejo de baterías y acumuladores con electrolitos alcalinos (p. ej. celdas de litio) debe seguir el estándar EN 62133.

1. No deben desmontarse, abrirse ni triturarse las celdas.
2. Las celdas o baterías no deben someterse a calor ni fuego. Debe evitarse el almacenamiento a la luz directa del sol. Las celdas y baterías deben mantenerse limpias y secas. Limpiar las conexiones sucias con un paño seco y limpio.
3. Las celdas o baterías no deben cortocircuitarse. Es peligroso almacenar las celdas o baterías en estuches o cajones en cuyo interior puedan cortocircuitarse por contacto recíproco o por contacto con otros materiales conductores. No deben extraerse las celdas o baterías de sus embalajes originales hasta el momento en que vayan a utilizarse.
4. Las celdas o baterías no deben someterse a impactos mecánicos fuertes indebidos.
5. En caso de falta de estanqueidad de una celda, el líquido vertido no debe entrar en contacto con la piel ni los ojos. Si se produce contacto, lavar con agua abundante la zona afectada y avisar a un médico.
6. En caso de cambio o recarga inadecuados, las celdas o baterías que contienen electrolitos alcalinos (p. ej. las celdas de litio) pueden explotar. Para garantizar la seguridad del producto, las celdas o baterías solo deben ser sustituidas por el tipo Rohde & Schwarz correspondiente (ver lista de recambios).
7. Las baterías y celdas deben reciclarse y no deben tirarse a la basura doméstica. Las baterías o acumuladores que contienen plomo, mercurio o cadmio deben tratarse como residuos especiales. Respete en esta relación las normas nacionales de eliminación y reciclaje.

Transporte

1. El producto puede tener un peso elevado. Por eso es necesario desplazarlo o transportarlo con precaución y, si es necesario, usando un sistema de elevación adecuado (p. ej. una carretilla elevadora), a fin de evitar lesiones en la espalda u otros daños personales.

2. Las asas instaladas en los productos sirven solamente de ayuda para el transporte del producto por personas. Por eso no está permitido utilizar las asas para la sujeción en o sobre medios de transporte como p. ej. grúas, carretillas elevadoras de horquilla, carros etc. Es responsabilidad suya fijar los productos de manera segura a los medios de transporte o elevación. Para evitar daños personales o daños en el producto, siga las instrucciones de seguridad del fabricante del medio de transporte o elevación utilizado.
3. Si se utiliza el producto dentro de un vehículo, recae de manera exclusiva en el conductor la responsabilidad de conducir el vehículo de manera segura y adecuada. El fabricante no asumirá ninguna responsabilidad por accidentes o colisiones. No utilice nunca el producto dentro de un vehículo en movimiento si esto pudiera distraer al conductor. Asegure el producto dentro del vehículo debidamente para evitar, en caso de un accidente, lesiones u otra clase de daños.

Eliminación/protección del medio ambiente

1. Los dispositivos marcados contienen una batería o un acumulador que no se debe desechar con los residuos domésticos sin clasificar, sino que debe ser recogido por separado. La eliminación se debe efectuar exclusivamente a través de un punto de recogida apropiado o del servicio de atención al cliente de Rohde & Schwarz.
2. Los dispositivos eléctricos usados no se deben desechar con los residuos domésticos sin clasificar, sino que deben ser recogidos por separado.
   Rohde & Schwarz GmbH & Co.KG ha elaborado un concepto de eliminación de residuos y asume plenamente los deberes de recogida y eliminación para los fabricantes dentro de la UE. Para desechar el producto de manera respetuosa con el medio ambiente, diríjase a su servicio de atención al cliente de Rohde & Schwarz.
3. Si se trabaja de manera mecánica y/o térmica cualquier producto o componente más allá del funcionamiento previsto, pueden liberarse sustancias peligrosas (polvos con contenido de metales pesados como p. ej. plomo, berilio o níquel). Por eso el producto solo debe ser desmontado por personal especializado con formación adecuada. Un desmontaje inadecuado puede ocasionar daños para la salud. Se deben tener en cuenta las directivas nacionales referentes a la eliminación de residuos.
4. En caso de que durante el trato del producto se formen sustancias peligrosas o combustibles que deban tratarse como residuos especiales (p. ej. refrigerantes o aceites de motor con intervalos de cambio definidos), deben tenerse en cuenta las indicaciones de seguridad del fabricante de dichas sustancias y las normas regionales de eliminación de residuos. Tenga en cuenta también en caso necesario las indicaciones de seguridad especiales contenidas en la documentación del producto. La eliminación incorrecta de sustancias peligrosas o combustibles puede causar daños a la salud o daños al medio ambiente.

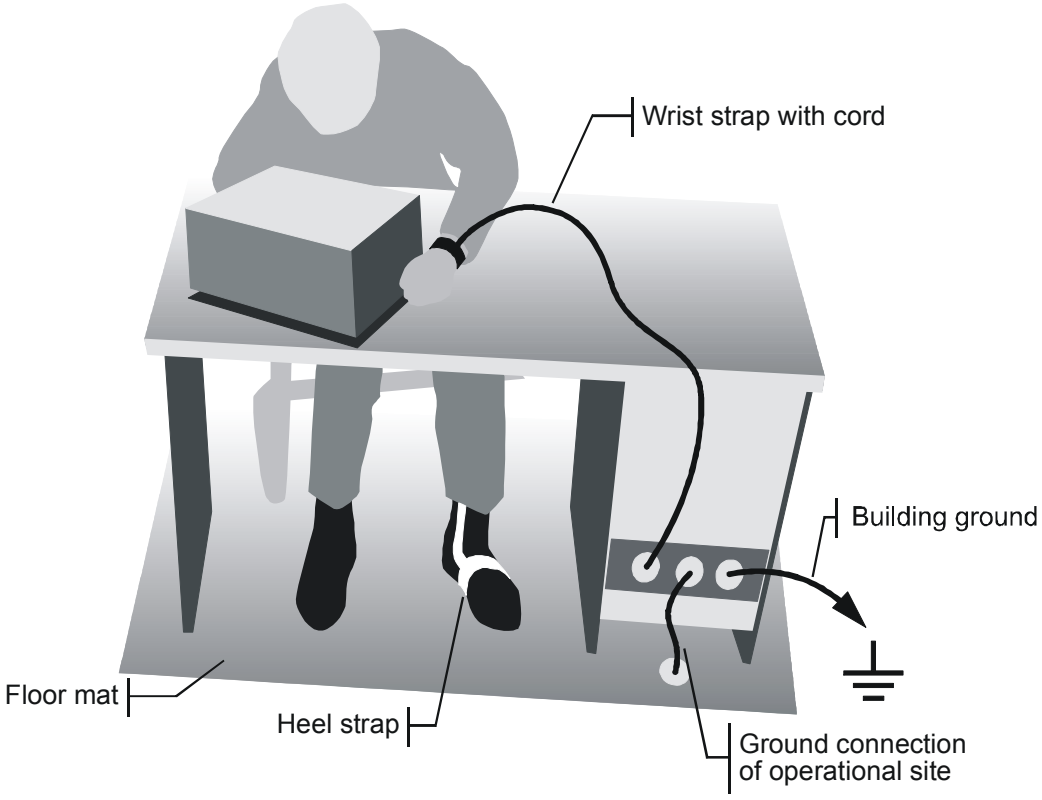
Se puede encontrar más información sobre la protección del medio ambiente en la página web de Rohde & Schwarz.

Instructions for Electrostatic Discharge Protection

NOTICE

Risk of damaging electronic components

To avoid damage of electronic components, the operational site must be protected against electrostatic discharge (ESD).



The following two methods of ESD protection may be used together or separately:

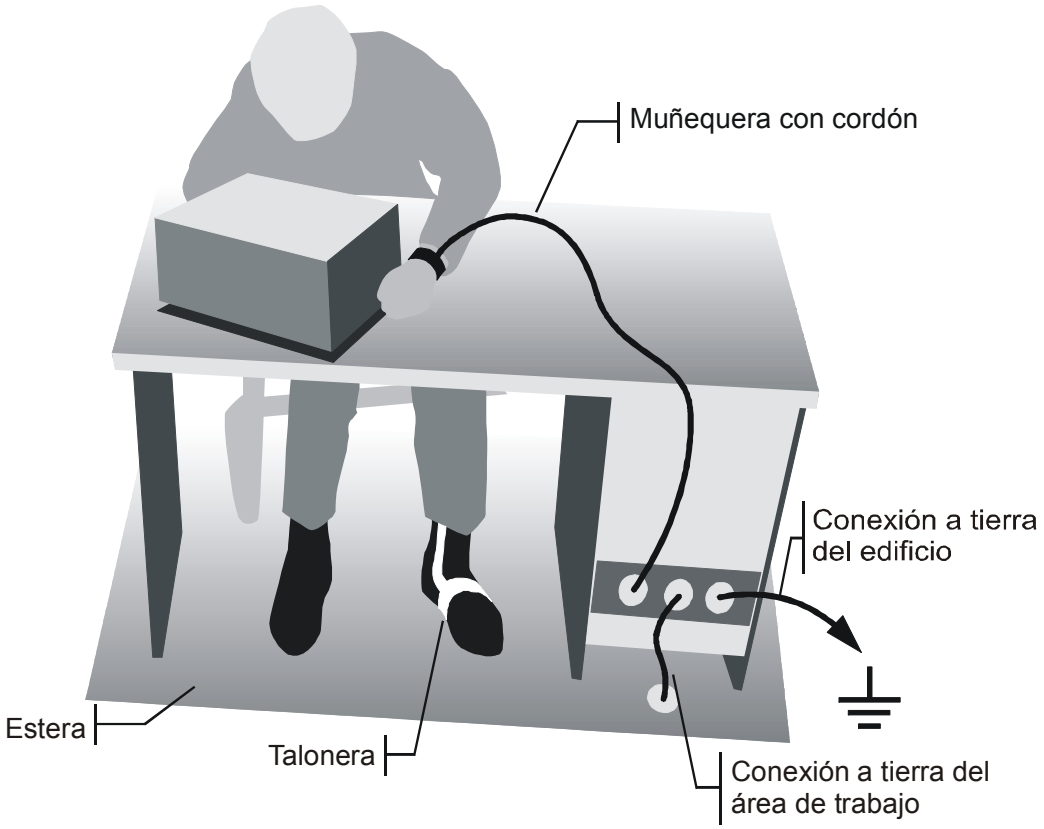
- Wrist strap with cord to ground connection
- Conductive floor mat and heel strap combination

Instrucciones para la protección contra descargas electroestáticas

AVISO

Riesgo de avería de los componentes electrónicos

Para evitar averías en los componentes electrónicos, el área de trabajo tiene que estar protegido contra descargas electroestáticas ESD (electrostatic discharge).



Los siguientes dos métodos de protección ESD pueden ser usados juntos o separados:

- Muñequera con cordón para conexión a tierra
- Combinación de estera antiestática y talonera

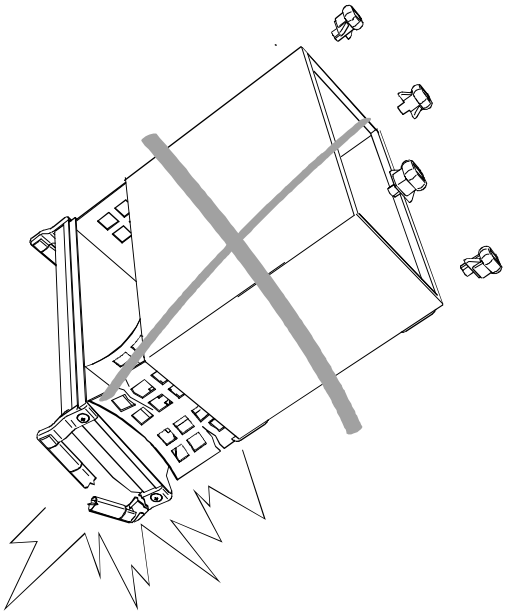
Safety Instructions for Units with Removable Cabinet

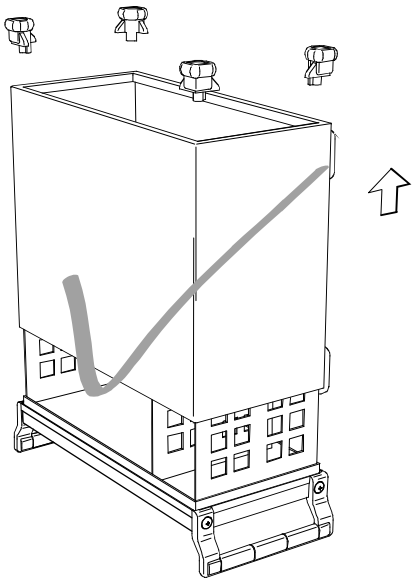
⚠ WARNING

Danger of injuries

When removing the rear feet, the unit can slip out of the cabinet.

Put the unit onto the front handles, before removing the rear feet and taking off the cabinet. Thus the risk of personal injuries and damages to the unit is avoided.





When mounting the cabinet take care not to pen in the fingers. Also pay attention not to damage or pull off cables. Screw the rear feet back on immediately after mounting the cabinet. Do not move the unit with the rear feet missing.

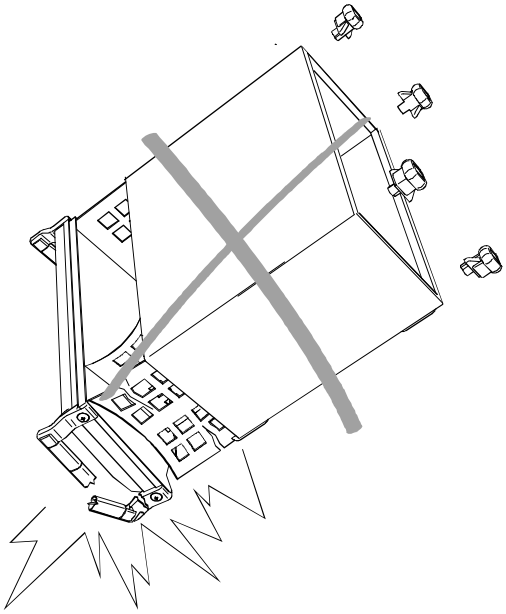
Informaciones de seguridad para aparatos con tubo de quita y pon

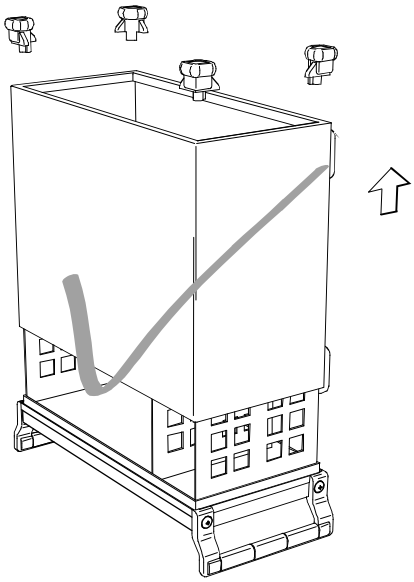
⚠ ADVERTENCIA

Peligro de heridas

Al sacar los piés de la pared posterior puede deslizarse el aparato fuera de la caja.

Posicionar el aparato de manera segura sobre las asas delanteras, antes de sacar los piés de la pared posterior y entonces sacar la caja. De esta manera evitarán el riesgo de daños en personas y daños en el aparato.





Existe el riesgo de heridas en el momento de poner otra vez la caja, como por ejemplo posiblemente engancharse los dedos. Por favor tengan además en cuenta de que no se enganchen o desconecten cables. Por favor atornillen los piés de la pared posterior directamente despues de poner la caja. No muevan el aparato nunca sin que los piés de la pared posterior estén atornillados.

Procedure in Case of Service and Ordering of Spare Parts

This section contains information on shipping an instrument to your service center and ordering spare parts.

Please contact your local Rohde & Schwarz service center if you need service or repair work of your equipment or to order spare parts. You can find the current address of your representative on our homepage www.rohde-schwarz.com.

Shipping the Instrument

We require the following information in order to answer your inquiry fast and correctly and to determine whether the warranty is still valid for your instrument:

- Instrument model
- Serial number
- Firmware version
- Must the instrument be returned with this firmware?
- Detailed error description in case of repair
- Indication of desired calibration
- Contact person for possible questions

In some countries, an RMA process is available for the return shipment of the instrument. For details, contact your local representative.

When shipping the instrument, be careful to provide for sufficient mechanical and antistatic protection.

- Use the original packaging for transporting or shipping the instrument. The protective caps for the front and rear prevent damage to the operating elements and the connectors.
- If you do not use the original packaging, provide for sufficient padding to prevent the instrument from slipping inside the box. Wrap antistatic packing foil around the instrument to protect it from electrostatic charging.

Rohde & Schwarz offers repair and calibrations of the test systems it produces. The calibration documentation fulfills ISO 17025 requirements.

Shipping Defective Modules

Also when shipping a module, be careful to provide for sufficient mechanical and antistatic protection.

- Ship the module in a sturdy, padded box.
- Wrap the module in antistatic foil.

If the packaging is only antistatic but not conductive, additional conductive packaging is required. The additional packaging is not required if the tightly fitting packaging is conductive.

Exception:
If the module contains a battery, the tightly fitting packaging must always consist of antistatic, non-chargeable material to protect the battery from being discharged.

Ordering Spare Parts

To deliver spare parts promptly and correctly, we need the following information:

- Stock number (see list of spare parts in chapter "Documents")
- Designation
- Component number according to list of spare parts
- Number of pieces
- Instrument type for which the spare part is needed
- Instrument stock number
- Instrument serial number
- Contact person for possible questions

Refurbished Modules

Refurbished modules are an economical alternative to original modules. Bear in mind that refurbished modules are not new, but repaired and fully tested parts. They may have traces from use, but they are electrically and mechanically equivalent to new modules.

Your Rohde & Schwarz representative will be happy to inform you about which modules are available as refurbished modules.

Taking Back Defective Replaced Modules

Defective modules of the replacement program which cannot be repaired are taken back within three months following delivery. A repurchasing value is credited.

Excluded are parts which cannot be repaired, e.g. printed boards that are burnt, broken or damaged by attempts to repair them, incomplete modules, and parts with severe mechanical damage.

Please return the defective replacement modules, together with the accompanying document for returned merchandise, which you received with the spare module. We need the following information:

- Stock number, serial number and designation of the removed part
- Detailed error description
- Stock number, serial number and type of instrument from which the module was removed
- Date of removal
- Name of the engineer/technician who replaced the module
- R&S ordering number
- Service reference number (if available)

Contents of the Manuals for the R&S SMU200A

Service manual - instrument

This service manual for the instrument contains information on checking specs, instrument alignment, repairs and troubleshooting. The service manual – instrument contains all the information you will need to repair the instrument by means of board replacement.

The service manual has four chapters and an annex (Chapter 5) which contains the instrument documentation:

Chapter 1 Contains all the information you will need to check specs and lists the test equipment required.

Chapter 2 Describes the manual alignment of the frequency and DC measurement accuracy, automatic alignment after board replacement and also system error calibration.

Chapter 3 Describes the instrument design and simple repair and troubleshooting strategies. Board replacement plays a key role.

Chapter 4 Contains information on expansions and modifications achieved by updating instrument software and by retrofitting options.

Chapter 5 Describes how to return the instrument and order spare parts. It also contains spare parts lists and exploded diagrams of the instrument.

Operating manual

The operating manual contains all the information you will need about the technical characteristics of the instrument, putting the instrument into operation, the basic operating procedures, controls and displays, menu operation and remote control.

By way of an introduction, typical measurement tasks are explained using menu screen-shots and program examples.

The operating manual also contains notes on maintenance and explains how to troubleshoot faults using the warnings and error messages output by the instrument.

Tabbed Divider Overview

Procedure in Case of Service and Ordering of Spare Parts

Contents of the Service Manual for the Vector Signal Generator R&S SMU200A

Tabbed Divider

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Contents - Chapter 1 "Performance Test"

1 Checking the Rated Characteristics

This performance test describes the steps for testing the R&S SMU Signal Generator family and the installed options with respect to function and compliance with specifications.
The R&S SMU Signal Generator family comprises the following instruments:

Table 1-1 **Vector Signal Generator Family**

Instrument	R&S Order No.
R&S SMU200A	1141.2005.02
R&S SMATE200A	1400.7005.02
R&S SMJ100A	1403.4507.02

In the following, the term DUT (Device Under Test) is used for any signal generator of this family. All option names are abbreviated in such a way that only the extension is given. For example, option R&S B106 denotes R&S B106, R&S B106 or B106 depending on the instrument.
The tests to be performed depend on the installed options. The values are given in the data sheet of the respective instrument.

Measuring Equipment and Accessories

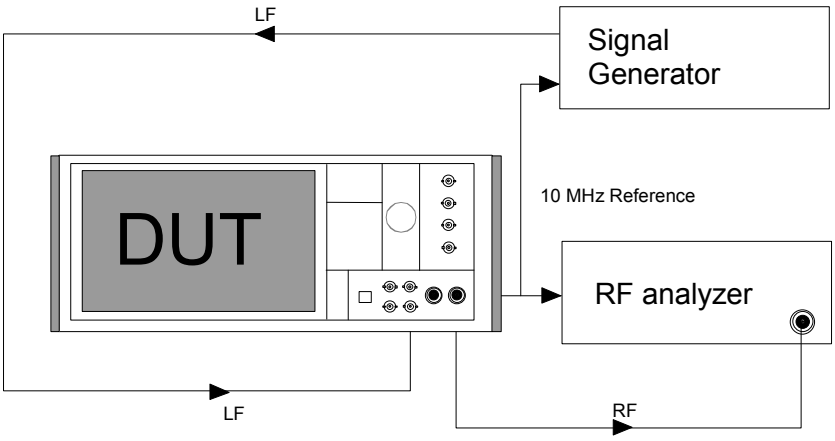
Table 1-2 **Measuring equipment and accessories**

Item	Type of Instrument	Required Characteristics	Suitable Instrument	R&S Order No.
1	Frequency counter (included in item 24)	1 Hz to RF_{max}, resolution 0.1 Hz		
2	Reference source for SSB noise measurements	Low SSB noise, frequency range up to RF_{max}	Reference Synthesizer	1158.2878
3	Storage oscilloscope	300 M samples/s, two channels		
4	Controller	Industry standard PC/XT/AT with IEC-60625 interface and USB interface	R&S PSM17	1116.5004.70
5	Signal generator	0.1 MHz to RF_{max}	R&S SMU with options R&S B106, -B10, -B13, -B31, -K43, -K61, - B17	1141.2005.02
6	Phase noise test assembly	Mixer: 10 MHz to RF_{max}, branching filter 2 MHz, preamplifier with gain of approx. 30 dB, input noise < 2 nV (1 Hz), DC decoupling after mixer for oscilloscope		
7	Oscilloscope (usually included in item 3)	Bandwidth > 100 MHz, two channels with DC coupling		
8	RF power meter	100 kHz to RF_{max}	R&S NRVS with R&S NRV-Z5	1020.1809.02 0828.3818.02
10	Low-noise preamplifier	100 kHz to RF_{max}, gain > 20 dB, noise figure < 10 dB		

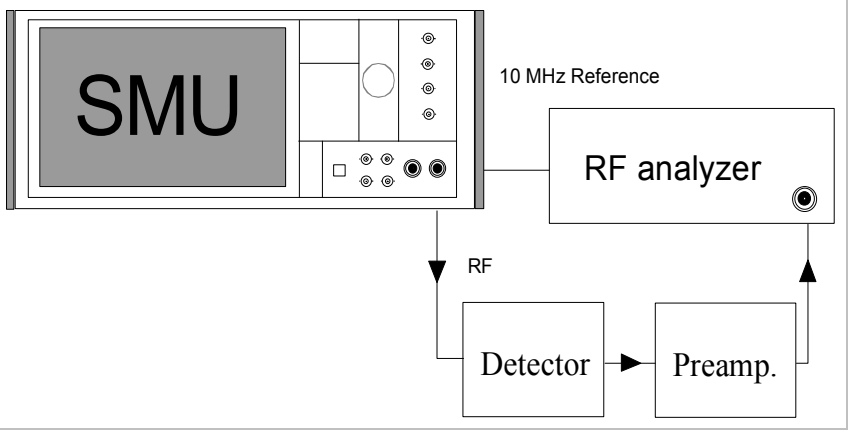
Item	Type of Instrument	Required Characteristics	Suitable Instrument	R&S Order No.
11	VSWR bridge	100 MHz to RF_{max} directivity > 30 dB	Agilent 773D	
12	DC voltage source	Setting range 0 to 10 V	R&S NGMD35	0117.7127.02
13	RF power amplifier	10 MHz to RF_{max}, power > 33 dBm		
17	Pulse generator	Pulse repetition frequency up to 100 kHz		
18	Arbitrary wave generator	two channels	included in R&S SMU (item 5)	
19	AC/DC voltmeter	10 Hz to 8 MHz	R&S URE3	350.5315.03
20	Broadband FM demodulator	included in spectrum analyzer item 24		
21	RF attenuator	DC to RF_{max}, 10 dB, system N	R&S DNF	0272.4210.50
22	RF attenuator	DC to RF_{max}, 3 dB, system N	R&S DNF	0272.4010.50
24	RF analyzer & Demodulator for digital modulations & FM-demodulator	Error vector measurement	R&S FSQ26 equipped with options R&S FSQ-K70 R&S FS-K5 R&S FS-K7	1155.5001.26 1161.8038.02 1141.1496.02 1141.1796.02
25	Program for simulation of digital modulations	Generation of data for ARB generator	R&S WinIQSIM, included in item 5	
27	Feed-through termination	50 Ω, BNC system	R&S RAD	0289.8966.00
28	Zero Bias Schottky Detecor	50 Ω	Krytar 202S	
29	FHOP-Bus generator	Generation of clock, data and strobe for FHOP-Bus	For example the printer port of a PC with software	
30	DX DIGITAL I/Q-KABEL	TVR290 Digital Interface Connection Cable (26 pin Mini D Ribbon Cable 14526-EZHB-XXX-0QC)		1402.4990.00

Test Assemblies

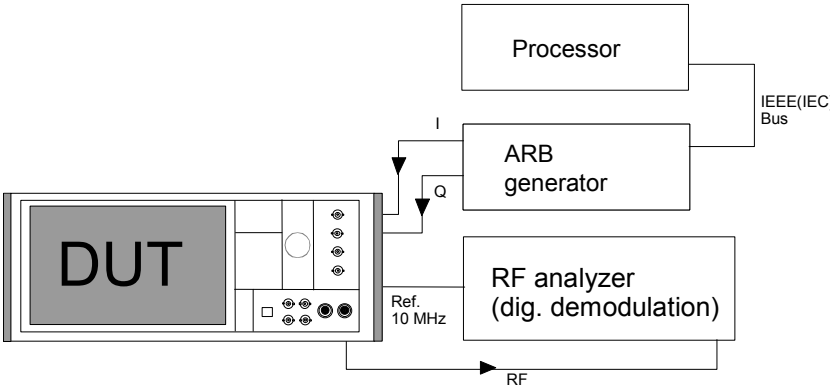
Standard Test Assembly for Analog Modulations

Test equipment	- RF analyzer (Table 1-1, item 7) - Signal generator (Table 1-1, item 5)
Test setup	The RF analyzer is used as a modulation analyzer. The signal generator is used as modulation source in case of external modulation.
	

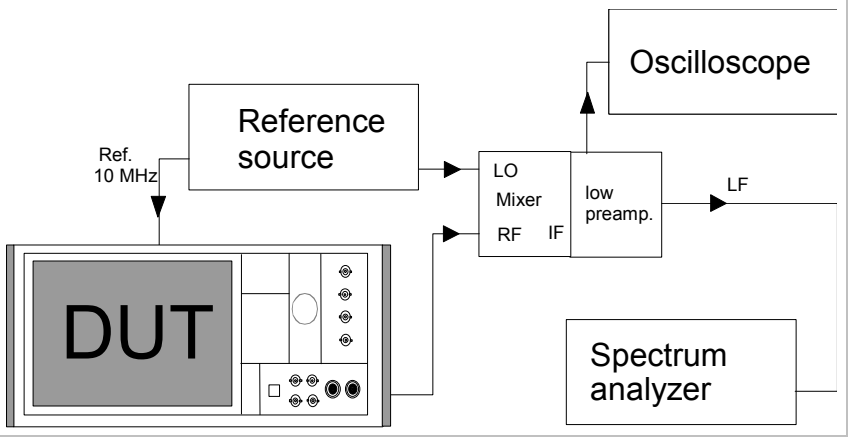
Test Assembly for Residual AM

Test equipment	- RF analyzer (Table 1-1, item 7) - Zero Bias Schottky Detecor (Table 1-1, item 28) - Low Noise Preamplifier 10 Hz – 30 kHz, >30 dB Gain - Signal generator (Table 1-1, item 5)
Test setup	

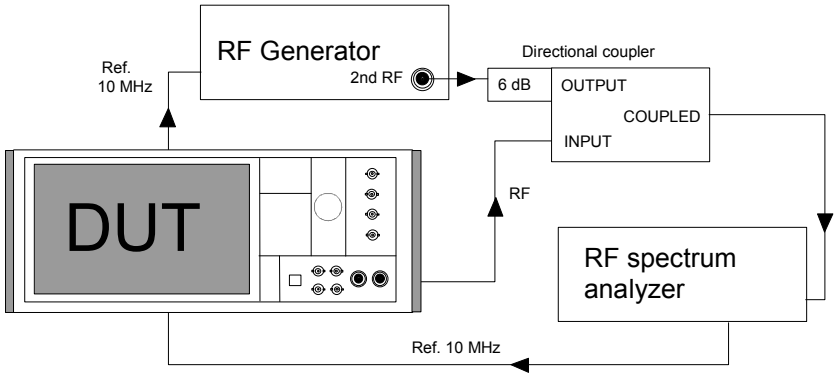
Test Assembly for I/Q Modulation

Test equipment	➢ - Demodulator for digital modulation (Table 1-2, item 23) ➢ - Arbitrary waveform generator (Table 1-1, item 24) ➢ - Program for simulation of digital modulations (Table 1-1, item 25) ➢ - Controller to industry standard (Table 1-1, item 4)
Test setup	

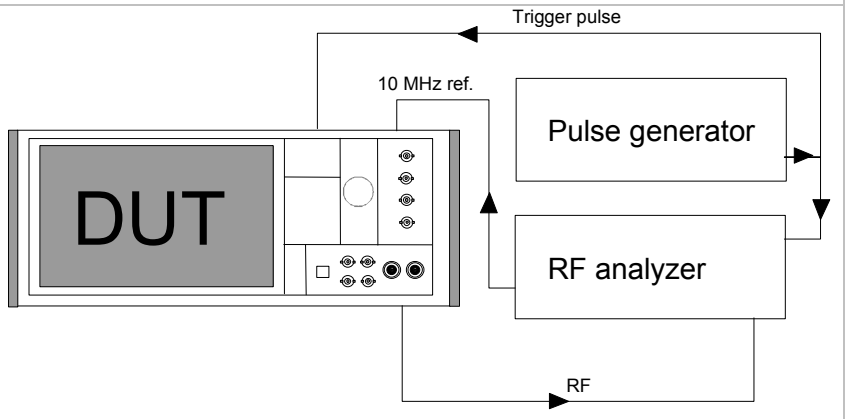
Test Assembly for SSB Phase Noise

Test equipment	- SSB reference source (Table 1-2 item 2), - Phase noise test assembly consisting of mixer with lowpass filter and preamplifier (Table 1-1 item 6) - Oscilloscope (Table 1-1 item 7) - Spectrum analyzer (Table 1-1 item 24)
Test setup	

Test Assembly for Output Impedance (VSWR)

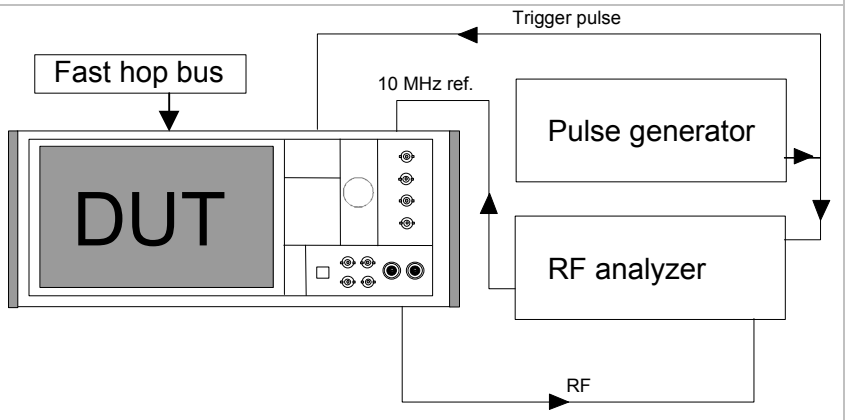
Test equipment	- VSWR bridge (Table 1-2, item 26), - Second signal generator (Table 1-1, item 5) - Spectrum analyzer (Table 1-1, item 24)
Test setup	
	Note: *The INPUT of the directional coupler is directly screwed to the DUT. The second test transmitter is connected to the line connector (OUTPUT), the analyzer to the coupling output (COUPLED) of the directional coupler.*

Test Assembly for Settling Time

Test equipment	- Spectrum analyzer (Table 1-2, item 24) - Pulse generator (Table 1-2, item 17)
Test setup	

Test Assembly for Settling Time with Fast Hopp Bus

Note: *R&S SMATE only*

Test equipment	- Spectrum analyzer (Table 1-2, item 24) - Pulse generator (Table 1-2, item 17) - FHOP-Bus generator (Table 1-2, item 29)
Test setup	

The Fast Hop control signals (clock, strobe and data) are supplied via the serial FHOP bus on the **Digital I/O** interface at the rear of the instrument. Data transmission starts with the MSB (most significant bit). A strobe marks the LSB (least significant bit) and thus the end of a valid data sequence (40 bits). The data bits determine the RF path, the Fast Hop mode (direct or not) and the processed list index.

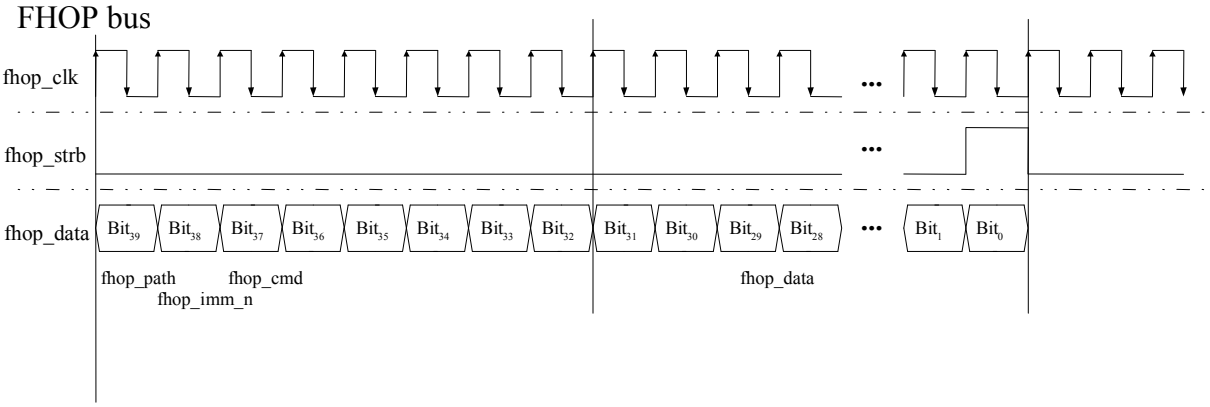


Fig. 1-1 Input control signals for List Modes Fast Hop and Fast Hop Direct on the serial FHOP bus of the Digital I/O interface.

Table 1-3 Function of data bits of FHOP bus (fhop_data line, see following figure) and their function for controlling fast frequency hopping

Data bit name (bit number)	**Function**
path (39)	Selects RF path: 0 = RF path A; 1 = RF path B
imm_n (38)	Selects Fast Hop mode: 0 = Fast Hop Direct (the selected settings are performed at once after data transfer of a complete sequence (40 bits) without additional triggering) 1 = Fast Hop (the selected settings are performed after an instrument trigger)
cmd (37 to 32)	Selects function for fast hop mode. Bit 32 must be set to 1 (= List Mode) Bit 37 to 33 must be set to 0 (= reserved for future extensions)
data (31 to 0)	Data bits Determine the list index (frequency/level setting) to be processed for List Mode

Preparation, Recommended Test Frequencies and Levels

To ensure proper conditions for the performance test and prevent setting errors, the instrument must be prepared as follows:

- Allow for a minimum **warm-up time of 30 minutes** at ambient temperature.
- Carry out all **internal adjustments** (see operating manual, chapter 4, section "Internal Adjustment - Setup-System").
- Press PRESET to establish a defined **initial** state before configuring a new measurement.

The following sections describe the **procedures** for checking the rated values. The **values** are specified in the **data sheet.** Additional uncertainties introduced by the measurement equipment must be taken into account when checking the rated values.

The following table lists the important internal switchpoint frequencies and the recommended measurement frequencies derived from these frequencies. We recommend measurements at these frequencies unless particular test frequencies are specified. In the following, RF_{max} is the maximal settable RF (depending on installed options).

Table 1-4 Range limits, main test frequencies

Range	Frequency/ MHz	Hardware switching points	Recommended test frequencies in MHz
Mixer	0.3 to 200		0.3, 0.5, 1, 2, 5, 10, 20, 50, 100, 199.9
Divider /4	>200 to 375	Lowpass filter 285 MHz	200.1, 280, 290, 374.9
Divider /2	>375 to 750	Lowpass filters, 436, 705.0 MHz	375.1, 435.9, 436.10, 704.9, 705.1, 749.9
Base octave	>750 to 1500	Lowpass filter, 1110 MHz, Oscillator limits 890, 1070, 1285 MHz	750.1, 889.9, 890.1, 1069.9, 1070.1, 1109.9, 1110.1, 1284.9, 1285.1, 1499.9
Doubler	>1500 to 3000	Lowpass filter, 1809.0 MHz	1500.1, 1808.9, 1809.1, 2999.9
R&S B106	>3000 to 6000	Bandpass filters 3780, 4500, 4760	3000.1, 3779.9, 3780.1, 4399.9, 4400.1, 4759.9, 4760.1, 6000

For **high-resolution measurements** in the entire frequency range, a logarithmic frequency grid in 1-2-5 sequence is recommended up to 50 MHz; above this value, linear 50 MHz steps should be used up to the upper limit frequency.

The recommended **test levels** are at the upper and lower switching threshold of the attenuator. The electronic attenuator of the DUT is switched depending on frequency, modulation parameters and level according to an internal stored table in approximately 5 dB steps. The switching thresholds can be detected under **Attenuator fixed range** in the **Level** menu. After setting all other parameters, the threshold level can be detected by level variation. The level at which the attenuator fixed range changes is the threshold. By measuring at the last level setting of one range and the first level setting of the next range, the internal setting range borders are used. In the following, P_{min} is the lowest level before switching the attenuator, and P_{max} the highest. For best measurement results, levels at the crossover from 0 to 5 dB attenuation are recommended.

Test Procedures

Reference Frequency

Output of Internal Reference

Important: *Allow the DUT to warm up for at least 2 hours before the measurement.*

Test equipment	- RF power meter (Table 1-2, item 8) - Frequency counter (Table 1-1, item 1)
Test setup	Connect an RF power meter to the REF OUT output (on rear panel).
Measurement	➢ Measure the output level. It should be within ±3 dB of the data sheet specifications.
Test setup	➢ Connect a calibrated frequency counter to the REF OUT output (on rear panel).
Measurement	➢ Measure the frequency. ⇨ The frequency deviation must not exceed the sum of deviations resulting from the frequency error in the rated temperature range and from aging.

Input for External Reference

Test equipment	- Frequency counter (Table 1-2, item 1) - Signal generator (Table 1-1, item 5)
Test setup	➢ Connect the signal generator to the REF IN input for the external reference (on rear panel) and connect a calibrated frequency counter to the RF output.
Measurement	➢ Measure the frequency with the setting **Reference Oscillator Settings/Source External.** ⇨ *The pull-in range has to be tested only at 10 MHz input frequency by measuring the output frequency (e.g. at 1 GHz). There must be no relative frequency error and no error message. At the other input frequencies, a function test at nominal frequency is sufficient. The level of the signal generator has to be varied over the specified range.*

Frequency

Frequency Setting

Test equipment	Frequency counter (Table 1-2, item 1)
Test method	The frequency setting is checked using a frequency counter whose reference frequency is in sync with that of the DUT.
Measurement	➢ Setting on DUT: - **Frequency**: test frequency unmodulated, recommended frequencies: according to Table 1-4 - **Level**: 0 dBm ⇨ The measured values must be exactly within the framework of the counter resolution.

Settling Time

Test assembly	See section "*Test Assembly for Settling Time*", page *1.5*. For measuring after IEC/IEEE bus delimiter the EOI-line of the IEC/IEEE bus is used as trigger signal instead of the pulse generator.
Test method	The spectrum analyzer is operated as an FM demodulator. A controller transmits the start and the stop frequency via the IEC/IEEE bus. The analyzer is triggered by the positive edge on the EOI line of the IEC/IEEE bus or the trigger pulse in list mode. At switch over from start to stop frequency, the settling procedure is displayed on the screen of the analyzer.
Preparation of measurement	➢ Synchronize the reference frequencies of the DUT and the analyzer. ➢ Make IEC/IEEE bus and RF connections. ➢ Connect trigger connector to EOI line (pin 5) of IEC/IEEE bus. ➢ Settings on DUT: - **Frequency**: start frequency unmodulated, - **Level**: 0 dBm ➢ Settings on spectrum analyzer: - AMPT/REF LEVEL 0 dBm - FREQ/CENTER/STOP FREQUENCY - FM DEMOD ON - DEMOD BW 100 kHz - RANGE /DEVIATION PER DIV 200 Hz - MEAS TIME 5 ms, 10 ms with ALC State Off
Measurement	➢ Settings on analyzer: TRIGGER EXTERN - External triggering by positive edge at 1.4 V. ➢ Send the stop frequency from the controller. ⇨ The settling curve is displayed on the screen of the externally triggered analyzer. The time for reaching the specified deviation can be determined by using the cursor. ➢ Repeat the measurement with the start and the stop frequency inter-changed.

Measurements in List mode	➢ Connect pulse generator as trigger source to the INSTR TRIG connector of DUT, analyzer and oscilloscope. External triggering at 1.4 V, positive edge. ➢ Settings on DUT: - In the List mode, generate a list containing the two test frequencies F1 and F2 with a level of 0 dBm each. - Set operating mode to **External Step**. ➢ Settings on spectrum analyzer: – Set DEMOD BW to 200 kHz – Set MEAS TIME to 1 ms ➢ Settings on pulse generator: - single shot ➢ With each pulse from the pulse generator, frequency toggles from F1 to F2 and reverse. ⇨ The settling curve is displayed on the screen of the externally triggered analyzer. Using the cursor, the time for reaching the specified deviation can be determined.
Measurements in Fast hopp mode	➢ Connect pulse generator as trigger source to the INSTR TRIG connector of DUT, analyzer and oscilloscope. External triggering at 1.4 V, positive edge. ➢ Connect FHOP generator to FHOP_CLK / DATA / STRB connectors of DUT. ➢ Settings on DUT: - In the List mode, generate a list containing the two test frequencies F1 and F2 with a level of 0 dBm each. - Set operating mode to **Fast Hopp Bus**. ➢ Settings on spectrum analyzer: – Set DEMOD BW to 200 kHz – Set MEAS TIME to 1 ms ➢ Settings on pulse generator: - single shot ➢ Adress list elements 0 and 1 alternately with the FHOP bus. Mode Fast Hop (FHOP_IMM_N = 1; default) must be selected, then release a trigger pulse. With each pulse, the frequency hops from F1 to F2 and back. ⇨ The settling curve is displayed on the screen of the externally triggered analyzer. Using the cursor, the time for reaching the specified deviation can be determined.
	⇨ Measure the following steps in both directions, when triggering from EOI with ALC set to ON and to OFF, S & H:

F1/MHz	F2/MHz
199	201
749	751
1499	1501 without, 1540 with option -B22
2999	3001
3779	3781
4399	4401
4759	6000

Spectral Purity

Harmonics

Test equipment	Spectrum analyzer (Table 1-2, item 24)
Test setup	Connect the spectrum analyzer to the RF output of the DUT. ➢ Synchronize reference frequencies of analyzer and DUT.
Recommended settings on the spectrum analyzer	➢ Reference level = test level + 3 dB, 10 dB/div. Span 0 Hz, Resolution bandwidth 1 kHz, Video bandwidth 30 Hz, Sample detector
Note: *These values are typical values that depend on the analyzer used.* *The necessary measurement resolution must be verified prior to the measurement.*	
Recommended frequencies	➢ According to Table 1-4
Measurement	➢ Settings on DUT: - **Frequency:** test frequencies, unmodulated - **Level:** $level_{max}$ according to data sheet (depending on configuration of the unit) ➢ First measure the level of the fundamental as a reference. Then find signals at twice and three times the carrier frequency. ⇨ The harmonic spacing is the measured level referred to the fundamental (dBc = referred to the carrier).

Subharmonics

Test equipment	Same as for harmonics suppression
Test setup	Same as for harmonics suppression
Recommended frequencies	➢ 1501 MHz, 1550 MHz to 6000 MHz in 50 MHz steps
Measurement	➢ First the level of the fundamental is measured as reference, then a signal is searched for at 0.5*test frequency and 1.5*test frequency. ⇨ The subharmonic spacing is the measured level referred to the reference level (dBc = referred to the carrier).

Nonharmonics

Test equipment	Same as for harmonics
Test setup	Same as for harmonics
Measurement	➢ Setting on analyzer: AMPT/MIXER/MIXER LVL MANUAL –5 dBm ➢ First the level is measured at the test frequency as reference, then a signal is searched for at the analyzer frequency. ⇨ The nonharmonic spacing is the measured level referred to the reference level (dBc = referred to the carrier).
	Note: *Some of the nonharmonics suppression values to be measured are outside analyzer specifications. In case of doubt, the measurement should be repeated with a 3 dB attenuator at the analyzer input. If the nonharmonic spacing changes, the nonharmonic comes from the analyzer.*

Recommended settings and sampling frequencies:

Nonharmonics of the synthesis without option R&S B22 at test level 3.0 dBm, unmodulated

Setting on DUT Frequency in MHz	**Analyzer search frequency in MHz**
984.001	987.557
1007.6443	1007.6515
1027.155	1027.20444
1144.005	1144.055
1253.0	1265.2
1401.26	1401.3074
1499.02379	1499.03469
1696.853	1696.8639
1849.5328	1849.5438
2696.296	2696.3058

Nonharmonics of output mixer without option R&S B22, test level P_{max}, unmodulated

Setting on DUT Frequency in MHz	**Analyzer search frequency in MHz**
200.0	1240.00
200.0	640.00
200.0	440.00
200.0	240.00

Setting on DUT Frequency in MHz	Analyzer search frequency in MHz
200.0	40.00
200.0	160.00
200.0	360.00
172.0	180.00
172.0	8.00
172.0	164.00
152.0	128.00
152.0	24.00
200.0	1040.00 at P_{min}

Nonharmonics of output mixer with option R&S B22, test level P_{max}, unmodulated

Setting on DUT Frequency in MHz	Analyzer search frequency in MHz
750.08	750.00
800.08	800.00
proceed in 50 MHz steps up to	
1450.08	1450.00
1000.00	1018.18
1499.92	1500.00
1538.469258	1538.619798
1592.58110430	1592.82240430
1632.762933	1633.031073
1687.354142	1687.645892
1700.94616990	1700.47315990
1746.74317	1746.93182
1719.096818	1719.678558
1786.29022436	1786.89326436
1800.28930450	1800.72343450
1806.873895	1807.078775
1828.65883132	1828,81149132
1834.39736688	1834.59060688
1875.38113408	1875.47165408
1879.75989280	1880.57816280

Setting on DUT Frequency in MHz	**Analyzer search frequency in MHz**
1990.39112151	1990.48938151
1924.53660942	1924.75680942
2040.13419274	2039.79070274
2043.92934349	2044.11700349
2104.44390554	2106.01121554
2110.663972	2111.026712
2163.630319	2163.796569
2167.27616036	2168.19042036
2210.14856183	2210.25761183
2356.00000	2356.54075
2684.95121340	2684.61542340
2985.158823	2985.300303
1.00	1201.00
152.00	288.00
152.00	136.00
180.00	300.00
180.00	120.00
180.00	60.00
198.00	210.00
198.00	120.00
198.00	186.00
198.00	1200.00 at P_{min}

Non-systematic nonharmonics

Measurement	Settings on DUT: - Test frequencies 93, 520, 749, 751, 1499, 1501, 2500, 3000, 3001, 4399, 4400, 5499, 6000 MHz - Test levels P_{min} unmodulated and P_{min} with I/Q modulation, dc input at max. level Recommended settings on analyzer: - Sample detector - Frequency far from the carrier: AMPT/MIXER/MIXER LVL MANUAL –5 dBm Resolution bandwidth 30 kHz Video bandwidth 1 kHz Span 10 MHz - Frequency at 50 kHz to 1 MHz from the carrier: Resolution bandwidth 1 kHz Video bandwidth 1 kHz ➢ Average over at least 3 sweeps.
	Note: *Some of the nonharmonics suppression values to be measured are outside analyzer specifications. In case of doubt, the measurement must be repeated with a 3 dB attenuator at the analyzer input. If the nonharmonics suppression changes, the nonharmonics come from the analyzer. Because of the bell-shaped noise of the analyzer in the vicinity of the carrier, smaller resolution bandwidths may have to be used.*

Wideband Noise

Test assembly	Connect spectrum analyzer to RF socket of the DUT.
Test method	Operate the spectrum analyzer in the CHANNEL POWER mode. Set SPAN to 400 kHz, channel bandwidth to 350 kHz, detector to RMS and MIXER LVL MANUAL to –5 dBm. For reference level measurement, set the center frequency of the analyzer to the test frequency, set the reference level to the test level, and read the channel power. Then measure the noise level by shifting the center frequency of the analyzer by the desired offset (for example 5 MHz). The channel power now displayed must be converted to 1 Hz bandwidth and referred to the reference level. By performing a measurement without input signal, input terminated with 50 Ohm, the analyzer's inherent noise can be determined and subtracted if necessary.
Measurement	➢ Determine the channel power with the center frequency of the analyzer set to the test frequency and note it down as P_{ref}. ➢ Increase the center frequency by the offset (e.g. 5 MHz). ➢ Inhibit the switching of the attenuator with AMPT RF ATTEN MANUAL without entering a value so that the input mixer is not overdriven. ➢ Lower the reference level of the analyzer by 20 dB, read the new channel power P_{noise} and note it down. ➢ Minimize the output level on the DUT by means of RF OFF, read the channel power P_{res} and note it down.
Evaluation	➢ If the power P_{res} is lower than P_{noise} by more than 0.41 dB and less than 10 dB, the inherent noise power of the analyzer can be subtracted. To this effect, convert the two power values into mW according to the formula PmW = $10^{(PdBm/10)}$, then subtract P_{res} from P_{noise}. Reconvert the corrected power into dBm according to the formula PdBm = 10*log10(PmW). ➢ If the power P_{res} is less than 0.41 dB below the power P_{noise}, the analyzer resolution is not sufficient for a precise measurement. The true result is in such case certainly more than 10 dB below the measured value. If P_{res} is more than 10 dB below P_{noise}, P_{noise} need not be corrected since the noise component of the analyzer is negligible (<0.41 dB). ➢ Convert the power P_{noise} to 1 Hz bandwidth according to the formula P1Hz = Pch - (10*log10(channel bandwidth)). ⇨The difference between the (possibly corrected) power P_{noise} in dBm and the power P_{ref} in dBm is the broadband noise floor in dBc.
➢ Recommended test frequencies	➢ See Table 1-4.
➢ Recommended test levels	➢ P_{min} with unmodulated carrier and P_{min} with I/Q modulation at full-scale level (0.5 V DC at I or Q input)

SSB Phase Noise

Test assembly	See section "*Test Assembly for SSB Phase Noise*", page *1.4*.
Test method	The two generators are set to the test frequency and synchronized with a phase offset of 90° (phase quadrature). Mixing to 0 Hz suppresses the RF carrier, and due to the phase quadrature the mixer supplies a voltage corresponding to the phase difference between the input signals. This is measured by the LF spectrum analyzer and can be converted into SSB phase noise.
Measurement	➢ Set the levels of the two generators in accordance with the specifications of the mixer used (unmodulated or I/Q modulation with max. level). ➢ For calibration, reduce the level of the DUT by 40 dB and detune one signal generator by 20 kHz. Check the signal for harmonics; the 2nd and 3rd harmonic should be more than 30 dB below the fundamental. Measure the reference value at 20 kHz at the analyzer and note it down. ➢ Set the detuned signal generator to the previous frequency and set the signal generators for phase quadrature. To this end, raise the level of the DUT to the previous level and call **Delta Phase** in the **Frequency/Phase** menu. Observe the output voltage of the mixer on the oscilloscope and vary the phase until the voltage becomes zero. ➢ Read the noise voltage, normalized to a bandwidth of 1 Hz (noise level) from the analyzer.
Evaluation	➢ Determine the difference relative to the reference level and add to the value found 6 dB for the second (correlated) sideband and 40 dB for level switchover. If the S/N ratio of the reference source is not at least 10 dB better than that of the DUT, the noise component of the reference signal generator must be determined and subtracted as well. This will apply, if one is using a second SMU as reference source instead of item 2. ⇨ The corrected S/N ratio is the wanted measured value. ***Example:*** *The measured reference level is assumed to be 12 dBm. A noise level of -78 dBm (1 Hz) is determined at 20 kHz. The difference is 90 dB, plus the correction for the second sideband (6 dB) and level switchover (40 dB), yielding an S/N ratio of -136 dB or a noise level of -136 dBc (dB referred to the carrier power). If two identical signal generators have been used, the result must be reduced by 3 dB for the (uncorrelated) noise power of the reference signal generator.* *The final result is then -139 dBc.*

Residual FM

Test assembly	See section "*Test Assembly for SSB Phase Noise*", page *1.4*.
Test Method	The Residual FM is calculated from the phase noise measurement data. The measurement setup and procedure is identical to the phase noise measurement.
Measurement	➢ Settings on DUT: - **Frequency** 1 GHz - **Level** P_{max}, unmodulated ➢ Setting on R&S FSQ analyzer: - Coupling = DC - FILTER-TYPE = FFT - RBW = 10 Hz - DETECTOR = SAMPLE Set up measurement and calibrate as described under SSB Phase Noise Measurement ➢ The Residual FM is defined as $\sigma = \sqrt{2 \cdot \int_{f\,\min}^{f\,\max} L_{\Phi}(f) \cdot f^2 df}$ with $L_{\Phi}(f)$ being the single side band phase noise. Set Analyzer Start and Stop Frequency to $F_{start} = 300Hz$ and $F_{stop} = 3kHz$ Read Trace Data $T(\mu)$ with $\mu \in [1, N]$ and $N = 625$ from R&S FSQ analyzer and calculate the summed residual FM of the DUT and the Reference Signal Generator $\sigma = \sqrt{2\sum_{\mu=1}^{N} \frac{10^{(T(\mu)-P_{ref}-46dB)/10}}{RBW} \cdot \frac{F_{stop}-F_{start}}{N} \left(F_{start} + (\mu-1) \cdot \frac{F_{stop}-F_{start}}{N-1}\right)^2}$ with P_{ref} being the reference level from the SSB Phase Noise Measurement with 40 dB reduced level with 20 kHz detuned frequency. The sum of the residual FM of the DUT and the Reference Signal Generator should be well below the guaranteed value of the DUT, so no correction of the measurement result is necessary. ➢ Repeat measurement with a test bandwidth of 20 Hz to 23 kHz in two steps: First sweep from 20 Hz to 1 kHz with a RBW of 3 Hz and then sweep from 1 kHz to 23 kHz with a RBW of 100 Hz. Calculate the Residual FM for both measurements with the formula given above. The Residual FM from 20 Hz-23 kHz is: $\sigma_{20Hz-23kHz} = \sqrt{\sigma^2_{20Hz-1kHz} + \sigma^2_{1kHz-23kHz}}$

Residual AM

Test assembly	See section "*Test Assembly for Residual AM*", page *1.3*.
Test method	The signal is AM-demodulated with a zero Bias Schottky Detector.
Measurement	➢ Settings on DUT: - **Frequency** 1 GHz - **Level** according to the mixer specification in linear range - AM-Source = internal - AM Depth = 1% - Lf-Gen-Frequency = 10 kHz - Level = 8 dBm ➢ Setting on R&S FSQ analyzer: - Coupling = DC, **an external Preamplifier with > 30dB Gain and a DC-blocking Capacitor is necessary (f_{-3dB} < 10Hz)!** - FILTER-TYPE = FFT - RBW = 100Hz - $F_{start} = 9900Hz$ - $F_{stop} = 10100Hz$ - DETECTOR = MAX PEAK ➢ Calibrate the setup: Measure power level P_{ref} [dBm] at f = 10 kHz. ➢ Switch of AM. Settings of the R&S FSQ analyzer: - RBW = 3Hz - $F_{start} = 20Hz$ - $F_{stop} = 1kHz$ - DETECTOR = SAMPLE ➢ Read Trace $T(\mu)$ with $\mu \in [1, N]$ and $N = 625$ from FSQ Analyzer. Calculate the summed power: $P = \sum_{\mu=1}^{N} \frac{10^{T(\mu)/10}}{RBW} \cdot \frac{F_{stop} - F_{start}}{N}$ ➢ Repeat Measurement with - RBW = 100Hz - $F_{start} = 1kHz$ - $F_{stop} = 23kHz$ calculate Power as above ➢ Calculate the residual AM: $AM_{residual} = \frac{1}{\sqrt{2}} \cdot \sqrt{\frac{P_{20Hz-1kHz} + P_{1kHz-23kHz}}{10^{P_{ref}/10}}} [\%]$
Test frequencies	100 MHz, 500 MHz, 1 GHz, 2.0 GHz, 3 GHz, 4.0 GHz, 6 GHz.

Level Data

Level Uncertainty

Test method	The level uncertainty is measured in two steps. First, the **frequency response** is measured at a fixed level with high frequency resolution. Then the **level dependant uncertainty** is measured at fixed frequencies over the specified range.
Test equipment	- Power meter (Table 1-2, item 8) - Spectrum analyzer (Table 1-1, item 24) - Low-noise preamplifier (Table 1-1, item 10)

Test method for levels in measurement range of power meter

Test setup	Connect power meter to RF output socket.
Measurement	➢ Setting on DUT: - **Level:** 1. the maximum specified level versus frequency, unmodulated 2. 3 dB below the maximum specified level, unmodulated 3. 0 dBm, unmodulated ➢ Measure the level at output frequencies of 300 kHz to RF_{max}. ⇨ The level error is the deviation of the measured level from the set value.
Recommended test frequencies for the level frequency response measurement	300 k, 1 M, 3 M, 5 M, 9 M, 15 M, every 10 M up to 1495 M, 1505 M, from 1520 M every 20 M up to 6000 M (all in Hz)
Recommended test frequencies and levels for the level dependant measurement.	1 MHz, 500 MHz, 1 GHz, 1.5 GHz, 2 GHz, 3 GHz, 4 GHz, 5 GHz, 6 GHz. Test level: from the maximum specified level in 5 dB steps down to the minimum specified level.

Test method for low levels

Test principle	Levels below the measurement range of the power meter can be determined by means of a relative measurement referred to the measurements performed with the power meter, using a high-linearity spectrum analyzer (digital IF). After switching the analyzer attenuator a continuity calibration is to be carried out. It is therefore recommended to switch the attenuator not until reaching approx. 50 dB under full scale, since the linearity errors are very small in the range up to -50 dBfs (referred to full scale). If the measurement is started at (P_{max} –40) dBm, no error occurs due to alternating internal impedance of the DUT.
Test setup	➢ Connect the spectrum analyzer to the RF output of the DUT with **hermetically sealed RF measurement cables**.

Measurement	➢ Settings on DUT **Frequency**: test frequency **Leve**: (P_{max} –40) dBm, unmodulated ➢ Setting on the analyzer Test frequency SPAN 0 Hz RES BW 10 Hz SWEEP TIME 500 ms Read out marker as rms summary Reference level (P_{max} –40) dBm ➢ Read the level at the analyzer and define the correction factors as a function of the frequency from the measurements performed with the power meter. ➢ Now the measurements between (P_{max} –45) dBm and (P_{max} -100) dBm can be carried out. ➢ In order to obtain enough spacing to the noise limit of the analyzer, a low-noise preamplifier (Table 1-1, item 10) is looped between the DUT and the analyzer **(Caution: hermetically sealed RF cables!)**. A continuity calibration at (P_{max} –100) dBm is thus required, the reference level of the analyzer should be set such that the measured level is close to the reference level. The sweep time is to be increased with lower levels to maintain measurement accuracy. ➢ Now the level steps down to the lowest can be measured.

Additional Uncertainty with ALC OFF, S&H

Test method	The additional level uncertainty is measured as the difference between level setting with ALC ON and ALC OFF, S&H.
Test equipment	Power meter (Table 1-2, item 8)
Test setup	➢ Connect power meter to RF output socket.
Measurement	➢ With ALC set to ON measure the level and note it down as reference. ➢ Then switch over to ALC OFF (sample & hold) and measure the level again. ⇨ The level difference in dB between the measurements is the additional uncertainty.
➢ Recommended test frequencies	➢ 10 MHz, 500 MHz, 1 GHz, 2.2 GHz, 3 GHz, 4 GHz, 5 GHz, 6 GHz.
➢ Recommended test level	➢ P_{min} with unmodulated carrier.

Output Impedance

Test assembly	See section "*Test Assembly for Output Impedance (VSWR)*", page *1.5*.
Test method	Since the VSWR of a source must be measured, a purely passive measurement using the VSWR bridge is only possible with levels where the VSWR is determined by the output impedance of the attenuator only. This applies to attenuations of more than 20 dB. With higher levels, the effect of level control must be taken into account. For this purpose, an auxiliary generator is used which transmits a wave with a slightly offset carrier frequency (difference frequency within the control bandwidth of the level control) into the DUT, on which the outgoing wave of the DUT is superimposed. In the case of an ideal source impedance, only the outgoing wave of the DUT flows back into the bridge, in the case of a deviating source impedance, the two components are superimposed on one another, which, due to the frequency offset, results in a beat, from the amplitude ratio of which the VSWR can be derived.
Recommended test frequencies and levels	➢ Test frequencies: every 50 MHz as from 1 GHz. ➢ Test levels: first the (frequency dependent) switching level of the first step attenuator has to be determined (see section "*Preparation, Recommended Test Frequencies and Levels*"). 2.5 dB above is the first measurement level. Then the first 5 attenuator steps are measured by reducing the level in steps of 5 dB. This way all possible output impedances are recorded. ➢ With options R&S B31, -B32, -B36, -B37 the measurement has to be performed in Attenuator Mode Normal, and an additional measurement has to be performed in Attenuator Mode High Power at 15 dBm. For the measurements in Attenuator Mode High Power and at the first two attenuator steps the procedure for high levels has to be used. The other measurements are performed following the procedure for lower levels.

Measurement with high levels	➢ Settings on DUT: - **Level**: test level - **Frequency**: test frequency, unmodulated ➢ Settings on spectrum analyzer: - Test frequency, span 0 Hz, test level - Resolution and video bandwidth 10 kHz - Linear level scale - Sweep time 30 ms ➢ Settings on second signal generator: - Detune the frequency by 100 Hz compared to the test frequency, - first set minimum level, unmodulated. ➢ Vary the reference level to bring the line displayed on the screen of the spectrum analyzer approximately into the center of the screen and read and note down the level as reference level. ➢ Unscrew the VSWR bridge from the DUT and increase the level at the second signal generator until the reference level is measured again at the analyzer. ➢ Screw the bridge or directional coupler onto the DUT again. ⇨ A more or less wavy line representing the VSWR of the DUT is now displayed on the spectrum analyzer. The VSWR is to be calculated from the maximum and minimum voltage $VSWR = V_{max}/V_{min}$
Passive measurement of VSWR for lower levels	➢ Settings on DUT: - **Level:** test level - **Frequency:** far from test frequency, unmodulated ➢ Settings on second signal generator: - Test frequency - Level 10 dBm ➢ Unscrew the VSWR bridge from the DUT and note down the level measured at the analyzer as reference value. ➢ Screw on the bridge or directional coupler again and determine the new level at the analyzer. ⇨ The voltage ratio of test level to reference level is the output reflection coefficient r of the DUT. The voltage standing wave ratio (VSWR) can be calculated according to the formula $VSWR = (1+r)/(1-r)$

Settling Time

Test assembly	Connect the spectrum analyzer (Table 1-2, item 24) to the RF connector of the DUT.
Test method	The spectrum analyzer is operated as a fast level meter with a span of 0 Hz. A controller transfers the start and the stop level via the IEC bus. The analyzer is triggered by the positive edge on the EOI line of the IEC bus. When the controller switches over from start to stop level, the settling procedure is displayed on the screen of the analyzer.
Preparation of measurement	➢ Synchronize the reference frequencies of the DUT and the analyzer. ➢ Make IEC/IEEE bus and RF connections. ➢ Apply trigger connection to EOI line (pin 5) of the IEC/IEEE bus. ➢ Setting on DUT: - **Frequencies (SMU, R&S SMJ):** 30 MHz, 1 GHz, 2.2 GHz, 3 GHz, 4 GHz, 6 GHz - **Frequencies (SMATE):** 30 MHz, 1 GHz, 2.2 GHz, 3 GHz, 4 GHz, 4.5 GHz, 5 GHz, 5.4 GHz, 6 GHz ➢ Settings on spectrum analyzer: - Reference level: target level + 3 dB - Amplitude log range 10 dB - Resolution bandwidth 200 kHz - Video bandwidth 2 MHz - Span 0 Hz - Sweep time (SMU, R&S SMJ): 62.4 ms, 31.2 ms for list mode - Sweep time (SMATE): 12.48 ms, 6.24 ms for list mode - Triggering externally by the positive edge at 1.4 V.
Measurement	➢ First send the start and then the stop level from controller. ⇨ The level characteristic from the trigger point is displayed on the screen of the externally triggered analyzer. The time difference between the trigger time and the time to reach the specified deviation to the final level is defined as the settling time. ➢ Measure the following steps (recommended) with ALC state on, ALC state off (S&H) and with List mode:

Start level in dBm	**Stop level in dBm**	**Remarks**
-130	maximum specified level	With options R&S -B31, -B32, -B36, -B37 with attenuator mode "auto" and "normal"
P_{max} of 5 dB attenuation + 2.5 dBm	P_{max} of 5 dB -27.5 dBm	And reverse

Overvoltage Protection (only R&S SMU)

Test equipment	- Signal generator (Table 1-1, item 5) - Power amplifier (Table 1-1, item 13)
Test setup	➢ Connect a signal generator with a subsequent power amplifier with a power output of more than 33 dBm.
Measurement	➢ Settings on DUT: **RF On** - **Frequency** 100 MHz, unmodulated - **Level** -120 dBm ➢ Connect the signal generator to the RF output socket of the DUT via the power amplifier and apply frequencies of up to RF_{max}. At each frequency feed a level according to table. ⇨ The overvoltage protection has to respond immediately.

Response thresholds

Option	Level
R&S -B30, -B35	Typ. 23 dBm, max. 26 dBm
R&S -B32, -B37, attenuator mode "High Power"	Typ. 33 dBm, max. 36 dBm
R&S -B32, -B37, attenuator mode "Normal"	Typ. 23 dBm, max. 26 dBm

Overvoltage Protection (SATT6C)

Test equipment	- Signal generator (Table 1-1, item 5) - Power amplifier (Table 1-1, item 13)
Test setup	➢ Connect a signal generator with a subsequent power amplifier with a power output of more than 33 dBm.
Measurement	➢ Settings on DUT: **RF On** - **Frequency** 100 MHz, unmodulated - **Level** -120 dBm ➢ Connect the signal generator to the RF output socket of the DUT via the power amplifier and apply frequencies of up to RF_{max}. At each frequency feed a level according to table. ⇨ The overvoltage protection has to respond immediately.

Response thresholds

Output Mode	Level
attenuator mode "High Power"	Typ. 33 dBm, max. 36 dBm
attenuator mode "Normal"	Typ. 26 dBm, max. 36 dBm

Internal Modulation Generator

Test equipment	Spectrum analyzer (Table 1-2, item 24) AC/DC voltmeter (Table 1-1, item 19)
Test setup	➢ Connect the spectrum analyzer to the LF socket of the DUT. For level measurement connect the AC/DC Voltmeter to the LF socket of the DUT.
Measurement of frequency settings and distortion	➢ Settings on DUT: **LF Output** menu: **LF Gen Voltage** 1 V Vary **LF Gen Frequency** from 0.1 Hz to 1 MHz. ➢ Settings of the spectrum analyzer: **RF INPUT** DC **AMPT REF LEVEL** 10 dBm **FREQ CENTER** = LF Gen Frequency **SPAN** = LF Gen Frequency / 10 ➢ Read the actual frequency from the spectrum analyzer using Marker function SIGNAL COUNT. ➢ Settings of the spectrum analyzer: **FREQ START** = LF Gen Frequency / 2 **STOP** = LF Gen Frequency * 5 **BW / FILTER TYPE** = FFT at higher frequencies use **TRACE AVERAGE** to smooth display ➢ Use MARKER to read the power of the fundamental and the harmonic spectral lines. ⇨ The distortion is calculated from the summed power of the spectral lines of the harmonics related to the fundamental.
Recommended test frequencies for frequency settings	1 kHz, 33.3333 kHz, 1 MHz
Recommended test frequencies for distortion	100 Hz, 300 Hz, 1 kHz, 3 kHz, 10 kHz, 30 kHz, 100 kHz
Measurement of the level	➢ Settings on DUT: **LF Output** menu: **LF Gen Frequency** 1 kHz Vary **LF Gen Voltage** from 0 mV to 3 V ➢ Measure the output level with the AC/DC voltmeter.
Recommended settings	3 mV, 10 mV, 30 mV, 100 mV, 300 mV, 1 V, 3 V

Frequency response

Test equipment	AC voltmeter (Table 1-2, item 19)
Test setup	➢ Connect the AC voltmeter to the LF socket of the DUT.
Measurement	➢ Settings on DUT: **LF Output** menu: Vary **LF Gen Frequency** from 10 Hz to 1 MHz. Recommendation: logarithmic with 4 steps/decade. ➢ Measure the output level. ⇨ The frequency response is the difference between the highest and the lowest level.

Note: *The settling time is a pure computer time and need therefore not be measured.*

Amplitude Modulation

Uncertainties

Test assembly	See section "*Standard Test Assembly for Analog Modulations*", page *1.3*.
Measurement	➢ Settings on DUT: **RF On** **Level** 0 dBm: **Amplitude Modulation** menu: **Source Internal**
Test Method Spectrum Measurement	➢ Measure the carrier power P_{RF} and the power of the two sidebands $P_{RF-f\,\mathrm{mod}}$ and $P_{RF+f\,\mathrm{mod}}$ with the spectrum analyzer. Calculate the modulation depth as mean value of both sidebands. $A = \frac{\sqrt{P_{RF-f\,\mathrm{mod}}} + \sqrt{P_{RF+f\,\mathrm{mod}}}}{\sqrt{P_{RF}}}$
Test Method Demodulation Measurement	➢ Settings on R&S FSQ: AMPTD / REF LEVEL test level + 6 dB , FREQ / CENTER test frequency FMDEMOD, FMDEMOD ON, RESULT DISPLAY / AM DEMOD BW > 3* fmod, RANGE / DEVIATION PER DIV 20 % MEAS TIME 3/fmod for distortion (up to 3rd harmonic) RESULT DISPLAY / AM / AF SPECTRUM DEMOD BW > 7 * fmod, MEAS TIME 16/fmod
Recommended settings	➢ Resolution of the setting Measurement at f_{mod} = 1 kHz, RF 150 MHz, test level P_{min} +3 dBm of m = 10% to 96% in at least 10 steps. ➢ RF frequency response at f_{mod} = 1 kHz, m = 80%, test level P_{max}, Recommended test frequencies: 5, 150, 1500, 1501, 2200, 2999, 3001, 4399, 4401, 6000 MHz.

AM Distortion

Test assembly	See section "*Standard Test Assembly for Analog Modulations*", page *1.3*.
Measurement	➢ Settings on DUT: **RF On** **Level** P_{min} **Amplitude Modulation** menu: **LF Gen Frequency** 1 kHz **Source Internal** **AM depth** 30%. ➢ Vary the carrier frequency from RF_{min} to RF_{max}. Recommended test frequencies: as with RF frequency response (see above) ➢ Repeat the measurement with PEP = P_{max} and AM 80%.
Test Method Spectrum Measurement	➢ Measure the power of the two sidebands $P_{RF-f\,\mathrm{mod}}$, $P_{RF+f\,\mathrm{mod}}$ and the harmonics $P_{RF-n*f\,\mathrm{mod}}$, $P_{RF+n*f\,\mathrm{mod}}$ with the spectrum analyzer. Calculate the distortion: $$Distortion = \sqrt{\frac{\sum_{n=2}^{4} P_{RF-n*f\,\mathrm{mod}} + P_{RF+n*f\,\mathrm{mod}}}{\sum_{n=1}^{4} P_{RF-n*f\,\mathrm{mod}} + P_{RF+n*f\,\mathrm{mod}}}}$$
Test Method Demodulation Measurement	➢ Set up Analyzer as described under Amplitude Modulation Uncertainties ➢ Read THD from the display. To convert to percent calculate Distortion = 100 * $10^{THDdB / 20}$.

AM Frequency Response

Test assembly	See section "*Standard Test Assembly for Analog Modulations*", page *1.3*.
Measurement	➢ Settings on DUT: **RF On** **Level** P_{min} +3 dBm **Amplitude Modulation** menu: **Source External** **External Coupling DC** **AM depth** 60%. ➢ Vary the carrier frequency from 5 MHz to RF_{max}. Recommended test frequencies 5 MHz, 450 MHz, 1 GHz, 2.2 GHz, 4.0 GHz. If measurements of RF Frequency Response due to Modulation (see page 1.44) are performed and meet specification, only one measurement at 1 GHz is necessary, since AM uses the I/Q modulator. ➢ Setting on the signal generator: - LF Output ON - LFGen Voltage 1 V (V_{peak}). ➢ Vary the generator frequency to determine the modulation frequency response. Measure the modulation depth as described above under 'Uncertainties'. ⇨ The modulation frequency response is the difference between the greatest and the smallest modulation depth. ➢ Repeat the measurement with the internal modulation generator with the setting **Source Internal.**

Synchronous PhiM with AM

Test assembly	See section "*Standard Test Assembly for Analog Modulations*", page *1.3*.
➢ Measurement	➢ Settings on DUT: **RF On** **Level** 0 dBm **Amplitude Modulation** menu: **LF Gen Frequency** 1 kHz **Source Internal** **AM depth** 30%. ➢ Settings on R&S FSQ FM DEMOD DEMOD BW 12.5 kHz MEAS TIME 10 ms RESULT DISPLAY PM ➢ Vary the carrier frequency from 5 MHz to RF_{max}. Recommended test frequencies as above. ➢ Measure the resulting phase modulation on the spectrum analyzer with peak detection.

Frequency Modulation (Option R&S B20/B22)

Test Methodes

Test assembly	See section "*Standard Test Assembly for Analog Modulations*", page *1.3*.
Test Method "Spectrum Measurement"	• The FM/PhiM deviation is determined by a spectrum measurement. All relevant spectral components of the modulation spectrum are measured and modulation index m is computed via Bessel functions. To suppress AM components, left and right spectral lines are averaged. From the ratio of the averaged spectral components a recalculation is done to get the modulation index m. Since the ratio of the spectral lines is used, the result is corrrect, if a sufficient number of lines is used. Missing lines at the spectrum borders do not deteriorate the result. • Restrictions: This method is suitable only with sine shaped modulation signal. Measuring large deviations at low modulation frequencies tends to get time consuming, since many spectrum lines are to be measured and recalculation may be ambiguous. It is recommended to use this method up to modulation index 100. ➢ Settings on spectrum analyzer: AMPT REF LEVEL test level FREQ CENTER test frequency Set SPAN to fmod/4, maximal 80 kHz and resolution bandwidth to fmod/20, maximal 20 kHz. ➢ First measure the carrier amplitude as zero order of Bessel function, then determine the n orders up to int(m + 1) by measuring the spectral lines CF + (n * fmod) and CF - (n * fmod). Calculate the average of the amplitude of both lines for each order. Now the measured modulation index m can be calculated by numerical search for the error minimum. ⇨ The PhiM deviation equals the modulation index m, FM deviation is calculated as m * fmod.

Test Method "FFT Demodulation (Option FS-K7)"	• The FM deviation and distortion are determined by digital signal processing in the spectrum analyzer. • Restrictions: At large deviations and low modulation rates the settable measuring time maybe insufficient to determine deviation (1 period minimum needed) or distortion. At high deviations and high modulation rates the settable demodulation bandwidth maybe insufficient. Missing lines at the spectrum borders deteriorate the result. ➢ Settings on R&S FSQ: AMPTD / REF LEVEL test level, FREQ / CENTER test frequency FMDEMOD, FMDEMOD ON, RESULT DISPLAY / FM resp. PM DEMOD BW > 2 * (deviation + fmod) for FM, DEMOD BW > 2 * fmod * (1 + deviation) for PM, RANGE / DEVIATION PER DIV 0.5 * deviation MEAS TIME 3/fmod for distortion (up to 3rd harmonic) RESULT DISPLAY / FM resp. PM / AF SPECTRUM DEMOD BW > 2 * (deviation + 3.5 * fmod) for FM, DEMOD BW > 7 * fmod * (1 + deviation) for PM, MEAS TIME 16/fmod

FM Setting Uncertainty

Test Method	➢ Spectrum Measurement (see chapter "Test Methodes")
Measurement	➢ Settings on DUT: **RF On** **Level** 0 dBm: **Frequency Modulation** menu: **Source Internal** **State on**
Recommended settings	➢ CF sweep 10 MHz, 250 MHz, 500 MHz, 812 MHz, 940 MHz, 1067 MHz, 1194 MHz, 1321 MHz, 1484 MHz, 2200 MHz, 4000 MHz, 6000 MHz with fmod = 10 kHz, deviation = 100 kHz. ➢ Deviation sweep Measurement at CF 500 MHz, f_{mod} = 10 kHz, deviation 1 kHz to half of max. deviation in logarithmic steps, 4 steps per decade (1, 1.8, 3.2, 5.6) ➢ Repeat measurement at 500 MHz with external modulation.

FM Distortion

Test Method	FFT Demodulation (see chapter "Test Methodes")
Measurement	➢ Settings on DUT: **RF On** **Level** 0 dBm **Frequency Modulation** menu: **LF Gen Frequency** 10 kHz **Source Internal** **FM deviation** 1 MHz. ➢ Settings on R&S FSQ: DEMOD BW 5 MHz, RANGE / DEVIATION PER DIV 250 kHz, RESULT DISPLAY / FM, AF SPECTRUM, SWEEP / MEAS TIME 2.5 ms, FREQ / AF STOP 50 kHz. ➢ Read THD from the display. To convert to percent calculate THDpct = 100 * 10 ^(THDdB/20).
Recommended settings	➢ CF sweep 10 MHz, 250 MHz, 500 MHz, 812 MHz, 940 MHz, 1067 MHz, 1194 MHz, 1321 MHz, 1484 MHz, 2200 MHz, 4000 MHz, 6000 MHz.

FM Frequency Response

Test Method	FFT Demodulation Spectrum Measurement (see chapter "Test Methodes")
Measurement	➢ Settings on DUT: **RF On** **Level** 0 dBm **Frequency Modulation** menu: **Source External** **FM deviation 100 kHz.** ➢ Setting on the signal generator: for frequencies up to 300 kHz the internal LF generator of the signal generator is used, >300 kHz the RF output. It is recommended to use an AC voltmeter (Item 19 of table 1-2) to control the correct input voltage. - LFGen Voltage 0.707 V - State ON - RF level 10 dBm (equivalent to 1 V peak voltage). ➢ Settings on R&S FSQ: Up to fmod = 300 kHz settings for FFT Demodulation fmod > 300 kHz settings for Spectrum Measurement. ➢ Vary the signal generator frequency and measure the modulation depth. ⇨ The modulation frequency response is the difference between the greatest and the smallest modulation depth. ➢ Repeat the measurement with the internal modulation generator with the setting **Source Internal.**
Recommended settings	➢ LF in logarithmic steps, 4 steps per decade (1, 1.8, 3.2, 5.6). Start with 10 Hz only with deviation 100 kHz, start with 10 kHz with all others. ➢ CF settings 20 MHz, 250 MHz, 500 MHz, 812 MHz, 940 MHz, 1067 MHz, 1194 MHz, 1321 MHz, 1484 MHz, 2200 MHz, 4000 MHz, 6000 MHz. ➢ At CF 500 MHz, FM source external test with deviation settings from 5 kHz to 5 MHz in logarithmic steps (1, 2, 5 sequence).

Synchronous AM with FM

Test assembly	See section "*Standard Test Assembly for Analog Modulations*", page *1.3*.
➢ Measurement	➢ Settings on DUT: **RF On** **Level** 0 dBm **Frequency Modulation** menu: **LF Gen Frequency** 1 kHz **Source Internal** **FM deviation** 40 kHz. ➢ Settings on spectrum analyzer AMPTD / REF LEVEL test level + 6 dB, FREQ / CENTER test frequency FMDEMOD, FMDEMOD ON, RESULT DISPLAY / AM / AF Spectrum AF Start = 0 Hz AF Stop = 5 kHz RES BW = 30 Hz DEMOD BW = 100 kHz IF BW MANUAL 10 MHz, RANGE / REFERENCE VALUE 0.2 % MEAS TIME 3 ms ➢ Read the AM depth at 1 kHz modulation frequency from the demodulated AF spectrum.
Recommended settings	➢ CF sweep 10 MHz, 250 MHz, 500 MHz, 812 MHz, 940 MHz, 1067 MHz, 1194 MHz, 1321 MHz, 1484 MHz, 2200 MHz, 4000 MHz, 6000 MHz.

Carrier Frequency Offset with FM

Test assembly	See section "*Standard Test Assembly for Analog Modulations*", page *1.3*.
➢ Measurement	➢ Settings on DUT: **RF On** **Level** 0 dBm Frequency 1 GHz **Frequency Modulation** menu: **LF Gen Frequency** 1 MHz **Source Internal** **FM deviation** 1 MHz. ➢ Settings on R&S FSQ AMPT / REF LEVEL 0 dBm FREQ / CENTER 1 GHz SPAN 10 kHz MKR / SIGNAL COUNT / NEXT / CNT RESOL 10 Hz ➢ Execute a single sweep. Using MKR → / PEAK, read counted marker frequency. ⇨ The offset is the difference between marker frequency and set carrier frequency. ➢ Repeat measurement with FM source external, impedance 50 Ohm and high Z, coupling ac and dc (4 measurements).

Phase Modulation (Option R&S B20/B22)

PhiM Setting Uncertainty

Test Method	Spectrum Measurement (see chapter "*Test Methodes*").
Measurement	➢ Settings on DUT: **RF On** **Level** 0 dBm: **Phase Modulation** menu: **Source Internal** **State on** ➢ Settings on spectrum analyzer: see chapter "*Test Methodes*"
Recommended settings	➢ CF sweep 10 MHz, 250 MHz, 500 MHz, 812 MHz, 940 MHz, 1067 MHz, 1194 MHz, 1321 MHz, 1484 MHz, 2200 MHz, 4000 MHz, 6000 MHz with fmod = 10 kHz, deviation = 1 rad. ➢ Deviation sweep Measurement at CF 500 MHz, f_{mod} = 10 kHz, deviation 1 mrad to 2.5 rad in logarithmic steps, 4 steps per decade (1, 1.8, 3.2, 5.6) ➢ Repeat measurement at 500 MHz with external modulation.

PhiM Distortion

Test Method	FFT Demodulation (see chapter "Test Methodes")
Measurement	➢ Settings on DUT: **RF On** **Level** 0 dBm **Frequency Modulation** menu: **LF Gen Frequency** 10 kHz **Source Internal** **PhiM deviation** 1 rad. ➢ Settings on R&S FSQ: see chapter "Test Methodes" SWEEP / MEAS TIME 2.5 ms, FREQ / AF STOP 50 kHz, AMPTD / REF LEVEL 0 dBm, FREQ / CENTER test frequency. ➢ Read THD from the Display. To convert to percent calculate THDpct = 100 * 10 ^(THDdB/20).
Recommended settings	➢ CF sweep 10 MHz, 250 MHz, 500 MHz, 812 MHz, 940 MHz, 1067 MHz, 1194 MHz, 1321 MHz, 1484 MHz, 2200 MHz, 4000 MHz, 6000 MHz.

PhiM Frequency Response

Test method	Spectrum measurement (see chapter "*Test Methodes*").
Measurement	➢ Settings on DUT: **RF On** **Level** 0 dBm **Frequency Modulation** menu: **Source External** **PhiM deviation 1 rad.** ➢ Setting on the signal generator: for frequencies up to 300 kHz the internal LF generator of the signal generator is used, >300 kHz the RF output. It is recommended to use an AC voltmeter (Item 19 of table 1-1) to control the correct input voltage. - LFGen Voltage 0.707 V - State ON - RF level 10 dBm (equivalent to 1 V peak voltage). ➢ Settings on R&S FSQ: see chapter "Test Methodes" ➢ Vary the signal generator frequency and measure the modulation depth. ⇨ The modulation frequency response is the difference between the greatest and the smallest modulation depth. ➢ Repeat the measurement with the internal modulation generator with the setting **Source Internal.**
Recommended settings	➢ LF in logarithmic steps, 4 steps per decade (1, 1.8, 3.2, 5.6). ➢ CF sweep 10 MHz, 250 MHz, 500 MHz, 812 MHz, 940 MHz, 1067 MHz, 1194 MHz, 1321 MHz, 1484 MHz, 2200 MHz, 4000 MHz, 6000 MHz.

Pulse Modulation

ON/OFF Ratio

Test equipment	- Spectrum analyzer (Table 1-2, item 24) - Pulse generator (Table 1-1, item 17)
Test setup	➢ To determine the ON/OFF ratio, connect the spectrum analyzer to the RF output socket of the DUT and the pulse generator to the EXT MOD socket on the rear of the DUT.
Measurement	➢ Setting on DUT: **Pulse Modulation** menu: **Source External** **State** On ➢ Determine the output level of the DUT at various carrier frequencies with a "high" and a "low" signal applied. ⇨ The difference between the output level with a "high" signal applied and that with a "low" signal applied is the ON/OFF ratio.
Recommended test frequencies	150 MHz, 400 MHz, 1 GHz, 2.2 GHz, 3 GHz, 4.5 GHz, 6 GHz
Recommended test level	P_{max}

Dynamic Characteristics

Test assembly	As above for ON/OFF Ratio
Test method	The spectrum analyzer is operated as a fast level meter with a span of 0 Hz.
Measurement	➢ Setting on pulse generator: - Squarewave pulse sequence with a frequency of 100 kHz, TTL level ➢ Setting on DUT: **RF On** **Level** 0 dBm **Pulse Modulation** menu: **State** On ➢ Vary the carrier frequency from 5 MHz to RF_{max}. Recommended test frequencies as above. ➢ Evaluate the pulse-modulated RF signal on the analyzer. ⇨ Rise time = time between 10% and 90% of RF amplitude Fall time = time between 90% and 10% of RF amplitude

Video Crosstalk

Test assembly	As above for ON/OFF Ratio
Measurement	➢ Setting on pulse generator: Squarewave pulse sequence with a frequency of 100 kHz, TTL level ➢ Setting on DUT: **RF On** **Frequency**: 1 GHz **Level**: 0 dBm **Pulse Modulation State:** On ➢ Settings on the Analyzer FREQ CENTER 100 kHz, SPAN 10 kHz. ➢ Evaluate the signal on the analyzer. ⇨ The Video Crosstalk is the amplitude of the spectral line found at 100 kHz related to the RF carrier level

I/Q modulation

Input Impedance (VSWR)

Test equipment	See section "*Test Assembly for Output Impedance (VSWR)*", page *1.5*.
Test setup	➢ Connect the test port to the I or Q input instead of the RF output.
Measurement	➢ Settings on DUT: **Frequency** 900 MHz **Level** 0 dBm **I/Q Settings** menu: **Source** Analog Wideband I/Q Input **State** On ➢ Settings on signal generator: - Level 10 dBm - Carrier frequency 1 to 50 MHz in 10 steps ➢ Screw the VSWR bridge off and measure the level as reference level. ➢ Connect the VSWR bridge to the I input and measure the level again. ⇨ The voltage ratio of test level to reference level is the output reflection coefficient r of the DUT. ➢ From this, the voltage standing wave ratio (VSWR) can be calculated as follows: VSWR = (1+r)/(1-r) ➢ Repeat the measurement for the Q input.

RF level with I/Q modulation

Test equipment	- Power meter (Table 1-2, item 8) - DC voltage source (Table 1-1, item 12)
Test setup	➢ Connect the power meter to the RF output socket. ➢ Connect the DC voltage source to the I or Q input.
Measurement	➢ Settings on DUT: **RF On** **Frequency** 900 MHz **Level** 0 dBm ➢ Measure the level without modulation as reference level. ➢ **I/Q Settings** menu: **Source** Analog Wideband I/Q Input **State** On ➢ Set the DC voltage source to 0.500 V and measure the level again. ⇨ The level difference is the required measurement value.

Error Vector

Test assembly	See section "*Test Assembly for I/Q Modulation*", page *1.4*.
Measurement	Instead of a static measurement, an equivalent dynamic measurement with a low symbol rate is carried out. ➢ Settings on DUT: **RF On** **Level** 0 dBm **I/Q Settings** menu: **Source** Analog Wideband I/Q Input **State** On ➢ Generate a modulation signal on the ARB generator using the controller and the simulation program: - Modulation 16QAM - No coding - SQR COS filter with α = 0.5 - PRBS-9 data sequence - Pulse width and oversampling 32 - Length 100 symbols - Symbol clock 10 kHz ➢ Check if the channels on the ARB generator are equal and adjust if necessary. ➢ Make the corresponding settings on the demodulator. Result length 80 symbols. ➢ Vary the carrier frequency from 20 MHz to RF_{max}. For recommended setting values see Table 1-4. ➢ Measure the error vector magnitude (peak and rms) on the demodulator.

RF Frequency Response due to Modulation

Test equipment	- Spectrum analyzer (Table 1-2, item 24) - Signal generator (Table 1-1, item 5)
Test setup	➢ Connect the RF output of the DUT to the spectrum analyzer, and connect the signal generator to the **I** input of the DUT.
Test method	By applying a sinewave AC voltage to the I (or Q) input, an amplitude modulation with a suppressed carrier is generated. The modulation frequency response is determined by measuring the sideband power as a function of the frequency of the applied AC voltage. The difference between the highest and the lowest sideband level, found by varying the modulation frequency is the frequency response to be measured.

Measurement	➢ Settings on DUT: **RF On** **Frequency** 100 MHz **Level** 0 dBm **I/Q Settings** menu: **Source** Analog Wideband I/Q Input **Crest Factor** 3 dB **State** On ➢ Setting on signal generator: Level 0.5 V (Vpeak) corresponding to 4 dBm ➢ Settings on spectrum analyzer AMPT/REF LEVEL 5 dBm, SPAN 105 MHz ➢ Vary the frequency from 1 MHz to 50 MHz on the signal generator and measure sideband levels. ⇨ The modulation frequency response is the difference between the highest and the lowest measured sideband level. ➢ **Frequencies:** start with 100 MHz, see table .

Residual Carrier and Leakage

Test equipment	Spectrum analyzer (Table 1-2, item 24)
Test setup	➢ Connect the spectrum analyzer to the RF output of the DUT.
Measurement	➢ Settings on DUT: **RF On** **Level** 0 dBm, ALC State OFF (S&H) **I/Q Settings** menu: **Source** Analog Wideband I/Q Input **State** Off ➢ Settings on analyzer: FREQ/CENTER = test frequency, SPAN 1 MHz, AMPT/REF LEVEL = test level ➢ First measure the unmodulated level as a reference. ➢ Then switch on I/Q modulation with open inputs (**I/Q Settings** menu: **State** On) and measure the residual carrier. ⇨ The residual carrier in dBc is the level of the residual signal found referred to the output signal of the DUT without modulation (dBc = referred to the carrier). ➢ Set **Impairments State** On and **Leakage** 10% on the DUT. ⇨ The residual carrier should increase to 10% (-20 dBc). ➢ Test frequencies: beginning with 10 MHz from table

Measurement on path B	➢ Since path B has no wideband I/Q Input, measurement has to be done using the internal baseband generator. ➢ The measurement is done as described in chapter "Image Rejection over the Complete Unit" (see below). Use offset frequency 10 kHz. ➢ Instead of reading the suppressed sideband level, read the level of the residual carrier on test frequency. ⇨ The residual carrier in dBc is the level of the residual signal found at test frequency referred to the shifted signal (dBc = referred to the carrier).

I/Q Imbalance

Measurement of imbalance	
Test equipment	- Spectrum analyzer (Table 1-2, item 24) - Adjustable DC voltage source (Table 1-1, item 12)
Test setup	➢ Connect the spectrum analyzer to the RF output of the DUT. ➢ Connect the DC voltage source to the I or the Q input.
Measurement	➢ Settings on DUT: **RF On** **Frequency** 900 MHz **Level** 0 dBm **ALC State** OFF, S&H **I/Q Settings** menu: **Source** Analog Wideband I/Q Input **State** On ➢ Settings on analyzer: - Center frequency = test frequency, span 1 MHz - Reference level = test level +3 dB - Scale 1 dB/div ➢ First measure the undistorted level as a reference. To this end, apply a DC voltage of 0.500 V to the I and then to the Q input and note down the corresponding RF levels as reference levels. Select **Impairments State** On and **Imbalance** 10% on the DUT. Repeat the level measurements. ⇨ The Q level should increase by the set imbalance, the I level decrease by the inverse ratio. With 10%, the Q level should increase to 1.1 times, the I level decrease to 1/1.1 times the original value, i.e. the I level should be reduced to 0.909 times the original value (corresponding to ±0.83 dB).

Measurement of quadrature error	
Test assembly	See section "*Test Assembly for I/Q Modulation*", page *1.4*.
Measurement	➢ Settings on DUT: **RF On** **Frequency** 900 MHz **Level** 0 dBm **I/Q Settings** menu: **Source** Analog Wideband I/Q Input **State** On **Impairment State** off **Quadrature Offset** 10 deg ➢ Generate a modulation signal using the controller and the simulation program: - Modulation 16QAM - No coding - SQR filter with α = 0.5 - PRBS-9 data sequence - Pulse width and oversampling 32 - Length 100 symbols - Symbol clock 10 kHz ➢ Make the corresponding settings on the demodulator. Synchronize to a bit sequence, starting with the 9th symbol, 12 bits long, result length 80 symbols. **Caution: the mapping of DUT and demodulator must be in agreement!** ➢ Select the vector representation on the demodulator. ⇨ The symbols should be located in a square grid. ➢ Select **Impairments State** On on the DUT. ⇨ The symbols must no longer be arranged at right angles; the Y axis should be inclined towards the left by 10°, with a setting of -10° it should be inclined towards the right.

Broadband Amplitude Modulation

Test equipment	- Spectrum analyzer (Table 1-2, item 24) - Signal generator (Table 1-1, item 5)
Test setup	➢ Connect the RF output of the DUT to the spectrum analyzer, connect the signal generator to the I input of the DUT.
	Note: *If the measurement of the modulation frequency response has been successfully performed for I/Q modulation, only a functional test is required here.*
Measurement	➢ Settings on DUT: **RF On** **Frequency** 1 GHz **Level** 0 dBm, ALC State OFF **Broadband AM** menu: **State** On
Functional test:	➢ Setting on signal generator: - Level 0.20 V (Vpeak) corresponding to -4 dBm for a modulation depth of 80% ➢ Vary the frequency from 1 MHz to 30 MHz on the signal generator and measure the sidebands referred to the carrier at SPAN 3 MHz. They should be 8 +- 1.5 dB below the carrier level. ➢ Repeat the measurement at a frequency of 30 MHz on the signal generator and SPAN 70 MHz on the analyzer. The sidebands should now be 8 +-3.5 dB below the carrier level.
Complete measurement:	➢ Setting on analyzer and measurement as for I/Q modulation, modulation frequency response, but the level is first to be measured as reference at the test frequency. ➢ Since the sidebands have an offset of m/2 from the carrier, an offset of -6 dB corresponds to 100% AM. ⇨ The modulation depth is calculated with the formula $m = 2*10^{(\text{sideband offset}/20)}$. ⇨ The frequency response is the difference between the greatest and the smallest modulation depth.

Baseband Input (Option R&S B17)

Input Impedance (VSWR)

Test equipment	See section "*Test Assembly for Output Impedance (VSWR)*", page *1.5*.
Test setup	➢ Connect the test port to the I or Q input instead of the RF output.
Measurement	➢ Settings on DUT: **Frequency** any **Level** any **I/Q Settings** menu: **Source** Internal Baseband **State** On **BB In Settings** menu: **State** On **Mode** analog input ➢ Settings on signal generator: - Level 10 dBm - Carrier frequency 1 MHz ➢ Screw the VSWR bridge off and measure the level as reference level. ➢ Connect the VSWR bridge to the I input and measure the level again. ⇨ The voltage ratio of test level to reference level is the output reflection coefficient r of the DUT. ➢ From this, the voltage standing wave ratio (VSWR) can be calculated as follows: VSWR = (1+r) / (1-r) ➢ Repeat the measurement with carrier frequencies of 5, 10, 15, 20, 25 and 30 MHz ➢ Repeat the measurement for the Q input.

Aliasing Filter Bandwidth

Test equipment	- Power meter (Table 1-2, item 8) - Signal generator (Table 1-1, item 5)
Test setup	➢ Connect the **I** output of the DUT to the power meter, and connect RF-output of the signal generator to the **I** input of the DUT.
Measurement	➢ Settings on DUT: **RF** Off **I/Q Settings** menu: **Source** Internal Baseband **State** On **BB In Settings** menu: **State** On **Mode** analog input **Crest Factor** 3 dB **Peak Level** 0 dBfs ➢ Setting on signal generator: **Level** 4 dBm (corresponding to 0.5 V_{p-p}) **Frequency** 100 kHz **I/Q Settings** menu: **State** Off ➢ Settings on RF power meter: high resolution. ➢ Make a reference measurement by connecting the RF output of the signal generator directly to the input of the power meter. ➢ Reconnect the output of the signal generator to the I- input of the DUT and the I-output of the DUT to the input of the power meter. ➢ Repeat the procedure for 1.1 MHz, 5.1 MHz, 10.1 MHz, 15.1 MHz, 20.1 MHz, 25.1 MHz and 30.1 MHz. The difference of the two measured levels at each frequency gives the frequency response of the DUT baseband section on the I-Channel. The frequency response should be within the specified roll-off. ➢ Repeat the measurement for the Q- inputs and outputs of the signal generator

Residual Carrier

Test equipment	➢ Spectrum analyzer (Table 1-2, item 24)
Test setup	➢ Connect the spectrum analyzer to the RF output of the DUT.
Measurement	➢ Settings on DUT: **Frequency** 1 GHz **Level** 0 dBm, ALC State OFF (S&H) **I/Q Settings** menu: **Source** Internal Baseband **State** Off **BB In Settings** menu: **State** On **Mode** analog input **Crest Factor** 0 dB **Peak Level** 0 dBfs ➢ Settings on analyzer: FREQ/CENTER = 1 GHz, SPAN 1 MHz, AMPT/REF LEVEL = 5 dBm. ➢ First measure the unmodulated level as a reference. ➢ Then switch on I/Q modulation with open inputs (**I/Q Settings** menu: **State** On) and measure the residual carrier. ⇨ The residual carrier in dBc is the level of the residual signal found referred to the output signal of the DUT without modulation (dBc = referred to the carrier).

Image Rejection over the Complete Unit

The equipment layout for generating multicarrier signals includes the options R&S B13 (baseband main module), R&S B10 (baseband generator) and R&S K61 (multicarrier CW).

Test equipment	➢ Spectrum Analyzer (Table 1-2, item 24) ➢ Signal generator (Table 1-1, item 5)
Test setup	➢ Connect the signal analyzer to the RF output of the DUT. ➢ Connect the signal generator's I/Q-outputs to the I/Q-inputs of the DUT
Test method	The signal generator generates a single sideband signal in the complex baseband. This signal is fed into the baseband input of the DUT and modulated with an RF carrier. The image rejection is the difference between the shifted signal and its mirror on the opposite side of the center frequency.
Measurement	➢ Settings on DUT **RF On** **Frequency:** 1 GHz **Level:** 0 dBm **I/Q Settings** menu: **Source** Internal Baseband **State** On **BB In Settings** menu: **State** On **Mode** analog input **Crest Factor** 0 dB **Peak Level** 0 dBfs ➢ Settings on signal generator **RF** Off **I/Q Settings** menu: **Source** Internal Baseband **State** On **Digital Modulation** menu: **State** On **Data Source** All 0 **Coding** Off **Modulation Type** BPSK **Filter** Rectangular **Frequency Offset:** 10 kHz, 10 MHz to 30 MHz in 10 MHz steps, -10 kHz, -10 MHz to -30 MHz in -10 MHz steps (BBIN Off) ➢ Settings on analyzer FREQ CENTER 1 GHz SPAN = 3 x offset frequency BW COUPLING RATIO SPAN / RBW MANUAL 300 AMPT/REF LEVEL 5 dBm MKR /MARKER 1 set to peak ➢ In the displayed spectrum, use MARKER DELTA to measure the image rejection. The test results should be lower than -40 dBc.

The measurement has to be carried out for each RF path installed in the DUT.

Adjacent Channel Power for 3GPP FDD

The equipment layout for 3GPP FDD signal generation includes the options R&S B13 (Baseband Main Module), R&S B10 (Baseband Generator) and R&S K42 (Digital Standard 3GPP FDD).

Test equipment	Signal analyzer R&S FSQ including option R&S FSQ-K70 (Vector Signal Analysis) (table 1-1, pos. 24) Signal generator (Table 1-1, item 5)
Test setup	➢ Connect signal generator's I/Q-outputs to I/Q-inputs of DUT. ➢ Connect signal analyzer to RF output of DUT.
Test method	Set standard 3GPP FDD in the baseband of the signal generator and feed the I/Q signal into the DUT's I/Q-inputs. Perform the measurements with the 3GPP measurement setting of the R&S FSQ.
Measurement	➢ Settings on DUT **Level:** max. level, refer to data sheet (depending on options) **Frequencies:** 2160 MHz (and 5 GHz for R&S B106) **I/Q Settings** menu: **Source** Internal Baseband **State** On **BB In Settings** menu: **State** On **Mode** analog input **Crest Factor** 0 dB **Peak Level** 0 dBfs **I/Q Settings** **Manual Gain** 3GPP ACP optimized 3 dB ➢ Settings on signal generator **3GPP FDD:** **Test Setups** Test_Model_1_64channels **State** ON ➢ Settings on analyzer **FREQ** CENTER: 2160 MHz (and 5 GHz for R&S B106) **MEAS → CHAN PWR ACP** **→ CP /ACP STANDARD** WCDMA 3GPP FWD **→ ADJUST REF LVL** **→ NOISE CORR ON** **SWEEP → SWEPP TIME** MANUAL 1 sec ➢ Check ACP: Adjacent Channel (take the smaller of the two measurement values UPPER/LOWER) ➢ Settings on DUT **I/Q Settings** **Manual Gain** Low Noise 6 dB ➢ Check ACP: Alternate Channel (take the smaller of the two measurement values UPPER/LOWER) Test results should not miss the typical values by more than 4 dB.

The measurement has to be carried out for each RF path installed in the DUT.

Differential I/Q Output (Option R&S B16)

Important:

Before the measurement, Signal Analyzer R&S FSQ must be calibrated as follows by means of a reference measurement at the measurement frequency in question:

1. Connect the RF output of the DUT to the power meter and measure the output level.
2. Include the measured level as a reference value/calibration value in the R&S FSQ.

Differential signal balance

Test equipment	Signal analyzer R&S FSQ (table 1-1, pos. 24).
Test setup	➢ Connect the signal analyzer to the I-, Q-, I Bar- and Q Bar-output of the DUT.
Test method	A single sideband signal is generated using the **Custom Digital Modulation** functionality by selecting only one carrier (DC-Signal). The offset is set with the **Frequency Offset** function in the Baseband menu. The test frequencies are set one after the other. The differential signal balance is obtained from the level differences between I and I Bar or Q and Q Bar at a particular frequency.
Measurement	➢ Settings on DUT **Custom Digital Modulation:** State ON **Data Source:** All 0 **Modulation Type:** BPSK **Filter:** Rectangular **Frequency Offset:** measurement frequency **I/Q Out Menu:** **Output Type:** Differential **Mode:** Normal ➢ Settings on analyzer FREQ CENTER 1 MHz SPAN 0 Hz AMPT/REF LEVEL + 10 dBm BW /RES BW MANUAL 30 kHz Measurement frequencies: 1MHz, 10 MHz, 30 MHz and 40 MHz.

Output voltage

Test equipment	AC/DC Voltmeter R&S URE 3 (table 1-1, pos. 19).
Test setup	➢ Connect the voltmeter to the I/(and Q)-output of the DUT.
Test method	A single sideband signal is generated using the **Custom Digital Modulation** functionality by selecting only one carrier (DC-Signal), the offset is set with the **Frequency Offset** function in the Baseband menu. The test levels are set one after the other.
Measurement	➢ Settings on DUT **Custom Digital Modulation:** State ON **Data Source:** All 0 **Modulation Type:** BPSK **Filter:** Rectangular **Frequency Offset:** 100 kHz **I/Q Out Menu:** **Output Type:** Single Ended **Mode:** Variable **I/Q I Level EMF:** 1 V ➢ Settings on multimeter COUPLING AC DETEKTOR RMS Multiply measured voltage with √2. ➢ Measurement level: 2 V (reference), 1 V, 0.4 V and 0.2 V.

Bias voltage

Test equipment	AC/DC Voltmeter R&S URE 3 (table 1-1, pos. 19).
Test setup	➢ Connect the multimeter to the I/(and Q)-output of the DUT.
Test method	The bias voltage is measured for different values.
Measurement	➢ Settings on DUT **I/Q Out Menu:** **Output Type:** Single Ended **Mode:** Variable **I/Q I Level EMF:** 0.1 V **Couple I/Q Bias:** On **I Bias EMF:** measurement bias ➢ Settings on multimeter COUPLING DC
Measurement	➢ Check bias: -3.6, -1, -0.3, -0.1, -0.03, -0.01, 0, +0.002, 1 and 3.6 V

Offset voltage

Test equipment	AC/DC Voltmeter R&S URE 3 (table 1-1, pos. 19).
Test setup	➢ Connect the multimeter to the I and I Bar (Q and Q Bar)-output of the DUT.
Test method	The I and I Bar (or Q and Q Bar) voltage are measured for different offset values. The differential offset is obtained from the differences between I and I Bar (or Q and Q Bar) at a particular offset.
Measurement	➢ Settings on DUT **I/Q Out Menu:** **Output Type:** Differential **Mode:** Variable **I/Q I Level EMF:** 1 V **Couple I/Q Bias:** On **I Bias EMF:** 0 V **I (or Q) Offset EMF:** measurement offset ➢ Settings on multimeter COUPLING DC
Measurement	➢ Check offset : -300, -150, -30, -10, -3, -1, 0, +0.1, 30, 150 and 300 mV

Baseband Digital IQ-Output (Option R&S -B18)

Test equipment	➢ Signal generator (Table 1-2, item 5), equiped with Digital Input (B17) ➢ Cable for Digital-Baseband IO (Table 1-2, item 30),
Test setup	➢ Connect signal generator's Digital Input to the Digital Output of the DUT with the Mini D Ribbon cable.
Test method	Set the Digital Output of the DUT in test sequence transmitting mode. The signal generator's Digital Input evaluates the incoming test pattern and calculates the Bit Error Rate.
Measurement	➢ Settings on DUT Activate test sequence transmitting via remote control with command :TEST<HW>:BBOut:TTEST *ON* ➢ Settings on signal generator Start bit error evaluation via remote control with command: :TEST<HW>:BBIN:RBERror? Result: 0 = TestOk, 1 = TestFailed Test will take 2 seconds to deliver a result. Repeat it 3 times, all of the test results must be OK. ➢ Settings on DUT Deactivate test sequence transmitting via remote control with command :TEST<HW>:BBOut:TTESt *OFF* *Remark: <HW> = 1 for path 1, only one B18 can be equiped*

Internal Baseband Generator

Modulated RF Frequency Response over the Complete Unit

The equipment layout for generating multicarrier signals includes the options R&S B13 (baseband main module), R&S B10 (baseband generator) and R&S K61 (multicarrier CW).

(also see section "*RF Frequency Response due to Modulation*")

Test equipment	Signal analyzer R&S FSQ (table 1-1, pos. 24)
Test setup	➢ Connect the RF output of the DUT to the signal analyzer.
Test method	By applying a sinewave AC voltage by means of Multicarrier_CW, an amplitude modulation with a suppressed carrier is generated. The modulation frequency response is determined by measuring the sideband power as a function of the frequency of the applied AC voltage. The difference between the highest and lowest sideband level, found by varying the modulation frequency, is the frequency response to be measured.
Measurement	➢ Settings on DUT **RF On** **Frequency:** measurement frequencies **Level:** 0 dBm **Level:** 0 dBm **Multi Carrier CW:** State ON **Number of Carriers:** 2 **Carrier Spacing:** 2 x test frequency **I/Q Mod:** Wideband I/Q On ➢ Settings on analyzer FREQ CENTER measurement frequency +/- test frequency AMPT/REF LEVEL 5 dBm, SPAN 5 MHz ➢ For all measurement frequencies with the specified carrier spacings (= 2x test frequencies), measure the sideband level. The modulation frequency response is the difference from the highest to the lowest sideband. **Test frequencies:** 1MHz (reference), 10MHz, 30MHz, 40MHz **Measurement frequencies:** 850 MHz, 1750 MHz, 2200 MHz, 5000 MHz (with option R&S B106 only)

The number of necessary measurement depends on the number of installed RF- and baseband paths, see following table:

Installed paths	1 X RF 1 X BB	2 X RF 2 X BB	2 X RF 1 X BB	1 X RF 2 X BB
RF frequency response due to modulation **Number of measurements**	1 X	2 X	2 X	1 X

Image Rejection over the Complete Unit

The equipment layout for generating multicarrier signals includes the options R&S B13 (baseband main module), R&S B10 (baseband generator) and R&S K61 (multicarrier CW).

Test equipment	Signal analyzer R&S FSQ (table 1-1, pos. 24).
Test setup	➢ Connect the signal analyzer to the RF output of the DUT.
Test method	A single sideband signal is generated using the **Multicarrier CW** functionality by selecting only one carrier. The offset is set with the **Frequency Offset** function in the Baseband menu. The image rejection is the difference between the shifted signal and its mirror on the opposite side of the center frequency.
Measurement	➢ Settings on DUT **RF On** **Frequency:** 1 GHz **Level:** 0 dBm **Multi Carrier CW:** State On **Number of Carriers:** 1 **Frequency Offset:** 10 kHz, 10 MHz to 40 MHz in 10 MHz steps, -10 kHz, -10 MHz to -40 MHz in -10 MHz steps ➢ Settings on analyzer FREQ CENTER 1 GHz SPAN = 3 x offset frequency BW COUPLING RATIO SPAN / RBW MANUAL 300 AMPT/REF LEVEL 5 dBm MKR /MARKER 1 set to peak ➢ In the displayed spectrum, use MARKER DELTA to measure the image rejection.

The number of necessary measurement depends on the number of installed RF- and baseband paths, see following table:

Installed paths	1 x RF 1 x BB	2 x RF 2 x BB	2 x RF 1 x BB	1 x RF 2 x BB
Image sideband suppression **Number of measurements**	1 x	2 x	2 x	1 x

IQ Output, Frequency Response and Imbalance

Important:

Before the measurement, Signal Analyzer R&S FSQ must be calibrated as follows by means of a reference measurement at the measurement frequency in question:

3. Connect the RF output of the DUT to the power meter and measure the output level.
4. Include the measured level as a reference value/calibration value in the R&S FSQ.

Test equipment	Signal analyzer R&S FSQ (table 1-1, pos. 24).
Test setup	Connect the signal analyzer to the I/(and Q)-output of the DUT.
Test method	A single sideband signal is generated using the **Multicarrier CW** functionality by selecting only one carrier. The offset is set with the **Frequency Offset** function in the Baseband menu. The test frequencies are set one after the other. 1 MHz is the reference. The imbalance is obtained from the level differences between I and Q at a particular frequency.
Measuremet	➢ Settings on DUT **Frequency:** 100 MHz **Level:** 0 dBm **Multi Carrier CW:** State ON **Number of Carriers:** 1 **Frequency Offset:** measurement frequency **Optimize internal I/Q Impairments for RF:** OFF ➢ Settings on analyzer FREQ CENTER measurement frequencies SPAN 0 Hz AMPT/REF LEVEL – 10 dBm BW /RES BW MANUAL 100 kHz ➢ Measure the frequency response at the measurement frequencies in I and Q and check the deviation. Measurement frequencies: 1MHz (reference), 10 MHz, 30 MHz and 40 MHz.

The number of necessary measurement depends on the number of installed RF- and baseband paths, see following table:

Installed paths	1 x RF 1 x BB	2 x RF 2 x BB	2 x RF 1 x BB	1 x RF 2 x BB
I/Q output: frequency response and amplitude-equality Number of measurements	1 x	2 x	2 x	2 x

IQ Output, Offset, Wideband Noise

Test equipment	Signal analyzer R&S FSQ (table 1-1, pos. 24), Multimeter (table 1-1, pos. 19)
Test setup	➢ Connect the signal analyzer to the I-output of the DUT.
Test method	First a reference measurement is performed in the menu (Multicarrier CW) with one carrier at 10 MHz (other carriers at zero). Subsequently, the noise power (all carriers switched off) is measured at 11 MHz.
Measurement	➢ Settings on DUT **Level:** 0 dBm **Multi Carrier CW:** State ON **Number of Carriers:** 2 **Carrier Spacing:** 20 MHz **Carrier 0 State:** Off **Carrier 1 State:** On **Power Step:** 0 dB ➢ Settings on analyzer FREQ CENTER 10 MHz SPAN 0 Hz AMPT/REF LEVEL 5 dBm BW /RES BW MANUAL 100 kHz MKR / MARKER 1 ➢ Measure carrier at 10 MHz (reference measurement) ➢ Settings on DUT **Carrier 1 State:** Off ➢ Settings on analyzer FREQ CENTER 11 MHz AMPT/REF LEVEL - 40 dBm AMPT/RF ATTEN MANUAL 0 dBm TRACE / DETECTOR RMS BW /SWEEP TIME MANUAL 50 ms MKR FCT / NOISE MEAS ➢ Measure the noise power at 11 MHz and calculate the wideband noise. **Calculation:** Wideband noise = noise power / reference value + 3 dB. (add +3 dB, as it is sine)
Test setup	➢ Connect the multi meter to the I and Q-output of the DUT.
Measurement	➢ Check offset

The number of necessary measurement depends on the number of installed RF- and baseband paths, see following table:

Installed paths	1 x RF 1 x BB	2 x RF 2 x BB	2 x RF 1 x BB	1 x RF 2 x BB
I/Q output: wideband noise and DC offset Number of measurements	1 x	2 x	2 x	1 x

IQ Output, Spurious Free Dynamic Range (SFDR)

Note:
Make sure that the measured spurious signal does not come from the analyzer. The following tests can be performed for this purpose:
- Switch off the signal from the DUT and repeat the measurement; if the signal remains, it may come from the analyzer.
- Output the signal from the DUT with a slight frequency offset; if the signal remains, it may come from the analyzer.

The number of necessary measurement depends on the number of installed RF- and baseband paths, see following table:

Installed paths	1 x RF 1 x BB	2 x RF 2 x BB	2 x RF 1 x BB	1 x RF 2 x BB
I/Q output: spurious free dynamic range Number of measurements	1 x	2 x	2 x	1 x

Aliasing Filter – D/A Converter, Interpolation Spectra

Note:
Make sure that the measured spurious signal does not come from the analyzer. The following tests can be performed for this purpose:
- Switch off the signal from the DUT and repeat the measurement; if the signal remains, it may come from the analyzer.
- Output the signal from the DUT with a slight frequency offset; if the signal remains, it may come from the analyzer.

Test equipment	Signal analyzer R&S FSQ (table 1-1, pos. 24).
Test setup	➢ Connect the signal analyzer to the RF output of the DUT. ➢ Synchronize the reference frequencies of the DUT and the analyzer.
Test method	Multicarrier CW with two carriers. The carrier spacing is double the test frequency, and the frequency is varied. The level measured at the measurement frequency gives the value for the suppression of the interpolation.
Measurement	➢ Settings on DUT **RF On** **Frequency:** 1 GHz **Level:** 0 dBm **Multi Carrier CW:** State ON **Number of Carriers:** 2 **Carrier Spacing:** 2 x test frequency **Carrier 0 State:** On **Carrier 1 State:** On **Power Step:** 0 dB ➢ Settings on analyzer: FREQ CENTER: measurement frequency SPAN 0 Hz AMPT / REF LEVEL - 10 dBm BW / RES BW MANUAL 30 kHz BW / SWEEP TIME MANUAL 200 ms TRACE / DETECTOR RMS MKR / MARKER 1 Test frequencies: Measurement frequencies: 9.9 MHz 949.5 MHz 9.9 MHz 1050.5 MHz 20.1 MHz 960.3 MHz 20.1 MHz 1039.7 MHz 39.9 MHz 939.9 MHz 39.9 MHz 1060.1 MHz

The number of necessary measurement depends on the number of installed RF- and baseband paths, see following table:

Installed paths	1 x RF 1 x BB	2 x RF 2 x BB	2 x RF 1 x BB	1 x RF 2 x BB
I/Q output: D/A converter interpolation spectra **Number of measurements**	1 x	2 x	2 x	1 x

Function Trigger and Marker

The equipment layout for generating the digital modulation signals includes the options R&S B13 (Baseband Main Module) and R&S B10 (Baseband Generator).

Test equipment	Oscilloscope (table 1-1, pos 7) Trigger source
Test setup	➢ Connect trigger source to trigger input of DUT. ➢ Connect the oscilloscope to marker outputs 1 and 2 on the front of DUT
Test method	In the **Custom Digital Mod** menu, a modulation with 100 kHz symbol rate, external triggering and active marker outputs (with 50 kHz and 25 kHz) is set. Modulation is started with the external trigger. No parameters are checked, but only whether the modulation has triggered (query of trigger status) and whether the markers are output.
Measurement	➢ Settings on DUT **Frequency:** 100 MHz **Level:** 0 dBm **Custom Digital Mod:** **State** On **Trigger/Marker** **Trigger In - Mode** Armed Auto **Trigger In - Source:** External **Reconfigure Marker – Channel 1:** Pulse, **Divider:** 2 (50 kHz) **Reconfigure Marker – Channel 2:** Pulse, **Divider:** 4 (25 kHz) ➢ Apply trigger. ➢ Check start of curve: Display of the trigger status in the Custom Dig Mod / Trigger – Marker _ Clock changes from **Stopped** to **Running** ➢ Check markers using the oscilloscope: Marker 1: frequency 50 kHz, Marker 2: frequency 25 kHz. ***Note:*** *Marker 3 or 1B is not measured here, but rather in the test of the AUX-IO.*

The number of necessary measurement depends on the number of installed RF- and baseband paths, see following table:

Installed paths	1 x RF 1 x BB	2 x RF 2 x BB	2 x RF 1 x BB	1 x RF 2 x BB
Custom Digital Modulation: trigger and marker function **Number of measurements**	1 x	1 x	1 x	1 x

Function External Clock

The equipment layout for generating the digital modulation signals includes the options R&S B13 (Baseband Main Module) and R&S B10 (Baseband Generator).

Test equipment	Vector Signal Generator DUT (table 1-1, pos. Pos. 5) , Signal Analyzer R&S FSQ with option R&S FSQ-K70 (vector signal analysis).
Test setup	➢ Connect CLOCK outputs of reference DUT to CLOCK inputs of test DUT (DUT). ➢ Connect signal analyzer to RF output of DUT
Test method	The test DUT is supplied with a clock from the reference DUT via the external interface. The modulated signal is extracted at the RF output of the DUT, demodulated with the R&S FSQ and checked for EVM.
Measurement	➢ Settings on DUT **Frequency:** 100 MHz **Level:** 0 dBm **Custom Digital Mod:** **State** ON **Data Source** Pattern 010101010101 **Modulation Type** 8PSK **Symbol Rate** 20 MHz **Filter** RRC (Root-Raised-Cosine) **Roll off** 0.22 **Clock** **Source:** External **Mode:** Multiple Symbol **Multiplier:** 5 **Global Settings** **Threshold Data Input** 50 Ohm **Impedance Data Input** 1.5 V ➢ Settings on reference-DUT **Frequency:** 100 MHz **Level:** 0 dBm **ARB** **Load Waveform** any **State** ON **Clock Freq** 100 MHz ➢ Check external clock rate (**Measured Extern Clock** in **Trigger-Marker-Clock menu**) - must be 100 MHz. ➢ Settings on analyzer: VSA FREQ CENTER: 100 MHz AMPT / REF LEVEL 5 dBm MODULATION SETTINGS SYM RATE 20 MHz MODULATION & MAPPING PSK 8PSK MODULATION FILTER RRC RRC RRC RRC ALPHA BT 0.22 ➢ Check **EVM** in Modulation Accuracy Table.

The number of necessary measurement depends on the number of installed RF- and baseband paths, see following table:

Installed paths	1 x RF 1 x BB	2 x RF 2 x BB	2 x RF 1 x BB	1 x RF 2 x BB
Custom Digital Modulation: external clock function **Number of measurements**	1 x	1 x	1 x	1 x

Function External Data

The equipment layout for generating the digital modulation signals includes the options R&S B13 (Baseband Main Module) and R&S B10 (Baseband Generator).

Test equipment	Vector signal generator DUT (table 1-1, pos. 5) , Signal Analyzer R&S FSQ with option R&S FSQ-K70 (Vector Signal Analysis) (table 1-1, pos.24)
Test setup	➢ Connect DATA and CLOCK outputs of reference DUT to DATA and CLOCK inputs of test DUT. ➢ Connect signal analyzer to RF output of DUT
Test method	As described above (test of external clock), but now the data from the external input is also taken.
Measurement	➢ Settings on test DUT **Frequency:** 100 MHz **Level:** 0 dBm **Custom Digital Mod:** **State** ON **Data Source** External Serial **Modulation Type** 8PSK **Symbol Rate** 20MHz **Filter** RRC (Root-Raised-Cosine) **Roll off** 0.22 **Clock Source:** External **Global Settings** **Threshold Data Input** 50Ohm **Impedance Data Input** 1.5 V ➢ Settings on reference-DUT **Frequency:** 100 MHz **Level:** 0 dBm **Custom Digital Mod:** **State** ON **Data Source** Pattern 01010101 11110111 00001000 **Modulation Type** 8PSK **Symbol Rate** 20MHz **Filter** RRC (Root-Raised-Cosine) **Roll off** 0.22 ➢ Settings on analyzer: VSA FREQ CENTER: 100 MHz AMPT / REF LEVEL 5 dBm MODULATION SETTINGS SYM RATE 20 MHz MODULATION & MAPPING PSK 8PSK MODULATION FILTER RRC RRC RRC RRC ALPHA BT 0.22 ➢ Read out the data pattern of the demodulated signal and compare it with the transmitted pattern. The data-pattern search function of the R&S FSQ can be used for this purpose.

The number of necessary measurement depends on the number of installed RF- and baseband paths, see following table:

Installed paths	1 x RF 1 x BB	2 x RF 2 x BB	2 x RF 1 x BB	1 x RF 2 x BB
Custom Digital Mod: external clock and external data **Number of measurements**	1 x	1 x	1 x	1 x

Function Level Attenuation

The equipment layout for generating GSM/EDGE signals includes the options R&S B13 (Baseband Main Module), R&S B10 (Baseband Generator) and R&S K40 (Digital Standard GSM/EDGE).

Test equipment	Signal analyzer (table 1-1, pos. 24) with options R&S FSQ-K70 (Vector Signal Analysis) and FS-K5 (GSM/EDGE Measurements).
Test setup	➢ Connect signal analyzer to RF output of DUT.
Measurement	➢ Settings on DUT: **Frequency:** 450 MHz **Level:** 0 dBm **GSM/EDGE:** **State** ON **Define All Slot Attenuations** **A1** 0 dB **A2** 10 dB **A3** 20 dB **A4** 30 dB **A5** 40 dB **A6** 50 dB **A7** 60 dB **Slot 0** **Slot Level** Attenuated **Slot Attenuation** 0 dB (A1) ➢ Settings on analyzer VSA FREQ CENTER 450 MHz DIGITAL STANDARD GSM/EDGE GSM NB ADJUST REF LVL ➢ Read off the level of the signal in the Modulation Accuracy table at mean power and write it down as the reference level. ➢ On the DUT, set the level attenuation of slot 0 in sequence to 10 dB (A2) to 60 dB (A7) (see above). ➢ Settings on analyzer (for each level attenuation settings) ADJUST REF LVL ➢ Each time, measure the level again relative to the reference level. ⇨ The additional level error in question is the difference of the level difference measured to the level difference set. ➢ Recommended test frequencies 450 MHz, 850 MHz, 1.8 GHz, 2.5 GHz, 3.0 GHz, 3.2 GHz, 4.5 GHz, 5.4 GHz.

The number of necessary measurement depends on the number of installed RF- and baseband paths, see following table:

Installed paths	1 x RF 1 x BB	2 x RF 2 x BB	2 x RF 1 x BB	1 x RF 2 x BB
Custom Digital Mod: level attenuation **Number of measurements**	1x	2x	2 x	2 x

AUX I/O and BNC Connectors

Test equipment	Adapter R&S Z5 (AUX I/O to BNC) (table 5-1, Pos. 27); several BNC cable
Test setup	Plug adapter into AUX I/O interface Make the following BNC connections on the adapter: PARDATA0 USER2 PARDATA1 USER3 PARDATA2 USER4 PARDATA4 BURST LEVATT INST_TRIG_B (HOP) Make the following BNC connections on the instrument and the BERT adapter: from: to: MARKER1 TRIGGER1, BER CLK, BER_RESTART MARKER2 TRIGGER2, BER_DATA, BER_EN_DATA MARKER3 USER1
Test method	Self-test by means of connection test
Measurement	➢ Settings on DUT **Custom Digital Mod:** **State** ON (the markers are available in this state only) ➢ Start selftest AUX-IO and BNC via remote control with commands `:TEST:CONNector:AUXio` and `:TEST:CONNector:BNC`.

The number of necessary measurement depends on the number of installed RF- and baseband paths, see following table:

Installed paths	1 x RF 1 x BB	2 x RF 2 x BB	2 x RF 1 x BB	1 x RF 2 x BB
Connection test AUX I/Q and BNC **Number of measurements**	1x	1x	1 x	1 x

GSM and GSM Normal Burst

The equipment layout for generating GSM/EDGE signals includes the options R&S B13 (Baseband Main Module), R&S B10 (Baseband Generator) and R&S K40 (Digital Standard GSM/EDGE).

Test equipment	Signal analyzer R&S FSQ including options R&S FSQ-K70 (Vector Signal Analysis) and R&S FS-K5 (GSM/EDGE) (table 1-1, pos. 24)
Test setup	➢ Connect signal analyzer to RF output of DUT.
Measurement method	1. Set Custom Dig Mod in the baseband; set standard GSM here. Perform the measurements with the GSM measurement setting of the R&S FSQ. 2. Set standard GSM in the baseband. Perform the measurements with the GSM measurement setting of the R&S FSQ.
Measurement 1	➢ Settings on DUT **Level:** max. level, refer to data sheet (depending on options) **Frequencies:** 910 and 1850 MHz (and 5GHz for R&S B106) **Custom Digital Mod:** **State** ON **Set acc. To Standard**: GSM ➢ Settings on analyzer VSA FREQ CENTER: 910 MHz, 1850 MHz (and 5 GHz for DUT-B106) DIGITAL STANDARD GSM/EDGE GSM_NB ADJUST REF LVL ➢ Check **phase error** in Modulation Accuracy Table ➢ Settings on analyzer FREQ CENTER: 910 MHz, 1850 MHz (and 5 GHz for R&S B106) MEAS CHAN PWR ACP CP /ACP CONFIG NO. OF ADJ CHAN 3 CHANNEL BANDWIDTH 30 kHz (all entries) CHANNEL SPACING 200 kHz (all entries) ADJUST SETTINGS MEAS CHAN PWR ACP ADJUST REF LVL NOISE CORR ON ➢ Check ACP (take the smaller of the two measurement values UPPER/LOWER in each case): Adjacent Channel, Alternate Channel, 2nd Alternate Channel

Measurement 2	➢ Settings on DUT: **Level:** max. level, refer to data sheet (depending on options) **Frequencies:** 910 MHz, 1850 MHz (and 5 GHz for R&S B106) **GSM/EDGE:** **State** ON ➢ Settings on analyzer GSM/EDGE FREQ CENTER 910 MHz, 1850 MHz (and 5 GHz) GSM/EDGE DEMOD SETTINGS AUTO LEVEL&TIME GSM/EDGE POWER VS TIME START REF MEAS. LIMIT CHECK PASSED has to be indicated on the analyzer. ➢ Settings on analyzer GSM/EDGE TRANSIENT SPECTRUM START REF MEAS LIMIT CHECK PASSED has to be indicated on the analyzer. ➢ Settings on analyzer GSM/EDGE MODULATION SPECTRUM START REF MEAS LIMIT CHECK PASSED or MARG has to be indicated on the analyzer.

The number of necessary measurement depends on the number of installed RF- and baseband paths, see following table:

Installed paths	1 x RF 1 x BB	2 x RF 2 x BB	2 x RF 1 x BB	1 x RF 2 x BB
GSM and GSM Normal Burst **Number of measurements**	1x	2x	2 x	2 x

GSM Edge and GSM Edge Burst

The equipment layout for generating GSM/EDGE signals includes the options R&S B13 (Baseband Main Module), R&S B10 (Baseband Generator) and R&S K40 (Digital Standard GSM/EDGE).

Test equipment	Signal analyzer R&S FSQ including options R&S FSQ-K70 (Vector Signal Analysis) and R&S FS-K5 (GSM/EDGE) (table 1-1, pos. 24)
Test setup	➢ Connect signal analyzer to RF output of DUT.
Measurement method	1. Set Custom Dig Mod in the baseband; set standard GSM EDGE here. Perform the measurements with the GSM EDGE measurement setting of the R&S FSQ. 2. Set standard GSM/EDGE in the baseband. Perform the measurements with the GSM EDGE measurement setting of the R&S FSQ.
Measurement 1	➢ Settings on DUT **Level:** max. level, refer to data sheet (depending on options) **Frequencies:** 910 and 1850 MHz (and 5GHz for R&S B106) **Custom Digital Mod:** **State** ON **Set acc. To Standard**: GSM EDGE ➢ Settings on analyzer VSA FREQ CENTER: 910 MHz, 1850 MHz (and 5 GHz for R&S B106) DIGITAL STANDARD GSM-EDGE EDGE_NB ADJUST REF LVL ➢ Check **EVM** in Modulation Accuracy Table ➢ Settings on analyzer FREQ CENTER: 910 MHz, 1850 MHz (and 5 GHz for R&S B106) MEAS CHAN PWR ACP CP /ACP CONFIG NO. OF ADJ CHAN 3 CHANNEL BANDWIDTH 30 kHz (all entries) CHANNEL SPACING 200 kHz (all entries) ADJUST SETTINGS MEAS CHAN PWR ACP ADJUST REF LVL NOISE CORR ON ➢ Check ACP (take the smaller of the two measurement values UPPER/LOWER in each case): Adjacent Channel, Alternate Channel, 2nd Alternate Channel

Measurement 2	➢ Settings on DUT: **Level:** max. level, refer to data sheet (depending on options) **Frequencies:** 910 MHz, 1850 MHz (and 5 GHz for R&S B106) **GSM/EDGE:** **State** ON **Slot 0** **Burst Type** Edge ➢ Settings on analyzer GSM/EDGE FREQ CENTER 910 MHz, 1850 MHz (and 5 GHz) GSM/EDGE DEMOD SETTINGS MODULATION EDGE AUTO LEVEL&TIME GSM/EDGE POWER VS TIME START REF MEAS LIMIT CHECK PASSED has to be indicated on the analyzer. ➢ Settings on analyzer GSM/EDGE TRANSIENT SPECTRUM START REF MEAS LIMIT CHECK PASSED has to be indicated on the analyzer. ➢ Settings on analyzer GSM/EDGE MODULATION SPECTRUM START REF MEAS LIMIT CHECK PASSED or MARG has to be indicated on the analyzer.

The number of necessary measurement depends on the number of installed RF- and baseband paths, see following table:

Installed paths	1 x RF 1 x BB	2 x RF 2 x BB	2 x RF 1 x BB	1 x RF 2 x BB
GSM and GSM Normal Burst **Number of measurements**	1x	2x	2 x	2 x

Modulation error for WCDMA - 3GPP

The equipment layout for generating the digital modulation signals includes the options R&S B13 (Baseband Main Module) and R&S B10 (Baseband Generator).

Test equipment	Signal analyzer R&S FSQ including option R&S FSQ-K70 (Vector Signal Analysis) (table 1-1, pos. 24)
Test setup	➢ Connect signal analyzer to RF output of DUT.
Test method	Set Custom Dig Mod to standard WCDMA-3GPP in the baseband. Perform the measurements with the 3GPP measurement setting of the R&S FSQ.
Measurement	➢ Settings on DUT **Level:** max. level, refer to data sheet (depending on options) **Frequencies:** 2160 MHz (and 5 GHz for R&S B106) **Custom Digital Mod:** **State** ON **Set acc. To Standard**: WCDMA-3GPP ➢ Settings on analyzer VSA FREQ CENTER: 2160 MHz (and 5GHz for R&S B106) DIGITAL STANDARD 3G-WCDMA 3G WCDMA_FWD ADJUST REF LVL ➢ Check EVM in Modulation Accuracy Table

The number of necessary measurement depends on the number of installed RF- and baseband paths, see following table:

Installed paths	1 x RF 1 x BB	2 x RF 2 x BB	2 x RF 1 x BB	1 x RF 2 x BB
Modulation error 3 GPP FDD **Number of measurements**	1x	2x	2 x	2 x

Adjacent Channel Power for 3GPP FDD

The equipment layout for 3GPP FDD signal generation includes the options R&S B13 (Baseband Main Module), R&S B10 (Baseband Generator) and R&S K42 (Digital Standard 3GPP FDD).

Test equipment	Signal analyzer R&S FSQ including option R&S FSQ-K70 (Vector Signal Analysis) (table 1-1, pos. 24)
Test setup	➢ Connect signal analyzer to RF output of DUT.
Test method	Set standard 3GPP FDD in the baseband. Perform the measurements with the 3GPP measurement setting of the R&S FSQ.
Measurement	➢ Settings on DUT **Level:** max. level, refer to data sheet (depending on options) **Frequencies:** 2160 MHz (and 5 GHz for R&S B106) **3GPP FDD:** **Test Setups** Test_Model_1_64channels **State** ON **I/Q Settings** **Manual Gain Unicod** 3GPP ACP optimized 3 dB ➢ Settings on analyzer FREQ CENTER: 2160 MHz (and 5 GHz for R&S B106) MEAS CHAN PWR ACP CP /ACP STANDARD WCDMA 3GPP FWD ADJUST REF LVL NOISE CORR ON SWEEP SWEPP TIME MANUAL 1 sec ➢ Check ACP: Adjacent Channel (take the smaller of the two measurement values UPPER/LOWER) ➢ Settings on DUT **I/Q Settings** **Manual Gain Unicod** Low Noise 6 dB ➢ Check ACP: Alternate Channel (take the smaller of the two measurement values UPPER/LOWER)

The number of necessary measurement depends on the number of installed RF- and baseband paths, see following table:

Installed paths	1 x RF 1 x BB	2 x RF 2 x BB	2 x RF 1 x BB	1 x RF 2 x BB
Modulation error 3 GPP FDD **Number of measurements**	1x	2x	2 x	2 x

Digital Standard GPS (R&S K44)

There is no testing required for the GPS (R&S K44) software personality. The functions required for this personality are already verified performing the tests defined in chapter “Internal Baseband Generator”.

3GPP FDD HSUPA (R&S K45)

There is no testing required for the 3GPP FDD HSUPA (R&S K45) software personality. The modulation error and adjacent channel power tests are already done when testing the 3GPP FDD option in chapter “Internal Baseband Generator”.

Digital Standard CDMA2000 (R&S K46)

There is no testing required for the CDMA2000 (R&S K46) software personality. The modulation error and adjacent channel power tests are already done when testing the 3GPP FDD option in chapter “Internal Baseband Generator”.

Digital Standard WLAN 802.11 a, b, g (R&S K48)

There is no testing required for the WLAN 802.11 a, b, g (R&S K48) software personality. The functions required for this personality are already verified performing the tests defined in chapter “Internal Baseband Generator”.

Digital Standard WiMAX 802.16-2004 (R&S K49)

There is no testing required for the WiMAX 802.16-2004 (R&S K49) software personality. The functions required for this personality are already verified performing the tests defined in chapter “Internal Baseband Generator”.

Digitaler Standard TD-SCDMA (R&S K50)

There is no testing required for the TD-SCDMA (R&S K50) software personality. The functions required for this personality are already verified performing the tests defined in chapter “Internal Baseband Generator”.

TD-SCDMA enhanced BS/MS Tests (R&S K51)

There is no testing required for the TD-SCDMA enhanced BS/MS Tests (R&S K51) software personality. The functions required for this personality are already verified performing the tests defined in chapter “Internal Baseband Generator”.

Fader and Fader Extension (R&S B14 / B15)

The equipment layout for fading includes the options R&S B13 (Baseband Main Module), R&S B10 (Baseband Generator) and R&S B14/B15. A first test is performed by internal means.

Internal Test 1, Self Test of B14 and B15:

Test equipment	Not needed
Test setup	-
Test method	All connections, data pathes and memory inside R&S SMU and R&S SMU are tested with PRBS data; This test requires approx. 10s per board (20s for both R&S B14 and R&S B15).
Measurement	➢ Run remote command TEST1:FADER? . Result: OK

Internal Test 2, Connectiontest of Baseband:

Test equipment	-
Test setup	-
Test method	The digital data path for I and Q inside the base band is tested with a PRBS signal and a bit error rate measurement is performed.
Measurement	➢ Run remote command TEST1:BB:CONNection? . Result: OK .

External Test:

Test equipment	Signal analyzer R&S FSQ including option R&S K70 (Vector Signal Analysis) (table 1-1, pos. 24)
Test setup	➢ Connect signal analyzer to RF output of DUT.
Test method	A digital modulated Signal is generated and its error vector magnitude and EVM is measured as a reference. Then the signal is faded with pure doppler shift. Using frequency shift of the same amount in the opposite direction, center frequency is put back to the displayed value. Than the signal is measured again and compared to the reference. No degradations may occur.

Measurement	➢ As a reference perform the measurement 1 of chapter “GSM and GSM Normal Burst” at RF = 910 MHz. Denote results of phase error and EVM. ➢ Now the Baseband has to shift its output in frequency. Source1:bb:foff 1000 Hz ➢ Now the Fader has to be set to Pure Doppler Shift in one channel of one path to counteract the above shift *Formula:* *f(doppler) = f(RF) * speed / c ; c = speed of light = 299792458 m/s* Settings on DUT Source1:fsim:path1:stat off Source1:fsim:rout famaxa Source1:fsim:speed:unit mps Source1:fsim:del:group1:path1:speed 272.8111 Source1:fsim:del:group1:path1:prof pdopp Source1:fsim:del:group1:path1:stat on Source1:fsim:stat on ➢ Perform above measurement again ➢ No signal degradations may occur, same readings in the limits of measurement uncertainty are to be obtained. ➢ If installed, repeat the test with Fader Extension B15. a) if DACB B is installed, use Channel B b) if no DAC B is installed, use Group 5, Path 1 ➢ If no UNICOD is available, perform this test with an external baseband source.

Additive White Gaussian Noise (R&S K62)

Test equipment	Signal analyzer R&S FSQ (table 1-1, pos. 24)
Test setup	➢ Connect signal analyzer to RF output of DUT.
Test method	A digital modulated signal is generated and noise is added. Using the channel power measurement facility of the spectrum analyzer, the carrier power and the power of a section of the noise spectrum is determined. By expanding the result to the system bandwidth, the carrier to noise ratio can be reconstructed. The noise generator is a firmware option, realized in a FPGA. The functionality of this FPGA is tested with one measurement, data are guaranteed by design.
Measurement	➢ Settings on DUT **Level:** 0 dBm **Frequency:** 1 GHz **RF:** State ON ➢ Settings on DUT if Unicod is installed **Baseband Custom Digital Modulation** Set to default (GSM), Symbol Rate 500 Hz State on **AWGN/IMP AWGN** Additive Noise, System Bandwidth 1 MHz Carrier/Noise Ratio 20.00 dB State ON ➢ Settings on analyzer **FREQ** CENTER: 1 GHz **MEAS** CHAN PWR ACP CP /ACP CONFIG CHANNEL BANDWIDTH 100 kHz **AMPT** REF LEVEL 10 dBm **BW** RES BW MANUAL 30 kHz VIDEO BW MANUAL 300 kHz **TRACE** DETECTOR RMS **SWEEP** SWEEP TIME MANUAL 2 sec ➢ Measure carrier power and denote as a reference. ➢ Settings on DUT if Unicod is not installed **AWGN/IMP AWGN** Noise only, System Bandwidth 1 MHz Noise Level -20.00 dB State ON ➢ Now retune center frequency of the analyzer to 1.0003 GHz. ➢ Measure the noise power. ➢ Since the measurement bandwidth is a tenth of the system bandwidth, the result is to be corrected by 10 dB. ⇨ The result is carrier power – noise power – 10 dB.

Bit Error Rate Tester (BER, Option R&S K80)

The Bit Error Rate Tester is a firmware option, realized in a FPGA. The functionality of this FPGA is tested in chapte “” on page 1.68. Performing these tests successfully implements Option R&S K80 to be functional. Further testing is unnecessary.

Hardware Signals (only R&S SMATE)

Signal OPC

Test equipment	- Spectrum analyser (Table 1-2, item 24) - Adapter R&S Z5 (AUX I/O to BNC) (table 5-1, Pos. 27); BNC cable
Test setup	➢ Plug adapter into DIG I/O interface ➢ Apply connection from OPC A/B to external trigger input of the spectrum analyser.
Test method	The function of the OPC Signal is tested by triggering the spectrum analyzer.
Measurement	➢ Setting on DUT: - **Frequency:** 100 MHz ➢ Settings on spectrum analyzer: - TRIGGER EXTERN - External triggering by positive edge at 1.4 V. ➢ Change DUT Frequncy to 1 GHz ➢ Check trigger on analyzer.

Signal RF OFF

Test equipment	- Spectrum analyzer (Table 1-2, item 24) - Pulse generator (Table 1-1, item 17) - Adapter R&S Z5 (AUX I/O to BNC) (table 5-1, Pos. 27); BNC cable
Test setup	➢ Plug adapter into AUX I/O interface ➢ To test the function, connect the spectrum analyzer to the RF output socket of the DUT and the pulse generator to the RF OFF A/B socket on the adapter Z5.
Measurement	➢ Setting on DUT: **Level** menu: **DIG I/O RF OFF** **Enable** On ➢ Determine the output level of the DUT at various carrier frequencies with a "high" and a "low" signal applied. ⇨ The difference between the output level with a "high" signal applied and that with a "low" signal applied is the ON/OFF ratio.
Recommended test frequencies	1 GHz, 4 GHz
Recommended test level	P_{max}

The number of necessary measurement depends on the number of installed RF paths.

Testing with Option B90 (Mimo) enabled

If the DUT is equipped with Option B90 the function of the LO_in_ext and LF_out_ext have to be verified. Also some of the tests which are always conducted have to be performed additionally in the coupled mode of the local oscillator. Option B90 requires a DUT with two paths, i.e the additional tests for B90 have to be performed for both paths. In the coupled mode the IQ modulator has to to be switched on and a an input has to be applied to the IQ modulator. If the test doesnot require a IQ modulator input anyhow, this Input can be provided by a single carrier MCCW from the baseband if installed, otherwise it can be provided by a single carrier MCCW input from an external IQ modulation source. The Scpi commands to bring the DUT into this state are:

SOUR:BB:MCCW:CARR:COUN 1
SOUR2:BB:MCCW:CARR:COUN 1
SOUR:BB:MCCW:STAT ON
SOUR2:BB:MCCW:STAT ON
FREQ:LOSC:MODE COUP

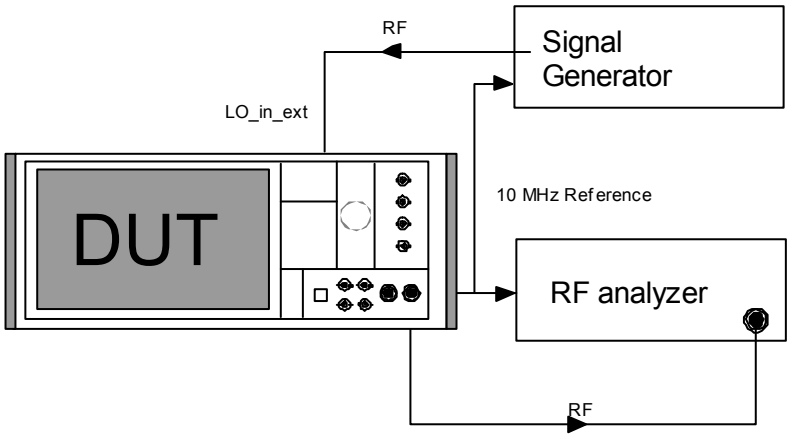
When setting the RF frequency for Path B in coupled mode, it has to be taken into account that in this mode the RF frequencies are coupled and set for both paths when the RF frequency for path A is set. Commands for setting the frequency on path B are ignored in coupled mode.

Additional tests with B90

LO_out_ext

Test equipment	Frequency counter (Table 1-2, item 1)
Test method	The frequency of the LO_out_ext is checked using a frequency counter whose reference frequency is in sync with that of the DUT..
Measurement	➢ Synchronize the reference frequencies of the DUT and the analyzer. ➢ Connect LO_out_ext to Frequency counter ➢ Settings on DUT: - Apply Single Carrier MCCW to IQ modulator **- Frequency:** test frequency unmodulated, recommended requencies: according to Table 1-4

LO_in_ext

Test equipment	- RF analyzer (Table 1-1, item 7) - Signal generator (Table 1-1, item 5)
Test setup	The signal generator is used as RF source for the LO_in_ext.
	
Test method	While the signal generator provides the RF signal for LO_in_ext the frequency of both RF out is checked using a frequency counter whose reference frequency is in sync with that of the DUT and the signal generator.
Measurement	➢ Synchronize the reference frequencies of the DUT and the analyzer. ➢ Connect RF of signal generator to LO_in_ext ➢ The Signal Generator provides the test frequencies according to Table 1-4 ➢ Settings on DUT: - Apply Single Carrier MCCW to IQ - Set LOSC mode to extern - measure RF frequency on all paths

Measurement	➢ Synchronize the reference frequencies of the DUT and the analyzer. ➢ Connect LO__ext to Frequency counter ➢ Settings on DUT: - Apply Single Carrier MCCW to IQ **- Frequency:** test frequency unmodulated, recommended requencies: according to Table 1-4

Tests extended for B90

Frequency Setting

Test equipment	Frequency counter (Table 1-2, item 1)
Test method	The frequency setting is checked using a frequency counter whose reference frequency is in sync with that of the DUT.
Preparation for B90	Single carrier MCCW has to be applied to IQ Modulator The upper frequency is determined by the lower maximum frequency of both paths (i.e. 3 GHz without B206)
Measurement	Same as without B90

Harmonics

Test equipment	Spectrum analyzer (Table 1-2, item 24)
Test setup	Connect the spectrum analyzer to the RF output of the DUT. ➢ Synchronize reference frequencies of analyzer and DUT.
Preparation for B90	Single carrier MCCW has to be applied to IQ Modulator The upper frequency is determined by the lower maximum frequency of both paths (i.e. 3 GHz without B206)
Recommended frequencies	➢ According to Table 1-4
Measurement	Same as without B90

Subharmonics

Test equipment	Same as for harmonics suppression
Test setup	Same as for harmonics suppression
Preparation for B90	Single carrier MCCW has to be applied to IQ Modulator The upper frequency is determined by the lower maximum frequency of both paths (i.e. 3 GHz without B206)
Recommended frequencies	➢ 1501 MHz, 1550 MHz to 6000 MHz in 50 MHz steps
Measurement	Same as without B90

Nonharmonics

Test equipment	Same as for harmonics
Test setup	Same as for harmonics
Preparation for B90	Single carrier MCCW has to be applied to IQ Modulator The upper frequency is determined by the lower maximum frequency of both paths (i.e. 3 GHz without B206)
Measurement	Same as without B90

Non-systematic nonharmonics

Measurement	Settings on DUT: Same as without B90, can only be measured with IQ dc input

Wideband Noise

Test method	The Wideband Noise measurement with IQ modulation as conducted without B90 has to be performed with the LOSC coupling switched on

SSB Phase Noise

Test method	The SSB Phase Noise measurement with IQ modulation as conducted without B90 has to be performed with the LOSC coupling switched on

I/Q modulation

For the I/Q modulation test no extra dc input to the I/Q modulator has to be supplied. Following tests have to be extended by a measurement with LOSC coupling switched on:

RF level with I/Q modulation

Test method	This measurement to be performed as without B90 but with the LOSC coupling switched on

Error Vector

Test method	This measurement to be performed as without B90 but with the LOSC coupling switched on

RF Frequency Response due to Modulation

Test method	This measurement to be performed as without B90 but with the LOSC coupling switched on

Residual Carrier and Leakage

Test method	This measurement to be performed as without B90 but with the LOSC coupling switched on

I/Q Imbalance

Measurement of imbalance	
Test method	This measurement to be performed as without B90 but with the LOSC coupling switched on
Measurement of quadrature error	
Test method	This measurement to be performed as without B90 but with the LOSC coupling switched on

Image Rejection over the Complete Unit

Test method	This measurement to be performed as without B90 but with the LOSC coupling switched on

Function Level Attenuation

Test method	This measurement to be performed as without B90 but with the LOSC coupling switched on

Adjacent Channel Power for 3GPP FDD

Test method	This measurement to be performed as without B90 but with the LOSC coupling switched on

Baseband Digital IQ-Output (Option R&S SMU/SMJ-B18)

The number of necessary measurement depends on the number of installed R&S -B18, see following table:

Installed paths	1 x BB	2 x BB
I/Q output: frequency response and amplitude-equality Number of measurements	1 x	2 x

Test equipment	- Signal generator (Table 1-1, item 4), equiped with Digital Input (B17) - Cable for Digital-Baseband IO (Table 1-1, item 14),
Test setup	➢ Connect signal generator's Digital Input to the Digital Output of the DUT with the Mini D Ribbon cable.
Test method	Set the Digital Output of the DUT in test sequence transmitting mode. The signal generator's Digital Input evaluates the incoming test pattern and calculates the Bit Error Rate.
Measurement	➢ Settings on DUT Activate test sequence transmitting via remote control with command :TEST<HW>:BBOut:TX:STAT*e ON* Settings on signal generator Start bit error evaluation via remote control with command: :TEST<HW>:BBIN:RX? Result: 0 = TestOk, 1 = TestFailed Test will take 2 seconds to deliver a result. Repeat it 3 times, all of the test results must be OK. ➢ Settings on DUT Deactivate test sequence transmitting via remote control with command :TEST<HW>:BBOut:TX:STAT*e OFF* *Remark: <HW> = 1 for path 1, 2 for path 2*

Internal Baseband Generator

Function Trigger and Marker

The equipment layout for generating the digital modulation signals includes the options R&S SMU-B13 (Baseband Main Module) and R&S SMU-B10 (Baseband Generator).

Test equipment	- Oscilloscope (table 1-1, pos 5) - Trigger source
Test setup	➢ Connect trigger source to trigger input of DUT. ➢ Connect the oscilloscope to marker outputs 1 and 2 on the front of DUT
Test method	In the **Custom Digital Mod** menu, a modulation with 100 kHz symbol rate, external triggering and active marker outputs (with 50 kHz and 25 kHz) is set. Modulation is started with the external trigger. No parameters are checked, but only whether the modulation has triggered (query of trigger status) and whether the markers are output.
Measurement	➢ Settings on DUT **Frequency:** 100 MHz **Level:** 0 dBm **Custom Digital Mod:** **State** On **Trigger/Marker** **Trigger In - Mode** Armed Auto **Trigger In - Source:** External **Reconfigure Marker – Channel 1:** Pulse, **Divider:** 2 (50 kHz) **Reconfigure Marker – Channel 2:** Pulse, **Divider:** 4 (25 kHz) Apply trigger. Check start of curve: Display of the trigger status in the Custom Dig Mod / Trigger – Marker _ Clock changes from **Stopped** to **Running** Check markers using the oscilloscope: Marker 1: frequency 50 kHz, Marker 2: frequency 25 kHz. ***Note:*** *Marker 3 or 1B is not measured here, but rather in the test of the AUX-IO.*

The number of necessary measurement depends on the number of installed baseband paths, see following table:

Installed paths	1 x BB	2 x BB
Custom Digital Modulation: trigger and marker function **Number of measurements**	1 x	1 x

Function External Clock

The equipment layout for generating the digital modulation signals includes the options R&S SMU-B13 (Baseband Main Module) and R&S SMU-B10 (Baseband Generator).

Test equipment	- See section "Test Assembly for Measurement realized by RF Evulation on page 1.2" - Vector Signal Generator(table 1-1, pos. Pos. 4) , - Signal Analyzer R&S FSQ with option R&S FSQ-K70 (vector signal analysis).
Test setup	➢ Connect CLOCK outputs of reference DUT to CLOCK inputs of test DUT (DUT). ➢ Connect the DUT I/Q-outputs to the I/Q-inputs of the signal generator ➢ Connect signal analyzer to RF output of signal generator.
Test method	The test DUT is supplied with a clock from the reference DUT via the external interface. The modulated signal is extracted at the RF output of the signal generator, demodulated with the R&S FSQ and checked for EVM.

Measurement	➢ Settings on DUT **Custom Digital Mod:** **State** ON **Data Source** Pattern 010101010101 **Modulation Type** 8PSK **Symbol Rate** 20 MHz **Filter** RRC (Root-Raised-Cosine) **Roll off** 0.22 **Clock** **Source:** External **Mode:** Multiple Symbol **Multiplier:** 5 **Global Settings** **Threshold Data Input** 1.5 V **Impedance Data Input** 50 Ohm **Analog I/Q Output Menu:** **Output Type:** Single Ended **Load Type:** 50 Ohm **PEP:** 0.5 V ➢ Settings on signal generator **Frequency:** 100 MHz **Level:** 0 dBm **I/Q Settings** menu: **Source** Analog Wideband I/Q Input **State** On Check external clock rate (**Measured Extern Clock** in **Trigger-Marker-Clock menu**) - must be 100 MHz. ➢ Settings on analyzer: VSA FREQ CENTER: 100 MHz AMPT / REF LEVEL 5 dBm MODULATION SETTINGS SYM RATE 20 MHz MODULATION & MAPPING PSK 8PSK MODULATION FILTER RRC RRC RRC RRC ALPHA BT 0.22 ➢ Check **EVM** in Modulation Accuracy Table.

The number of necessary measurement depends on the number of installed RF- and baseband paths, see following table:

Installed paths	1 x BB	2 x BB
Custom Digital Modulation: trigger and marker function **Number of measurements**	1 x	1 x

Function External Data

The equipment layout for generating the digital modulation signals includes the options R&S SMU-B13 (Baseband Main Module) and R&S SMU-B10 (Baseband Generator).

Test equipment	- Vector signal generator DUT (table 1-1, pos. 4), Signal Analyzer R&S FSQ with option R&S FSQ-K70 (Vector Signal Analysis) (table 1-1, pos.11)
Test setup	➢ Connect DATA and CLOCK outputs of signal generator to DATA and CLOCK inputs of test DUT. ➢ Connect the DUT I/Q-outputs to the I/Q-inputs of the signal generator ➢ Connect signal analyzer to RF output of signal generator
Test method	As described above (test of external clock), but now the data from the external input is also evaluated.

Measurement	➢ Settings on test DUT **Custom Digital Mod:** **State** ON **Data Source** External Serial **Modulation Type** 8PSK **Symbol Rate** 20MHz **Filter** RRC (Root-Raised-Cosine) **Roll off** 0.22 **Clock Source:** External **Global Settings** **Threshold Data Input** 1.5 V **Impedance Data Input** 50Ohm **Analog I/Q Output Menu:** **Output Type:** Single Ended **Load Type:** 50 Ohm **PEP:** 0.5 V ➢ Settings on signal generator **Frequency:** 100 MHz **Level:** 0 dBm **I/Q Settings** menu: **Source** Analog Wideband I/Q Input **State** On **Custom Digital Mod:** **State** ON **Data Source** Pattern 01010101 11110111 00001000 **Modulation Type** 8PSK **Symbol Rate** 20 MHz **Filter** RRC (Root-Raised-Cosine) **Roll off** 0.22 ➢ Settings on analyzer: VSA FREQ CENTER: 100 MHz AMPT / REF LEVEL 5 dBm MODULATION SETTINGS SYM RATE 20 MHz MODULATION & MAPPING PSK 8PSK MODULATION FILTER RRC RRC RRC RRC ALPHA BT 0.22 ➢ Read out the data pattern of the demodulated signal and compareit with the transmitted pattern. The data-pattern search function of the R&S FSL can be used for this purpose.

The number of necessary measurement depends on the number of installed RF- and baseband paths, see following table:

Installed paths	1 x BB	2 x BB
Custom Digital Modulation: trigger and marker function **Number of measurements**	1 x	1 x

AUX I/O and BNC Connectors

Test equipment	- Adapter R&S SMU-Z5 (AUX I/O to BNC) (table 1-1, Pos. 13); several BNC cable
Test setup	Plug adapter into AUX I/O interface Make the following BNC connections on the adapter: PARDATA0 USER2 PARDATA1 USER3 PARDATA2 USER4 PARDATA4 BURST LEVATT INST_TRIG_B (HOP) on the rear side of the device Make the following BNC connections on the instrument and the BERT adapter: from: to: MARKER1A TRIGGER1, BER CLK, BER_RESTART MARKER2A TRIGGER2, BER_DATA, BER_EN_DATA MARKER1B USER1
Test method	Self-test by means of connection test
Measurement	➢ Settings on DUT **Custom Digital Mod:** **State** ON (the markers are available in this state only) ➢ Start selftest AUX-IO and BNC via remote control with commands `:TEST:CONNector:AUXio` and `:TEST:CONNector:BNC`.

The number of necessary measurement depends on the number of installed RF- and baseband paths, see following table:

Installed paths	1 x BB	2 x BB
Custom Digital Modulation: trigger and marker function **Number of measurements**	1 x	1 x

Modulation error for WCDMA - 3GPP

The equipment layout for generating the digital modulation signals includes the options R&S SMU-B13 (Baseband Main Module) and R&S SMU-B9/10/11 (Baseband Generator).

Test equipment	➢ See section „Test Assembly for Measurement realized RF Evaluation“ on page 1.2 ➢ Signal analyzer R&S FSQ including option R&S FSQ-K70 (Vector Signal Analysis) (table 1-1, pos. 24) ➢ Signal generator if **no** R&S SMU-B10 (Baseband Generator) is installed.
Test setup	➢ Connect the DUT I/Q-outputs to the I/Q-inputs of the signal generator ➢ Connect the signal analyzer to the RF output of the signal Generator.
Test method	Set Custom Dig Mod to standard WCDMA-3GPP in the baseband. Perform the measurements with the 3GPP measurement setting of the R&S FSQ.
Measurement	➢ Settings on signal generator **Level:** 0 dBm **Frequency:** 2160 MHz **RF:** State ON **I/Q Settings** menu: **Source** Analog Wideband I/Q Input **State** On ➢ Settings on DUT **Custom Digital Mod:** **State** ON **Set acc. To Standard**: WCDMA-3GPP ➢ Settings on analyzer VSA FREQ CENTER: 2160 MHz DIGITAL STANDARD 3G-WCDMA 3G WCDMA_FWD ADJUST REF LVL Check EVM in Modulation Accuracy Table

The number of necessary measurement depends on the number of installed RF- and baseband paths, see following table:

Installed paths	1 x RF 1 x BB	2 x RF 2 x BB	2 x RF 1 x BB	1 x RF 2 x BB
Modulation error 3 GPP FDD **Number of measurements**	1x	2x	2 x	2 x

Adjacent Channel Power for 3GPP FDD

The equipment layout for 3GPP FDD signal generation includes the options R&S SMU-B13 (Baseband Main Module), R&S SMU-B9/10/11 (Baseband Generator) and R&S SMU-K42 (Digital Standard 3GPP FDD).

Test equipment	➢ - See section See section „Test Assembly for Measurement realized RF Evaluation“ on page 1.2 - Signal analyzer R&S FSQ including option R&S FSQ-K70 (Vector Signal Analysis) (table 1-1, pos. 24) - Signal generator if **no** R&S SMU-B10 (Baseband Generator) is installed
Test setup	➢ Connect the DUT I/Q-outputs to the I/Q-inputs of the signal generator ➢ Connect the signal analyzer to the RF output of the signal Generator.
Test method	Set standard 3GPP FDD in the baseband. Perform the measurements with the 3GPP measurement setting of the R&S FSQ.
Measurement	➢ Settings on signal generator **Level:** 0 dBm **Frequency:** 2160 MHz **RF:** State ON **I/Q Settings** menu: **Source** Analog Wideband I/Q Input **State** On ➢ Settings on DUT **Level:** max. level, refer to data sheet (depending on options) **Frequencies:** 2160 MHz **3GPP FDD:** **Test Setups** Test_Model_1_64channels **State** ON **I/Q Settings** **I/Q Gain** 3GPP ACP optimized 3 dB ➢ Settings on analyzer FREQ CENTER: 2160 MHz MEAS CHAN PWR ACP CP /ACP STANDARD WCDMA 3GPP FWD ADJUST REF LVL NOISE CORR ON SWEEP SWEPP TIME MANUAL 1 sec ➢ Check ACP: Adjacent Channel (take the smaller of the two measurement values UPPER/LOWER) ➢ Settings on DUT **I/Q Settings** **I/Q Gain** Low Noise 6 dB ➢ Check ACP: Alternate Channel (take the smaller of the two measurement values UPPER/LOWER)

The number of necessary measurement depends on the number of installed RF- and baseband paths, see following table:

Installed paths	1 x RF 1 x BB	2 x RF 2 x BB	2 x RF 1 x BB	1 x RF 2 x BB
Modulation error 3 GPP FDD **Number of measurements**	1x	2x	2 x	2 x

Contents - Chapter 2 "Adjustments"

2 Adjustments

This chapter describes all necessary measures to restore the performance of the R&S SMU after module replacement.
There are no manual adjustments to be performed. Internal and external adjustment routines are implemented for this purpose.

Preliminary Remark
Setting a defined **initial** state by pressing the PRESET key prior to adjustments is recommended.
To ensure that the internal adjustments are valid at operating temperature, at least **30 minutes warm-up time** at this temperature must be observed.

Internal Adjustments

All internal adjustments are available in the **Setup/Internal Adjustments** menu (see operating manual).

External Adjustments Requiring Measurement Equipment

The external adjustments require calibrated equipment and special software. Data sheet specifications of the unit are concerned. If required, contact your local Rohde & Schwarz representative.

External Level Correction

The measuring program for external level correction measures output power over frequency and level and stores the correction values inside the R&S SMU to maintain level accuracy.

I/Q Skew Correction, Modulation Frequency Response Correction

This program performes

- measurements on mirror sideband suppression for I/Q skew correction,
- measurements of modulation frequency response over center frequency and level
- and stores the correction values inside the R&S SMU to improve the performance of internal baseband I/Q modulation.

Adjustments of the Complete Unit

Performing **Setup/Internal Adjustments/Adjust All** activates all internal adjustments in a reasonable order.
The external adjustments have to be performed, if the recommended calibration interval is exhausted.

Adjustments after Module Replacement

Changed module	Required adjustment/correction	Calibration necessary (refer to chapter "Checking the rated characteristics")
Front Module Controller	See below, "*Procedures after Replacing the Front Module Controller or the Lithium Battery*"	None
Harddisk Drive	Setup/Internal Adjustments/Adjust All	None
Motherboard	Device Keys and Option Keys have to be restored. Contact R&S Service Department, Memmingen. Only for instruments equipped with SATT6C Full External Level Correction (R&S UCS2010 required).	Level Accuracy, Spectral Purity
Standard synthesis	Setup/Internal Adjustments/Adjust Synthesis Setup/Internal Adjustments/Adjust Level	Frequency setting, Frequency settling time, Spectral Purity
Synthesis Extension	Setup/Internal Adjustments/Adjust Synthesis Setup/Internal Adjustments/Adjust Level	Frequency setting, Frequency settling time, Spectral Purity, all tests on FM/Phim
Radio Frequency Module IQ Output Module 3 GHz IQ Output Module 6 GHz	Setup/Internal Adjustments/Adjust Level Setup/Internal Adjustments/Adjust IQ Modulator External Level Correction (power meter and measuring program required) Modulation Frequency Response Correction (power meter and measuring program required) I/Q Skew Correction (spectrum analyzer and measuring program required)	All tests
Level Control Module	Setup/Internal Adjustments/Adjust IQ Modulator, Modulation Frequency Response Correction (power meter and measuring program required) I/Q Skew Correction (spectrum analyzer and measuring program required)	Level settling time, all tests on AM, all tests on Vector Modulation, RF Frequency Response over the complete unit, Image Rejection over the complete unit
Attenuator SATT3 and SATT6	External Level Correction (power meter and measuring program required) Modulation Frequency Response Correction (power meter and measuring program required)	Level accuracy, Output Impedance, Level Settling Time, Modulation Frequency Response
Attenuator SATT6C	Full External Level Correction (R&S UCS2010 required) Modulation Frequency Response Correction (power meter and measuring program required)	Level accuracy, Output Impedance, Level Settling Time, Modulation Fequency Response
DAC Interface Board	None	All tests on the LF Generator, Connection test AUX-IO, Connection Test BNC
DAC Board	Modulation Frequency Response Correction (power meter and measuring program required) I/Q Skew Correction (spectrum analyzer and measuring program required)	All tests on internal baseband I/Q
Universal Coder	Modulation Frequency Response Correction (power meter and measuring program required) I/Q Skew Correction (spectrum analyzer and measuring program required)	All tests on internal baseband I/Q

Procedures after Replacing the Front Module Controller or the Lithium Battery

1. Before switching on, connect an USB keyboard to the R&S SMU.
2. After switching on, immediately press the "Delete" key to enter CMOS Setup Utility.
3. Select "Standard CMOS Features".
4. Set the correct date and time. Leave this topic by pressing "Esc" key.
5. Now select "Load Optimized Defaults" and prompt with "Y" (on German keyboards the button "Z" will generate the "Y").
6. Exit with F10: Save & Exit Setup, prompt with "Y".

Now the firmware will start.

Contents – Chapter 3 "Repair"

3 Repair

This chapter describes the design of the R&S SMU, measures for tracing errors down to module level and, in particular, the replacement of modules. Options are denominated without headers, so option B102 means R&S SMU-B102.

Instrument Design and Function Description

A detailed schematic of the Vector Signal Generator design is presented in the block diagrams (see chapter 5). The following functional description of the instrument refers to the block diagram.

RF-Section

Standard Synthesis Module SSYN

The Standard Synthesis (SSYN) module generates a frequency range from 200 MHz to 3025 MHz (extended divider range starting at 500 kHz) with an internal resolution of approx. 2 μHz. The actual frequency synthesis generates the frequency band from 731 MHz to 1512.5 MHz. All further output frequencies are generated by frequency doubling or frequency division. In addition, the module contains the 10 MHz reference frequency as well as a fixed frequency oscillator at 1040 MHz that is synchronized to the reference. Its output signal is used to generate the lower frequency band down to 100 kHz (by down-conversion) on the IQOP3 module.
The SSYN module supplies additional fixed frequencies obtained from the 1040 MHz reference by division, and these serve as reference signals for other modules (DAC IF).
The individual function modules are described below.

Reference Loop

The Reference Loop submodule contains a high-quality, 1040 MHz ceramic resonator oscillator. The oscillator is set to a stable reference frequency in a control loop with a frequency divider in the reverse path. The control bandwidth can be set in two stages. The reference frequency can be the 10 MHz OCXO located on the board (internal reference mode), an externally applied reference frequency (EXTREF_IN) of 5 MHz, 10 MHz or 13 MHz (external reference mode).
The 1040 MHz reference signal is distributed to the individual modules of the synthesizer via several power splitters and buffer amplifiers.
A variable frequency (REFVAR) is derived from the CRO 1040 MHz via a programmable divider. This frequency is used either by the DAC IF board as a reference (12.8 MHz).
The oscillator frequency of 1040 MHz is required as a reference frequency for the other function modules of the synthesizer and is also available to the IQOP3 for down-conversion (REF 1040). The output level for the IQOP3 is kept constant by a level control.

Fractional-N Loop

The Fractional-N Loop submodule handles fine resolution for the entire synthesizer. It contains a PLL in which a tuneable oscillator in the range from 652.689 MHz to 676 MHz is synchronized to a reference frequency (43.51 MHz to 45.06 MHz) obtained via fractional-N division. The divider in the reverse path of the PLL functions only as an integer divider.
Fractional division is performed by using the SYNCON4 and RFDIV chips. The advantage of fractional division in the reference path of the PLL is that the higher input frequency of 1040 MHz also allows higher division factors to be implemented, which poses fewer problems with regard to resulting spurious.
To ensure quick settling, a high reference frequency was chosen. Dynamic switchover of the control bandwidth during settling also occurs. However, it is also possible to keep the control bandwidth statically wide. The VCO is preset via a D/A converter.
A programmable divider at the output of the Fractional-N Loop submodule divides the oscillator output spectrum down to a frequency range of 56.7 MHz to 117.55 MHz. This step improves phase noise and spurious suppression by the corresponding divider factor.
The output frequency is used by the Main Loop submodule as a reference frequency.

Step Frequency Unit

The Step Frequency Unit handles coarse resolution for frequency synthesis. Within a given frequency grid, it creates discrete frequencies in the range from 693.33 MHz to 1500 MHz that are derived from the 1040 MHz reference frequency.
This is done by using a programmable divider (RFDIV) to divide the 1040 MHz fixed frequency into three frequencies of 104 MHz to 115.55 MHz (division factors of 9, 9.5 and 10). These frequencies are multiplied by factors of 6 to 14 using a frequency multiplier, and the required frequency characteristic is then selected by means of a tuneable bandpass filter.
The level of the output signal of the Step Frequency Unit is calibrated by means of a level preset and is used by the Main Loop submodule as an RF signal for down-conversion in a PLL.

Main Loop

The Main Loop submodule generates the frequency spectrum from 731 MHz to 1512.5 MHz. It consists of four tuneable oscillators that each cover a segment of the entire spectrum. The reverse path of the PLL contains a mixer that down-converts the VCO signal and the output signal of the Step Frequency Unit to the reference frequency of 56.7 MHz to 117.55 MHz. An analog frequency phase detector (mixer) compares the down-converted frequency with the output signal of the Fractional-N Loop submodule. To ensure proper settling, a digital PD (RFDIV) is parallel-connected during frequency switchover.
The frequency algorithm prevents mixture products from crossing the reference frequency (it would not be possible to suppress them as spurious near the carrier).
The control bandwidth of the Main Loop submodule is approx. 200 kHz. To ensure that the control loop always locks on the correct mixer sideband, pretuning of the VCOs is provided.
The output signal of the Main Loop submodule is directly forwarded to the Frequency Doubler module. The input signal of the Frequency Doubler module covers the frequency range from 750 MHz to 1512.5 MHz.

Output Unit

Frequency Doubler Module

By using frequency doubling, the Frequency Doubler module expands the frequency range of the synthesizer upward to 3025 MHz. Tunable highpasses and lowpasses connected in series ensure sufficient suppression of subharmonic spurious.

Divider Unit

The Divider Unit divides the spectrum of the base octave from 750 MHz to 1500 MHz into the frequency range from 200 MHz (500 kHz) to 750 MHz by using a programmable 2^N divider. The division factor range is from 2 to 4 (1024). Harmonic spurious caused by frequency division are not filtered out. Frequencies above 750 MHz are routed via a bypass. The frequency spectrum at the output of the Divider Unit ranges from 200 MHz (500 kHz) to 3025 MHz.
Output amplifiers with level preset ensure a constant output level at the module output.

Synthesis Extension Module SYNEX

The Synthesis Extension (SYNEX) module adds frequency and phase modulation capability (option B20) and can be equipped with low phase noise option (B22).
This module works only in combination with the module standard synthesis.
The source of the modulation signal is chosen by a modulation switch. FM/PhiM is generated by analog to digital conversion of the modulation signal and feeding it into a digital synthesis device in the module DDS-Modulator. The output of the DDS is fed as reference signal into a phase locked loop (PLL), the FM-loop. At higher modulation rates the VCOs of this PLL are modulated directly via D/A-converter and a level setting device to adjust to the steepness of the VCOs. The input signal of the standard synthesis is fed into the FM-loop to convert the VCO frequency down to the reference frequency supplied by the DDS-Modulator. The option B22 provides two high quality quartz reference oscillators. From these references several signal are derived by multiplying, dividing and filtering.
The individual function modules are described below.

Modulation Switch

This module consists of an input switch matrix, aliasing filter and a A/D-converter to feed modulation signals into the DDS-Modulator from internal or external sources.

DDS-Modulator

This module consists mainly of the DDS modulator implemented as a FPGA. The 14 bit output of this FPGA is D/A converted and filtered. The frequency range is about 17 to 19 MHz, with FM 25 to 29 MHz.

Analog FM

This module provides the modulation signal to directly modulate the FM-loop VCOs. The fine scaled signal from the DDS is D/A converted, filtered and coarse scaled by a level setting device.

FM-Loop

The FM-Loop consists of 6 switched VCOs, providing 750 to 1512.5 MHz output frequency. A mixer down converts the VCO frequency to the DDS output frequency. Phase detector, switchable loop filter and pretune facility complete this loop. A divider in the IF branch allowes to handle great FM deviations without overdriving the phase detector.

Option Low Phase Noise

The option B22 provides two high quality quartz reference oscillators, working on 10 MHz and 100 MHz. The 100 MHz oscillator is synchronised to the 10 MHz oscillator or, with reference set to external, to a 40 MHz signal from the SSYN module.
The 100 MHz signal is fed to the standard synthesis, where it replaces the step frequency to get a cleaner spectrum. The thereby missing frequency resolution is replaced by the resolution of the DDS.
To generate a clean 1200 MHz LO signal for the output module, the 100 MHz signal is multiplied by four, filtered, tripled and filtered again.
To provide the clock signal for the module DAC-board it is fractional divided to 12.8 MHz.

IQ Output Module 3GHz IQOP3

The module consists of two submodules, the Level Control Module (LCM) and the RF Module (RFM).

Level Control Module LCM

The LCM consists of the following functional units:

- Baseband processing with switchover matrix, adjustable voltage sources, IQ swap switch, 3 dB attenuator and imbalance setting for the I/Q modulator
- Baseband power meter
- Digital gain and level control with DSP
- LF AM, pulse and Levatt matrix

Baseband Processing

The LCM is used to select and process baseband signals for the I/Q modulator. Two different baseband inputs of the module can be selected, one for differential input signals with a restricted input frequency range from internal sources and one that is an asymmetrical input for externally supplied signals. In addition, the Q channel can also be switched to the LF AM input at a narrower bandwidth. To adjust the module and I/Q modulator on the RFM, the module input can also be switched over to adjustable voltage sources or to ground. The polarity of the I baseband signal can be inverted. An attenuator with four stages in 3 dB steps can be used to raise or lower the baseband level for optimal balance of the I/Q modulator. High-resolution gain control can be used to set the baseband level of the I and Q signals in a range of approx 1.5 dB. To create the broadband AM, a DC voltage can be added to the I signal.

Baseband Power Meter

The baseband power is the sum of the squares of the I and Q input signals situated orthogonally to one another. The baseband power meter squares the I and Q signals. Input offsets are compensated for by additive, adjustable DC voltages (DACs). The squared signal I^2 is scaled in such a manner as to compensate for the different steepnesses of the two squaring devices. The sum of the squared signals is determined, and a DC voltage for reducing the output offset is added. The steepness scaling and the output offset can be adjusted via DACs.

Digital Gain and Level Control with DSP

A digital control on the LCM is used to control the gain or the output level of the IQOP3 RFM and IQOP6. The control consists of a digital signal processor, two ADCs with anti-aliasing filters and a DAC for controlling the gain control elements on the IQOP3 RFM or IQOP6.

LF AM

Two modulation inputs of narrow bandwidth are available as the LF AM source. They can be selected via a switching matrix. Either DC or AC coupling is possible. The modulation depth can be set from 0 to 100% using a DAC. The signal is fed into the Q channel of the baseband processing module.

Pulse Matrix/Blank/RF_DOWN_N

The pulse matrix can be used to switch either one of the two modulation inputs of narrow bandwidth or the pulse line to the pulse modulator output for the IQOP3 RFM and IQOP6. The switching logic can be inverted. The RF_DOWN_N line (from the attenuator) and the BLANK line (from the DAC IF board) are hard-wired to the two pulse outputs.

Levatt

The two Levatt signals are filtered out and forwarded to the DSP controller and the RFM.

Radio Frequency Module RFM

The RFM contains the following elements:

- I/Q modulator with bypass for CW signals for reducing the broadband noise in the CW operating modes
- 15/30/45 dB LEVATT attenuation (for slot attenuation with digital modulation)
- 15 dB LEVELPRESET attenuation, adjustable in 1 dB steps
- 6 switchable lowpass filters for suppressing harmonics after the first preamplifier
- Pulse modulator with typ. 100 dB reduction
- Switchable amplifier for high output power (for overrange operating states)
- LEVEL CONTROL: PIN diodes for level reduction with typ. 30/60 dB in the normal range/overrange
- Mixing range with 1040 MHz or 1200 MHz local oscillator
- Switchable 5 dB attenuator for generating 5 dB steps in the output power
- Output amplifier with 3 switchable harmonic filters
- Directional coupler + detector attenuator + rms level detector with thermostat

Switching Sequence

Operating the MIX_A mixer switch is allowed only when PULSE_SWITCH=ON.
This precaution prevents "hot switching", which can destroy the mixer switch.

Interrupts

IRQ_UTHERMOX
The RFM thermostat requires a settling time of two minutes (maximum) to reach the nominal temperature. The interrupt IRQ_UTHERMOX line is H (+3.3 V) if the thermostat temperature deviates more than +-1 °C from the nominal temperature (70 °C). This generates a correspondent error mesage.

IRQ_QUADX
If the I/Q modulator quadrature control loop is out of range, this interrupt will be triggered and a error message is generated.

IQ Output Module 6GHz IQOP6

IQ Output Module 6 GHz doubles the output frequency of module Standard Synthesis and provides the output power in the frequency range 3 to 6 GHz.

Doubler, Filter Bank, CW Path

The RF signal provided by module Standard Synthesis is either connected through to output SYNRFE or is feed into the doubler and then into a switchable filter assembly. The filter assembly consists of two RF switches at the input and output and of three parallel branches with band pass filters and subsequent low pass filters. The output signal of the filter assembly is amplified and supplied to output SYNRFE or switched through (CW Path). The RF level at this point is detected and kept constant using a control loop. The output section of the CW Path switch couples in the modulated signal from IQOP3, if modulation is switched on.

Pulse, Level Attenuation, Level Control

A switch-selected low pass filter suppresses the harmonics of the output frequency at frequencies < 4400 MHz (not shown in the block diagram). A switched attenuator element attenuates the RF level relative in steps of 0 dB, 20 dB or 40 dB for use with digital modulation. In a fourth position the control element attenuates the signal by 60 dB and is used as a part of the pulse modulators off state attenuation. The pulse modulator is completed by two GaAs switches.
Level Control is done by four blocks of PIN diode control elements. The control voltage from IQOP3 is converted into a exponentially related current.

Power Amplifier

A Wilkonson Power Divider supplies the RF signal for two identical power amplifiers which are thermally coupled.

Level Detector

A power amplifier supplies the signal for the level detector via a digitally controlled attenuator pad. The output voltage is provided at connector X 286 UDET. The detector voltage is used for level control on module IQOP3/LCM. The full-wave rectifier and the instrument amplifier are kept at a constant temperature by temperature control.
The attenuator pad is set by the firmware to provide the optimum RF power (which depends on the modulation of the RF signal) for the detector diodes.

Output Switch

The RF signal for connector X289 OPU6RF is either supplied by the 6 GHz power output stage or from connector X287 OPU3RF in the frequency range f <= 3 GHz.

Attenuators 3 GHz SATT3 and 6 GHz SATT6

The attenuation switchover is performed by solid state switches to increase the life cycle of the module. The switches are arranged in a matrix designed to minimize the minimal attenuation.

All module-relevant data such as amendment status, model, module name, etc, as well as module-internal calibration data is stored in non-volatile form in the module EEPROM.

The attenuator requires a +12 V, +5 V, +3.3 V and –12 V supply.

Attenuators

The electronic attenuators switch attenuation in the range from 0 to 125 dB in 5 dB steps.

Protection against Transients

The modules output and input are protected against transients up to 1 ms and 1 W by biased limiter diodes. The overload status is reported via interrupt to the controller and indicated on the display.

Module Interface

A bus decoder converts the serial operating data to parallel data and stores them on the module. Function-related events (overload, level reduction, relay control) are processed in realtime via hardware control lines and interrupts.

Diagnostics

The diagnostics measurement functions are switched to the central diagnostic line DIAG on the motherboard by means of an analog multiplexer.

Correction Data Memory

The data memory contains data for module identification, statistics and service, as well as module attenuation data for the individual attenuators covering the entire frequency range.

High-Power Output (Option for SATT3 and SATT6)

With this option the output signal of the RF output stage can be fed directly to the output by means of bypass relays with low insertion loss. At lower output levels, the electronic attenuator is used.

Overvoltage Protection (Option for SATT3)

By disconnecting the instrument output with a relay, the overvoltage protection prevents damage to the instrument as a result of an impermissible external voltage being supplied at the output. The disconnect threshold depends on the attenuator configuration. The voltage at the RF output is evaluated via limiter diodes and RF detectors as well as logically linked comparators. If the trigger threshold at the comparator input is exceeded, the RF relay at the output is switched off. If option high power is installed too, the bypass relays are switched accordingly.

Electronic Attenuator 6 GHz SATT6C

The SATT6C module is an adjustable RF attenuator pad with integrated overvoltage protection. The module has an RF input and RF output. The insertion loss of the module can be electronically set from approx. 5 dB to 130 dB in steps of 5 dB. The switches used are CMOS switches. In the model 1400.3400.06, a relay path can be used to bypass the attenuator pad in order to decrease insertion loss. This bypass is referred to as high-power path. The overvoltage protection is at the module output. If RF powers exceeding 30 dBm are fed in on the RF output, a relay separates the RF output from the adjustable attenuator pads. In this state, the module triggers a software interrupt and the firmware generates an error message. Switching off the instrument also interrupts this connection and changes the signal generator's RF output to high impedance, which protects the module.

Baseband Section

The baseband section is in the first compartment directly behind the front module controller. All baseband modules (exceptions: Baseband inputs) are addressed via the PCI bus. The signal (I and Q) flows from front to rear; a point-to-point connection is implemented in each case. Each module receives the data flow (I and Q , Path A and B for both) from the previous module, processes the data from case to case and forwards the data to the next module. The modules must therefore fill slots 1D to 6D starting from the rear, otherwise the data transfer would be interrupted.

Data Transfer

The sample clock of the whole baseband is 100 MHz. The data is multiplexed seven-fold at this clock rate and transferred from module to module by means of differential LVDS transmission (as defined by TIA644).

IQ Bridge

This is simply an auxiliary module. If a slot does not have a standard module, the auxiliary module is used to feed the IQ data flow through this slot. This is necessary in the following case (see also Table 3-1 Overview - module replacement, on page 3.46):
Option Baseband Input is fitted:
Since this option has a fixed slot assignment, the remaining free slots must each be fitted with an IQ Bridge module up to the next baseband module.

DAC Interface DACIF

The DAC Interface (DACIF) module is a central module of the signal generator. It must always be present in the instrument. The following functions are provided.

- Thermal monitoring of the instrument, control of the instrument fans. The ON check of the power supply unit (overtemperature protection) is also linked logically to these functions. If the overtemperature protection function has triggered or the DAC Interface module is not inserted, the power supply of the signal generator does not start.
- Auxiliary power generation for RF modules and the Universal Coder module (28V)
- Hardware recognition and checking of the baseband and RF modules. The SPI bus and SER bus are used for this purpose.
- Boot controllers of the FPGAs in the other modules; only the FPGA “PIF” of the DAC Interface is booted from an EEPROM, all other FPGAs are configured from the hard disk. (The booting procedure is described below.)
- Output drivers and input amplifiers for all signal generator connections relevant to the baseband (data, clock, trigger, user).
- BER and BLER measurement (in the FPGA 'SNIF').
- USB device functionality: Two USB device chips are available. They are connected to the USB IN (Type B) socket on the rear panel by means of an integrated hub. The two USB devices have the following tasks:
  - USB Remote Control: This device is used to remotely control the signal generator and to load the firmware.
  - USB Modulation Data In: This device is used to load data to be modulated by the signal generator, from an external PC. The data is then sent internally to the CODER.
- Slot for two DAC boards. The digital data (I+Q) is passed from the motherboard to the DAC boards without being processed further. A selection circuit is provided for the analog I/Q output.
- Clock generation for the baseband (100 MHz) and for the DAC boards (400 MHz). A synchronization circuit ensures precise temporal reference of the converters to the DAC boards.
- LF generator: Generation of a CW signal up to 1 MHz. This signal is sent to the rear panel and the RF modules.
- Instrument diagnosis: An A/D converter is used to read out operating voltages and calibration values of the individual modules. This allows the voltage supply for the modules and the internal voltages of a particular module to be checked during the self test.

Booting procedure for other modules:
The DAC Interface boots the FPGAs on the other modules. The name and version are read out of the EEPROM of the target module for this purpose. They are used to form the name of a key in the registry. The value of this key is the file to be loaded.

The version of the loaded FGPA can be shown in the version display. If 0.0.0 is displayed for a chip, this chip could not be loaded.

DAC Board

One or two DAC Board modules are mounted on the DAC Interface motherboard, depending on the instrument configuration. If only one path is fitted, the DAC A slot (on the right-hand side when viewed from the front) must be mounted.
The DAC board receives the digital I/Q data from the baseband. This data is transmitted as multiplexed LVDS data flows with a 100 MHz clock rate and 700 MHz data rate as defined by TIA644. The received data is then processed further in the FPGA “PRENOI”. In some cases, AWGN (noise) is added and the delay distortions of the anti-aliasing filters downstream of the converters are compensated. The signal then reaches the converters for I and Q and finally passes through the anti-aliasing filters.

Baseband Input

This option consists of two modules: **BBIN-R** (placed at the rear panel) and **BBIN-S** (placed behind the Front Module).

BBIN-R (rear)

The BBIN-R enables the digital IQ input on the R&S SMU. It is fitted in slot is X117.
The following functions are provided:
Digital IQ input (see Operating Manual, Chapter 8 'Maintenance and Interfaces')
These input signals are received on the module and sent resynchronized to the BBIN-S.
Generation of a +5 V supply voltage for external instruments.

BBIN-S (front)

The module BBIN-S is installed the slot X111. Vacant slots between the BBIN-S and the next baseband module (DAC Interface, Fading Simulator, Universal Coder) have to be bridged with the IQ Bridge module (see above).

The following functions are provided:
Analog I/Q input signals can be digitized (filtering, A/D conversion with R&S SMU system clock rate of 100 MHz) for further baseband processing or directly fed through to the IQOP3 module.

Universal Coder UNICOD

A maximum of two of these modules can be fitted in the instrument, depending on the instrument configuration. If no Fading Simulator (option B14) is installed, the Universal Coder modules must be inserted directly next to the DAC Interface (slot 5 and 4, X150 and X140). If the module is inserted nearer to the front, the I/Q data flow in the baseband will be interrupted!

Two-path instruments only:

The module installed closest to the DAC Interface is referred to as Universal Coder1 and is responsible for modulation in Path A. The module closest to the front is referred to as Universal Coder2 and is responsible for modulation in Path B.

The Universal Coder module provides the following functions:

- Receiving of external modulation data or generation of modulation data (either PRBS, patterns, list …)
- Encoding and modulation of this data (depending on selected code, e.g. QPSK) at the desired symbol rate.
- Filtering of the modulation symbols (e.g. root cosine)
- Conversion of the clock rate at the symbol level to the clock rate of the converter.
- Addition of an arbitrary waveform generator signal either to the symbol level or to the output signal.
- Level adjustment of the generated signal in the baseband.
- Injection (depending on the selected signal path setting) of the generated signal into the baseband data flow for I and Q.
- Generation of marker signals. They go directly from the Universal Coder to the outputs.

The following signal processing blocks are provided in the Universal Coder in order to permit these functions:

- Bus interface (FPGA “PSD”): Forms the connection with the PCI bus and monitors the functioning of the SDRAM (for lists and arbitrary waveform). All adjustment procedures run via this interface.
- SDRAM: The lists (modulation data) and waveforms are stored here. The memory is always operated at the same clock rate (approx. 101 MHz) irrespective of the selected symbol rate.
- DSP: Manages the modulation sources and actuates the respective modules in the case of complex scenarios (e.g. 3GPP or GSM).
- Code-FPGA: Useful bits are encoded into actual I and Q values here. Depending on the desired encoding, a different version is in some cases loaded to this FPGA. At present, there are COD_D (for DIGMOD such as GSM) and COD_W (for 3GPP and so on). The Code-FPGA uses an external memory for storing individual symbols.
- Clock converter: This consists of two special chips, DUC and RESAMPLER. The DUC chip converts the clock rate by an integer multiple and the RESAMPLER chip by any given rational ratio. As a result, the converter clock rate can always remain at 100 MHz irrespective of the symbol rate.
- Signal output stage (FPGA “ROUT”): Here the I-Q data which comes from the resampler with a sampling rate of 100 MHz undergoes level adjustment and is injected into the data flow of the baseband.
- Clock generation: An adjustable symbol reference of 400 Hz to approx. 80 MHz is generated from the reference supply of the baseband (100 MHz). A VCO which is set in the range 110 to 250 MHz is used for this purpose. The bandwidth of the loop filter can be switched in stages so that steady-state operation can be achieved at different speeds according to requirements. The phase comparators and clock dividers are located in the FPGA “CLOCK”.

Fading Simulator (FADER) and Fading Simulator Extension (FADEX)

Depending on the configuration, the Fading Simulator module can be installed with or without Path Extension.

Fading Simulator module without Fading Simulator Extension*:*
The module must be installed in the signal flow downstream of the Universal Coder and upstream of the DAC Interface. If the Fading Simulator is installed, all other baseband modules are moved one slot towards the front of the instrument.

Fading Simulator module with Fading Simulator Extension*:*
The Path Extension module is mounted downstream of the Fading Simulator. Both modules are connected by a fader bridge (1160.2013.02 from connector X50 to X51).

The Fading Simulator module allows propagation conditions to be simulated for moving transmitters or receivers. For this purpose, the modulation signal is firstly delayed and then multiplied using a rotating vector whose amplitude and phase are derived from the models for the channel (e.g. Rayleigh) and from the rate of motion (Doppler shift). Such a combination of delay and complex multiplication is referred to as a 'path'. Up to 20 such paths can be calculated on the R&S SMU-B14. They are combined into groups of 5 paths. R&S SMU-B15 increases the computing power to up to 40 paths.

The Fading Simulator module consists of the following blocks:

- Bus interface and DSP: These are used to control the module. The DSP provides the simulation data for the respective arithmetic units in the paths. The bus interface is active after power ON which means that this module is already detected by the BIOS.
- Four simulation groups: Each group has a delay memory (2 SRAM) and the arithmetic units (for each FPGA) to calculate the path models. These groups can be configured differently according to the desired resolution of the path delay and the possible number of paths.
- LVDS interface: The first group also contains the demultiplexers and multiplexers for receiving and sending the I-Q data.

The modules R&S SMU-B14 and R&S SMU-B15 do not have a dedicated clock source or alignment points.

Power Supply Module

The power supply module provides all currents necessary for the operation of the Vector Signal Generator. It can be switched off and on by means of the power switch on the rear panel. After switching on the instrument is either ready for operation (STANDBY) or in operating mode, depending on the position of the standby switch on the instrument front panel.

The power supply is in compliance with safety class EN61010-3-2 (input harmonics) and is equipped with a Standby circuit.
On the secondary side, it generates DC voltages +3.4 V; +5.2 V; +6.5 V; -6.5 V; +12 V; -12 V

The control signal PS_ONOFF controlled by the front module controller (depending on the operating key STBY on the front of the instrument frame) switches the power supply from Standby mode to operating mode. In standby operation, it only supplies a 13.5-V-standby voltage, that is stabilized to +12 V on the Motherboard for the crystal oscillator and the LED STBY on the front panel.
The control line PWGOOD indicates if the +5.2V are within the tolerance limits of typ. +/-10%.

The secondary voltages are open-circuit-proof and short-circuit-proof with respect to ground and each other.

The power inlet module contains two fuses. Replace only with type and rating specified on the rear panel. If replaced fuse blows again, change module.

A further fuse is fitted inside the power supply as a means of fire protection.

Note: *This fuse is not accessible to the user from outside and is only blown in the case of a serious fault of the power supply. Servicing is required, change module!*

Front Module Controller

The front module controller contains all the necessary components on a board such as processor, memory chips (SODIMM modules), I/O devices (USB host, Ethernet), lithium battery, IEC-bus controller (IEEE), LCD graphics controller, external VGA monitor graphics interface (monitor). External keyboard and mouse connections are implemented as USB devices. In addition, an IDE hard disk controller is integrated on the controller board.

Motherboard

Only the following modules are mounted on the motherboard:

- Fuses
  Each baseband slot has its own fuses for the 3.3 V and 5 V supply. An additional fuse pair for supplying power to the R&S SMU-B15 (FADEX) is provided at slots 4 and 5.
  The external USB ports are fitted with self-resetting polymer fuses (1 A).
- EEPROM
  The following data is stored here: Serial number of the instrument, calibration data (which must be taken into account for all modules throughout the entire instrument).
- Supplementary regulator for the 12 V standby voltage: The standby voltage from the power supply is passed through a linear regulator to minimize interference in the quartz reference oscillator.
- Inrush-current limiter:
  To prevent excessive inrush currents, the 5 V supply of the front module controller is started up slowly (approx. 50 ms) using a MOSFET.

Troubleshooting

The purpose of these troubleshooting instructions is to help to trace down malfunctions to board level. The instrument so can be made ready for use again by means of board replacement.

If error tracing doesn't show clear results, we recommend that you ship the instrument to our experts in the service centers (*see* address list) for module replacement and further error elimination. Some module replacements involve calibration procedures, requiring calibrated equipment and appropriate software.

Warning!

Make sure that the instrument is disconnected from the AC supply before inserting or removing boards!

Be careful not to cause short-circuits when measuring voltages at pins placed close together (particularly on the motherboard)!

The following utilities are provided in the Vector Signal Generator for easy diagnosis:

- Internal diagnosis test points
- Internal adjustments
- Info line with error messages and history of messages
- Internal keyboard test
- HW debug page

Note: *When problems occur, first check whether any connections (cables, plug-in connections of boards etc.) are damaged or wrongly connected.*

Measuring Equipment and Accessories

Item	Type of equipment	Specifications recommended	Equipment recommended	R&S Order No.
1	DC meter		R&S URE	0350.5315.02
2	Spectrum analyzer	Frequency range 0 to 7 GHz	R&S FSP	1164.4391.07
3	Adapting cable	1 m long SMP-to-SMA connection	-	1129.8259.00
4	Oscilloscope	100 MHz	TDS 220	-

Switch-On Problems

- **Error: Unit cannot be switched on.**

Action	Possible error causes and further steps
Check power-on switch on the rear Check fuses on the rear ⇓	Power switch OFF: Switch on power supply.
Check yellow LED (standby). ⇓	LED remains unlit: ➢ Measure voltage at X211.A17 (slot 5A): Rated value: +12 V ± 1 V Voltage OK: Keyboard membrane or controller faulty. No voltage: Subsequently remove DACIF (slot 6D), SSYN A (slot 4A) and SSYN B (slot 5A; two-path instruments only). ➢ Repeat measurement of voltage at X211.A17 (slot 5A). Rated value: +12.0 V ± 0.1 V Correct voltage: The removed module caused short circuit and is to be replaced. No voltage: ➢ Check voltage regulator on motherboard: To do so, first measure voltage output at power supply. This is accessible from outside through housing grille at rear left, at flat cable connector , upper edge of power supply, 3rd pin from left: Rated value: +13.5 V ± 0.3 V No voltage: Power supply faulty Correct voltage: voltage regulator on motherboard faulty.

Action	Possible error causes and further steps
Switch on instrument. Check green LED ⇓	LED remains unlit, power supply doesn't start: ➢ Check signal PS_ONOFF at test point on underside of mainboard (near to rear panel): Rated value: < 1 V for ON. Voltage < 1 V: power supply defective. ➢ Check signal FMR_ONOFF (connector X161. A2) from controller Voltage > 1 V: Either FMR (front module controller) or keyboard defective. To check, short-circuit X161.A2 to ground. If power supply starts, check these modules. Voltage < 1 V: Check signal PS_ONOFF at DACIF connector (X161, B2): Voltage > 1 V: Temperature sensor on DACIF defective. To check, short-circuit X161.B2 to ground. If power supply starts, check this module. Voltage < 1 V: Fault in motherboard temperature monitors (or simply temperature too high, >47 degrees). Check temperature monitors on motherboard.
Check for defektive keyboard or front module controller	➢ Open front module, short-circuit jumper X21 (approx. 2 cm from top and approx. 4 cm from right on board): If power supply starts now: Keyboard defective or not connected correctly. Power supply still does not start: FMR (front module controller) defective.
Power supply starts, screen remains dark	Measure voltages on motherboard, see below "Short-circuit of one or more operating voltages".

- **Error: Short-circuit of one or more operating voltages**

Action	Possible error causes and further steps
Check on the bottom of the motherboard which of the voltages is short-circuited: +U5V2_PS Rated value: +5.2 V +U3V3_PS Rated value: +3.4 V X237.1 Rated value: -6.5 V X237.3 Rated value: -12.0 V X237.5 Rated value: +12.0 V X237.7 Rated value: +6.5 V	Since all operating voltages are fed to the modules via fuses, no voltage / insufficient voltage here indicates that the power supply is defective. ***Note:*** *With instruments from pilot series, –6.5 V and –12.0 V are not fed via fuses.*
Check on the bottom of the motherboard if the fuses are defective: Analog slots: +5.2 V: F13 +3.3 V: F12 +6.5 V: F1, F3, F23 +12.0 V: F2 Digital slots: +5.2 V: F14 to 18, F21, F25 +3.3 V: F4,F5,F8 to 11, F24 Controller: +5.2 V: F19,F20,F22	Error at -6.5 V, -12 V ➢ Remove modules in sequence until error disappears. ***Note****:* *The operating voltages of the individual modules can also be queried by means of diagnosis / test points. The DACIF board must, however, be functioning correctly.* *The power supply switches off as a result of overloads caused by overheating. If this is the case, you have to wait until the power supply has cooled down again.* *The 5.2 V supply of the controller is started with a controlled slope via FET V1.Check this, if the controller does not start.*

- **Error: Fan does not work.**

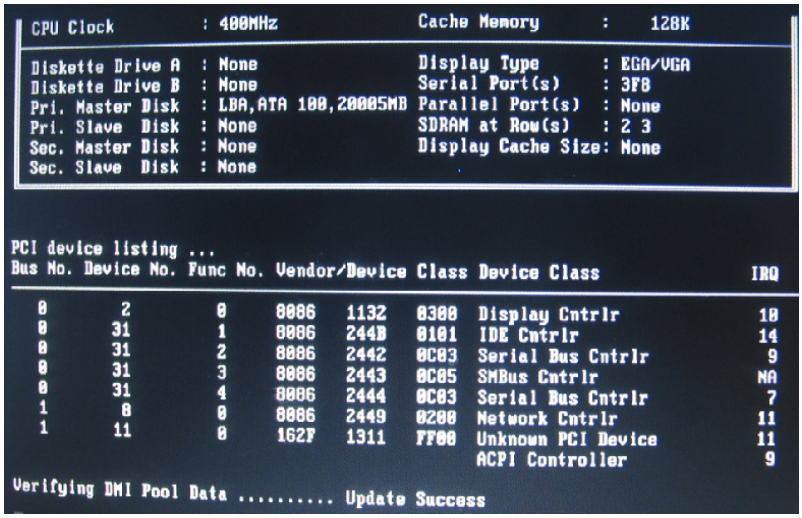
Action	Possible error causes and further steps
Check voltage at connector: X223,X224: Rated value: 8 to 12 V, temperature-dependent.	Voltage not in rated range: Fan or DACIF board fan control defective. Fit new fan / DACIF board.

Problems with Booting

- **Error: Unit does not start the application.**

Following switch-on, the Vector Signal Generator first boots the computer BIOS. After successful initialization of the computer the Windows XP operating system starts up. Subsequently, the application is loaded as a start-up program. Simultaneously, several FPGAs are loaded on the modules and self tests are performed at various locations. Error messages, if any, are output. The messages are disabled with normal operation, but can be enabled for troubleshooting purposes. It is advisable to connect a keyboard to the USB socket when troubleshooting.

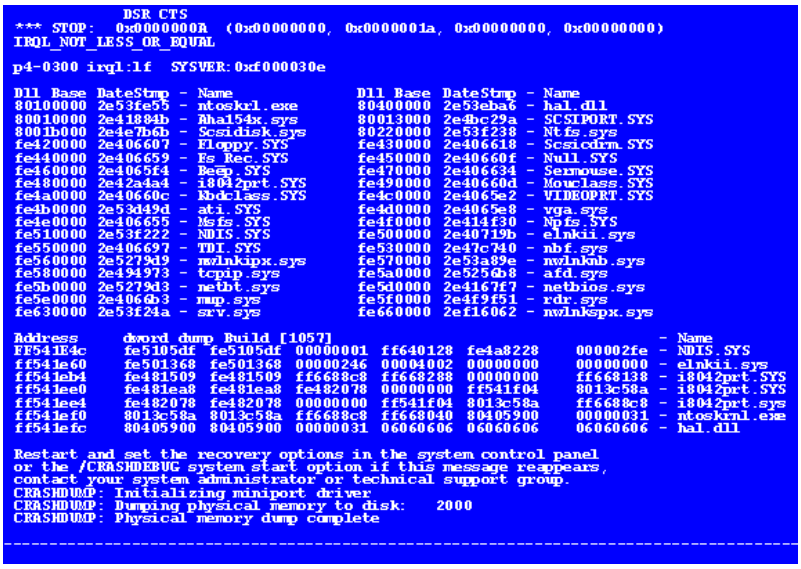
Normal action	Error and error cause
➢ Start Vector Signal Generator	
Subsequent to switching on the Vector Signal Generator, the following BIOS message is displayed:	
Award Modular BIOS v6.00PG, An Energy Star Ally **Copyright (C) 1984-2000, Award Software, Inc.** **FMR6_REV1_BIOS_22_R&S SMU0103** **Main Processor Intel Celeron (TM) 400MHz (100x4.0)** **Memory Testing ...**	***Note:*** *The BIOS version is given in line 3. With BIOS versions < R&S SMU0103, the instrument cannot start up again by itself after it has been disconnected from the power network.* **Remedy:** Update BIOS with BIOS versions ≥ R&S SMU0103.
After the first beep, the computer starts the hardware test and the message: **, ESC to skip Memory test...** is shortly displayed at the lower edge of the screen.	
The memory test outputs the memory capacity of the front module controller. The basic version of the Vector Signal Generator has 256 Mbytes. Subsequently, BIOS starts the hardware check and displays all PC boards found. **Award Modular BIOS v6.00PG, An Energy Star Ally** **Copyright (C) 1984-2000, Award Software, Inc.** **FMR6_REV1_BIOS_22_R&S SMU0103** **Main Processor Intel Celeron (TM) 400MHz (100x4.0)** **Memory Testing....261120K OK + 1024 Shared Memory** **Main Memory Clock is 100 MHz** **Detecting IDE drives …**	If no result is indicated for the memory test, the memory is defective.

Normal action	Error and error cause
This procedure can be interrupted using the "PAUSE" key on the connected external keyboard; pressing any other key continues execution of the program. The following messages are displayed: 	If this hard disk entry is missing, the hard disk may be faulty.

Normal action	Error and error cause
The PCI hardware test is displayed in the lower half of the screen. All modules found during the test are displayed with their names and PCI device IDs. The Device Class column lists the types of PCI device. The DACIF is listed as “Unknown PCI Device, Vendor ID 162F, Device ID 1311“. Option R&S SMU-B14 (Fader) is listed as 'Unknown PCI Device, Vendor ID 104C, Device ID A106'. After a cold start, the UNICOD module is not listed. After a warm start and prior successful initialization of the UNICOD module it is listed as “Unknown PCI Device, Vendor ID 162F, Device ID 1312”.	If the line "Unknown PCI Device" is missing, the DACIF board has not been identified and the measuring application cannot be started. If the remaining PCI devices have all been identified, the DACIF board must then be replaced. If the Vendor ID and/or Device ID of the “Unknown Devices” is incorrect, either the module concerned or the motherboard is defective. ***Note:*** *The connectors on the motherboard must be checked for bent terminal pins.*
After this test, the BIOS has been loaded and the operating system is started. **Updating ESCD … Success** **Verifying DMI POOL Data ..... Update Success**	The message “**DISK BOOT FAILURE, INSERT SYSTEM DISK AND PRESS ENTER**” at this point indicates that the contents of the hard disk are not correct. In this case, the fault is either on the hard disk or on partition C: of the hard disk, i.e. Windows XP Embedded must be reinstalled or the hard disk changed. Please contact your Rohde & Schwarz representative.

Normal action	Error and error cause
A Boot Manager window now briefly appears. The window contains the following options: **Firmware** and **Recovery** If no key is pressed, the boot option **Firmware** for standard signal generator operation is activated automatically. The first part of the operating system booting procedure appears on the display:	If the instrument crashes during booting, you can try to perform a Windows XP repair routine by pressing the F8 key. Pressing F8 displays the following menu: Windows Advanced Options Menu Please select an option: Safe Mode Safe Mode with Networking Safe Mode with Command Prompt Enable Boot Logging Enable VGA Mode **Last Known Good Configuration (your most recent settings that worked)** Directory Services Restore Mode (Windows domain controllers only) Debugging Mode Start Windows Normally Reboot Use the up and down arrow keys to highlight your choice. The repair routine can be started by selecting “Last Known Good …”. If the repair routine with F8 fails, the instrument can be restarted and the boot option **Recovery** called up in the Boot Manager**.** The boot option **Recovery** permits (protected by a confirmation query) the complete reconstruction of the system partition (drive C). Drive C is completely erased, reformatted and the operating system reset to its default status. All other drives are not affected. When the Signal Generator is restarted with the restored partition, the Signal Generator firmware must be reinstalled (see chapter 4, section “Firmware Update”). This option is recommended if Windows XP cannot be repaired by any other means, but the hard disk is still functioning adequately enough to allow the recovery image to be started.

Normal action	Error and error cause
Graphical boot screen of Windows XP Embedded, a flashing light bar indicates that loading is in progress. The background image for the instrument is then loaded. The graphical boot screen reappears with the message: Windows XP: Windows is starting up	If the instrument has started correctly so far, there is most probably no fault in the computer. If a booting problem occurs at this point, it is probably caused by defective installation of the instrument firmware. In this case, an attempt must be made to correct the error by reinstalling the instrument firmware (see chapter 4, section “Firmware Update”).
	If the operating system on the hard disk has been destroyed and cannot be loaded correctly, Windows XP reacts by displaying a “bluescreen”. This bluescreen contains all essential information on the internal states of the computer which are displayed as follows (example of screen):



	Windows XP Embedded must then be reinstalled using the **Recovery** boot option (see above). When the instrument is restarted with the restored partition, the instrument firmware must be reinstalled (see chapter 4, section “Firmware Update”). ***Note:*** *Only partition C: is overwritten. Any data on partition D: is retained.*

Subsequent to starting the operation system, the application for the Vector Signal Generator is loaded in a start-up program. The program start is initiated automatically and generates a window, which displays information on the start-up procedure. Information on the used software version is displayed at the bottom of the window.	***Note:*** *When the software is started, information on the instrument configuration and SW version can be found under:* *Menu -> Setup -> Installed Options.*

Normal action	**Error and error cause**
During this loading procedure, the FPGAs of the modules registered in the instrument are initialized and undergo a functional test. This loading procedure may take some time depending on the number of installed options.	If an error occurs, the module concerned must be changed: If an error occurs at the very beginning of the process, the DACIF board is probably defective. If errors occur at a later point, the board concerned is specified in the error message.

Keyboard and Rotary Knob Test

- This utility allowes to check proper function of all front panel control elements.

Normal action	**Error and error cause**
Test called with SETUP - **Check Front Panel…**	
An image of the front panel appears with grey keys. When a key is pressed once or the knob is moved, the field changes to green. If the key is pressed more than once, the field changes to red.	***Note:*** *Take care with the rotary knob! Turn only slightly in the specified direction, otherwise the field changes to red.*
All fields are green when all operating elements including the rotary knob have been actuated once and red if actuated twice.	If colour changes to red at the first actuation, a malfunction has occurred (bouncing). If the colour of the corresponding field remains the same after actuation, the function is defective. In both cases: Change the switching pad and/or rotary knob.
A message is output when all keys have been pressed: “All Front Panel Keys were accessed correctly”	***Note:*** *No error message is output even if a number of keys are red. The user himself must decide whether a malfunction has occurred.*

A Baseband Module can not be operated

Malfunction	Reason and remedy
A baseband module can not be operated, although it is visible in the front panel block diagram.	The operating system may have disabled the device. To check for this, you need an external keyboard and a mouse. If not present, put both to USB interface connectors and reboot the unit. To terminate the firmware, press ALT + F4. Then select Start, Control Panel, System, Hardware, Device Manager. In the folder "Rohde & Schwarz supported devices" search for the disabled device. Disabled devices show a red cross in the icon. Double click to open "Properties of the module". Click on the button "Enable Device" and confirm the following popups. Now the topic "Use this device (enable)" has to show under "Device usage". Confirm with "Close" button at the bottom of the window. Close all windows. To start the instrument firmware again, double click the Vector Signal Generator Firmware icon.

Troubleshooting with Test Points and Debug Page

A diagnostic A/D converter on the DACIF board allows analog voltages at selected test points in the instrument to be read out.

Normal action	Error and error cause
Internal diagnosis switched on with: SETUP - **Test Points...** Select the desired path under **Path**. Select the desired test point under **Select Test Point**. To operate set **State** ON	***Note:*** *The test points also include a test point for the CPU temperature of FMR6 (front module controller) and the CPU fan speed.*
The measured voltage is displayed under Voltage. "99.9999V" means that the test point does not exist. This value is also returned for queries concerning the IEC/IEEE bus if a non-existent test point is queried. The diagnostic system operates with multiplexers on each board to switch the desired testpoint to the common line named DIAG on the motherboard. Each test point is switched to the line only for the time of a measurement and switched off after it. The A/D converter is placed on the DACIF board.	➢ For troubleshooting refer to the following chapters. ➢ Check the displayed values against the values specified in the respective sections concerning troubleshooting on the module. Major deviations from the named values indicate a defect: Change the module. If all test points display nonsensical values, one of the multiplexers on the modules maybe defective. To check, remove modules one after another, to find which module disturbes the common diagnostic line. If values are nonsensical yet, it is

Normal action	Error and error cause
It is recommended, to begin with checking the test points on the DACIF board, since the diagnostic converter is placed there.	definitely the DACIF board that is defective. ***Note:*** *Temperatures are not always output directly in °C. The measured value often has to be multiplied by 100.*

The **Debug Page** displays a lot of information about internal parameters, which are supplied by the instrument firmware to set the modules.

The Debug Page is protected under protection level 1. To unlock, use SETUP Protection... and key in 123456, quit with ENTER. Now the Debug Page can be called with:

SETUP - **R&S Debug** -> **Hardware** Debug **Page**
Select the desired path under Path.
Select desired page under Select Debug Page.

Use **Update Debug Page** to display the current settings.
This button must also be used to update the display when instrument settings such as level or frequency are changed.
Among others, the currently used internal adjustment and calibration data are displayed as well as internal levels.

Note: *The displayed information represents internal generated data. Interpretation of the data requires a sound knowledge of the functional correlation and the firmware in the instrument. Refer to the hints given in following sections*

Troubleshooting with Internal Adjustments

Various internal adjustments are indispensable for correct functioning of the instrument. The failure of a certain adjustment can shorten troubleshooting considerably. The affected modules are the synthesis module SSYN, the DACIF board and the output modules IQOP3 and IQOP6.

Note: *Failed internal adjustments can also be queried on the info page -> History.*

Normal action	Error and error cause
Internal adjustments called: SETUP - **Internal Adjustments…** Select the desired path under **Path**.	***Note:*** *When **Adjust All** is called, all internal calibration operations are performed in both channels. When troubleshooting, however, it is advisable to start the calibration operations individually and also to monitor their progress.*
Adjust Synthesis SFU (step frequency unit), MLP (main loop), FRA (fractional N-synthesis) and OPU (output unit) are now calibrated in sequence.	Abort during adjustment: See section *Troubleshooting - Module SSYN.*

Normal action	Error and error cause
Adjust Level Baseband adjustment is performed.	Abort during baseband adjustment: Progress bar at <= 0%: Note error message in the INFO line: DACIF board probably defective, LO signal at IQOP3, X273 may be missing, RF input signal at IQOP3, X272 may be missing. Progress bar at <= 50%: Error on LCM module Progress bar at > 50%: Cause is probably a malfunction on DACIF and/or DAC boards. ➢ Check with oscilloscope: The adjustment procedure can be checked at the instrument sockets for I-Out and Q-Out using an oscilloscope . If no signals can be measured there, the cause of error is definitely on the DACIF board. If OK: Switching matrix on submodule LCM of IQOP3 may be defective.
Zero adjustment is performed.	Abort during zero adjustment: Error on IQOP3.
AM adjustment is performed.	Abort during AM adjustment: Error on submodule LCM of IQOP3.
Adjust I/Q Modulator – …Full Range. The I/Q adjustments are now performed in sequence for the modules IQOP3 and IQOP6 (if fitted).	Abort during IQOP3 adjustment: Check submodule RFM of IQOP3 Abort during IQOP6 adjustment: Check module IQOP6.
To permit further troubleshooting, the option "Continue Cal. on Error" can be activated by enabling Protection Level 1: SETUP - **Protection..** Enter 123456 for **Protection Level 1 Password**. **Cont. Cal on Error** can now be activated in the **Internal Adjustment** menu. This forces an adjustment which was previously aborted to be fully executed. This is useful for tracing errors and allowes to use the instrument temporarily in ranges without defects.	***Notes:*** *Using this option may provoke secondary error messages!* *The benefits of this action largely depend on the error and the module that caused it.* *For example, continuation of level adjustment or I/Q adjustment can provide information about a particular weak point in the module.*

Faulty RF Output Signal

- **Error: Vector Signal Generator supplies no signal or faulty signal at the RF output.**

Normal action	Error and error cause
RF output is switched on; Menu **RF A(B) RF ON**	**No RF signal or a signal with insufficient level is output at the RF output.** ➢ Run internal adjustments (see "*Troubleshooting with Internal Adjustments*") Following successful internal adjustment, check the following modules in sequence. Change any defective modules. 3 GHz path ➢ Check 3 GHz attenuator ➢ Check IQOP3 (see "*Troubleshooting - Module IQOP3*") Check SSYN (see "*Troubleshooting - Module SSYN*") 6 GHz path ➢ Check 6 GHz attenuator ➢ Check IQOP6 (see "*Troubleshooting - Module IQOP6*") ➢ Check IQOP3 (see "*Troubleshooting - Module IQOP3*") ➢ Check SSYN (see "*Troubleshooting - Module SSYN*") The signal at the RF output does not have the entered frequency. ➢ Run internal adjustments (see "*Troubleshooting with Internal Adjustments*") ➢ Following successful internal adjustment, check SSYN A(B) (see "*Troubleshooting - Module SSYN*")

Level Errors

Error	Error correction
Output unlevelled at frequencies up to 3 GHz, I/Q modulation on: The following, more precise error descriptions may appear: gain control on upper limit gain control on lower limit gain out of setting range	➢ Switch over to CW mode. Error message “Output unlevelled” disappears: Continue troubleshooting on LCM module (see “*Tests on Submodule IOQOP3 LCM*”). Error message “Output unlevelled” does not disappear: ➢ Check for correct input signal to IQOP3 from SSYN at connectors X272 and X273 (see “*Troubleshooting - Module IQOP3*”). With incorrect input signals check cabling and continue troubleshooting at module SSYN. Error message “Output unleveled” does not disappear with correct input : IQOP3/RFM is defective.
Frequencies > 3 GHz, I/Q modulation on	➢ Check for correct input signal at IQOP6, X284. Level too low: check cabling and module IQOP3. Level correct: continue troubleshooting at module IQOP6.
Frequencies > 3 GHz, I/Q modulation off	The module IQOP3 is not involved here and can be ruled out as the cause of error. Check module IQOP6.
No output level for CW	➢ Check output level of module SSYN, X244. Output level incorrect: Check SSYN Check level control using Hardware Debug Page ➢ Select “level” . ➢ Check control lines in “LCM (DSP Status, OK)” block with RF ON Pulse = 0 Blank = 0 Levatt0 = Levatt1 = 0 RF_DOWN = 0 If one of bits is incorrect: check control lines on motherboard. ➢ Measure control voltage of gain control element using Test Point: Freq < 3 GHz: DIAG_IQOP3_LCM_LEVEL_CNTRL > 7.2 V -> IQOP3/RFM is defective. Freq > 3 GHz: DIAG_IQOP3_LCM_LCON6 > 7.5 V -> IQOP6 is defective.

Error	Error correction
Always maximum output level	➢ Check voltage of RF RMS detectors. Freq < 3 GHz: DIAG_IQOP3_LCM_D_UDET < 0.1 V -> IQOP3/RFM is defective, otherwise IQOP3/LCM defective. Freq > 3 GHz: DIAG_IQOP3_LCM_D_UDET < 0.1 V and DIAG_IQOP6_UDET6 < 0.1 V -> IQOP6 defective, otherwise LCM defective.

Faulty I/Q Modulation

Before performing troubleshooting for I/Q modulation, always call “Adjust All”. If adjustment fails, perform troubleshooting on the basis of the error message displayed.

Error	Error correction
No output level with I/Q modulator set to Internal Baseband	➢ Check output level for CW. If not OK: proceed with section "*Level Errors*". ➢ Setting on Vector Signal Generator: RF ON ”Multicarrier CW” menu: No. of Carriers = 1 Carrier Phase = 45 deg Adopt with Accept State = On ➢ Measure DC voltage at I OUT and Q OUT: DC voltage < 0.4 V: Troubleshooting on DACIF board Measurement using Test Point s: DIAG_IQOP3_D_LCM_IX = 0.35 V to 0.45 V DIAG_IQOP3_D_INX = -0.45 V to -0.35 V DIAG_IQOP3_D_QX = 0.35 V to 0.45 V DIAG_IQOP3_D_QNX= -0.45 V to -0.35 V If these voltages are not OK: Baseband processing by submodule LCM of IQOP3 is defective. ➢ Call Hardware Debug Page “Level”. ➢ In “LCM (DSP status, OK)” block, compare DSP measured value “bb rms” with setpoint value “uBBRMS”. Deviation > 10%: Baseband RMS detector on LCM is defective. If OK: submodule RFM of IQOP3 is defective.

Error	Error correction
No output level for Analog Wideband I/Q In	Check output level for CW. If not OK: Perform Troubleshooting -"*Level Errors*. ➢ Setting on Vector Signal Generator: RF ON Analog Wideband I/Q In = On ➢ 0.35 V DC applied at I and Q ➢ Measurement of Test Points: DIAG_IQOP3_D_LCM_IX = -1.05 V to -0.85 V DIAG_IQOP3_D_INX = 0.85 V to 1.05 V DIAG_IQOP3_D_QX = -1.05 V to -0.85 V DIAG_IQOP3_D_QNX= 0.85 V to 1.05 V If these voltages are not OK: Baseband processing by LCM is defective. ➢ Call hardware debug page “Level”. ➢ In “LCM (DSP status, OK)” block, compare DSP measured value “bb rms” with setpoint value “uBBRMS”. Deviation > 10%: Baseband RMS detector on LCM is defective. If OK: IQOP3/RFM is defective.
Image rejection < 20 dB	➢ Call “Adjust I/Q Modulator Full Range”. If error message appears, see “*Troubleshooting with Internal Adjustments*”. ➢ With setting Internal Baseband: Check frequency response of DACIF board. Refer to chapter 1, Sections IQ Output, Frequency Response and Imbalance. Frequency response of DACIF OK: LCM is defective. ➢ With setting Analog Wideband I/Q In: LCM is defective.
I/Q Swap is not functioning.	Submodule LCM of IQOP3 is defective
Baseband gain is not functioning	Submodule LCM of IQOP3 is defective

Faulty AM

In the Vector Signal Generator, both the LF-AM and the BB-AM are implemented using the I/Q modulator. If I/Q modulation and the LF generator are functioning, the LCM is defective.

Faulty Pulse Modulation

The pulse logic is on the IQOP3/LCM and the pulse switches on the IQOP3/RFM and IQOP6. The status of the line to the pulse modulators can be read out on the level hardware debug page using the DSP.

Error	Error correction
Internal pulse modulation is not possible.	➢ Check DACIF LF generator. ➢ Setting on Vector Signal Generator: RF On Pulse Modulation State = On Source = Internal LFGenFrequency = 0.1 Hz ➢ Evaluation: Cyclic updating of level hardware debug page: Bit pulse in “LCM (DSP Status, OK)” block toggles between 1 and 0 every 5 seconds. If not: LCM is defective, otherwise IQOP3 is defective if Freq < 3 GHz and IQOP6 is defective if Freq > 3 GHz.
Error	**Error correction**
External pulse modulation is corrupted.	➢ Setting on Vector Signal Generator: RF On Pulse Modulation State = On Source = External Polarity = Normal ➢ 0 or 5 V applied at EXT MOD ➢ To evaluate, update hardware debug page accordingly: EXT MOD = 0 V, Polarity = Normal: Pulse = 1 EXT MOD = 0 V, Polarity = Inverted: Pulse = 0 EXT MOD = 5 V, Polarity = Normal: Pulse = 0 If these states are not adopted, IQOP3/LCM is defective, otherwise IQOP3/RFM is defective if RF < 3 GHz and IQOP6 is defective if RF > 3 GHz.

Faulty Signal Generation in the Baseband

- **Error: Vector Signal Generator does not supply correct baseband signal (at I+Q output sockets on rear panel and/or digital modulation disturbed).**

Normal action	Test
Baseband signal is generated on the Universal Coder (UNICOD) board and transferred via motherboard to the DACIF board. Placed on this board are the D/A converters (DAC board), which feed analog signals to the rear panel sockets and to module IQOP3. The Graphics facility takes data from UNICOD for constellation diagram and from DAC board for power spectrum.	➢ Setting on Vector Signal Generator: Baseband/Custom Digital Modulation Set acc. to standard TETRA State On ➢ Graphics/Graphic Settings Mode Constellation A set of 8 points, equally spaced on a circle with 0.7 radius should appear. If not, UNICOD is faulty. ➢ Setting on Vector Signal Generator: Graphics/Graphic Settings Mode Power Spectrum A clean, nearly rectangle shaped power spectrum should appear without sidelobes. If not, DACIF board or DAC board (mounted on DACIF) is faulty.

- **Error: Vector Signal Generator does not supply any baseband signal (UNICOD, FADER, and DACIF).**

Normal action	Error and error cause
Same setting as above, but with FADER whereby FADER should be set to OFF (i.e. bypass in the first FGPA on the FADER). Select a modulation (e.g. DIGMOD, QPSK) in the baseband. The modulation is set on the UNICOD board and the level and RMS are checked directly at the output of this board.	The expected constellation diagram (e.g. 4 scatterplots for QPSK) does not appear in the graphical display: ➢ Repeat test without fader: Signal now OK: Fault on fader
The data of the UNICOD is transferred to the DACIF where it is received on the DAC boards. From here the IQ data can be displayed in the graphical window in the operator control window. The FADER should be set to OFF.	The expected constellation diagram (e.g. 4 scatterplots for QPSK) does not appear in the graphical display: Connection possibly defective. ➢ Check plug-in contacts between UNICOD and motherboard, between motherboard and DACIF and DACB. Connection OK: DAC board is probably defective.
	No analog signal: ➢ Check graphical display Signal OK: Check output of DACIF

Normal action	Error and error cause
On booting the instrument all calibration data required must be written to the RAM of the computer. The calibration data of a module is either read from the EEPROM (in case of a cold start from EEPROM only) or from the associated binary file. In case of a cold start, for each module identified by the software a check is made first to determine whether the EEPROM can be read.	
If reading at the desired address is not possible, the software assumes that the module is not available.	In this case an error message will be output: “Missing Equipment”. The software allows missing modules to be simulated. This means that after confirmation of the error message the booting procedure is continued as if everything were OK. However, the instrument will then only function partially or may even be completely unusable. The simulation can indicate the following: 1: Software and front module controller are OK. 2: The defective module is most likely that which caused an error message first. Subsequent errors are possible (DACIF).
The calibration data stored in the EEPROM for each module is then transferred to the controller RAM.	
A detailed error message is output if the calibration data is not available or invalid.	Error message: “EEPROM – missing Data” “ ...(further details depending on module)” Module only needs to be changed if factory calibration data (preliminary module test) is missing / incorrect. All other data can be obtained again by means of internal adjustment or external calibration (see also “*Troubleshooting with Internal Adjustments*”).

Troubleshooting - Module SSYN

The tests listed below ensure that a supposed error on the synthesis module SSYN is not caused by a defective or incorrectly connected cable, incorrect adjustment or another module.
Two-path instruments have two synthesis modules. The Synthesis module of Path A contains the reference quartz oscillator or is synchronised to an external reference. The module of path B is synchronised to that of path A by a cable connection from SSYN A X245 to SSYN B X246.

Internal adjustment "Adjust Synthesis"

A comprehensive test of the module is to run the internal adjustment.

Error	Error correction
Internal adjustment "Adjust Synthesis" aborts at SSYN-OPU Adjustment.	➢ Terminate socket X244 with 50 Ω and perform internal module adjustment. **(SETUP - Internal Adjustment Path A/B Adjust Synthesis)** Internal adjustment is now performed successfully: This indicates that termination at X244 is insufficient (defective cable or output module IQOP3/6). Adjustment aborts again: ➢ Change module.

Input and Output Signals

Connector, System	Signal name	Setting on Signal Generator	Frequency	Level	Signal flow
X242, SMA	SYNEX_IN	750 to 1500 MHz	731to 1495.5 MHz	5+-3dBm	to SYNEX (when fitted)
X243, SMA	SYNEX_OUT	750 to 1500 MHz	750 to 1500 MHz	5+-3dBm	from SYNEX (when fitted)
X244, SMA	SYNRF	200 to 3000 MHz 0.1 to 200 MHz	200 to 3000 MHz 1040.1 to 1240 MHz, 1200.1 to 1400 MHz with SYNEX fitted	13±3 dBm	to IQOP3/6
X245, SMP	EXTREF_OUT	Ext. ref. freq. 5/10/13 MHz	5/10/13 MHz	>6 dBm	to Rear Panel or to SSYN B
X246, SMP	EXTREF_IN	Ext. ref. freq. 5/10/13 MHz	5/10/13 MHz	-6 to 19 dBm	from rear Panel or from SSYN A
X247, SMP	REF100	B22 fitted	100 MHz	10+-2 dBm	from SYNEX
X248, SMP	REFVAR	SYNEX not fitted B22 fitted, ref. int. B22 fitted, ref. ext. B20 fitted	12.8 MHz 10 MHz 40 MHz 104 MHz	13+-3 dBm 3 V TTL 3 V TTL 3 V TTL	to DACIF from SYNEX to SYNEX to SYNEX
X249, SMA	REF1040	<200 MHz	1040 MHz	10±2 dBm	to IQOP3

Error messages concerning the module SSYN

Error message	Error correction
"Synthesis OCXO 10 MHz oven cold"	➢ If this message doesn't vanish after 10 minutes, OCXO is defective, change the module.
"Synchronization error on external reference" "Synthesis Reference PLL unlocked"	➢ Check for correct External Reference Frequency setting and corresponding input signal. ➢ If input signal and frequency settings are correct and error message is displayed anyhow, change the module.
"Synthesis Reference 1040MHz ALC-loop unlocked"	This error message indicates that the level control for the 1040 MHz reference signal at X249 is unlocked. ➢ Terminate X249 with 50 Ω. Set RF to 100 MHz and to 1000 MHz. If the message disappears, cable connection or module IQOP3 is defective. If the message is displayed anyhow, change the module.
"Synthesis fractional-loop PLL unlocked" "Synthesis main-loop PLL unlocked"	➢ Change the module.
"Synthesis SFU attenuator DAC on limit" "Synthesis OPU attenuator DAC on limit" "Synthesis MLP adjustment failed" "Synthesis FRA adjustment failed" "Synthesis SFU adjustment failed" "Synthesis OPU adjustment failed"	These errors may occur, when the internal adjustment "Adjust Synthesis" is executed. ➢ See above.
"Synthesis adjustment data invalid" "Synthesis new adjustment data invalid" "Synthesis cannot initialize adjustment data" "Synthesis cannot store adjustment data" "Synthesis cannot read EEPROM data"	➢ Try to execute Internal Adjustment "Adjust Synthesis" anew. ➢ If error messages continue, change module. If there are problems with other modules too, data transfer maybe disturbed. Try to change the DACIF module.

Error Message - DACIF: PLL unlocked (100 MHz)

Error	Error correction
This error message indicates that the 100 MHz PLL on the DACIF board module is unlocked. The reference signal for this PLL is supplied by the SSYN A module. The error also occurs if this reference signal is missing.	➢ Connect spectrum analyzer to SSYN A X248. Check that frequency is 12.8 MHz and level is > 6 dBm. Values correct: Defective connecting cable or continue troubleshooting on DACIF board. Values incorrect: Change SSYN A

Frequency Error < $2*10^{-6}$, Reference Oscillator adjustment

Error	Error correction
Internal reference frequency: Frequency error < $2*10^{-6}$	➢ The frequency accuracy of the synthesizer is determined (set to internal reference) by a highly stable 10 MHz quartz oscillator which is adjusted to a calibrated frequency standard at the R&S factory. This oscillator is subject to ageing and mostly can be recalibrated, please contact your R&S representative. ***Note**: The internal reference can be impaired by up to approx. $\pm 10^{-6}$ under the menu **RF/A Mod** - **Reference Oscillator** - **Adjustment**. This setting does not affect the factory adjustment and can be reset at any time by means of deactivation. Path B is always synchronized to Path A.*

Troubleshooting - Module SYNEX

Internal adjustment “Adjust Synthesis”

A comprehensive test of the module is to run the internal adjustment.

Error	Error correction
Internal adjustment “Adjust Synthesis” aborts at SSYN Adjustments.	➢ Check performance and cabling of REF100 signal ➢ If alright, first troubleshoot module SSYN.

Input and Output Signals

Connector, System	Signal name	Setting on Signal Generator	Frequency	Level	Signal flow
X702, SMA	SYNEX_OUT	750 to 1500 MHz	750 to 1500 MHz	5+-3dBm	to SSYN
X703, SMA	SYNEX_IN	750 to 1500 MHz	731to 1495.5 MHz	5+-3dBm	from SSYN
X704, SMP	REFVAR Path A	B22, ref. internal B22, ref. external B20 fitted	10 MHz 40 MHz 104 MHz	3 V TTL	to SSYN A from SSYN A from SSYN A
X705, SMP	REF100		100 MHz	10±2 dBm	to SSYN
X706, SMP	REF_DACB		12.8 MHz	13+-3 dBm	to DACIF
X707, SMP	REF_LPN2 Path A	Ref. internal Ref. external	10 MHz 40 MHz	3 V TTL	to SSYN A from SSYN A
X708, SMA	REF1200	<200 MHz	1200 MHz	10±2dBm	to IQOP3

Error messages concerning the module SYNEX

Error message	Error correction
"Synthesis-extension: OCXO 10 MHz oven cold"	➢ If this message doesn’t vanish after 10 minutes, OCXO is defective, change the module.
"Synchronization error on external reference" "Synthesis-extension: Reference PLL unlocked"	➢ Check for correct External Reference Frequency setting and corresponding input signal. ➢ If input signal and frequency settings are correct and error message is displayed anyhow, change the module.
"Synthesis-extension: fm-loop PLL unlocked"	➢ Check for correct input signals from SSYN ➢ If input signals are correct and error message is displayed anyhow, change the module.

Error message	Error correction
"Synthesis-extension: modulation input level out of range"	➢ If this message doesn't vanish after reducing or removing input signal, change the module.
" Synthesis-extension: fm-offset adjustment failed" "Synthesis-extension: msw-ad adjustment failed"	➢ Try to execute Internal Adjustment "Adjust FM" anew. ➢ If error messages continue, change the module.
"Synthesis-extension: kvco adjustment failed"	➢ Check for correct input signals and cabling from SSYN. ➢ If input signals are correct and error message is displayed anyhow, change the module.
"Synthesis-extension: adjustment data invalid" "Synthesis-extension: new adjustment data invalid" "Synthesis-extension: cannot initialize adjustment data" "Synthesis-extension: cannot initialize adjustment pattern"	➢ Try to execute Internal Adjustment "Adjust Synthesis" anew. ➢ If error message continues, although the adjustment finished successfully, data transfer maybe disturbed. Try to change the DACIF module.
"Synthesis-extension: cannot read EEPROM data" "Synthesis-extension: cannot store adjustment data"	➢ This indicates problems concerning the data transfer from and to the EEPROM of the module. If changing the module does not cure, change module DACIF .

Error Message - DACIF: PLL unlocked (100 MHz)

Error	Error correction
This error message indicates that the 100 MHz PLL on the DACIF board module is unlocked. The reference signal for this PLL is supplied by the SYNEX A module, if fitted. The error also occurs if this reference signal is missing.	➢ Connect spectrum analyzer to SYNEX A X706. ➢ Check that frequency is 12.8 MHz and level is correct. Values correct: Defective connecting cable or continue troubleshooting on DACIF board. Values incorrect: Change module SSYN A.

Frequency Error < $2*10^{-6}$, Reference Oscillator adjustment

If a SYNEX module is fitted in Path A, the internal 10 MHz reference oscillator in this module is used. Refer to module SSYN for adjustment.

Troubleshooting - Module IQOP3

This module consist of two submodules in one housing. Internal digital modulation signals are fed from DACIF module via motherboard over connectors X172for path A and X182 for path B. The submodule RFM, Radio Frequency Module contains the RF path including the wideband I/Q-modulator. The submodule LCM, Level Control Module, contains a DSP based level control and the baseband input circuitry

Internal adjustments “Adjust Level”, “Adjust I/Q Modulator”

A comprehensive test of the module is to run the internal adjustments.

Error	Error correction
Internal adjustment “Adjust Level” or “Adjust I/Q Modulator” aborts.	➢ Check for correct input signals, if incorrect, first repair feeding modules. Adjustment aborts again: ➢ See section “*Troubleshooting with Internal Adjustments*.

Input and Output Signals

Connector, System	Signal name	Setting on Generator	Frequency	Level	Signal flow
X263, SMP	QEXT			max 0.5 V	Q modulation signal from front panel or BBIN
X264, SMP	IEXT			max 0.5 V	I modulation signal from front panel or BBIN
X265, SMP	UDET6	>3000 MHz	dc	0.5 to 15 V	from IQOP6
X266, SMP	LCON6	>3000 MHz	dc	0.5 to 8 V	to IQOP6
X271, SMA	IQ6	>3000MHz, I/Q modulation on	>3000 MHz	>-5 to 0 dBm	to IQOP6
X272, SMA	SYNRF	200 to 3000 MHz	200 to 3000 MHz	13±3 dBm	from SSYN
X273, SMA	REF1040	<200 MHz	1040 MHz	10±2dBm	from SSYN
X274, SMA	OPU3RF	0.3 to 3000 MHz, 8 dBm	0.3 to 3000 MHz	8 to 18 dBm	to SATT3 or IQOP6

Error messages concerning the module IQOP3

Error	Error correction
"Output unleveled, RMS detector cold"	The temperature control of the detector is unable to maintain the desired temperature of 70 °C. RF Level is out of specification. This can be checked using diagnostic system: ➢ Thermostat temperature is displayed using test point SETUP - **Test Point** DIAG_IQOP3_RFM_TEMP_DET 100 * U_{DIAG} = Thermostat temperature in degrees Celsius If temperature deviates more than 4 °, the module is to be replaced.
"Output unleveled: Gain Control on Upper Limit" "Output unleveled: Gain Control on Lower Limit" "Output unleveled: Gain out of Setting Range"	Check settings, especially of attenuator mode and ALC mode. Start anew with blue PRESET key. Try to execute internal adjustment “Adjust Level”. See section “Troubleshooting – Internal Adjustments”. Check for correct input levels from SSYN or IQOP6.
"Questionable level adjustment data" "Questionable IQOP3 I/Q adjustment data" "Questionable IQOP6 I/Q adjustment data" "Baseband adjustment failed" "Zero adjustment failed" "AM adjustment failed" "IQOP3 I/Q adjustment failed" "IQOP6 I/Q adjustment failed"	These error messages indicate problems with internal adjustment prodedures. Retry internal adjustments (see section “Troubleshooting – Internal Adjustments”). If error still exists, check for correct input signals (see above).
"Missing level adjustment data" "Missing IQOP3 I/Q adjustment data" "Missing IQOP6 I/Q adjustment data"	There are no data of internal adjustments. This may be the result of problems with the hard disk. Execute internal adjustments (see section “Troubleshooting – Internal Adjustments”).
"Impairments DAC on limit"	The desired setting of impairments is limited. If this happens with no impairment set, execute internal adjustment “Adjust I/Q Modulator” (see section “Troubleshooting – Internal Adjustments”).
"Vector Modulator: Quadrature Loop unlocked"	The submodule RFM is defective and must be changed.

Tests on Submodule IOQOP3 LCM

The LCM module is probably defective if one of the following error messages appears. The tests listed below can be performed with the IQOP3 to localize an error on the LCM.
The LCM regulates the gain and the output level of the RF signal paths on the IQOP3 and IQOP6.

Error Message DSP....

Error	Error correction
The following, more precise error descriptions may appear: DSP read error DSP check/communication error DSP write zero data error DSP communication error Communication between the gain control DSP and host computer via the serial bus is faulty.	All other modules are found when firmware is started: LCM is defective and must be changed. No modules are found when firmware is started: Check DACIF board .

Error Message Baseband.... or DAC...

Error	Error correction
The following, more precise error descriptions may appear: Baseband adjustment error Baseband offset error DAC underflow (RMS Offset) DAC overflow (RMS Offset) DAC underflow (RMS Offset_I) DAC overflow (RMS Offset_I) DAC underflow (RMS Offset_Q) DAC overflow (RMS Offset_Q) DAC underflow (RMS Imbalance) DAC overflow (RMS Imbalance) Error during baseband detector adjustment.	Error occurs at less than 50% progress bar of baseband detector adjustments: LCM is defective and must be changed. Error occurs at over 50% progress bar of baseband detector adjustments: ➢ Check analog outputs of DAC board. If outputs are OK: LCM is defective.

Error Message I/Q cal... or DAC….

Error	Error correction
The following, more precise error descriptions may appear: I/Q cal error I/Q cal Newton error DAC underflow (Offset_I) DAC overflow (Offset_I) DAC underflow (Offset_Q) DAC overflow (Offset_Q) DAC underflow (Gain_I) DAC overflow (Gain_I) DAC underflow (Gain_Q) DAC overflow (Gain_Q) DAC underflow (Quadrature) DAC overflow (Quadrature) Error during I/Q modulator adjustment.)	➢ Check input level from SSYN. Input level < 8 dBm: ➢ Check SSYN. Input level > 8 dBm: ➢ Check whether error occurs during IQOP3 or IQOP6 adjustment. Error occurs during IQOP3 adjustment: ➢ Check I/Q modulation below 3 GHz. Error occurs during IQOP6 adjustment: ➢ Check I/Q modulation above 6 GHz.

Error Message CAL DAC… and DSP cal

Error	Error correction
The following, more precise error descriptions may appear: Checking CAL DAC voltages DAC underflow (CAL_DAC) DAC overflow (CAL_DAC) CAL DAC error Setup IQOP3 CAL DAC voltages DSP cal range underflow DSP cal range overflow	➢ Test diagnostic converter using a test point of a different module. If converter is OK: LCM is defective and must be changed.

Error Message "DSP zero error"

Error	Error correction
Error Message "DSP zero error"	➢ Setting on Vector Signal Generator RF OFF Frequency 1 GHz ➢ Read out test point SETUP - **Test Point** DIAG_IQOP3_D_UDET Voltage < 0 V : Error on RFM. Voltage > 0 V : LCM is defective and must be changed.

Error Message IQOP3/6 settling error

Error	Error correction
Gain control does not lock during adjustment.	➢ Check gain control (section "*Level Errors*", page 3.27).

Error Message BB AM adjustment error

Error	Error correction
BB AM adjustment fails.	LCM is defective and must be changed.

Error Message AM adjustment error

Error	Error correction
LF AM adjustment fails.	➢ Test LF generator at LF output. If OK: LCM is defective and must be changed.

Error Message I/Q Offset out of hardware setting range - reduce baseband gain

Error	Error correction
Setting range of the offset DA converters is not sufficient for the entered impairment values.	With gain of +0 dB, it must be possible to set values from -10% to 10%. If not: LCM is defective and must be changed.

Error Message Gain Imbalance out of hardware setting range

Error	Error correction
The setting range for the imbalance DA converters is not sufficient for the entered impairment values. This is a characteristic of the hardware.	It should be possible to set -0.8 dB to 0.8 dB without problem for all frequencies. If not: LCM is defective and must be changed.

Error Message Quadrature Offset out of hardware setting range

Error	Error correction
The setting range for the quadrature DA converters is not sufficient for the entered impairment values.	IQOP3/RFM is defective and must be changed.

Error Message Output unlevelled..

Error	Error correction
The following, more precise error descriptions may appear: Gain Control on Upper Limit Gain Control on Lower Limit Gain out of Setting Range Gain control is unlocked.	See " "*Level Errors*"

Troubleshooting - Module IQOP6

Internal adjustments , Adjust I/Q Modulator

A comprehensive test of the module is to run this internal adjustment.

Error	Error correction
Internal adjustment “Adjust I/Q Modulator” aborts at frequencies >3 GHz.	➢ Check for correct input signals, if incorrect, first replace appropriate feeding modules. Adjustment aborts again: ➢ IQOP6 module is probably faulty.

Input and Output Signals

Connector, System	Signal name	Setting on Signal Generator	Frequency	Level	Signal flow
X282, SMA	SYNRF	200 to 3000 MHz 3000 to 6000 MHz	200 to 3000 MHz 1500 to 3000 MHz	13±3 dBm	from SSYN
X283, SMA	SYNRFE	200 to 6000 MHz	200 to 6000 MHz	10±3 dBm	to IQOP3
X284, SMA	IQ6	>3000MHz, I/Q modulation on	>3000 MHz	>-5 to 0 dBm	from IQOP3
X285, SMP	LCON6	>3000 MHz	dc	0.5 to 8 V	from IQOP3
X286, SMP	UDET6	>3000 MHz	dc	0.5 to 15 V	to IQOP3
X287, SMA	OPU3RF	0.3 to 3000 MHz, 8 dBm	0.3 to 3000 MHz	8 to 18 dBm	from IQOP3
X289, SMA	OPU6RF	0.3 to 6000 MHz	0.3 to 6000 MHz	>0 dBm	to SATT6

Error messages concerning the module IQOP6

Error message	Error correction
Error messages concerning IQOP3/RFM and /LCM	These errors have to be cured first, because of interaction. Levelling circuitry for IQOP6 is placed on IQOP3 and RF signals are interchanged between the modules.
All level related error messages, that appear only at frequencies >3 GHz	• Check proper connection of signals LCON6 and UDET6. • Check ALC functionality • Check control lines on motherboard.

Check ALC functionality	Result and possible error cause
➢ Signal Generator setting: Frequency 5 GHz, Level 0 dBm, ALC State On Attenuator Mode Fixed. ➢ Disconnect cable connection LCON6 (W1285) and UDET6 (W1286) . ➢ Connect IQOP3/X265 to IQOP3/X266. Monitor voltage on this connection using a T-piece or use diagnostic system, Testpoint DIAG_IQOP3_LCM_LCON6. ➢ Now vary the level in 0.1 dB steps using spin wheel.	• The monitored voltage has to vary smoothly between 0 and 2.5 V. ➢ If there is no variation or only rough steps, LCM does not work properly and has to be serviced or replaced first.

Check control lines on motherboard	Result and possible error cause
Very low or no output level at f > 3 GHz: Check the logic states of the control lines from the motherboard (X281) (Low = 0 V, High = +3 V): ➢ Press **PRESET** key ➢ Set **RF Frequency** to 5.8 GHz ➢ Set **RF State** to On ➢ Check lines	X281.D9 PUM_N = High X281.C8 LEVATT_20DB = Low X281.A12 LEVATT_40DB = Low X281.A8 RFDOWN2_N = High Incorrect logic level: ➢ Check source modules DAC Interface and Universal Coder

Troubleshooting – Module DACIF

Error messages concerning the module DACIF

Error message	Error correction
"Dacif error, ... ”Dacboard...	➢ Check for correct power supply, check fuses on the motherboard. If correct, change module

Troubleshooting – Module UNICOD

Error messages concerning the module UNICOD

Error message	Error correction
"Unicod error, ...	➢ Check for correct power supply, check fuses on the motherboard. If correct, change module

Troubleshooting - Module BBIN

At power on some basic tests are performed to check functionality of the module.

Error messages concerning the module BBIN

Error message	Error correction
"Bbin error, ...	➢ Check for correct power supply, check fuses on the motherboard. If correct, change module

Troubleshooting – Module FADER

At power on some basic tests are performed to check the functionality of the module. Further tests can be performed, described in section 'Performance Test' to find out faulty modules.

Error messages concerning the module FADER

Error message	Error correction
"Fader error, ...	➢ Check for correct power supply, check fuses on the motherboard. If correct, change module.

Module Replacement

This section describes in detail the replacement of modules. Chapter 5 provides information on how to order spare parts; it contains the list of mechanical parts with order numbers and the illustrations for module replacement.

Important:

Module replacement only by authorized Rohde & Schwarz Service

Overview of the Modules

Table 3-1 Overview - module replacement

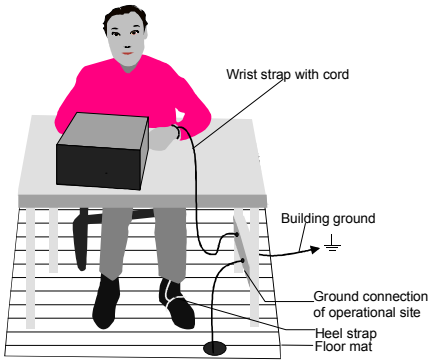
Module	Adjustment (see chapter 2, "Adjustments")	See page
Front Module Controller A201	X	3.54
2.5 Hard Disk 20 GB A202	X	3.56
Lithium battery	X	3.55
8.4" Color TFT (Display) A210 Display Unit (1141.2405.02)		3.56
Display Unit A200		3.57
Rotary Pulse Generator (B10)		3.57
Switch Board (1141.2528) or Flex. Switch Board (1141.2511)		3.57
DC to AC Converter Unit T10		3.56
USB Adapter A130		3.57
Front Panel (1141.2311)		3.49
Standard Synthesis A1240, A2240	X	3.50
Synthesis Extension A700	X	3.50
IQ Output Module 3 GHz (RFM A262/LCM A261) A1260, A2260	X	3.50
IQ Output Module 6 GHz A1280	X	3.50
DAC Interface A340	X	3.51
DAC Board A580, Option B13	X	3.52
Universal Coder A500, Option B10	X	3.52
Differential Output, Option B16		3.51
Baseband Input A620	X	3.51
IQ Bridge A640		3.51
Fading Simulator A520, Option B14		3.51
Path Extension A525, Option B15		3.51
Switching Power Supply A400		3.53
Fan Units E1 and E2		3.59
Fan Unit E3		3.60
BNC-Board Rear A120		3.61
Motherboard A100	X	3.62
Elec. Attenuator 3 GHz A1300, A2300	X	3.63
Elec. Attenuator 6 GHz A1320	X	3.63
Overvoltage Protection and High Power Relay Control A1815, A2815 and Relays K1820, K1825, K2820, K2825 / Options B30, B31, B32, B35, B36, B37	X	3.64

Note: *The words "left" and "right" in the manual always refer to the front view of the instrument.*

Safety Instruction, Dismounting the Case

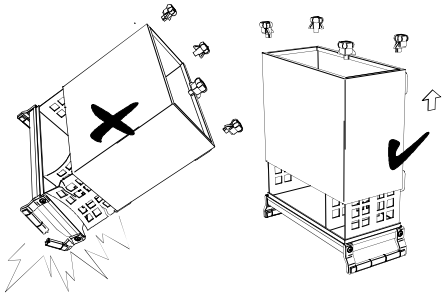
Caution!

- *Please note the safety instructions at the beginning of this manual.*
- *Disconnect the instrument from the mains before opening the case.*
- *Protect the replacement site against electrostatic discharge to avoid damage to electronic components of the modules.*



The following two methods of ESD protection may be used together or separately:

- *Wrist strap with cord to ground connection*
- *Conductive floor mat and heel strap combination*



- *Put the instrument on the front handles before loosening the rear feet and pulling off the case to avoid damage to the instrument.*
- *When mounting the case, take care not to damage or pull off cables.*

The case is to be dismounted for all the following procedures and retrofitted to finish. This will not be mentioned further.

Replacing Fuses

Caution!
Ensure that the power supply cord is disconnected.

If you are not using the supplied spares, be sure to use fuses of the same type and rating.

The spare fuses come in a small plastic bag included in the Quick Start Guide binder.

- Switch off the instrument.
- Disconnect the power supply cord.
- To replace a fuse, use a small screwdriver to open the fuse holder at the power inlet.

Removing Instrument Cover 1 (Top Side)

(See chapter 5, parts list and drawing 1141.2005.01)

- Switch off the instrument and pull the mains plug.
- Undo the 20 countersunk screws (1148.3288) and lift the instrument cover 1 (top side, 1141.2728).

Removing Instrument Cover 2 (Bottom Side)

(See chapter 5, parts list and drawing 1141.2005.01)

- Switch off the instrument and pull the mains plug.
- Undo the 14 screws (9 x 0041.1653, 2 x 0041.1660, and 3 x 1148.3288) and lift the instrument cover 2 (bottom side, 1141.2734).

Removing and Replacing the Front Panel

Removing the Front Panel

(See chapter 5, parts list and drawing 1141.2005.01

- Switch off the instrument and pull the mains plug.
- Unscrew the four screws of the front handles (1096.1480) on both sides and take off the front handles.
- Pull off the labelling panel (1141.2311) towards the front.
- Unscrew two countersunk screws (1148.3288) in the front frame each at the top and at the bottom.
- Completely remove the front panel with keyboard and display toward the front.

Caution!

The connecting cables are still connected to the controller.

- Pull off the connecting cables to the color TFT display, DC/AC illumination converter, switch board, rotary pulse generator and network connector at the front module controller (see figure below).

Note: *When pulling off the connecting cables, be careful with the cable connecting to the keyboard. It is a film cable which can only be disconnected after sliding up the lock of the film cable plug.*

Front Module Controller Type FMR6

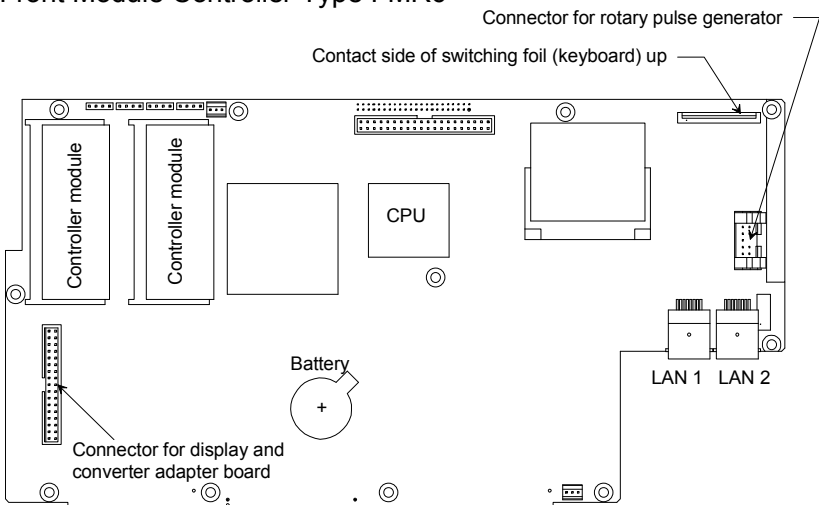


Fig. 3-1 Position of connectors on front module controller

Installing the Front Panel

- Place the front panel with the keys on top of the instrument so that the cables can be connected to the front module controller.
- Reconnect the cables to the color TFT display, DC/AC illumination converter, switch board, rotary pulse generator and network connector at the front module controller.

Caution!
Make sure to route the cables properly.

- Push the front panel on the signal generator and fasten in place using 4 countersunk screws (1148.3288) in the front frame.
- Install the front cover (1141.2311).
- Mount the 2 front handles (1096.1480) on the instrument using the 4 screws.

Replacing an RF Module

(See chapter 5, spare parts list 1141.2057.01, parts list and drawing 1141.2005.01, 1142.0006.01 and 1160.5006.01

Table 3-2 Replacing RF boards – overview and specific requirements of the individual boards

RF module		**Remarks**
Standard Synthesis	A1240, A2240	Prior to the installation, a shielding plate has to be mounted onto the last module in front of the power supply.
IQ Output Module 3 GHz (RFM/LCM)	A1260, A2260	This module consists of two submodules, the radio frequency module A262 and the level control module A261. They can be separated by loosening 6 screws, marked by punched dots on the cooling fin side of the case.
IQ Output Module 6 GHz	A1280	
Synthesis Extension	A700	

Removing an RF Module

- Switch off the instrument and pull the mains plug.
- Remove instrument cover 1.
- Place the instrument on its side and remove all RF cables leading to the board and from it at the bottom of the instrument.
- Pull out the board towards the top of the instrument.

Note: *The board can be disconnected from the motherboard connector by carefully pressing from the bottom through the motherboard slots*

Installing a New RF Module

- Plug the new board into the instrument and reconnect the RF cables.
- Reinstall instrument cover 1.
- Perform internal adjustments after replacement according to chapter 2, “Adjustments”.

Replacing a Digital Board

(See chapter 5, spare parts list 1141.2057.01, parts list and drawing 1141.2005.01 and 1161.0066.01)
A
Table 3-3 Replacing digital boards – overview and specific requirements of the individual boards

Digital module		**Specific Requirements**
DAC Interface	A340	***Caution:*** *Do not forget to unplug 3 coaxial cables on the bottom side before pulling out the module and to retrofit after inserting the new board.*
DAC Board, Option B13	A580	The DAC interface board A340 first is to be dismounted (see “*Replacing the Digital Module DAC Board, A580 - Option B13*” section on page 3.52).
Universal Coder Option B10/B11	A500	
Differential I/Q Output		Two cables have to be mounted.
Fading Simulator, Option B14	A520	
Fading Simulator Extension Option B15	A525	
I/Q Bridge Option B15	A640	
Baseband Input Option B17	A620	

Table 3-4 Position of digital boards in R&S SMU200A

In other devices of the family the relative positions of the boards are the same, only slot numbers differ.

Slot 6D	DAC Interface and DAC Board	DAC Interface and DAC Board	DAC Interface and DAC Board	DAC Interface and DAC Board	DAC Interface and DAC Board	DAC Interface and DAC Board	DAC Interface and DAC Board	DAC Interface and DAC Board	DAC Interface and DAC Board	DAC Interface and DAC Board
Slot 5D	Universal Coder	Fading Simulator	Fading Simulator	Universal Coder	Fading Simulator	Fading Simulator	Universal Coder	Universal Coder	Fading Simulator	Fading Simulator
Slot 4D		Universal Coder	Fading Simulator Extension	Universal Coder	Universal Coder	Fading Simulator Extension	IQ Bridge	Universal Coder	Universal Coder	Fading Simulator Extension
Slot 3D			Universal Coder		Universal Coder	Universal Coder	IQ Bridge	IQ Bridge	Universal Coder	Universal Coder
Slot 2D						Universal Coder	IQ Bridge	IQ Bridge	IQ Bridge	Universal Coder
Slot 1D							Baseband Input	Baseband Input	Baseband Input	Baseband Input

Removing a Digital Board

- Switch off the instrument and pull the mains plug.
- Remove instrument covers 1 and 2.
- Pull out the board towards the top of the instrument using the pull-out levers.

Installing a New Digital Module

- Plug the new board into the instrument. Be sure to plug in to the limit stop.
- Reinstall instrument covers 1 and 2.

Replacing the Digital Module DAC Board, A580 - Option B13

Removing the Module

- Loosen 6 screws (0041.1660) on the back of the DAC interface board. (Slot 6D)
- Then carefully remove the cooling cover of the DAC board.
- Unscrew another 6 screws (1148.2600 with washers 0082.4640 and 0005.0267) on the component side near the connectors of the DAC board.
- The DAC board can be removed now.

Installing the New Module

- Carefully mount the DAC board A580 onto A340 in the reverse order and install it again.
- Perform internal and external adjustments according to chapter 2, “Adjustments”.

Replacing the Power Supply A400

(See chapter 5, spare parts list 1141.2057.01, parts list and drawing 1141.2005.01)

Note: *If Pos. A300 (Second Standard Synthesis) is fitted, it has to be removed prior to replacing the power supply.*

Removing the Power Supply

- Remove instrument cover 1.
- Unplug power input cables and interface plug at the sides of the power supply.
- Unscrew the four screws at the rear of the power supply.
- Now the power supply can be lifted to disconnect the DC lines.
- Unplug DC connection X237. Unscrew the 3.6 V, 5.2 V and ground cables.
- The power supply can now be removed.

Installing a New Power Supply

- Install the new power supply in the reverse order. To avoid mistakes, be careful when connecting the DC lines.
- Reinstall instrument cover 1.

Replacing the Front Module Controller A201

(See chapter 5, spare parts list 1141.2057.01, parts list and drawing 1141.2005.01)

The front module controller is mounted behind the front panel.

Removing the Front Module Controller

- Remove the front panel.
- Unscrew the 11 screws with washers (1148.3059) of the front module controller board and take out the front module controller as follows:

Note: *The front module controller is tightly inserted on the motherboard. It can be pulled off towards the front using the slots at the bottom of the mounting plate. Carefully push the board towards the front step by step using a flat, blunt tool.*

Caution:

Do not insert the tool too far into the slots and press only against the PC board!
To pull out the board, pry off at all slots alternately.
The board must not be bent!

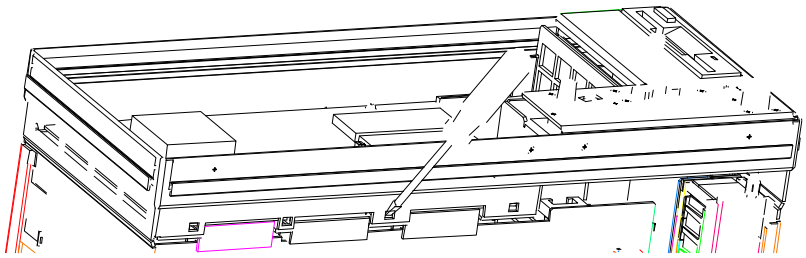


Fig. 3-2 Removing the front module controller

Installing the New Front Module Controller

- Carefully plug the new front module controller (A201) to the motherboard (A100) and fasten it in place using the 10 screws with washers (1148.3059).
- Carefully plug the cable connectors to the controller board, taking care not to reverse the polarities.
- Install the front panel.

Replacing the Lithium Battery 0858.2049 on the Front Module Controller

(See chapter 5, parts list and drawing1141.2005.01)
The lithium battery is accommodated on the front module controller board behind the front panel.

Caution!

- *Lithium batteries must not be exposed to high temperatures or fire.*
- *Keep away from children.*
- *If the battery is replaced improperly, there is danger of explosion. Only replace the battery by an R&S type (See chapter 5, spare parts list 1141.2057.01, item 775 for type FMR5 and item 776 for type FMR6).*
- *Lithium batteries are hazardous waste and must be disposed of in dedicated containers.*

➢ Remove the front panel.

➢ Carefully lift and pull out the battery (for position, see drawing in "Removing the Front Panel" section).

Note: *3.4 V lithium battery (∅ 20 mm * 3 mm , type CR2032) R&S Order No. 0858.2049.00*

Warning!
Do not short-circuit the battery!

➢ Insert new battery into holder below the spring.

Note: *The positive pole (+) of the battery points up.*

➢ Install front panel again.

Replacing the Hard Disk A202

(See chapter 5, spare parts list 1141.2057.01, A202, parts list and drawing1141.2005.01)

The hard disk is located between the processor trough and the boards. The spare part contains the preinstalled software.

- Remove instrument cover 1.
- Disconnect the ribbon cable (1093.5156) at the hard disk.
- Undo the two countersunk screws (1148.3288) on the hard disk mounting plate (A202).
- Take the hard disk (A202) with the mounting plate (1093.4837) out of signal generator.

Installing the New Hard Disk and Putting into Operation

- Mount the hard disk with the mounting plate into the instrument using two screws (1148.3288).

  Note: *The mounting plate is put into a slot in the rear of the front module.*

- Connect the ribbon cable (1093.5156) to the hard disk, carefully observing the pinning.
- Reinstall instrument cover 1.
- Perform internal adjustments according to chapter 2, “Adjustments”.

Replacing the DC/AC Converter (T10) and Color TFT Display (A210)

(See chapter 5, spare parts list 1141.2057.01, parts list and drawing 1141.2005.01)
The color TFT display is accommodated on the mounting plate together with the associated DC/AC converter. It is connected to the front module controller via cables, which can also be replaced individually. For replacement proceed as follows:

- Remove the front panel (see above).
- Place the front module with the keys onto a clean surface.

Removing the DC/AC Converter

- Pull off the connecting cable from the display to the DC/AC converter (T10).
- Disconnect cable (1091.2650) between the DC/AC converter (T10) and the display connector (A211).
- Remove the DC/AC converter (T10) after undoing the two screws (1148.3059).

Removing the Color TFT Display

- Unscrew two screws (1148.3059) and plug off the display connector (A211).
- Disconnect cable (1091.2666) from the display (A210).
- Loosen the 4 screws with washers (1148.3059) and remove the display.

Installing the New TFT Display and/or DC/AC Converter and Putting into Operation

- To insert the new TFT display and/or the DC/AC converter, proceed in the reverse order, connect all cables in the correct position and tighten all screws (drawing 1141.2405.01).

Reinstall the front module (see above).

Replacing the Switch Board (1141.2528), Flex. Switch Board (1141.2511), Display Unit (A200), Rotary Pulse Generator B10 on the Front Module and USB Adapter (A130)

(See chapter 5, spare parts list 1141.2057.01, parts list and drawing 1141.2405.01, and parts list and drawing 1141.2005.01 (for A130)).

Display unit, rotary pulse generator, switch board and flex. switch board are located behind the front panel and the keyboard frame. The USB adapter is located behind the right part front panel.

- Remove the front panel (see above).

Removing the Modules

Place the front panel onto a clean surface with the keys pointing upwards.

- Pull off the knob (0852.1086) of the rotary pulse generator.

  The rotary pulse generator can be replaced after loosening screw (1066.2066).

- Remove W1300 and W2300 and unscrew the 3 screws (1148.3288) on the right part of the front panel (1141.2334) and slightly tilt forward the right part of the front panel.

  The USB Adapter can be replaced after loosening 3 screws (1148.3059).

- Loosen the 14 countersunk screws (0041.1599) and remove the keyboard frame (1141.2505).

The switch board (1141.2528), the flex. switch board (1141.2511), as well as the display unit can now be replaced.

Installing the Modules

- Insert the new flex. switch board (1141.2528) into the keyboard frame from the back.

  Note: *The pins of the flex. switch board must be inserted into the holes at the keyboard frame.*

- Position the new switch board (1141.2511) on the back of the flex. switch board (1141.2528).

  Note: *Push the foil cable of the membrane through the slot in the mounting panel. The membrane must be positioned so that the pins of the flex. switch board are inserted into the holes in the membrane.*

- Place the display unit on the rear onto the flex. switch board.

  Note: *The display must be positioned so that the pins of the flex. switch board are inserted in the holes in the mounting plate (1141.2428).*

- Press the front panel together, turn the keys to the top and fasten in the keyboard frame using 14 countersunk screws (0041.1599).
- Insert the new USB adapter, plug in W1300 and W2300, fasten screws (1148.3059) and then fasten screws (1148.3288).

Reinstall the front panel (see above).

Replacing the Labelling Panel

(See chapter 5, parts list and drawing1141.2005.01)

- The labelling panel is the outer front panel that carries the labelling. Every model has its own labelling panel.
- Switch off the instrument and pull the mains plug.
- Unscrew the four screws of the front handles (1096.1480.) on both sides and take off the front handles.
- Pull off the labelling panel (1141.2311) towards the front.
- Paste matching insert labels into the new labelling panel (depending on configuration of the instrument).
- Install the new labelling panel and reassemble the instrument in the reverse order.

Replacing the Fans E1 and E2

(See chapter 5, spare parts list 1141.2057.01 E1, E2, parts list and drawing 1141.2105.01
The fans are fitted at the right side of the frame.

Removing the Fans E1 and E2

- Remove instrument cover 1.
- Remove the fans E1 and/or E2 by loosening the four screws (0041.1653).
- Disconnect the fan cable at the motherboard connector (X223 and/or X224).

Installing the New Fans

- Mount the new fans.
- Connect the fan cables at the motherboard.

Note: *Please note the direction of the airflow printed on the fan. The fan must blow the cold air into the instrument.*
Make sure to route the cable so that it cannot get into the fan.

- Reinstall instrument cover 1.

Replacing the Fan E3 (See chapter 5, spare parts list 1141.2057.01 E3, parts list and drawing 1141.2105.01)

This fan is fitted behind the rear panel.

Removing the Fan E3

- Remove instrument cover 1.
- Remove mounting plate (1141.2786) with fan (E3) from the transverse partition at the rear by loosening the two screws (1148.2781).
- Disconnect the fan cable to the motherboard.
- Remove the fan (E3) by loosening the four screws (0041.8218) at the mounting plate 1141.2786.

Installing the New Fan

- Mount the new fan.
- Connect the fan cable at the motherboard.

> ***Note:*** *Please note the direction of the airflow printed on the fan. The fan must blow the cold air into the instrument.*
>
> *Make sure to route the cable so that it cannot get into the fan.*

- Reinstall instrument cover 1.

Replacing the BNC Board Rear A120

(See chapter 5, spare parts list 1141.2057.01 A120, parts list and drawing 1141.2005.01)
The module is fitted at the rear panel.

Removing the BNC Board Rear

- Remove instrument cover 1.
- Loosen the nuts of the 7 BNC connectors at the rear panel.
- Pull out board towards the top of the instrument and disconnect cables.

Installing the New BNC Board Rear A120

- Install the new module in reverse order.

Reinstall instrument cover 1.

Replacing the Fan E3

(See chapter 5, spare parts list 1141.2057.01 E3, parts list and drawing 1141.2105.01)

This fan is fitted behind the rear panel.

Removing the Fan E3

- Remove instrument cover 1.
- Remove mounting plate (1141.2786) with fan (E3) from the transverse partition at the rear by loosening the two screws (1148.2781).
- Disconnect the fan cable to the motherboard.
- Remove the fan (E3) by loosening the four screws (0041.8218) at the mounting plate 1141.2786.

Installing the New Fan

- Mount the new fan.
- Connect the fan cable at the motherboard.

> ***Note:*** *Please note the direction of the airflow printed on the fan. The fan must blow the cold air into the instrument.*
>
> *Make sure to route the cable so that it cannot get into the fan.*

- Reinstall instrument cover 1.

Replacing the BNC Board Rear A120

(See chapter 5, spare parts list 1141.2057.01 A120, parts list and drawing 1141.2005.01)

The module is fitted at the rear panel.

Removing the BNC Board Rear

- Remove instrument cover 1.
- Loosen the nuts of the 7 BNC connectors at the rear panel.
- Pull out board towards the top of the instrument and disconnect cables.

Installing the New BNC Board Rear A120

- Install the new module in reverse order.
- Reinstall instrument cover 1.

Replacing the Motherboard (A100)

(See chapter 5, spare parts list 1141.2057.01, A100, parts list and drawing 1141.2005.01)
The motherboard is fitted at the bottom side and establishes all connections between the modules.

Caution!
The motherboard contains an EEPROM with all the specific data like serial number, software options and correction data of the instrument. After replacement, the data and correction tables have to be restored. This can only be done in the factory. Without this data, the instrument will not operate correctly!

Removing the Motherboard

- Remove all boards.
- Remove the front panel.
- Pull out all air baffles towards the top of the instrument.
- Disconnect all cables from motherboard to components (attenuators, fans, etc).
- Remove all cable fasteners of the rear panel connections.
- Loosen all screws fixing the motherboard (8 x 1148.3059) at the bottom side.
- Take out the motherboard by carefully swaying it to the bottom side.

Installing the New Motherboard

- Install the motherboard into the instrument in the reverse order.

Note: *Be careful when installing the motherboard in order not to cause damage to any components.*

Make sure to connect the cables according to their labelling.

- Insert the front module controller, front panel, power supply, boards and cables in the reverse order.
- After replacement, device-specific data and correction tables must be restored. This can only be done in the factory.

Replacing the RF Attenuators A1300, 1320 and A2300

(See chapter 5, spare parts list 1141.2057.01, AA1300, A1320 and A2300, parts list and drawing 1141.2005.01)
The attenuator(s) is (are) fitted in the side chamber with the fans.

Removing the RF Attenuator

- Remove instrument cover 1.
- Remove options B30, B31, or B32 in case they are installed (see below). The attenuator of path A is fitted at the bottom, of path B at the top side.

Bottom side:
- Loosen the 4 screws (2 x 0041.1630 and 2 x 1148.3271) fastening the attenuator to the chassis (one of them is accessible through a hole in the motherboard).

Top side:
- Loosen the 4 screws (4 x 1148.3271) fastening the attenuator.
- Place the instrument onto the left side and unscrew the RF cables at the input and the output of the RF attenuator.
- Unplug the flexible ribbon connection from the attenuator. Now the attenuator can be removed.

Installing the New RF Attenuator

- Proceed in the reverse order as described under "Removing the RF Attenuator".
- After replacement, perform the internal and external adjustments according to chapter 2, “Adjustments”).

Replacing the Options Overvoltage Protection (B30, B35), High Power (B31, B36), and Overvoltage Protection and High Power (B32, B37)

Related Parts are Relay Control A1815, A2815 Relay K1820, K2820, K1825, K2825.
(See chapter 5, spare parts 1141.2057.01 list A1815, A2815, drawings 1141.2005.01, 1159.7444.01 (B30), 1159.8011.01 (B31), 1160.0256 (B32), 1160.0256.01 (B33), 1160.0633.01 (B35), 1160.1000 (B36), 1160.1400.01 (B37)

The board is fitted behind the RF input connector. Options B30, B31, B32 are mounted at the instrument bottom; options B35, B36, B37 are mounted at the end in the air duct.

Removing the Module

- Remove the instrument cover 1.
- Place the instrument on its left side and unscrew the RF cable.
- Remove the modules together with the brackets, circuit and relay (3 screws 1148.2869.00).
- Disconnect the ribbon cable to the motherboard.

The removal of all the options is thus completed. If troubleshooting indicates a defective relay control circuit or a defective relay, these components can be separately removed and replaced as follows:

- Remove the relay control circuit A1815 by loosening the 3 screws M2.5 (1148.3059).

Note: *Carefully unscrew other RF cables as necessary. Do not undo short RF cables completely on one side (danger of bending or breaking the inner conductor).*

- Remove relay(s) K1820, K1825 by loosening the 2 screws (1148.2869).

Installing the New Module

- Be sure, coding switches are set according to the option

Option	Contact S0	Contact S1
B30, B35 (overvoltage protection)	closed	open
B31, B36 (high power)	open	closed
B32, B37 (both)	closed	closed

- Reconnect the ribbon cable.
- Reconnect the RF cable and mount the module or components in the reverse order.
- Fix module with screws to the mounting.
- Screw on RF cable.
- Reinstall instrument cover 1.

After replacement, perform internal and external adjustments according to chapter 2, 'Adjustments'.

Contents - Chapter 4 "Firmware Update/Installing Options"

4 Firmware Update / Installing Options

This chapter contains information on firmware update and installing options to the R&S SMU. Additional manuals obtained together with a firmware update or with subsequently acquired options can be filed here.

CAUTION

Drivers and programs used in the instrument under Windows XP have been adapted to the signal generator. Existing software must only be modified with update software released by Rohde & Schwarz. Likewise, only programs *authorized* by Rohde & Schwarz for use on the instrument must be executed.

Installation of New R&S Firmware

Your R&S SMU is delivered with the latest firmware version available. Firmware updates as well as the Release Notes describing the improvements and modifications are provided on the Internet at the down load site of the Rohde & Schwarz SMU home page ((www.smu200a.rohde-schwarz.com). This home page always offers the latest information on your vector signal generator, e.g. also on **changes of the firmware update procedure**.

The installation of a new firmware version can be performed either via the USB or the LAN interface. The files have to be downloaded from the internet on a PC. From there the files must be transferred to the instrument. They have to be stored on the memory stick for an update via the USB interface or on a network directory for an update via the LAN interface. Chapter 1 of the operating manual describes how to connect the R&S SMU to a network and how to access network files.

The firmware update consists of three files which have to be installed in the given sequence. The version numbers in the file names vary with each update:

Uninstall:	SMU_Uninstaller_x.x.cmd
Installation of software platform:	SoftwarePlatform.msi
Firmware:	SMU_x.xx.xx.exe

The firmware update is performed in the Windows XP embedded operating system. Windows XP can only be accessed if a mouse or an external keyboard is connected. For convenient operation of Windows XP a mouse and either the on-screen keyboard (Menu **Start-Accessories-Accessibility)** or an external keyboard is recommended.

Installing the firmware

Notes: *A backup of the system partition can be performed with the Windows XP Recovery and Backup Partition, see following section "Windows XP Recovery and Backup Partition".*

The programs lead the user through the remaining steps of the update.

1. Switch off instrument
2. Connect a mouse (and/or an external keyboard) to the USB interface.
3. Switch on instrument.
4. Access Windows XP embedded desktop.

Operation with mouse
- Wait until R&S SMU firmware boot window with the progress bars appears.
- Click the **Abort** button in the boot window. Booting of the R&S SMU firmware is aborted and the Windows XP Embedded desktop is displayed.

Operation with keyboard
- Wait until the R&S SMU firmware has booted and the application has started
- Press ALT F4 to close the application. The Windows XP Embedded desktop is displayed.

5. Uninstall old firmware version.
   - Open the Windows **Start** menu on the task bar.
   - Open folder with update files using the **Windows Explorer.**
   - Execute SMU**_uninstall_x.x.cmd.**
     This script file identifies and removes all currently installed SMU software items.
   - Confirm Message Box with “Ok”.
     The process will take several minutes.
6. Install new software platform version.
   - Double-click **SoftwarePlatform.msi.**
   - Confirm Message Box regarding instrument restart with “No”.
7. Install new firmware version.
   - Execute SMU**_1.10.10.exe.**
   - Select setup type **Instrument Setup**
   - Restart the instrument and wait until R&S SMU firmware is operational.
     The new drivers are enabled only after a restart.
8. Execute internal adjustments:
   - Press the SETUP key on the instrument front panel, select **Internal Adjustments** and execute **Adjust All**.
     This process updates internal instrument adjustments and will take several minutes. Adjustments requiring external measurement equipment are not affected by the firmware update and need not to be performed.

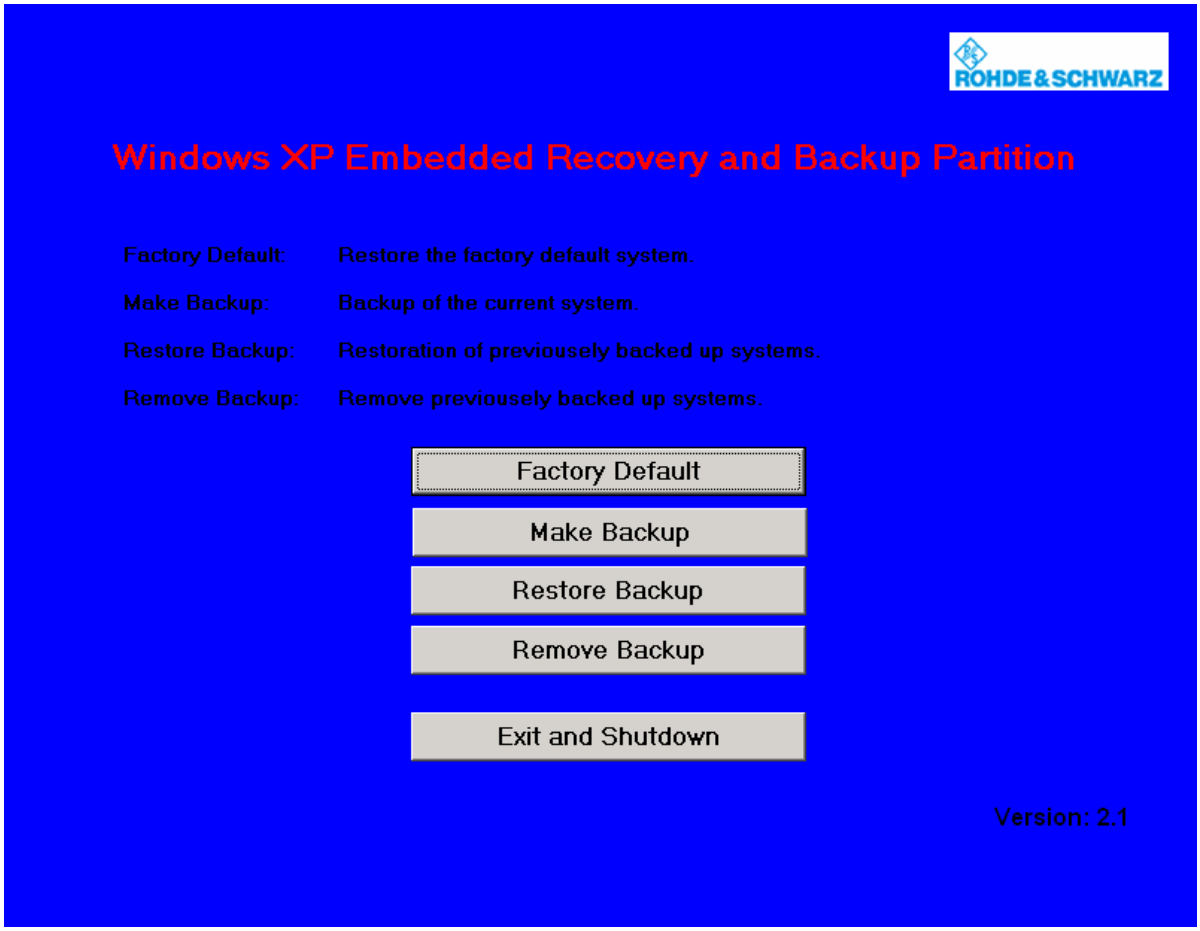
Windows XP Recovery and Backup Partition

R&S SMU provides a backup and recovery partition. A backup of the factory system partition (C:\) is stored per default and can be recovered in case of a system crash.
In addition, backups of up to 5 firmware versions can be stored on this partition. It is e.g. possible to backup the current system partition prior to a firmware update or to provide different system configurations for different environments. When recovered, the system partition (C:/) is deleted, formatted and the newly written. The data partition (D:\) is not affected.

Call the Windows XP Recovery and Backup Partition Menu

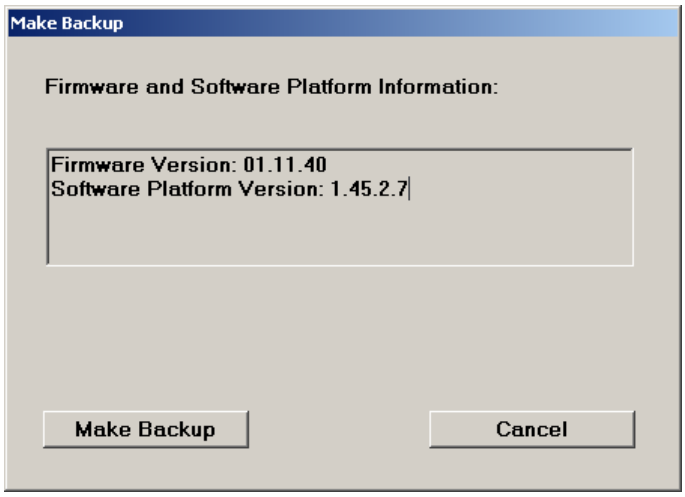
1. Switch the instrument off and on again
2. In the boot menu select line **Backup/Recovery** with the up/down cursors.
3. Open **Windows XP Recovery and Backup Partition** menu by pressing the rotary knob.
   The menu shows the available selections for the recovery and backup partition:

Note: *If already several backups are stored on the disk the remaining space might not be sufficient for an additional bachup. In this case a warning is indicated in the* ***Windows XP Recovery and Backup Partition*** *menu and the user is requested to remove an old backup before making a new one.*



Backup Current System Partition

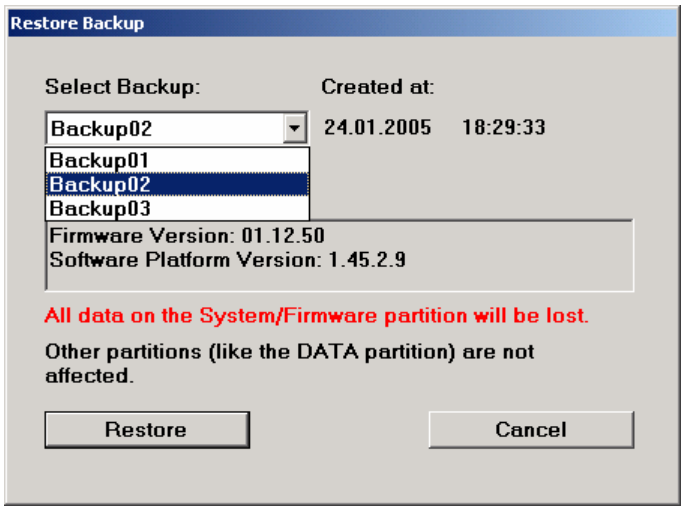
1. Select the **Make Backup** button in the **Windows XP Recovery and Backup Partition** menu with the rotary knob.
2. Open the **Make Backup** menu with the ENTER key.
   The menu shows the current versions of the firmware and the software platform.



3. Select the **Make Backup** button with the rotary knob
4. Start the backup with the ENTER key.
   After the backup the **Windows XP Recovery and Backup Partition** menu appears again.
5. Select the **Exit and Shutdown** button with the rotary knob
6. Exit and shut down with the ENTER key.

Recover Selected Version of System Partition

1. Select the **Restore Backup** button in the **Windows XP Recovery and Backup Partition** menu with the rotary knob to recover a selected version of the system partition.
2. Open the **Restore Backup** menu with the ENTER key.
   The menu shows the versions of the firmware and the software platform of the backup displayed in the **Select Backup** window.



3. Select the **Select Backup** window with the rotary knob.
4. Select the backup to be restored with the up/down cursor keys and the ENTER key.

5. Select the **Restore** button with the rotary knob
6. Start the recovery with the ENTER key
   The script which is performed during recovery is displayed.
   After the recovery the instrument is shut down and switched off.

Recover Factory Default

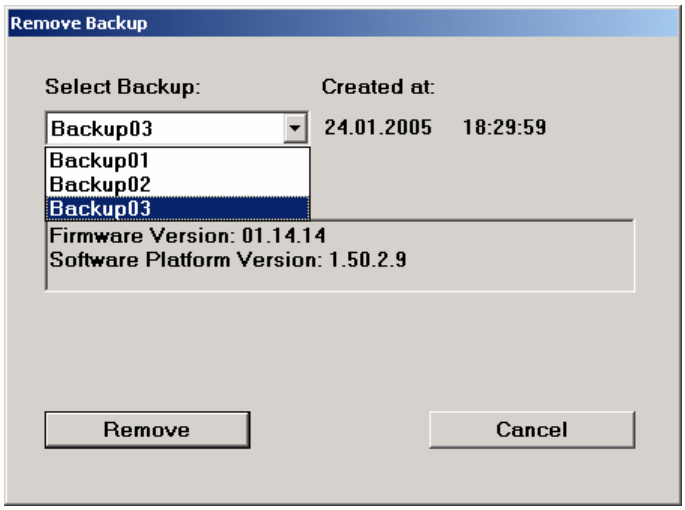
1. Select the **Factory Default** button in the **Windows XP Recovery and Backup Partition** menu with the rotary knob to recover the factory version of the system partition.
2. Open the **Factory Default** menu with the ENTER key.
   The menu shows the versions of the firmware and the software platform on delivery.

7. Select the **Restore now** button with the rotary knob.
8. Start the recovery with the ENTER key
   The script which is performed during recovery is displayed.
   After the recovery the instrument is shut down and switched off.

Delete Backups

Up to five backups in addition to the factory default can be stored on the recovery partition. To provide space for new backups it might be neccessary to remove older backups. The factory default cannot be deleted.

1. Select **Remove Backup** button in the **Windows XP Recovery and Backup Partition** menu with the rotary knob to delete a selected backup.
2. Open the **Remove Backup** menu with the ENTER key
   The menu shows the versions of the firmware and the software platform of the backup displayed in the **Select Backup** window.



3. Select the **Select Backup** window with the rotary knob.
4. Select the backup to be deleted with the up/down cursor keys and the ENTER key.
5. Select the **Remove** button with the rotary knob
6. Start the deletion with the ENTER key
   After the deletion, the instrument returns to the **Remove Backup** menu as long as backups are still available. If the last backup is deleted the **Windows XP Recovery and Backup Partition** menu opens again.
7. Select the **Cancel** button with the rotary knob
8. Close the **Remove Backup** menu with the ENTER key.
   The **Windows XP Recovery and Backup Partition** menu opens.
9. Select the **Exit and Shutdown** button with the rotary knob.
10. Exit the menuand shutdown the instrument with the ENTER key.

Installing the Options

A list of all available R&S SMU options is provided in the data sheet and on the internet (www.smu200a.rohde-schwarz.com).

Hardware Options

Installation and replacement of hardware options is described in chapter 3 of this service manual.

Please also note the mounting instructions enclosed with the options. These mounting instructions can be filed at this place in the service manual and are thus easily available whenever they are required.

CAUTION

Disconnect the instrument from the mains before opening the casing. Also note the safety instructions at the beginning of this manual.

The components used in the instrument are sensitive to electrostatic discharges which is why they are to be dealt with according to the ESD regulations.

The SETUP **Installed Options** menu provides information on the already installed options.

Software Options

All available software options are already included in the latest firmware. They are ready to operate after they are enabled by means of a key code supplied with the option.

Only if the R&S SMU is equipped with an older firmware version, a firmware update prior to enabling the software option may be required. The information on the valid firmware versions for the purchased software option is provided together with the option.

The key code is to be entered into the SETUP **Install SW Option** menu.

The SETUP **Installed Options** menu provides information on the already installed options.

Contents - Chapter 5 "Documents"

Figures

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Tables

5 Documents

Spare Parts

The stock numbers necessary for ordering replacement parts and modules can be found in the component lists further down.

CAUTION **Risk of shock hazard and instrument damage**

When replacing a module please note the safety instructions and the repair instructions given in chapter 3 and at the beginning of this service manual

When shipping a module be careful to provide for sufficient mechanical and antistatical protection.

Available Power Cables

Table 5-1 List of power cables available

Stock No.	Earthed-contact connector	Preferably used in
DS 0006.7013.00	BS1363: 1967' 10 A 250 V complying with IEC 83: 1975 standard B2	Great Britain
DS 0006.7020.00	Type 12 , 10 A 250 V complying with SEV-regulation 1011.1059, standard sheet S 24 507	Switzerland
DS 0006.7036.00	Type 498/13 10 A 250 V complying with US-regulation UL 498, or with IEC 83	USA/Canada
DS 0041.4752.00	GB2099 , GB1002 10 A 250 V approvals CCC	China
DS 0041.6232.00	JIS C 8303 7A 125V AC approvals PSE (JET)	Japan
DS 0006.7107.00	Type SAA3 10 A, 250 V, complying with AS C112-1964 Ap.	Australia
DS 0025.2365.00	DIN 49 441, 10 A, 250 V, **straight** approvals VDE,ÖVE,CEBEC,KEMA,S,D,N,FI,LCIE,IMQ,UCIEE	Europe (except Switzerland)
DS 0086.4400.00	DIN 49 441, 10 A, 250 V, **angular** approvals VDE,ÖVE,CEBEC,KEMA,S,D,N,FI,LCIE,IMQ,UCIEE	

Spare Part List

Pos.-Nr. *ItemNo*	Menge *Quantity*	ME *Unit*	El.Kennz *Ref.Des.*	Benennung / Bezeichnung *Designation*	Z	Sachnummer *Stock No.*	Ersatzteil *Subst.part*	BA	VH
				ACHTUNG EGB/ATTENTION ESD *VARIANTENERKLAERUNG *EXPLANATION OF MODELS VAR02=GRUNDVARIANTE MOD02=BASIC MODEL					
10	0	S		PB BEMERKUNG NOTE Module replacement only by authorized R&S Service.		0999.9610.00		B	O
50	0	S		PB BEMERKUNG NOTE SMU Spareparts A100...A400		0999.9610.00		B	O
100	1	S	A100	ED MOTHERBOARD SMU MOTHERBOARD SMU Bis TAZ / Until C.I. < 23.00 SMU *** Beachte / Note! Funktioniert nur in Verbindung mit / Function only with FMR6/1+ 1091.2808.00 und / and DAC-Interface 1141.4308.02 DAC-Board 1141.8090.02	Z	1141.3501.02	X	M	
150	0	S	A100	ED MOTHERBOARD F. SMU/SMJ MOTHERBOARD F. SMU/SMJ Ab TAZ / From C.I. 23.00 (2005-05) Bis TAZ / Until C.I. < 28.00 SMU ********** Beachte / Note: Nicht 1:1 kompatibel! Not 1:1 compatible! Ersatz durch / Replacement through 1141.3653.07 (A100) und / and 1091.3104.00 (A201 FMR7/3) 1141.3160.02 (A130 USB2.0 Board) aktueller/actual A202 (HDD) 1091.3440.00 (W11 Datacable) 1091.3427.00 (W12 SATA Powercable) 1405.7249.00 (SW Recovery CD) Download Bios in Lotus Notes	Z	1141.3653.02	X	M	O
200	1	S	A100	ED MOTHERBOARD F. SMU/SMJ MOTHERBOARD F. SMU/SMJ Ab TAZ 28.00 / From C.I. 28.00 SMU (2006-03) Funktioniert nur mit / Function only with FMR7 1091.3104.00 und / and 1141.3160.02 (A130 USB2.0 Board) aktueller/actual A202 (HDD) 1091.3440.00 (W11 Data Cable) 1091.3427.00 (W12 SATA Powercable) 1405.7249.00 (SW Recovery CD) Download Bios in Lotus Notes ********** Ersatz fuer / Replacement for 1141.3653.02 Beachte / Note: Nicht 1:1 kompatibel! Not 1:1 compatible	Z	1141.3653.07	X	M	O
300	0	S	A120	ED BNC BOARD REAR BNC BOARD REAR Enthalten / Included in SMU. Ersatz durch/Replacement by 1141.2657.02	Z	1141.2670.02	X	M	
350	1	S	A120	ED BNC BOARD REAR II BNC BOARD REAR II Enthalten / Included in SMU.	Z	1141.2657.02	X	M	

Pos.-Nr. *ItemNo*	Menge *Quantity*	ME *Unit*	El.Kennz *Ref.Des.*	Benennung / Bezeichnung *Designation*	Z	Sachnummer *Stock No.*	Ersatzteil *Subst.part*	BA	VH
				Ersatz von/Replacement from 1141.2670.02					
400	0	S	A130	ED USB 1.1 ADAPTER USB 1.1 ADAPTER Enthalten / Included in SMU. Funktioniert nur mit / Function only with FMR6/* Bis TAZ / Until C.I. < 28.00 SMU Ersatz durch / Replacement through 1141.3160.02	Z	1141.3201.02	X	M	
450	1	S	A130	ED 2X SINGLE USB2.0 BOARD USB 2.0 BOARD Funktioniert nur mit / Function only with A201 (FMR7) 1091.3104.00, additional actual A202, W11, W12, SW Recovery CD, Bios Ersatz fuer / Replacement for 1141.3201.02	Z	1141.3160.02	X	M	
500	1	S	A200	ZM DISPLAYEINHEIT SM./AMU DISPLAY UNIT SM./AMU Enthalten / Included in SMU.	Z	1141.2405.02	X	M	
600	0	S	A201	GR FMR6/2 FRONT MOD. CONTROLLER Enthalten / Included in SMU. Bis TAZ < 14.00 / Until C.I. < 14.00		1091.2750.00	X	B	A
650	0	S	A201	GR FMR6/1+ FRONTMOD. CONTR. 6/1+ Enthalten / Included in SMU Ab TAZ / From C.I. 14.00 Bis TAZ / Until C.I. < 17.00 Ersatz durch / Replacement through 1091.2814.00		1091.2808.00	X	B	A
700	0	S	A201	GR FMR6/1+ FRONTMOD.CONTR.6/1+ Enthalten / Included in SMU. Ab TAZ / From C.I. 17.00 Bis TAZ / Until C.I. < 28.00		1091.2814.00	X	B	A
750	1	S	A201	GR FMR7/3 FRONTMODUL CONTR. 7/3 Enthalten / Included in SMU. Funktioniert nur mit / Function only with Motherboard 1141.3653.07 und aktueller / and actual A202 HDD + W11, W12 und/and A130 + SW Recovery CD + Bios Ab TAZ / From C.I. 28.00 SMU Beachte / Note remarks A100		1091.3104.00	X	B	A
900	0	S	A202	GP HDD 2.5 INCH 20GB 2.5 HARDDISK 20 GB Enthalten / Included in SMU. Bis TAZ / Until C.I. < 10.00 Nur fuer / Only for FMR 6/2 1091.2750.00 ********** Beachte / Note: SW Recovery CD 1405.7161.00 notwendig / needed !		0041.5071.00	X	B	N
950	0	S	A202	GP HDD 2.5 INCH 30GB 2.5 HARDD. 30GB Enthalten / Included in SMU. Nur fuer / Only for FMR6/1+ 1091.2808.00 Ab TAZ / From C.I. >= 10.00 ********** Beachte / Note: SW Recovery CD 1405.7161.00 notwendig / needed !		0041.5807.00	X	B	N
1000	0	S	A202	ZE HARDD. INCL. XP-IMAGE HARDD. INCL. XP-IMAGE	Z	1141.6517.00	X	M	

Pos.-Nr. *ItemNo*	Menge *Quantity*	ME *Unit*	El.Kennz *Ref.Des.*	Benennung / Bezeichnung *Designation*	Z	Sachnummer *Stock No.*	Ersatzteil *Subst.part*	BA	VH
				Enthalten / Included in SMU. Funktioniert nur mit / Function only with FMR6/2 1091.2750.00 1091.2750.00 ********** Beachte / Note: SW Recovery CD 1405.7161.00 notwendig / needed !					
1050	0	S	A202	GP HDD 2.5 INCH SATA 40GB MHV2040BH Funktioniert nur mit / Function only with FMR7/3 1091.3104.00 Bis TAZ / Until C.I. 33.00 SMU Ersatz durch / Replacement through 3583.1503.00		1161.7925.00	X	B	A
1100	0	S	A202	GP HDD 2.5 SATA 40GB MHW2040BH HDD 2.5 SATA 40GB MHW2040BH Funktioniert nur mit / Function only with FMR7/3 1091.3104.00 Bis TAZ / Until C.I. 44.00 SMU Ersatz fuer / Replacement for 1161.7925.00		3583.1503.00	X	B	N
1150	1	S	A202	GP HDD 2.5 SATA 80GB MHZ2080BH HDD 2.5 SATA 80GB MHZ2080BH Funktioniert nur mit / Function only with FMR7/3 1091.3104.00 Ab TAZ / From C.I. 45.00 SMU Ersatz fuer / Replacement for 3583.1503.00		3583.1855.00	X	B	O
1300	0	S	A210	BP TFT 8.4 SVGA DRGB CCFL 8.4 COLOR TFT Enthalten / Included in SMU.		0048.8599.00	X	B	A
1350	0	S	A340	EE DAC INTERFACE DAC INTERFACE Enthalten / Included in SMU. Funktioniert nur in Verbindung mit / Function only with Motherboard 1141.3501.02 und / and DAC-Board 1141.8090.02 Bis TAZ / Until C.I. < 23.00 SMU Ersatz durch / Replacement through 1141.4408.02	Z	1141.4308.02	X	M	
1360	1	S	A340	EE DAC INTERFACE DAC INTERFACE Enthalten / Included in SMU Funktioniert nur in Verbindung mit / Function only with Motherboard 1141.3653.02 und / and DAC-Board 1141.8190.02 Ab TAZ / From C.I. 23.00 (2005-06) Ersatz von / Replacement from 1141.4308.02	Z	1141.4408.02	X	M	
1370	0	S		GR DISPL.VERB.FMR6-TOSHIB DISPL.CONNECT FMR6-TOSHIBA Enthalten / Included in SMU.		1091.2637.00	X	B	A
1380	0	S		SF SCHALTMATTE 52T SMU SWITCH-BOARD Enthalten / Included in SMU.	Z	1141.2528.00	X	B	V
1390	0	S		SF SCHALTFOLIE 52T SMU FLEX.SWITCH BOARD Enthalten / Included in SMU.		1141.2511.00	X	B	V
1400	1	S	A400	GJ SCHALTNETZT. AC90-264V SWITCHING POWER SUPPLY Enthalten / Included in SMU.		1142.4918.00	X	B	V
1500	0	S		PB BEMERKUNG NOTE Sparparts SMU e.g. Cables...		0999.9610.00		B	O
1600	0	S	T10	BP VNR-08C351-INV DC/AC-INVERTER		0048.8760.00	X	B	B

Pos.-Nr. *ItemNo*	Menge *Quantity*	ME *Unit*	El.Kennz *Ref.Des.*	Benennung / Bezeichnung *Designation*	Z	Sachnummer *Stock No.*	Ersatzteil *Subst.part*	BA	VH
				CCFL BACKLIGHT INVERTER Enthalten / Included in SMU.					
1650	0	S	B10	EM DREHIMPULSGEBER ROTARY PULSE ENCODER Enthalten / Included in SMU		0852.1170.00	X	B	A
1700	1	S		KB Fronthaube SMU (bedr.) KB Frontcover SMU (labelled) Enthalten / Included in SMU.	Z	1141.2311.00	X	M	
1750	1	S		ZM BW2-TUBUS 4E1/1T450 EMU TUBUS 4UNITS Enthalten / Included in SMU.	Z	1129.9410.00	X	M	
1800	1	S	E1 E2	ZM LUEFTEREINHEIT FAN UNIT Enthalten / Included in SMU.	Z	1141.2740.00	X	M	
1850	1	S	E3	ZM LUEFTEREINHEIT 2 FAN UNIT 2 Enthalten / Included in SMU.	Z	1141.2763.00	X	M	
1900	0	S	X9	DX USB SENSOR KABEL USB SENSOR CABLE Enthalten / Included in SMU. eingebaut bis TAZ 39.00 Beachte/Note: Passend für alle Durchbrüche / fit for all panels! *** Ersatz durch / replacement through 1144.0103.03	Z	1144.0103.02	X	M	
1950	1	S	X9	DX USB SENSOR KABEL USB SENSOR CABLE Enthalten / Included in SMU. eingebaut ab TAZ 40.00 *** Ersatz von / Replacement of 1144.0103.02	Z	1144.0103.03	X	M	
2500	0	S		PB BEMERKUNG NOTE Spareparts Options SMU-Bxx A110...A2300		0999.9610.00		B	O
2650	1	S	A110	ED BNC BOARD REAR2 BNC BOARD REAR2 Enthalten / Included in SMU-B81.	Z	1141.2634.02	X	M	
2700	1	S	A261	EE LEVEL CONTROL MODULE LEVEL CONTROL MODULE Enthalten / Included in SMU-B10x, SMU-B20x	Z	1141.3260.02	X	M	
2750	1	S	A262	EE RADIO FREQUENCY MODULE RADIO FREQUENCY MODULE Enthalten / Included in SMU-B10x, SMU-B20x	Z	1141.3101.02	X	M	
2800	1	S	A500	EE UNIVERSALCODER UNIVERSALCODER Enthalten / Included in SMU-B10.	Z	1141.7107.02	X	M	
2850	1	S	A520	EE FADING SIMULATOR FADING SIMULATOR Enthalten / Included in SMU-B14.	Z	1160.1852.02	X	M	
2900	0	S	A525	ED PATH EXTENTION SECTION PATH EXTENTION SECTION Enthalten / Included in SMU-B15. Ersatz durch / Replacement through 1160.1852.02 und / and 1160.2013.02	Z	1160.2313.02	X	M	

Pos.-Nr. *ItemNo*	Menge *Quantity*	ME *Unit*	El.Kennz *Ref.Des.*	Benennung / Bezeichnung *Designation*	Z	Sachnummer *Stock No.*	Ersatzteil *Subst.part*	BA	VH
2950	1	S	A525	EE FADING SIMULATOR FADING SIMULATOR Enthalten / Included in SMU-B15. Ersatz von / Replacement from 1160.2313.02 und / and 1142.3163.02	Z	1160.1852.02	X	M	
3000	0	S	A580	ED DAC-BOARD DAC-BOARD Enthalten / Included in SMU-B13 Funktioniert nur in Verbindung mit / Function only with Motherboard 1141.3501.02 und / and DAC-Interface 1141.4308.02 Bis TAZ / Until C.I. < 23.00 SMU Ersatz durch / Replacement through 1141.8190.02	Z	1141.8090.02	X	M	
3050	1	S	A580	ED DAC-BOARD DAC-BOARD Enthalten / Included in SMU-B13 Funktioniert nur in Verbindung mit / Function only with Motherboard 1141.3501.02 und / and DAC-Interface 1141.4408.02 Ab TAZ / From C.I. 23.00 (2005-06)	Z	1141.8190.02	X	M	
3100	1	S	A620	EE BBIN-S BBIN-S Enthalten / Included in SMU-B17.	Z	1142.3011.02	X	M	
3140	0	S	A640	EE IQ BRUECKE IO BRIDGE Enthalten / Included in SMU-B15. Ersatz durch / Replacement through 1160.1852.02 und / and 1160.2013.02	Z	1142.3163.02	X	M	
3150	1	S	A640	EE IQ BRUECKE IO BRIDGE Enthalten / Included in SMU-B17.	Z	1142.3163.02	X	M	
3180	1	S	A650	EE BBOUT-R BBOUT-R Enthalten in/Included in SMU-B18 Ab TAZ/FROM C.I. 38.00 SMU	Z	1159.7009.02	X	M	
3200	0	S	A700	EE SYNTHESE ERWEITERUNG SYNTHESIS EXTENSION Enthalten / Included in SMU-B20 *** Ersatz durch / Replacement by 1142.0270.06 ab / from 2009-02	Z	1142.0070.06	X	M	O
3250	1	S	A700	EE SYNTHESE ERWEITERUNG SYNTHESIS EXTENSION Enthalten / Included in SMU-B20 *** Ersatz von / Replacement from 1142.0070.06 ab / from 2009-02	Z	1142.0270.06	X	M	
3300	1	S	A700	EE SYNTHESE ERWEITERUNG SYNTHESIS EXTENSION Enhalten / Included in SMU-B22	Z	1142.0070.02	X	M	
3350	1	S	A800	ED LO SYNC BOARD LO SYNC BOARD Enthalten in/Included in SMU-B90 Ab TAZ/FROM C.I. > 38 SMU	Z	1409.8640.02	X	M	
3400	1	S	A1240	EE STANDARD SYNTHESE STANDARD SYNTHESE Enthalten / Include in SMU-B10x.	Z	1141.4208.02	X	M	
3450	1	S	A1280	EE IQ-AUSGANGSTEIL 6GHz IQ OUTPUT MODULE 6GHz Enthalten / Included in SMU-B104 / -B106.	Z	1141.4450.02	X	M	
3500	1	S	A1300	ED ELEK.EICHLEITUNG 3 GHz	Z	1141.3601.02	X	M	

Pos.-Nr. *ItemNo*	Menge *Quantity*	ME *Unit*	El.Kennz *Ref.Des.*	Benennung / Bezeichnung *Designation*	Z	Sachnummer *Stock No.*	Ersatzteil *Subst.part*	BA	VH
				ELECTR.ATTENUATOR 3 GH Enthalten in/Included in SMU-B102/-B103 Bis / Until 2007-10 SMU F-Nr. <103000 ********** Beachte / Note: Nicht kompatibel, Original ist notwendig! Not compatible, original neccessary!					
3550	1	S	A1300	ED STEP ATTENUATOR CMOS STEP ATTENUATOR CMOS Enthalten in/Included in SMU-B102/-B103 Ab / From 2007-11 SMU F-Nr. >103000 ********** Beachte / Note: Nicht kompatibel, Original ist notwendig! Not compatible, original neccessary!	Z	1400.3400.16	X	M	
3600	1	S	A1300 A2300	ED STEP ATTENUATOR CMOS STEP ATTENUATOR CMOS Enthalten in/Included in SMU-B31/-B36 Ab / From 2006-01 SMU F-Nr. >103000 ********** Beachte / Note: Nicht kompatibel, Original ist notwendig! Not compatible, original neccessary!	Z	1400.3400.06	X	M	
3650	1	S	A1320	ED ELEK.EICHLEITUNG6.0GHZ ELECTR. ATTENUATOR Enthalten in/Included in SMU-B104/-B106 Bis / Until 2007-10 SMU F-Nr. <103000 ********** Beachte / Note: Nicht kompatibel, Original ist notwendig! Not compatible, original neccessary!	Z	1141.3901.02	X	M	
3700	1	S	A1320	ED STEP ATTENUATOR CMOS STEP ATTENUATOR CMOS Enthalten in/Included in SMU-B104/-B106 Ab / From 2006-01 SMU F-Nr. >103000 ********** Beachte / Note: Nicht kompatibel, Original ist notwendig! Not compatible, original neccessary!	Z	1400.3400.16	X	M	
3750	1	S	A1525	EE FADER BRIDGE FADER BRIDGE Enthalten / Included in SMU-B15. Ersatz von / Replacement from 1160.2313.02 und / and 1142.3163.02	Z	1160.2013.02	X	M	O
3800	0	S	A1815 A2815	ED RELAIS CONTROL RELAIS CONTROL Enthalten / Included in SMU-B3x. Ersatz durch / Replacement by 1159.7544.03	Z	1159.7544.02	X	M	
3850	1	S	A1815 A2815	ED RELAIS CONTROL RELAIS CONTROL Enthalten / Included in SMU-B3x. Ersatz von / Replacement from 1159.7544.02	Z	1159.7544.03	X	M	O
3900	1	S	A2240	EE STANDARD SYNTHESE STANDARD SYNTHESE Enthalten / Included in SMU-B20x.	Z	1141.4208.04	X	M	
3950	1	S	A2300	ED ELEK.EICHLEITUNG 3 GHz	Z	1141.3601.02	X	M	

Pos.-Nr. *ItemNo*	Menge *Quantity*	ME *Unit*	El.Kennz *Ref.Des.*	Benennung / Bezeichnung *Designation*	Z	Sachnummer *Stock No.*	Ersatzteil *Subst.part*	BA	VH
				ELECTR.ATTENUATOR 3 GH Enthalten in/Included in SMU-B202/-B203 Bis / Until 2007-10 SMU F-Nr. <103000 ********** Beachte / Note: Nicht kompatibel, Original ist notwendig! Not compatible, original neccessary!					
4000	1	S	A2300	ED STEP ATTENUATOR CMOS STEP ATTENUATOR CMOS Enthalten in/Included in SMU-B203 Ab / From 2008-01 SMU F-Nr. >103000 ********** Beachte / Note: Nicht kompatibel, Original ist notwendig! Not compatible, original neccessary!	Z	1400.3400.16	X	M	
4150	0	S	K1820 K2820	SH KOAXREL. SMA 12V BISTA RELAY Enthalten / Included in SMU-B3x. Ersatz/Replacement by 1400.5802.02		1130.1254.00	X	B	T
4200	1	S	K1825 K2825	ED Koax Relais geschirmt COAX RELAY SHIELDED Enthalten / Included in SMU-B3x. Ersatz von / Replacement from 1130.1254.00	Z	1400.5802.02	X	M	O

Mechanical Drawings

Projektionsmethode
Projection Method

Montage Teilfrontplatte
Installation of front panel section

KABEL W222 (1141.5962.00)
GELOETET AN FOLGENDE BUCHSEN
CABLE W222 SOLDERED TO THE FOLLOWING SOCKETS

Adern 8,10 (Masse)
geloetet an
Lines 8,10 (ground)
soldered to
FJ 0099.5768.00

Ader 9 (TRIGGER 1)
geloetet an
Line 9 (TRIGGER 1)
soldered to
FJ 0099.9186.00

Adern 5,7 (Masse)
geloetet an
Lines 5,7 (ground)
soldered to
FJ 0099.5768.00

Ader 6 (MARKER 2)
geloetet an
Line 6 (MARKER 2)
soldered to
FJ 0099.9186.00

Adern 2,4 (Masse)
geloetet an
Lines 2,4 (ground)
soldered to
FJ 0099.5786.00

Ader 3 (MARKER 1)
geloetet an
Line 3 (MARKER 1)
soldered to
FJ 0099.9186.00

W1264 (1141.5633.00)
W1263 (1141.5627.00)

DX 1144.0103.02
(Markierung oben)
(Marking on the top)

MZ 1141.2334.00
VS 1148.3288.00 (3x)

MZ 1402.4449.00

1143.8881.00 (2x)
Feder mittig in
Durchbruch geklebt
Spring centered and
glued into opening

W130 (1161.5474.00)
wird erst beim Einbau
ins Geraet gesteckt
not inserted into the unit
until the installation

A130

VS 1148.3059.00 (3x)

W218 (1141.5640.00)

W219 (1141.5656.00)

VS 1148.3288.00 (3x)

Montage Teilrueckwand
Installation of rear panel section

KB 1141.2570.00
W380 (1141.5685.00)
W381 (1141.5691.00)
MP 0009.9217.00 (4x)

W217 (1141.5979.00)
W1246 (1141.5879.00)
Bestandteil/*part of*
B102-B106
W1245 (1141.5862.00)
Bestandteil/*part of*
B102-B106

0099.0020.00
ueber W402 und W403 gewickelt
wrapped over W402 and W403
W402 sw /*blk*
W403 bl /*blu*

W401 (1141.5527.00) gn/ge
grn/yel
Kabel gesteckt
an Laengswand
Connect cable to
longitudinal partition

A400 (1142.4918.00)

W237
DX 1141.3560.00
(geschraubt ans
Netzteil)
(screwed to
power supply)
gesteckt auf
Conneceted to
A100-X237
(Motherboard)

3.6V
5.2V
W413 −
W412 +
W411 −
W410 +

W413
W411
W412
W410

Kabel W411,W412
W413 und W414
im Bereich des
Durchbruchs
herausfuehren.
Diese Kabel mit
DZ 0015.9038.00
zusammenbinden.
Bring out cables W411,
W412,W413 and W414 through
the opening.
Tie these cables with
DZ 0015.9038.00.

W239
1141.5956.00
gesteckt auf A100-X239
Connected to A100-X239

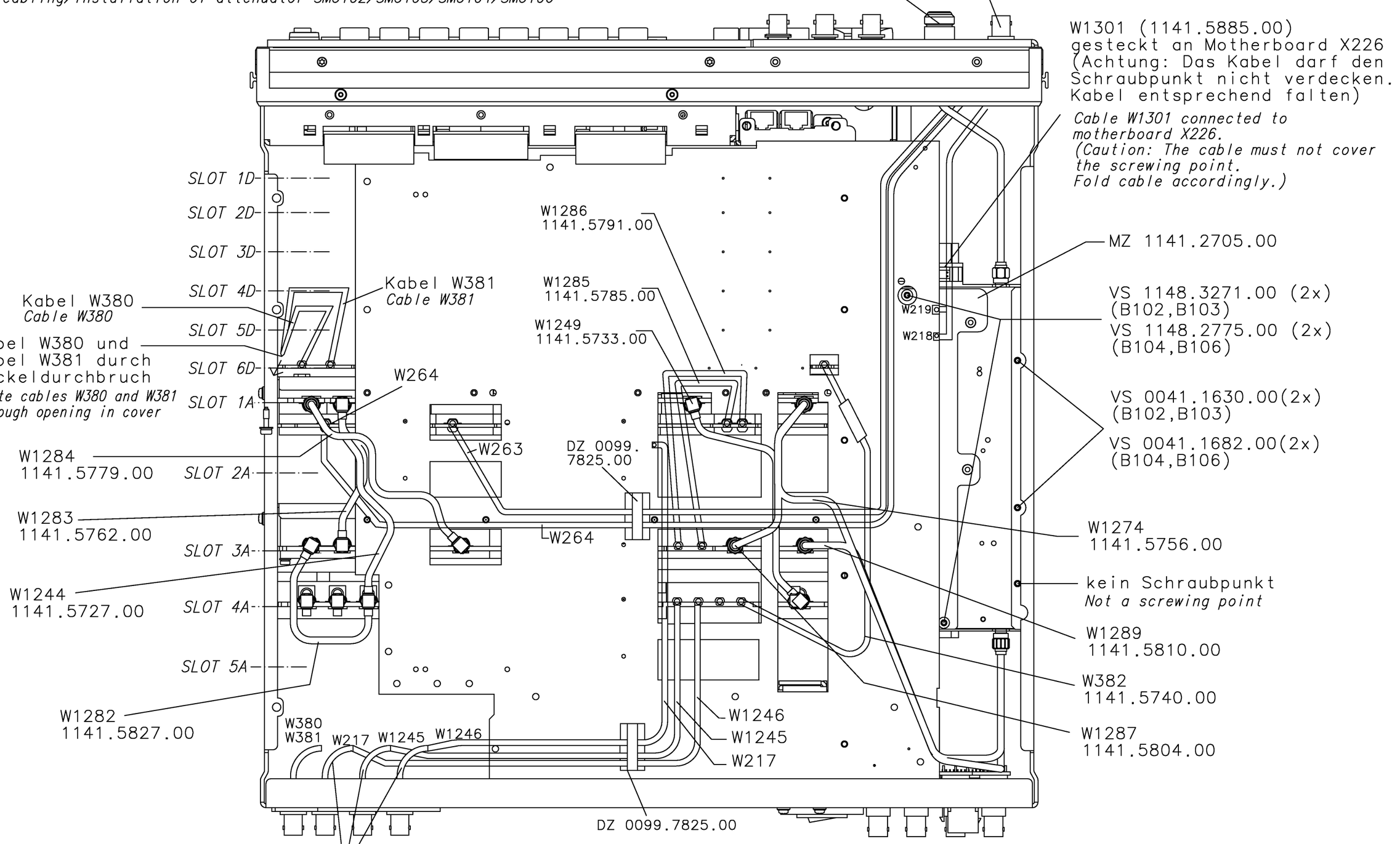
W237
(Abstand zwischen Blech
und Kabel 5-10mm)
(metal sheet and cable
spaced 5 to 10 mm)
DZ 0015.9038.00
(Kabelbinder vor Stecker)
(cable tie in front of connector)

DZ 0275.3109.00
VS 1148.2652.00

Maßstab / Scale	Toleranz / Tol.	Werkstoff / Material			
ROHDE&SCHWARZ	Benennung / Designation: SMU200A SIGNALGENERATOR VECTOR SIG. GENERARTOR			Sprache / Lang.: de en	Aei. / C.I.: 07.00
	Datum / Date: 2007-08-21	Abteilung / Dept.: MENZ	Name / Name: WU	Zeichn.Nr. / Drawing No.: 1141.2005.01	Blatt / Sh.: 2 D

Grundverkabelung SMU200A und HF-Verkabelung/Eichleitungseinbau SMU102/SMU103/SMU104/SMU106

Basic cabling of SMU200A and RF cabling/installation of attenuator SMU102/SMU103/SMU104/SMU106



Diese Kabel muessen zwischen W410,411,412,413 und W239 durchgefuehrt werden.

Route these cables between W410, 411, 412, 413, and W239

Projektionsmethode
Projection Method

Maßstab / *Scale*	Toleranz / *Tol.*	Werkstoff / *Material*	
ROHDE&SCHWARZ	Benennung / *Designation*: SMU200A SIGNALGENERATOR VECTOR SIG. GENERARTOR	Sprache / *Lang.*: de en; Aei. / *C.I.*: 02.00; Blatt / *Sh.*: 4	
	Datum / *Date*: 08.10.2003; Abteilung / *Dept.*: 1GPK; Name / *Name*: FI	Zeichn.Nr. / *Drawing No.*: 1141.2005.01	D

Nicht dargestellt:
BW2-Tubus 4E1/1T450
1166.1760.00

Not shown:
BW2 enclosure 4HU1/1D450
1166.1760.00

je nach Option
depending on option
A2240
A1280
A1260
A2260

Slot 5A oder /*or* 1141.2563.00
Slot 4A, A1240
Slot 3A
Slot 2A
Slot 1A
A261 A262

A400
(4x 1148.2652.00)

Achtung! Vor Einbau von A290 oder A300 muss Schirmblech 1141.2392.00 montiert werden, immer auf der letzten Baugruppe vor dem Netzteil.
Caution! Affix shielding plate 1141.2392.00 to the last module in front ofthe power supply before installing A290 or A300

0396.5518.00 (3x)
0031.5185.00 (3x)
1148.2775.00 (3x)

1141.2770.00
(1x 1148.3059.00)
Haube nach Einbau des Netzteiles ueber das Netzfilter geschoben und mit Schraube an der Laengswand befestigt
After installing power supply, push cover over the power filter and screw it in place on the longitudinal wall

A580
A202

Slot 6D A340
Slot 5D (1141.2563.00)
Slot 5D
Slot 4D
Slot 3D
Slot 2D
Slot 1D
A620

je nach Option
depending on option
A500
A520,525
A640

1141.2634.02 fuer Rackeinbau
oder 3x 0344.4591.00 (Abdeckung)
je nach Option
1141.2634.00 for rack mounting or 3 pc 0344.4591.00 (spare plate) depending on option

A120

A201
(11x 1148.3059.00)

A200
1141.2511.00
1141.2528.00
1141.2311.00

A2300

A100
Von unten eingeschwenkt und befestigt
insert module from below and fasten in place

1141.2705.00
Muss vor dem Motherboard eingebaut werden, montiert an Laengswand mit 2x 0041.1569.00
Must be affixed to longitudinal wall with 2x 0041.1569.00 before installing motherboard

W1300
W2300

E2
gesteckt
plugged in

A1815
A2815

E1
gesteckt
plugged in

SMU-B30/B31/B32
je nach Option
depending on option

A1300 / A1320
je nach Option
depending on option

Frequenzschild
Frequ.label
B102, B103, B104, B106

SMU-B35/B36/B37
je nach Option
depending on option

K1820/K1825/K2820/K2825
Koaxrelais 1130.1254.00

Projektions-methode
Projection Method

Maßstab *Scale*	Toleranz *Tol.*	Werkstoff *Material*			
ROHDE&SCHWARZ	Benennung / *Designation* SMU200A SIGNALGENERATOR VECTOR SIG. GENERARTOR			Sprache / *Lang.* de en	Aei. / *C.I.* 02.00	Blatt / *Sh.* 6
				Zeichn.Nr. / *Drawing No.* 1141.2005.01		D
	Datum *Date* 15.07.2003	Abteilung *Dept.* 1ZKS	Name *Name* UI			

Pos.-Nr. *ItemNo*	Menge *Quantity*	ME *Unit*	El.Kennz *Ref.Des.*	Benennung / Bezeichnung *Designation*	Z	Sachnummer *Stock No.*	Ersatzteil *Subst.part*	BA	VH
				ACHTUNG EGB/ATTENTION ESD *VARIANTENERKLAERUNG *EXPLANATION OF MODELS VAR02=GRUNDVARIANTE MOD02=BASIC MODEL					
200	1	S		ZM RAHMEN SMU FRAME SMU	Z	1141.2105.04		M	
305	1	S	A100	ED MOTHERBOARD F. SMU/SMJ MOTHERBOARD F. SMU/SMJ Ab TAZ / From C.I. 06.00	Z	1141.3653.07	X	M	O
307	1	S		VS 6900/ISR-M2.5X10-A2 COMBINATION SCREWS		0041.1660.00		B	T
310	8	S		VS 6900/ISR-M2.5X6-A2 COMBINATION SCREWS		1148.3059.00		B	T
320	2	S		FM VERRIEGELUNGSBOLZEN M3 LOCKING SCREW		0009.6501.00		B	O
330	2	S		FM VERRIEGEL.BOLZEN H=4.5 LOCKINSCREW		1093.9180.00		B	O
340	2	S		VS ZYL. 2-56UNCX 1/8 ZOLL A1 SCREW		0645.8235.00		B	V
350	3	S		DZ FLBDK.HALTER 25/13 FLAT CABLE HOLDER		0099.7825.00		B	O
390	1	S	A120	ED BNC BOARD REAR II BNC BOARD REAR II	Z	1141.2657.02	X	M	
400	1	S	W120	DY FLACHBANDKABEL W120 CABLE W120	Z	1141.5662.00		M	
505	1	S	A201	GR FMR7/3 FRONTMODUL CONTR. 7/3		1091.3104.00	X	B	A
520	10	S		VS 6900/ISR-M2.5X6-A2 COMBINATION SCREWS		1148.3059.00		B	T
530	1	S	W210	DG PATCHKABEL KAT6. 0.5M PATCHCABLE CAT.6. 0.5M		0041.9283.00		B	T
540	1	S	X210	FT EINBAUADAPTER 8P.GER 2XRJ45 COUPLER JACK STRAIGHT		1093.9122.00		B	O
590	2	S		EK STECKFED.Z-FORM 6FED. SEALING SPRING		0032.5337.00		M	V
595	1	S		EK STECKFED.Z-FORM 10FED. SEALING SPRING		0032.5372.00		M	V
600	1	S		ZM DISPLAYEINHEIT DISPLAY UNIT	Z	1141.2405.02		M	
700	4	S		VS 965/ISR-M2.5X6-A4-PA 965/ISR-M2.5X6-A4-PA		1148.3288.00		B	T
710	1	S		MP TASTATURRAHMEN SMU FRAME FOR KEYBOARD SMU		1141.2505.00		B	V
720	1	S		SF SCHALTFOLIE 52T SMU FLEX.SWITCH BOARD		1141.2511.00		B	V
730	1	S		SF SCHALTMATTE 52T SMU SWITCH-BOARD	Z	1141.2528.00		B	V
740	1	S		OK DREH.RD28 ACHS-RD6 KNOB		0852.1086.00		B	V

Pos.-Nr. *ItemNo*	Menge *Quantity*	ME *Unit*	El.Kennz *Ref.Des.*	Benennung / Bezeichnung *Designation*	Z	Sachnummer *Stock No.*	Ersatzteil *Subst.part*	BA	VH
750	14	S		VS 965/ISR-M2X6-A4-PA 965/ISR-M2X6-A4-PA		0041.1599.00		B	O
850	1	S		MZ DISK-HALTERUNG MZ DISK-MOUNT	Z	1093.4837.00		M	
865	1	S	A202	GP HDD 2.5 SATA 40GB MHW2040BH HDD 2.5 SATA 40GB MHW2040BH		3583.1503.00	X	B	N
870	3	S		VS 965/ISR-M3X5-A4-PA SCREW		1148.2775.00		B	O
880	2	S		VS 965/ISR-M2.5X6-A4-PA 965/ISR-M2.5X6-A4-PA		1148.3288.00		B	T
892	1	S	W11	DG SATA DATENKABEL 265 SATA DATACABLE 265	Z	1091.3440.00		B	O
895	1	S	W12	DF SATA VERSORGUNGSKABEL 285 SATA POWERCABLE 285		1091.3427.00		B	O
900	1	S	A400	GJ SCHALTNETZT. AC90-264V SWITCHING POWER SUPPLY		1142.4918.00	X	B	V
905	4	S		VS 7985/ISR-M4X8-A4-PA 7985/ISR-M4X8-A4-PA		1148.2652.00		B	T
910	1	S	W401	DX KABEL W401 CABLE W401	Z	1141.5527.00		M	
925	.1	M		DZ SPIRALBAND RD1.5BIS12 HELICAL TAPE		0099.0020.00		B	O
930	1	S	W410	DX KABEL W410 CABLE W410	Z	1141.5585.00		M	
935	1	S	W411	DX KABEL W411 CABLE W411	Z	1141.5591.00		M	
940	1	S	W412	DX KABEL W412 CABLE W412	Z	1141.5604.00		M	
945	1	S	W413	DX KABEL W413 CABLE W413	Z	1141.5610.00		M	
950	4	S		VS 6900-M4.0X8 -A2 COMBINATION SCREWS		0071.6860.00		B	V
960	1	S	W237	DX Kabel W237 Cable W237	Z	1141.3560.00		M	
970	1	S	W239	DY KABEL W239 DY CABLE W239	Z	1141.5956.00		M	
980	1	S		DZ KABELBINDER L 150MM CABLETIE		0275.3109.00		B	O
983	1	S		VS 7985/ISR-M4X8-A4-PA 7985/ISR-M4X8-A4-PA		1148.2652.00		B	T
988	10	S		DZ KABELBI.RD 1 BIS 25 B2 CABLETIE		0015.9038.00		B	O
990	.2	M		WT KTSCH.PROF PVC-W SW		0298.1477.00		B	O
995	1	S		MZ ABDECKUNG COVER		1141.2770.00		M	
1100	1	S	A340	EE DAC INTERFACE DAC INTERFACE	Z	1141.4408.02	X	M	
1150	1	S		MZ LUFTLEITBLECH 2 MZ AIRBAFFLE 2	Z	1141.2563.00		M	
1300	1	S		MZ TEILMONTAGEPLATTE SMU	Z	1141.2334.00		M	

Pos.-Nr. *ItemNo*	Menge *Quantity*	ME *Unit*	El.Kennz *Ref.Des.*	Benennung / Bezeichnung *Designation*	Z	Sachnummer *Stock No.*	Ersatzteil *Subst.part*	BA	VH
				MZ MOUNTINGPLATE SMU					
1314	3	S	X55 X56 X57	FJ EINBAUBUCHSE SYST.BNC BNC-CONNECTOR UG 625CIU		0099.9186.00		B	O
1316	3	S		FJ MASSELOETFAHNE F.BNC SOLDER LUG FOR BNC		0099.5768.00		B	O
1318	1	S	W222	DY Kabel W222 DY CABLE W222	Z	1141.5962.00		M	
1351	1	S	A130	ED 2X SINGLE USB2.0 BOARD USB 2.0 BOARD	Z	1141.3160.02	X	M	
1352	1	S		ZN USB WINKEL USB HOLDER	Z	1402.4449.00		M	
1354	2	S		MZ Dichtungsfeder L=12.05 MZ SEAL SPRING L=12.05	Z	1143.8881.00		M	
1356	3	S		VS 6900/ISR-M2.5X6-A2 COMBINATION SCREWS		1148.3059.00		B	T
1358	3	S		VS 965/ISR-M2.5X6-A4-PA 965/ISR-M2.5X6-A4-PA		1148.3288.00		B	T
1360	3	S		VS 965/ISR-M2.5X6-A4-PA 965/ISR-M2.5X6-A4-PA		1148.3288.00		B	T
1375	1	S	W130	DG KABEL 4X2 SCHIRM 130 CABLE		1161.5474.00		B	O
1400	1	S	W1263	DV KABEL W1263 CABLE W1263	Z	1141.5627.00		M	
1410	1	S	W1264	DV KABEL W1264 CABLE W1264	Z	1141.5633.00		M	
1420	1	S	W218	DV KABEL W218 CABLE W218	Z	1141.5640.00		M	
1430	1	S	W219	DV KABEL W219 CABLE W219	Z	1141.5656.00		M	
1440	1	S	W380	DV KABEL W380 CABLE W380	Z	1403.4936.00		M	
1450	1	S	W381	DV KABEL W381 CABLE W381	Z	1403.4942.00		M	
1460	1	S	W217	DV KABEL W217 CABLE W217	Z	1141.5979.00		M	
1470	1	S	W382	DV KABEL W382 CABLE W382	Z	1403.4920.00		M	O
1480	1	S	X9	DX USB SENSOR KABEL USB SENSOR CABLE	Z	1144.0103.02		M	
1500	1	S		KB Rueckwandplatte REARPANEL 1	Z	1141.2805.00		M	
1510	4	S		VS 6900/ISR-M2.5X6-A2 COMBINATION SCREWS		1148.3059.00		B	T
1550	1	S		KB Rueckwand REARPANEL 2	Z	1141.2570.00		M	
1560	5	S		VS 6900/ISR-M2.5X6-A2 COMBINATION SCREWS		1148.3059.00		B	T
1570	4	S		MP ABDECKK. RD11.1/9.9 COVER		0009.9217.00		B	T

Pos.-Nr. *ItemNo*	Menge *Quantity*	ME *Unit*	El.Kennz *Ref.Des.*	Benennung / Bezeichnung *Designation*	Z	Sachnummer *Stock No.*	Ersatzteil *Subst.part*	BA	VH
1600	1	S		MZ SCHIRMBLECH SHIELDING PLATE		1141.2392.00		M	
1610	3	S		VS SCHEI.RD3.1/7.2H1.8 CR WASHER		0396.5518.00		B	V
1620	3	S		VS DIN9021-B3.2-A4 PLAIN WASHER DIN 9021-B3.2		0031.5185.00		B	O
1630	3	S		VS 965/ISR-M3X5-A4-PA SCREW		1148.2775.00		B	O
1700	1	S		MZ HAUBE 1 COVER 1	Z	1141.2728.00		M	
1720	20	S		VS 965/ISR-M2.5X6-A4-PA 965/ISR-M2.5X6-A4-PA		1148.3288.00		B	T
1750	1	S		MZ HAUBE 2 COVER 2	Z	1141.2734.00		M	
1760	9	S		VS 6900/ISR-M2.5X8-A2 COMBINATION SCREWS		0041.1653.00		B	T
1770	2	S		VS 6900/ISR-M2.5X10-A2 COMBINATION SCREWS		0041.1660.00		B	T
1780	3	S		VS 965/ISR-M2.5X6-A4-PA 965/ISR-M2.5X6-A4-PA		1148.3288.00		B	T
1990	1	S		KB Fronthaube SMU (bedr.) KB Frontcover SMU (labelled)	Z	1141.2311.00		M	
2000	1	S		ZM TUBUS KOMPLETT L CASE COMPLETE	Z	1166.1760.00		M	
2010	2	S		KR BW2-FRONTGRIFF 4E FRONT HANDLE		1096.1480.00		B	T
2020	4	S		VS SCHR. M4X14-ISR-PA SCREW M4X14-ISR-PA		1096.4896.00		B	T
2060	4	S		KR BW2-RUECKWANDFUSS REAR WALL FOOT		1096.2487.00		B	O
2070	1	S		OS BW2-SCHILD F RUECKWAND BW2 LABEL F. REAR PANEL FOOT		1096.2435.00		M	O
2100	2	S		MP ABDECKKAPPE RD15.9 COVER RD 15.9		0009.9200.00		B	T
2110	3	S		MP ABDECKKAPPE RD12.7 COVER		0344.4591.00		B	O
2120	.2	S		OS EINLEGESCHILD 6X20 INSERTING SIGNS		0789.2091.00		B	B
2200	1	S		HS WINDOWS XP EMBEDDED OPERATING SYSTEM		1099.8570.00		B	T
2215	1	S		HS SW IMAGE FMR7 (BIOS/BOOTM./WIN XPE) SW IMAGE FMR7 (BIOS/BOOTM./WIN XPE)		1141.6598.00		M	
2220	1	S		HS SMU Firmware SMU Firmware		1141.6330.00		M	
2230	1	S		HS IMAGE SOFTWARE IMAGE SOFTWARE		0048.7540.00		B	O
2250	1	S		HS SW PLATTFORM SMU SW PLATFORM SMU		1141.6430.00		M	
2300	2	S		OS EGB-SCHILD 12X28		0061.1520.00		M	O

Pos.-Nr. *ItemNo*	Menge *Quantity*	ME *Unit*	El.Kennz *Ref.Des.*	Benennung / Bezeichnung *Designation*	Z	Sachnummer *Stock No.*	Ersatzteil *Subst.part*	BA	VH
				WARNING LABEL FOR ESDS					

Montage der Lueftereinheit E3 (1141.2763.00):

Vor Montagebeginn muessen die Tuellen geteilt werden.
Es muss auf jeder Seite des Blechs ein Teil der Gummituelle aufliegen. Das dickere Teil zeigt zum Luefter.
Fuer die Folgekommission werden die Bohrungen im Teil 1141.2592.00 aufgebohrt und so gestaltet, dass die Tuellen eingeschoben werden koennen.

Die Schrauben muessen so angezogen werden, dass zwischen 1141.2592.00 und 1141.2786.00 ein Spalt von 1mm entsteht.

Wichtig: Der Luefter darf nicht das Montageblech 1141.2592.00 beruehren (Resonanzen).

Installation of fan unit E3 (1141.2763.00)
Separate the bushings before starting the installation.
One part of the bushings must be at each side of the metal sheet.
The thicker end of the bushings points towards the fan.
For the subsequent job, boreholes will be made in part 1141.2592.00 so that the bushings can be inserted.
Tighten the screws such that parts 1141.2592.00 and 1141.2786.00 are spaced 1 mm.
Important: The fan must not touch metal sheet 1141.2592.00 (resonances)

Z400 (LI 1142.5443.00)
3 E 4
LINE
W408 1 2 W407

Montage: Kabel W407 und W408 auf Anschlag schieben und vorsichtig den Kontakt um 90 Grad biegen.
Installation: insert cables W407 and W408 as far as thei will go and carefully bend the contact by 90°

W407 (sw)/(black) 1141.6098.00
W408 (bl)/(blue) 1141.6100.00
L N
W404 (gn/ge)/(grn/yel) 1090.3881.00

S400
FN 1152.3320.00
SS 0020.7630.00 (2x)
VS 1141.2798.00 (2x)

Klebeschild 1141.2828.00 rechts neben S400 kleben
Affix label at the right of S400
(geklebt zwischen dieser Bohrung und der Tubusfreistanzung)
(between this borehole and the opening in iht enclosure)

MZ 1141.2811.00

VS 1148.3059.00 (3x)
DZ 0099.1410.00 (4x)
MZ 1141.2786.00
MZ 1141.2592.00
VS 0048.8218.00 (4x)
E3 (ZM 1141.2763.00)
VN 1096.4821.00(5x)
KB 1141.2111.00

VS 1148.3059.00 (2x)
MZ 1141.2292.00
VS 1148.3059.00 (3x)
MZ 1141.2286.00
MZ 1141.2305.00
VN 1096.4821.00 (5x)

VS 0041.1653.00 (2x)
W407
Z400
W408
OS 0042.5330.00 geklebt neben Schutzleiter
affix label next to protective earth
W404 (gn/ge) von S400
(grn/yel) of S400
VS 1148.2669.00
FV 0543.6705.00
VS 0016.2837.00
VS 0005.0315.00
VS 0016.4400.00
Schraubpunkt bleibt frei

VS 1148.3059.00 (2x)
VS 1148.3288.00 (3x)
VN 1096.4821.00 (3x)

VN 1096.4821.00 (3x)

MZ 1141.2270.00
MZ 1141.2240.00
VN 1096.4821.00 (6x)
MZ 1141.2386.00
VN 1096.4821.00 (2x)
VN 1096.4821.00 (2x)

Luefterkabel zeigt nach unten *Fan cable points downwards*
ZM 1141.2740.00 (E2) (Kabel nach unten) *(cable points downwards)*
VS 0041.1653.00 (4x)
Luefter blasen ins Geraet
Fans blow air into the instrument
ZM 1141.2740.00 (E1)
VS 0041.1653.00 (4x)

zusaetzliche Dichtschnur 0396.1035.00 fuer Fronthaube einlegen
Insert additional shielding seal 0396.1035.00 for front cover

Dichtschnur 0396.1035.00 einlegen (fuer Montagewanne)
Insert shielding seal 0396.1035.00 (for mounting trough)

Tuelle DZ 0099.1433.00 in Durchbruch
Insert bushing DZ 0099.1433.00 into the opening

MZ 1141.2757.00
VN 1096.4821.00 (2x)
VN 1096.4821.00

Dichtschnur 0396.1035.00 in Frontrahmen einlegen (fuer Tubus)
Insert shielding seal 0396.1035.00 in front frame (for enclosure)

MZ 1129.9290.00

Luefterkabel
Fan cable

Fix the parts with rivets in the following order:
A: 1141.2240.00 and 1141.2386.00
B: Unit A and 1141.2270.00
C: 1141.2305.00 and 1141.2757.00
D: Unit B and unit C
E: Unit D and 1129.9290.00
F: Unit E and 1141.2111.00

Nietreihenfolge:
A: 1141.2240.00 und 1141.2386.00 vernieten
B: Einheit A und 1141.2270.00 vernieten
C: 1141.2305.00 und 1141.2757.00 vernieten
D: Einheit B und Einheit C vernieten
E: Einheit D und 1129.9290.00 vernieten
F: Einheit E und 1141.2111.00 vernieten

Var 02 = Grundausfuehrung
Mod 02 = basic model

VN 1096.4821.00 (3x)

Maßstab / Scale	Toleranz / Tol.	Werkstoff / Material		
ROHDE&SCHWARZ	Benennung / Designation: RAHMEN SMU		Sprache / Lang.: de en	Aei. / C.I.: 04.00	Blatt / Sh.: 2
	Datum / Date: 08.10.2003	Abteilung / Dept.: 1GPK	Name / Name: FI	Zeichn.Nr. / Drawing No.: 1141.2105.01 D	

Projektionsmethode
Projection Method

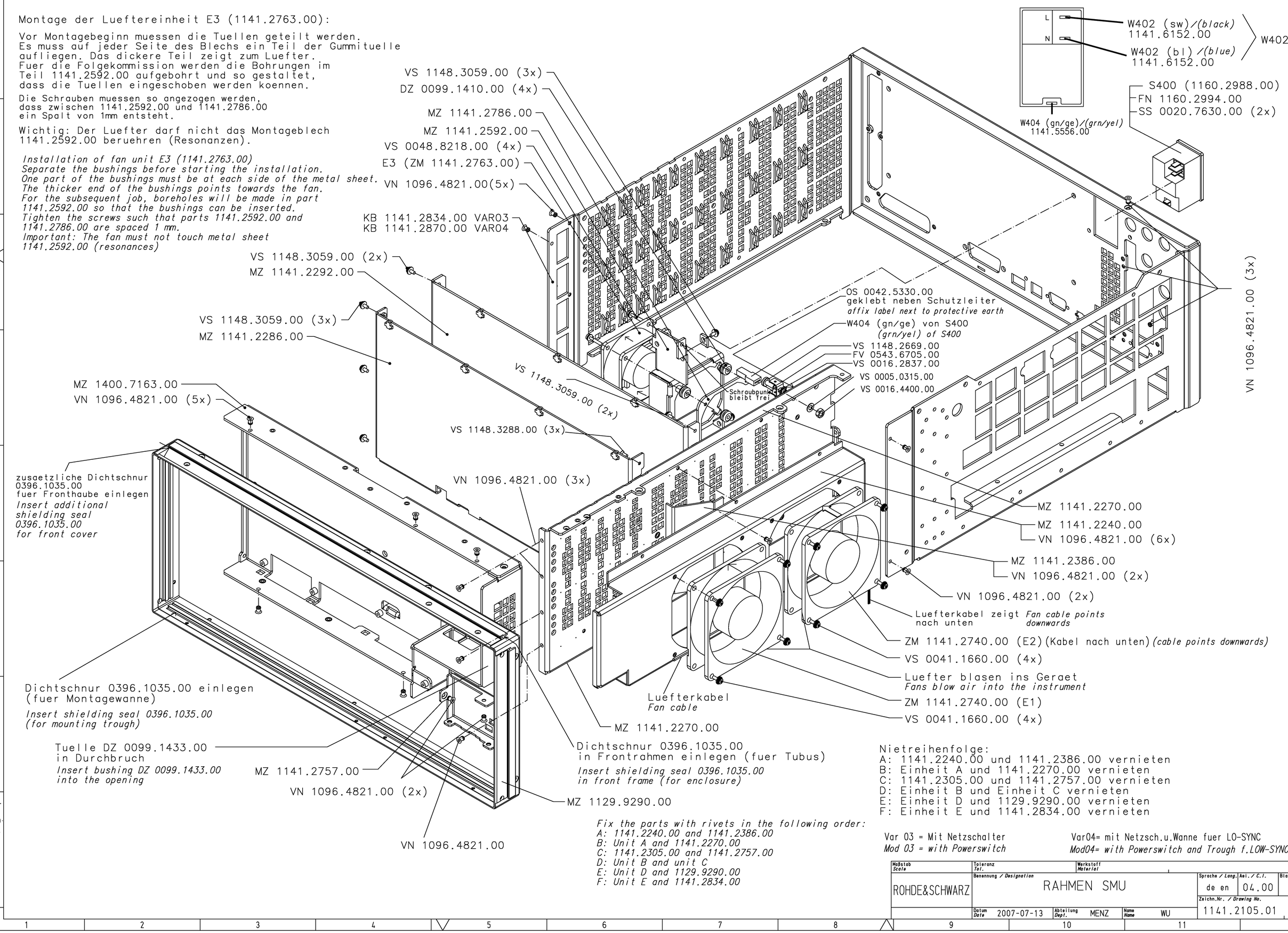
Montage der Lueftereinheit E3 (1141.2763.00):

Vor Montagebeginn muessen die Tuellen geteilt werden.
Es muss auf jeder Seite des Blechs ein Teil der Gummituelle
aufliegen. Das dickere Teil zeigt zum Luefter.
Fuer die Folgekommission werden die Bohrungen im
Teil 1141.2592.00 aufgebohrt und so gestaltet,
dass die Tuellen eingeschoben werden koennen.

Die Schrauben muessen so angezogen werden,
dass zwischen 1141.2592.00 und 1141.2786.00
ein Spalt von 1mm entsteht.

Wichtig: Der Luefter darf nicht das Montageblech
1141.2592.00 beruehren (Resonanzen).

Installation of fan unit E3 (1141.2763.00)
Separate the bushings before starting the installation.
One part of the bushings must be at each side of the metal sheet.
The thicker end of the bushings points towards the fan.
For the subsequent job, boreholes will be made in part
1141.2592.00 so that the bushings can be inserted.
Tighten the screws such that parts 1141.2592.00 and
1141.2786.00 are spaced 1 mm.
Important: The fan must not touch metal sheet
1141.2592.00 (resonances)



Fix the parts with rivets in the following order:
A: 1141.2240.00 and 1141.2386.00
B: Unit A and 1141.2270.00
C: 1141.2305.00 and 1141.2757.00
D: Unit B and unit C
E: Unit D and 1129.9290.00
F: Unit E and 1141.2834.00

Nietreihenfolge:
A: 1141.2240.00 und 1141.2386.00 vernieten
B: Einheit A und 1141.2270.00 vernieten
C: 1141.2305.00 und 1141.2757.00 vernieten
D: Einheit B und Einheit C vernieten
E: Einheit D und 1129.9290.00 vernieten
F: Einheit E und 1141.2834.00 vernieten

Var 03 = Mit Netzschalter
Mod 03 = with Powerswitch

Var04= mit Netzsch.u.Wanne fuer LO-SYNC
Mod04= with Powerswitch and Trough f.LOW-SYNC

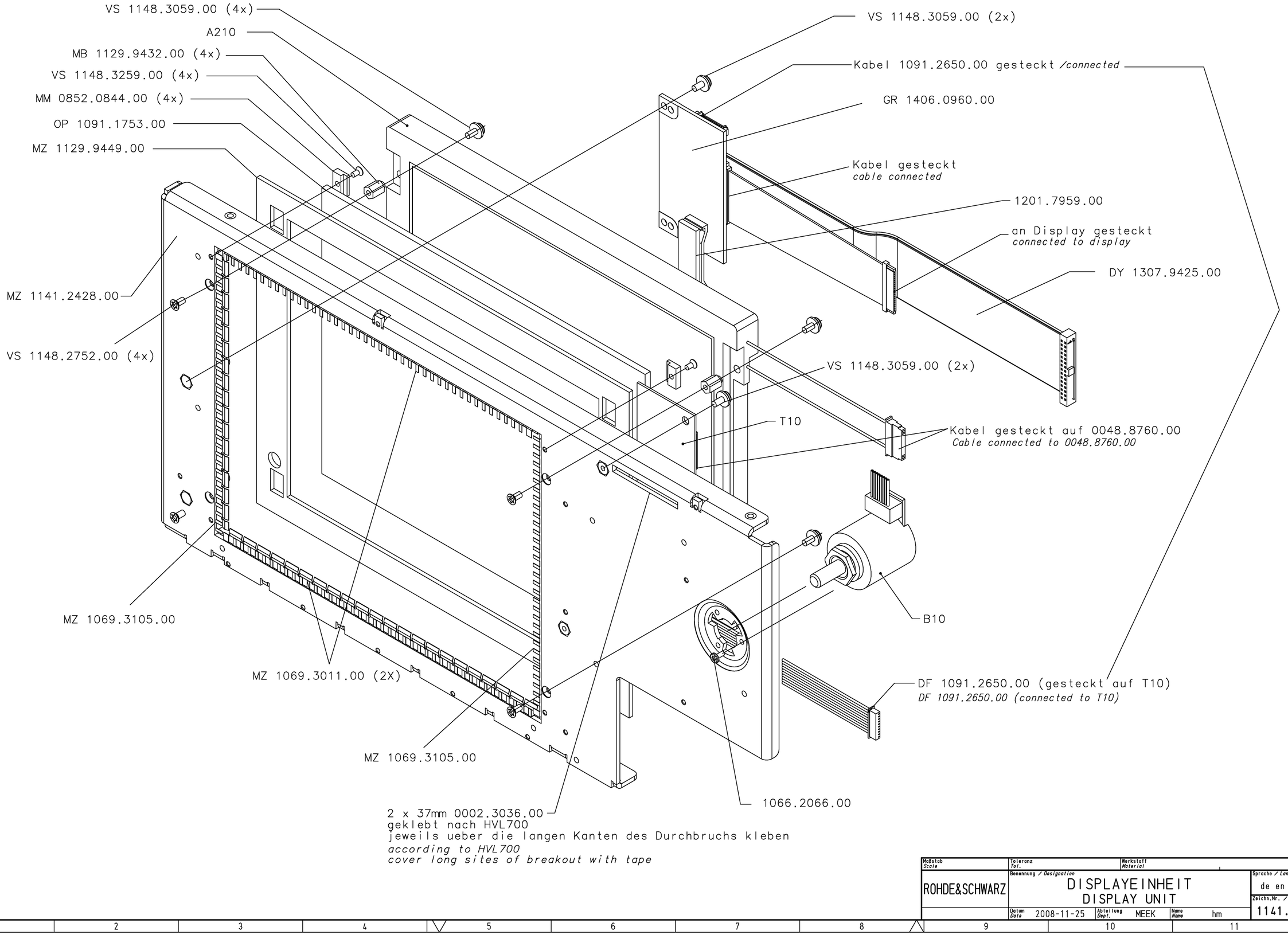
Maßstab / Scale	Toleranz / Tol.	Werkstoff / Material			
ROHDE&SCHWARZ	Benennung / Designation: RAHMEN SMU		Sprache / Lang.: de en	Aei. / C.I.: 04.00	Blatt / Sh.: 3
	Datum / Date: 2007-07-13	Abteilung / Dept.: MENZ	Name / Name: WU	Zeichn.Nr. / Drawing No.: 1141.2105.01	D

Projektionsmethode / Projection Method

Pos.-Nr. *ItemNo*	Menge *Quantity*	ME *Unit*	El.Kennz *Ref.Des.*	Benennung / Bezeichnung *Designation*	Z	Sachnummer *Stock No.*	Ersatzteil *Subst.part*	BA	VH
				ACHTUNG EGB/ATTENTION ESD *VARIANTENERKLAERUNG *EXPLANATION OF MODELS VAR02=GRUNDVARIANTE MOD02=BASIC MODEL VAR03=MIT NETZSCHALTER MOD03=WITH POWERSWITCH VAR04=MIT NETZSCHALTER UND WANNE FUER LOW SYNC MOD04=WITH POWERSWITCH AND TROUGH FOR LOW SYNC					
20	1	S		MZ FRONTRAHMEN 4E 1/1 MZ FRONTFRAME 4E1/1		1129.9290.00		M	
30	2.4	M		WG HF-DICHT O-PROF 2.0 SI SEALING		0396.1035.00		B	T
35	1.2	M		WG HF-DICHT O-PROF 2.0 SI SEALING		0396.1035.00		B	T
40	1	S		MZ RECHNERWANNE PROCESSORBOARD METAL	Z	1400.7163.00		M	O
45	1	S		DZ DURCHF.TUELLE10X17X6.8 GROMMET 10X17X6.8		0099.1433.00		B	O
50	1	S		MZ DICHTBLECH MZ SEALINGPLATE	Z	1141.2757.00		M	
60	1	S		MZ LAENGSWAND MZ LONGITUDINAL PARTITION	Z	1141.2270.00		M	
80	1	S		MZ Trennblech PARTITIONER		1141.2386.00		M	
100	1	S		MZ LUEFTERKASTEN FANUNITBOX	Z	1141.2240.00		M	
120	1	S		KB Geraetewanne KB TROUGH VAR 02	Z	1141.2111.00		M	
125	1	S		KB GERAETEWANNE TROUGH VAR 03	Z	1141.2834.00		M	
127	1	S		KB GERAETEWANNE (BEDR.) TROUGH VAR 04	Z	1141.2870.00		M	
140	1	S		MZ QUERWAND 1 PARTITION LENGTHWISE	Z	1141.2286.00		M	
160	1	S		MZ QUERWAND 2 PARTITION CROSSWISE 2	Z	1141.2292.00		M	
180	10	S		VS 6900/ISR-M2.5X6-A2 COMBINATION SCREWS		1148.3059.00		B	T
185	3	S		VS 965/ISR-M2.5X6-A4-PA 965/ISR-M2.5X6-A4-PA		1148.3288.00		B	T
200	29	S		VN BLINDNIET 3.2X5.8 ST		1096.4821.00		B	O
220	2	S	E1 E2	ZM LUEFTEREINHEIT FAN UNIT	Z	1141.2740.00	X	M	
240	8	S		VS 6900/ISR-M2.5X10-A2 COMBINATION SCREWS		0041.1660.00		B	T
245	1	S		MZ LUEFTERBLECH	Z	1141.2592.00		M	

Pos.-Nr. *ItemNo*	Menge *Quantity*	ME *Unit*	El.Kennz *Ref.Des.*	Benennung / Bezeichnung *Designation*	Z	Sachnummer *Stock No.*	Ersatzteil *Subst.part*	BA	VH
				MZ FANPLATE					
247	1	S	E3	ZM LUEFTEREINHEIT 2 FAN UNIT 2	Z	1141.2763.00	X	M	
249	4	S		DZ DURCHF.TUELLE3X10X6 GROMMET 3X10X6		0099.1410.00		B	O
251	4	S		VS HVC/ISR-M2.5X16-A2 COMBINATION SCREWS		0048.8218.00		B	O
253	1	S		MZ MONTAGEPLATTE MOUNTING PLATE		1141.2786.00		M	
270	1	S	X401	FV FLACHSTECKER GR 6.3 CONNECTOR		0543.6705.00		B	O
271	1	S		VS 7985/ISR-M4X10-A4-PA SCREW		1148.2669.00		B	O
272	1	S		VS DIN137-A4-A2 WAVE SPRING WASHER DIN 137-A4-A2		0005.0315.00		B	V
273	1	S		VS DIN934-M4-A4 NUT		0016.4400.00		B	O
274	1	S		VS DIN6797-A4.3-A2 TOOTHED LOCK WASHERS		0016.2837.00		B	O
275	1	S		OS SCHILD RD11 SCHUTZZEIC LABEL		0042.5330.00		B	O
320	1	S	W404	DX SCHUTZLEITERKABEL PROTECTIONCABLE VAR 02	Z	1090.3881.00		M	O
325	1	S	W404	DX KABEL W404 CABLE W404 VAR 03 04	Z	1141.5556.00		M	
330	1	S	W402	DX KABEL W402 CABLE W402 VAR 03 04	Z	1141.6152.00		M	
363	1	S	W407	DX KABEL W407 CABLE W407 VAR 02	Z	1141.6098.00		M	
366	1	S	W408	DX KABEL W408 CABLE W408 VAR 02	Z	1141.6100.00		M	
480	1	S		MZ PLATTE PLATE VAR 02		1141.2811.00		M	
490	1	S	S400	FN GERAETEST. INC. 2 SICH AC-INLET W. 2 FUSE VAR 02		1152.3320.00		B	O
492	2	S		VS 965/ISR-M3X8-A4-PA SCREW VAR 02		1148.2798.00		B	O
494	2	S	F1 F2	SS SCHMELZSICHERUNG T6.3H IEC60127-2/V TIME LAG FUSE T6.3H		0020.7630.00		B	O
495	1	S	Z400	LI NETZF. 6A 2X MULTI SECTION FILTER VAR 02		1142.5443.00		B	O
497	2	S		VS 6900/ISR-M2.5X8-A2 COMBINATION SCREWS		0041.1653.00		B	T

Pos.-Nr. *ItemNo*	Menge *Quantity*	ME *Unit*	El.Kennz *Ref.Des.*	Benennung / Bezeichnung *Designation*	Z	Sachnummer *Stock No.*	Ersatzteil *Subst.part*	BA	VH
				VAR 02					
498	1	S	S400	FN GERAETESTECKER MODUL POWER ENTRY MODUL VAR 03 04		1160.2988.00		B	O
499	1	S		FN SCHUBLADE EXTRA SAFE FUSE DRAWER EXTRA SAFE VAR 03 04		1160.2994.00		B	O
500	1	S		OS SCHILD LABEL VAR 02		1141.2828.00		M	



Projektions-methode
Projection Method

Maßstab / Scale	Toleranz / Tol.	Werkstoff / Material			
ROHDE&SCHWARZ	Benennung / Designation: DISPLAYEINHEIT / DISPLAY UNIT			Sprache / Long.: de en	Aei. / C.I.: 06.00
					Blatt / Sh.: 1
	Datum / Date: 2008-11-25	Abteilung / Dept.: MEEK	Name / Name: hm	Zeichn.Nr. / Drawing No.: 1141.2405.01	D

Pos.-Nr. *ItemNo*	Menge *Quantity*	ME *Unit*	El.Kennz *Ref.Des.*	Benennung / Bezeichnung *Designation*	Z	Sachnummer *Stock No.*	Ersatzteil *Subst.part*	BA	VH
				ACHTUNG EGB/ATTENTION ESD *VARIANTENERKLAERUNG *EXPLANATION OF MODELS VAR02=GRUNDVARIANTE MOD02=BASIC MODEL					
100	1	S	JMZ01	MZ MONTAGEWANNE SMU MZ MOUNTINGTROUGH SMU	Z	1141.2428.00		M	
110	1	S	JOP01	OP MESH-SCHEIBE 8.4 GLAS NFT ENTSP. SCREENED FILTER GLASS		1091.1753.00		B	V
120	2	S	JMZ02 JMZ03	MZ HF-FEDER (177) RF SPRING	Z	1069.3011.00		M	
130	2	S	JMZ04 JMZ05	MZ HF-FEDER (137) RF SPRING	Z	1069.3105.00		M	
140	4	S	JMM01 JMM02 JMM03 JMM04	MM SCHEIBENHALTER DISK HOLDER		0852.0844.00		M	
150	4	S	JVS01 JVS02 JVS03 JVS04	VS 965/ISR-M2X4-A4-PA SCREW		1148.3259.00		B	O
160	1	S	JMZ06	MZ STAUBABDICHTUNG MZ DUSTPROOFING	Z	1129.9449.00		M	
170	1	S	T10	BP VNR-08C351-INV DC/AC-INVERTER CCFL BACKLIGHT INVERTER		0048.8760.00		B	B
180	2	S	JVS05 JVS06	VS 6900/ISR-M2.5X6-A2 COMBINATION SCREWS		1148.3059.00		B	T
190	1	S	B10	EM DREHIMP.1 (MIT TASTE) ROTARY PULS-GENERATOR		0852.2760.00		B	I
200	1	S	JVS07	VS SCHRAUBE F.KUST 1.8X4.4 SCREW		1066.2066.00		B	O
210	1	S	A210	BP TFT 8.4 SVGA DRGB CCFL 8.4 COLOR TFT replace 1201.8403.00		0048.8599.00	X	B	V
220	4	S	JVS08 JVS09 JVS10 JVS11	VS 6900/ISR-M2.5X6-A2 COMBINATION SCREWS		1148.3059.00		B	T
230	4	S	JMB01 JMB02 JMB03 JMB04	MB ABSTANDSSAEULE MB SPACER		1129.9432.00		M	
240	4	S	JVS12 JVS13 JVS14 JVS15	VS 965/ISR-M2.5X5-A4-PA SCREW		1148.2752.00		B	T
270	1	S	A211	GR DISPL.VERB.FMR6-TOSHIB DISPL.CONNECT FMR6-TOSHIBA replace 1406.0960.00		1091.2637.00	X	B	A

Pos.-Nr. *ItemNo*	Menge *Quantity*	ME *Unit*	El.Kennz *Ref.Des.*	Benennung / Bezeichnung *Designation*	Z	Sachnummer *Stock No.*	Ersatzteil *Subst.part*	BA	VH
275	2	S	JVS16 JVS17	VS 6900/ISR-M2.5X6-A2 COMBINATION SCREWS		1148.3059.00		B	T
280	1	S	JDF01	DF WANDLERKAB.L=310 10POL CABLE 310MM 10PIN		1091.2650.00		B	V
290	1	S	JDF02	DF DISPL.KAB.TOSHIBA DISPL.CABLE TOSHIBA replace 1307.9425.00		1091.2666.00	X	B	V
300	.074	M	JWW01	WW KLEB-BD0.17X19 PTFE ADHESIVE TAPE		0002.3036.00		B	O
310	0	S	JDZ01	DZ KABELHALTER HOLDER nur mit / only with 1307.9425.00		1201.7959.00		B	O

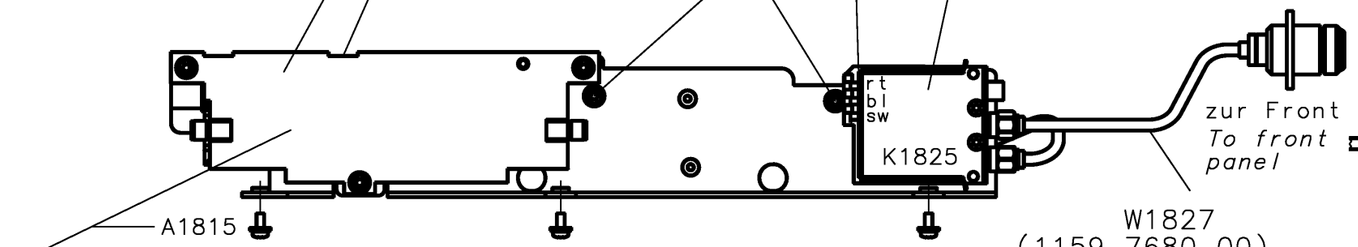
Kabel W1817 (1141.7644.00)
gesteckt
Cable W1817
plugged

W1819 gesteckt
W1819 plugged

Kabel W1819 Oese gebogen und an Loetpins geloetet
Loetstellen ueberschrumpft
Cable W1819 bended eye and soldered to soldering pin
Soldered Joint shrinked

VS 1148.3059.00 (2x)

K1825
1148.2869.00 (2x)



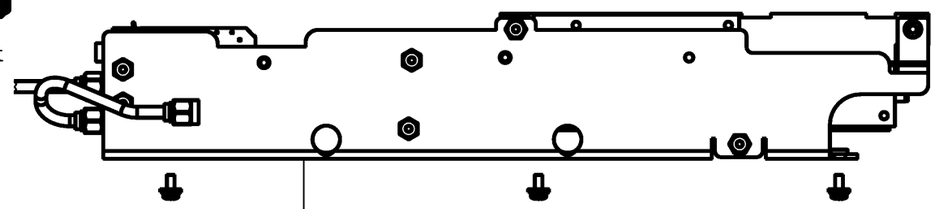
zur Front
To front
panel

W1827
(1159.7680.00)

A1815

VS 1148.3059.00 (3x)

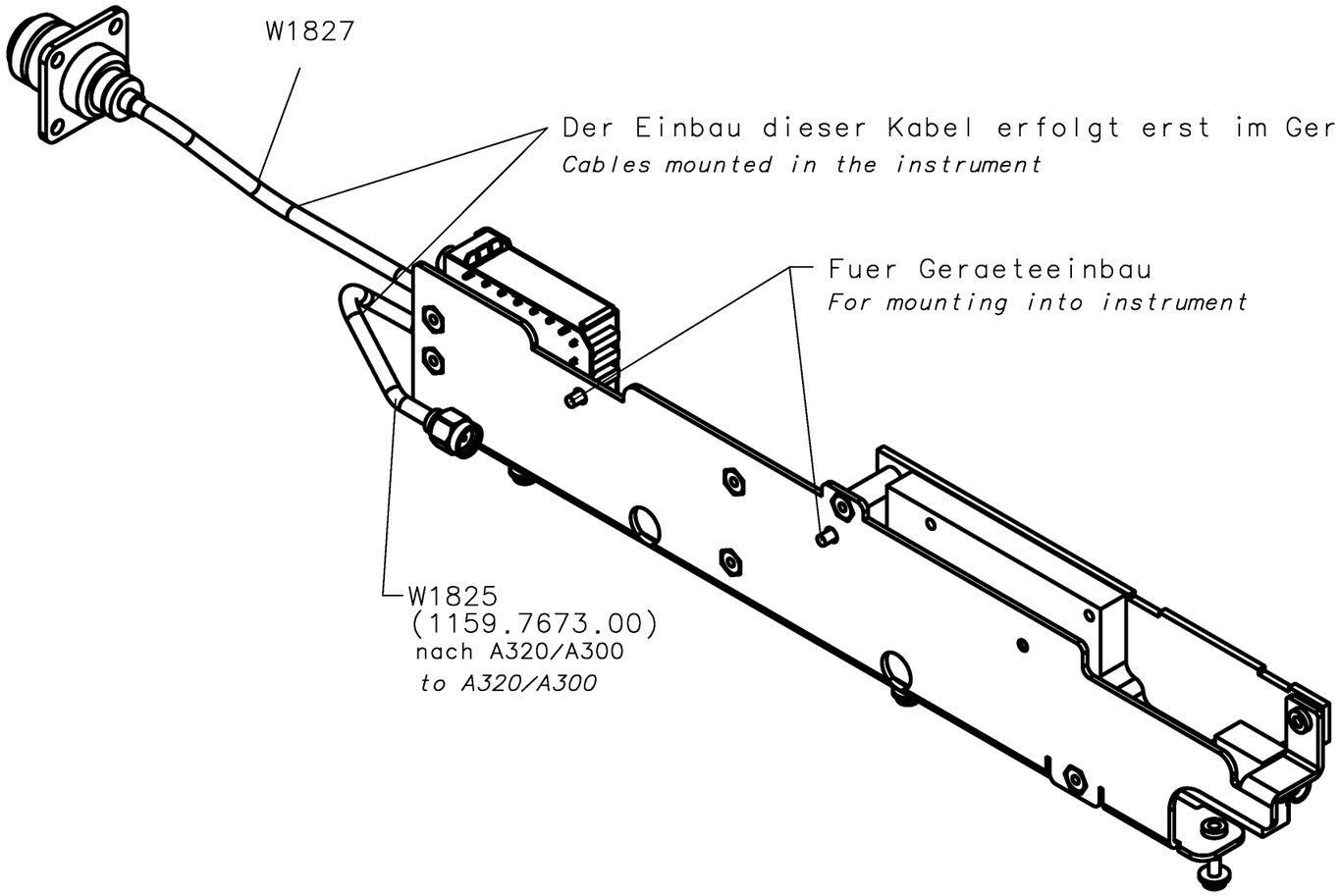
Kabel W1819 unter Leiterplatte durchfuehren
Cable W1819 laid below circuit board



MZ 1159.7780.00

VS 1148.3059.00 (3x)
(Fuer Geraeteeinbau)
(Used for mounting into instrument)

W1827



Der Einbau dieser Kabel erfolgt erst im Geraet
Cables mounted in the instrument

Fuer Geraeteeinbau
For mounting into instrument

W1825
(1159.7673.00)
nach A320/A300
to A320/A300

Projektions-
methode
Projection
Method

Maßstab *Scale*	Toleranz *Tol.*	Werkstoff *Material*			
ROHDE&SCHWARZ	Benennung / *Designation*: SMUB30 Ueberspg.Schutz / SMUB30 Overvolt.Prot.			Sprache / *Lang.*: de en	Aei. / *C.I.*: 04.00
				Blatt / *Sh.*: 1	
	Datum *Date*: 2005-05-09	Abteilung *Dept.*: MEZ1	Name *Name*: WU	Zeichn.Nr. / *Drawing No.*: 1159.7444.01	D

Pos.-Nr. *ItemNo*	Menge *Quantity*	ME *Unit*	El.Kennz *Ref.Des.*	Benennung / Bezeichnung *Designation*	Z	Sachnummer *Stock No.*	Ersatzteil *Subst.part*	BA	VH
				ACHTUNG EGB/ATTENTION ESD *VARIANTENERKLAERUNG *EXPLANATION OF MODELS VAR02=GRUNDVARIANTE MOD02=BASIC MODEL					
40	1	S	A1815	ED RELAIS CONTROL RELAIS CONTROL	Z	1159.7544.03	X	M	O
100	1	S	W1817	DY Kabel W1817 Cable W1817	Z	1159.7644.00		M	
110	1	S	W1819	DX Kabel W1819 Cable W1819	Z	1159.7609.00		M	
120	1	S	W1825	DW KABEL HF W1825 RF CABLE W1825	Z	1159.7673.00		M	
130	1	S	W1827	DW KABEL HF W1827 CABLE RF W1827	Z	1159.7680.00		M	
140	2	S		VS 7985/ISR-M2.5X16-A4-PA 7985/ISR-M2.5X16-A4-PA		1148.2869.00		B	T
150	8	S		VS 6900/ISR-M2.5X6-A2 COMBINATION SCREWS		1148.3059.00		B	T
160	1	S		MZ MONTAGEWINKEL	Z	1159.7780.00		M	
310	1	S	K1825	ED SCHIRMUNG HF-RELAIS SHIELDING COAX RELAIS	Z	1400.5802.02	X	M	O

Kabel W1817 (1141.7644.00)
gesteckt
Cable W1817 plugged

W1819
gesteckt
Plugged

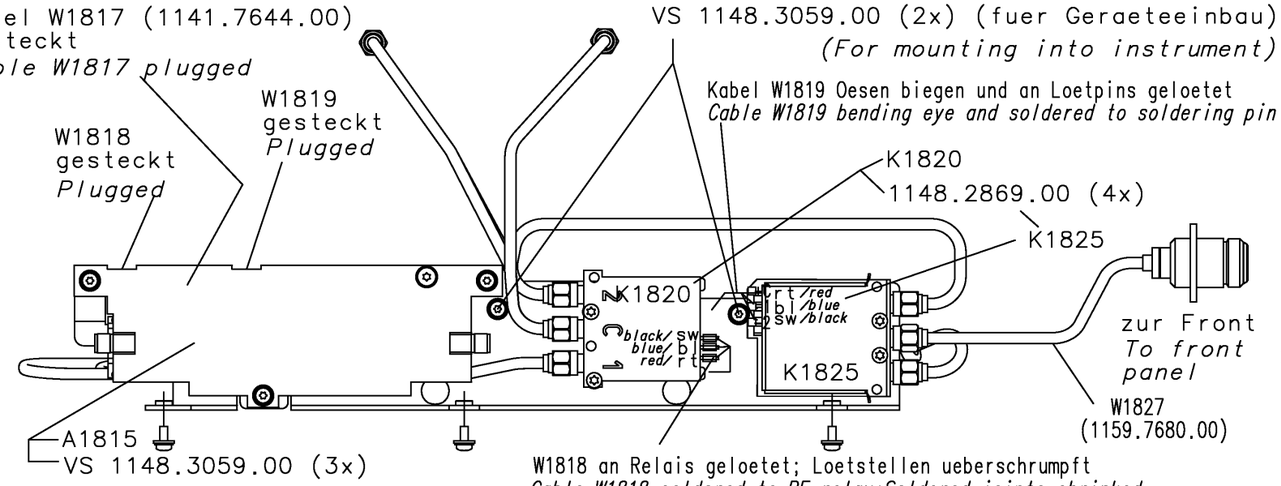
W1818
gesteckt
Plugged

VS 1148.3059.00 (2x) (fuer Geraeteeinbau)
(For mounting into instrument)

Kabel W1819 Oesen biegen und an Loetpins geloetet
Cable W1819 bending eye and soldered to soldering pin

K1820
1148.2869.00 (4x)

K1825



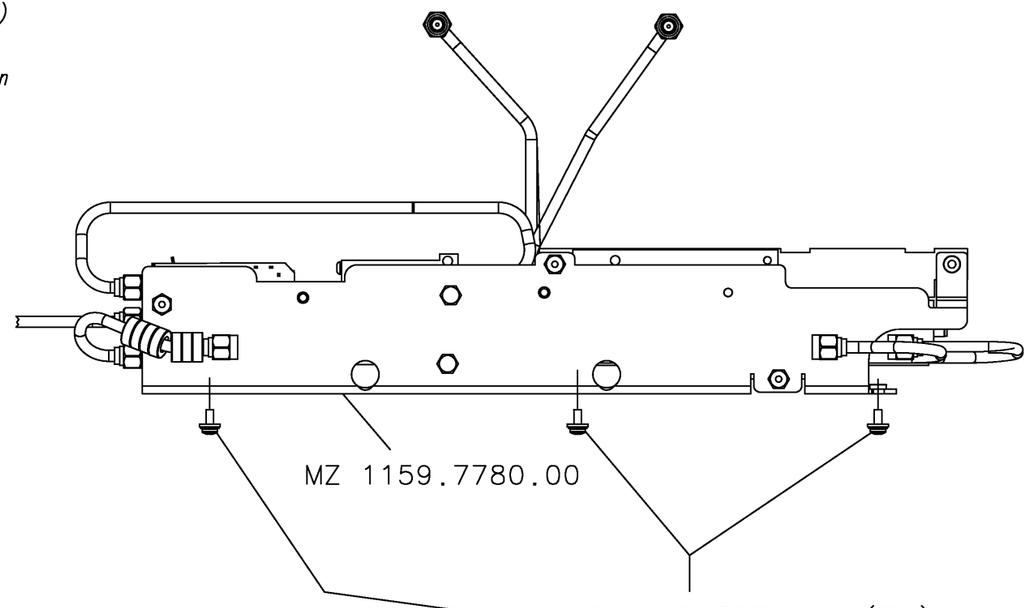
zur Front
To front panel

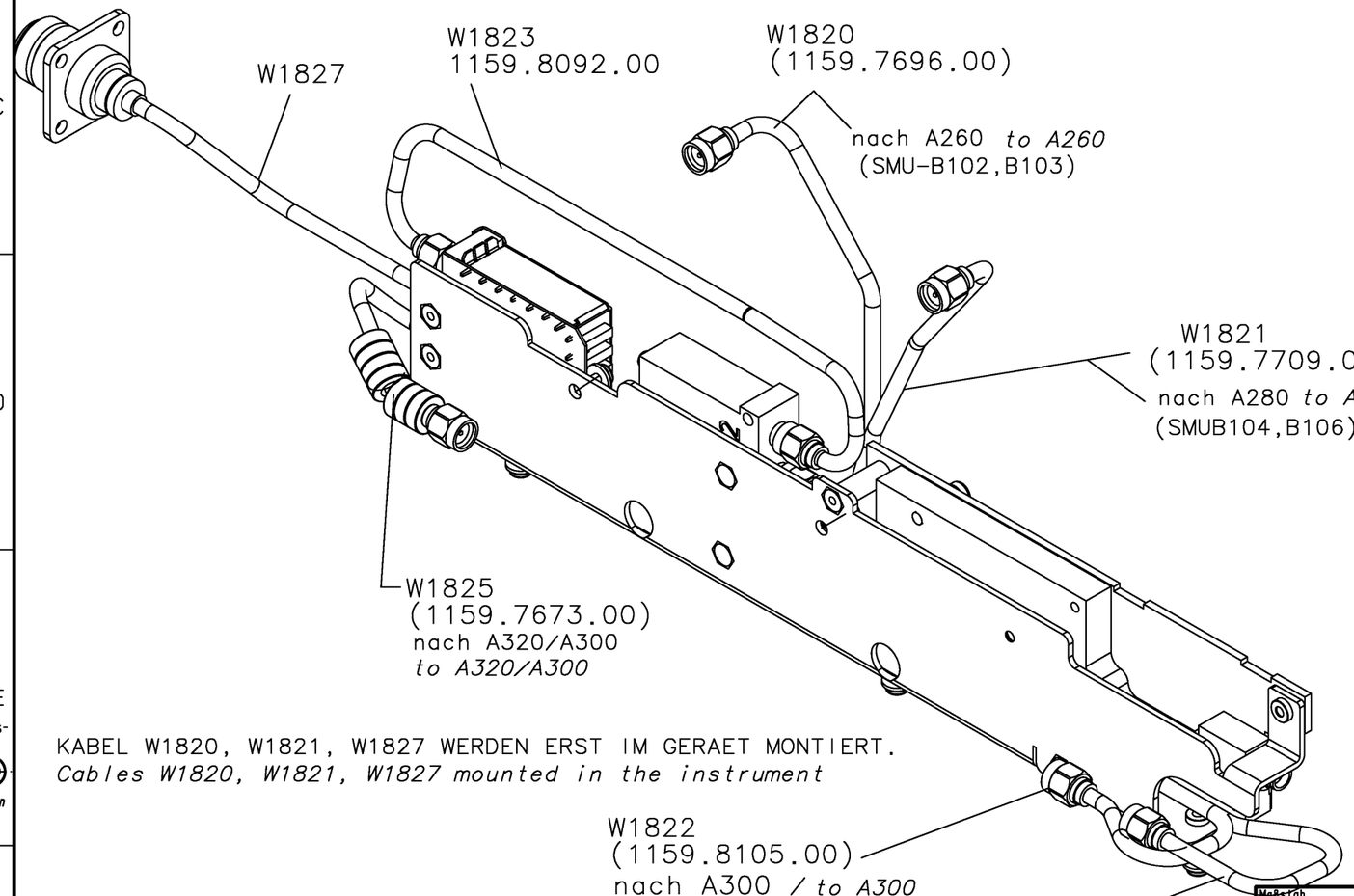
W1827
(1159.7680.00)

A1815
VS 1148.3059.00 (3x)

W1818 an Relais geloetet; Loetstellen ueberschrumpft
Cable W1818 soldered to RF relay;Soldered joints shrinked

Kabel W1818 und W1819 unter Relais und Leiterplatte durchfuehren
Cables W1818 and W1819 laid below relays and circuit board





KABEL W1820, W1821, W1827 WERDEN ERST IM GERAET MONTIERT.
Cables W1820, W1821, W1827 mounted in the instrument

Projektions-methode
Projection Method

Maßstab / *Scale*	Toleranz / *Tol.*	Werkstoff / *Material*			
ROHDE&SCHWARZ	Benennung / *Designation*: SMU-B31 High P. Outp.1 SMU-B31 High P. Outp.1			Sprache / *Lang.*: de en	Aei. / *C.I.*: 05.00
	Datum / *Date*: 15.07.2003	Abteilung / *Dept.*: MEZ1	Name / *Name*: WU	Zeichn.Nr. / *Drawing No.*: 1159.8011.01	Blatt / *Sh.*: 1 D

Pos.-Nr. *ItemNo*	Menge *Quantity*	ME *Unit*	El.Kennz *Ref.Des.*	Benennung / Bezeichnung *Designation*	Z	Sachnummer *Stock No.*	Ersatzteil *Subst.part*	BA	VH
				ACHTUNG EGB/ATTENTION ESD *VARIANTENERKLAERUNG *EXPLANATION OF MODELS VAR02=GRUNDVARIANTE MOD02=BASIC MODEL VAR04=CMOS EICHLEITUNG MIT HIGH POWER MOD04=CMOS ATTENUATOR HIGH POWER					
20	1	S	A1815	ED RELAIS CONTROL RELAIS CONTROL VAR 02	Z	1159.7544.03	X	M	O
30	1	S	K1820	SH KOAXREL. SMA 12V BISTA RELAY VAR 02		1130.1254.00	X	B	T
40	1	S	K1825	ED Koax Relais geschirmt COAX RELAY SHIELDED VAR 02	Z	1400.5802.02	X	M	O
60	1	S	W1817	DY Kabel W1817 Cable W1817 VAR 02	Z	1159.7644.00		M	
70	1	S	W1819	DX Kabel W1819 Cable W1819 VAR 02	Z	1159.7609.00		M	
80	1	S	W1825	DW KABEL HF W1825 RF CABLE W1825 VAR 02	Z	1159.7673.00		M	
90	1	S	W1827	DW KABEL HF W1827 CABLE RF W1827 VAR 02	Z	1159.7680.00		M	
100	1	S	W1818	DX Kabel W1818 Cable W1818 VAR 02	Z	1159.7621.00		M	
110	1	S	W1823	DW HF Kabel W1823 RF Cable W1823 VAR 02	Z	1159.8092.00		M	
120	1	S	W1820	DW HF Kabel W1820 RF Cable W1820 VAR 02	Z	1159.7696.00		M	
130	1	S	W1821	DW HF Kabel W1821 RF Cable W1821 VAR 02	Z	1159.7709.00		M	
140	1	S	W1822	DW HF Kabel W1822 RF CABLE W1822 VAR 02	Z	1159.8105.00		M	
145	1	S		DW HF Kabel W1822 RF CABLE W1822 VAR 02	Z	1159.8111.00		M	O
150	4	S		VS 7985/ISR-M2.5X16-A4-PA 7985/ISR-M2.5X16-A4-PA VAR 02		1148.2869.00		B	T
160	8	S		VS 6900/ISR-M2.5X6-A2 COMBINATION SCREWS VAR 02		1148.3059.00		B	T
170	1	S		MZ MONTAGEWINKEL VAR 02	Z	1159.7780.00		M	

Pos.-Nr. *ItemNo*	Menge *Quantity*	ME *Unit*	El.Kennz *Ref.Des.*	Benennung / Bezeichnung *Designation*	Z	Sachnummer *Stock No.*	Ersatzteil *Subst.part*	BA	VH
300	1	S	A1300	ED STEP ATTENUATOR CMOS STEP ATTENUATOR CMOS VAR 04	Z	1400.3400.06	X	M	

Kabel W1817 (1141.7644.00)
gesteckt
Plugged

W1818
gesteckt
Plugged

W1819
gesteckt
Plugged

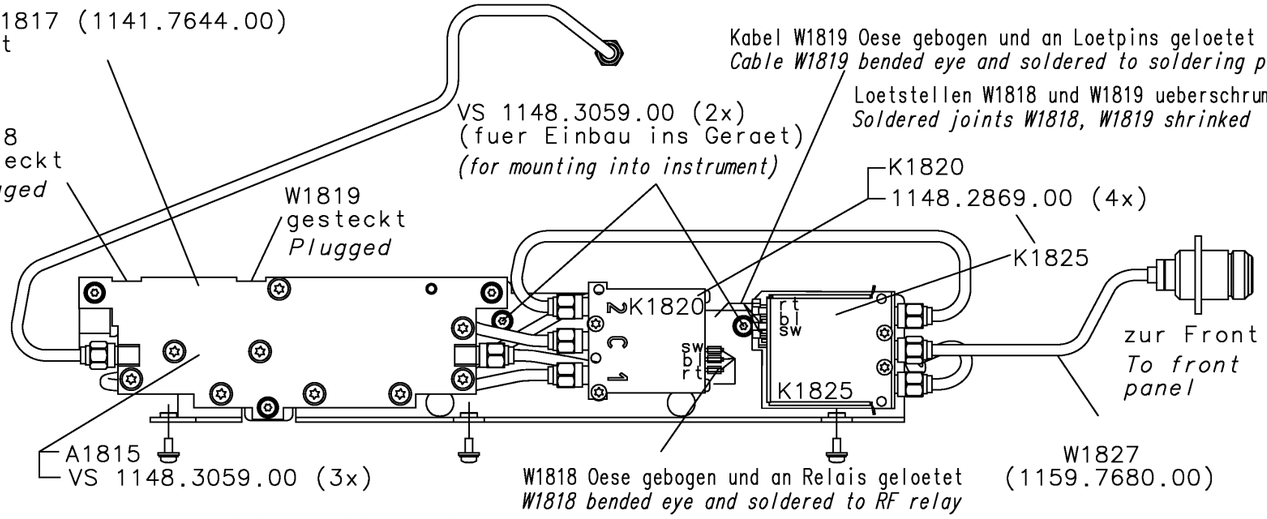
VS 1148.3059.00 (2x)
(fuer Einbau ins Geraet)
(for mounting into instrument)

Kabel W1819 Oese gebogen und an Loetpins geloetet
Cable W1819 bended eye and soldered to soldering pin

Loetstellen W1818 und W1819 ueberschrumpft
Soldered joints W1818, W1819 shrinked

K1820
1148.2869.00 (4x)

K1825



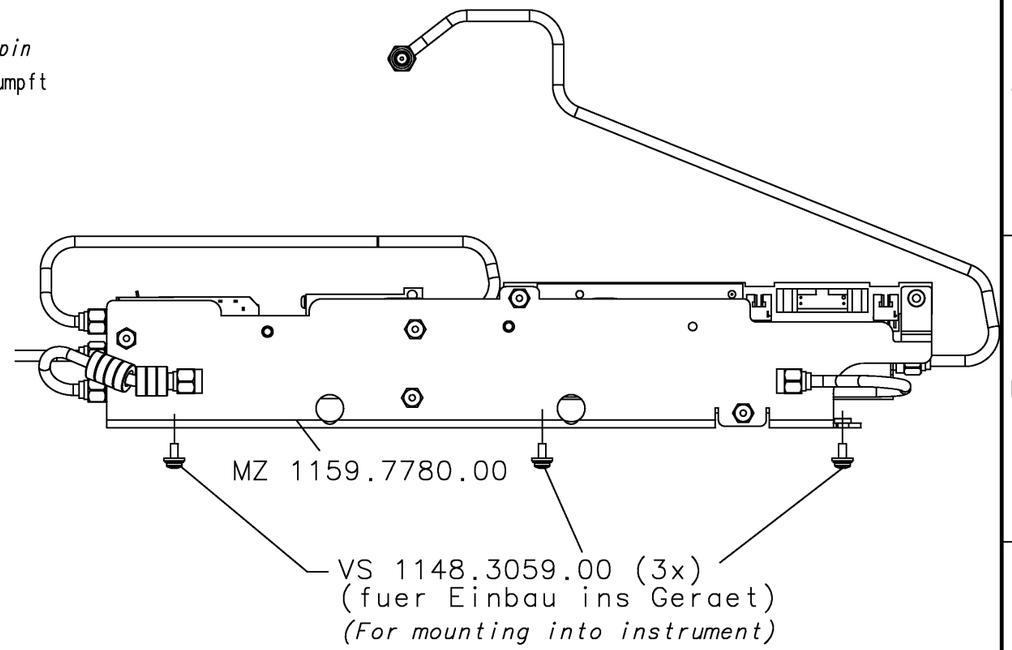
zur Front
To front panel

A1815
VS 1148.3059.00 (3x)

W1818 Oese gebogen und an Relais geloetet
W1818 bended eye and soldered to RF relay

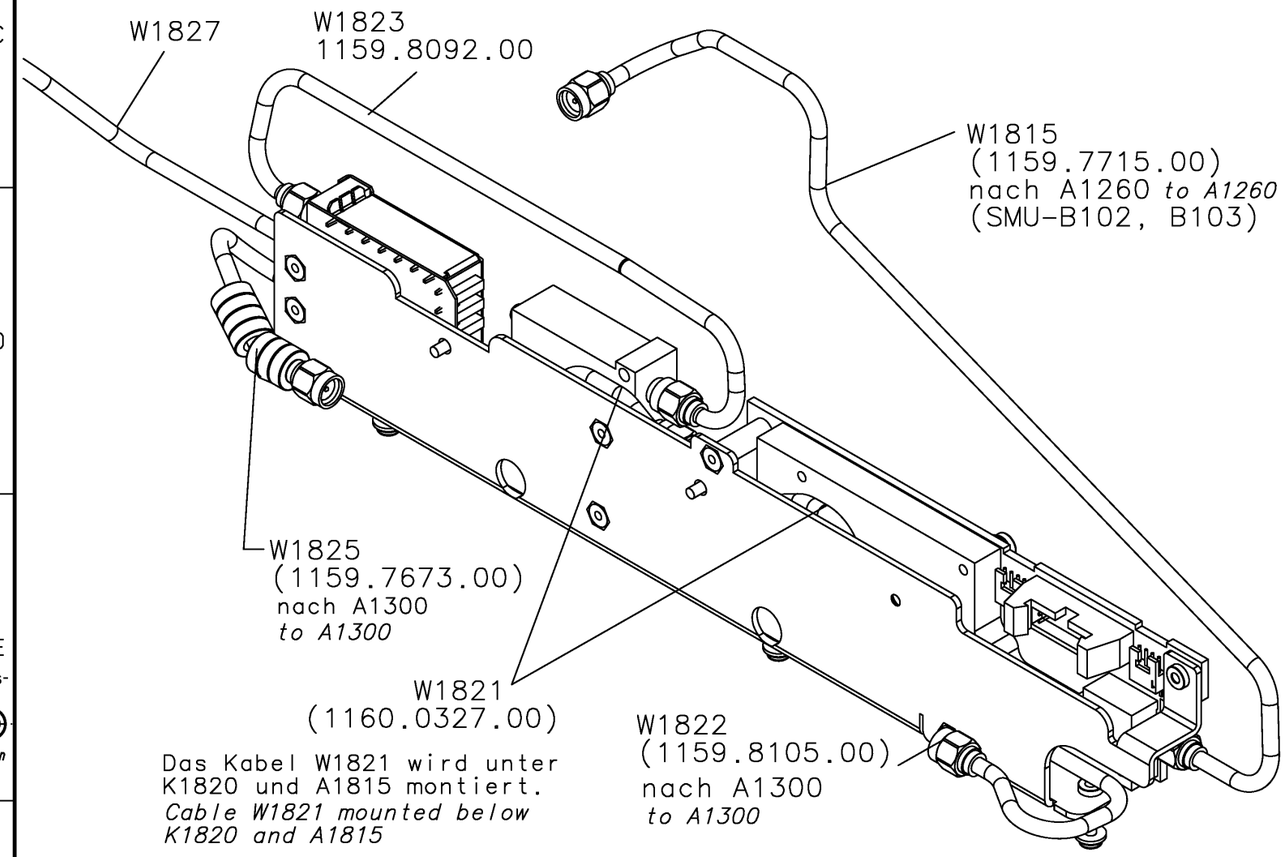
W1827
(1159.7680.00)

Kabel W1818 und W1819 unter Relais und Leiterplatte durchfuehren
Cables W1818 and W1819 laid below RF relay and circuit board



MZ 1159.7780.00

VS 1148.3059.00 (3x)
(fuer Einbau ins Geraet)
(For mounting into instrument)



Das Kabel W1821 wird unter
K1820 und A1815 montiert.
Cable W1821 mounted below K1820 and A1815

Die Kabel W1815, W1825, W1827 werden erst im Geraet montiert.
Cables W1815, W1825 and W1827 will be mounted in the instrument

Projektions-
methode
Projection Method

Maßstab / *Scale*	Toleranz / *Tol.*	Werkstoff / *Material*			
ROHDE&SCHWARZ	Benennung / *Designation*: SMU-B32 Overv.Prot H.P SMU-B32 Overv.Prot H.P			Sprache / *Lang.*: de en	Aei. / *C.I.*: 04.00	Blatt / *Sh.*: 1
	Datum / *Date*: 2005-05-09	Abteilung / *Dept.*: MEZ1	Name / *Name*: WU	Zeichn.Nr. / *Drawing No.*: 1160.0256.01		D

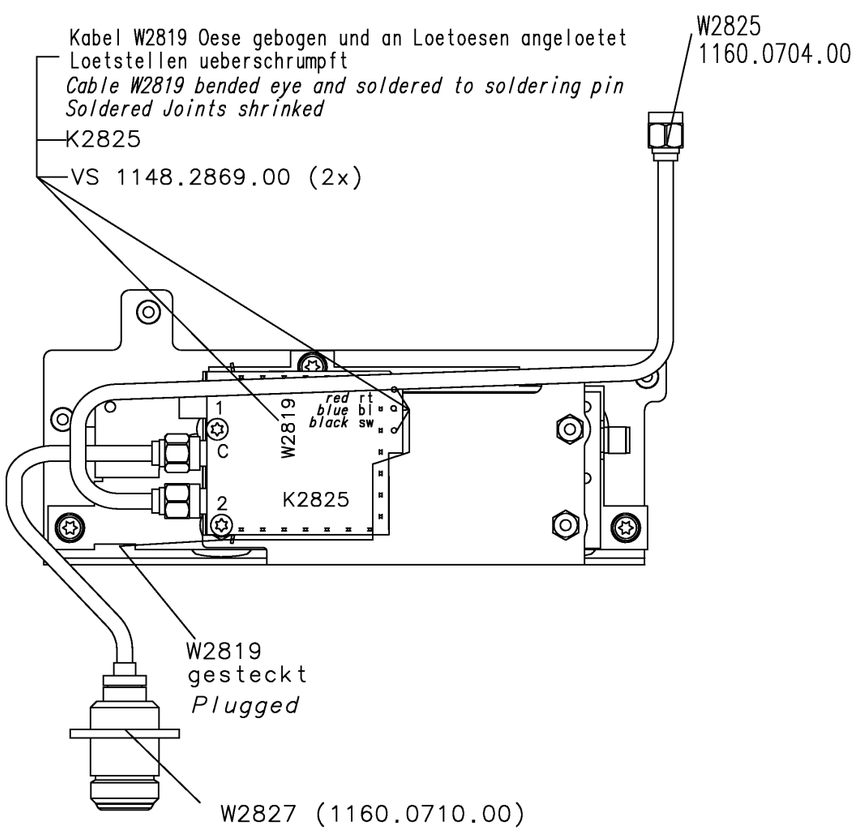
Pos.-Nr. *ItemNo*	Menge *Quantity*	ME *Unit*	El.Kennz *Ref.Des.*	Benennung / Bezeichnung *Designation*	Z	Sachnummer *Stock No.*	Ersatzteil *Subst.part*	BA	VH
				ACHTUNG EGB/ATTENTION ESD *VARIANTENERKLAERUNG *EXPLANATION OF MODELS VAR02=GRUNDVARIANTE MOD02=BASIC MODEL					
20	1	S	A1815	ED RELAIS CONTROL RELAIS CONTROL	Z	1159.7544.02	X	M	
40	1	S	K1825	ED Koax Relais geschirmt COAX RELAY SHIELDED	Z	1400.5802.02	X	M	O
50	1	S	K1820	SH KOAXREL. SMA 12V BISTA RELAY		1130.1254.00	X	B	T
70	1	S	W1815	DW HF Kabel W1815 RF Cable W1815	Z	1159.7715.00		M	O
80	1	S	W1821	DW HF KABEL W1821 RF CABLE W1821	Z	1160.0327.00		M	
90	1	S	W1817	DY Kabel W1817 Cable W1817	Z	1159.7644.00		M	
100	1	S	W1819	DX Kabel W1819 Cable W1819	Z	1159.7609.00		M	
110	1	S	W1818	DX Kabel W1818 Cable W1818	Z	1159.7621.00		M	
120	1	S	W1825	DW KABEL HF W1825 RF CABLE W1825	Z	1159.7673.00		M	
130	1	S	W1827	DW KABEL HF W1827 CABLE RF W1827	Z	1159.7680.00		M	
140	1	S	W1823	DW HF Kabel W1823 RF Cable W1823	Z	1159.8092.00		M	
150	1	S	W1822	DW HF Kabel W1822 RF CABLE W1822	Z	1159.8105.00		M	
170	1	S		MZ MONTAGEWINKEL	Z	1159.7780.00		M	
180	4	S		VS 7985/ISR-M2.5X16-A4-PA 7985/ISR-M2.5X16-A4-PA		1148.2869.00		B	T
190	8	S		VS 6900/ISR-M2.5X6-A2 COMBINATION SCREWS		1148.3059.00		B	T
200	1	S		OS EINLEGESCHILD REV DC LABLE	Z	1141.2992.00		M	

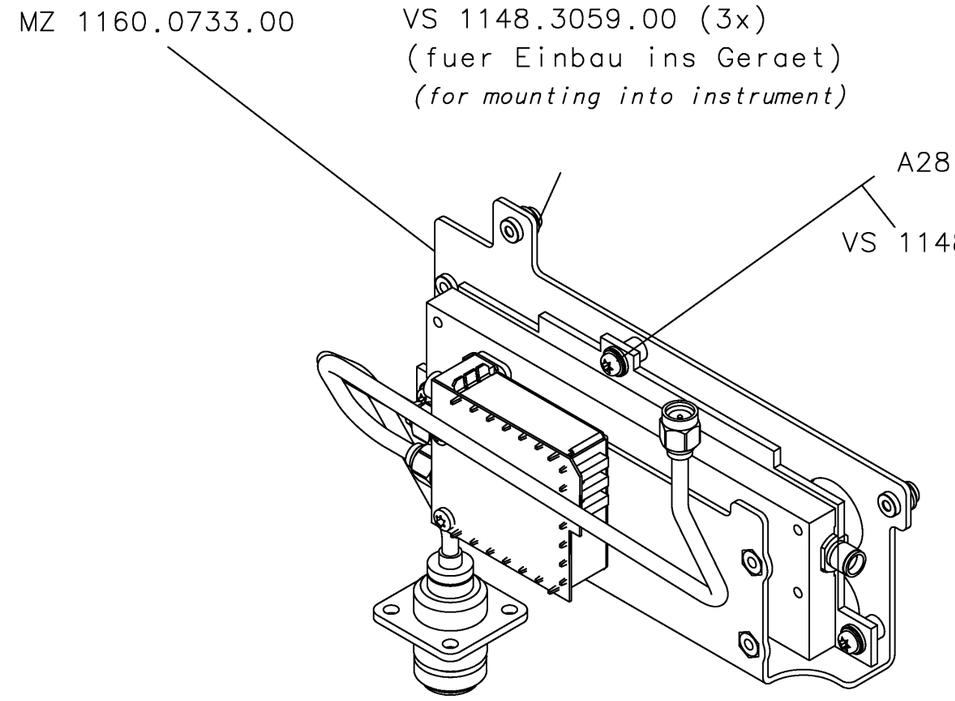
Kabel W2817 vor Einbau der
Leiterplatte gesteckt

Das Kabel W2817 (1159.7650.00)
wird im Geraet auf
A100-X227 (Motherboard)
gesteckt.

Connect cable W2817
before mounting PCB

Connect cable W2817 (1159.7650.00)
in instrument to A100-X227
(motherboard)





Projektions-methode
Projection Method

Maßstab / *Scale*	Toleranz / *Tol.*	Werkstoff / *Material*	
ROHDE&SCHWARZ	Benennung / *Designation*: SMU-B35 Overv.Prot 2 (SMU-B35 Overv.Prot 2)	Sprache / *Lang.*: de en	Aei. / *C.I.*: 05.00
		Blatt / *Sh.*: 1	
	Datum / *Date*: 2005-05-09	Abteilung / *Dept.*: MEZ1	Name / *Name*: WU
	Zeichn.Nr. / *Drawing No.*: 1160.0633.01		D

Pos.-Nr. *ItemNo*	Menge *Quantity*	ME *Unit*	El.Kennz *Ref.Des.*	Benennung / Bezeichnung *Designation*	Z	Sachnummer *Stock No.*	Ersatzteil *Subst.part*	BA	VH
				ACHTUNG EGB/ATTENTION ESD *VARIANTENERKLAERUNG *EXPLANATION OF MODELS VAR02=GRUNDVARIANTE MOD02=BASIC MODEL					
20	1	S	A2815	ED RELAIS CONTROL RELAIS CONTROL	Z	1159.7544.03	X	M	O
30	1	S	K2825	ED SCHIRMUNG HF-RELAIS SHIELDING COAX RELAIS	Z	1400.5802.02	X	M	O
50	1	S	W2819	DX Kabel W2819 Cable W2819	Z	1159.7615.00		M	
60	1	S	W2825	DW HF Kabel W2825 RF Cable W2825	Z	1160.0704.00		M	
70	1	S	W2827	DW HF Kabel W2827 RF Cable W2827	Z	1160.0710.00		M	O
80	1	S	W2817	DY Kabel W2817 Cable W2817	Z	1159.7650.00		M	
90	1	S		MZ BEFESTIGUNGSWINKEL HOLDING BRACKET	Z	1160.0733.00		M	
100	2	S		VS 7985/ISR-M2.5X16-A4-PA 7985/ISR-M2.5X16-A4-PA		1148.2869.00		B	T
110	6	S		VS 6900/ISR-M2.5X6-A2 COMBINATION SCREWS		1148.3059.00		B	T

Nur das Kabel W2823 kann (muss) vormontiert werden

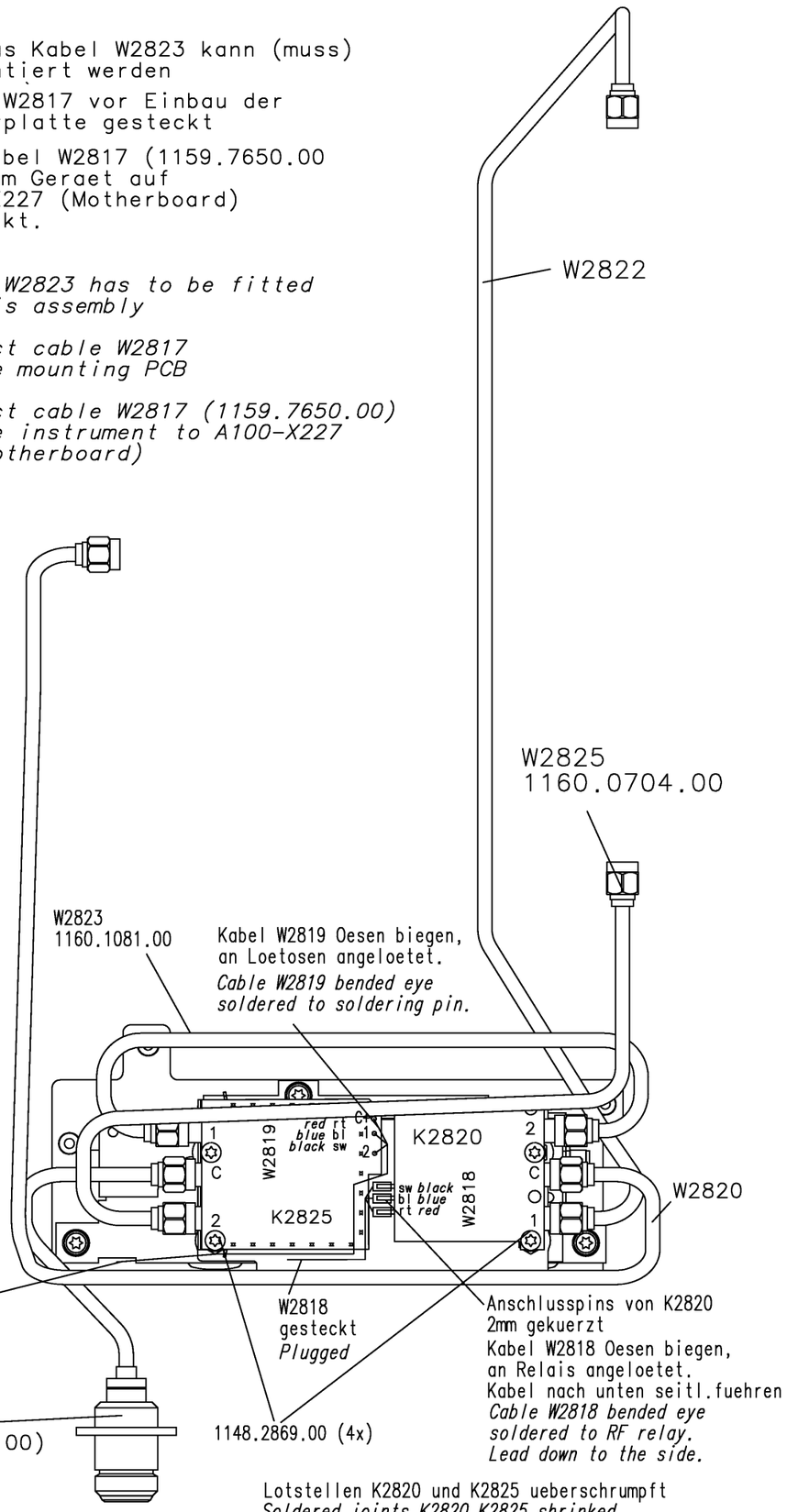
Kabel W2817 vor Einbau der Leiterplatte gesteckt

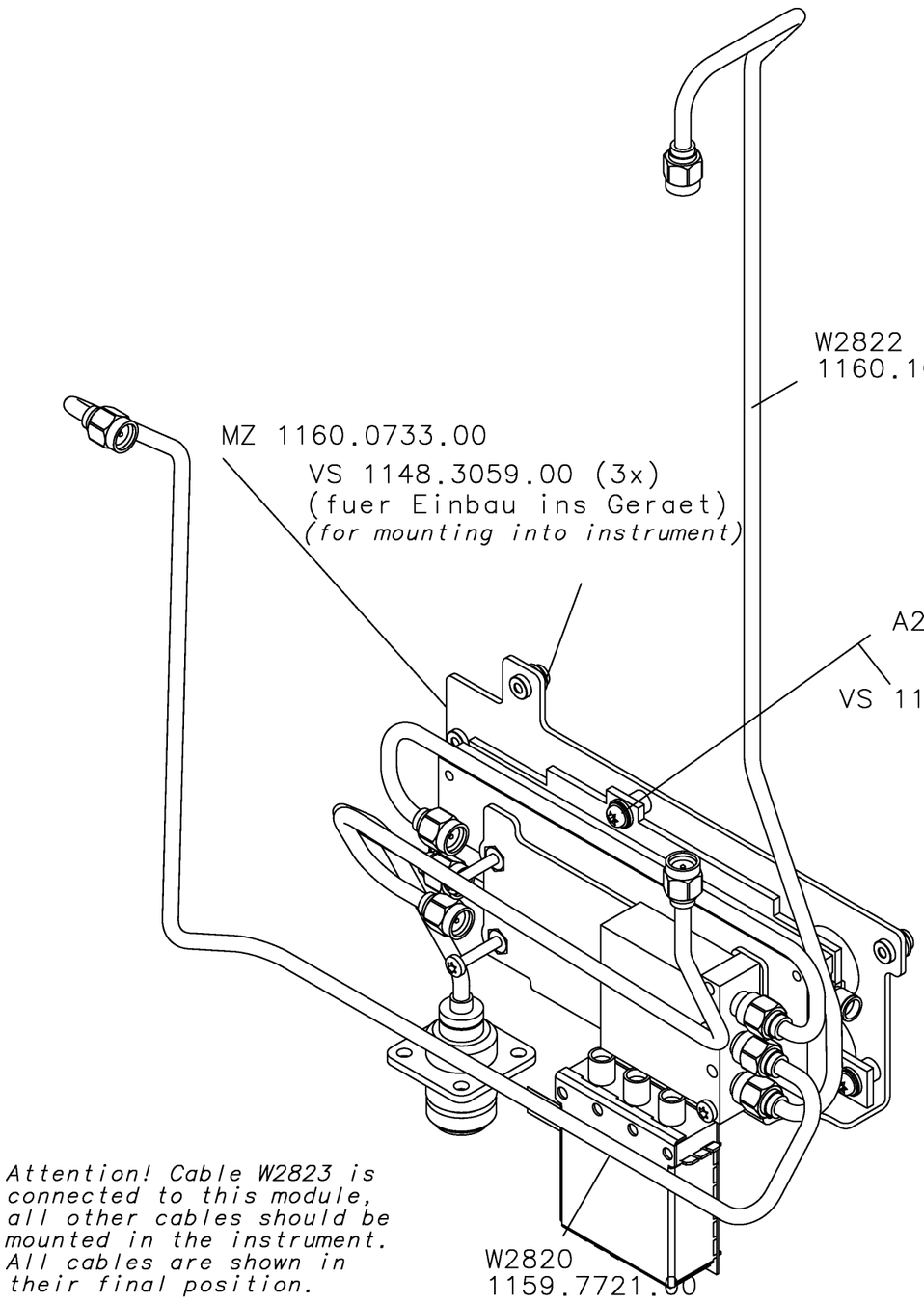
Das Kabel W2817 (1159.7650.00 wird im Geraet auf A100-X227 (Motherboard) gesteckt.

Cable W2823 has to be fitted to this assembly

Connect cable W2817 before mounting PCB

Connect cable W2817 (1159.7650.00) in the instrument to A100-X227 (on motherboard)





Attention! Cable W2823 is connected to this module, all other cables should be mounted in the instrument. All cables are shown in their final position.

Achtung: Das Kabel W2823 wird montiert, alle anderen Kabel sollen im Geraet montiert werden. Die Kabel sind in ihrer spaeteren Lage dargestellt

Projektions-methode
Projection Method

Maßstab *Scale*	Toleranz *Tol.*	Werkstoff *Material*			
ROHDE&SCHWARZ	Benennung / *Designation* SMU-B36 High P.Outp2 SMU-B36 High P.Outp2			Sprache / *Lang.* de en	Aei. / *C.I.* 04.00	Blatt / *Sh.* 1
	Datum *Date* 2005-05-03	Abteilung *Dept.* MEZ1	Name *Name* WU	Zeichn.Nr. / *Drawing No.* 1160.1000.01		D

Pos.-Nr. *ItemNo*	Menge *Quantity*	ME *Unit*	El.Kennz *Ref.Des.*	Benennung / Bezeichnung *Designation*	Z	Sachnummer *Stock No.*	Ersatzteil *Subst.part*	BA	VH
				ACHTUNG EGB/ATTENTION ESD *VARIANTENERKLAERUNG *EXPLANATION OF MODELS VAR02=GRUNDVARIANTE MOD02=BASIC MODEL VAR04=CMOS EICHLEITUNG MIT HIGH POWER MOD04=CMOS ATTENUATOR HIGH POWER					
20	1	S	A2815	ED RELAIS CONTROL RELAIS CONTROL VAR 02	Z	1159.7544.03	X	M	O
30	1	S	K2820	SH KOAXREL. SMA 12V BISTA RELAY VAR 02		1130.1254.00	X	B	T
40	1	S	K2825	ED Koax Relais geschirmt COAX RELAY SHIELDED VAR 02	Z	1400.5802.02	X	M	O
60	1	S	W2820	DW HF Kabel W2820 RF Cable W2819 VAR 02	Z	1159.7721.00		M	
70	1	S	W2822	DW HF Kabel W2822 RF Cable W2822 VAR 02	Z	1160.1075.00		M	
80	1	S	W2825	DW HF Kabel W2825 RF Cable W2825 VAR 02	Z	1160.0704.00		M	
90	1	S	W2827	DW HF Kabel W2827 RF Cable W2827 VAR 02	Z	1160.0710.00		M	O
100	1	S	W2823	DW HF Kabel W2823 RF Cable W2823 VAR 02	Z	1160.1081.00		M	
110	1	S	W2819	DX Kabel W2819 Cable W2819 VAR 02	Z	1159.7615.00		M	
120	1	S	W2818	DX Kabel W2818 Cable W2818 VAR 02	Z	1159.7638.00		M	
130	1	S	W2817	DY Kabel W2817 Cable W2817 VAR 02	Z	1159.7650.00		M	
140	1	S		MZ BEFESTIGUNGSWINKEL HOLDING BRACKET VAR 02	Z	1160.0733.00		M	
150	4	S		VS 7985/ISR-M2.5X16-A4-PA 7985/ISR-M2.5X16-A4-PA VAR 02		1148.2869.00		B	T
160	6	S		VS 6900/ISR-M2.5X6-A2 COMBINATION SCREWS VAR 02		1148.3059.00		B	T
300	1	S		ED STEP ATTENUATOR CMOS STEP ATTENUATOR CMOS VAR 04	Z	1400.3400.06	X	M	

Nur das Kabel W2823 kann (muss)
vormontiert werden

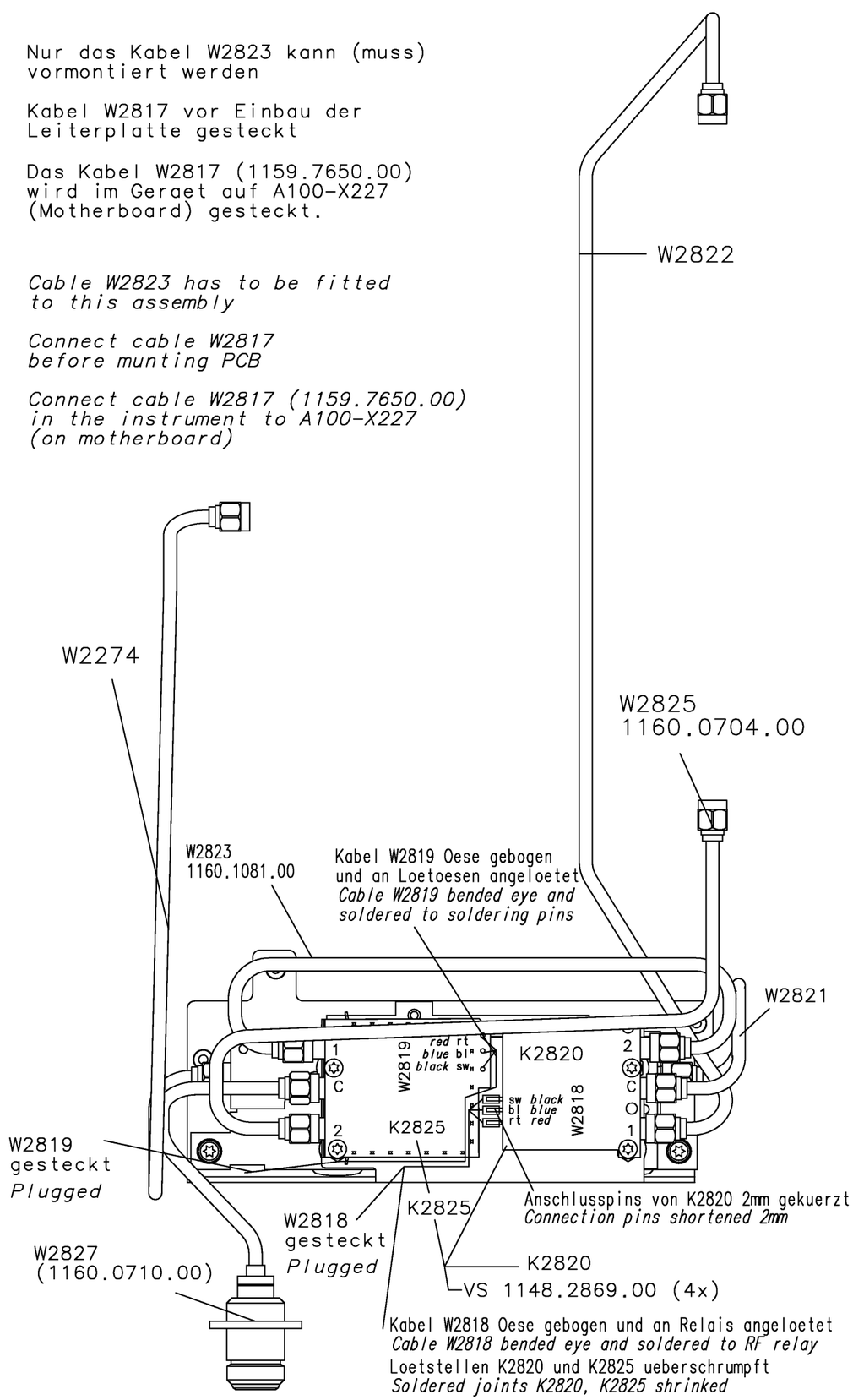
Kabel W2817 vor Einbau der
Leiterplatte gesteckt

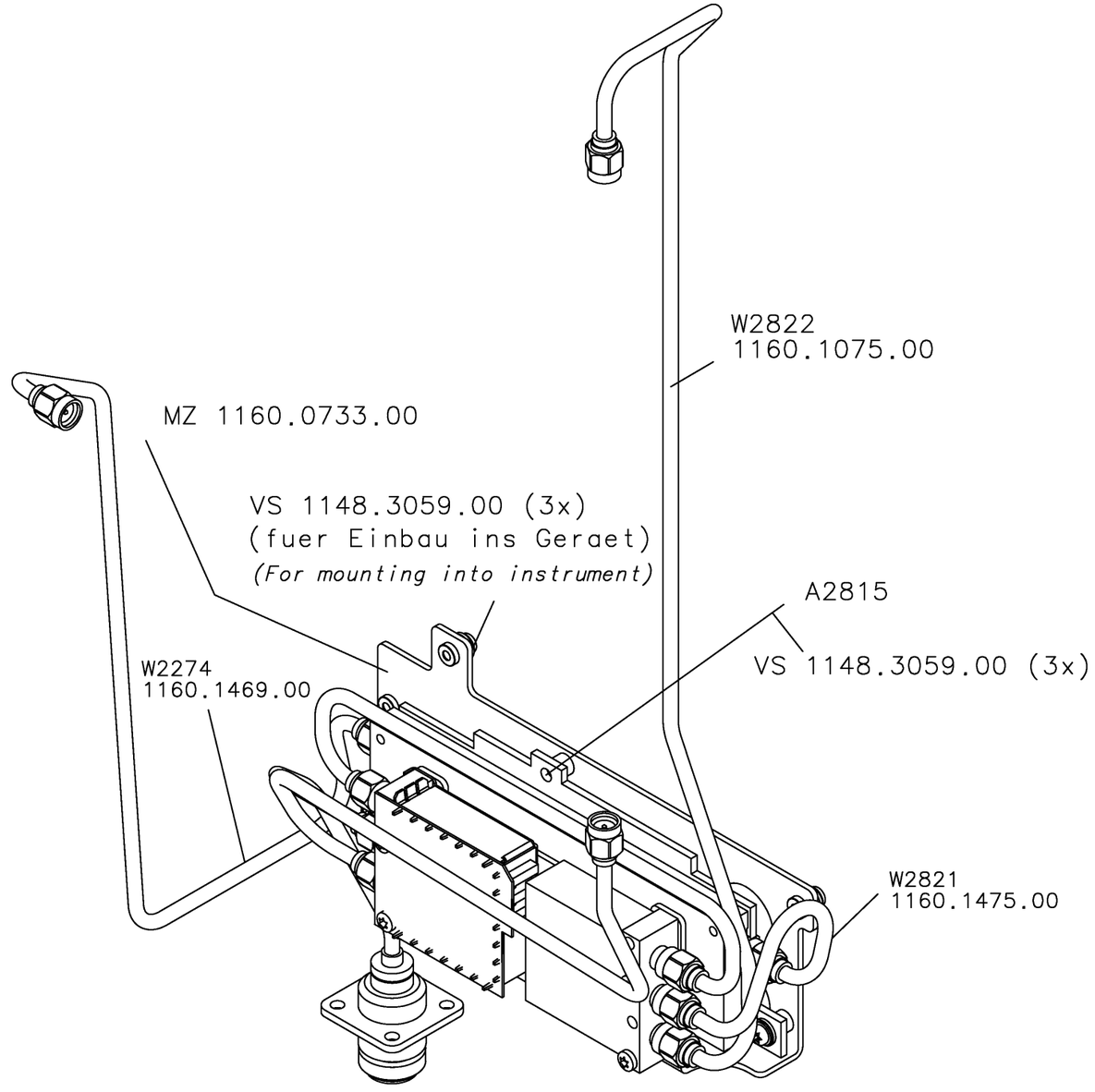
Das Kabel W2817 (1159.7650.00)
wird im Geraet auf A100-X227
(Motherboard) gesteckt.

Cable W2823 has to be fitted
to this assembly

Connect cable W2817
before munting PCB

Connect cable W2817 (1159.7650.00)
in the instrument to A100-X227
(on motherboard)





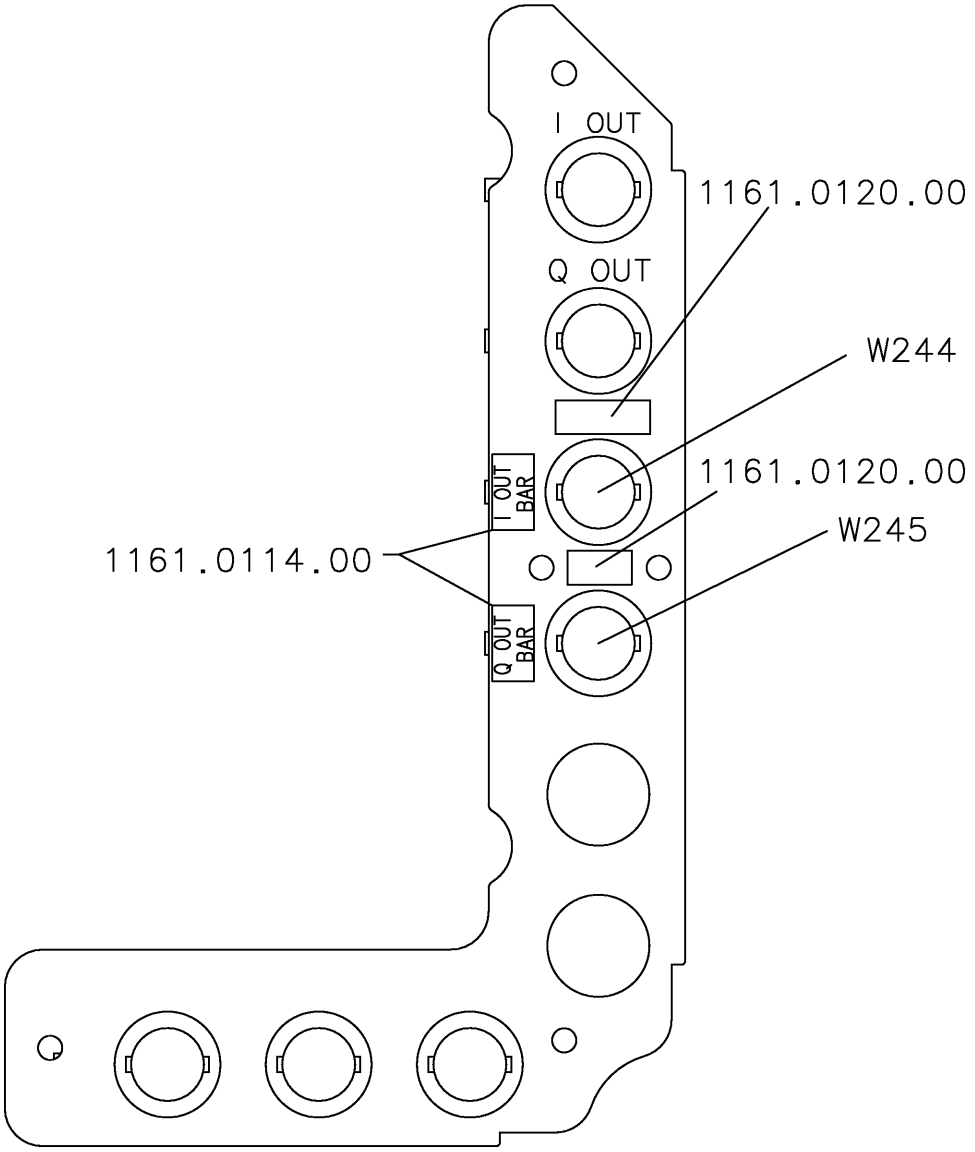
Attention! Cable W2823 is
connected to this module,
all other cables should be
mounted in the instrument.
All cables are shown in
their final position

Achtung: Das Kabel W2823 wird montiert,
alle anderen Kabel sollen im Geraet montiert werden.
Die Kabel sind in ihrer spaeteren Lage
dargestellt

Projektions-methode
Projection Method

Maßstab *Scale*	Toleranz *Tol.*	Werkstoff *Material*			
ROHDE&SCHWARZ	Benennung / *Designation*: SMU-B37 Overv.Prot H.P SMU-B37 Overv.Prot.H.P			Sprache / *Lang.*: de en	Aei. / *C.I.*: 04.00	Blatt / *Sh.*: 1
	Datum *Date*: 2005-05-09	Abteilung *Dept.*: MEZ1	Name *Name*: WU	Zeichn.Nr. / *Drawing No.*: 1160.1400.01		D

Pos.-Nr. *ItemNo*	Menge *Quantity*	ME *Unit*	El.Kennz *Ref.Des.*	Benennung / Bezeichnung *Designation*	Z	Sachnummer *Stock No.*	Ersatzteil *Subst.part*	BA	VH
				ACHTUNG EGB/ATTENTION ESD *VARIANTENERKLAERUNG *EXPLANATION OF MODELS VAR02=GRUNDVARIANTE MOD02=BASIC MODEL					
30	1	S	A2815	ED RELAIS CONTROL RELAIS CONTROL	Z	1159.7544.02	X	M	
40	1	S	K2820	SH KOAXREL. SMA 12V BISTA RELAY		1130.1254.00	X	B	T
50	1	S	K2825	ED Koax Relais geschirmt COAX RELAY SHIELDED	Z	1400.5802.02	X	M	O
60	1	S	W2822	DW HF Kabel W2822 RF Cable W2822	Z	1160.1075.00		M	
70	1	S	W2823	DW HF Kabel W2823 RF Cable W2823	Z	1160.1081.00		M	
80	1	S	W2818	DX Kabel W2818 Cable W2818	Z	1159.7638.00		M	
90	1	S	W2819	DX Kabel W2819 Cable W2819	Z	1159.7615.00		M	
100	1	S	W2817	DY Kabel W2817 Cable W2817	Z	1159.7650.00		M	
110	1	S	W2825	DW HF Kabel W2825 RF Cable W2825	Z	1160.0704.00		M	
120	1	S	W2827	DW HF Kabel W2827 RF Cable W2827	Z	1160.0710.00		M	O
130	1	S	W2274	DW HF Kabel W2274 RF Cable W2274	Z	1160.1469.00		M	
140	1	S	W2821	DW HF Kabel W2821 RF Cable W2821	Z	1160.1475.00		M	
150	1	S		MZ BEFESTIGUNGSWINKEL HOLDING BRACKET	Z	1160.0733.00		M	
160	4	S		VS 7985/ISR-M2.5X16-A4-PA 7985/ISR-M2.5X16-A4-PA		1148.2869.00		B	T
170	6	S		VS 6900/ISR-M2.5X6-A2 COMBINATION SCREWS		1148.3059.00		B	T
180	1	S		OS EINLEGESCHILD REV DC LABLE	Z	1141.2992.00		M	



Kabel W244 gesteckt in A100-X244 (Motherboard)

Cable W244 plugged in A100-X244 (Motherboard)

Kabel W245 gesteckt in A100-X245 (Motherboard)

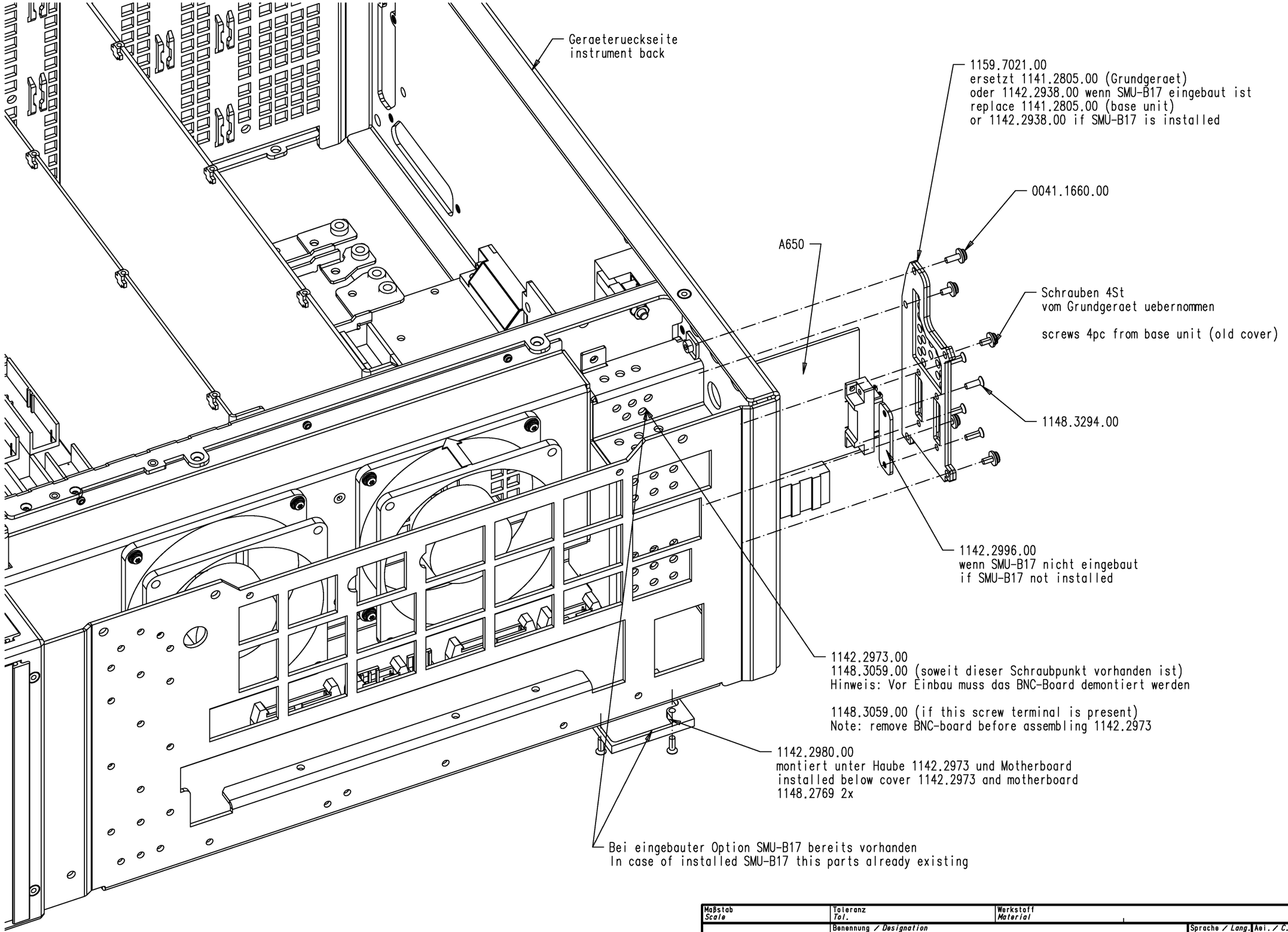
Cable W245 plugged in A100-X245 (Motherboard)

Projektions-methode

Projection Method

Maßstab *Scale*	Toleranz *Tol.*	Werkstoff *Material*		
ROHDE&SCHWARZ	Benennung / *Designation* SMU-B16 DIFF. I/Q AUSG. SMU-B16 DIFF. I/Q OUT		Sprache / *Lang.*: de en Aei. / *C.I.*: 02.00 Blatt / *Sh.*: 1	
	Datum *Date*: 15.12.2004	Abteilung *Dept.*: 1GPK	Name *Name*: FI	Zeichn.Nr. / *Drawing No.*: 1161.0066.01 D

Pos.-Nr. *ItemNo*	Menge *Quantity*	ME *Unit*	El.Kennz *Ref.Des.*	Benennung / Bezeichnung *Designation*	Z	Sachnummer *Stock No.*	Ersatzteil *Subst.part*	BA	VH
				ACHTUNG EGB/ATTENTION ESD *VARIANTENERKLAERUNG *EXPLANATION OF MODELS VAR02=GRUNDVARIANTE MOD02=BASIC MODEL					
20	1	S	W244	DV KABEL W244 CABLE W244	Z	1401.0585.00		M	
30	1	S	W245	DV KABEL W245 CABLE W245	Z	1401.0591.00		M	
40	1	S		OS KLEBESCHILD LABEL		1161.0114.00		M	O
50	1	S		OS KLEBESCHILD LABEL		1161.0120.00		M	



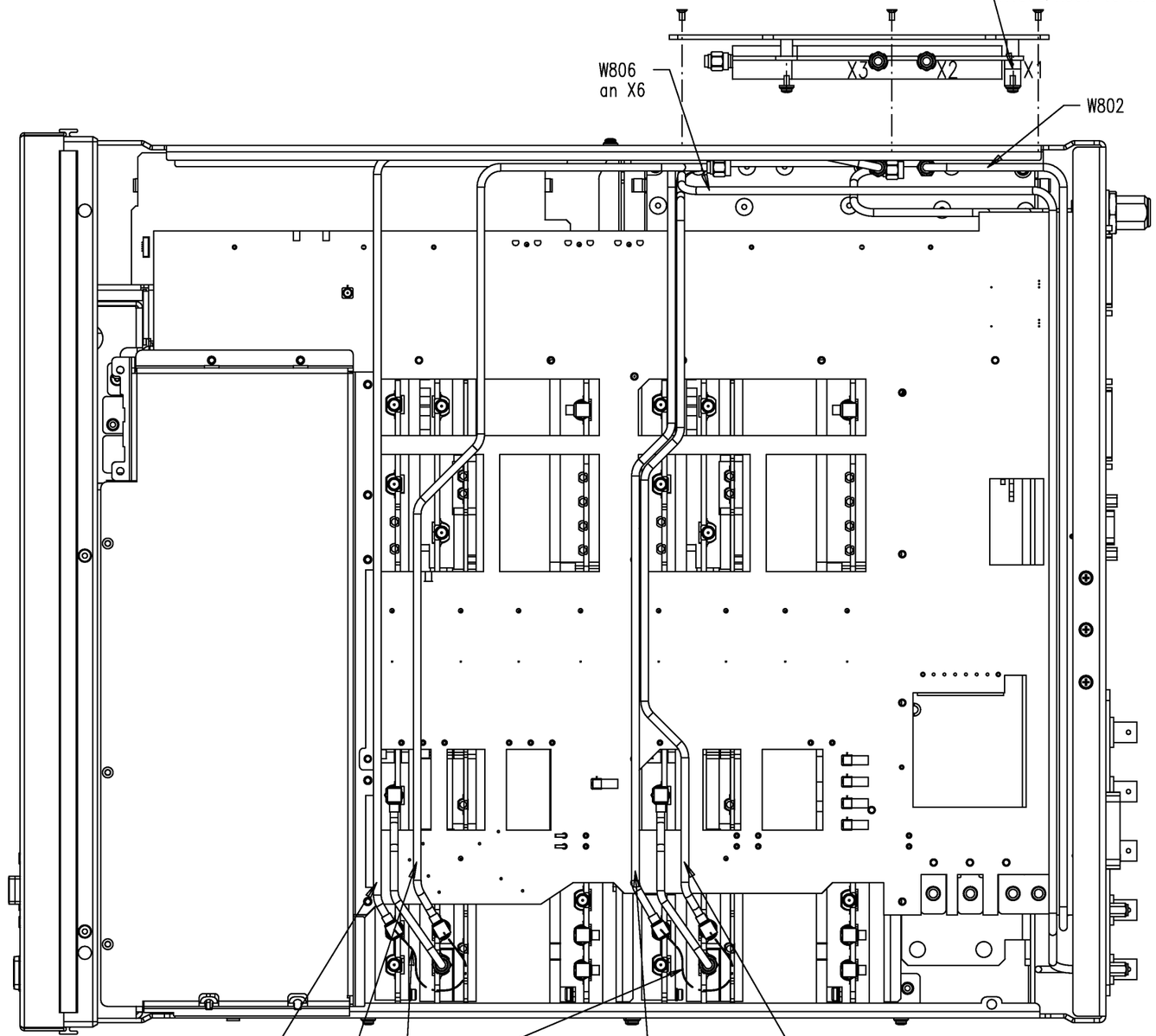
Projektions-methode
Projection Method

Maßstab / *Scale*	Toleranz / *Tol.*	Werkstoff / *Material*			
ROHDE&SCHWARZ	Benennung / *Designation*: SMU-B18 DIG. BASISBAND AUSGANG / SMU-B18 DIG. BASEBAND OUTPUT			Sprache / *Lang.*: de en	Aei. / *C.I.*: 01.00
SMU-B18	Datum / *Date*: 2007-07-26	Abteilung / *Dept.*: MEZ1	Name / *Name*: WU	Zeichn.Nr. / *Drawing No.*: 1159.6954.01	Blatt / *Sh.*: 1 / D

Pos.-Nr. *ItemNo*	Menge *Quantity*	ME *Unit*	El.Kennz *Ref.Des.*	Benennung / Bezeichnung *Designation*	Z	Sachnummer *Stock No.*	Ersatzteil *Subst.part*	BA	VH
				ACHTUNG EGB/ATTENTION ESD *VARIANTENERKLAERUNG *EXPLANATION OF MODELS VAR02=GRUNDVARIANTE MOD02=BASIC MODEL					
100	1	S	A650	EE BBOUT-R BBOUT-R	Z	1159.7009.02	X	M	
120	1	S		KB RUECKWAND GESCH. DIG.BASIS AUS REAR PANEL SHIELDED DIG.BASIS OUT	Z	1159.7021.00		M	
140	1	S		VS 6900/ISR-M2.5X10-A2 COMBINATION SCREWS		0041.1660.00		B	T
160	1	S		MZ ABDECKUNG COVER		1142.2996.00		M	
180	4	S		VS 965/ISR-M2.5X8-A4-PA 965/ISR-M2.5X8-A4-PA		1148.3294.00		B	T
190	1	S		MZ HAUBE COVER	Z	1142.2973.00		M	
200	1	S		VS 6900/ISR-M2.5X6-A2 COMBINATION SCREWS		1148.3059.00		B	T
210	1	S		MF HAUBE COVER 2		1142.2980.00		M	
220	2	S		VS 965/ISR-M2.5X10-A4-PA 965/ISR-M2.5X10-A4-PA		1148.2769.00		B	T

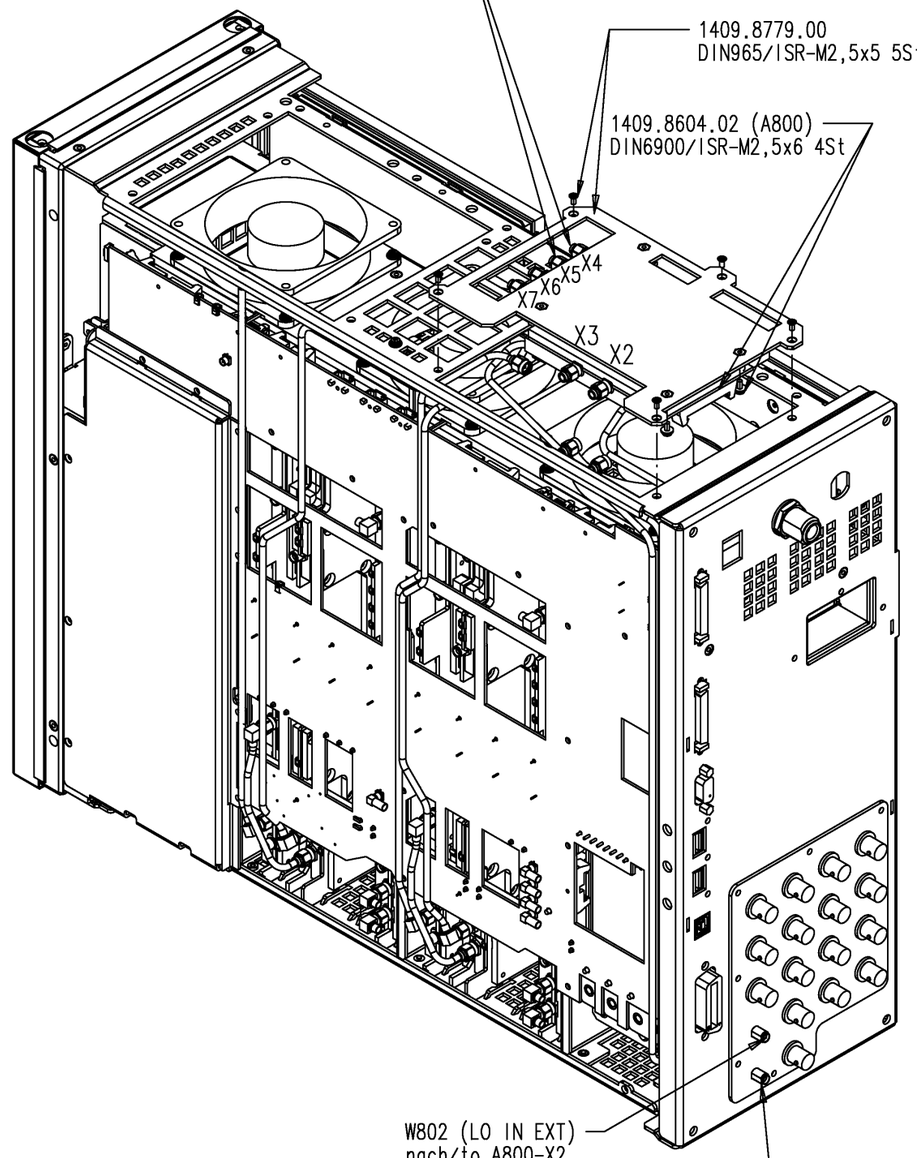
Kabel W1301 ersetzt durch W801
cable W1301 replaced by W801

W801/X1 verbunden ueber
A1300/X301 nach A100/X226
W801/X1 connected to
A1300/X301 to A100/X226



W804 und/and W805:
nur für Geräte mit 2 Kanälen notwendig
for 2-channel instruments only

fuer Geräte mit nur einem Kanal:
Abschlußwiderstände 50 Ohm auf X4 u.X5
for instruments with one channel only:
terminations 50 Ohm at X4 and X5



Darstellung 2x6GHz Gerät
View 2x6GHz Model

Projektions-methode
Projection Method

Maßstab *Scale*	Toleranz *Tol.*	Werkstoff *Material*			
ROHDE&SCHWARZ	Benennung / *Designation* SMATE-B90 PHASENKOHAERENZ SMATE-B90 PHASENKOHAERENZ			Sprache / *Lang.* de en	Aei. / *C.I.* 02.00
SMATE-B90	Datum *Date* 2008-01-23	Abteilung *Dept.* MENZ	Name *Name* WU	Zeichn.Nr. / *Drawing No.* 1404.9531.01	Blatt / *Sh.* 1 D

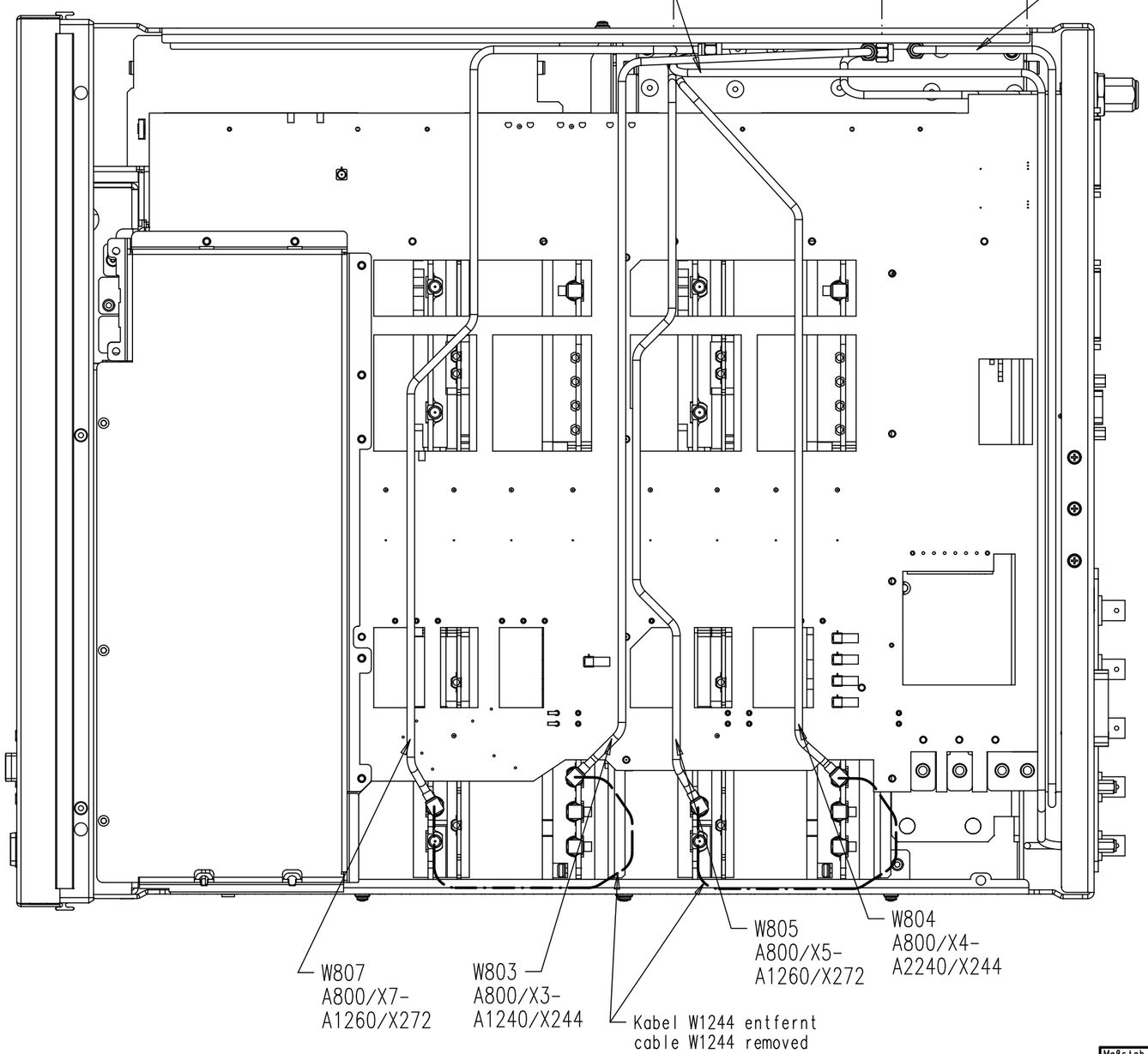
Kabel 1301 ersetzt durch W801
Cable W1301 replaced by W801

W801/X1 verbunden ueber
A1300/X301 nach A100/X226
W801/X1 connected to
A1300/X301 to A100/X226

W806
an X6

W802

X3 X2 X1



W807
A800/X7-
A1260/X272

W803
A800/X3-
A1240/X244

Kabel W1244 entfernt
cable W1244 removed

W805
A800/X5-
A1260/X272

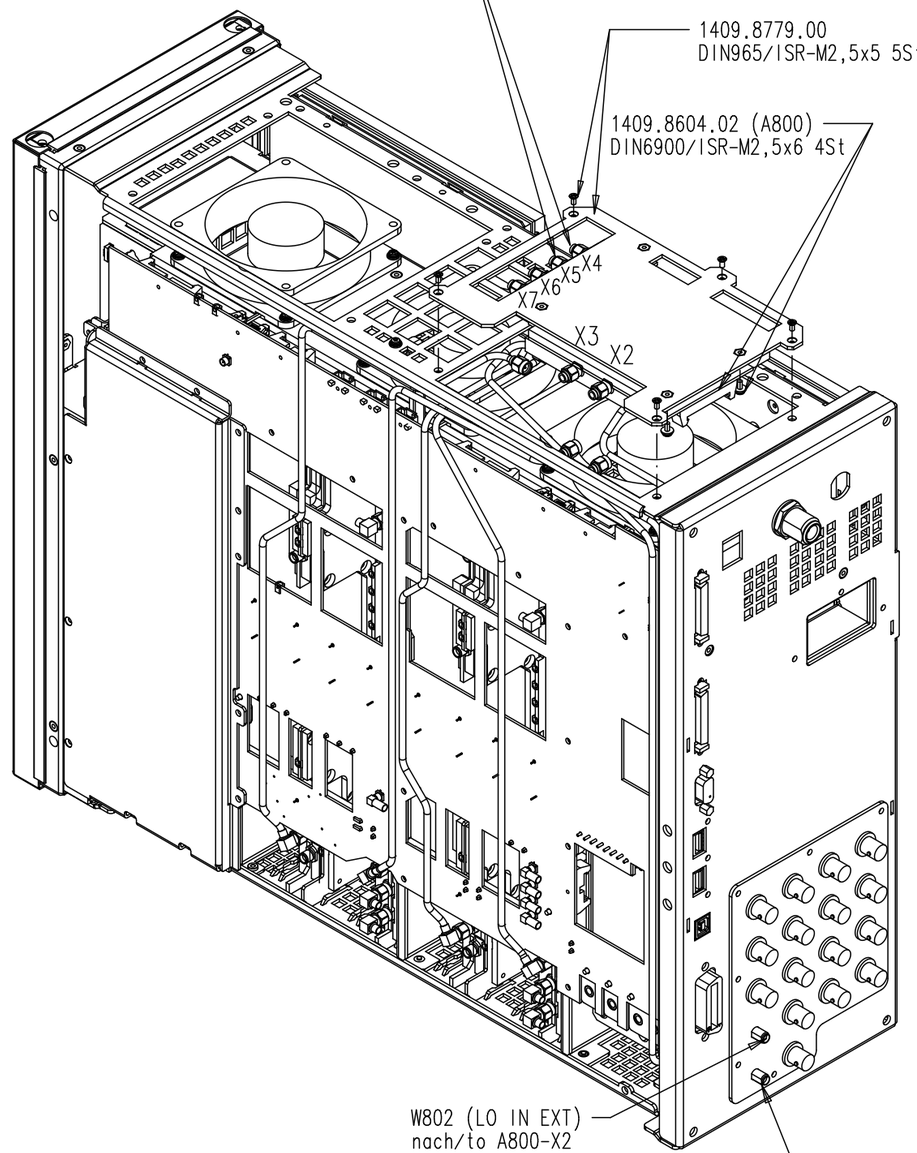
W804
A800/X4-
A2240/X244

W804 und/and W805:
nur für Geräte mit 2 Kanälen notwendig
for 2-channel instruments only

fuer Geräte mit nur einem Kanal:
Abschlußwiderstände 50 Ohm auf X4 u.X5
for instruments with one channel only:
terminations 50 Ohm at X4 and X5

1409.8779.00
DIN965/ISR-M2,5x5 5St

1409.8604.02 (A800)
DIN6900/ISR-M2,5x6 4St



W802 (LO IN EXT)
nach/to A800-X2

W806 (LO OUT EXT)
nach/to A800-X6

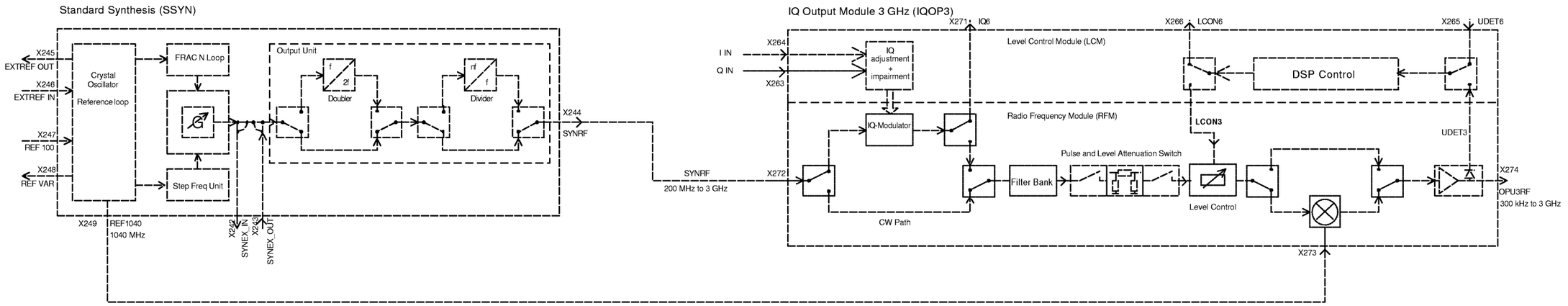
Darstellung 2x3GHz Gerät
View 2x3GHz Model

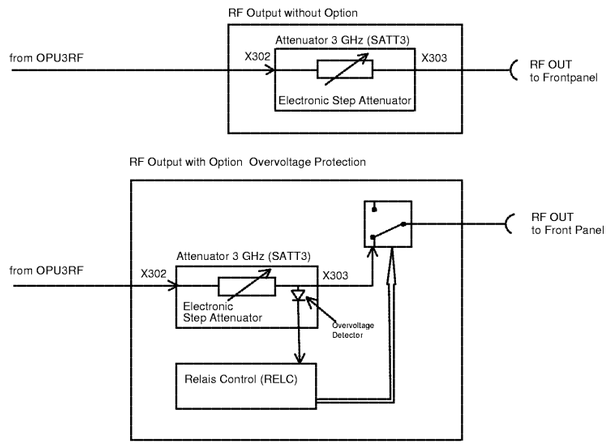
Projektions-
methode
Projection Method

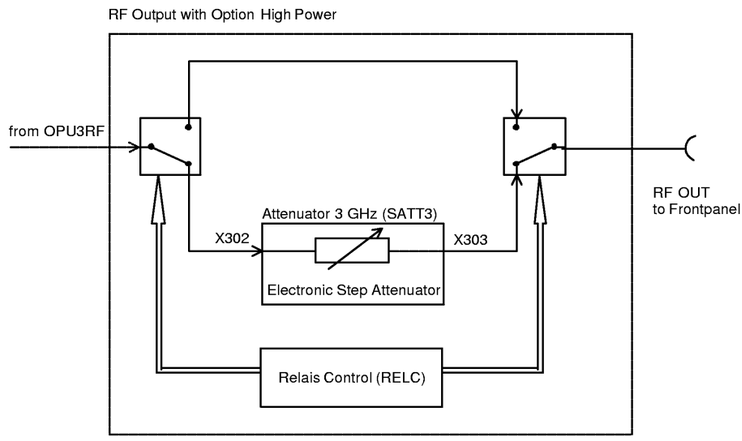
Maßstab *Scale*	Toleranz *Tol.*	Werkstoff *Material*		
ROHDE&SCHWARZ	Benennung / *Designation* SMATE-B90 PHASENKOHAERENZ SMATE-B90 PHASENKOHAERENZ		Sprache / *Lang.* de en	Aei. / *C.I.* 01.00	Blatt / *Sh.* 2
SMATE-B90	Datum *Date*	Abteilung *Dept.* MENZ	Name *Name* WU	Zeichn.Nr. / *Drawing No.* 1404.9531.01 D	

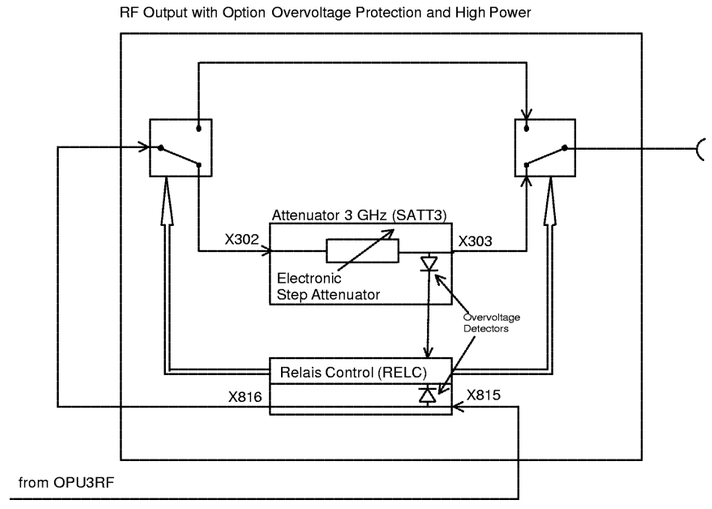
Pos.-Nr. *ItemNo*	Menge *Quantity*	ME *Unit*	El.Kennz *Ref.Des.*	Benennung / Bezeichnung *Designation*	Z	Sachnummer *Stock No.*	Ersatzteil *Subst.part*	BA	VH
				ACHTUNG EGB/ATTENTION ESD *VARIANTENERKLAERUNG *EXPLANATION OF MODELS VAR02=GRUNDVARIANTE MOD02=BASIC MODEL					
5	0	S		ZS ERSATZTEILLISTE VORHANDEN SPARE PARTS LIST AVAILABLE *** BEACHTE / NOTE: 1400.7040.01 ST ERSATZTEIL-LISTE SMATE / SPARE PARTS LIST SMATE ***		0999.9684.00		M	O
20	1	S	A800	ED LO SYNC BOARD LO SYNC BOARD	Z	1409.8640.02	X	M	
30	1	S		ZN MONTAGEBLECH LO SYNC MOUNTING PLATE LO SYNC	Z	1409.8779.00		M	
40	4	S		VS 6900/ISR-M2.5X6-A2 COMBINATION SCREWS		1148.3059.00		B	T
50	5	S		VS 965/ISR-M2.5X5-A4-PA SCREW		1148.2752.00		B	T
80	1	S	W801	DY KABEL W801 CABLE W801	Z	1409.8740.00		M	
100	1	S	W802	DW HF-KABEL W802 RF CABLE W802	Z	1409.8685.00		M	
110	1	S	W803	DW HF KABEL W803 RF-CABLE W803 für 6GHz Pfad/for 6GHz path	Z	1409.8691.00		M	
120	1	S	W807	DW HF-KABEL W807 RF CABLE W807 für 6GHz Pfad/for 6GHz path	Z	1409.8704.00		M	
130	1	S	W806	DW HF-KABEL W806 RF-CABLE W806	Z	1409.8710.00		M	
140	1	S	W804	DW HF-KABEL W804 RF CABLE W 804	Z	1409.8727.00		M	
150	1	S	W805	DW HF-KABEL W805 RF CABLE W805	Z	1409.8733.00		M	
170	.6	S	W803	DW HF-KABEL W803 3GHZ RF-CABLE W803 3GHZ für 3GHz Pfad/for 3GHz path	Z	1404.9554.00		M	
180	.6	S	W804	DW HF-KABEL W804 3GHZ RF-CABLE W804 3GHZ für 3GHz Pfad/for 3GHz path	Z	1404.9560.00		M	
200	2	S	R1 R2	FJ ABSCHLUSSW.50OHM SMA 0.5W TERMINATION 50 OHM		0249.7823.00		B	O
250	1	S		PD EINBAUANWEISUNG SMATE-B90 INSTALLATION INSTRUCTION		1404.9548.00		M	

Block Diagrams





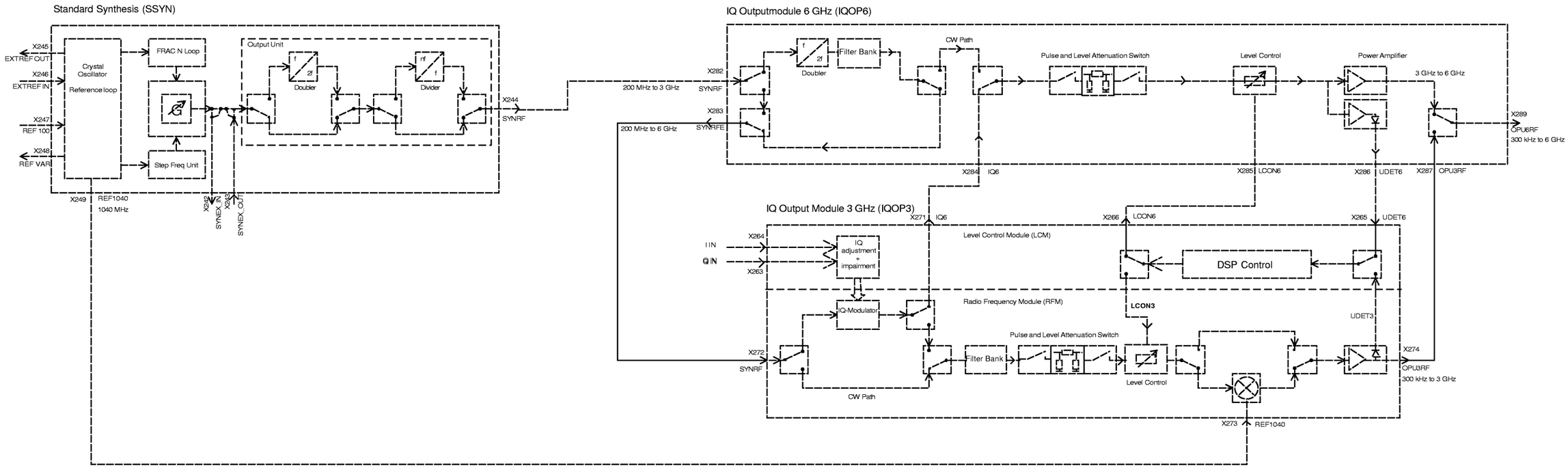


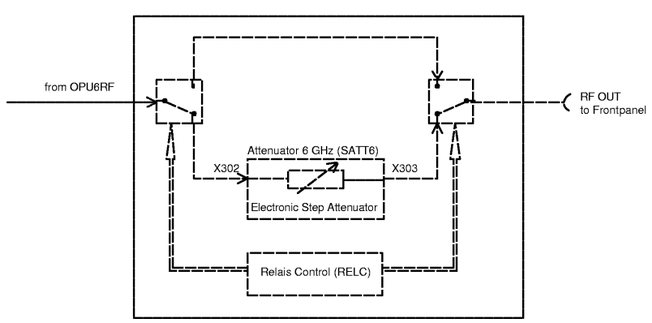


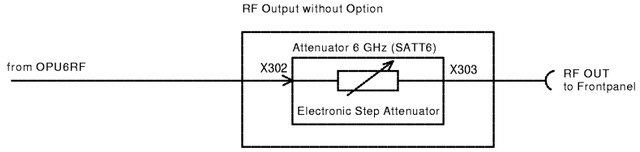
Block Diagram SMU Family

3 GHz RF Path

03				Benennung: SMU200A SIGNALGENERATOR VECTOR SIG. GENERATOR					
				1GPK	Tag	Name	ROHDE&SCHWARZ	Zeichn.-Nr. 1141.2005.01 FS	Blatt-Nr. 1+
				Bearb.	10.2003	Massa			v. Bl.
Änd. Zust.	Änderungs-Mitteilung	Tag	Name	Gepr.					
				Norm			zu Gerät SMU	reg. i. V. 1141.2005	erste Z.



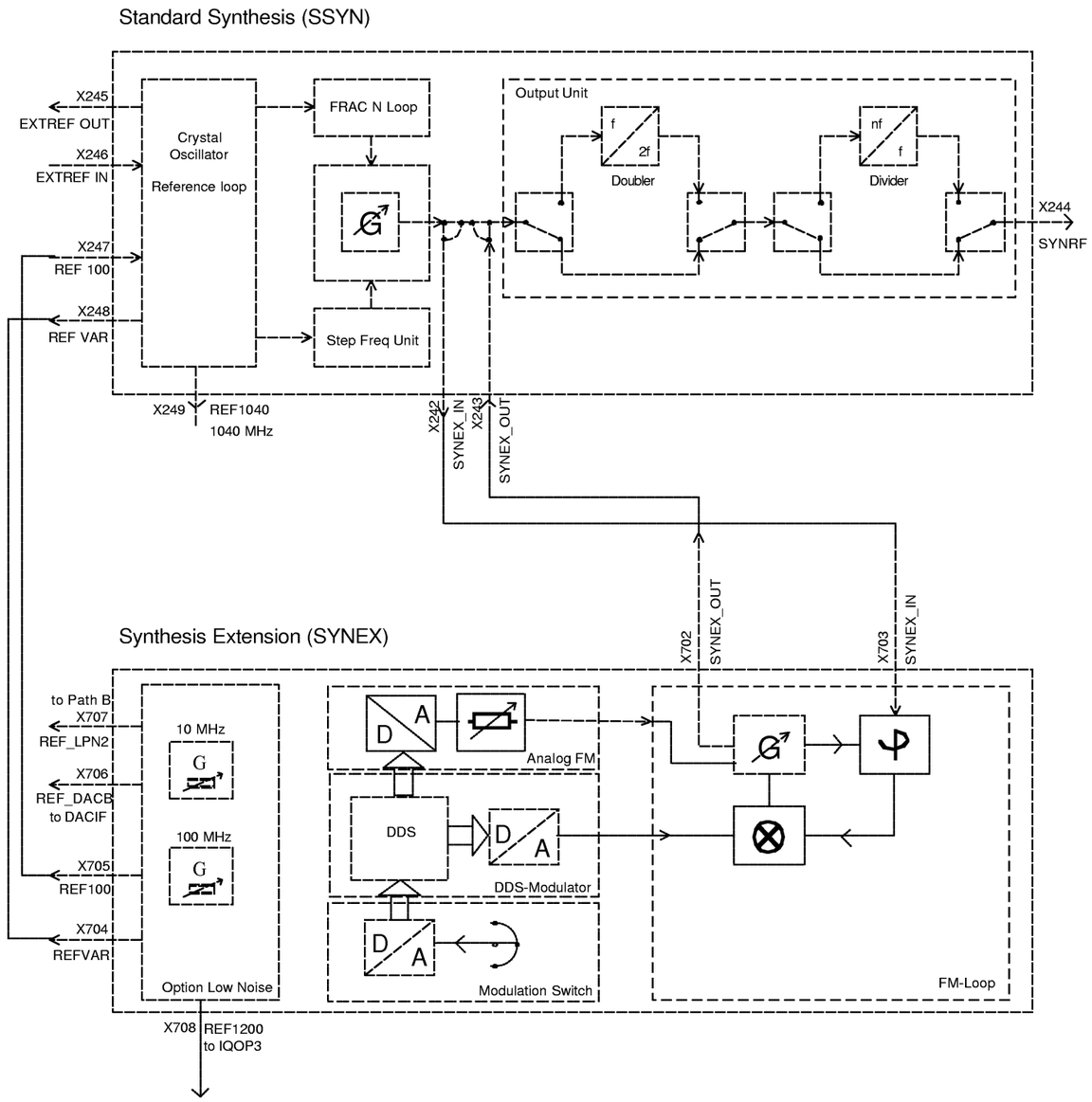




Block Diagram SMU Family

6 GHz RF Path

03				Benennung: SMU200A SIGNALGENERATOR VECTOR SIG. GENERATOR					
				1GPK	Tag	Name	ROHDE&SCHWARZ	Zeichn.-Nr. 1141.2005.01 FS	Blatt-Nr. 2+
				Bearb.	10.2003	Massa			v. Bl.
Änd. Zust.	Änderungs-Mitteilung	Tag	Name	Gepr.					
				Norm			zu Gerät SMU	reg. i. V. 1141.2005	erste Z.



Block Diagram SMU Family

Synthesis Extension Connections

Änd. Zust.	Änderungs-Mitteilung	Tag	Name
03		10.2003	dr

Benennung: SMU200A SIGNALGENERATOR
VECTOR SIG. GENERATOR

	Tag	Name
1GPK		
Bearb.	10.2003	Massa
Gepr.		
Norm		

ROHDE&SCHWARZ

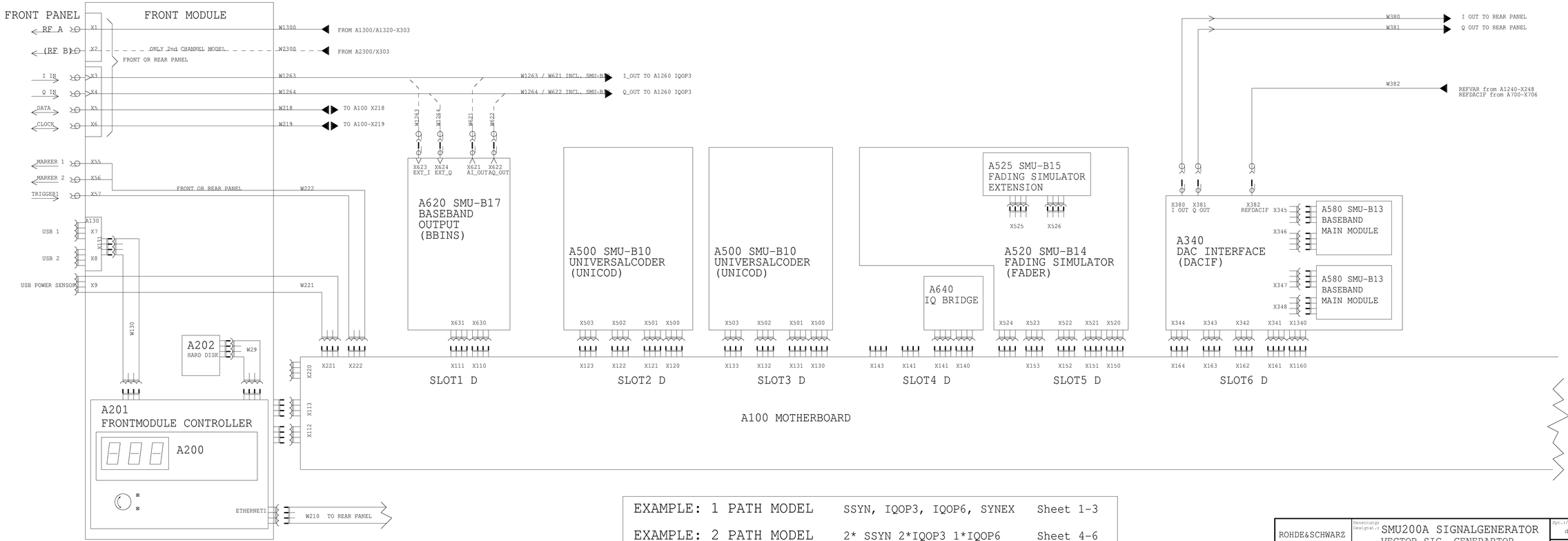
Zeichn.-Nr. 1141.2005.01 FS

Blatt-Nr. 3- v. Bl.

zu Gerät SMU | reg. i. V. 1141.2005 | erste Z.

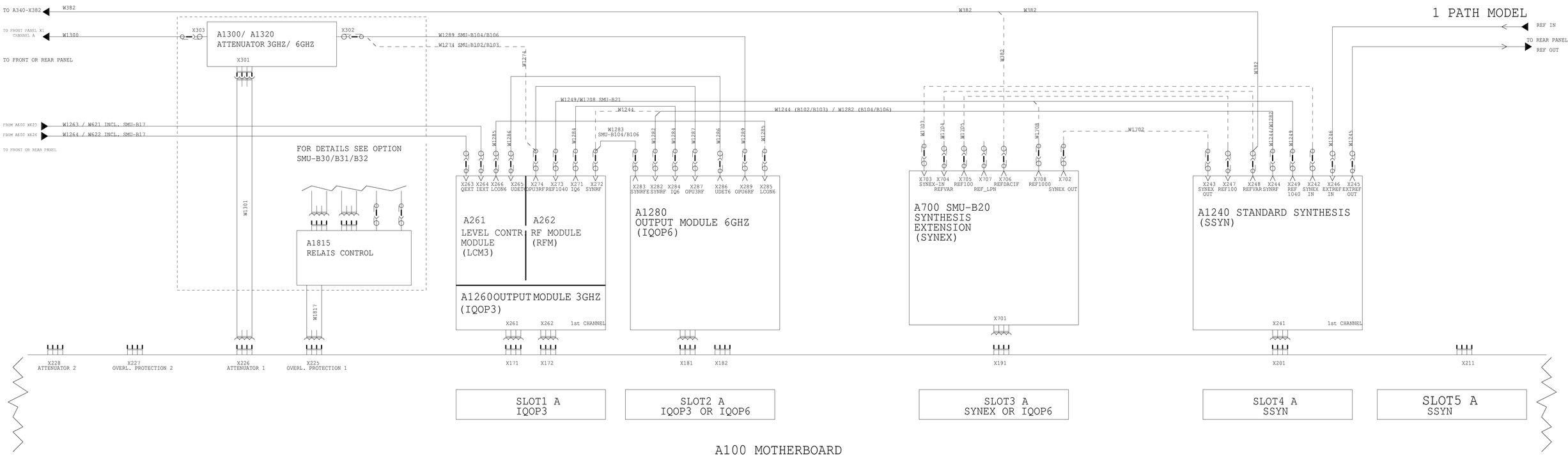
Circuit Diagrams

1 PATH MODEL



EXAMPLE: 1 PATH MODEL	SSYN, IQOP3, IQOP6, SYNEX	Sheet 1-3
EXAMPLE: 2 PATH MODEL	2* SSYN 2*IQOP3 1*IQOP6	Sheet 4-6

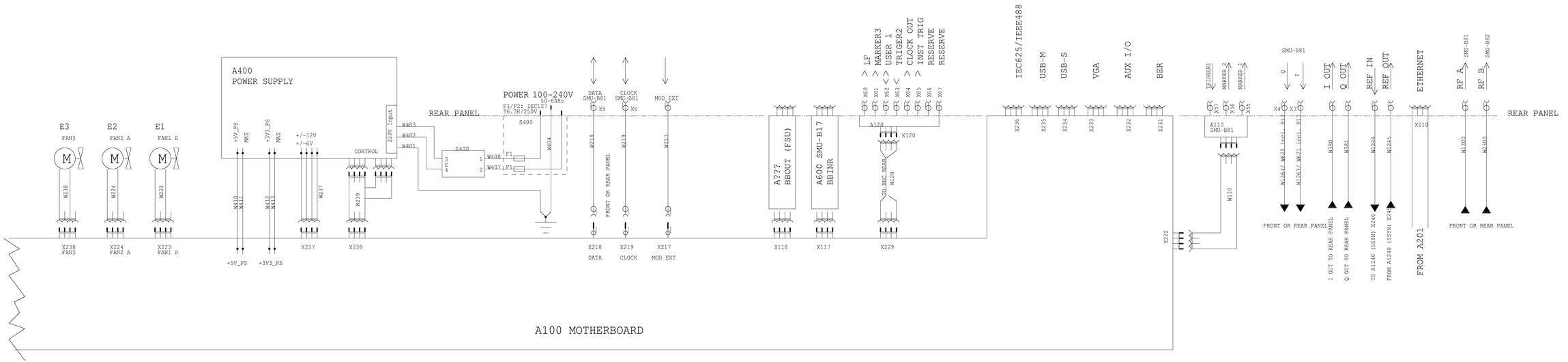
ROHDE&SCHWARZ	Benennung/ Designat.: SMU200A SIGNALGENERATOR VECTOR SIG. GENERARTOR	Spr./Lang.: de	Ausf./V.: 08.00	Blatt/Bl.: 1 +
		Zeichn.Nr./Drawing No.: 1141.2005.01 S		
@plotR	Datum/ Date: 05-02-28	Abteilung/ Dept.: 1GPK	Name/ Name: dorner	



EXAMPLE: 1 PATH MODEL	SSYN, IQOP3, IQOP6, SYNEX	Sheet 1-3
EXAMPLE: 2 PATH MODEL	2* SSYN 2*IQOP3 1*IQOP6	Sheet 4-6

ROHDE&SCHWARZ	Benennung/ Designat.: SMU200A SIGNALGENERATOR VECTOR SIG. GENERARTOR	Spr./Lang.: de	Ausf./V.: 08.00	Blatt/Bl.: 2 +
		Gelöscht/Nr./Löschung Nr.:		
@plotR	Datum/ Date: 05-02-28	Abteilung/ Dept.: 1GPK	Name/ Name: dorner	1141.2005.01 S

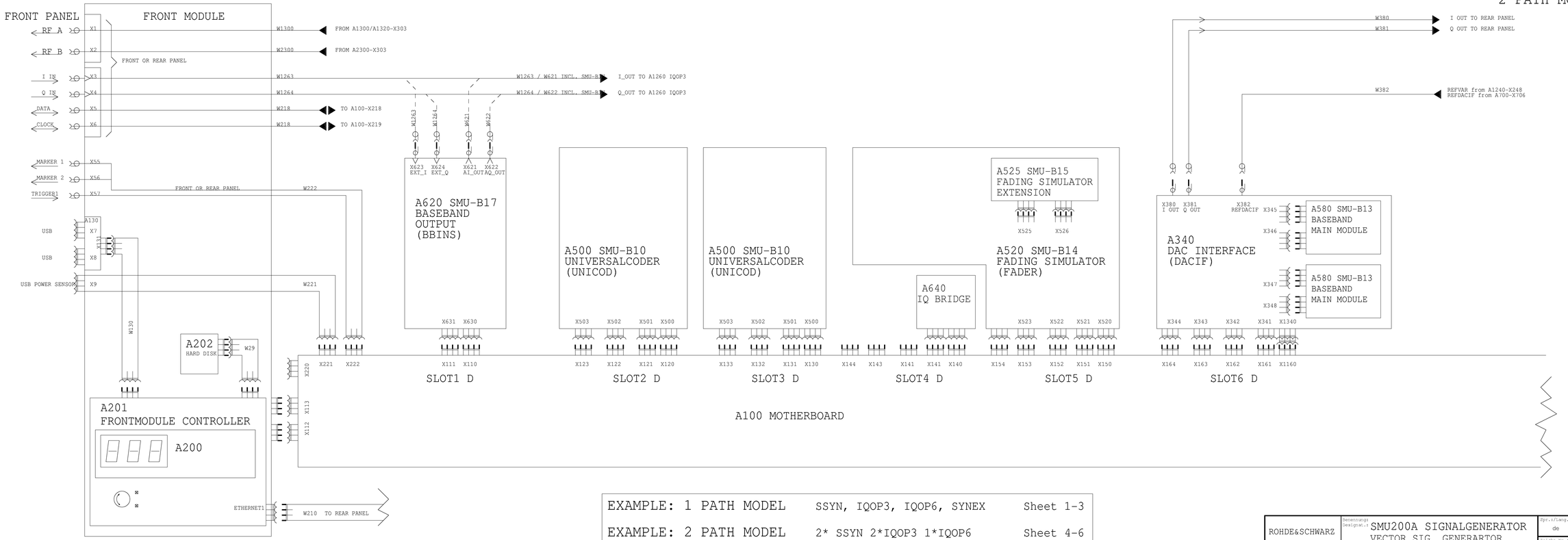
1 PATH MODEL



EXAMPLE: 1 PATH MODEL	SSYN, IQOP3, IQOP6, SYNEX	Sheet 1-3
EXAMPLE: 2 PATH MODEL	2* SSYN 2*IQOP3 1*IQOP6	Sheet 4-6

ROHDE&SCHWARZ	Benennung/ Designat.: SMU200A SIGNALGENERATOR VECTOR SIG. GENERARTOR	Spr./Lang.: de	Ausf./V.: 08.00	Blatt/Bl.: 3 +
		Sach-Nr./Zeichnung No.: 1141.2005.01 S		
@plotR	Datum/ Date: 05-02-28	Abteilung/ Dept.: IGPK	Name/ Name: dorner	

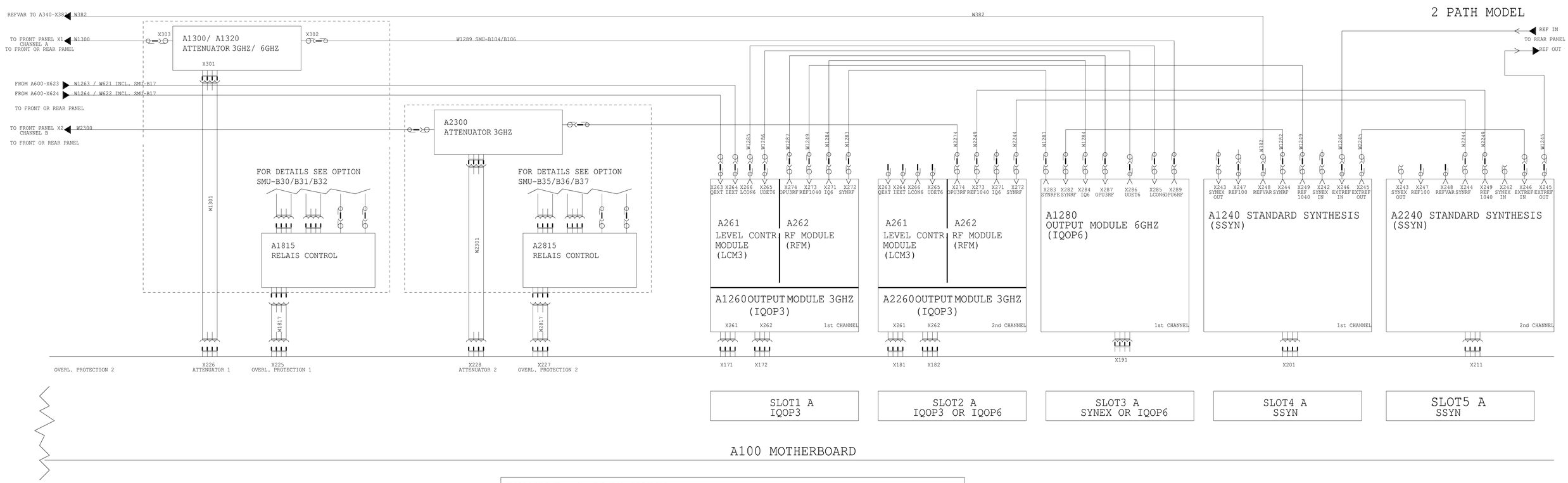
2 PATH MODEL



EXAMPLE: 1 PATH MODEL	SSYN, IQOP3, IQOP6, SYNEX	Sheet 1-3
EXAMPLE: 2 PATH MODEL	2* SSYN 2*IQOP3 1*IQOP6	Sheet 4-6

ROHDE&SCHWARZ	Benennung/ Designat.:	SMU200A SIGNALGENERATOR VECTOR SIG. GENERARTOR	Spr./Lang.: de	Art/C.I.: 08.00	Blatt/Bl.: 4 +
	Sach-Nr./Zeichng No.:				
@plotR	Datum/ Date: 05-02-28	Abteilung/ Dept.: IGPK	Name/ Name: dorner	1141.2005.01 S	

2 PATH MODEL

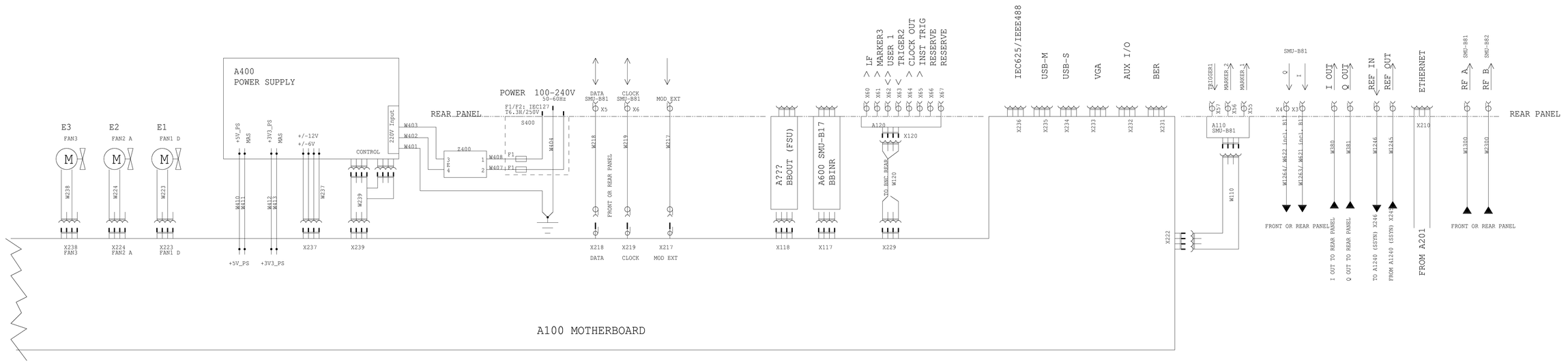


A100 MOTHERBOARD

EXAMPLE: 1 PATH MODEL	SSYN, IQOP3, IQOP6, SYNEX	Sheet 1-3
EXAMPLE: 2 PATH MODEL	2* SSYN 2*IQOP3 1*IQOP6	Sheet 4-6

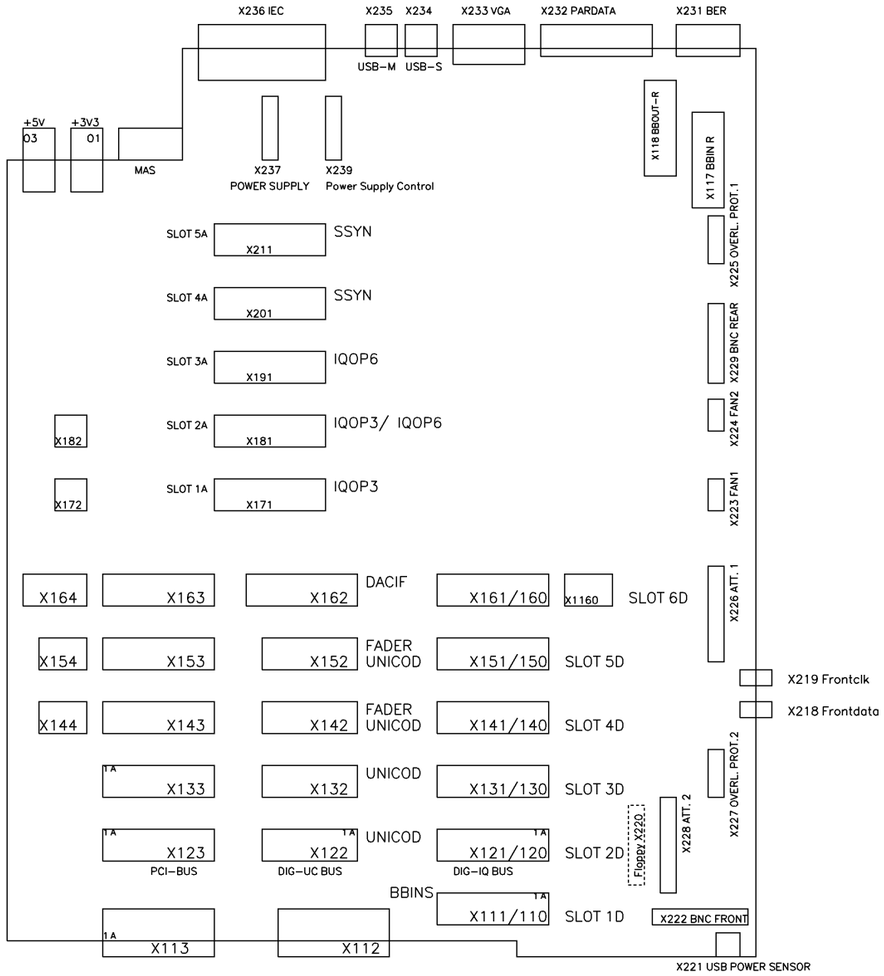
ROHDE&SCHWARZ	Benennung/ Designat.: SMU200A SIGNALGENERATOR VECTOR SIG. GENERARTOR	Spr.r/Lang.: de	Ael.t/C.I.: 08.00	Blatt/Bl.: 5 +
		Zeichn.Nr./Drawing No.: 1141.2005.01 S		
@plotR	Datum/ Date: 05-02-28	Abteilung/ Dept.: 1GPK	Name: dorner	

2 CHANNEL MODEL



EXAMPLE: 1 PATH MODEL	SSYN, IQOP3, IQOP6, SYNEX	Sheet 1-3
EXAMPLE: 2 PATH MODEL	2* SSYN 2*IQOP3 1*IQOP6	Sheet 4-6

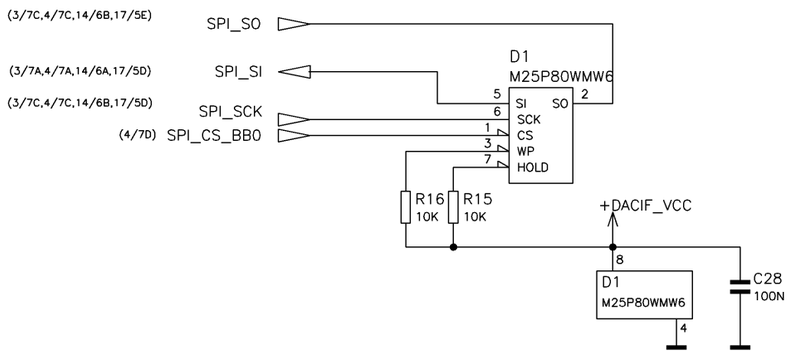
ROHDE&SCHWARZ	Benennung/ Designat.: SMU200A SIGNALGENERATOR VECTOR SIG. GENERARTOR		Spr./Lang.: de	Ausg./Ed.: 08.00	Blatt/Bl.: 6 -
			Schalt-Nr./Drawing No.: 1141.2005.01 S		
@plotR	Datum/ Date: 05-02-28	Abteilung/ Dept.: 1GPK	Name/ Name: dorner		



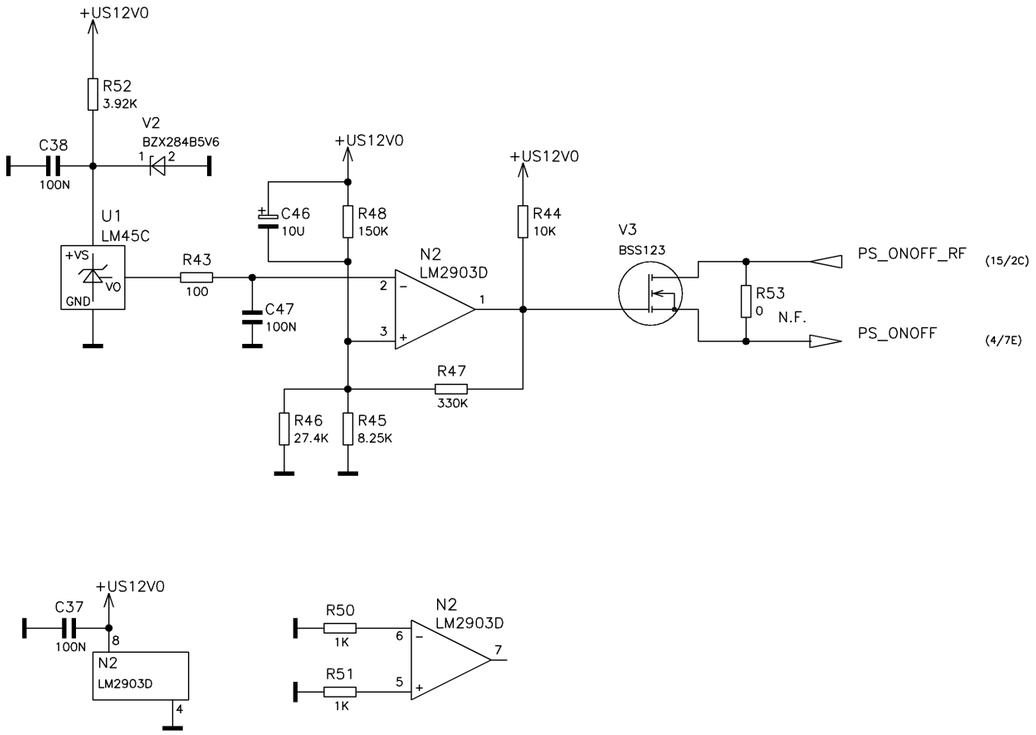
ACHTUNG: EGB !
ELEKTROSTATISCH GEFAEHRDETE BAUELEMENTE ERFORDERN EINE BESONDERE HANDHABUNG.
ATTENTION ESD !
ELECTROSTATIC SENSITIVE DEVICES REQUIRE A SPECIAL HANDLING

ROHDE&SCHWARZ	Benennung: / Designation: MOTHERBOARD SMU MOTHERBOARD SMU				Sprache: / Lang.: DE	Aei: / C.I.: 07.05	Blatt: / Sh.: 1+
Typ: / Type: SMU	Datum: / Date: 05–03–09	Abteilung: / Dpt: 1GPK	Name: / Name: DORNER		Zeichn. Nr.: / Drawing No.: 1141.3501.01 S		
1. Z.: / used in: 1141.2005.01	TOP/TOP.1						

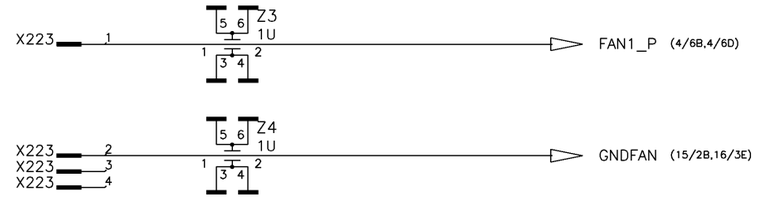
BG DATA



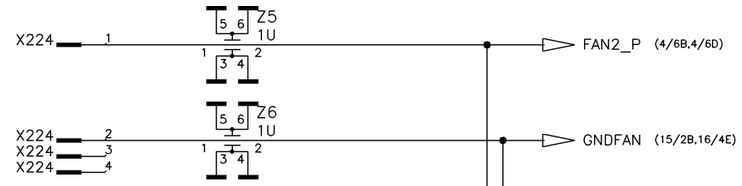
TEMP_SWITCH_RF



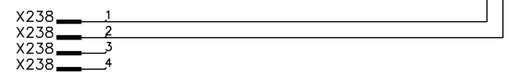
FAN 1 /DIGITAL

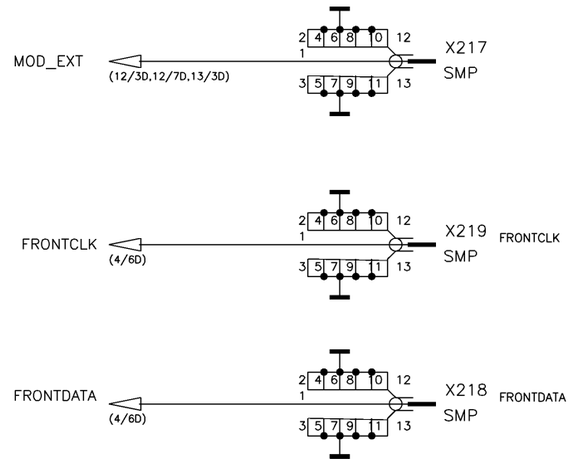


FAN 2 /ANALOG



FAN 3 /POWER SUPPLY





ACHTUNG: EGB !
ELEKTROSTATISCH GEFAEHRDETE BAUELEMENTE ERFORDERN EINE BESONDERE HANDHABUNG.
ATTENTION ESD !
ELECTROSTATIC SENSITIVE DEVICES REQUIRE A SPECIAL HANDLING

ROHDE&SCHWARZ	Benennung: MOTHERBOARD SMU Designation: MOTHERBOARD SMU				Sprache: / Lang.: DE	Aei: / C.I.: 07.05	Blatt: / Sh.: 2+
Typ: SMU Type:	Datum: 05-03-09 Date:	Abteilung: 1GPK Dpt:	Name: DORNER Name:		Zeichn. Nr.: / Drawing No.: 1141.3501.01 S		
1. Z.: 1141.2005.01 used in:	TOP/TOP.2						

FRONT > > > REAR >

SPI_CS_BB1 (4/7B)

SLOT1 D — BBINS

SLOT2 D

SLOT3 D

SPI_CS_BB2 (4/7D)

SPI_CS_BB3 (10/4B)

(14/6B) BBL0_P
(14/6B) BBL1_P
(14/6B) BBL2_P
(14/6B) BBL3_P
(14/6B) BBL4_P
(14/6C) BBL5_P
(14/6C) BBL6_P
(14/6C) BBL7_P
(14/6C) BBL8_P

(17/7E)
(8/3C,8/7C,9/3C,9/7C,14/6D) ABUS2
(8/2C,8/5C,9/2C,9/6C) ABUS0

(14/6C) BBIN_REC_CLK_P
(14/6C) BBIN_I2C_D

BBOUTCK_P
(8/2C,8/2E,8/5C,9/2C,9/6C) (17/7D)

+U3V3-S1
+U5V2-S2
+U12V0
-U6V0
+U6V0

TIQCLKFP

IQ

R35 330
R33 470
+U3V3

R1 100

SPI_SI (2/2A,4/7A,14/6A,17/5D)
RIQ_CLK_RP (4/7A)
MARKER6 (4/7A,17/2D)
MARKER2 (4/7A,17/8B)
MARKER4 (4/7A,17/2D)

C0_A0 (4/2B)
C1_A1 (4/2B)
C2_A2 (4/2B)
C3_A3 (4/2B)
C4_A4 (4/2B)
C5_A5 (4/2B)
C6_A6 (4/2B)
C7_A7 (4/2B)
C8_A8 (4/2B)
C9_A9 (4/2B)
C10_A10 (4/2B)
C11_A11 (4/2C)
C12_A12 (4/2C)
C13_A13 (4/2C)
C14_A14 (4/2C)
C15_A15 (4/2C)
C16_A16 (4/2C)

SER_STRB_A_BB (4/7B,14/6A,17/5D)
SER_IN_BB (4/7B,14/6C,17/7D)
SER_OUT_BB (4/7B,14/6B,17/5D)
SER_CLK_BBS (10/2C)

JTAG_TMS_BB1 (4/7E)
JTAG_TDO_BB (4/6E,8/3C,8/7C,9/3C,9/7C) (14/6C,17/7D)
JTAG_TRST_BB (4/7C,8/2B,8/5B,9/2B,9/6B) (14/6C,17/7D)

MARKER3 (4/7C,17/6B)
SPI_SCK (2/2B,4/7C,14/6B,17/5D)
SPI_SO (2/2A,4/7C,14/6B,17/5E)
RIQ_CLK_RM (4/7C)
MARKER5 (4/7C,17/2D)
MARKER1 (4/7C,17/8B)

(14/6C) BBL0_N
(14/6C) BBL1_N
(14/6C) BBL2_N
(14/6C) BBL3_N
(14/6C) BBL4_N
(14/6D) BBL5_N
(14/6D) BBL6_N
(14/6D) BBL7_N
(14/6D) BBL8_N

(8/2B,8/5B,9/2B,9/6B,14/6D) ABUS3
(8/3B,8/7B,9/3B,9/7B) ABUS1

(14/6D) BBIN_REC_CLK_N
(14/6D) BBIN_I2C_C

BBOUTCK_N
(8/2E,8/3B,8/7B,9/3B,9/7B)
(17/7E)

(10/4D) BB_USRCLK

CLEAN_CLK (4/6D)
BBOUT_USRCLK (17/7D)

R36 330
R34 470
+U3V3

D0_B0 (4/2D)
D1_B1 (4/2D)
D2_B2 (4/2D)
D3_B3 (4/2D)
D4_B4 (4/2D)
D5_B5 (4/2D)
D6_B6 (4/2D)
D7_B7 (4/2D)
D8_B8 (4/2D)
D9_B9 (4/2D)
D10_B10 (4/2E)
D11_B11 (4/2E)
D12_B12 (4/2E)
D13_B13 (4/2E)
D14_B14 (4/2E)
D15_B15 (4/2E)
D16_B16 (4/2E)

SER_STRB_D_BB (4/7D,14/6B,17/5E)
SER_RESET_BB_N (4/7D,14/6B,17/5E)
SER_INT_BB_N (4/7D,14/6B,17/5D)
DIAG (12/3C,12/7C,13/3C,13/7C) (8/3D,8/7D,9/3D,9/7D,10/2E) (14/3D,15/5B,15/7B)
JTAG_TDI_BB (4/6C,8/3B,8/7B,9/3B,9/7B) (14/6D,17/7D)
JTAG_TCK_BBS (4/6C,8/2B,8/5B,9/2B,9/6B)

ACHTUNG: EGB !
ELEKTROSTATISCH GEFAEHRDETE BAUELEMENTE ERFORDERN EINE BESONDERE HANDHABUNG.
ATTENTION ESD !
ELECTROSTATIC SENSITIVE DEVICES REQUIRE A SPECIAL HANDLING

X110 CD1	X111 CD1	X110 AB1	X111 AB1	X120 AB1	X121 AB1	X120 CD1	X121 CD1
X110 CD2	X111 CD2	X110 AB2	X111 AB2	X120 AB2	X121 AB2	X120 CD2	X121 CD2
X110 CD3	X111 CD3	X110 AB3	X111 AB3	X120 AB3	X121 AB3	X120 CD3	X121 CD3
X110 CD4	X111 CD4	X110 AB4	X111 AB4	X120 AB4	X121 AB4	X120 CD4	X121 CD4
X110 CD5	X111 CD5	X110 AB5	X111 AB5	X120 AB5	X121 AB5	X120 CD5	X121 CD5
X110 CD6	X111 CD6	X110 AB6	X111 AB6	X120 AB6	X121 AB6	X120 CD6	X121 CD6
X110 CD7	X111 CD7	X110 AB7	X111 AB7	X120 AB7	X121 AB7	X120 CD7	X121 CD7
X110 CD8	X111 CD8	X110 AB8	X111 AB8	X120 AB8	X121 AB8	X120 CD8	X121 CD8
X110 CD9	X111 CD9	X110 AB9	X111 AB9	X120 AB9	X121 AB9	X120 CD9	X121 CD9
X110 CD10	X111 CD10	X110 AB10	X111 AB10	X120 AB10	X121 AB10	X120 CD10	X121 CD10

X130 CD1	X131 CD1	X130 AB1	X131 AB1
X130 CD2	X131 CD2	X130 AB2	X131 AB2
X130 CD3	X131 CD3	X130 AB3	X131 AB3
X130 CD4	X131 CD4	X130 AB4	X131 AB4
X130 CD5	X131 CD5	X130 AB5	X131 AB5
X130 CD6	X131 CD6	X130 AB6	X131 AB6
X130 CD7	X131 CD7	X130 AB7	X131 AB7
X130 CD8	X131 CD8	X130 AB8	X131 AB8
X130 CD9	X131 CD9	X130 AB9	X131 AB9
X130 CD10	X131 CD10	X130 AB10	X131 AB10

ROHDE&SCHWARZ	Benennung: / Designation: MOTHERBOARD SMU / MOTHERBOARD SMU			Sprache: / Lang.: DE; Aei: / C.I.: 07.05; Blatt: / Sh.: 3+
Typ: / Type: SMU	Datum: / Date: 05-03-09	Abteilung: / Dpt: 1GPK	Name: / Name: DORNER	Zeichn. Nr.: / Drawing No.: 1141.3501.01 S
1. Z.: / used in: 1141.2005.01			TOP/TOP.3	

REAR

SLOT4 D > IQ > SLOT5 D > SLOT6 D

SPI_CS_BB4 (10/2C)

SPI_CS_BB5 (4/7D)

SPI_SI (2/2A,3/7A,14/6A,17/5D) (FROM DACIF)
RIQ_CLK_RP (3/7A)
MARKER6 (3/7A,17/2D)
MARKER2 (3/7A,17/8B)
MARKER4 (3/7A,17/2D)

(3/7B) C0_A0, C1_A1, C2_A2, C3_A3, C4_A4, C5_A5, C6_A6, C7_A7, C8_A8, C9_A9, C10_A10, C11_A11, C12_A12, C13_A13, C14_A14, C15_A15, C16_A16

(17/7D) BB01_P, (17/7D) BB03_P, (17/7D) BB05_P, (4/6D,16/3E) FAN2_P, (4/6D,16/4E) FAN1_P

BB00_P (17/7D), BB02_P (17/5D), BB04_P (17/5D), BB06_P (17/5D), BB07_P (17/5D), BBOFCK_P (17/5D), BB_REF_P (17/7D), SPI_CS_BB1 (3/3A)

SER_CLK_BBR (14/6B,17/5E), SER_OUT_BB (3/7C,14/6B,17/5D), SER_IN_BB (3/7C,14/6C,17/7D), SER_STRB_A_BB (3/7C,14/6A,17/5D), SENS_TRIG_P (16/8E), PARDATA8 (17/2D), PARDATA6 (17/2D), PARDATA4 (17/2D), PARDATA2 (17/2D), PARDATA0 (17/2D), SYMB_CLK (17/2E), BIT_CLK (17/2E), FMR_ONOFF (11/3C), REARCLK (17/6B), USER1 (17/6C), USER3 (17/2D), HOPP (17/2D), BURST (17/2D), TRIGIN_A (17/8A), JTAG_TRST_BB (3/7C,8/2B,8/5B,9/2B,9/6B,14/6C,17/7D), JTAG_TMS_BB2 (8/2C)

(9/2C) JTAG_TMS_BB4
(3/7E,8/2B,8/5B,9/2B,9/6B) JTAG_TCK_BBS
(3/7E,8/3B,8/7B,9/3B,9/7B) JTAG_TDI_BB
(14/6D,17/7D)

MARKER3 (3/7C,17/6B)
SPI_SCK (2/2B,3/7C,14/6B,17/5D)
SPI_SO (2/2A,3/7C,14/6B,17/5E) (TO DACIF)

MARKER5 (3/7C,17/2D)
MARKER1 (3/7C,17/8B)
RIQ_CLK_RM (3/7C)

(3/7D) D0_B0, D1_B1, D2_B2, D3_B3, D4_B4, D5_B5, D6_B6, D7_B7, D8_B8, D9_B9, D10_B10, D11_B11, D12_B12, D13_B13, D14_B14, D15_B15, D16_B16

(17/7E) BB01_N, (17/7E) BB03_N, (17/7E) BB05_N, (4/6B,16/3E) FAN2_P, (4/6B,16/4E) FAN1_P, (2/7E) FRONTDATA, (2/7D) FRONTCLK, (3/3D) CLEAN_CLK

BB00_N (17/7E), BB02_N (17/5E), BB04_N (17/5E), BB06_N (17/5E), BB07_N (17/5E), BBOFCK_N (17/5E), BB_REF_N (17/7E), SPI_CS_BB2 (3/4A), SPI_CS_BB5 (4/4B), SPI_CS_BB0 (2/2B), SER_INT_BB_N (3/7E,14/6B,17/5D), SER_RESET_BB_N (3/7E,14/6B,17/5E), SER_STRB_D_BB (3/7E,14/6B,17/5E), SENS_TRIG_N (16/8E), PARDATA9 (17/2D), PARDATA7 (17/2D), PARDATA5 (17/2D), PARDATA3 (17/2D), PARDATA1 (17/2D), PAR_RESERVE (17/2D), SPI_CS_BB7 (17/5D), PS_ONOFF (2/4D), SPI_CS_BB6 (14/6A), USER2 (17/2E), USER4 (17/2D), CW_MOD2 (17/2C), LEVATT (17/2C), TRIGIN_B (17/6B), JTAG_TMS_BB3 (8/5C), JTAG_TMS_BB1 (3/7C)

(9/6C) JTAG_TMS_BB5
(14/6D,17/7E) JTAG_TCK_BBR
(3/7C,8/3C,8/7C,9/3C,9/7C) JTAG_TDO_BB
(14/6C,17/7D)

X140 AB1..AB10, CD1..CD10
X141 AB1..AB10, CD1..CD10
X150 AB1..AB10, CD1..CD10
X151 AB1..AB10, CD1..CD10
X1160 AB1..AB10, CD1..CD10
X160 AB1..AB10, CD1..CD10
X161 AB1..AB10, CD1..CD10

ROHDE&SCHWARZ	Benennung: MOTHERBOARD SMU Designation: MOTHERBOARD SMU	Sprache: / Lang.: DE	Aei: / C.I.: 07.05 / Blatt: / Sh.: 4+
Typ: / Type: SMU	Datum: / Date: 05-03-09	Abteilung: / Dpt: 1GPK	Name: / Name: DORNER
1. Z.: / used in: 1141.2005.01	TOP/TOP.4		Zeichn. Nr.: / Drawing No.: 1141.3501.01 S

FMR (PCI)

CONNECTOR FRM

X113	A1		+UP5V2
X113	A2	CLK3	(7/3C)
X113	A3	INTA	(5/5D,6/1B,6/7A,7/2A)
X113	A4	GNT2	(6/5D)
X113	A5	REQ2	(6/5A)
X113	A6	REQ0	(5/5A)
X113	A7	AD30	(5/5A,6/1A,6/3A,6/5A,7/2A)(7/5A)
X113	A8	AD26	(5/5A,6/1A,6/5A,7/2A,7/5A)
X113	A9	C_BE3	(5/5A,6/1A,6/5A,7/2A,7/5A)
X113	A10	AD21	(5/5A,6/1A,6/5A,7/2A,7/5A)
X113	A11	AD18	(5/5B,6/1A,6/5A,7/2B,7/5B)
X113	A15	INTF	(7/7A)
X113	A16	DEVSEL	(5/5B,6/1B,6/5B,7/2B,7/5B)
X113	A17	INTE	(7/5A)
X113	A18	SERR	(5/5B,6/1B,6/5B,7/2B,7/5B)
X113	A19	PME	(5/5B,6/1B,6/5B,7/2B,7/5B)
X113	A20	AD12	(5/5B,6/1B,6/5B,7/2B,7/5B)
X113	A21	NC IRRX	
X113	A22	AD7	(5/5B,6/1B,6/5B,7/2B,7/5B)
X113	A23	NC IRTX	
X113	A24	AD1	(5/5B,6/1B,6/5B,7/2B,7/5B)
X113	A25		+UP5V2

X113	B1	NC	
X113	B2		+UP5V2
X113	B3	INTB	(5/5A,6/1D,6/5B,7/3A)
X113	B4		
X113	B5	CLK2	(6/7B)
X113	B6		
X113	B7	AD29	(5/7A,6/3A,6/7A,7/3A,7/7A)
X113	B8		
X113	B9	NC ("idsel")	
X113	B10		
X113	B11	AD17	(5/7B,6/3A,6/7A,7/3B,7/7B)
X113	B15	FRAME	(5/7B,6/3B,6/7B,7/3B,7/7B)
X113	B16		
X113	B17	SDONE	(5/7B,6/3B,6/7B,7/3B,7/7B)
X113	B18		
X113	B19	AD15	(5/7B,6/3B,6/7B,7/3B,7/7B)
X113	B20		
X113	B21	AD9	(5/7B,6/3B,6/7B,7/3B,7/7B)
X113	B22		
X113	B23	AD4	(5/7B,6/3B,6/7B,7/3B,7/7B)
X113	B24		+UP5V2
X113	B25	CLK1	(6/3B)

X113	C1	USBD0M	(16/8B)
X113	C2	USBD0P	(16/8B)
X113	C3	INTC	(5/7A,6/1A,6/5D,7/2B)
X113	C4	GNT3	(7/2D)
X113	C5	RST	(5/5B,6/1B,6/5B,7/2B,7/5B)
X113	C6	REQ3	(7/2A)
X113	C7	AD28	(5/5C,6/1C,6/5C,7/2C,7/3A) (7/5C)
X113	C8	INTH	(7/5D)
X113	C9	AD23	(5/5C,6/1C,6/5C,7/2C,7/5C)
X113	C10	INTG	(7/5B)
X113	C11	AD16	(5/5C,6/1C,6/5C,7/2C,7/5C)
X113	C15	IRDY	(5/5C,6/1C,6/5C,7/2C,7/5C)
X113	C16	NC REQ5	
X113	C17	SBO	(5/5C,6/1C,6/5C,7/2C,7/5C)
X113	C18	NC GNT5	
X113	C19	AD14	(5/5C,6/1C,6/5C,7/2C,7/5C)
X113	C20	NC CLK5	
X113	C21	AD8	(5/5C,6/1C,6/5C,7/2C,7/5C)
X113	C22	GNT4	(7/5D)
X113	C23	AD3	(5/5C,6/1C,6/5C,7/2C,7/5C)
X113	C24	CLK4	(7/7C)
X113	C25	REQ1	(6/1A)

X113	D1	NC	
X113	D2	USBD2P	(16/8E)
X113	D3		+UP5V2
X113	D4	P5VUSB0	(16/8B)
X113	D5		
X113	D6	CLK0	(5/7C)
X113	D7		
X113	D8	AD25	(5/7C,6/3C,6/7C,7/3C,7/7C)
X113	D9		
X113	D10	AD20	(5/7C,6/3C,6/7C,7/3C,7/7C)
X113	D11		
X113	D15		
X113	D16	STOP	(5/7C,6/3C,6/7C,7/3C,7/7C)
X113	D17		
X113	D18	PAR	(5/7C,6/3C,6/7C,7/3C,7/7C)
X113	D19		
X113	D20	AD11	(5/7C,6/3C,6/7C,7/3C,7/7C)
X113	D21	M66EN	(5/7C,6/3C,6/7C,7/3C,7/7C)
X113	D22	AD6	(5/7C,6/3C,6/7C,7/3C,7/7C)
X113	D23		+UP5V2
X113	D24	AD0	(5/7C,6/3C,6/7C,7/3C,7/7C)
X113	D25	REQ4	(7/5A)

R300 49.9

X113	E1		+UP5V2
X113	E2	USBD2M	(16/8E)
X113	E3	INTD	(5/5B,6/3A,6/5A,7/2D)
X113	E4	P5VUSB2	(16/8E)
X113	E5	GNT0	(5/5D)
X113	E6	AD31	(5/5D,5/7A,6/1D,6/5D,7/2D) (7/5D)
X113	E7	AD27	(5/5D,6/1D,6/5D,7/2D,7/5D) (7/7A)
X113	E8	AD24	(5/5D,6/1D,6/5D,7/2D,7/5D)
X113	E9	AD22	(5/5D,6/1D,6/5D,7/2D,7/5D)
X113	E10	AD19	(5/5D,6/1D,6/5D,7/2D,7/5D)
X113	E11	C_BE2	(5/5D,6/1D,6/5D,7/2D,7/5D)
X113	E15	TRDY	(5/5D,6/1D,6/5D,7/2D,7/5D)
X113	E16	LOCK	(5/5D,6/1D,6/5D,7/2D,7/5D)
X113	E17	PERR	(5/5D,6/1D,6/5D,7/2D,7/5D)
X113	E18	C_BE1	(5/5D,6/1D,6/5D,7/2D,7/5D)
X113	E19	AD13	(5/5D,6/1D,6/5D,7/2D,7/5D)
X113	E20	AD10	(5/5D,6/1D,6/5D,7/2D,7/5D)
X113	E21	C_BE0	(5/5D,6/1D,6/5D,7/2D,7/5D)
X113	E22	AD5	(5/5E,6/1D,6/5D,7/2E,7/5E)
X113	E23	AD2	(5/5E,6/1E,6/5E,7/2E,7/5E)
X113	E24	GNT1	(6/1D)
X113	E25		+UP5V2

SLOT 2 DIGITAL / PCI SLOT#0

X123	A1		
X123	A2		
X123	A3	INTB	(5/3A,6/1D,6/5B,7/3A)
X123	A4		
X123	A5		
X123	A6	REQ0	(5/2A)
X123	A7	AD30	(5/2A,6/1A,6/3A,6/5A,7/2A)(7/5A)
X123	A8	AD26	(5/2A,6/1A,6/5A,7/2A,7/5A)
X123	A9	C_BE3	(5/2A,6/1A,6/5A,7/2A,7/5A)
X123	A10	AD21	(5/2A,6/1A,6/5A,7/2A,7/5A)
X123	A11	AD18	(5/2B,6/1A,6/5A,7/2B,7/5B)
X123	A15		+U3V3-S2
X123	A16	DEVSEL	(5/2B,6/1B,6/5B,7/2B,7/5B)
X123	A17		+U3V3-S2
X123	A18	SERR	(5/2B,6/1B,6/5B,7/2B,7/5B)
X123	A19	PME	(5/2B,6/1B,6/5B,7/2B,7/5B)
X123	A20	AD12	(5/2B,6/1B,6/5B,7/2B,7/5B)
X123	A21		+U3V3-S2
X123	A22	AD7	(5/2B,6/1B,6/5B,7/2B,7/5B)
X123	A23		+U3V3-S2
X123	A24	AD1	(5/2B,6/1B,6/5B,7/2B,7/5B)
X123	A25		+U5V2-S2

X123	B1	NC	
X123	B2		+U5V2-S2
X123	B3	INTC	(5/2B,6/1A,6/5D,7/2B)
X123	B4		
X123	B5		
X123	B6		
X123	B7	AD29	(5/3A,6/3A,6/7A,7/3A,7/7A)
X123	B8		
X123	B9	("idsel") AD31	(5/2D,5/5D,6/1D,6/5D,7/2D) (7/5D)
X123	B10		
X123	B11	AD17	(5/3B,6/3A,6/7A,7/3B,7/7B)
X123	B15	FRAME	(5/3B,6/3B,6/7B,7/3B,7/7B)
X123	B16		
X123	B17	SDONE	(5/3B,6/3B,6/7B,7/3B,7/7B)
X123	B18		
X123	B19	AD15	(5/3B,6/3B,6/7B,7/3B,7/7B)
X123	B20		
X123	B21	AD9	(5/3B,6/3B,6/7B,7/3B,7/7B)
X123	B22		
X123	B23	AD4	(5/3B,6/3B,6/7B,7/3B,7/7B)
X123	B24		+U5V2-S2
X123	B25		

X123	C1		
X123	C2		
X123	C3	INTD	(5/2D,6/3A,6/5A,7/2D)
X123	C4		
X123	C5	RST	(5/2B,6/1B,6/5B,7/2B,7/5B)
X123	C6		+U3V3-S2
X123	C7	AD28	(5/2C,6/1C,6/5C,7/2C,7/3A) (7/5C)
X123	C8	NC	
X123	C9	AD23	(5/2C,6/1C,6/5C,7/2C,7/5C)
X123	C10		+U3V3-S2
X123	C11	AD16	(5/2C,6/1C,6/5C,7/2C,7/5C)
X123	C15	IRDY	(5/2C,6/1C,6/5C,7/2C,7/5C)
X123	C16	NC	
X123	C17	SBO	(5/2C,6/1C,6/5C,7/2C,7/5C)
X123	C18		+U3V3-S2
X123	C19	AD14	(5/2C,6/1C,6/5C,7/2C,7/5C)
X123	C20	NC	
X123	C21	AD8	(5/2C,6/1C,6/5C,7/2C,7/5C)
X123	C22		+U3V3-S2
X123	C23	AD3	(5/2C,6/1C,6/5C,7/2C,7/5C)
X123	C24	NC	
X123	C25		

X123	D1	NC	
X123	D2		
X123	D3		+U5V2-S2
X123	D4		
X123	D5		
X123	D6	CLK0	(5/3C)
X123	D7		
X123	D8	AD25	(5/3C,6/3C,6/7C,7/3C,7/7C)
X123	D9		
X123	D10	AD20	(5/3C,6/3C,6/7C,7/3C,7/7C)
X123	D11		
X123	D15		
X123	D16	STOP	(5/3C,6/3C,6/7C,7/3C,7/7C)
X123	D17		
X123	D18	PAR	(5/3C,6/3C,6/7C,7/3C,7/7C)
X123	D19		
X123	D20	AD11	(5/3C,6/3C,6/7C,7/3C,7/7C)
X123	D21	M66EN	(5/3C,6/3C,6/7C,7/3C,7/7C)
X123	D22	AD6	(5/3C,6/3C,6/7C,7/3C,7/7C)
X123	D23		+U5V2-S2
X123	D24	AD0	(5/3C,6/3C,6/7C,7/3C,7/7C)
X123	D25		+U3V3-S2

X123	E1		+U5V2-S2
X123	E2		
X123	E3	INTA	(5/2A,6/1B,6/7A,7/2A)
X123	E4		
X123	E5	GNT0	(5/2D)
X123	E6	AD31	(5/2D,5/7A,6/1D,6/5D,7/2D) (7/5D)
X123	E7	AD27	(5/2D,6/1D,6/5D,7/2D,7/5D) (7/7A)
X123	E8	AD24	(5/2D,6/1D,6/5D,7/2D,7/5D)
X123	E9	AD22	(5/2D,6/1D,6/5D,7/2D,7/5D)
X123	E10	AD19	(5/2D,6/1D,6/5D,7/2D,7/5D)
X123	E11	C_BE2	(5/2D,6/1D,6/5D,7/2D,7/5D)
X123	E15	TRDY	(5/2D,6/1D,6/5D,7/2D,7/5D)
X123	E16	LOCK	(5/2D,6/1D,6/5D,7/2D,7/5D)
X123	E17	PERR	(5/2D,6/1D,6/5D,7/2D,7/5D)
X123	E18	C_BE1	(5/2D,6/1D,6/5D,7/2D,7/5D)
X123	E19	AD13	(5/2D,6/1D,6/5D,7/2D,7/5D)
X123	E20	AD10	(5/2D,6/1D,6/5D,7/2D,7/5D)
X123	E21	C_BE0	(5/2D,6/1D,6/5D,7/2D,7/5D)
X123	E22	AD5	(5/2D,6/1D,6/5D,7/2E,7/5E)
X123	E23	AD2	(5/2E,6/1E,6/5E,7/2E,7/5E)
X123	E24		
X123	E25		+U5V2-S2

X123	111
X123	112
X123	113
X123	114
X123	115
X123	116
X123	117
X123	118
X123	119
X123	120
X123	121
X123	122
X123	123
X123	124
X123	125
X123	126
X123	127
X123	128
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X123	138
X123	139
X123	140
X123	141
X123	142
X123	143
X123	144
X123	145
X123	146
X123	147
X123	148
X123	149
X123	150
X123	151
X123	152
X123	153
X123	154

X113	111
X113	112
X113	113
X113	114
X113	115
X113	116
X113	117
X113	118
X113	119
X113	120
X113	121
X113	122
X113	123

ACHTUNG: EGB !
ELEKTROSTATISCH GEFAEHRDETE BAUELEMENTE ERFORDERN EINE BESONDERE HANDHABUNG.
ATTENTION ESD !
ELECTROSTATIC SENSITIVE DEVICES REQUIRE A SPECIAL HANDLING

ROHDE&SCHWARZ	Benennung: / Designation: MOTHERBOARD SMU / MOTHERBOARD SMU				Sprache: / Lang.: DE	Aei: / C.I.: 07.05	Blatt: / Sh.: 5+
Typ: / Type: SMU	Datum: / Date: 05-03-09	Abteilung: / Dpt: 1GPK	Name: / Name: DORNER		Zeichn. Nr.: / Drawing No.: 1141.3501.01 S		
1. Z.: / used in: 1141.2005.01				TOP/TOP.5			

SLOT 3 DIGITAL / PCI SLOT #1

X133	A1		
X133	A2		
X133	A3	$\overline{INTC}$	(5/2B,5/7A,6/5D,7/2B)
X133	A4		
X133	A5		
X133	A6	$\overline{REQ1}$	(5/2C)
X133	A7	AD30	(5/2A,5/5A,6/3A,6/5A,7/2A)(7/5A)
X133	A8	AD26	(5/2A,5/5A,6/5A,7/2A,7/5A)
X133	A9	C_BE3	(5/2A,5/5A,6/5A,7/2A,7/5A)
X133	A10	AD21	(5/2A,5/5A,6/5A,7/2A,7/5A)
X133	A11	AD18	(5/2B,5/5B,6/5A,7/2B,7/5B)
X133	A15	+U3V3-S3	
X133	A16	$\overline{DEVSEL}$	(5/2B,5/5B,6/5B,7/2B,7/5B)
X133	A17	+U3V3-S3	
X133	A18	$\overline{SERR}$	(5/2B,5/5B,6/5B,7/2B,7/5B)
X133	A19	$\overline{PME}$	(5/2B,5/5B,6/5B,7/2B,7/5B)
X133	A20	AD12	(5/2B,5/5B,6/5B,7/2B,7/5B)
X133	A21	+U3V3-S3	
X133	A22	AD7	(5/2B,5/5B,6/5B,7/2B,7/5B)
X133	A23	+U3V3-S3	
X133	A24	AD1	(5/2B,5/5B,6/5B,7/2B,7/5B)
X133	A25	+U5V2-S3	

X133	B1	NC	
X133	B2	+U5V2-S3	
X133	B3	$\overline{INTD}$	(5/2D,5/5B,6/5A,7/2D)
X133	B4		
X133	B5		
X133	B6		
X133	B7	AD29	(5/3A,5/7A,6/7A,7/3A,7/7A)
X133	B8		
X133	B9	AD30	(5/2A,5/5A,6/1A,6/5A,7/2A)(7/5A)
X133	B10		
X133	B11	$\overline{AD17}$	(5/3B,5/7B,6/7A,7/3B,7/7B)
X133	B15	$\overline{FRAME}$	(5/3B,5/7B,6/7B,7/3B,7/7B)
X133	B16		
X133	B17	SDONE	(5/3B,5/7B,6/7B,7/3B,7/7B)
X133	B18		
X133	B19	AD15	(5/3B,5/7B,6/7B,7/3B,7/7B)
X133	B20		
X133	B21	AD9	(5/3B,5/7B,6/7B,7/3B,7/7B)
X133	B22		
X133	B23	AD4	(5/3B,5/7B,6/7B,7/3B,7/7B)
X133	B24	+U5V2-S3	
X133	B25		

X133	C1		
X133	C2		
X133	C3	$\overline{INTA}$	(5/2A,5/5D,6/7A,7/2A)
X133	C4		
X133	C5	$\overline{RST}$	(5/2B,5/5B,6/5B,7/2B,7/5B)
X133	C6	+U3V3-S3	
X133	C7	AD28	(5/2C,5/5C,6/5C,7/2C,7/3A) (7/5C)
X133	C8	NC	
X133	C9	AD23	(5/2C,5/5C,6/5C,7/2C,7/5C)
X133	C10	+U3V3-S3	
X133	C11	AD16	(5/2C,5/5C,6/5C,7/2C,7/5C)
X133	C15	$\overline{IRDY}$	(5/2C,5/5C,6/5C,7/2C,7/5C)
X133	C16	NC	
X133	C17	$\overline{SBO}$	(5/2C,5/5C,6/5C,7/2C,7/5C)
X133	C18	+U3V3-S3	
X133	C19	AD14	(5/2C,5/5C,6/5C,7/2C,7/5C)
X133	C20		
X133	C21	AD8	(5/2C,5/5C,6/5C,7/2C,7/5C)
X133	C22	+U3V3-S3	
X133	C23	AD3	(5/2C,5/5C,6/5C,7/2C,7/5C)
X133	C24	NC	
X133	C25		

X133	D1	NC	
X133	D2		
X133	D3	+U5V2-S3	
X133	D4		
X133	D5		
X133	D6	CLK1	(5/3B)
X133	D7		
X133	D8	AD25	(5/3C,5/7C,6/7C,7/3C,7/7C)
X133	D9		
X133	D10	AD20	(5/3C,5/7C,6/7C,7/3C,7/7C)
X133	D11		
X133	D15		
X133	D16	$\overline{STOP}$	(5/3C,5/7C,6/7C,7/3C,7/7C)
X133	D17		
X133	D18	PAR	(5/3C,5/7C,6/7C,7/3C,7/7C)
X133	D19		
X133	D20	AD11	(5/3C,5/7C,6/7C,7/3C,7/7C)
X133	D21	M66EN	(5/3C,5/7C,6/7C,7/3C,7/7C)
X133	D22	AD6	(5/3C,5/7C,6/7C,7/3C,7/7C)
X133	D23	+U5V2-S3	
X133	D24	AD0	(5/3C,5/7C,6/7C,7/3C,7/7C)
X133	D25	+U3V3-S3	

X133	E1	+U5V2-S3	
X133	E2		
X133	E3	$\overline{INTB}$	(5/3A,5/5A,6/5B,7/3A)
X133	E4		
X133	E5	$\overline{GNT1}$	(5/2E)
X133	E6	AD31	(5/2D,5/5D,5/7A,6/5D,7/2D) (7/5D)
X133	E7	AD27	(5/2D,5/5D,6/5D,7/2D,7/5D) (7/7A)
X133	E8	AD24	(5/2D,5/5D,6/5D,7/2D,7/5D)
X133	E9	AD22	(5/2D,5/5D,6/5D,7/2D,7/5D)
X133	E10	AD19	(5/2D,5/5D,6/5D,7/2D,7/5D)
X133	E11	C_BE2	(5/2D,5/5D,6/5D,7/2D,7/5D)
X133	E15	TRDY	(5/2D,5/5D,6/5D,7/2D,7/5D)
X133	E16	LOCK	(5/2D,5/5D,6/5D,7/2D,7/5D)
X133	E17	PERR	(5/2D,5/5D,6/5D,7/2D,7/5D)
X133	E18	C_BE1	(5/2D,5/5D,6/5D,7/2D,7/5D)
X133	E19	AD13	(5/2D,5/5D,6/5D,7/2D,7/5D)
X133	E20	AD10	(5/2D,5/5D,6/5D,7/2D,7/5D)
X133	E21	C_BE0	(5/2D,5/5D,6/5D,7/2D,7/5D)
X133	E22	AD5	(5/2D,5/5E,6/5D,7/2E,7/5E)
X133	E23	AD2	(5/2E,5/5E,6/5E,7/2E,7/5E)
X133	E24		
X133	E25	+U5V2-S3	

SLOT 4 DIGITAL / PCI SLOT #2

X143	A1		
X143	A2		
X143	A3	$\overline{INTD}$	(5/2D,5/5B,6/3A,7/2D)
X143	A4		
X143	A5		
X143	A6	$\overline{REQ2}$	(5/2A)
X143	A7	AD30	(5/2A,5/5A,6/1A,6/3A,7/2A) (7/5A)
X143	A8	AD26	(5/2A,5/5A,6/1A,7/2A,7/5A)
X143	A9	C_BE3	(5/2A,5/5A,6/1A,7/2A,7/5A)
X143	A10	AD21	(5/2A,5/5A,6/1A,7/2A,7/5A)
X143	A11	AD18	(5/2B,5/5B,6/1A,7/2B,7/5B)
X143	A15	+U3V3-S4	
X143	A16	$\overline{DEVSEL}$	(5/2B,5/5B,6/1B,7/2B,7/5B)
X143	A17	+U3V3-S4	
X143	A18	$\overline{SERR}$	(5/2B,5/5B,6/1B,7/2B,7/5B)
X143	A19	$\overline{PME}$	(5/2B,5/5B,6/1B,7/2B,7/5B)
X143	A20	AD12	(5/2B,5/5B,6/1B,7/2B,7/5B)
X143	A21	+U3V3-S4	
X143	A22	AD7	(5/2B,5/5B,6/1B,7/2B,7/5B)
X143	A23	+U3V3-S4	
X143	A24	AD1	(5/2B,5/5B,6/1B,7/2B,7/5B)
X143	A25	+U5V2-S4	

X143	B1	NC	
X143	B2	+U5V2-S4	
X143	B3	$\overline{INTA}$	(5/2A,5/5D,6/1B,7/2A)
X143	B4		
X143	B5		
X143	B6		
X143	B7	AD29	(5/3A,5/7A,6/3A,6/7A,7/3A)(7/7A)
X143	B8		
X143	B9	("IDSEL") AD29	(5/3A,5/7A,6/3A,6/7A,7/3A)(7/7A)
X143	B10		
X143	B11	$\overline{AD17}$	(5/3B,5/7B,6/3A,7/3B,7/7B)
X143	B15	$\overline{FRAME}$	(5/3B,5/7B,6/3B,7/3B,7/7B)
X143	B16		
X143	B17	SDONE	(5/3B,5/7B,6/3B,7/3B,7/7B)
X143	B18		
X143	B19	AD15	(5/3B,5/7B,6/3B,7/3B,7/7B)
X143	B20		
X143	B21	AD9	(5/3B,5/7B,6/3B,7/3B,7/7B)
X143	B22		
X143	B23	AD4	(5/3B,5/7B,6/3B,7/3B,7/7B)
X143	B24	+U5V2-S4	
X143	B25		

X143	C1		
X143	C2		
X143	C3	$\overline{INTB}$	(5/3A,5/5A,6/1D,7/3A)
X143	C4		
X143	C5	$\overline{RST}$	(5/2B,5/5B,6/1B,7/2B,7/5B)
X143	C6	+U3V3-S4	
X143	C7	AD28	(5/2C,5/5C,6/1C,7/2C,7/3A) (7/5C)
X143	C8	NC	
X143	C9	AD23	(5/2C,5/5C,6/1C,7/2C,7/5C)
X143	C10	+U3V3-S4	
X143	C11	AD16	(5/2C,5/5C,6/1C,7/2C,7/5C)
X143	C15	$\overline{IRDY}$	(5/2C,5/5C,6/1C,7/2C,7/5C)
X143	C16	NC	
X143	C17	$\overline{SBO}$	(5/2C,5/5C,6/1C,7/2C,7/5C)
X143	C18	+U3V3-S4	
X143	C19	AD14	(5/2C,5/5C,6/1C,7/2C,7/5C)
X143	C20	NC	
X143	C21	AD8	(5/2C,5/5C,6/1C,7/2C,7/5C)
X143	C22	+U3V3-S4	
X143	C23	AD3	(5/2C,5/5C,6/1C,7/2C,7/5C)
X143	C24	NC	
X143	C25		

X143	D1	NC	
X143	D2		
X143	D3	+U5V2-S4	
X143	D4		
X143	D5		
X143	D6	CLK2	(5/3A)
X143	D7		
X143	D8	AD25	(5/3C,5/7C,6/3C,7/3C,7/7C)
X143	D9		
X143	D10	AD20	(5/3C,5/7C,6/3C,7/3C,7/7C)
X143	D11		
X143	D15		
X143	D16	$\overline{STOP}$	(5/3C,5/7C,6/3C,7/3C,7/7C)
X143	D17		
X143	D18	PAR	(5/3C,5/7C,6/3C,7/3C,7/7C)
X143	D19		
X143	D20	AD11	(5/3C,5/7C,6/3C,7/3C,7/7C)
X143	D21	M66EN	(5/3C,5/7C,6/3C,7/3C,7/7C)
X143	D22	AD6	(5/3C,5/7C,6/3C,7/3C,7/7C)
X143	D23	+U5V2-S4	
X143	D24	AD0	(5/3C,5/7C,6/3C,7/3C,7/7C)
X143	D25	+U3V3-S4	

X143	E1	+U5V2-S4	
X143	E2		
X143	E3	$\overline{INTC}$	(5/2B,5/7A,6/1A,7/2B)
X143	E4		
X143	E5	$\overline{GNT2}$	(5/2A)
X143	E6	AD31	(5/2D,5/5D,5/7A,6/1D,7/2D) (7/5D)
X143	E7	AD27	(5/2D,5/5D,6/1D,7/2D,7/5D) (7/7A)
X143	E8	AD24	(5/2D,5/5D,6/1D,7/2D,7/5D)
X143	E9	AD22	(5/2D,5/5D,6/1D,7/2D,7/5D)
X143	E10	AD19	(5/2D,5/5D,6/1D,7/2D,7/5D)
X143	E11	C_BE2	(5/2D,5/5D,6/1D,7/2D,7/5D)
X143	E15	TRDY	(5/2D,5/5D,6/1D,7/2D,7/5D)
X143	E16	LOCK	(5/2D,5/5D,6/1D,7/2D,7/5D)
X143	E17	PERR	(5/2D,5/5D,6/1D,7/2D,7/5D)
X143	E18	C_BE1	(5/2D,5/5D,6/1D,7/2D,7/5D)
X143	E19	AD13	(5/2D,5/5D,6/1D,7/2D,7/5D)
X143	E20	AD10	(5/2D,5/5D,6/1D,7/2D,7/5D)
X143	E21	C_BE0	(5/2D,5/5D,6/1D,7/2D,7/5D)
X143	E22	AD5	(5/2D,5/5E,6/1D,7/2E,7/5E)
X143	E23	AD2	(5/2E,5/5E,6/1E,7/2E,7/5E)
X143	E24		
X143	E25	+U5V2-S4	

24ST X144	A1	+U5V2-FAD	
X144	A2	+U5V2-FAD	
X144	A3	+U3V3-FAD	
X144	A4		
X144	A5		
X144	A6		

X144	B1	+U5V2-FAD
X144	B2	+U5V2-FAD
X144	B3	+U3V3-FAD
X144	B4	
X144	B5	
X144	B6	

X144	C1	+U5V2-FAD
X144	C2	+U3V3-FAD
X144	C3	+U3V3-FAD
X144	C4	
X144	C5	
X144	C6	

X144	D1	+U5V2-FAD
X144	D2	+U3V3-FAD
X144	D3	+U3V3-FAD
X144	D4	
X144	D5	
X144	D6	

X133	111	
X133	112	
X133	113	
X133	114	
X133	115	
X133	116	
X133	117	
X133	118	
X133	119	
X133	120	
X133	121	
X133	122	
X133	123	
X133	124	
X133	125	
X133	126	
X133	127	
X133	128	
X133	129	
X133	130	
X133	131	
X133	132	
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X133	134	
X133	135	
X133	136	
X133	137	
X133	138	
X133	139	
X133	140	
X133	141	
X133	142	
X133	143	
X133	144	
X133	145	
X133	146	
X133	147	
X133	148	
X133	149	
X133	150	
X133	151	
X133	152	
X133	153	
X133	154	

X143	111	
X143	112	
X143	113	
X143	114	
X143	115	
X143	116	
X143	117	
X143	118	
X143	119	
X143	120	
X143	121	
X143	122	
X143	123	
X143	124	
X143	125	
X143	126	
X143	127	
X143	128	
X143	129	
X143	130	
X143	131	
X143	132	
X143	133	
X143	134	
X143	135	
X143	136	
X143	137	
X143	138	
X143	139	
X143	140	
X143	141	
X143	142	
X143	143	
X143	144	
X143	145	
X143	146	
X143	147	
X143	148	
X143	149	
X143	150	
X143	151	
X143	152	
X143	153	
X143	154	

ACHTUNG: EGB !
ELEKTROSTATISCH GEFAEHRDETE BAUELEMENTE ERFORDERN EINE BESONDERE HANDHABUNG.
ATTENTION ESD !
ELECTROSTATIC SENSITIVE DEVICES REQUIRE A SPECIAL HANDLING

ROHDE&SCHWARZ	Benennung: MOTHERBOARD SMU Designation: MOTHERBOARD SMU				Sprache: / Lang.: DE	Aei: / C.I.: 07.05	Blatt: / Sh.: 6+
Typ: / Type: SMU	Datum: / Date: 05-03-09	Abteilung: / Dpt: 1GPK	Name: / Name: DORNER		Zeichn. Nr.: / Drawing No.: 1141.3501.01 S		
1. Z.: / used in: 1141.2005.01	TOP/TOP.6						

SLOT5 DIGITAL / PCI SLOT #3

X153	A1		
X153	A2		
X153	A3	INTA	(5/2A,5/5D,6/1B,6/7A)
X153	A4		
X153	A5		
X153	A6	REQ3	(5/2C)
X153	A7	AD30	(5/2A,5/5A,6/1A,6/3A,6/5A) (7/5A)
X153	A8	AD26	(5/2A,5/5A,6/1A,6/5A,7/5A)
X153	A9	C_BE3	(5/2A,5/5A,6/1A,6/5A,7/5A)
X153	A10	AD21	(5/2A,5/5A,6/1A,6/5A,7/5A)
X153	A11	AD18	(5/2B,5/5B,6/1A,6/5A,7/5B)
X153	A15	+U3V3-S5	
X153	A16	DEVSEL	(5/2B,5/5B,6/1B,6/5B,7/5B)
X153	A17	+U3V3-S5	
X153	A18	SERR	(5/2B,5/5B,6/1B,6/5B,7/5B)
X153	A19	PME	(5/2B,5/5B,6/1B,6/5B,7/5B)
X153	A20	AD12	(5/2B,5/5B,6/1B,6/5B,7/5B)
X153	A21	+U3V3-S5	
X153	A22	AD7	(5/2B,5/5B,6/1B,6/5B,7/5B)
X153	A23	+U3V3-S5	
X153	A24	AD1	(5/2B,5/5B,6/1B,6/5B,7/5B)
X153	A25	+U5V2-S5	

X153	B1	NC	
X153	B2	+U5V2-S5	
X153	B3	INTB	(5/3A,5/5A,6/1D,6/5B)
X153	B4		
X153	B5		
X153	B6		
X153	B7	AD29	(5/3A,5/7A,6/3A,6/7A,7/7A)
X153	B8		
X153	B9	("IDSEL") AD28	(5/2C,5/5C,6/1C,6/5C,7/2C) (7/5C)
X153	B10		
X153	B11	AD17	(5/3B,5/7B,6/3A,6/7A,7/7B)
X153	B15	FRAME	(5/3B,5/7B,6/3B,6/7B,7/7B)
X153	B16		
X153	B17	SDONE	(5/3B,5/7B,6/3B,6/7B,7/7B)
X153	B18		
X153	B19	AD15	(5/3B,5/7B,6/3B,6/7B,7/7B)
X153	B20		
X153	B21	AD9	(5/3B,5/7B,6/3B,6/7B,7/7B)
X153	B22		
X153	B23	AD4	(5/3B,5/7B,6/3B,6/7B,7/7B)
X153	B24	+U5V2-S5	
X153	B25		

X153	C1		
X153	C2		
X153	C3	INTC	(5/2B,5/7A,6/1A,6/5D)
X153	C4		
X153	C5	RST	(5/2B,5/5B,6/1B,6/5B,7/5B)
X153	C6	+U3V3-S5	
X153	C7	AD28	(5/2C,5/5C,6/1C,6/5C,7/3A) (7/5C)
X153	C8	NC	
X153	C9	AD23	(5/2C,5/5C,6/1C,6/5C,7/5C)
X153	C10	+U3V3-S5	
X153	C11	AD16	(5/2C,5/5C,6/1C,6/5C,7/5C)
X153	C15	IRDY	(5/2C,5/5C,6/1C,6/5C,7/5C)
X153	C16	NC	
X153	C17	SBO	(5/2C,5/5C,6/1C,6/5C,7/5C)
X153	C18	+U3V3-S5	
X153	C19	AD14	(5/2C,5/5C,6/1C,6/5C,7/5C)
X153	C20	NC	
X153	C21	AD8	(5/2C,5/5C,6/1C,6/5C,7/5C)
X153	C22	+U3V3-S5	
X153	C23	AD3	(5/2C,5/5C,6/1C,6/5C,7/5C)
X153	C24	NC	
X153	C25		

X153	D1	NC	
X153	D2		
X153	D3	+U5V2-S5	
X153	D4		
X153	D5		
X153	D6	CLK3	(5/2A)
X153	D7		
X153	D8	AD25	(5/3C,5/7C,6/3C,6/7C,7/7C)
X153	D9		
X153	D10	AD20	(5/3C,5/7C,6/3C,6/7C,7/7C)
X153	D11		
X153	D15		
X153	D16	STOP	(5/3C,5/7C,6/3C,6/7C,7/7C)
X153	D17		
X153	D18	PAR	(5/3C,5/7C,6/3C,6/7C,7/7C)
X153	D19		
X153	D20	AD11	(5/3C,5/7C,6/3C,6/7C,7/7C)
X153	D21	M66EN	(5/3C,5/7C,6/3C,6/7C,7/7C)
X153	D22	AD6	(5/3C,5/7C,6/3C,6/7C,7/7C)
X153	D23	+U5V2-S5	
X153	D24	AD0	(5/3C,5/7C,6/3C,6/7C,7/7C)
X153	D25	+U3V3-S5	

X153	E1	+U5V2-S5	
X153	E2		
X153	E3	INTD	(5/2D,5/5B,6/3A,6/5A)
X153	E4		
X153	E5	GNT3	(5/2B)
X153	E6	AD31	(5/2D,5/5D,5/7A,6/1D,6/5D) (7/5D)
X153	E7	AD27	(5/2D,5/5D,6/1D,6/5D,7/5D) (7/7A)
X153	E8	AD24	(5/2D,5/5D,6/1D,6/5D,7/5D)
X153	E9	AD22	(5/2D,5/5D,6/1D,6/5D,7/5D)
X153	E10	AD19	(5/2D,5/5D,6/1D,6/5D,7/5D)
X153	E11	C_BE2	(5/2D,5/5D,6/1D,6/5D,7/5D)
X153	E15	TRDY	(5/2D,5/5D,6/1D,6/5D,7/5D)
X153	E16	LOCK	(5/2D,5/5D,6/1D,6/5D,7/5D)
X153	E17	PERR	(5/2D,5/5D,6/1D,6/5D,7/5D)
X153	E18	C_BE1	(5/2D,5/5D,6/1D,6/5D,7/5D)
X153	E19	AD13	(5/2D,5/5D,6/1D,6/5D,7/5D)
X153	E20	AD10	(5/2D,5/5D,6/1D,6/5D,7/5D)
X153	E21	C_BE0	(5/2D,5/5D,6/1D,6/5D,7/5D)
X153	E22	AD5	(5/2D,5/5E,6/1D,6/5D,7/5E)
X153	E23	AD2	(5/2E,5/5E,6/1E,6/5E,7/5E)
X153	E24		
X153	E25	+U5V2-S5	

24ST X154	A1	+U5V2-FAD	
X154	A2	+U5V2-FAD	
X154	A3	+U3V3-FAD	
X154	A4		
X154	A5		
X154	A6		

X154	B1	+U5V2-FAD	
X154	B2	+U5V2-FAD	
X154	B3	+U3V3-FAD	
X154	B4		
X154	B5		
X154	B6		

X154	C1	+U5V2-FAD	
X154	C2	+U3V3-FAD	
X154	C3	+U3V3-FAD	
X154	C4		
X154	C5		
X154	C6		

X154	D1	+U5V2-FAD	
X154	D2	+U3V3-FAD	
X154	D3	+U3V3-FAD	
X154	D4		
X154	D5		
X154	D6		

SLOT6 DIGITAL / PCI SLOT #4

X163	A1		
X163	A2		
X163	A3	INTE	(5/2B)
X163	A4		
X163	A5		
X163	A6	REQ4	(5/3C)
X163	A7	AD30	(5/2A,5/5A,6/1A,6/3A,6/5A)(7/2A)
X163	A8	AD26	(5/2A,5/5A,6/1A,6/5A,7/2A)
X163	A9	C_BE3	(5/2A,5/5A,6/1A,6/5A,7/2A)
X163	A10	AD21	(5/2A,5/5A,6/1A,6/5A,7/2A)
X163	A11	AD18	(5/2B,5/5B,6/1A,6/5A,7/2B)
X163	A15	+U3V3-S6	
X163	A16	DEVSEL	(5/2B,5/5B,6/1B,6/5B,7/2B)
X163	A17	+U3V3-S6	
X163	A18	SERR	(5/2B,5/5B,6/1B,6/5B,7/2B)
X163	A19	PME	(5/2B,5/5B,6/1B,6/5B,7/2B)
X163	A20	AD12	(5/2B,5/5B,6/1B,6/5B,7/2B)
X163	A21	+U3V3-S6	
X163	A22	AD7	(5/2B,5/5B,6/1B,6/5B,7/2B)
X163	A23	+U3V3-S6	
X163	A24	AD1	(5/2B,5/5B,6/1B,6/5B,7/2B)
X163	A25	+U5V2-S6	

X163	B1	NC	
X163	B2	+U5V2-S6	
X163	B3	INTF	(5/2B)
X163	B4		
X163	B5		
X163	B6		
X163	B7	AD29	(5/3A,5/7A,6/3A,6/7A,7/3A)
X163	B8		
X163	B9	("IDSEL") AD27	(5/2D,5/5D,6/1D,6/5D,7/2D) (7/5D)
X163	B10		
X163	B11	AD17	(5/3B,5/7B,6/3A,6/7A,7/3B)
X163	B15	FRAME	(5/3B,5/7B,6/3B,6/7B,7/3B)
X163	B16		
X163	B17	SDONE	(5/3B,5/7B,6/3B,6/7B,7/3B)
X163	B18		
X163	B19	AD15	(5/3B,5/7B,6/3B,6/7B,7/3B)
X163	B20		
X163	B21	AD9	(5/3B,5/7B,6/3B,6/7B,7/3B)
X163	B22		
X163	B23	AD4	(5/3B,5/7B,6/3B,6/7B,7/3B)
X163	B24	+U5V2-S6	
X163	B25		

X163	C1		
X163	C2		
X163	C3	INTG	(5/2C)
X163	C4		
X163	C5	RST	(5/2B,5/5B,6/1B,6/5B,7/2B)
X163	C6	+U3V3-S6	
X163	C7	AD28	(5/2C,5/5C,6/1C,6/5C,7/2C) (7/3A)
X163	C8	NC	
X163	C9	AD23	(5/2C,5/5C,6/1C,6/5C,7/2C)
X163	C10	+U3V3-S6	
X163	C11	AD16	(5/2C,5/5C,6/1C,6/5C,7/2C)
X163	C15	IRDY	(5/2C,5/5C,6/1C,6/5C,7/2C)
X163	C16	NC	
X163	C17	SBO	(5/2C,5/5C,6/1C,6/5C,7/2C)
X163	C18	+U3V3-S6	
X163	C19	AD14	(5/2C,5/5C,6/1C,6/5C,7/2C)
X163	C20	NC	
X163	C21	AD8	(5/2C,5/5C,6/1C,6/5C,7/2C)
X163	C22	+U3V3-S6	
X163	C23	AD3	(5/2C,5/5C,6/1C,6/5C,7/2C)
X163	C24	NC	
X163	C25		

X163	D1	NC	
X163	D2		
X163	D3	+U5V2-S6	
X163	D4		
X163	D5		
X163	D6	CLK4	(5/2C)
X163	D7		
X163	D8	AD25	(5/3C,5/7C,6/3C,6/7C,7/3C)
X163	D9		
X163	D10	AD20	(5/3C,5/7C,6/3C,6/7C,7/3C)
X163	D11		
X163	D15		
X163	D16	STOP	(5/3C,5/7C,6/3C,6/7C,7/3C)
X163	D17		
X163	D18	PAR	(5/3C,5/7C,6/3C,6/7C,7/3C)
X163	D19		
X163	D20	AD11	(5/3C,5/7C,6/3C,6/7C,7/3C)
X163	D21	M66EN	(5/3C,5/7C,6/3C,6/7C,7/3C)
X163	D22	AD6	(5/3C,5/7C,6/3C,6/7C,7/3C)
X163	D23	+U5V2-S6	
X163	D24	AD0	(5/3C,5/7C,6/3C,6/7C,7/3C)
X163	D25	+U3V3-S6	

X163	E1	+U5V2-S6	
X163	E2		
X163	E3	INTH	(5/2C)
X163	E4		
X163	E5	GNT4	(5/2C)
X163	E6	AD31	(5/2D,5/5D,5/7A,6/1D,6/5D) (7/2D)
X163	E7	AD27	(5/2D,5/5D,6/1D,6/5D,7/2D) (7/7A)
X163	E8	AD24	(5/2D,5/5D,6/1D,6/5D,7/2D)
X163	E9	AD22	(5/2D,5/5D,6/1D,6/5D,7/2D)
X163	E10	AD19	(5/2D,5/5D,6/1D,6/5D,7/2D)
X163	E11	C_BE2	(5/2D,5/5D,6/1D,6/5D,7/2D)
X163	E15	TRDY	(5/2D,5/5D,6/1D,6/5D,7/2D)
X163	E16	LOCK	(5/2D,5/5D,6/1D,6/5D,7/2D)
X163	E17	PERR	(5/2D,5/5D,6/1D,6/5D,7/2D)
X163	E18	C_BE1	(5/2D,5/5D,6/1D,6/5D,7/2D)
X163	E19	AD13	(5/2D,5/5D,6/1D,6/5D,7/2D)
X163	E20	AD10	(5/2D,5/5D,6/1D,6/5D,7/2D)
X163	E21	C_BE0	(5/2D,5/5D,6/1D,6/5D,7/2D)
X163	E22	AD5	(5/2D,5/5E,6/1D,6/5D,7/2E)
X163	E23	AD2	(5/2E,5/5E,6/1E,6/5E,7/2E)
X163	E24		
X163	E25	+DACIF_VCC	

X153	111	X163	111
X153	112	X163	112
X153	113	X163	113
X153	114	X163	114
X153	115	X163	115
X153	116	X163	116
X153	117	X163	117
X153	118	X163	118
X153	119	X163	119
X153	120	X163	120
X153	121	X163	121
X153	122	X163	122
X153	123	X163	123
X153	124	X163	124
X153	125	X163	125
X153	126	X163	126
X153	127	X163	127
X153	128	X163	128
X153	129	X163	129
X153	130	X163	130
X153	131	X163	131
X153	132	X163	132
X153	133	X163	133
X153	134	X163	134
X153	135	X163	135
X153	136	X163	136
X153	137	X163	137
X153	138	X163	138
X153	139	X163	139
X153	140	X163	140
X153	141	X163	141
X153	142	X163	142
X153	143	X163	143
X153	144	X163	144
X153	145	X163	145
X153	146	X163	146
X153	147	X163	147
X153	148	X163	148
X153	149	X163	149
X153	150	X163	150
X153	151	X163	151
X153	152	X163	152
X153	153	X163	153
X153	154	X163	154

ACHTUNG: EGB !
ELEKTROSTATISCH GEFAEHRDETE BAUELEMENTE ERFORDERN EINE BESONDERE HANDHABUNG.
ATTENTION ESD !
ELECTROSTATIC SENSITIVE DEVICES REQUIRE A SPECIAL HANDLING

ROHDE&SCHWARZ	Benennung: MOTHERBOARD SMU Designation: MOTHERBOARD SMU			Sprache: / Lang.: DE	Aei: / C.I.: 07.05	Blatt: / Sh.: 7+
Typ: SMU Type:	Datum: 05-03-09 Date:	Abteilung: 1GPK Dpt:	Name: DORNER Name:	Zeichn. Nr.: / Drawing No.: 1141.3501.01 S		
1. Z.: 1141.2005.01 used in:	TOP/TOP.7					

SLOT2 D

X122 A1	JTAG_TCK_BBS	(3/7E,4/6C,8/5B,9/2B,9/6B)	
X122 A2			
X122 A3	JTAG_TRST_BB	(3/7C,4/7C,8/5B,9/2B,9/6B)	(14/6C,17/7D)
X122 A4			
X122 A5	ABUS3	(3/2D,8/5B,9/2B,9/6B,14/6D)	
X122 A6	ABUS7	(8/5B,9/2B,9/6B)	
X122 A7	UC_DATA0	(8/5B,9/2B,9/6B,10/2B)	
X122 A8	UC_DATA4	(8/5B,9/2B,9/6B,10/2B)	
X122 A9			
X122 A10	UC_DATA8	(8/5B,9/2B,9/6B,10/2B)	
X122 A11	UC_DATA12	(8/5B,9/2B,9/6B,10/2B)	
X122 A12			
X122 A13	UC_DACIF_RSV0	(8/5B,9/2B,9/6B,10/2B)	
X122 A14	UC_TRIGIN1	(8/5B,9/2B,9/6B,10/2B)	
X122 A15			
X122 A16	UC_LEVATT	(8/5B,9/2B,9/6B,10/2B)	
X122 A17	UC_USER2	(8/5B,9/2C,9/6C,10/4B)	
X122 A18			
X122 A19	-U6V0		
X122 A20			
X122 A21	-U12V0		
X122 A22			
X122 A23	+U3V3-S2		
X122 A24			

X122 C1			
X122 C2	JTAG_TDI_BB	(3/7E,4/6C,8/7B,9/3B,9/7B)	(14/6D,17/7D)
X122 C3			
X122 C4	ABUS1	(3/2D,8/7B,9/3B,9/7B)	
X122 C5	ABUS5	(8/7B,9/3B,9/7B)	
X122 C6	BBOUTCK_N	(3/2D,8/2E,8/7B,9/3B,9/7B)	(17/7E)
X122 C7	UC_DATA2	(8/7B,9/3B,9/7B,10/4C)	
X122 C8	UC_DATA6	(8/7B,9/3B,9/7B,10/4C)	
X122 C9	UC_VALID	(8/7B,9/3B,9/7B,10/2D)	
X122 C10	UC_DATA10	(8/7B,9/3B,9/7B,10/4D)	
X122 C11	UC_DATA14	(8/7B,9/3B,9/7B,10/4D)	
X122 C12			
X122 C13	UC_DACIF_RSV1	(8/7B,9/3B,9/7B,10/2D)	
X122 C14	UC_READ_REQ	(8/7B,9/3B,9/7B,10/4D)	
X122 C15			
X122 C16	UC_HOPP	(8/7B,9/3B,9/7B,10/2D)	
X122 C17	UC_USER4	(8/7B,9/3C,9/7C,10/4D)	
X122 C18			
X122 C19	+U5V2-S2		
X122 C20			
X122 C21			
X122 C22			
X122 C23	+U3V3-S2		
X122 C24			

X122 B1			
X122 B2	JTAG_TMS_BB2	(4/7C)	
X122 B3			
X122 B4	ABUS0	(3/2B,8/5C,9/2C,9/6C)	
X122 B5	ABUS4	(8/5C,9/2C,9/6C)	
X122 B6	BBOUTCK_P	(3/2B,8/2E,8/5C,9/2C,9/6C)	(17/7D)
X122 B7	UC_DATA1	(8/5C,9/2C,9/6C,10/4B)	
X122 B8	UC_DATA5	(8/5C,9/2D,9/6D,10/4B)	
X122 B9			
X122 B10	UC_DATA9	(8/5C,9/2D,9/6D,10/4B)	
X122 B11	UC_DATA13	(8/5D,9/2D,9/6D,10/4B)	
X122 B12			
X122 B13	UC_BITCLK_RV	(8/5D,9/2D,9/6D,10/4B)	
X122 B14	UC_TRIGIN2	(8/5D,9/2D,9/6D,10/4B)	
X122 B15			
X122 B16	UC_CW	(8/5D,9/2D,9/6D,10/4B)	
X122 B17	UC_USER3	(8/5D,9/2D,9/6D,10/2D)	
X122 B18			
X122 B19			
X122 B20			
X122 B21			
X122 B22			
X122 B23	+U3V3-S2		
X122 B24			

R11 200 R19 1K → +U3V3-S2

X122 D1			
X122 D2	JTAG_TDO_BB	(3/7C,4/6E,8/7C,9/3C,9/7C)	(14/6C,17/7D)
X122 D3			
X122 D4	ABUS2	(3/2B,8/7C,9/3C,9/7C,14/6D)	(17/7E)
X122 D5	ABUS6	(8/7C,9/3C,9/7C)	
X122 D6			
X122 D7	UC_DATA3	(8/7C,9/3C,9/7C,10/2E)	
X122 D8	UC_DATA7	(8/7C,9/3D,9/7D,10/2E)	
X122 D9	UC_EXTCLK	(8/7C,9/3D,9/7D,10/2D)	
X122 D10	UC_DATA11	(8/7C,9/3D,9/7D,10/2E)	
X122 D11	UC_DATA15	(8/7D,9/3D,9/7D,10/2E)	
X122 D12			
X122 D13	UC_SYMB_RV	(8/7D,9/3D,9/7D,10/4D)	
X122 D14	UC_BURST	(8/7D,9/3D,9/7D,10/4D)	
X122 D15	UC_PD_SIG	(8/7D,9/3D,9/7D,10/2E)	
X122 D16	UC_USER1	(8/7D,9/3D,9/7D,10/2B)	
X122 D17			
X122 D18	DIAG	(3/7E,8/7D,9/3D,9/7D,10/2E)	
X122 D19	+U5V2-S2	(12/3C,12/7C,13/3C,13/7C)	
X122 D20	+U12V0	(14/3D,15/5B,15/7B)	
X122 D21	+U6V0		
X122 D22	+U5V2-S2		
X122 D23	+U28V0		
X122 D24			

R10 200 R20 1K → +U3V3-S2

(3/2D,8/3B,8/7B,9/3B,9/7B) BBOUTCK_N — R12 200 (17/7E)

(3/2B,8/2C,8/5C,9/2C,9/6C) BBOUTCK_P — (17/7D)

SLOT3 D

X132 A1	JTAG_TCK_BBS	(3/7E,4/6C,8/2B,9/2B,9/6B)	
X132 A2			
X132 A3	JTAG_TRST_BB	(3/7C,4/7C,8/2B,9/2B,9/6B)	(14/6C,17/7D)
X132 A4			
X132 A5	ABUS3	(3/2D,8/2B,9/2B,9/6B,14/6D)	
X132 A6	ABUS7	(8/2B,9/2B,9/6B)	
X132 A7	UC_DATA0	(8/2B,9/2B,9/6B,10/2B)	
X132 A8	UC_DATA4	(8/2B,9/2B,9/6B,10/2B)	
X132 A9			
X132 A10	UC_DATA8	(8/2B,9/2B,9/6B,10/2B)	
X132 A11	UC_DATA12	(8/2B,9/2B,9/6B,10/2B)	
X132 A12			
X132 A13	UC_DACIF_RSV0	(8/2B,9/2B,9/6B,10/2B)	
X132 A14	UC_TRIGIN1	(8/2B,9/2B,9/6B,10/2B)	
X132 A15			
X132 A16	UC_LEVATT	(8/2B,9/2B,9/6B,10/2B)	
X132 A17	UC_USER2	(8/2B,9/2C,9/6C,10/4B)	
X132 A18			
X132 A19	-U6V0		
X132 A20			
X132 A21	-U12V0		
X132 A22			
X132 A23	+U3V3-S3		
X132 A24			

X132 C1			
X132 C2	JTAG_TDI_BB	(3/7E,4/6C,8/3B,9/3B,9/7B)	(14/6D,17/7D)
X132 C3			
X132 C4	ABUS1	(3/2D,8/3B,9/3B,9/7B)	
X132 C5	ABUS5	(8/3B,9/3B,9/7B)	
X132 C6	BBOUTCK_N	(3/2D,8/2E,8/3B,9/3B,9/7B)	(17/7E)
X132 C7	UC_DATA2	(8/3B,9/3B,9/7B,10/4C)	
X132 C8	UC_DATA6	(8/3B,9/3B,9/7B,10/4C)	
X132 C9	UC_VALID	(8/3B,9/3B,9/7B,10/2D)	
X132 C10	UC_DATA10	(8/3B,9/3B,9/7B,10/4D)	
X132 C11	UC_DATA14	(8/3B,9/3B,9/7B,10/4D)	
X132 C12			
X132 C13	UC_DACIF_RSV1	(8/3B,9/3B,9/7B,10/2D)	
X132 C14	UC_READ_REQ	(8/3B,9/3B,9/7B,10/4D)	
X132 C15			
X132 C16	UC_HOPP	(8/3B,9/3B,9/7B,10/2D)	
X132 C17	UC_USER4	(8/3B,9/3C,9/7C,10/4D)	
X132 C18			
X132 C19	+U5V2-S3		
X132 C20			
X132 C21			
X132 C22			
X132 C23	+U3V3-S3		
X132 C24			

X132 B1			
X132 B2	JTAG_TMS_BB3	(4/7E)	
X132 B3			
X132 B4	ABUS0	(3/2B,8/2C,9/2C,9/6C)	
X132 B5	ABUS4	(8/2C,9/2C,9/6C)	
X132 B6	BBOUTCK_P	(3/2B,8/2C,8/2E,9/2C,9/6C)	(17/7D)
X132 B7	UC_DATA1	(8/2C,9/2C,9/6C,10/4B)	
X132 B8	UC_DATA5	(8/2C,9/2D,9/6D,10/4B)	
X132 B9			
X132 B10	UC_DATA9	(8/2C,9/2D,9/6D,10/4B)	
X132 B11	UC_DATA13	(8/2D,9/2D,9/6D,10/4B)	
X132 B12			
X132 B13	UC_BITCLK_RV	(8/2D,9/2D,9/6D,10/4B)	
X132 B14	UC_TRIGIN2	(8/2D,9/2D,9/6D,10/4B)	
X132 B15			
X132 B16	UC_CW	(8/2D,9/2D,9/6D,10/4B)	
X132 B17	UC_USER3	(8/2D,9/2D,9/6D,10/2D)	
X132 B18			
X132 B19			
X132 B20			
X132 B21			
X132 B22			
X132 B23	+U3V3-S3		
X132 B24			

X132 D1			
X132 D2	JTAG_TDO_BB	(3/7C,4/6E,8/3C,9/3C,9/7C)	(14/6C,17/7D)
X132 D3			
X132 D4	ABUS2	(3/2B,8/3C,9/3C,9/7C,14/6D)	(17/7E)
X132 D5	ABUS6	(8/3C,9/3C,9/7C)	
X132 D6			
X132 D7	UC_DATA3	(8/3C,9/3C,9/7C,10/2E)	
X132 D8	UC_DATA7	(8/3C,9/3D,9/7D,10/2E)	
X132 D9	UC_EXTCLK	(8/3C,9/3D,9/7D,10/2D)	
X132 D10	UC_DATA11	(8/3C,9/3D,9/7D,10/2E)	
X132 D11	UC_DATA15	(8/3D,9/3D,9/7D,10/2E)	
X132 D12			
X132 D13	UC_SYMB_RV	(8/3D,9/3D,9/7D,10/4D)	
X132 D14	UC_BURST	(8/3D,9/3D,9/7D,10/4D)	
X132 D15	UC_PD_SIG	(8/3D,9/3D,9/7D,10/2E)	
X132 D16	UC_USER1	(8/3D,9/3D,9/7D,10/2B)	
X132 D17			
X132 D18	DIAG	(3/7E,8/3D,9/3D,9/7D,10/2E)	
X132 D19	+U5V2-S3	(12/3C,12/7C,13/3C,13/7C)	
X132 D20	+U12V0	(14/3D,15/5B,15/7B)	
X132 D21	+U6V0		
X132 D22	+U5V2-S3		
X132 D23	+U28V0		
X132 D24			

ACHTUNG: EGB !
ELEKTROSTATISCH GEFAEHRDETE BAUELEMENTE ERFORDERN EINE BESONDERE HANDHABUNG.
ATTENTION ESD !
ELECTROSTATIC SENSITIVE DEVICES REQUIRE A SPECIAL HANDLING

ROHDE&SCHWARZ	Benennung: MOTHERBOARD SMU Designation: MOTHERBOARD SMU				Sprache: / Lang.: DE	Aei: / C.I.: 07.05	Blatt: / Sh.: 8+
Typ: / Type: SMU	Datum: / Date: 05-03-09	Abteilung: / Dpt: 1GPK	Name: / Name: DORNER		Zeichn. Nr.: / Drawing No.: 1141.3501.01 S		
1. Z.: / used in: 1141.2005.01	TOP/TOP.8						

SLOT4 D

X142 A1			
X142 A2		JTAG_TCK_BBS	(3/7E,4/6C,8/2B,8/5B,9/6B)
X142 A3		JTAG_TRST_BB	(3/7C,4/7C,8/2B,8/5B,9/6B)
X142 A4			(14/6C,17/7D)
X142 A5		ABUS3	(3/2D,8/2B,8/5B,9/6B,14/6D)
X142 A6		ABUS7	(8/2B,8/5B,9/6B)
X142 A7		UC_DATA0	(8/2B,8/5B,9/6B,10/2B)
X142 A8		UC_DATA4	(8/2B,8/5B,9/6B,10/2B)
X142 A9			
X142 A10		UC_DATA8	(8/2B,8/5B,9/6B,10/2B)
X142 A11		UC_DATA12	(8/2B,8/5B,9/6B,10/2B)
X142 A12			
X142 A13		UC_DACIF_RSV0	(8/2B,8/5B,9/6B,10/2B)
X142 A14		UC_TRIGIN1	(8/2B,8/5B,9/6B,10/2B)
X142 A15			
X142 A16		UC_LEVATT	(8/2B,8/5B,9/6B,10/2B)
X142 A17		UC_USER2	(8/2B,8/5B,9/6C,10/4B)
X142 A18			
X142 A19		-U6V0	
X142 A20			
X142 A21		-U12V0	
X142 A22			
X142 A23		+U3V3-S4	
X142 A24			

X142 C1		JTAG_TDI_BB	(3/7E,4/6C,8/3B,8/7B,9/7B)
X142 C2			(14/6D,17/7D)
X142 C3			
X142 C4		ABUS1	(3/2D,8/3B,8/7B,9/7B)
X142 C5		ABUS5	(8/3B,8/7B,9/7B)
X142 C6		BBOUTCK_N	(3/2D,8/2E,8/3B,8/7B,9/7B) (17/7E)
X142 C7		UC_DATA2	(8/3B,8/7B,9/7B,10/4C)
X142 C8		UC_DATA6	(8/3B,8/7B,9/7B,10/4C)
X142 C9		UC_VALID	(8/3B,8/7B,9/7B,10/2D)
X142 C10		UC_DATA10	(8/3B,8/7B,9/7B,10/4D)
X142 C11		UC_DATA14	(8/3B,8/7B,9/7B,10/4D)
X142 C12			
X142 C13		UC_DACIF_RSV1	(8/3B,8/7B,9/7B,10/2D)
X142 C14		UC_READ_REQ	(8/3B,8/7B,9/7B,10/4D)
X142 C15			
X142 C16		UC_HOPP	(8/3B,8/7B,9/7B,10/2D)
X142 C17		UC_USER4	(8/3B,8/7B,9/7C,10/4D)
X142 C18			
X142 C19		+U5V2-S4	
X142 C20			
X142 C21			
X142 C22			
X142 C23		+U3V3-S4	
X142 C24			

X142 B1			
X142 B2		JTAG_TMS_BB4	(4/6C)
X142 B3			
X142 B4		ABUS0	(3/2B,8/2C,8/5C,9/6C)
X142 B5		ABUS4	(8/2C,8/5C,9/6C)
X142 B6		BBOUTCK_P	(3/2B,8/2C,8/2E,8/5C,9/6C) (17/7D)
X142 B7		UC_DATA1	(8/2C,8/5C,9/6C,10/4B)
X142 B8		UC_DATA5	(8/2C,8/5C,9/6D,10/4B)
X142 B9			
X142 B10		UC_DATA9	(8/2C,8/5C,9/6D,10/4B)
X142 B11		UC_DATA13	(8/2D,8/5D,9/6D,10/4B)
X142 B12			
X142 B13		UC_BITCLK_RV	(8/2D,8/5D,9/6D,10/4B)
X142 B14		UC_TRIGIN2	(8/2D,8/5D,9/6D,10/4B)
X142 B15			
X142 B16		UC_CW	(8/2D,8/5D,9/6D,10/4B)
X142 B17		UC_USER3	(8/2D,8/5D,9/6D,10/2D)
X142 B18			
X142 B19			
X142 B20			
X142 B21			
X142 B22			
X142 B23		+U3V3-S4	
X142 B24			

X142 D1		JTAG_TDO_BB	(3/7C,4/6E,8/3C,8/7C,9/7C)
X142 D2			(14/6C,17/7D)
X142 D3			
X142 D4		ABUS2	(3/2B,8/3C,8/7C,9/7C,14/6D) (17/7E)
X142 D5		ABUS6	(8/3C,8/7C,9/7C)
X142 D6			
X142 D7		UC_DATA3	(8/3C,8/7C,9/7C,10/2E)
X142 D8		UC_DATA7	(8/3C,8/7C,9/7D,10/2E)
X142 D9		UC_EXTCLK	(8/3C,8/7C,9/7D,10/2D)
X142 D10		UC_DATA11	(8/3C,8/7C,9/7D,10/2E)
X142 D11		UC_DATA15	(8/3D,8/7D,9/7D,10/2E)
X142 D12			
X142 D13		UC_SYMB_RV	(8/3D,8/7D,9/7D,10/4D)
X142 D14		UC_BURST	(8/3D,8/7D,9/7D,10/4D)
X142 D15		UC_PD_SIG	(8/3D,8/7D,9/7D,10/2E)
X142 D16		UC_USER1	(8/3D,8/7D,9/7D,10/2B)
X142 D17			
X142 D18		DIAG	(3/7E,8/3D,8/7D,9/7D,10/2E)
X142 D19		+U5V2-S4	(12/3C,12/7C,13/3C,13/7C)
X142 D20		+U12V0	(14/3D,15/5B,15/7B)
X142 D21		+U6V0	
X142 D22		+U5V2-S4	
X142 D23		+U28V0	
X142 D24			

SLOT5 D

X152 A1			
X152 A2		JTAG_TCK_BBS	(3/7E,4/6C,8/2B,8/5B,9/2B)
X152 A3		JTAG_TRST_BB	(3/7C,4/7C,8/2B,8/5B,9/2B)
X152 A4			(14/6C,17/7D)
X152 A5		ABUS3	(3/2D,8/2B,8/5B,9/2B,14/6D)
X152 A6		ABUS7	(8/2B,8/5B,9/2B)
X152 A7		UC_DATA0	(8/2B,8/5B,9/2B,10/2B)
X152 A8		UC_DATA4	(8/2B,8/5B,9/2B,10/2B)
X152 A9			
X152 A10		UC_DATA8	(8/2B,8/5B,9/2B,10/2B)
X152 A11		UC_DATA12	(8/2B,8/5B,9/2B,10/2B)
X152 A12			
X152 A13		UC_DACIF_RSV0	(8/2B,8/5B,9/2B,10/2B)
X152 A14		UC_TRIGIN1	(8/2B,8/5B,9/2B,10/2B)
X152 A15			
X152 A16		UC_LEVATT	(8/2B,8/5B,9/2B,10/2B)
X152 A17		UC_USER2	(8/2B,8/5B,9/2C,10/4B)
X152 A18			
X152 A19		-U6V0	
X152 A20			
X152 A21		-U12V0	
X152 A22			
X152 A23		+U3V3-S5	
X152 A24			

X152 C1			
X152 C2		JTAG_TDI_BB	(3/7E,4/6C,8/3B,8/7B,9/3B)
X152 C3			(14/6D,17/7D)
X152 C4		ABUS1	(3/2D,8/3B,8/7B,9/3B)
X152 C5		ABUS5	(8/3B,8/7B,9/3B)
X152 C6		BBOUTCK_N	(3/2D,8/2E,8/3B,8/7B,9/3B) (17/7E)
X152 C7		UC_DATA2	(8/3B,8/7B,9/3B,10/4C)
X152 C8		UC_DATA6	(8/3B,8/7B,9/3B,10/4C)
X152 C9		UC_VALID	(8/3B,8/7B,9/3B,10/2D)
X152 C10		UC_DATA10	(8/3B,8/7B,9/3B,10/4D)
X152 C11		UC_DATA14	(8/3B,8/7B,9/3B,10/4D)
X152 C12			
X152 C13		UC_DACIF_RSV1	(8/3B,8/7B,9/3B,10/2D)
X152 C14		UC_READ_REQ	(8/3B,8/7B,9/3B,10/4D)
X152 C15			
X152 C16		UC_HOPP	(8/3B,8/7B,9/3B,10/2D)
X152 C17		UC_USER4	(8/3B,8/7B,9/3C,10/4D)
X152 C18			
X152 C19		+U5V2-S5	
X152 C20			
X152 C21			
X152 C22			
X152 C23		+U3V3-S5	
X152 C24			

X152 B1			
X152 B2		JTAG_TMS_BB5	(4/6E)
X152 B3			
X152 B4		ABUS0	(3/2B,8/2C,8/5C,9/2C)
X152 B5		ABUS4	(8/2C,8/5C,9/2C)
X152 B6		BBOUTCK_P	(3/2B,8/2C,8/2E,8/5C,9/2C) (17/7D)
X152 B7		UC_DATA1	(8/2C,8/5C,9/2C,10/4B)
X152 B8		UC_DATA5	(8/2C,8/5C,9/2D,10/4B)
X152 B9			
X152 B10		UC_DATA9	(8/2C,8/5C,9/2D,10/4B)
X152 B11		UC_DATA13	(8/2D,8/5D,9/2D,10/4B)
X152 B12			
X152 B13		UC_BITCLK_RV	(8/2D,8/5D,9/2D,10/4B)
X152 B14		UC_TRIGIN2	(8/2D,8/5D,9/2D,10/4B)
X152 B15			
X152 B16		UC_CW	(8/2D,8/5D,9/2D,10/4B)
X152 B17		UC_USER3	(8/2D,8/5D,9/2D,10/2D)
X152 B18			
X152 B19			
X152 B20			
X152 B21			
X152 B22			
X152 B23		+U3V3-S5	
X152 B24			

X152 D1		JTAG_TDO_BB	(3/7C,4/6E,8/3C,8/7C,9/3C)
X152 D2			(14/6C,17/7D)
X152 D3			
X152 D4		ABUS2	(3/2B,8/3C,8/7C,9/3C,14/6D) (17/7E)
X152 D5		ABUS6	(8/3C,8/7C,9/3C)
X152 D6			
X152 D7		UC_DATA3	(8/3C,8/7C,9/3C,10/2E)
X152 D8		UC_DATA7	(8/3C,8/7C,9/3D,10/2E)
X152 D9		UC_EXTCLK	(8/3C,8/7C,9/3D,10/2D)
X152 D10		UC_DATA11	(8/3C,8/7C,9/3D,10/2E)
X152 D11		UC_DATA15	(8/3D,8/7D,9/3D,10/2E)
X152 D12			
X152 D13		UC_SYMB_RV	(8/3D,8/7D,9/3D,10/4D)
X152 D14		UC_BURST	(8/3D,8/7D,9/3D,10/4D)
X152 D15		UC_PD_SIG	(8/3D,8/7D,9/3D,10/2E)
X152 D16		UC_USER1	(8/3D,8/7D,9/3D,10/2B)
X152 D17			
X152 D18		DIAG	(3/7E,8/3D,8/7D,9/3D,10/2E)
X152 D19		+U5V2-S5	(12/3C,12/7C,13/3C,13/7C)
X152 D20		+U12V0	(14/3D,15/5B,15/7B)
X152 D21		+U6V0	
X152 D22		+U5V2-S5	
X152 D23		+U28V0	
X152 D24			

ACHTUNG: EGB !
ELEKTROSTATISCH GEFAEHRDETE BAUELEMENTE ERFORDERN EINE BESONDERE HANDHABUNG.
ATTENTION ESD !
ELECTROSTATIC SENSITIVE DEVICES REQUIRE A SPECIAL HANDLING

ROHDE&SCHWARZ	Benennung: / Designation: MOTHERBOARD SMU MOTHERBOARD SMU				Sprache: / Lang.: DE	Aei: / C.I.: 07.05	Blatt: / Sh.: 9+
Typ: / Type: SMU	Datum: / Date: 05-03-09	Abteilung: / Dpt: 1GPK	Name: / Name: DORNER		Zeichn. Nr.: / Drawing No.: 1141.3501.01 S		
1. Z.: / used in: 1141.2005.01	TOP/TOP.9						

SLOT6 D
DACIF BOARD

X162 A1		USBD_N	(16/6C)
X162 A2			
X162 A3	→	SER_OUT	(12/2B,12/5B,13/2B,13/5B,14/2A) (15/5B,15/7B)
X162 A4	→	SER_RESET_N	(12/2B,12/5B,13/2B,13/5B,14/2B)
X162 A5			(15/5A,15/7A)
X162 A6	→	JTAG_TCK_HF	(12/2B,12/5B,13/2B,13/5B,14/2B)
X162 A7	→	JTAG_TMS_HF1	(12/3B)
X162 A8	→	UC_DATA0	(8/2B,8/5B,9/2B,9/6B)
X162 A9	→	UC_DATA4	(8/2B,8/5B,9/2B,9/6B)
X162 A10	→	UC_DATA8	(8/2B,8/5B,9/2B,9/6B)
X162 A11	→	UC_DATA12	(8/2B,8/5B,9/2B,9/6B)
X162 A15	→	UC_DACIF_RSV0	(8/2B,8/5B,9/2B,9/6B)
X162 A16	→	UC_TRIGIN1	(8/2B,8/5B,9/2B,9/6B)
X162 A17			
X162 A18	→	UC_LEVATT	(8/2B,8/5B,9/2B,9/6B)
X162 A19	←	UC_USER1	(8/3D,8/7D,9/3D,9/7D)
X162 A20	→	-U6V0	
X162 A21	→	-U6V0	
X162 A22	→	-U12V0	
X162 A23	→	-U12V0	
X162 A24	→	SER_CLK_HFS	(12/3C,12/7C,13/3C,13/7C,14/3C)
X162 A25			

X162 B1	◇	USBD_P	(16/6C)
X162 B2			
X162 B3	→	SER_IN	(12/2C,12/5C,13/2C,13/5C,14/2C) (15/5B,15/7B)
X162 B4	→	SPI_CS_BB3	(3/5A)
X162 B5	→	SER_INT_N	(12/2C,12/5C,13/2C,13/5C,14/2D) (15/5B,15/7B)
X162 B6			
X162 B7	→	JTAG_TMS_HF2	(12/7B)
X162 B8	◇	UC_DATA1	(8/2C,8/5C,9/2C,9/6C)
X162 B9	◇	UC_DATA5	(8/2C,8/5C,9/2D,9/6D)
X162 B10	◇	UC_DATA9	(8/2C,8/5C,9/2D,9/6D)
X162 B11	◇	UC_DATA13	(8/2D,8/5D,9/2D,9/6D)
X162 B15	◁	UC_BITCLK_RV	(8/2D,8/5D,9/2D,9/6D)
X162 B16	◁	UC_TRIGIN2	(8/2D,8/5D,9/2D,9/6D)
X162 B17			
X162 B18	◁	UC_CW	(8/2D,8/5D,9/2D,9/6D)
X162 B19	◁	UC_USER2	(8/2B,8/5B,9/2C,9/6C)
X162 B20	→	-U6V0	
X162 B21	→	-U6V0	
X162 B22			
X162 B23	→	+U12V0	
X162 B24	→	SER_CLK_HFE	(15/5B,15/7B)
X162 B25			

X162 C1			
X162 C2	→	SPI_CS_BB4	(4/2B)
X162 C3	→	SER_STRB_A	(12/3B,12/7B,13/3B,13/7B,14/3A) (15/5B,15/7B)
X162 C4	→	SER_STRB_D	(12/3C,12/7C,13/3C,13/7C,14/3C) (15/5B,15/7B)
X162 C5	→	SER_CLK_BBS	(3/7C)
X162 C6	→	JTAG_TRST_HF	(12/2C,12/5C,13/2C,13/5C,14/2D)
X162 C7	→	JTAG_TMS_HF3	(13/3B)
X162 C8	→	PWGOOD	(11/7C,15/2D)
X162 C9			
X162 C10	→	LEVATT_A	(12/2D,13/2D)
X162 C11	→	LEVATT_B	(12/5D)
X162 C15	→	UC_DACIF_RSV1	(8/3B,8/7B,9/3B,9/7B)
X162 C16	→	UC_VALID	(8/3B,8/7B,9/3B,9/7B)
X162 C17	→	UC_EXTCLK	(8/3C,8/7C,9/3D,9/7D)
X162 C18	◁	UC_HOPP	(8/3B,8/7B,9/3B,9/7B)
X162 C19	◁	UC_USER3	(8/2D,8/5D,9/2D,9/6D)
X162 C20			
X162 C21			
X162 C22			
X162 C23	→	+U6V0	
X162 C24	→	+U6V0	
X162 C25	→	BLANK_A	(12/2C,13/2D)

X162 D1	→	LEVATT0_A	(12/3B,13/3B)
X162 D2	→	BURST_A	(12/3C,13/3C)
X162 D3	→	LEVATT0_B	(12/7B)
X162 D4	→	BURST_B	(12/7C)
X162 D5	→	JTAG_TMS_BB6	(14/6C)
X162 D6	→	JTAG_TDI_HF	(12/3B,12/7B,13/3B,13/7B,14/3B)
X162 D7	→	JTAG_TMS_HF4	(13/7B)
X162 D8	◇	UC_DATA2	(8/3B,8/7B,9/3B,9/7B)
X162 D9	◇	UC_DATA6	(8/3B,8/7B,9/3B,9/7B)
X162 D10	◇	UC_DATA10	(8/3B,8/7B,9/3B,9/7B)
X162 D11	◇	UC_DATA14	(8/3B,8/7B,9/3B,9/7B)
X162 D15	→	UC_SYMB_RV	(8/3D,8/7D,9/3D,9/7D)
X162 D16	→	UC_READ_REQ	(8/3B,8/7B,9/3B,9/7B)
X162 D17			
X162 D18	◁	UC_BURST	(8/3D,8/7D,9/3D,9/7D)
X162 D19	◁	UC_USER4	(8/3B,8/7B,9/3C,9/7C)
X162 D20			
X162 D21	→	BB_USRCLK	(3/2E)
X162 D22			
X162 D23	→	+US12V0	
X162 D24	→	+U28V0	
X162 D25	→	BLANK_B	(12/5C)

X162 E1	→	BER_MASK	(17/3B)
X162 E2	→	BER_RES	(17/3B)
X162 E3	→	BER_DATA	(17/3B)
X162 E4	→	BER_CLK	(17/3B)
X162 E5			
X162 E6	→	JTAG_TDO_HF	(12/3C,12/7C,13/3C,13/7C,14/3D)
X162 E7	→	JTAG_TMS_HF5	(14/3B)
X162 E8	◇	UC_DATA3	(8/3C,8/7C,9/3C,9/7C)
X162 E9	◇	UC_DATA7	(8/3C,8/7C,9/3D,9/7D)
X162 E10	◇	UC_DATA11	(8/3C,8/7C,9/3D,9/7D)
X162 E11	◇	UC_DATA15	(8/3D,8/7D,9/3D,9/7D)
X162 E15	NC	(TESTREG0)	
X162 E16	→	JTAG_TMS_BB7	(17/7D)
X162 E17	→	UC_PD_SIG	(8/3D,8/7D,9/3D,9/7D)
X162 E18	→	LEVATT1_A	(12/2B,13/2B)
X162 E19	→	INST_TRIG_IN	(17/6C)
X162 E20	→	DIAG	(3/7E,8/3D,8/7D,9/3D,9/7D) (12/3C,12/7C,13/3C,13/7C) (14/3D,15/5B,15/7B)
X162 E21	→	LEVATT1_B	(12/5B)
X162 E22	→	TX_PARDATA	(17/2E)
X162 E23			
X162 E24			
X162 E25			

X162 111 112 113 114 115 116 117 118 119 120 121 122 123 124 125

X162 126 127 128 129 130 131 132 133 134 135 136 137 138 139 140

X162 141 142 143 144 145 146 147 148 149 150 151 152 153 154

SLOT6 D
DACIF BOARD

X164 A1 A2 A3 A4 A5 A6 A7 A8 A9 A10 A11 A12

X164 C1			
X164 C2	→	IQOP_I_A_N	(12/3E)
X164 C3			
X164 C4	→	IQOP_Q_A_N	(12/3E)
X164 C5			
X164 C6	→	IQOP_I_B_N	(12/7E)
X164 C7			
X164 C8	→	IQOP_Q_B_N	(12/7E)
X164 C9			
X164 C10			
X164 C11	→	SYNEX_FSK	(13/2D)
X164 C12			

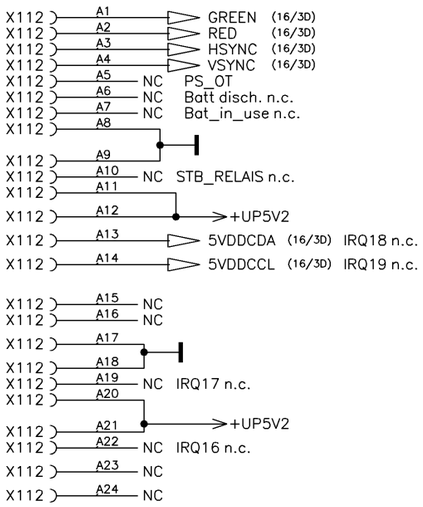
X164 B1			
X164 B2	→	IQOP_I_A_P	(12/2E)
X164 B3			
X164 B4	→	IQOP_Q_A_P	(12/2F)
X164 B5			
X164 B6	→	IQOP_I_B_P	(12/5E)
X164 B7			
X164 B8	→	IQOP_Q_B_P	(12/5F)
X164 B9			
X164 B10	→	MOD_INT	(12/3B,12/7B,13/3B)
X164 B11			
X164 B12	→	LF_OUT	(17/6B)

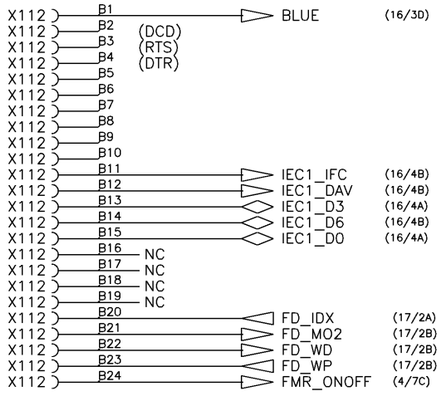
X164 D1 D2 D3 D4 D5 D6 D7 D8 D9 D10 D11 D12

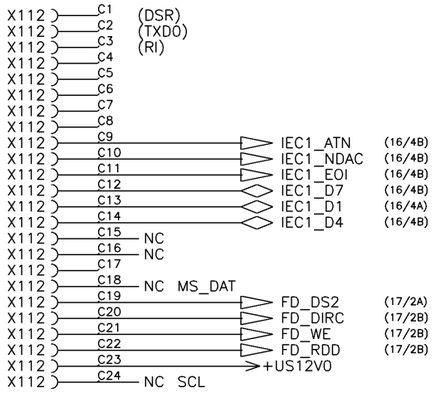
ACHTUNG: EGB !
ELEKTROSTATISCH GEFAEHRDETE BAUELEMENTE ERFORDERN EINE BESONDERE HANDHABUNG.
ATTENTION ESD !
ELECTROSTATIC SENSITIVE DEVICES REQUIRE A SPECIAL HANDLING

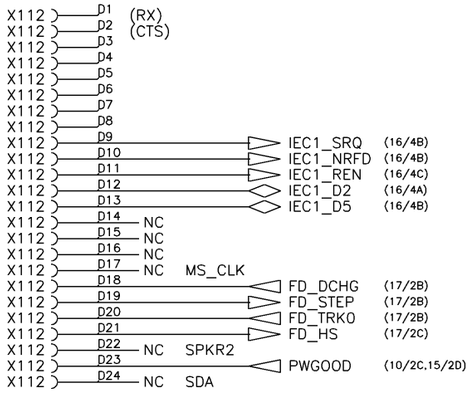
ROHDE&SCHWARZ	Benennung: MOTHERBOARD SMU Designation: MOTHERBOARD SMU				Sprache: / Lang.: DE	Aei: / C.I.: 07.05	Blatt: / Sh.: 10+
Typ: / Type: SMU	Datum: / Date: 05-03-09	Abteilung: / Dpt: 1GPK	Name: / Name: DORNER	Zeichn. Nr.: / Drawing No.: 1141.3501.01 S			
1. Z.: / used in: 1141.2005.01	TOP/TOP.10						

FMR (I/O)









ACHTUNG: EGB !
ELEKTROSTATISCH GEFAEHRDETE BAUELEMENTE ERFORDERN EINE BESONDERE HANDHABUNG.
ATTENTION ESD !
ELECTROSTATIC SENSITIVE DEVICES REQUIRE A SPECIAL HANDLING

ROHDE&SCHWARZ	Benennung: / Designation: MOTHERBOARD SMU / MOTHERBOARD SMU				Sprache: / Lang.: DE	Aei: / C.I.: 07.05	Blatt: / Sh.: 11+
Typ: / Type: SMU	Datum: / Date: 05-03-09	Abteilung: / Dpt: 1GPK	Name: / Name: DORNER		Zeichn. Nr.: / Drawing No.: 1141.3501.01 S		
1. Z.: / used in: 1141.2005.01	TOP/TOP.11						

SLOT1 A /IQOP3

X171	A1		
X171	A2	SER_OUT	(10/2B,12/5B,13/2B,13/5B,14/2A) (15/5B,15/7B)
X171	A3	SER_RESET_N	(10/2B,12/5B,13/2B,13/5B,14/2B)
X171	A4		(15/5A,15/7A)
X171	A5	JTAG_TCK_HF	(10/2B,12/5B,13/2B,13/5B,14/2B)
X171	A6	SLOTADR	
X171	A7		
X171	A8	RF_DOWN1_N	(13/2B,15/5A)
X171	A9	AMOD6_A	(12/5B,13/2B)
X171	A10		
X171	A11	−U6V0	
X171	A12	LEVATT1_A	(10/2E,13/2B)
X171	A13	−U12V0	
X171	A14		
X171	A15	+U12V0	
X171	A16		
X171	A17	+US12V0	
X171	A18		
X171	A19	+U6V0	
X171	A20		
X171	A21	+UA5V2	
X171	A22		
X171	A23	+U3V3	
X171	A24	+U28V0	

X171	C1		
X171	C2	SER_STRB_A	(10/2C,12/7B,13/3B,13/7B,14/3A) (15/5B,15/7B)
X171	C3		
X171	C4	JTAG_TDI_HF	(10/4C,12/7B,13/3B,13/7B,14/3B)
X171	C5	JTAG_TMS_HF1	(10/2B)
X171	C6	+U3V3 SLOTADR	
X171	C7		
X171	C8	LEVATT0_A	(10/4C,13/3B)
X171	C9	PUM_A	(12/7C,13/3D)
X171	C10	MOD_INT	(10/6C,12/7B,13/3B)
X171	C11	−U6V0	
X171	C12		
X171	C13	−U12V0	
X171	C14		
X171	C15	+U12V0	
X171	C16		
X171	C17	+US12V0	
X171	C18		
X171	C19	+U6V0	
X171	C20		
X171	C21	+UA5V2	
X171	C22		
X171	C23	+U3V3	
X171	C24		

X171	B1		
X171	B2	SER_IN	(10/4B,12/5C,13/2C,13/5C,14/2C) (15/5B,15/7B)
X171	B3	SER_INT_N	(10/4B,12/5C,13/2C,13/5C,14/2D)
X171	B4		(15/5B,15/7B)
X171	B5	JTAG_TRST_HF	(10/2C,12/5C,13/2C,13/5C,14/2D)
X171	B6	SLOTADR	
X171	B7		
X171	B8		
X171	B9	BLANK_A	(10/2D,13/2D)
X171	B10		
X171	B11	−U6V0	
X171	B12	LEVATT_A	(10/2D,13/2D)
X171	B13	−U12V0	
X171	B14		
X171	B15	+U12V0	
X171	B16		
X171	B17	+US12V0	
X171	B18		
X171	B19	+U6V0	
X171	B20		
X171	B21	+UA5V2	
X171	B22		
X171	B23	+U3V3	
X171	B24	+U28V0	

X171	D1	SER_CLK_HFS	(10/2C,12/7C,13/3C,13/7C,14/3C)
X171	D2	SER_STRB_D	(10/2C,12/7C,13/3C,13/7C,14/3C)
X171	D3		(15/5B,15/7B)
X171	D4	JTAG_TDO_HF	(10/2E,12/7C,13/3C,13/7C,14/3D)
X171	D5		
X171	D6	DIAG	(3/7E,8/3D,8/7D,9/3D,9/7D) (10/2E,12/7C,13/3C,13/7C) (14/3D,15/5B,15/7B)
X171	D7		(10/4C,13/3C)
X171	D8	BURST_A	
X171	D9		
X171	D10	MOD_EXT	(2/7D,12/7D,13/3D)
X171	D11	−U6V0	
X171	D12		
X171	D13	−U12V0	
X171	D14		
X171	D15	+U12V0	
X171	D16		
X171	D17	+US12V0	
X171	D18		
X171	D19	+U6V0	
X171	D20		
X171	D21	+UA5V2	
X171	D22		
X171	D23	+U3V3	
X171	D24		

SLOT2 A / IQOP3 IQOP6

X181	A1		
X181	A2	SER_OUT	(10/2B,12/2B,13/2B,13/5B,14/2A) (15/5B,15/7B)
X181	A3	SER_RESET_N	(10/2B,12/2B,13/2B,13/5B,14/2B)
X181	A4		(15/5A,15/7A)
X181	A5	JTAG_TCK_HF	(10/2B,12/2B,13/2B,13/5B,14/2B)
X181	A6	SLOTADR	
X181	A7		
X181	A8	RF_DOWN2_N (AMOD6_B)	(15/7A)
X181	A9		
X181	A10	AMOD6_A	(12/2B,13/2B)
X181	A11	−U6V0	
X181	A12	LEVATT1_B	(10/2E)
X181	A13	−U12V0	
X181	A14		
X181	A15	+U12V0	
X181	A16		
X181	A17	+US12V0	
X181	A18		
X181	A19	+U6V0	
X181	A20		
X181	A21	+UA5V2	
X181	A22		
X181	A23	+U3V3	
X181	A24	+U28V0	

X181	C1		
X181	C2	SER_STRB_A	(10/2C,12/3B,13/3B,13/7B,14/3A) (15/5B,15/7B)
X181	C3		
X181	C4	JTAG_TDI_HF	(10/4C,12/3B,13/3B,13/7B,14/3B)
X181	C5	JTAG_TMS_HF2	(10/4B)
X181	C6		
X181	C7	SLOTADR	
X181	C8	LEVATT0_B (PUM_B)	(10/4C)
X181	C9		
X181	C10	MOD_INT	(10/6C,12/3B,13/3B)
X181	C11	−U6V0	
X181	C12		
X181	C13	−U12V0	
X181	C14		
X181	C15	+U12V0	
X181	C16		
X181	C17	+US12V0	
X181	C18		
X181	C19	+U6V0	
X181	C20		
X181	C21	+UA5V2	
X181	C22		
X181	C23	+U3V3	
X181	C24		

X181	B1		
X181	B2	SER_IN	(10/4B,12/2C,13/2C,13/5C,14/2C) (15/5B,15/7B)
X181	B3	SER_INT_N	(10/4B,12/2C,13/2C,13/5C,14/2D)
X181	B4		(15/5B,15/7B)
X181	B5	JTAG_TRST_HF	(10/2C,12/2C,13/2C,13/5C,14/2D)
X181	B6	+U3V3 SLOTADR	
X181	B7		
X181	B8		
X181	B9	BLANK_B	(10/4D)
X181	B10		
X181	B11	−U6V0	
X181	B12	LEVATT_B	(10/2D)
X181	B13	−U12V0	
X181	B14		
X181	B15	+U12V0	
X181	B16		
X181	B17	+US12V0	
X181	B18		
X181	B19	+U6V0	
X181	B20		
X181	B21	+UA5V2	
X181	B22		
X181	B23	+U3V3	
X181	B24	+U28V0	

X181	D1	SER_CLK_HFS	(10/2C,12/3C,13/3C,13/7C,14/3C)
X181	D2	SER_STRB_D	(10/2C,12/3C,13/3C,13/7C,14/3C)
X181	D3		(15/5B,15/7B)
X181	D4	JTAG_TDO_HF	(10/2E,12/3C,13/3C,13/7C,14/3D)
X181	D5		
X181	D6	DIAG	(3/7E,8/3D,8/7D,9/3D,9/7D) (10/2E,12/3C,13/3C,13/7C) (14/3D,15/5B,15/7B)
X181	D7		(10/4C)
X181	D8	BURST_B	(12/3B,13/3D)
X181	D9	PUM_A	(2/7D,12/3D,13/3D)
X181	D10	MOD_EXT	
X181	D11	−U6V0	
X181	D12		
X181	D13	−U12V0	
X181	D14		
X181	D15	+U12V0	
X181	D16		
X181	D17	+US12V0	
X181	D18		
X181	D19	+U6V0	
X181	D20		
X181	D21	+UA5V2	
X181	D22		
X181	D23	+U3V3	
X181	D24		

24ST X172	A1		
X172	A2		
X172	A3		
X172	A4		
X172	A5		
X172	A6		
X172	B1		
X172	B2	IQOP_I_A_P	(10/6C)
X172	B3		
X172	B4	IQOP_Q_A_P	(10/6C)
X172	B5		
X172	B6		

X172	C1		
X172	C2	IQOP_I_A_N	(10/8B)
X172	C3		
X172	C4	IQOP_Q_A_N	(10/8B)
X172	C5		
X172	C6		
X172	D1		
X172	D2		
X172	D3		
X172	D4		
X172	D5		
X172	D6		

24ST X182	A1		
X182	A2		
X182	A3		
X182	A4		
X182	A5		
X182	A6		
X182	B1		
X182	B2	IQOP_I_B_P	(10/6C)
X182	B3		
X182	B4	IQOP_Q_B_P	(10/6C)
X182	B5		
X182	B6		

X182	C1		
X182	C2	IQOP_I_B_N	(10/8B)
X182	C3		
X182	C4	IQOP_Q_B_N	(10/8B)
X182	C5		
X182	C6		
X182	D1		
X182	D2		
X182	D3		
X182	D4		
X182	D5		
X182	D6		

ACHTUNG: EGB !
ELEKTROSTATISCH GEFAEHRDETE BAUELEMENTE ERFORDERN EINE BESONDERE HANDHABUNG.
ATTENTION ESD !
ELECTROSTATIC SENSITIVE DEVICES REQUIRE A SPECIAL HANDLING

ROHDE&SCHWARZ	Benennung: / Designation: MOTHERBOARD SMU MOTHERBOARD SMU			Sprache: / Lang.: DE	Aei: / C.I.: 07.05	Blatt: / Sh.: 12+
Typ: / Type: SMU	Datum: / Date: 05−03−09	Abteilung: / Dpt: 1GPK	Name: / Name: DORNER	Zeichn. Nr.: / Drawing No.: 1141.3501.01 S		
1. Z.: / used in: 1141.2005.01	TOP/TOP.12					

SLOT3 A / IQOP6

X191	A1		
X191	A2	SER_OUT	(10/2B,12/2B,12/5B,13/5B,14/2A) (15/5B,15/7B)
X191	A3	SER_RESET_N	(10/2B,12/2B,12/5B,13/5B,14/2B)
X191	A4		(15/5A,15/7A)
X191	A5	JTAG_TCK_HF	(10/2B,12/2B,12/5B,13/5B,14/2B)
X191	A6		
X191	A7		
X191	A8	RF_DOWN1_N	(12/2B,15/5A)
X191	A9		
X191	A10	AMOD6_A	(12/2B,12/5B)
X191	A11	–U6V0	
X191	A12	LEVATT1_A	(10/2E,12/2B)
X191	A13	–U12V0	
X191	A14	OCXO_ENA0	(13/5D,14/2D)
X191	A15	+U12V0	
X191	A16		
X191	A17	+US12V0	
X191	A18		
X191	A19	+U6V0	
X191	A20		
X191	A21	+UA5V2	
X191	A22		
X191	A23	+U3V3	
X191	A24	+U28V0	

X191	B1		
X191	B2	SER_IN	(10/4B,12/2C,12/5C,13/5C,14/2C) (15/5B,15/7B)
X191	B3	SER_INT_N	(10/4B,12/2C,12/5C,13/5C,14/2D)
X191	B4		(15/5B,15/7B)
X191	B5	JTAG_TRST_HF	(10/2C,12/2C,12/5C,13/5C,14/2D)
X191	B6	+U3V3	
X191	B7		
X191	B8		
X191	B9	BLANK_A	(10/2D,12/2C)
X191	B10	SYNEX_FSK	(10/8B)
X191	B11	–U6V0	
X191	B12	LEVATT_A	(10/2D,12/2D)
X191	B13	–U12V0	
X191	B14		
X191	B15	+U12V0	
X191	B16		
X191	B17	+US12V0	
X191	B18		
X191	B19	+U6V0	
X191	B20		
X191	B21	+UA5V2	
X191	B22		
X191	B23	+U3V3	
X191	B24	+U28V0	

X191	C1		
X191	C2	SER_STRB_A	(10/2C,12/3B,12/7B,13/7B,14/3A) (15/5B,15/7B)
X191	C3		
X191	C4	JTAG_TDI_HF	(10/4C,12/3B,12/7B,13/7B,14/3B)
X191	C5	JTAG_TMS_HF3	(10/2C)
X191	C6	+U3V3	
X191	C7		
X191	C8	LEVATT0_A	(10/4C,12/3B)
X191	C9		
X191	C10	MOD_INT	(10/6C,12/3B,12/7B)
X191	C11	–U6V0	
X191	C12	OCXO_TUNE	(13/7B,14/3B)
X191	C13	–U12V0	
X191	C14		
X191	C15	+U12V0	
X191	C16		
X191	C17	+US12V0	
X191	C18		
X191	C19	+U6V0	
X191	C20		
X191	C21	+UA5V2	
X191	C22		
X191	C23	+U3V3	
X191	C24		

X191	D1	SER_CLK_HFS	(10/2C,12/3C,12/7C,13/7C,14/3C)
X191	D2	SER_STRB_D	(10/2C,12/3C,12/7C,13/7C,14/3C)
X191	D3		(15/5B,15/7B)
X191	D4	JTAG_TDO_HF	(10/2E,12/3C,12/7C,13/7C,14/3D)
X191	D5		
X191	D6	DIAG	(3/7E,8/3D,8/7D,9/3D,9/7D) (10/2E,12/3C,12/7C,13/7C) (14/3D,15/5B,15/7B)
X191	D7		
X191	D8	BURST_A	(10/4C,12/3C)
X191	D9	PUM_A	(12/3B,12/7C)
X191	D10	MOD_EXT	(2/7D,12/3D,12/7D)
X191	D11	–U6V0	
X191	D12	EXT_TUNE	(13/7D,14/3D,17/2D)
X191	D13	–U12V0	
X191	D14		
X191	D15	+U12V0	
X191	D16		
X191	D17	+US12V0	
X191	D18		
X191	D19	+U6V0	
X191	D20		
X191	D21	+UA5V2	
X191	D22		
X191	D23	+U3V3	
X191	D24		

SLOT4 A / SSYN

X201	A1		
X201	A2	SER_OUT	(10/2B,12/2B,12/5B,13/2B,14/2A) (15/5B,15/7B)
X201	A3	SER_RESET_N	(10/2B,12/2B,12/5B,13/2B,14/2B)
X201	A4		(15/5A,15/7A)
X201	A5	JTAG_TCK_HF	(10/2B,12/2B,12/5B,13/2B,14/2B)
X201	A6	+U3V3	
X201	A7		
X201	A8		
X201	A9		
X201	A10		
X201	A11	–U6V0	
X201	A12		
X201	A13	–U12V0	
X201	A14	OCXO_ENA2	(14/3D)
X201	A15	+U12V0	
X201	A16		
X201	A17	+US12V0	
X201	A18		
X201	A19	+U6V0_S4	
X201	A20		
X201	A21	+UA5V2	
X201	A22		
X201	A23	+U3V3	
X201	A24	+U28V0	

X201	B1		
X201	B2	SER_IN	(10/4B,12/2C,12/5C,13/2C,14/2C) (15/5B,15/7B)
X201	B3	SER_INT_N	(10/4B,12/2C,12/5C,13/2C,14/2D)
X201	B4		(15/5B,15/7B)
X201	B5	JTAG_TRST_HF	(10/2C,12/2C,12/5C,13/2C,14/2D)
X201	B6		
X201	B7		
X201	B8		
X201	B9		
X201	B10		
X201	B11	–U6V0	
X201	B12		
X201	B13	–U12V0	
X201	B14	OCXO_ENA0	(13/2B,14/2D)
X201	B15	+U12V0	
X201	B16		
X201	B17	+US12V0	
X201	B18		
X201	B19	+U6V0_S4	
X201	B20		
X201	B21	+UA5V2	
X201	B22		
X201	B23	+U3V3	
X201	B24	+U28V0	

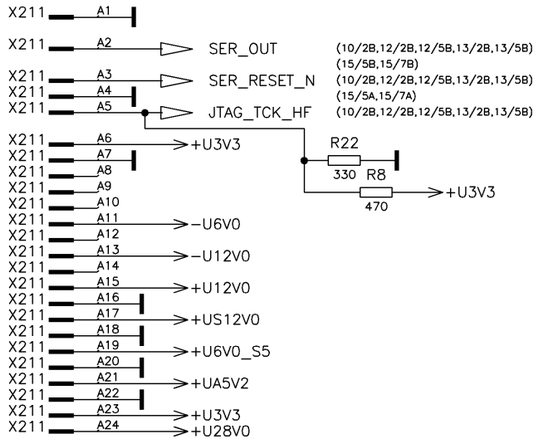
X201	C1		
X201	C2	SER_STRB_A	(10/2C,12/3B,12/7B,13/3B,14/3A) (15/5B,15/7B)
X201	C3		
X201	C4	JTAG_TDI_HF	(10/4C,12/3B,12/7B,13/3B,14/3B)
X201	C5	JTAG_TMS_HF4	(10/4C)
X201	C6		
X201	C7		
X201	C8		
X201	C9		
X201	C10		
X201	C11	–U6V0	
X201	C12	OCXO_TUNE	(13/3B,14/3B)
X201	C13	–U12V0	
X201	C14	OCXO_ENA1	(14/3B)
X201	C15	+U12V0	
X201	C16		
X201	C17	+US12V0	
X201	C18		
X201	C19	+U6V0_S4	
X201	C20		
X201	C21	+UA5V2	
X201	C22		
X201	C23	+U3V3	
X201	C24		

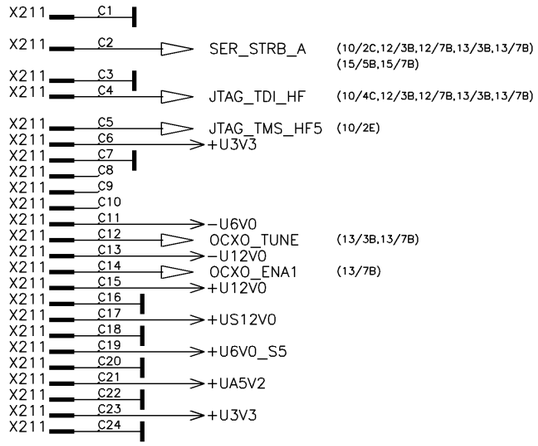
X201	D1	SER_CLK_HFS	(10/2C,12/3C,12/7C,13/3C,14/3C)
X201	D2	SER_STRB_D	(10/2C,12/3C,12/7C,13/3C,14/3C)
X201	D3		(15/5B,15/7B)
X201	D4	JTAG_TDO_HF	(10/2E,12/3C,12/7C,13/3C,14/3D)
X201	D5		
X201	D6	DIAG	(3/7E,8/3D,8/7D,9/3D,9/7D) (10/2E,12/3C,12/7C,13/3C) (14/3D,15/5B,15/7B)
X201	D7		
X201	D8		
X201	D9		
X201	D10		
X201	D11	–U6V0	
X201	D12	EXT_TUNE	(13/3D,14/3D,17/2D)
X201	D13	–U12V0	
X201	D14		
X201	D15	+U12V0	
X201	D16		
X201	D17	+US12V0	
X201	D18		
X201	D19	+U6V0_S4	
X201	D20		
X201	D21	+UA5V2	
X201	D22		
X201	D23	+U3V3	
X201	D24		

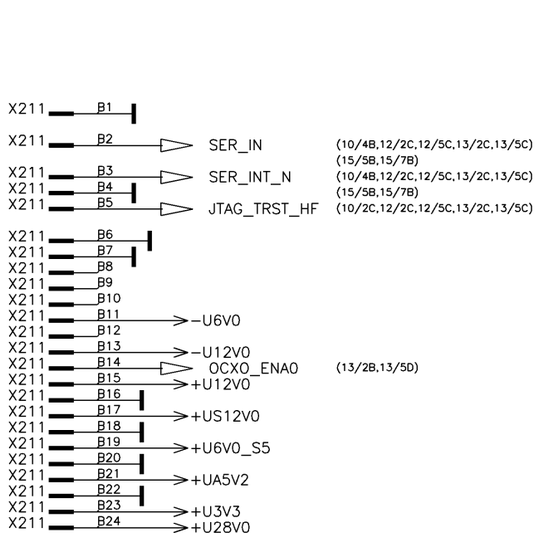
ACHTUNG: EGB !
ELEKTROSTATISCH GEFAEHRDETE BAUELEMENTE ERFORDERN EINE BESONDERE HANDHABUNG.
ATTENTION ESD !
ELECTROSTATIC SENSITIVE DEVICES REQUIRE A SPECIAL HANDLING

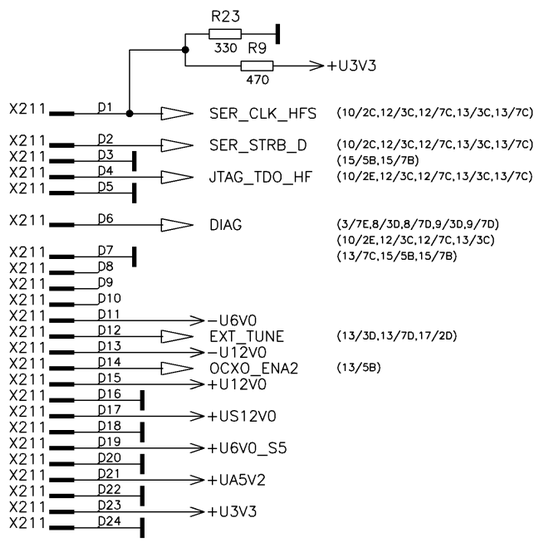
ROHDE&SCHWARZ	Benennung: / Designation: MOTHERBOARD SMU MOTHERBOARD SMU			Sprache: / Lang.: DE	Aei: / C.I.: 07.05	Blatt: / Sh.: 13+
Typ: / Type: SMU	Datum: / Date: 05–03–09	Abteilung: / Dpt: 1GPK	Name: / Name: DORNER	Zeichn. Nr.: / Drawing No.: 1141.3501.01 S		
1. Z.: / used in: 1141.2005.01	TOP/TOP.13					

SLOT5 A

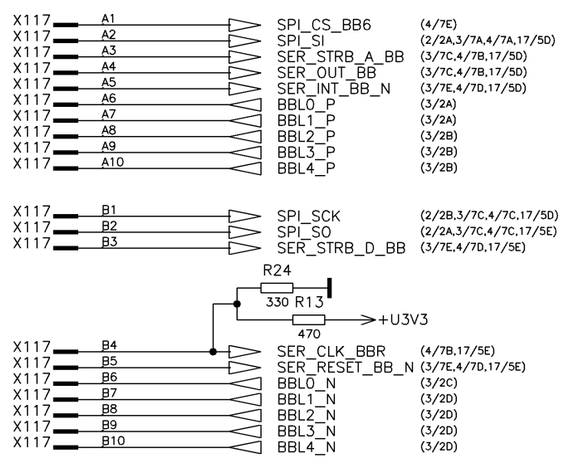


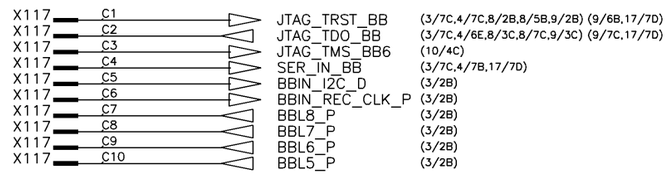


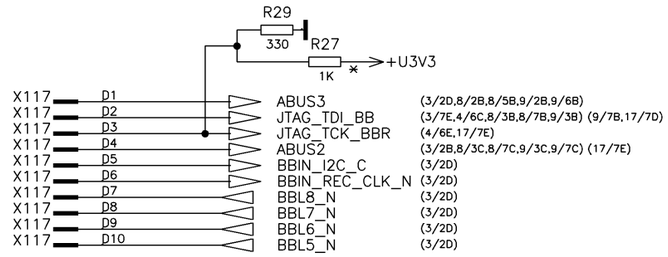


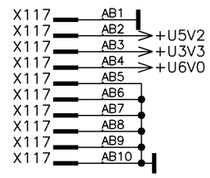


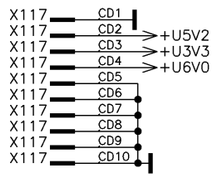
BBIN R







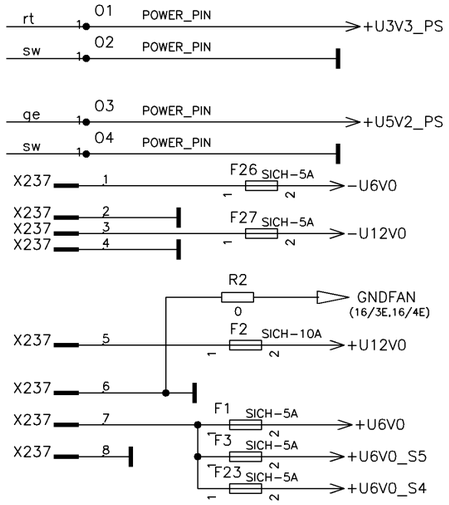


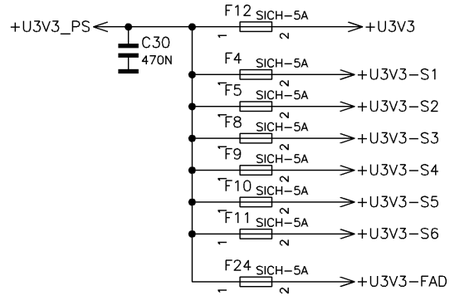


ACHTUNG: EGB !
ELEKTROSTATISCH GEFAEHRDETE BAUELEMENTE ERFORDERN EINE BESONDERE HANDHABUNG.
ATTENTION ESD !
ELECTROSTATIC SENSITIVE DEVICES REQUIRE A SPECIAL HANDLING

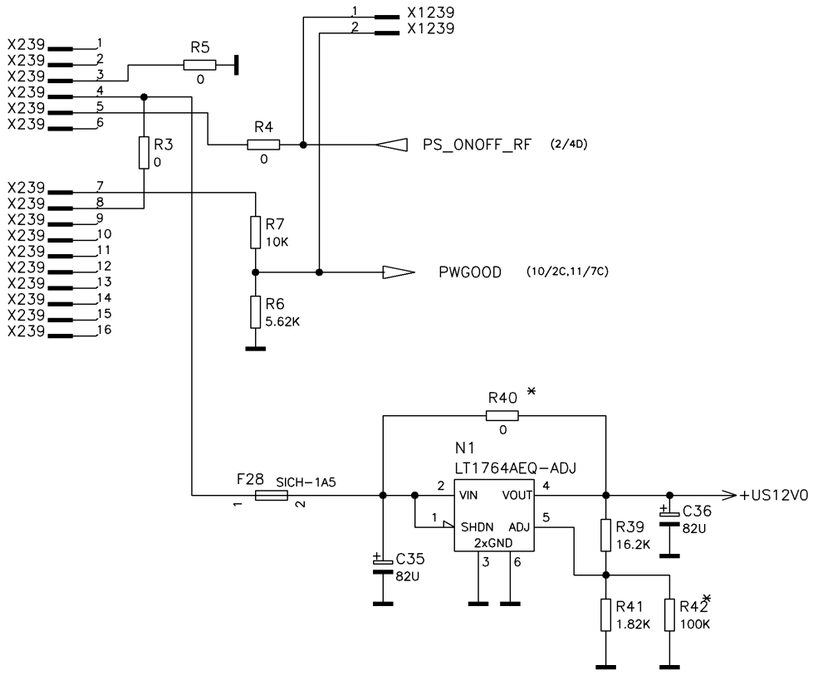
ROHDE&SCHWARZ	Benennung: MOTHERBOARD SMU Designation: MOTHERBOARD SMU				Sprache: / Lang.: DE	Aei: / C.I.: 07.05	Blatt: / Sh.: 14+
Typ: / Type: SMU	Datum: / Date: 05-03-09	Abteilung: / Dpt: 1GPK	Name: / Name: DORNER		Zeichn. Nr.: / Drawing No.: 1141.3501.01 S		
1. Z.: / used in: 1141.2005.01				TOP/TOP.14			

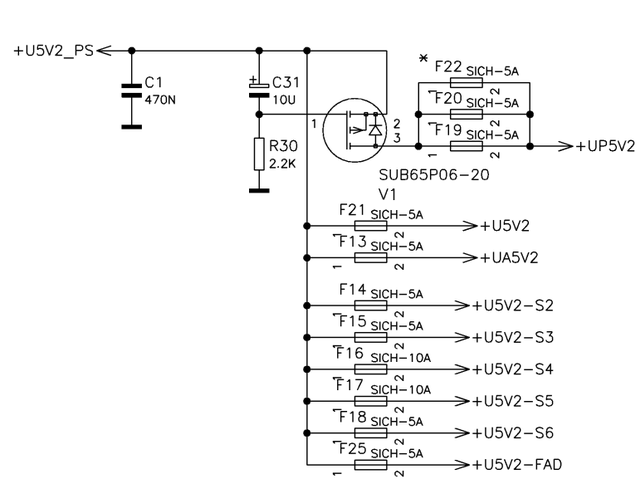
FROM POWER SUPPLY





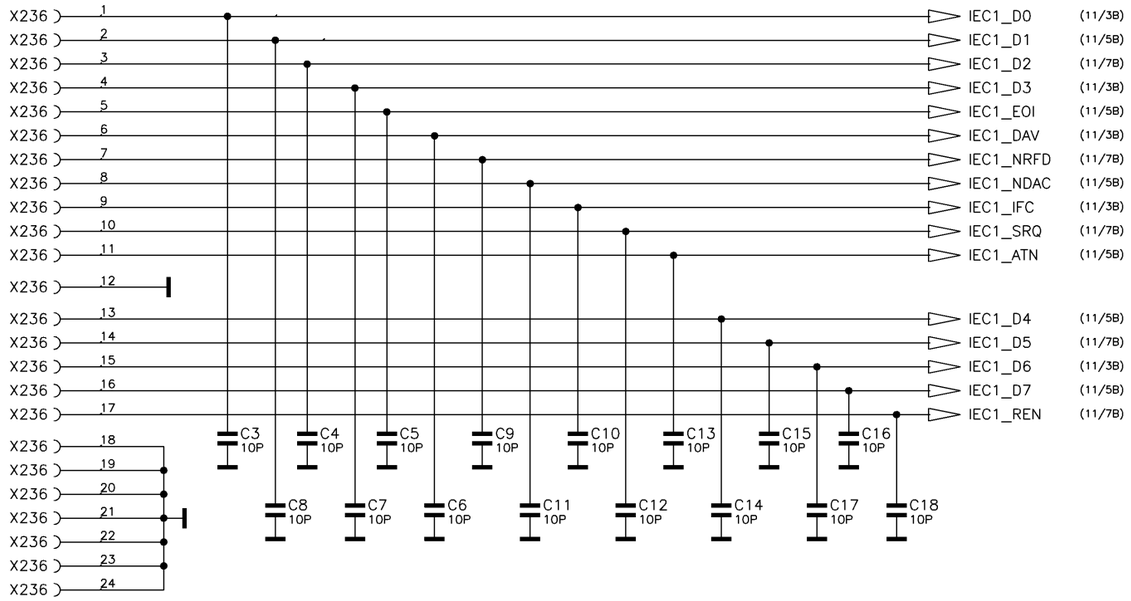
FROM POWER SUPPLY CONTROL



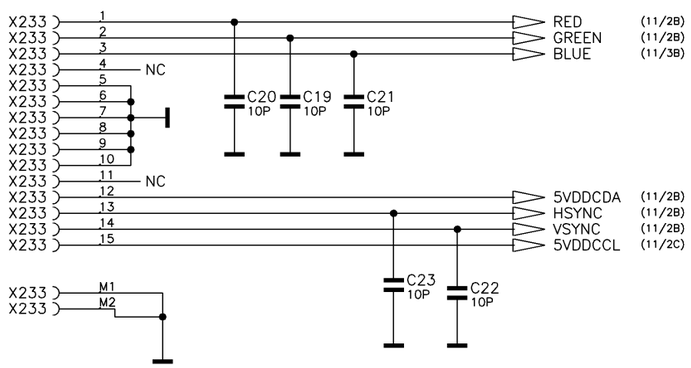


ROHDE&SCHWARZ	Benennung: / Designation: MOTHERBOARD SMU MOTHERBOARD SMU				Sprache: / Lang.: DE	Aei: / C.I.: 07.05	Blatt: / Sh.: 15+
Typ: / Type: SMU	Datum: / Date: 05-03-09	Abteilung: / Dpt: 1GPK	Name: / Name: DORNER		Zeichn. Nr.: / Drawing No.: 1141.3501.01 S		
1. Z.: / used in: 1141.2005.01	TOP/TOP.15						

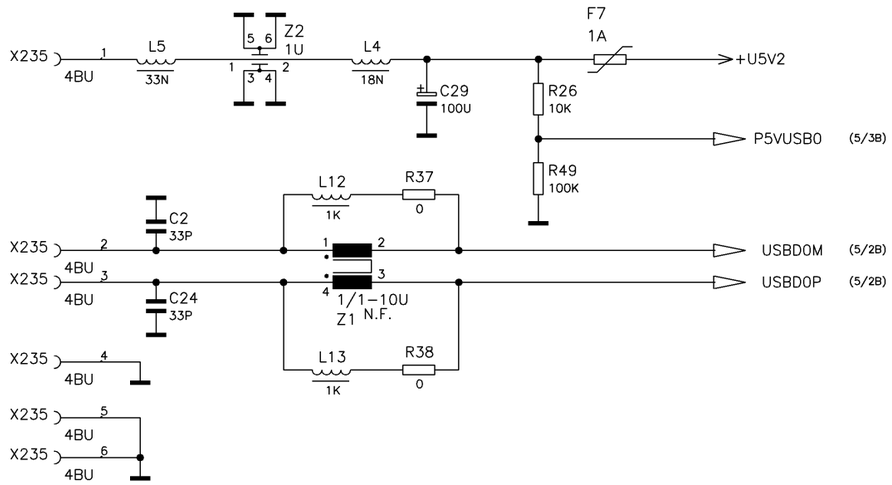
IEC



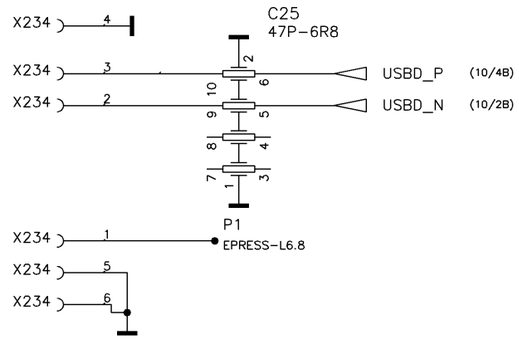
VGA



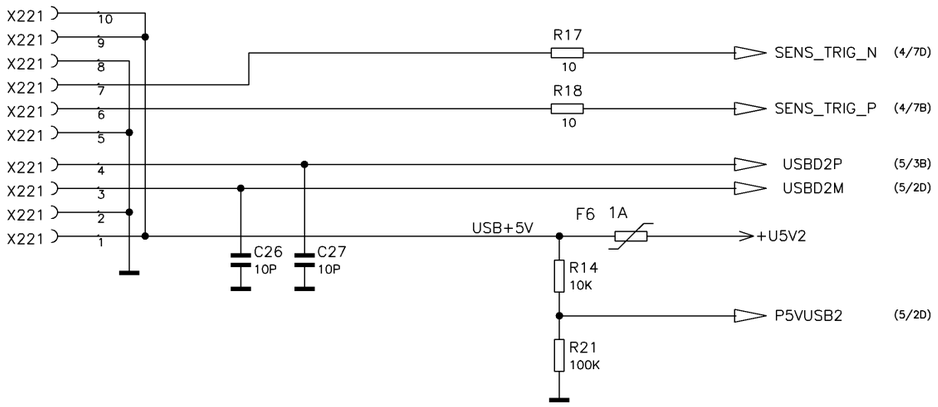
USB



USB SLAVE



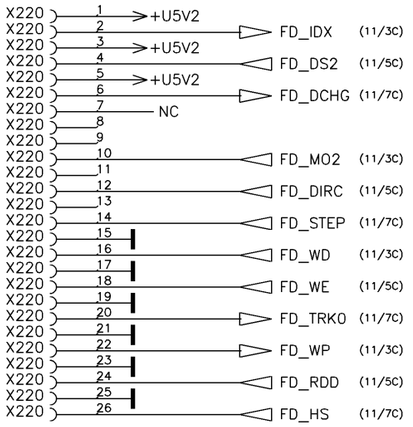
USB POWER SENSOR



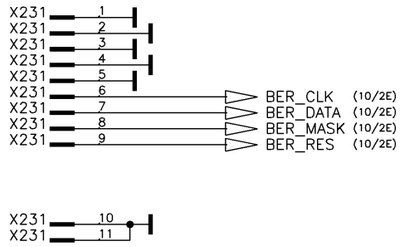
ACHTUNG: EGB !
ELEKTROSTATISCH GEFAEHRDETE BAUELEMENTE ERFORDERN EINE BESONDERE HANDHABUNG.
ATTENTION ESD !
ELECTROSTATIC SENSITIVE DEVICES REQUIRE A SPECIAL HANDLING

ROHDE&SCHWARZ	Benennung: / Designation: MOTHERBOARD SMU MOTHERBOARD SMU				Sprache: / Lang.: DE	Aei: / C.I.: 07.05	Blatt: / Sh.: 16+
Typ: / Type: SMU	Datum: / Date: 05-03-09	Abteilung: / Dpt: 1GPK	Name: / Name: DORNER		Zeichn. Nr.: / Drawing No.: 1141.3501.01 S		
1. Z.: / used in: 1141.2005.01	TOP/TOP.16						

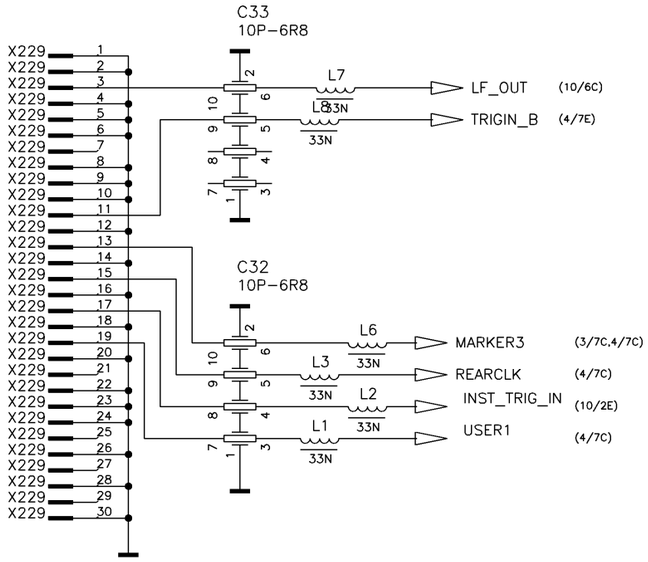
FD (not fitted)



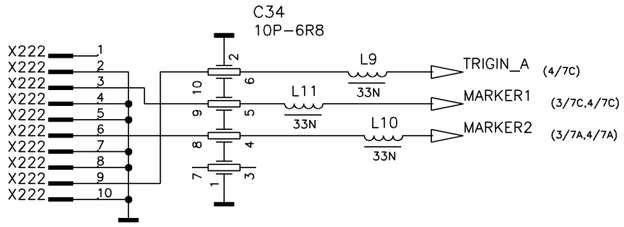
BER



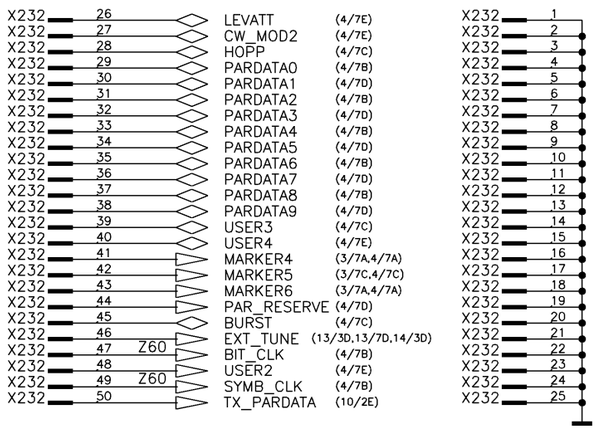
X229 BNC REAR



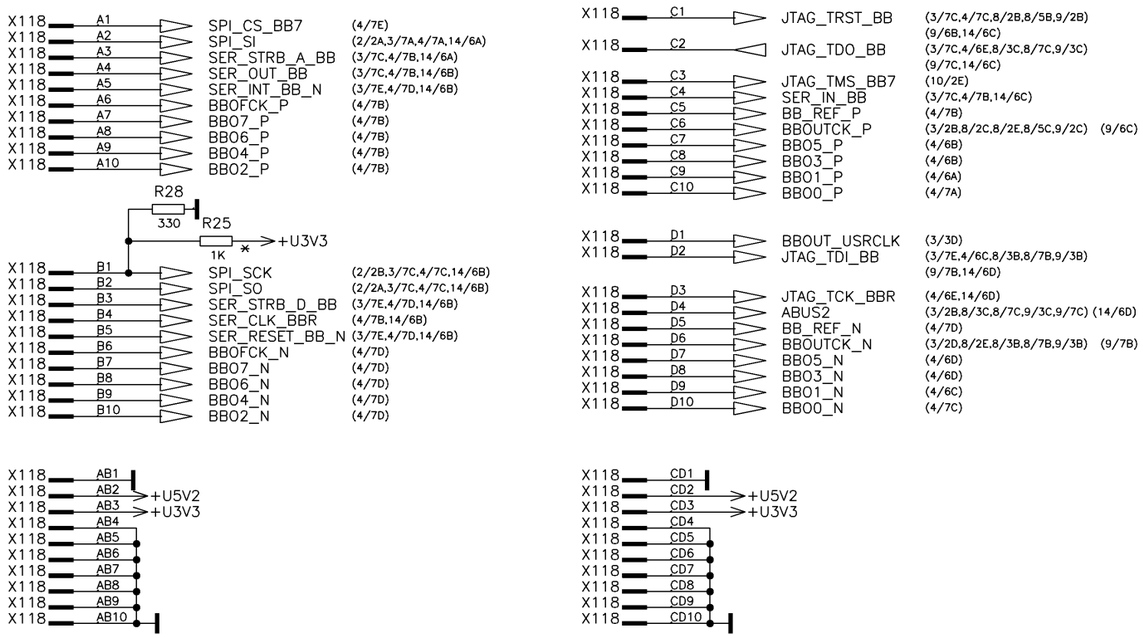
X222 FRONT



AUX I/O



BBOUTR



ROHDE&SCHWARZ	Benennung: MOTHERBOARD SMU Designation: MOTHERBOARD SMU			Sprache: / Lang.: DE	Aei: / C.I.: 07.05	Blatt: / Sh.: 17–
Typ: / Type: SMU	Datum: / Date: 05-03-09	Abteilung: / Dpt: 1GPK	Name: / Name: DORNER	Zeichn. Nr.: / Drawing No.: 1141.3501.01 S		
1. Z.: / used in: 1141.2005.01	TOP/TOP.17					

ATTENUATOR 1

X226 1
X226 2
X226 12
X226 14
R32
R31 330
470
X226 16
X226 17
X226 19
X226 21
X226 23
X226 5
X226 3
X226 18
X226 20
X226 15
X226 13
X226 7
X226 22 — MI_OVP1_N (15/5D)
X226 24 — OVP_DIAG1 (15/5D)
X226 25 — OVP_ID10 (15/5D)
X226 26 — OVLD_ATT1_N (15/5D)
X226 27 — OL_SET1_N (15/5D)
X226 28 — BP1_ON (15/5D)
X226 29 — OL_CLR1_N (15/5D)
X226 30 — OVP_ID11 (15/5C)

X226 4 — +U12V0A — L15 33N — C40 10N — +U12V0
X226 6 — −U12V0A — L16 33N — C41 10N — −U12V0
X226 8 / X226 9 (SLOTADR1) — +U5V2A — L17 33N — C42 10N — +U5V2
X226 10 / X226 11 (SLOTADR0) — +U3V3A — L18 33N — C43 10N — +U3V3

C45 47P−6R8 (10 9 8 7 / 2 6 5 4 3 1)
C44 47P−6R8 (10 9 8 7 / 2 6 5 4 3 1)
C39 47P−6R8 (7 8 9 10 / 1 3 4 5 6 2)

L20 33N, L19 33N, L14 33N, L21 33N, L22 33N, L23 33N, L24 33N, L25 33N, L26 33N, L27 33N

ATTENUATOR 2

X228 1
X228 12
X228 14
X228 16
X228 17
X228 19
X228 21
X228 23
X228 2
X228 22 — MI_OVP2_N (15/7D)
X228 24 — OVP_DIAG2 (15/7D)
X228 25 — OVP_ID20 (15/7D)
X228 26 — OVLD_ATT2_N (15/7D)
X228 27 — OL_SET2_N (15/7D)
X228 28 — BP2_ON (15/7D)
X228 29 — OL_CLR2_N (15/7D)
X228 30 — OVP_ID21 (15/7C)
X228 5
X228 7
X228 13
X228 15
X228 18
X228 20
X228 3
X228 11
(SLOTADR0)

RF_DOWN2_N (12/5B)
SER_RESET_N (10/2B,12/2B,12/5B,13/2B,13/5B) (12/2B,13/2B)
RF_DOWN1_N (14/2B,15/7A)
SER_STRB_A (10/2C,12/3B,12/7B,13/3B,13/7B) (14/3A,15/7B)
SER_IN (10/4B,12/2C,12/5C,13/2C,13/5C) (14/2C,15/7B)
SER_OUT (10/2B,12/2B,12/5B,13/2B,13/5B) (14/2A,15/7B)
SER_STRB_D (10/2B,12/2B,12/5B,13/2B,13/5B) (14/2A,15/7B)
SER_CLK_HFE (10/4C,15/7B)
SER_INT_N (10/4C,15/7B)
DIAG (3/7E,8/3D,8/7D,9/3D,9/7D) (10/2E,12/3C,12/7C,13/3C) (13/7C,14/3D,15/7B)

X228 8
X228 9
(SLOTADR1)
X228 10
X228 6
X228 4

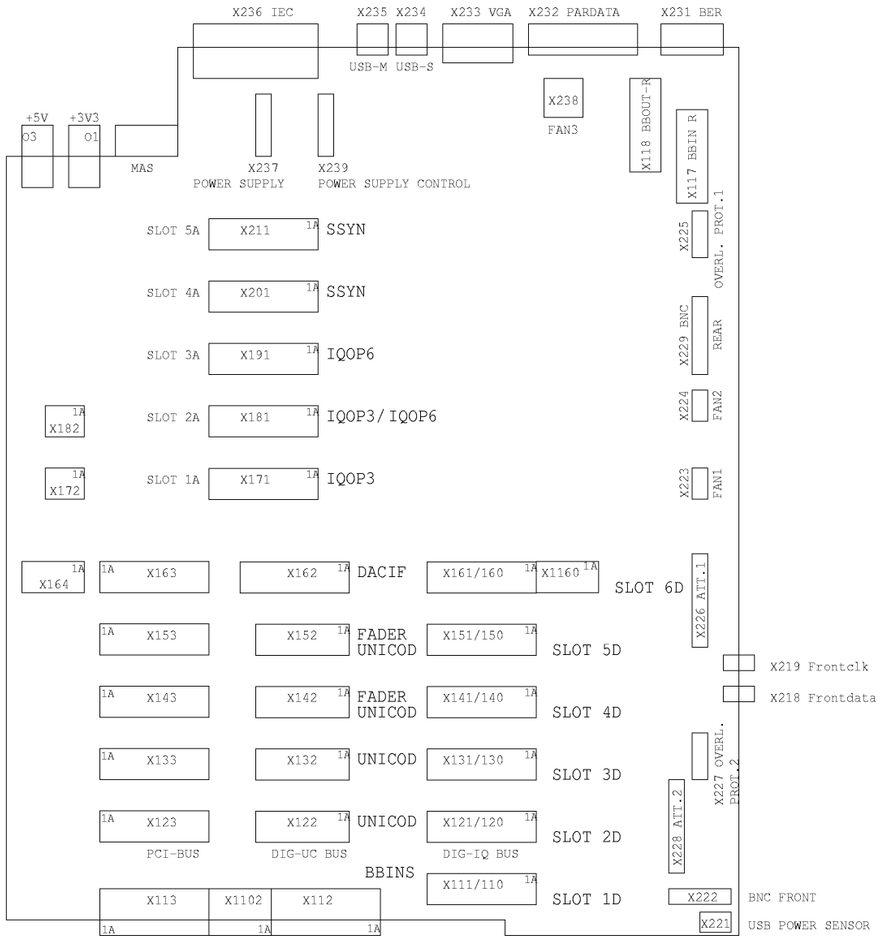
OVERLOAD PROTECTION 1

X225 1 — OVP_ID11 (15/5C)
X225 2
X225 3
X225 4
X225 5
X225 6
X225 7
X225 8 — MI_OVP1_N (15/5B)
X225 9
X225 10 — OVP_DIAG1 (15/5B)
X225 11 — OVP_ID10 (15/5B)
X225 12 — OVLD_ATT1_N (15/5C)
X225 13 — OL_SET1_N (15/5C)
X225 14 — BP1_ON (15/5C)
X225 15 — OL_CLR1_N (15/5C)
X225 16

OVERLOAD PROTECTION 2

X227 1 — OVP_ID21 (15/7C)
X227 2
X227 3
X227 4
X227 5
X227 6
X227 7
X227 8 — MI_OVP2_N (15/7B)
X227 9
X227 10 — OVP_DIAG2 (15/7B)
X227 11 — OVP_ID20 (15/7B)
X227 12 — OVLD_ATT2_N (15/7C)
X227 13 — OL_SET2_N (15/7C)
X227 14 — BP2_ON (15/7C)
X227 15 — OL_CLR2_N (15/7C)
X227 16

ROHDE&SCHWARZ	Benennung: / Designation: MOTHERBOARD SMU / MOTHERBOARD SMU				Sprache: / Lang.: DE	Aei: / C.I.: 07.05	Blatt: / Sh.: 18+
Typ: / Type: SMU	Datum: / Date: 05−03−09	Abteilung: / Dpt: 1GPK	Name: / Name: DORNER		Zeichn. Nr.: / Drawing No.: 1141.3501.01 S		
1. Z.: / used in: 1141.2005.01	TOP/TOP.18						

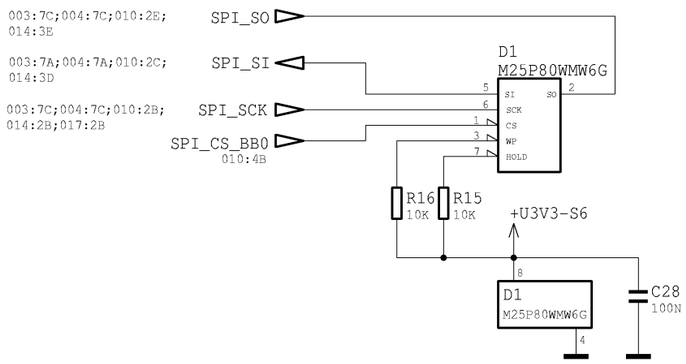


ACHTUNG: ESD!
Elektrostatisch gefaehrdete Bauelemente erfordern eine besondere Handhabung.

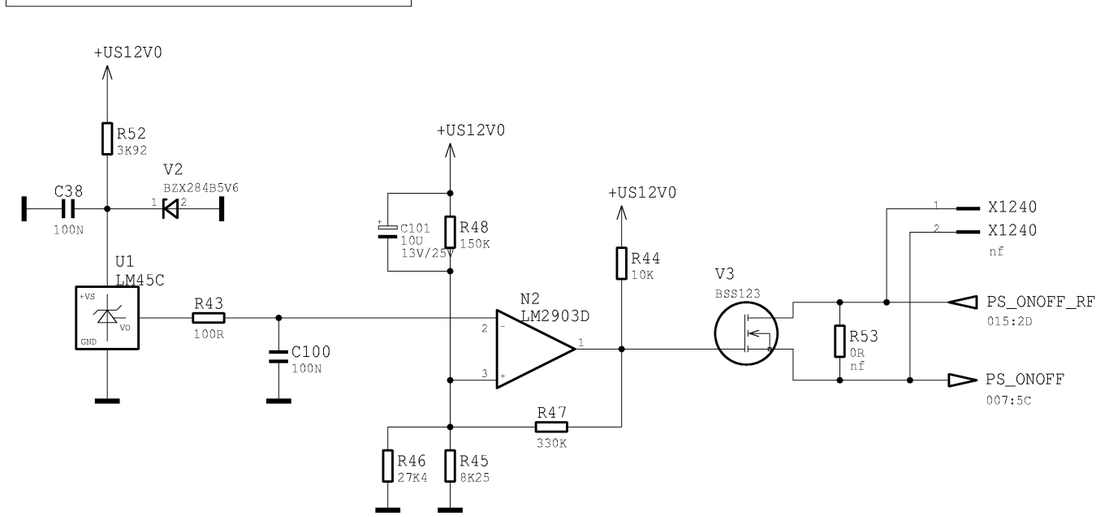
ATTENTION: ESD!
Electrostatic sensitiv devices require a special handling.

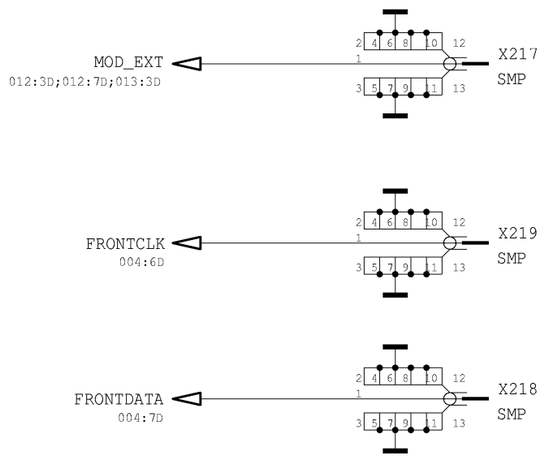
ROHDE&SCHWARZ	Benennung / Designat.: MOTHERBOARD F. SMU/SMJ MOTHERBOARD F. SMU/SMJ			Spr.:/Lang.: de en	Aei:/C.I.: 10.00	Blatt:/Sh.: 1 +
SMU	Datum: Date: 08/06/16	Abteilung: Dept.: 1GPK	Name: Name: eichfeld	Zeichn.Nr.:/Drawing No.: 1141.3653.01 S		

BG DATA



TEMP_SWITCH_RF





ACHTUNG: ESD!
Elektrostatisch gefaehrdete Bauelemente erfordern eine besondere Handhabung.

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ROHDE&SCHWARZ	Benennung / Designat.: MOTHERBOARD F. SMU/SMJ MOTHERBOARD F. SMU/SMJ			Spr.:/Lang.: de en	Aei:/C.I.: 10.00	Blatt:/Sh.: 2 +
SMU	Datum: Date: 08/06/16	Abteilung: Dept.: 1GPK	Name: Name: eichfeld	Zeichn.Nr.:/Drawing No.: 1141.3653.01 S		

DIGITAL/IQ-BUS

FRONT > > > REAR >

SLOT1 D

SLOT2 D

SLOT3 D

BBINS

SPI_CS_BB1 010:4C

SPI_CS_BB2 010:2B

SPI_CS_BB3 010:2C

014:2B BBL0_P
014:2B BBL1_P
014:2B BBL2_P
014:2B BBL3_P
014:2B BBL4_P
014:2C BBL5_P
014:2C BBL6_P
014:2C BBL7_P
014:2C BBL8_P

008:3C;008:7C;009:3C;
009:7C;014:3D ABUS2
008:1C;008:5C;009:2C; ABUS0
009:5C

+U3V3-S1

-U6V0
+U6V0

014:2C BBIN_REC_CLK_P
014:2C BBIN_I2C_D

+U5V2-S2

BBOUTCK_P
008:1C;008:2E;008:5C;
009:2D;009:5D;017:2D

+U12V0
+U3V3-S1

TIQCLKFP

IQ

R35 330R
R33 470R
+U3V3-S1

R1 100R

SPI_SI 002:2B;004:7A;010:2C;014:3D
DIQ_CLK_RP 004:7A
MARKER6 004:7A;017:7E
MARKER2 004:7A;017:8B
MARKER4 004:7A;017:7D

C0_A0 004:2B
C1_A1 004:2B
C2_A2 004:2B
C3_A3 004:2B
C4_A4 004:2B
C5_A5 004:2B
C6_A6 004:2B
C7_A7 004:2B
C8_A8 004:2B
C9_A9 004:2C
C10_A10 004:2C
C11_A11 004:2C
C12_A12 004:2C
C13_A13 004:2C
C14_A14 004:2C
C15_A15 004:2C
C16_A16 004:2C

SER_B_STRB_A 010:2C;014:2B;017:2B
SER_B_IN 010:2C;014:2C;017:2D
SER_B_OUT 010:2E;014:2B;017:2B
SER_B_CLK1 010:2B

JTAG_TMS_BB1 010:2B
JTAG_TDO_BB 008:3C;008:7C;009:3C;009:7C;010:2C;014:3E
JTAG_TRST_BB 008:1B;008:5B;009:2B;009:5B;010:4B;014:3E

MARKER3 004:7C;017:5B
SPI_SCK 002:2B;004:7C;010:2B;014:2B;017:2B
SPI_SO 002:2B;004:7C;010:2E;014:3E
DIQ_CLK_RM 004:7C
MARKER5 004:7C;017:7E
MARKER1 004:7C;017:8B

014:2C BBL0_N
014:2C BBL1_N
014:2C BBL2_N
014:2C BBL3_N
014:2C BBL4_N
014:2D BBL5_N
014:2D BBL6_N
014:2D BBL7_N
014:2D BBL8_N

008:1B;008:5B;
009:2B;009:5B;014:3F ABUS3
008:3B;008:7B;009:3B; ABUS1
009:7B

+U3V3-S1

-U6V0
+U6V0

004:6D CLEAN_CLK

014:2D BBIN_REC_CLK_N
014:2C BBIN_I2C_C

BBOUT_USRCLK 017:2D

+U5V2-S2

BBOUTCK_N
008:2E;008:3B;008:7B;
009:3B;009:7B;017:2E

+U3V3-S1

TIQCLKFM

BB_USRCLK 010:4D

R36 330R
R34 470R
+U3V3-S1

D0_B0 004:2D
D1_B1 004:2D
D2_B2 004:2D
D3_B3 004:2D
D4_B4 004:2D
D5_B5 004:2D
D6_B6 004:2D
D7_B7 004:2D
D8_B8 004:2D
D9_B9 004:2D
D10_B10 004:2D
D11_B11 004:2E
D12_B12 004:2E
D13_B13 004:2E
D14_B14 004:2E
D15_B15 004:2E
D16_B16 004:2E

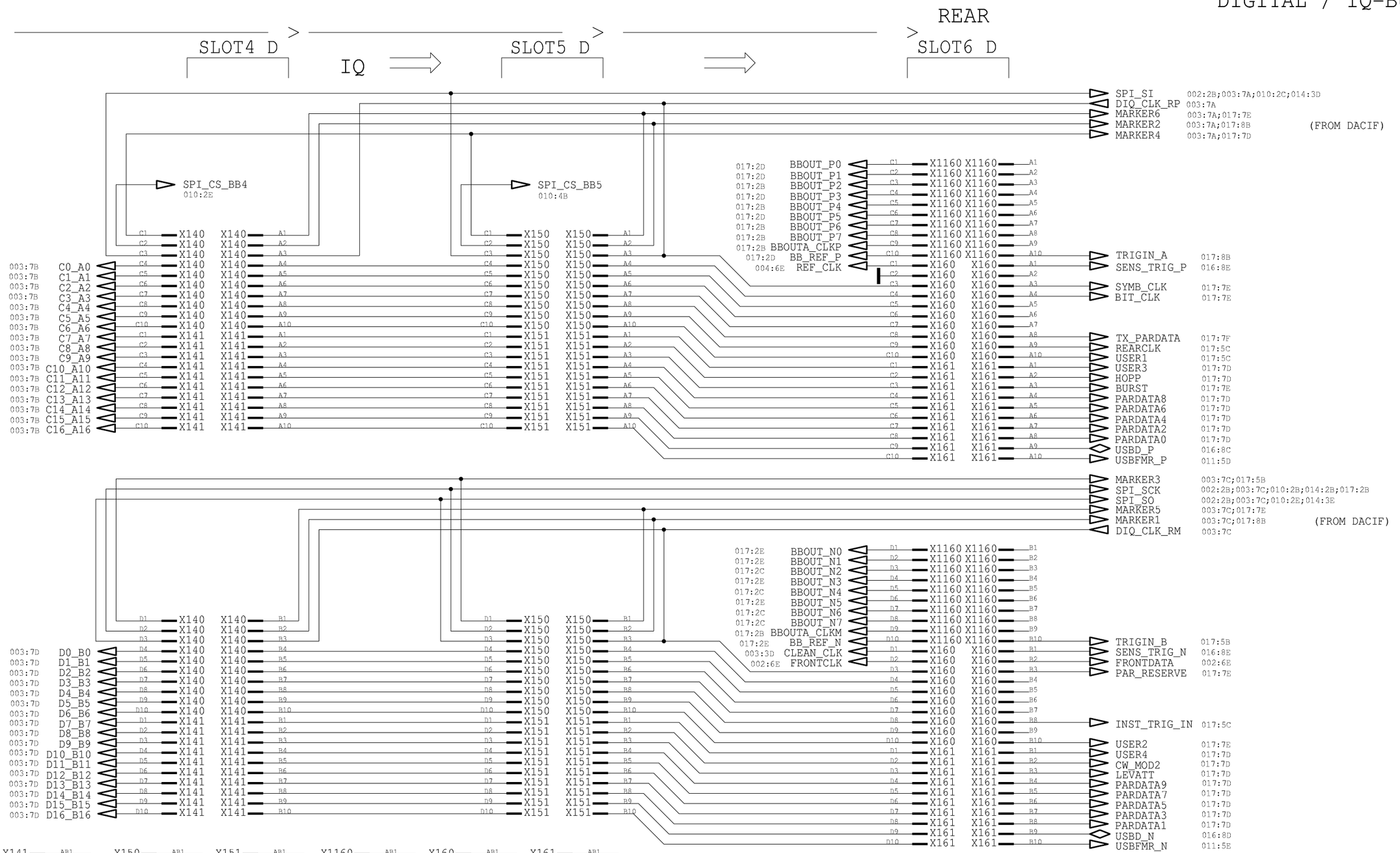
SER_B_STRB_D 010:2E;014:2B;017:2B
SER_B_RESET_N 010:2B;014:2C;017:2B
SER_B_INT_N 010:4B;014:3D
DIAG 008:3D;008:7D;009:3D;009:7D;010:6D;014:8D;018:7D

008:3B;008:7B;009:3B;009:7B;
JTAG_TDI_BB 010:2E;014:2C;017:2D
JTAG_TCK_BB1 008:1B;008:5B;009:2B;009:5B;010:2B

ACHTUNG: ESD!
Elektrostatisch gefaehrdete Bauelemente erfordern eine besondere Handhabung.
ATTENTION: ESD!
Electrostatic sensitiv devices require a special handling.

ROHDE&SCHWARZ	Benennung / Designat.: MOTHERBOARD F. SMU/SMJ MOTHERBOARD F. SMU/SMJ		Spr.:/Lang.: de en	Aei:/C.I.: 10.00	Blatt:/Sh.: 3 +
SMU	Datum: Date: 08/06/16	Abteilung: Dept.: 1GPK	Name: Name: eichfeld	Zeichn.Nr.:/Drawing No.: 1141.3653.01 S	

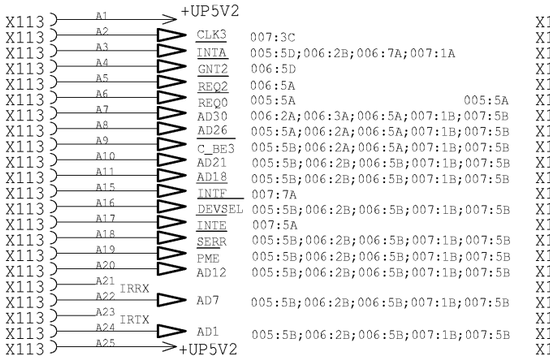
DIGITAL / IQ-BUS

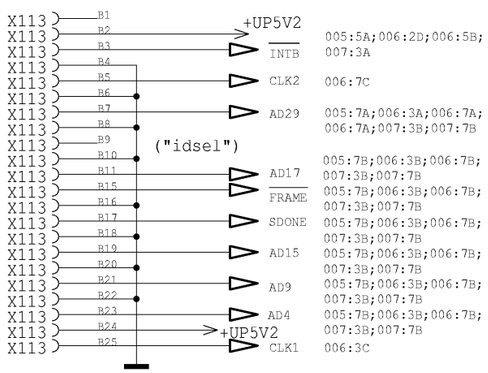


ROHDE&SCHWARZ	Benennung / Designat.: MOTHERBOARD F. SMU/SMJ			Spr.:/Lang.: de en	Aei:/C.I.: 10.00	Blatt:/Sh.: 4 +
	MOTHERBOARD F. SMU/SMJ			Zeichn.Nr.:/Drawing No.: 1141.3653.01 S		
SMU	Datum: Date: 08/06/16	Abteilung: Dept.: 1GPK	Name: Name: eichfeld			

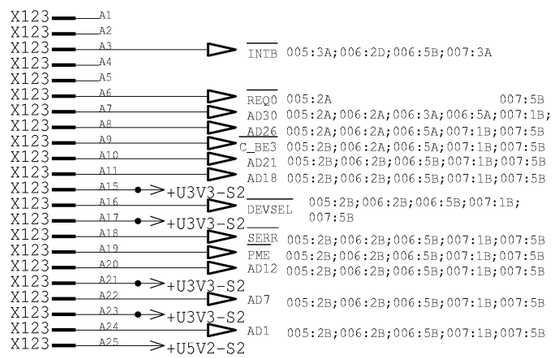
FMR (PCI)

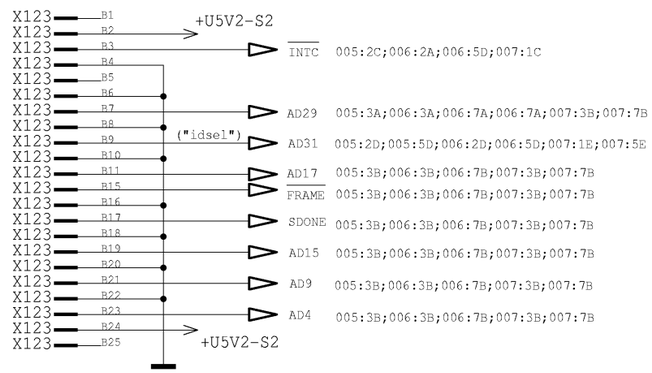
CONNECTOR FRM

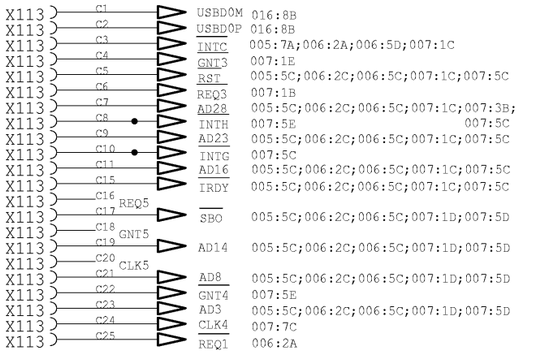


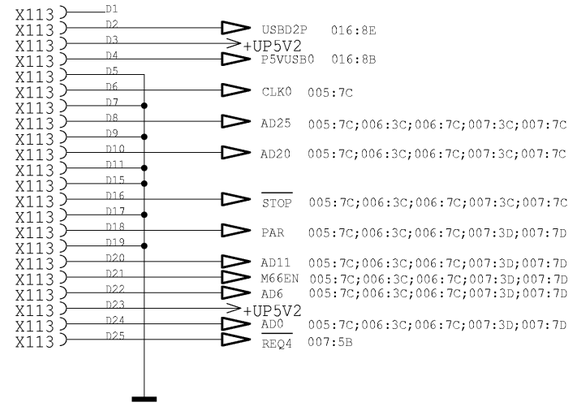


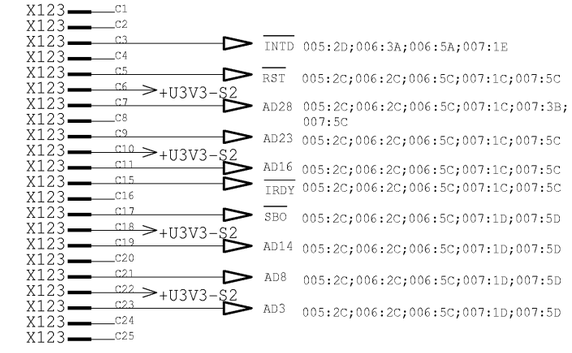
SLOT 2 DIGITAL / PCI SLOT#0

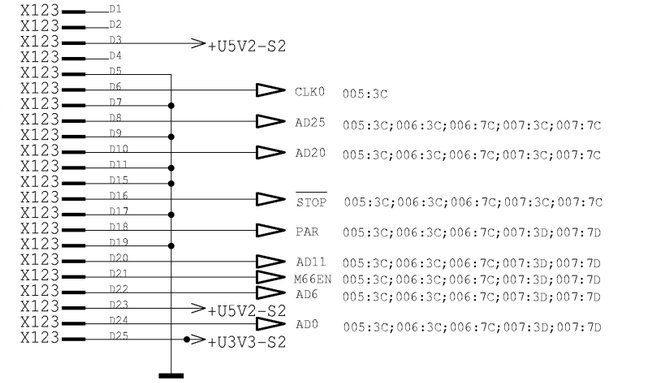


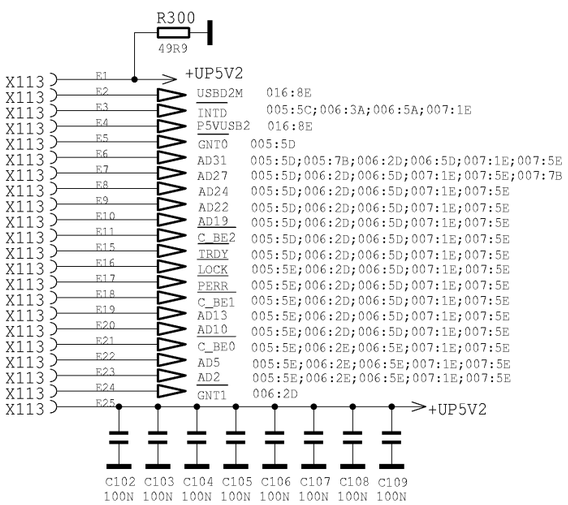


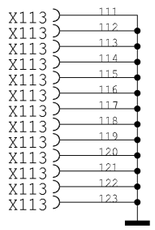


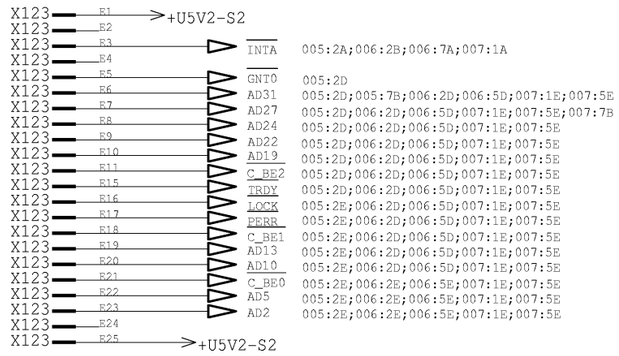


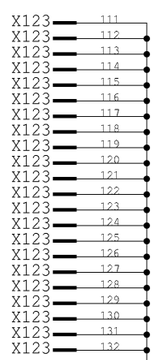


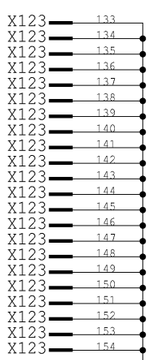










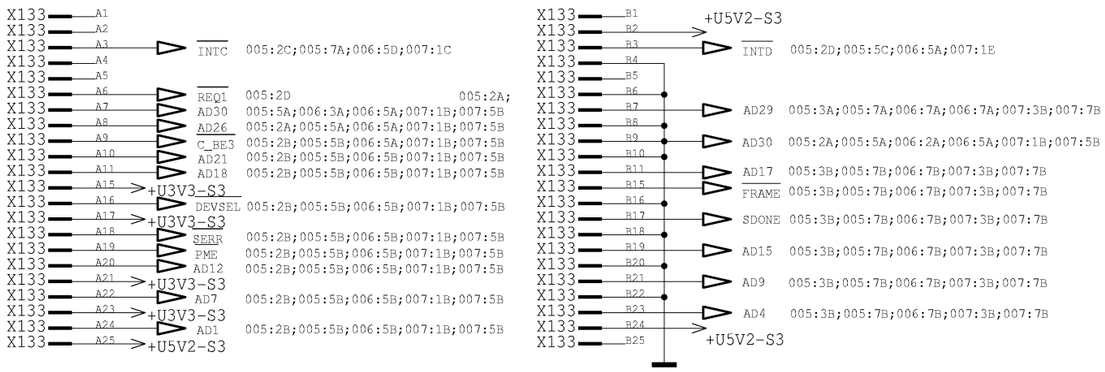


ACHTUNG: ESD!
Elektrostatisch gefaehrdete Bauelemente erfordern eine besondere Handhabung.

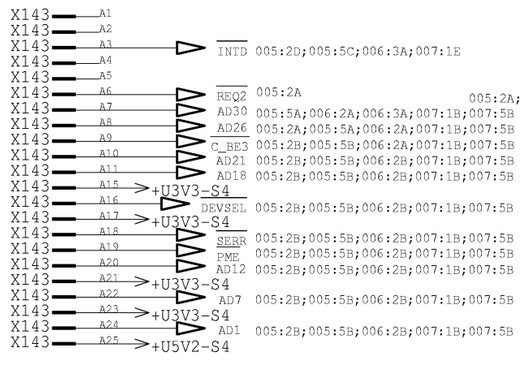
ATTENTION: ESD!
Electrostatic sensitiv devices require a special handling.

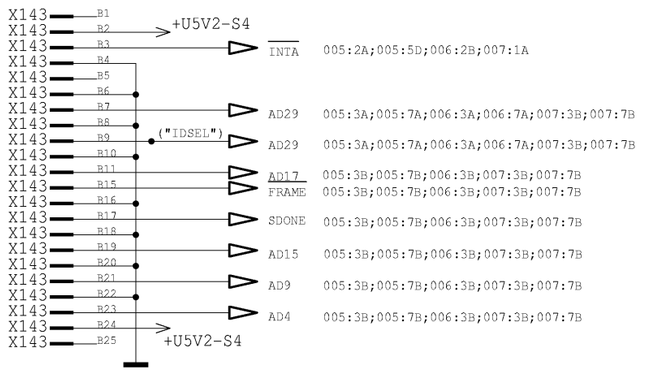
ROHDE&SCHWARZ	Benennung / Designat.: MOTHERBOARD F. SMU/SMJ MOTHERBOARD F. SMU/SMJ			Spr.:/Lang.: de en	Aei:/C.I.: 10.00	Blatt:/Sh.: 5 +
SMU	Datum: Date: 08/06/16	Abteilung: Dept.: 1GPK	Name: Name: eichfeld	Zeichn.Nr.:/Drawing No.: 1141.3653.01 S		

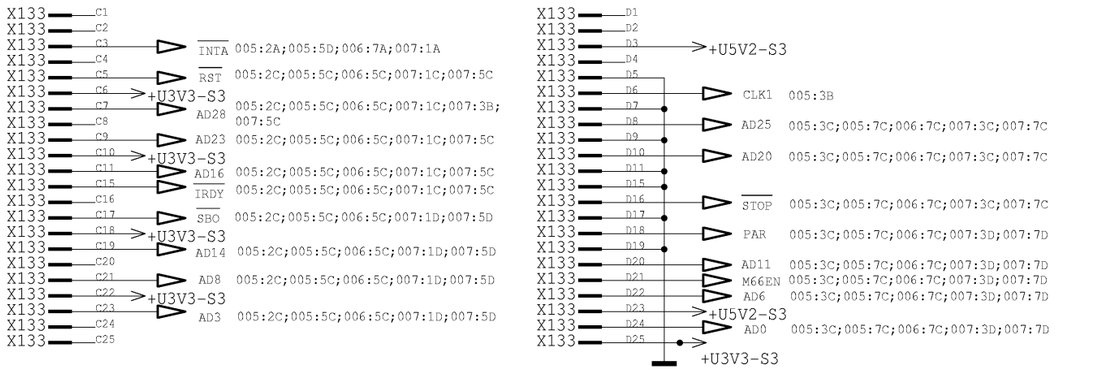
SLOT 3 DIGITAL / PCI SLOT #1

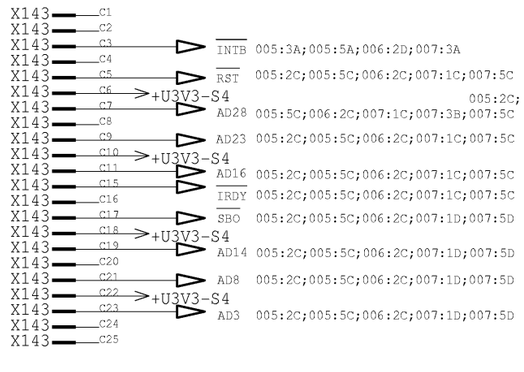


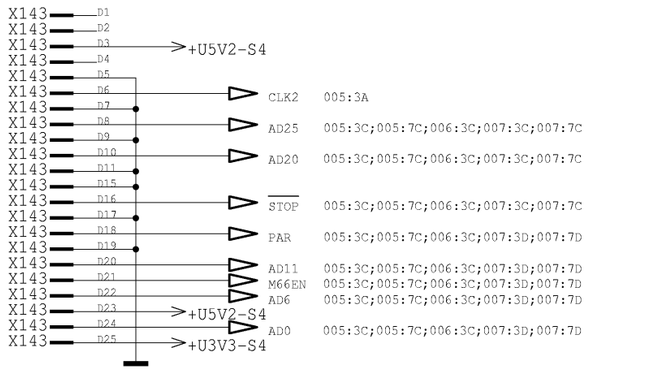
SLOT 4 DIGITAL / PCI SLOT #2

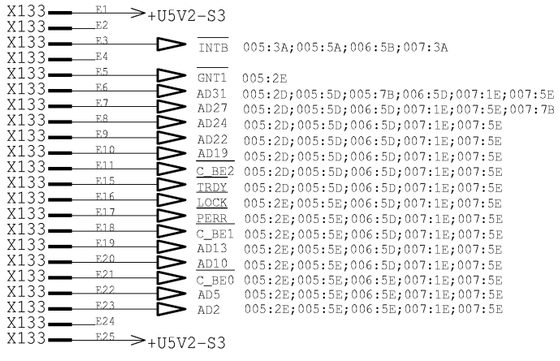


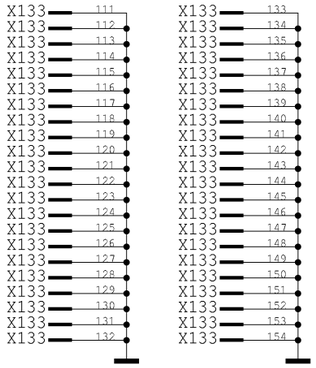


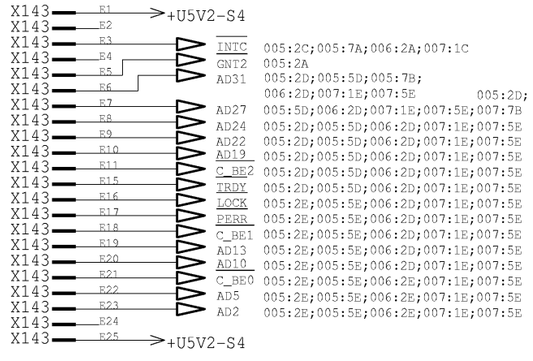


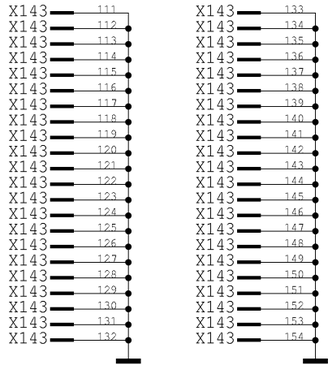










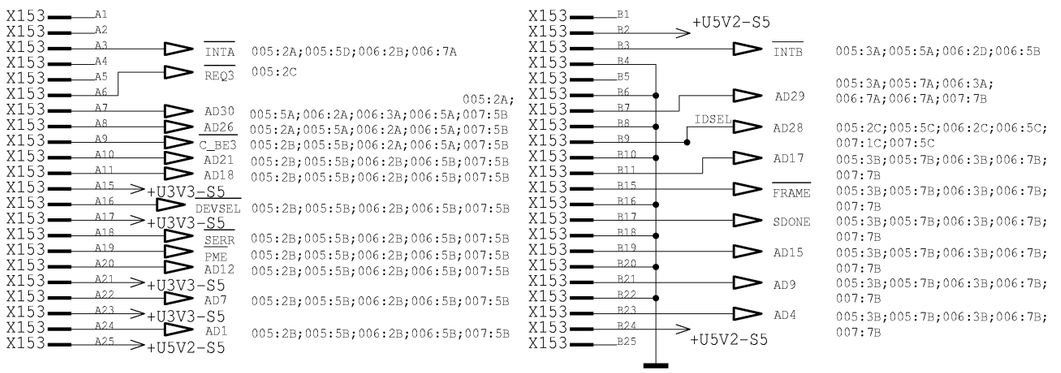


ACHTUNG: ESD!
Elektrostatisch gefaehrdete Bauelemente erfordern eine besondere Handhabung.

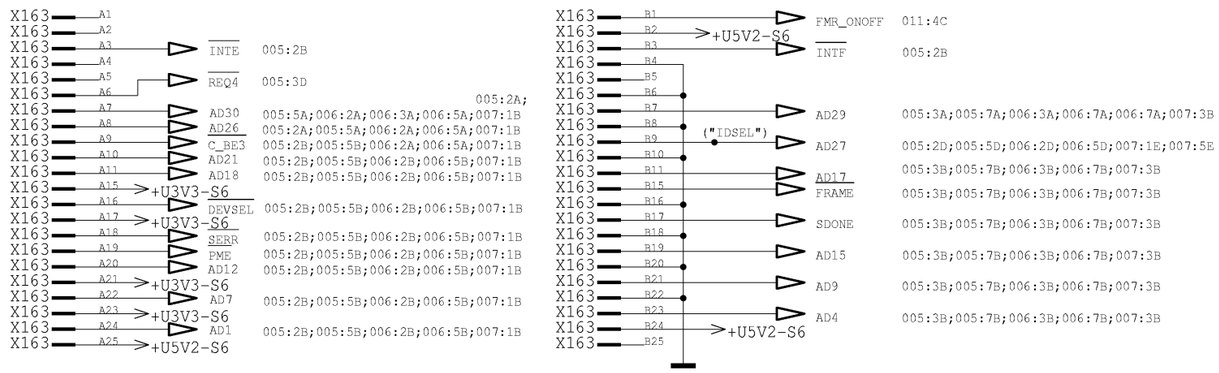
ATTENTION: ESD!
Electrostatic sensitiv devices require a special handling.

ROHDE&SCHWARZ	Benennung / Designat.: MOTHERBOARD F. SMU/SMJ MOTHERBOARD F. SMU/SMJ			Spr.:/Lang.: de en	Aei:/C.I.: 10.00	Blatt:/Sh.: 6 +
SMU	Datum: Date: 08/06/16	Abteilung: Dept.: 1GPK	Name: Name: eichfeld	Zeichn.Nr.:/Drawing No.: 1141.3653.01 S		

SLOT5 DIGITAL / PCI SLOT #3



SLOT6 DIGITAL / PCI SLOT #4



ACHTUNG: ESD!
Elektrostatisch gefaehrdete Bauelemente erfordern eine besondere Handhabung.
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Electrostatic sensitiv devices require a special handling.

ROHDE&SCHWARZ	Benennung / Designat.: MOTHERBOARD F. SMU/SMJ			Spr.:/Lang.: de en	Aei:/C.I.: 10.00	Blatt:/Sh.: 7 +
	MOTHERBOARD F. SMU/SMJ			Zeichn.Nr.:/Drawing No.: 1141.3653.01 S		
SMU	Datum: Date: 08/06/16	Abteilung: Dept.: 1GPK	Name: Name: eichfeld			

DIGITAL / UC-BUS

SLOT2 D

X122 A1	JTAG_TCK_BB1	003:7E;008:5B;009:2B;	
X122 A2		009:5B;010:2B	
X122 A3	JTAG_TRST_BB	003:7C;008:5B;009:2B;	
X122 A4		009:5B;010:4B;014:3E	
X122 A5	ABUS3	003:2D;	008:5B;009:2B;009:5B;014:3F
X122 A6	ABUS7		008:5B;009:2B;009:5B
X122 A7	UC_DATA0		008:5B;009:2B;009:5B;010:2C
X122 A8	UC_DATA4		008:5B;009:2B;009:5B;010:2C
X122 A9			
X122 A10	UC_DATA8		008:5B;009:2B;009:5B;010:2C
X122 A11	UC_DATA12		008:5B;009:2B;009:5B;010:2D
X122 A12			
X122 A13	UC_DACIF_RSV0		008:5B;009:2B;009:5B;010:4B
X122 A14	UC_TRIGIN1		008:5B;009:2B;009:5B;010:4B
X122 A15			
X122 A16	UC_LEVATT		008:5B;009:2C;009:5C;010:4B
X122 A17	UC_USER2		008:5B;009:2C;009:5C;010:4D
X122 A18			
X122 A19	-U6V0		
X122 A20			
X122 A21	-U12V0		
X122 A22			
X122 A23	+U3V3-S2		
X122 A24			

X122 C1		003:7E;008:7B;009:3B;009:7B;	
X122 C2	JTAG_TDI_BB	010:2E;014:2C;017:2D	
X122 C3	ABUS1	003:2D;008:7B;009:3B;009:7B	
X122 C4	ABUS5	008:7B;009:3B;009:7B	
X122 C5		003:2D;008:2E;	
X122 C6	BBOUTCK_N		008:7B;009:3B;009:7B;017:2E
X122 C7	UC_DATA2		008:7B;009:3B;009:7B;010:4B
X122 C8	UC_DATA6		008:7B;009:3B;009:7B;010:4B
X122 C9	UC_VALID		008:7B;009:3B;009:7B;010:4B
X122 C10	UC_DATA10		008:7B;009:3B;009:7B;010:4B
X122 C11	UC_DATA14		008:7B;009:3B;009:7B;010:4B
X122 C12			
X122 C13	UC_DACIF_RSV1		008:7B;009:3B;009:7B;010:4D
X122 C14	UC_READ_REQ		008:7B;009:3B;009:7B;010:4B
X122 C15			
X122 C16	UC_HOPP		008:7B;009:3C;009:7C;010:4D
X122 C17	UC_USER4		008:7B;009:3C;009:7C;010:4D
X122 C18			
X122 C19	+U5V2-S2		
X122 C20			
X122 C21			
X122 C22			
X122 C23	+U3V3-S2		
X122 C24			

SLOT3 D

X132 A1	JTAG_TCK_BB1	003:7E;008:1B;009:2B;009:5B;	
X132 A2		010:2B	
X132 A3	JTAG_TRST_BB	003:7C;008:1B;009:2B;009:5B;	
X132 A4		010:4B;014:3E	
X132 A5	ABUS3	003:2D;	008:1B;009:2B;009:5B;014:3F
X132 A6	ABUS7		008:1B;009:2B;009:5B
X132 A7	UC_DATA0		008:1B;009:2B;009:5B;010:2C
X132 A8	UC_DATA4		008:1B;009:2B;009:5B;010:2C
X132 A9			
X132 A10	UC_DATA8		008:1B;009:2B;009:5B;010:2C
X132 A11	UC_DATA12		008:1B;009:2B;009:5B;010:2D
X132 A12			
X132 A13	UC_DACIF_RSV0		008:1B;009:2B;009:5B;010:4B
X132 A14	UC_TRIGIN1		008:1B;009:2B;009:5B;010:4B
X132 A15			
X132 A16	UC_LEVATT		008:1B;009:2C;009:5C;010:4B
X132 A17	UC_USER2		008:1B;009:2C;009:5C;010:4D
X132 A18			
X132 A19	-U6V0		
X132 A20			
X132 A21	-U12V0		
X132 A22			
X132 A23	+U3V3-S3		
X132 A24			

X132 C1		003:7E;008:3B;009:3B;009:7B;	
X132 C2	JTAG_TDI_BB	010:2E;014:2C;017:2D	
X132 C3			
X132 C4	ABUS1	003:2D;008:3B;009:3B;009:7B	
X132 C5	ABUS5	008:3B;009:3B;009:7B	
X132 C6	BBOUTCK_N		003:2D;008:2E;008:3B;009:3B;009:7B;017:2E
X132 C7	UC_DATA2		008:3B;009:3B;009:7B;010:4B
X132 C8	UC_DATA6		008:3B;009:3B;009:7B;010:4B
X132 C9	UC_VALID		008:3B;009:3B;009:7B;010:4B
X132 C10	UC_DATA10		008:3B;009:3B;009:7B;010:4B
X132 C11	UC_DATA14		008:3B;009:3B;009:7B;010:4B
X132 C12			
X132 C13	UC_DACIF_RSV1		008:3B;009:3B;009:7B;010:4D
X132 C14	UC_READ_REQ		008:3B;009:3B;009:7B;010:4B
X132 C15			
X132 C16	UC_HOPP		008:3B;009:3C;009:7C;010:4D
X132 C17	UC_USER4		008:3B;009:3C;009:7C;010:4D
X132 C18			
X132 C19	+U5V2-S3		
X132 C20			
X132 C21			
X132 C22			
X132 C23	+U3V3-S3		
X132 C24			

X122 B1			
X122 B2	JTAG_TMS_BB2	010:2C	
X122 B3	ABUS0	003:2B;008:5C;009:2C;009:5C	
X122 B4	ABUS4	008:5C;009:2C;009:5C	
X122 B5		003:2B;008:2E;	
X122 B6	BBOUTCK_P		008:5C;009:2D;009:5D;017:2D
X122 B7	UC_DATA1		008:5C;009:2D;009:5D;010:2E
X122 B8	UC_DATA5		008:5C;009:2D;009:5D;010:2E
X122 B9			
X122 B10	UC_DATA9		008:5D;009:2D;009:5D;010:2E
X122 B11	UC_DATA13		008:5D;009:2D;009:5D;010:2E
X122 B12			
X122 B13	UC_BITCLK_RV		008:5D;009:2D;009:5D;010:4B
X122 B14	UC_TRIGIN2		008:5D;009:2D;009:5D;010:4D
X122 B15			
X122 B16	UC_CW		008:5D;009:2D;009:5D;010:4B
X122 B17	UC_USER3		008:5D;009:2D;009:5D;010:4B
X122 B18			
X122 B19			
X122 B20			
X122 B21			
X122 B22			
X122 B23	+U3V3-S2		
X122 B24			

R11 200R

R19 1K nf +U3V3-S2

X122 D1		003:7C;008:7C;009:3C;	
X122 D2	JTAG_TDO_BB	009:7C;010:2C;014:3E	
X122 D3		003:2B;008:7C;009:3C;	
X122 D4	ABUS2	009:7C;014:3D	
X122 D5	ABUS6	008:7C;009:3C;009:7C	
X122 D6			
X122 D7	UC_DATA3		008:7C;009:3D;009:7D;010:4C
X122 D8	UC_DATA7		008:7C;009:3D;009:7D;010:4C
X122 D9	UC_EXTCLK		008:7D;009:3D;009:7D;010:4C
X122 D10	UC_DATA11		008:7D;009:3D;009:7D;010:4C
X122 D11	UC_DATA15		008:7D;009:3D;009:7D;010:4D
X122 D12			
X122 D13	UC_SYMB_RV		008:7D;009:3D;009:7D;010:4D
X122 D14	UC_BURST		008:7D;009:3D;009:7D;010:4D
X122 D15	UC_PD_SIG		008:7D;009:3D;009:7D;010:4D
X122 D16	UC_USER1		008:7D;009:3D;009:7D;010:4B
X122 D17			
X122 D18	DIAG		003:7E;008:7D;009:3D;009:7D; 010:6D;014:8D;018:7D
X122 D19	+U5V2-S2		
X122 D20	+U12V0		
X122 D21	+U6V0		
X122 D22	+U5V2-S2		
X122 D23	+U28V0		
X122 D24			

R10 200R

R20 1K nf +U3V3-S2

X132 B1			
X132 B2	JTAG_TMS_BB3	010:2E	
X132 B3	ABUS0	003:2B;008:1C;009:2C;009:5C	
X132 B4	ABUS4	008:1C;009:2C;009:5C	
X132 B5		003:2B;008:1C;	
X132 B6	BBOUTCK_P		008:2E;009:2D;009:5D;017:2D
X132 B7	UC_DATA1		008:1C;009:2D;009:5D;010:2E
X132 B8	UC_DATA5		008:1C;009:2D;009:5D;010:2E
X132 B9			
X132 B10	UC_DATA9		008:1D;009:2D;009:5D;010:2E
X132 B11	UC_DATA13		008:1D;009:2D;009:5D;010:2E
X132 B12			
X132 B13	UC_BITCLK_RV		008:1D;009:2D;009:5D;010:4B
X132 B14	UC_TRIGIN2		008:1D;009:2D;009:5D;010:4D
X132 B15			
X132 B16	UC_CW		008:1D;009:2D;009:5D;010:4B
X132 B17	UC_USER3		008:1D;009:2D;009:5D;010:4B
X132 B18			
X132 B19			
X132 B20			
X132 B21			
X132 B22			
X132 B23	+U3V3-S3		
X132 B24			

X132 D1			
X132 D2	JTAG_TDO_BB	003:7C;008:3C;009:3C;009:7C;010:2C;014:3E	
X132 D3			
X132 D4	ABUS2	003:2B;008:3C;009:3C;009:7C;014:3D	
X132 D5	ABUS6	008:3C;009:3C;009:7C	
X132 D6			
X132 D7	UC_DATA3		008:3C;009:3D;009:7D;010:4C
X132 D8	UC_DATA7		008:3C;009:3D;009:7D;010:4C
X132 D9	UC_EXTCLK		008:3D;009:3D;009:7D;010:4C
X132 D10	UC_DATA11		008:3D;009:3D;009:7D;010:4C
X132 D11	UC_DATA15		008:3D;009:3D;009:7D;010:4D
X132 D12			
X132 D13	UC_SYMB_RV		008:3D;009:3D;009:7D;010:4D
X132 D14	UC_BURST		008:3D;009:3D;009:7D;010:4D
X132 D15	UC_PD_SIG		008:3D;009:3D;009:7D;010:4D
X132 D16	UC_USER1		008:3D;009:3D;009:7D;010:4B
X132 D17			
X132 D18	DIAG		003:7E;008:3D;009:3D; 009:7D;010:6D;014:8D; 018:7D
X132 D19	+U5V2-S3		
X132 D20	+U12V0		
X132 D21	+U6V0		
X132 D22	+U5V2-S3		
X132 D23	+U28V0		
X132 D24			

003:2D;008:3B;008:7B;
009:3B;009:7B;017:2E BBOUTCK_N R12 200R nf

003:2B;008:1C;008:5C; BBOUTCK_P
009:2D;009:5D;017:2D

ACHTUNG: ESD!
Elektrostatisch gefaehrdete Bauelemente erfordern eine besondere Handhabung.

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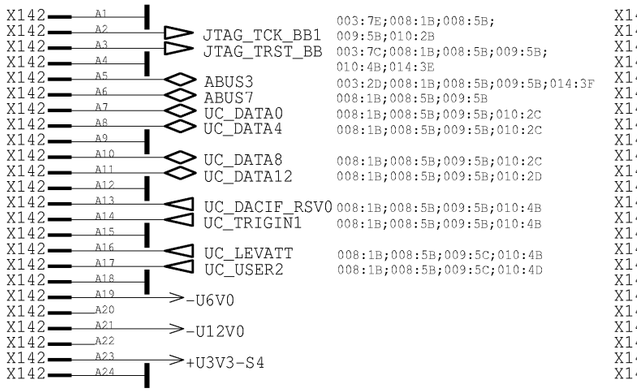
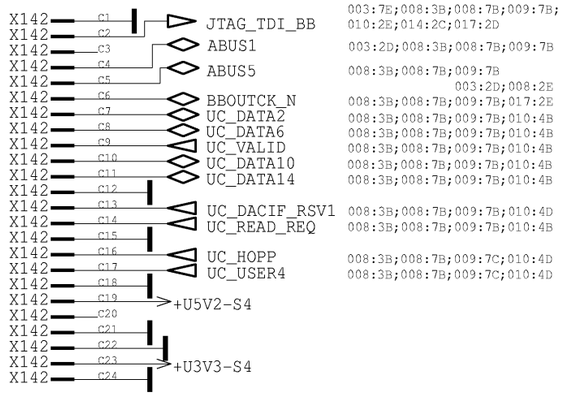
ROHDE&SCHWARZ	Benennung / Designat.: MOTHERBOARD F. SMU/SMJ MOTHERBOARD F. SMU/SMJ			Spr.:/Lang.: de en	Aei:/C.I.: 10.00	Blatt:/Sh.: 8 +
SMU	Datum: Date: 08/06/16	Abteilung: Dept.: 1GPK	Name: Name: eichfeld	Zeichn.Nr.:/Drawing No.: 1141.3653.01 S		

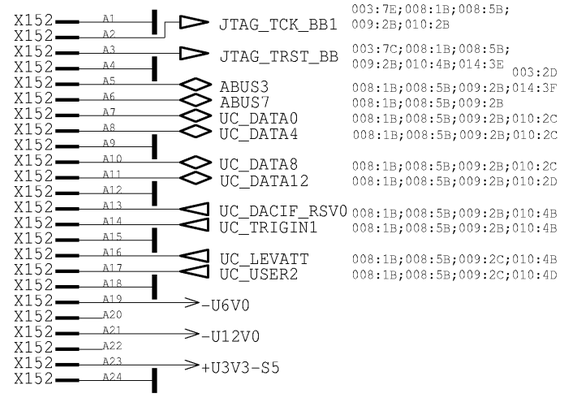
DIGITAL / UC-BUS

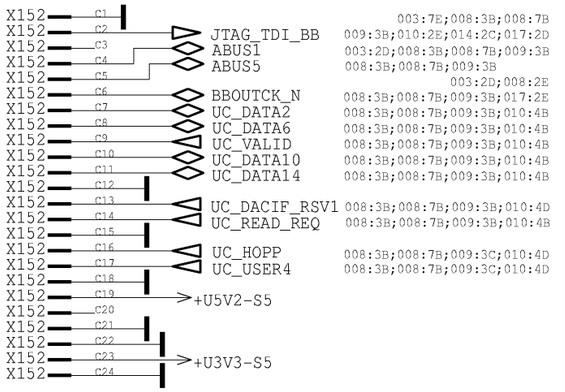
SLOT4 D

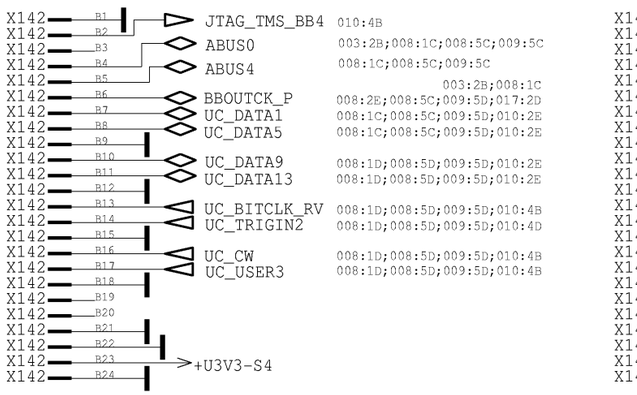


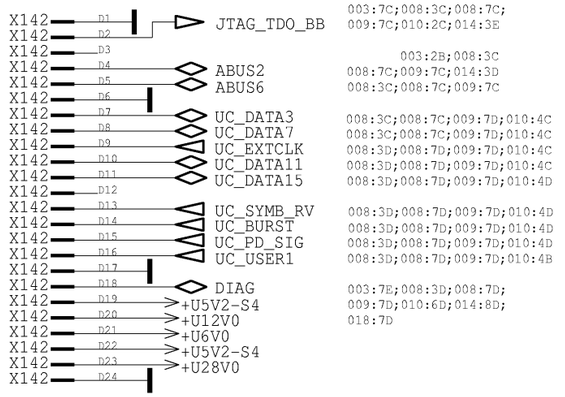


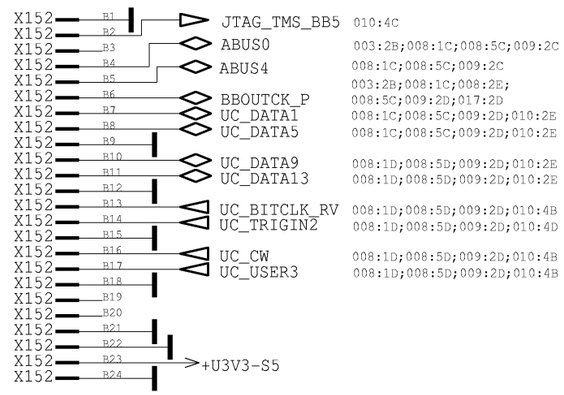
SLOT5 D

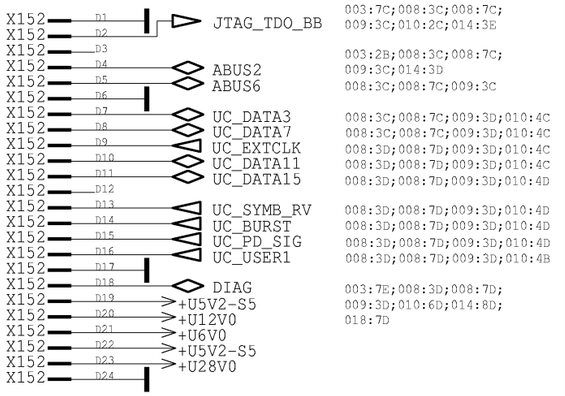












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ROHDE&SCHWARZ	Benennung / Designat.: MOTHERBOARD F. SMU/SMJ			Spr.:/Lang.: de en	Aei:/C.I.: 10.00	Blatt:/Sh.: 9 +
	MOTHERBOARD F. SMU/SMJ			Zeichn.Nr.:/Drawing No.: 1141.3653.01 S		
SMU	Datum: Date: 08/06/16	Abteilung: Dept.: 1GPK	Name: Name: eichfeld			

DIGITAL / UC-BUS

SLOT6 D
DACIF BOARD

X162	A1	SPI_SCK	002:2B;003:7C;004:7C;014:2B;017:2B	
X162	A2	SPI_CS_BB2	003:4A	
X162	A3	SER_B_CLK1	003:7C	
X162	A4	SER_B_RESET_N	003:7E;014:2C;017:2B	
X162	A5	JTAG_TCK_BB1	003:7E;008:1B;008:5B;009:2B;009:5B	
X162	A6	JTAG_TMS_BB1	003:7C	
X162	A7	JTAG_TMS_BB6	014:2C	
X162	A8	BURST_A	012:3D;013:3D	
X162	A9	BURST_B	012:7D	
X162	A10	BLANK_A	012:1D;013:1D	
X162	A11	BLANK_B	012:5D	
X162	A12	RESERVE1_A		
X162	A13	LEVATT0_A	012:3B;013:3B	
X162	A14	LEVATT2_A	012:1D;013:1D	
X162	A15	LEVATT1_B	012:5B	
X162	A16	SER_A_CLK1	012:3C;012:7C;013:3C;013:7C;014:7C	
X162	A17	SER_A_STRB_A	012:3B;012:7B;013:3B;013:7B;014:7B;018:7D	
X162	A18	SER_A_OUT	012:1B;012:5B;013:1B;013:5B;014:5B;018:7D	
X162	A19	JTAG_TRST_HF	012:1C;012:5C;013:1C;013:5C;014:5D	
X162	A20	JTAG_TMS_HF1	012:3B	
X162	A21	JTAG_TMS_HF6		
X162	A22	JTAG_TCK_HF1	012:1B;012:5B;013:1B;013:5B;014:5B	
X162	A23	PWGOOD	011:7C;015:2E	
X162	A24	-U12V0		

X162	D1	SPI_CS_BB0	002:2B	
X162	D2	SPI_CS_BB5	004:4B	
X162	D3	SPI_CS_BB7	017:2A	
X162	D4	SER_B_INT_N	003:7E;014:3D	
X162	D5	JTAG_TRST_BB	003:7C;008:1B;008:5B;009:2B	
X162	D6	JTAG_TMS_BB4	009:2C 009:5B;014:3E	
X162	D7	UC_VALID	008:3B;008:7B;009:3B;009:7B	
X162	D8	UC_DATA2	008:3B;008:7B;009:3B;009:7B	
X162	D9	UC_DATA6	008:3B;008:7B;009:3B;009:7B	
X162	D10	UC_DATA10	008:3B;008:7B;009:3B;009:7B	
X162	D11	UC_DATA14	008:3B;008:7B;009:3B;009:7B	
X162	D12	UC_BITCLK_RV	008:1D;008:5D;009:2D;009:5D	
X162	D13	UC_DACIF_RSV0	008:1B;008:5B;009:2B;009:5B	
X162	D14	UC_TRIGIN1	008:1B;008:5B;009:2B;009:5B	
X162	D15	UC_READ_REQ	008:3B;008:7B;009:3B;009:7B	
X162	D16	UC_LEVATT	008:1B;008:5B;009:2C;009:5C	
X162	D17	UC_CW	008:1D;008:5D;009:2D;009:5D	
X162	D18	UC_USER1	008:3D;008:7D;009:3D;009:7D	
X162	D19	UC_USER3	008:1D;008:5D;009:2D;009:5D	
X162	D20	JTAG_TMS_HF4	013:7B	
X162	D21	JTAG_TMS_HF9	(EICHLEITUNG)	
X162	D22	JTAG_TCK_HF2	(EICHLEITUNG)	
X162	D23	N.C.		
X162	D24	+US12V0		

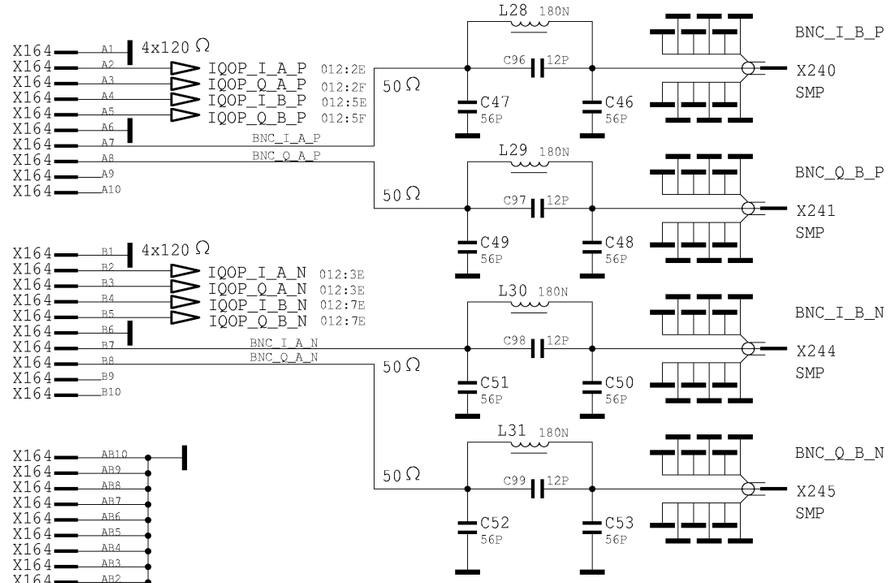
X162	B1	SPI_SI	002:2B;003:7A;004:7A;014:3D	
X162	B2	SPI_CS_BB3	003:6A	
X162	B3	SER_B_STRB_A	003:7C;014:2B;017:2B	
X162	B4	SER_B_IN	003:7C;014:2C;017:2D	
X162	B5	JTAG_TDO_BB	003:7C;008:3C;008:7C;009:3C;009:7C;014:3E	
X162	B6	JTAG_TMS_BB2	008:1C	
X162	B7	JTAG_TMS_BB7	017:2D	
X162	B8	UC_DATA0	008:1B;008:5B;009:2B;009:5B	
X162	B9	UC_DATA4	008:1B;008:5B;009:2B;009:5B	
X162	B10	UC_DATA8	008:1B;008:5B;009:2B;009:5B	
X162	B11	UC_DATA12	008:1B;008:5B;009:2B;009:5B	
X162	B12	RESERVE1_B		
X162	B13	LEVATT1_A	012:1B;013:1B	
X162	B14	LEVATT0_B	012:7B	
X162	B15	LEVATT2_B	012:5D	
X162	B16	SER_A_CLK2	018:7D	
X162	B17	SER_A_STRB_D	012:3C;012:7C;013:3C;013:7C;014:7D;018:7D	
X162	B18	SER_A_IN	012:1C;012:5C;013:1C;013:5C;014:5D;018:7D	
X162	B19	JTAG_TDO_HF	012:3C;012:7C;013:3C;013:7C;014:7D	
X162	B20	JTAG_TMS_HF2	012:7B	
X162	B21	JTAG_TMS_HF7		
X162	B22	SPI_CS_BB9		
X162	B23	-U6V0		
X162	B24	-U6V0		

X162	E1	SPI_CS_BB1	003:3A	
X162	E2	SPI_CS_BB6	014:2A	
X162	E3	SPI_CS_BB8		
X162	E4	SER_B_CLK2	014:2B;017:2B	
X162	E5	JTAG_TCK_BB2	014:3D	
X162	E6	JTAG_TMS_BB5	009:5C	
X162	E7	UC_EXTCLK	008:3D;008:7D;009:3D;009:7D	
X162	E8	UC_DATA3	008:3C;008:7C;009:3D;009:7D	
X162	E9	UC_DATA7	008:3C;008:7C;009:3D;009:7D	
X162	E10	UC_DATA11	008:3D;008:7D;009:3D;009:7D	
X162	E11	UC_DATA15	008:3D;008:7D;009:3D;009:7D	
X162	E12	UC_SYMB_RV	008:3D;008:7D;009:3D;009:7D	
X162	E13	UC_DACIF_RSV1	008:3B;008:7B;009:3B;009:7B	
X162	E14	UC_TRIGIN2	008:1D;008:5D;009:2D;009:5D	
X162	E15	UC_BURST	008:3D;008:7D;009:3D;009:7D	
X162	E16	UC_PD_SIG	008:3D;008:7D;009:3D;009:7D	
X162	E17	UC_HOPP	008:3B;008:7B;009:3C;009:7C	
X162	E18	UC_USER2	008:1B;008:5B;009:2C;009:5C	
X162	E19	UC_USER4	008:3B;008:7B;009:3C;009:7C	
X162	E20	JTAG_TMS_HF5	014:7B	
X162	E21	JTAG_TMS_HF10	(EICHLEITUNG)	
X162	E22	BB_USRCLK	003:2E	
X162	E23	FAN_CTRL	019:6E	
X162	E24	+U12V0		

X162	C1	SPI_SO	002:2B;003:7C;004:7C;014:3E	
X162	C2	SPI_CS_BB4	004:2B	
X162	C3	SER_B_STRB_D	003:7E;014:2B;017:2B	
X162	C4	SER_B_OUT	003:7C;014:2B;017:2B	
X162	C5	JTAG_TDI_BB	003:7E;008:3B;008:7B;009:3B;009:7B;	
X162	C6	JTAG_TMS_BB3	008:5C 014:2C;017:2D	
X162	C7	JTAG_TMS_BB8		
X162	C8	UC_DATA1	008:1C;008:5C;009:2D;009:5D	
X162	C9	UC_DATA5	008:1C;008:5C;009:2D;009:5D	
X162	C10	UC_DATA9	008:1D;008:5D;009:2D;009:5D	
X162	C11	UC_DATA13	008:1D;008:5D;009:2D;009:5D	
X162	C12	BER_MASK	017:4D	
X162	C13	BER_RES	017:4D	
X162	C14	BER_DATA	017:4D	
X162	C15	BER_CLK	017:4D	
X162	C16	RESERVE2		
X162	C17	SER_A_RESET_N	012:1B;012:5B;013:1B;013:5B;014:5B;018:7D	
X162	C18	SER_A_INT_N	012:1C;012:5C;013:1C;013:5C;014:5D;018:7D	
X162	C19	JTAG_TDI_HF	012:3B;012:7B;013:3B;013:7B;014:7B	
X162	C20	JTAG_TMS_HF3	013:3B	
X162	C21	JTAG_TMS_HF8		
X162	C22	SPI_CS_BB10		
X162	C23	+U6V0		
X162	C24	+U6V0		

X162	GD1		X162	GD19
X162	GD2		X162	GD20
X162	GD3		X162	GD21
X162	GD4		X162	GD22
X162	GD5		X162	GD23
X162	GD6		X162	GD24
X162	GD7		X162	GD25
X162	GD8		X162	GD26
X162	GD9		X162	GD27
X162	GD10		X162	GD28
X162	GD11		X162	GD29
X162	GD12		X162	GD30
X162	GD13		X162	GD31
X162	GD14		X162	GD32
X162	GD15		X162	GD33
X162	GD16		X162	GD34
X162	GD17		X162	GD35
X162	GD18		X162	GD36

SLOT6 D
DACIF BOARD



ACHTUNG: ESD!
Elektrostatisch gefaehrdete Bauelemente erfordern eine besondere Handhabung.

ATTENTION: ESD!
Electrostatic sensitiv devices require a special handling.

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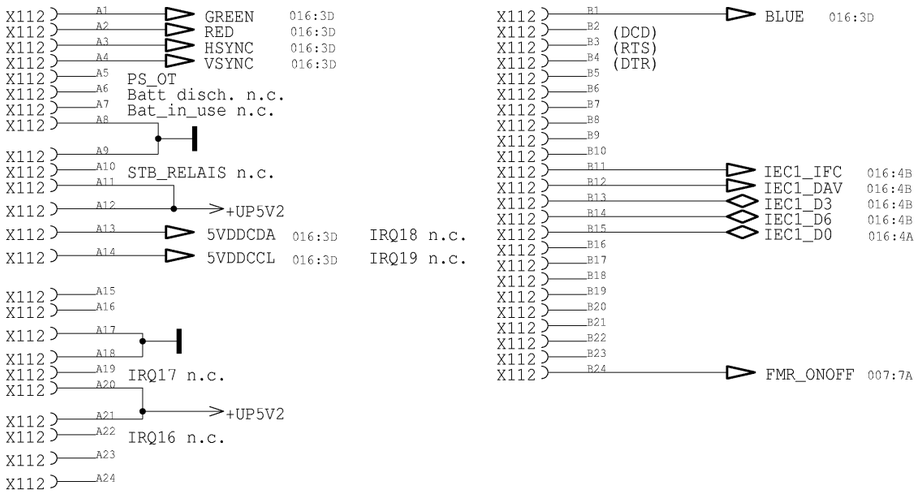
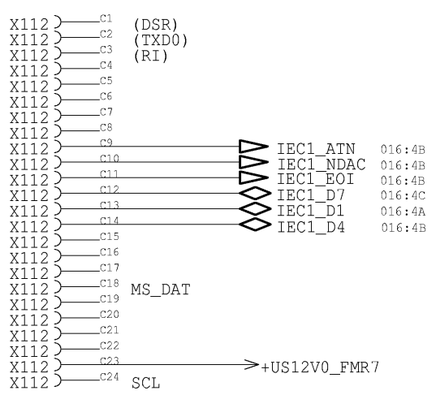
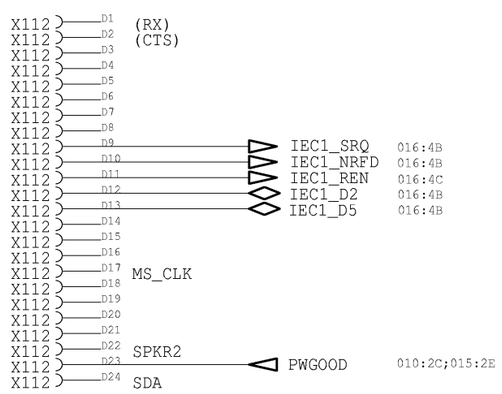
SMU	Datum: Date: 08/06/16	Abteilung: Dept.: 1GPK	Name: Name: eichfeld	Zeichn.Nr.:/Drawing No.: 1141.3653.01 S		

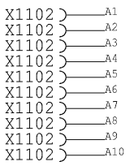
FMR (I/O)

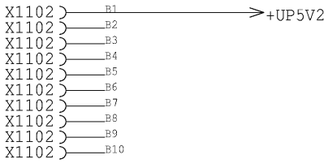


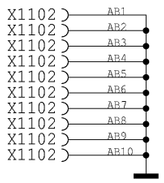


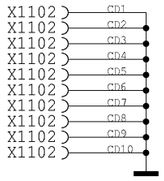


NF-MOD02









ACHTUNG: ESD!
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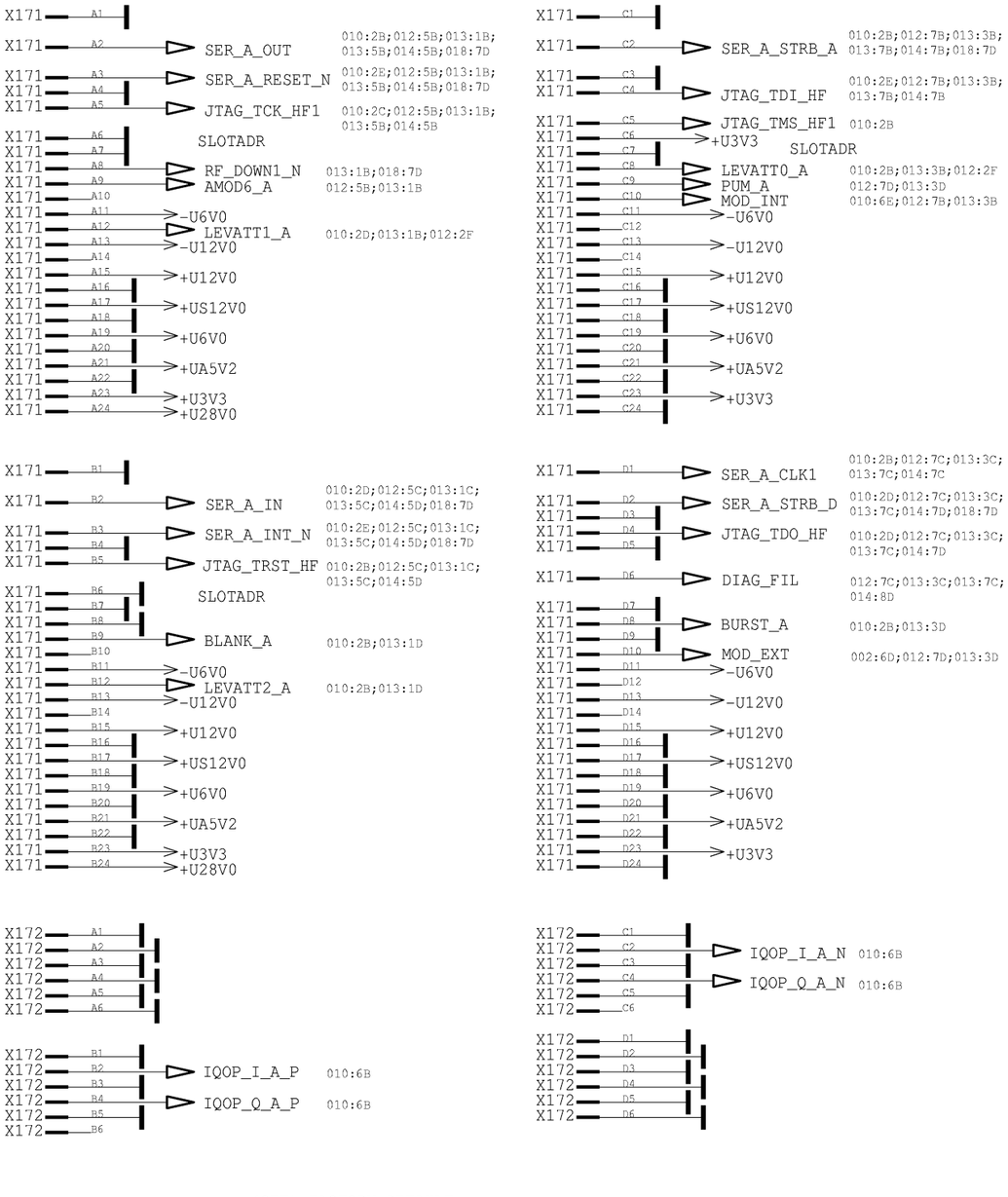
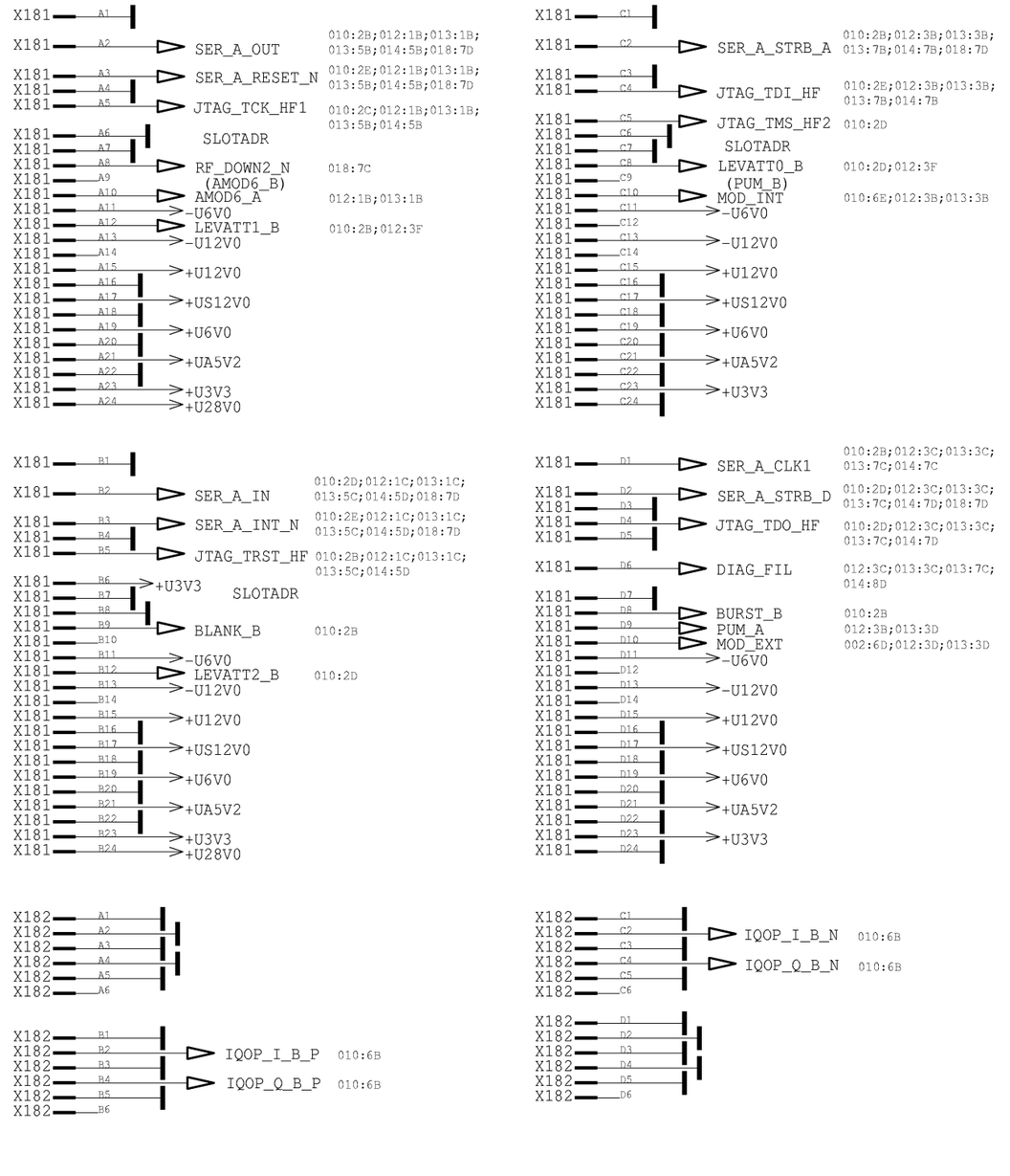
	MOTHERBOARD F. SMU/SMJ			Zeichn.Nr.:/Drawing No.:		
SMU	Datum: 08/06/16	Abteilung: Dept.: 1GPK	Name: eichfeld	1141.3653.01 S		

ANALOG

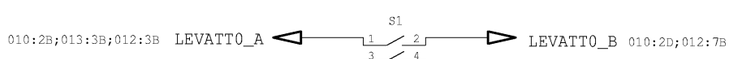
SLOT1 A /IQOP3



SLOT2 A / IQOP3 IQOP6



(OFF) FACTORY DEFAULT



(ON) IF B104/106 AND B13
AND B20/22 FITTED

ACHTUNG: ESD!
Elektrostatisch gefaehrdete Bauelemente erfordern eine besondere Handhabung.

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SMU	Datum: Date: 08/06/16	Abteilung: Dept.: 1GPK	Name: Name: eichfeld	Zeichn.Nr.:/Drawing No.: 1141.3653.01 S		

SLOT3 A / IQOP6

X191	A1			
X191	A2	SER_A_OUT	010:2B;012:1B;012:5B;013:5B;014:5B;018:7D	
X191	A3	SER_A_RESET_N	010:2B;012:1B;012:5B;013:5B;014:5B;018:7D	
X191	A4			
X191	A5	JTAG_TCK_HF1	010:2C;012:1B;012:5B;013:5B;014:5B	
X191	A6			
X191	A7			
X191	A8	RF_DOWN1_N	012:1B;018:7D	
X191	A9			
X191	A10	AMOD6_A	012:1B;012:5B	
X191	A11	-U6V0		
X191	A12	LEVATT1_A	010:2D;012:1B	
X191	A13	-U12V0		
X191	A14	OCXO_ENA0	013:5D;014:5D	
X191	A15	+U12V0		
X191	A16			
X191	A17	+US12V0		
X191	A18			
X191	A19	+U6V0		
X191	A20			
X191	A21	+UA5V2		
X191	A22			
X191	A23	+U3V3		
X191	A24	+U28V0		

X191	B1			
X191	B2	SER_A_IN	010:2D;012:1C;012:5C;013:5C;014:5D;018:7D	
X191	B3	SER_A_INT_N	010:2B;012:1C;012:5C;013:5C;014:5D;018:7D	
X191	B4			
X191	B5	JTAG_TRST_HF	010:2B;012:1C;012:5C;013:5C;014:5D	
X191	B6	+U3V3		
X191	B7			
X191	B8			
X191	B9	BLANK_A	010:2B;012:1D	
X191	B10	SYNEX_FSK	010:6E	
X191	B11	-U6V0		
X191	B12	LEVATT2_A	010:2B;012:1D	
X191	B13	-U12V0		
X191	B14			
X191	B15	+U12V0		
X191	B16			
X191	B17	+US12V0		
X191	B18			
X191	B19	+U6V0		
X191	B20			
X191	B21	+UA5V2		
X191	B22			
X191	B23	+U3V3		
X191	B24	+U28V0		

X191	C1			
X191	C2	SER_A_STRB_A	010:2B;012:3B;012:7B;013:7B;014:7B;018:7D	
X191	C3			
X191	C4	JTAG_TDI_HF	010:2E;012:3B;012:7B;013:7B;014:7B	
X191	C5	JTAG_TMS_HF3	010:2E	
X191	C6	+U3V3		
X191	C7			
X191	C8	LEVATT0_A	010:2B;012:3B	
X191	C9			
X191	C10	MOD_INT	010:6E;012:3B;012:7B	
X191	C11	-U6V0		
X191	C12	OCXO_TUNE	013:7B;014:7B	
X191	C13	-U12V0		
X191	C14			
X191	C15	+U12V0		
X191	C16			
X191	C17	+US12V0		
X191	C18			
X191	C19	+U6V0		
X191	C20			
X191	C21	+UA5V2		
X191	C22			
X191	C23	+U3V3		
X191	C24			

X191	D1	SER_A_CLK1	010:2B;012:3C;012:7C;013:7C;014:7C	
X191	D2	SER_A_STRB_D	010:2D;012:3C;012:7C;013:7C;014:7D;018:7D	
X191	D3			
X191	D4	JTAG_TDO_HF	010:2D;012:3C;012:7C;013:7C;014:7D	
X191	D5			
X191	D6	DIAG_FIL	012:3C;012:7C;013:7C;014:8D	
X191	D7			
X191	D8	BURST_A	010:2B;012:3D	
X191	D9	PUM_A	012:3B;012:7D	
X191	D10	MOD_EXT	002:6D;012:3D;012:7D	
X191	D11	-U6V0		
X191	D12	EXT_TUNE	013:7D;014:7D;017:7E	
X191	D13	-U12V0		
X191	D14			
X191	D15	+U12V0		
X191	D16			
X191	D17	+US12V0		
X191	D18			
X191	D19	+U6V0		
X191	D20			
X191	D21	+UA5V2		
X191	D22			
X191	D23	+U3V3		
X191	D24			

SLOT4 A / SSYN

X201	A1			
X201	A2	SER_A_OUT	010:2B;012:1B;012:5B;013:1B;014:5B;018:7D	
X201	A3	SER_A_RESET_N	010:2E;012:1B;012:5B;013:1B;014:5B;018:7D	
X201	A4			
X201	A5	JTAG_TCK_HF1	010:2C;012:1B;012:5B;013:1B;014:5B	
X201	A6	+U3V3		
X201	A7			
X201	A8			
X201	A9			
X201	A10			
X201	A11	-U6V0		
X201	A12			
X201	A13	-U12V0		
X201	A14	OCXO_ENA2	014:7E	
X201	A15	+U12V0		
X201	A16			
X201	A17	+US12V0		
X201	A18			
X201	A19	+U6V0_S4		
X201	A20			
X201	A21	+UA5V2		
X201	A22			
X201	A23	+U3V3		
X201	A24	+U28V0		

X201	B1			
X201	B2	SER_A_IN	010:2D;012:1C;012:5C;013:1C;014:5D;018:7D	
X201	B3	SER_A_INT_N	010:2B;012:1C;012:5C;013:1C;014:5D;018:7D	
X201	B4			
X201	B5	JTAG_TRST_HF	010:2B;012:1C;012:5C;013:1C;014:5D	
X201	B6			
X201	B7			
X201	B8			
X201	B9			
X201	B10			
X201	B11	-U6V0		
X201	B12			
X201	B13	-U12V0		
X201	B14	OCXO_ENA0	013:1B;014:5D	
X201	B15	+U12V0		
X201	B16			
X201	B17	+US12V0		
X201	B18			
X201	B19	+U6V0_S4		
X201	B20			
X201	B21	+UA5V2		
X201	B22			
X201	B23	+U3V3		
X201	B24	+U28V0		

X201	C1			
X201	C2	SER_A_STRB_A	010:2B;012:3B;012:7B;013:3B;014:7B;018:7D	
X201	C3			
X201	C4	JTAG_TDI_HF	010:2E;012:3B;012:7B;013:3B;014:7B	
X201	C5	JTAG_TMS_HF4	010:4B	
X201	C6			
X201	C7			
X201	C8			
X201	C9			
X201	C10			
X201	C11	-U6V0		
X201	C12	OCXO_TUNE	013:3B;014:7B	
X201	C13	-U12V0		
X201	C14	OCXO_ENA1	014:7B	
X201	C15	+U12V0		
X201	C16			
X201	C17	+US12V0		
X201	C18			
X201	C19	+U6V0_S4		
X201	C20			
X201	C21	+UA5V2		
X201	C22			
X201	C23	+U3V3		
X201	C24			

X201	D1	SER_A_CLK1	010:2B;012:3C;012:7C;013:3C;014:7C	
X201	D2	SER_A_STRB_D	010:2D;012:3C;012:7C;013:3C;014:7D;018:7D	
X201	D3			
X201	D4	JTAG_TDO_HF	010:2D;012:3C;012:7C;013:3C;014:7D	
X201	D5			
X201	D6	DIAG_FIL	012:3C;012:7C;013:3C;014:8D	
X201	D7			
X201	D8			
X201	D9			
X201	D10			
X201	D11	-U6V0		
X201	D12	EXT_TUNE	013:3D;014:7D;017:7E	
X201	D13	-U12V0		
X201	D14			
X201	D15	+U12V0		
X201	D16			
X201	D17	+US12V0		
X201	D18			
X201	D19	+U6V0_S4		
X201	D20			
X201	D21	+UA5V2		
X201	D22			
X201	D23	+U3V3		
X201	D24			

ACHTUNG: ESD!
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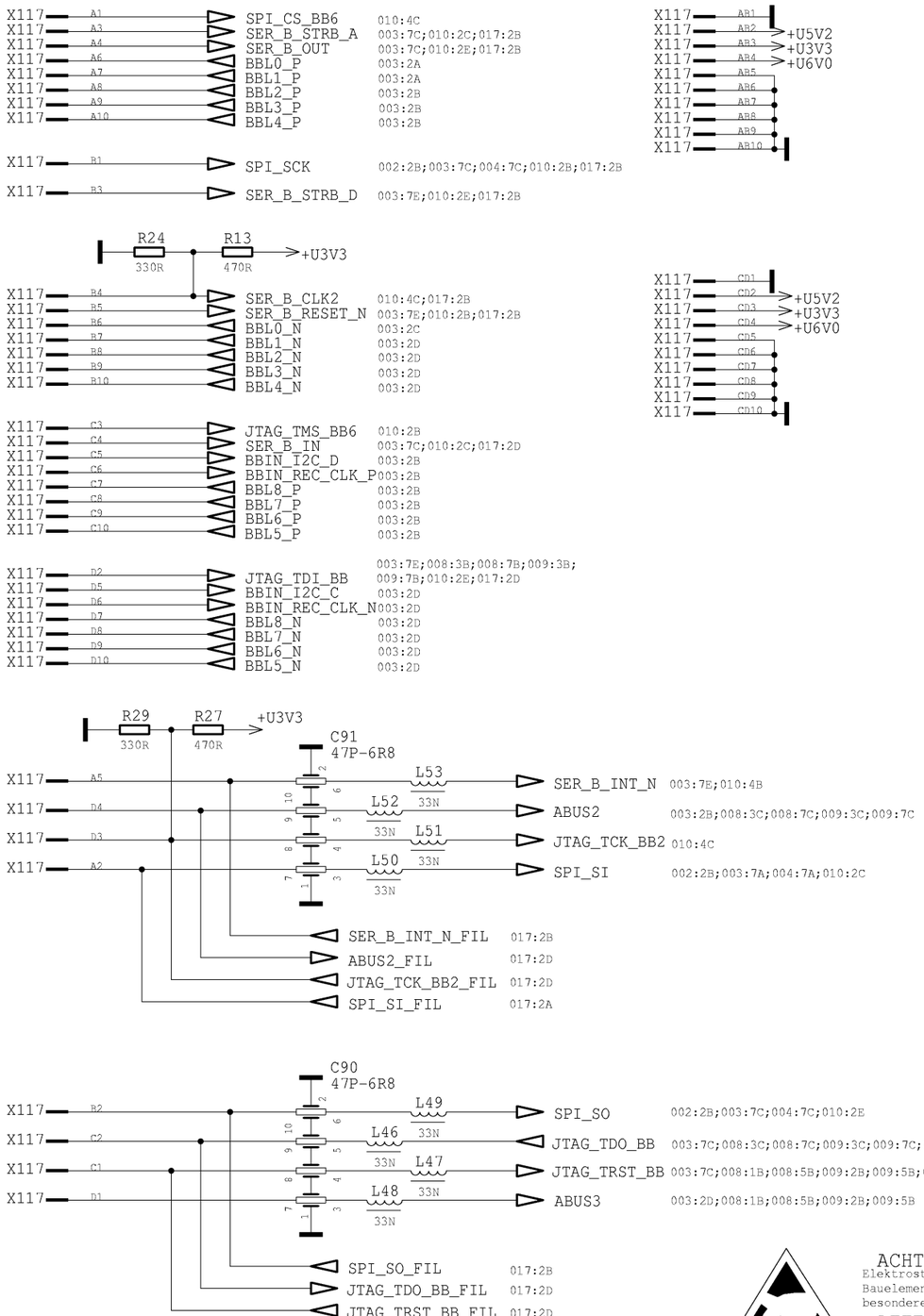
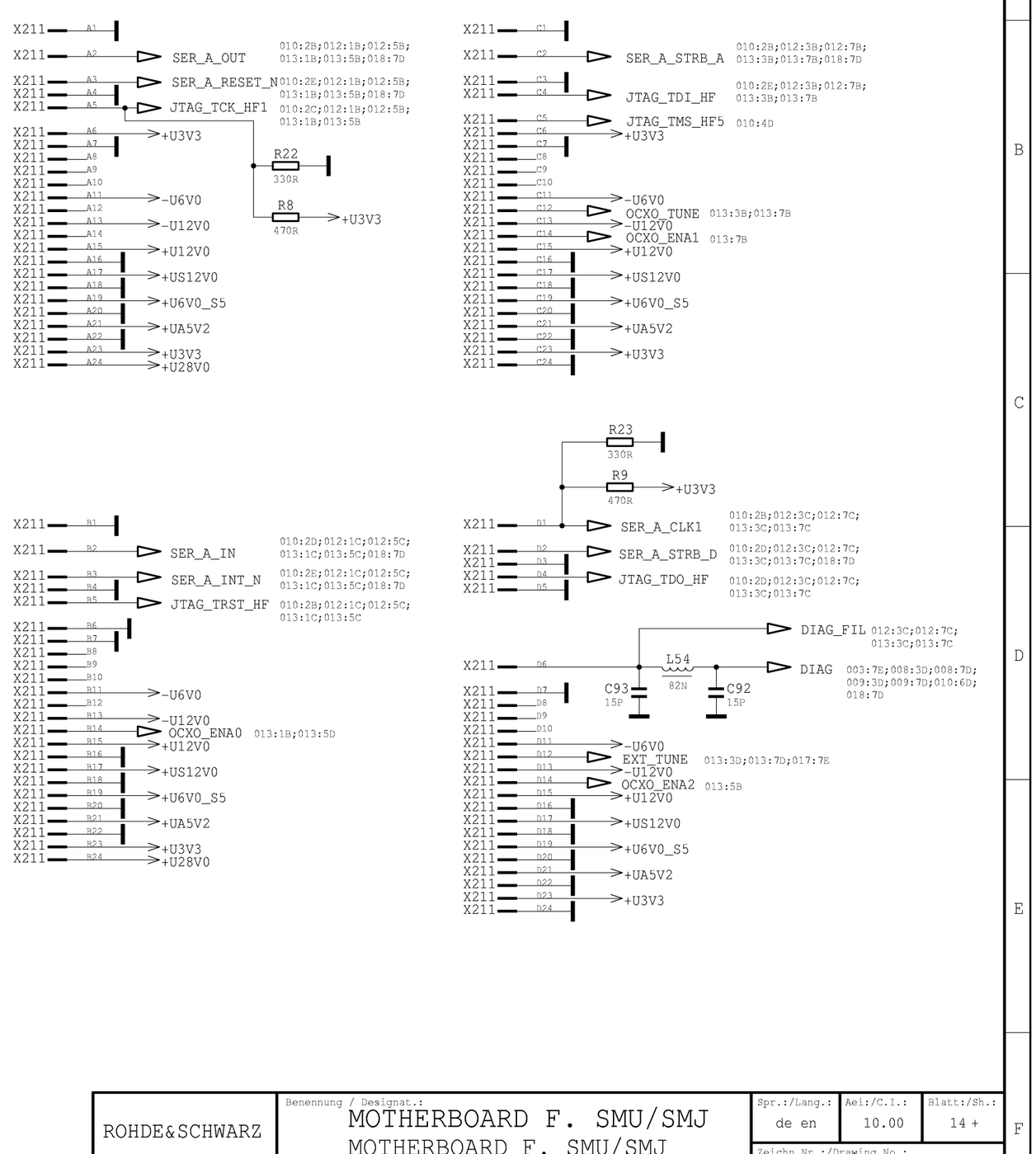
SMU	Datum: Date: 08/06/16	Abteilung: Dept.: 1GPK	Name: Name: eichfeld	Zeichn.Nr.:/Drawing No.: 1141.3653.01 S		

BBIN R



SLOT5 A



ACHTUNG: ESD!
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ATTENTION: ESD!
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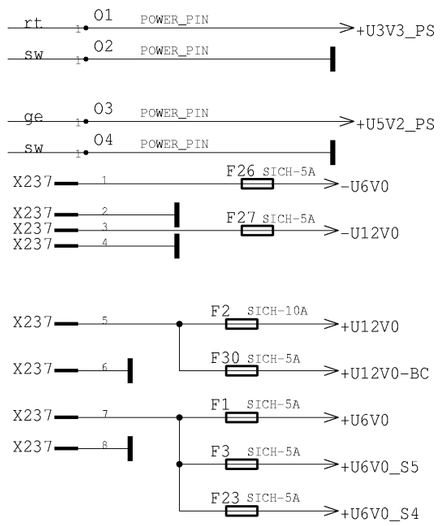
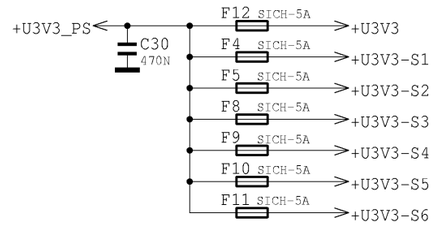
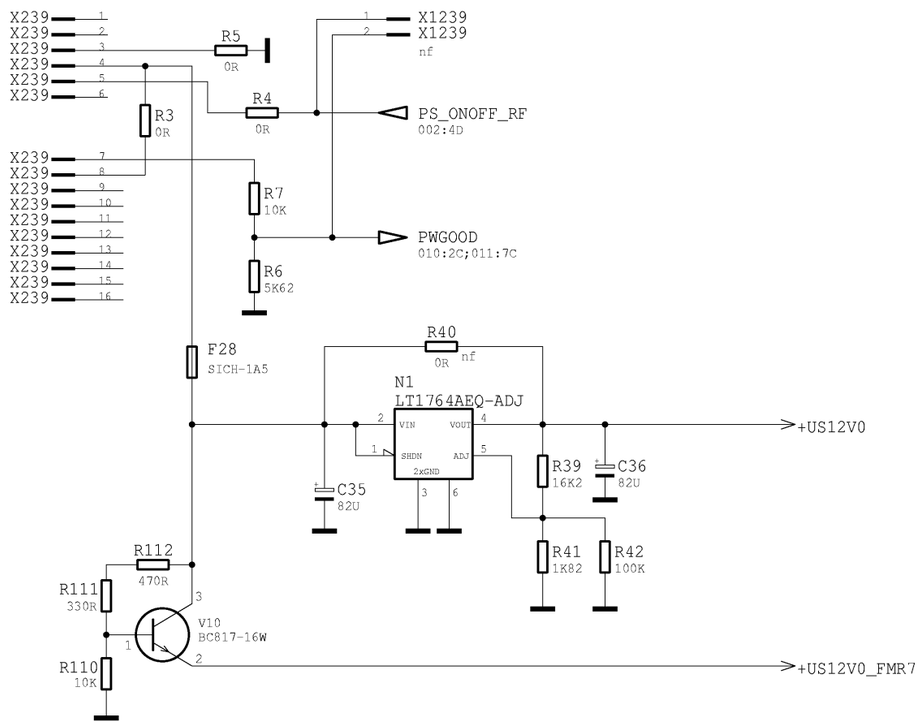
SMU	Datum: Date: 08/06/16	Abteilung: Dept.: 1GPK	Name: Name: eichfeld	Zeichn.Nr.:/Drawing No.: 1141.3653.01 S		

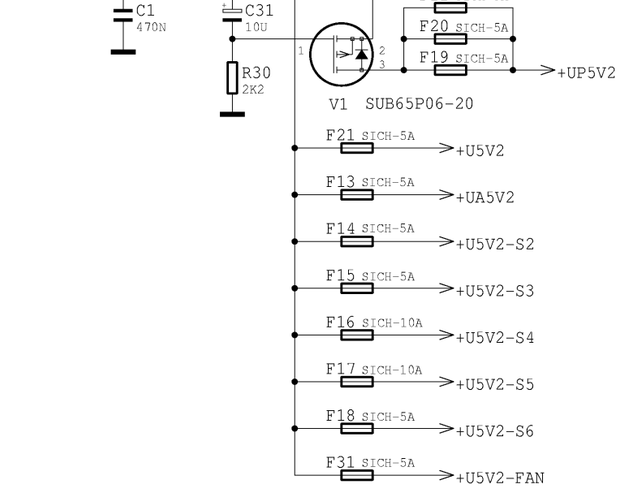
FROM POWER SUPPLY





FROM POWER SUPPLY CONTROL





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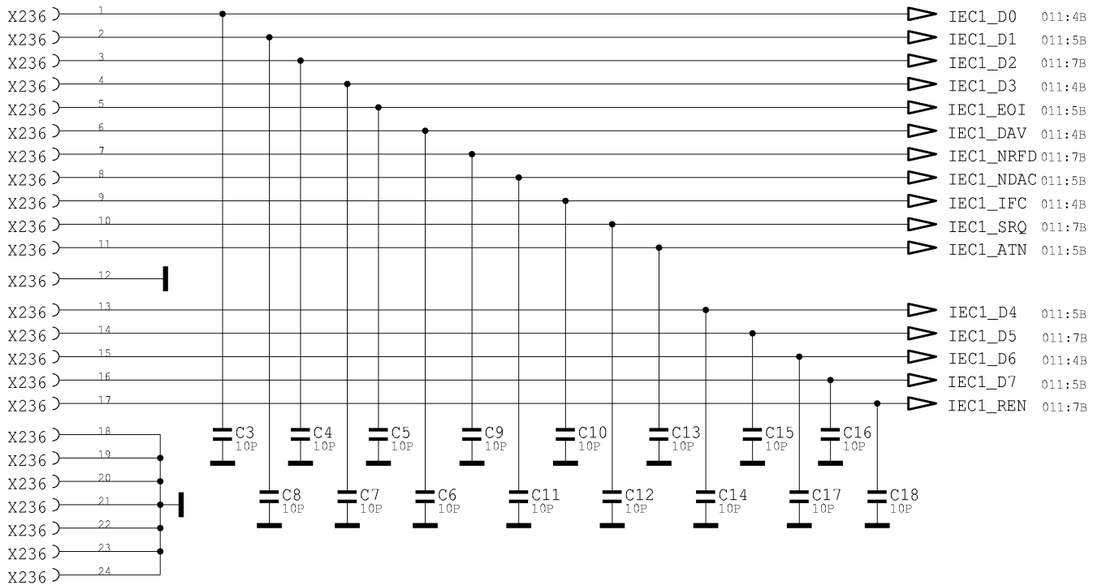
SMU	Datum: Date: 08/06/16	Abteilung: Dept.: 1GPK	Name: Name: eichfeld	Zeichn.Nr.:/Drawing No.: 1141.3653.01 S		

IEC



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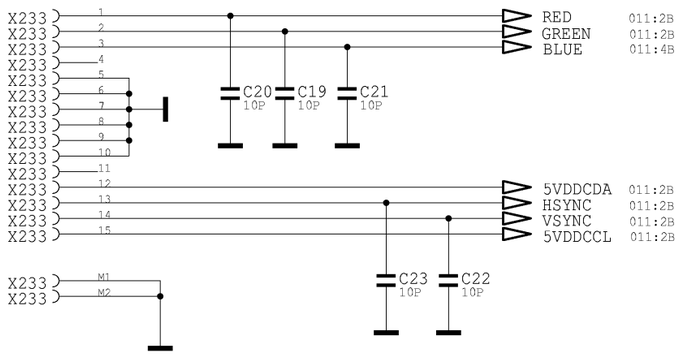

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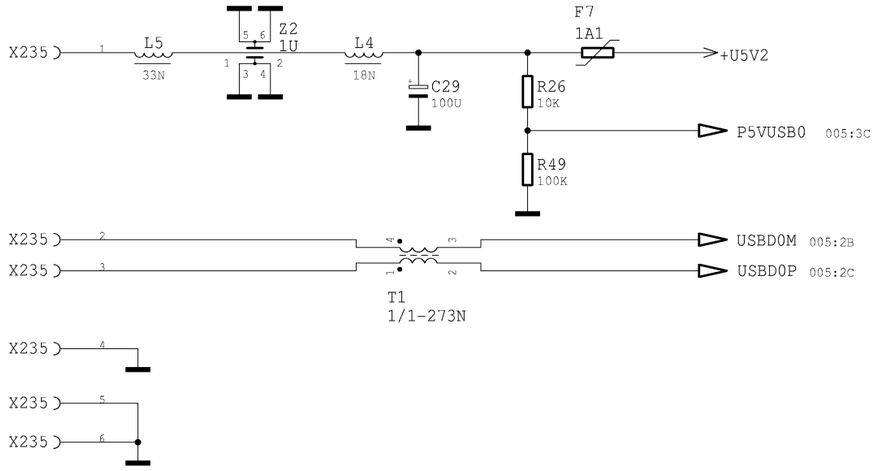
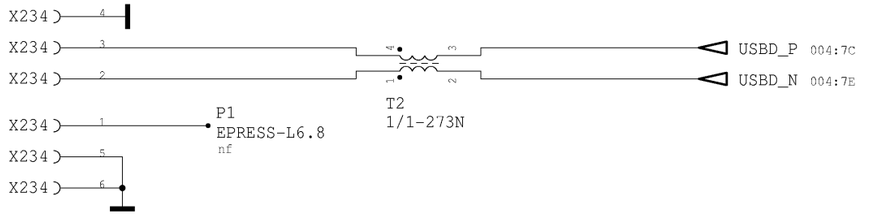
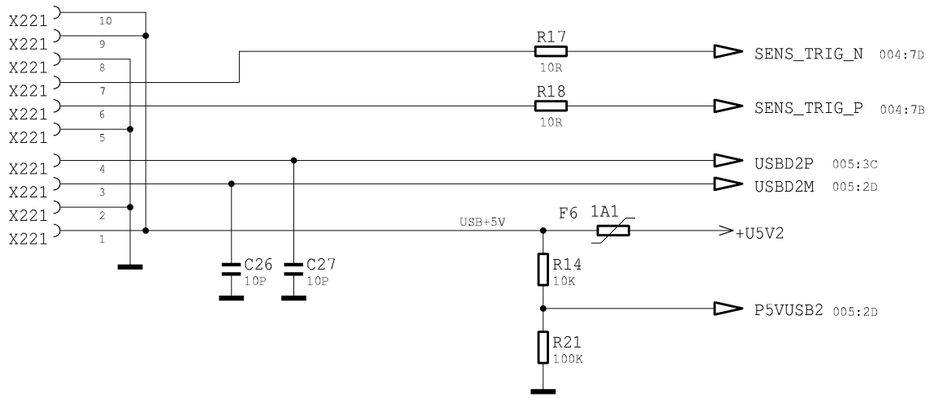


USB SLAVE



USB POWER SENSOR



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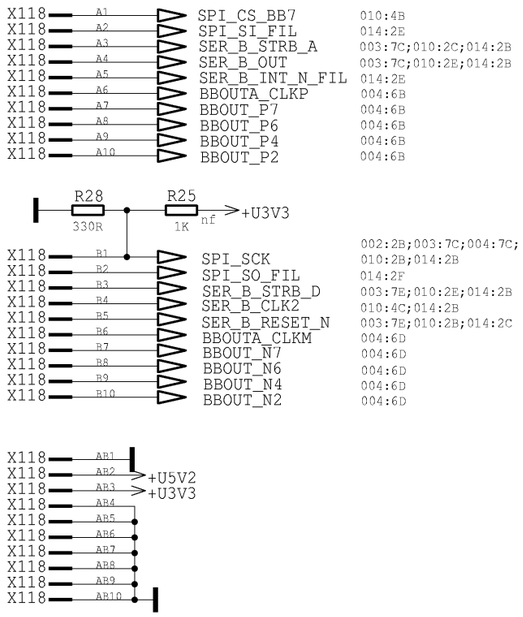
SMU	Datum: Date: 08/06/16	Abteilung: Dept.: 1GPK	Name: Name: eichfeld			

BBOUTR



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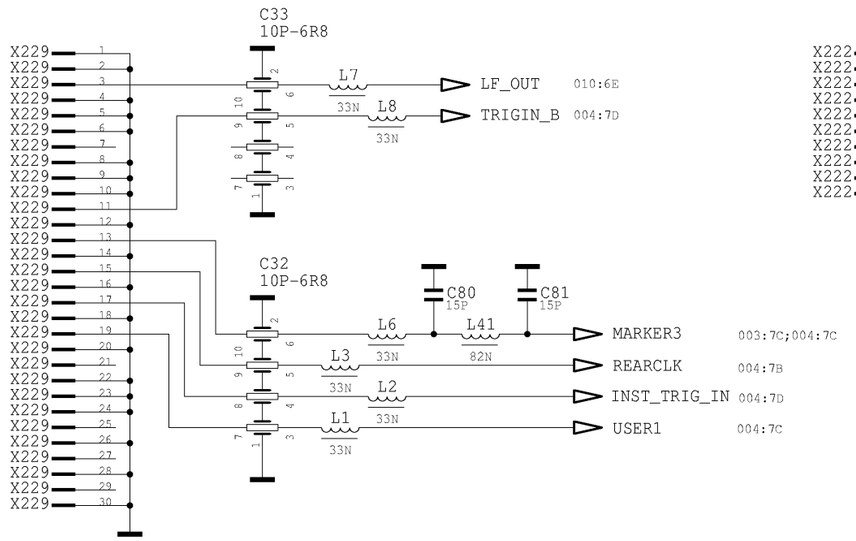

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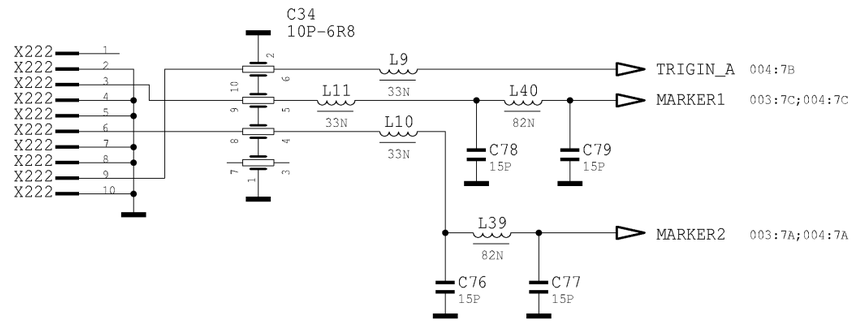
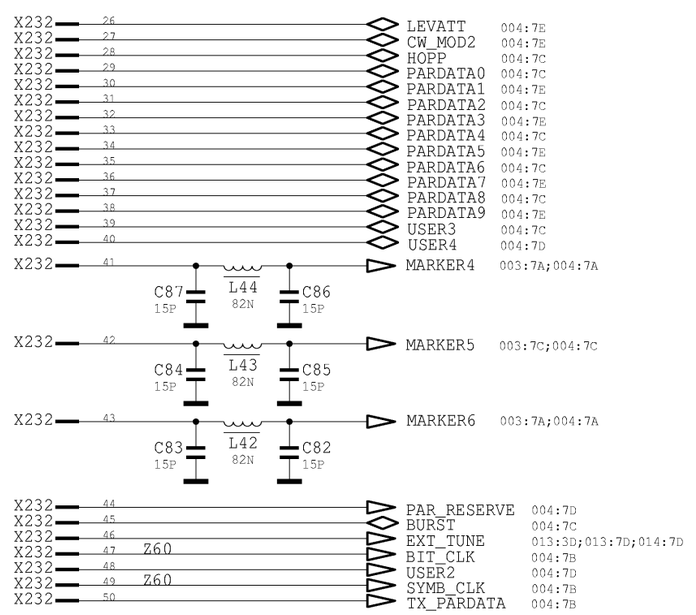


AUX I/O



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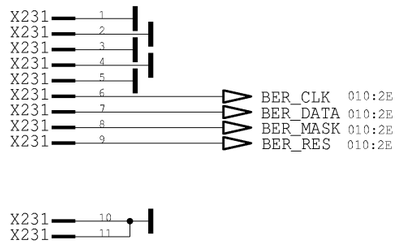

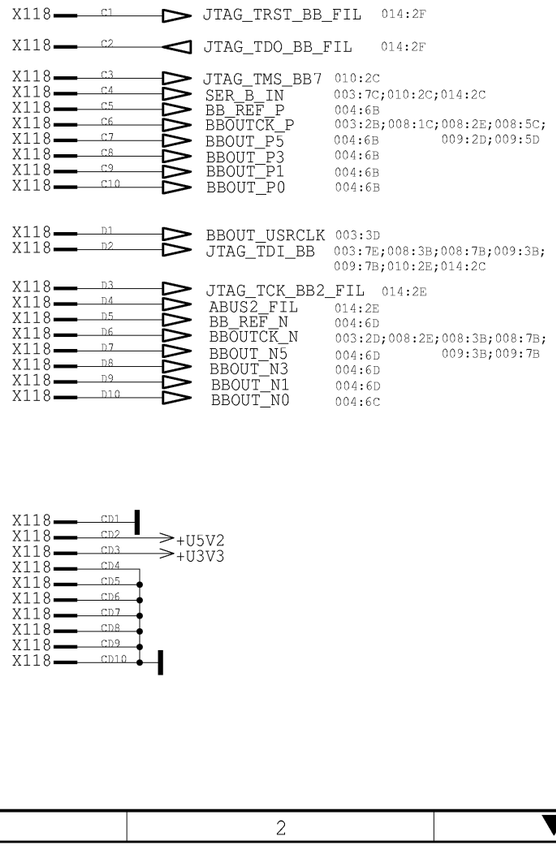

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SMU	Datum: Date: 08/06/16	Abteilung: Dept.: 1GPK	Name: Name: eichfeld	Zeichn.Nr.:/Drawing No.: 1141.3653.01 S		

ATTENUATOR 1

ATTENUATOR 2

X226 1
X226 2
X226 12
X226 14
R32 330R
R31 470R
X226 16
X226 17
X226 19
X226 21
X226 23
X226 5
X226 3
X226 18
X226 20
X226 15
X226 13
X226 7
X226 22 — MI_OVP1_N 018:2E
X226 24 — OVP_DIAG1 018:2E
X226 25 — OVP_ID10 018:2F
X226 26 — OVLD_ATT1_N 018:2F
X226 27 — OL_SET1_N 018:2F
X226 28 — BP1_ON 018:2F
X226 29 — OL_CLR1_N 018:2F
X226 30 — OVP_ID11 018:2E

X226 4 — +U12V0A — L15 33N — C40 10N — +U12V0
X226 6 — -U12V0A — L16 33N — C41 10N — -U12V0
X226 8 — +U5V2A — L17 33N — C42 10N — +U5V2
X226 9 (SLOTADR1)
X226 10 — +U3V3A — L18 33N — C43 10N — +U3V3
X226 11 (SLOTADR0)

C45 47P-6R8 — L20 33N, L19 33N, L14 33N
C44 47P-6R8 — L21 33N, L22 33N, L23 33N, L24 33N
C39 47P-6R8 — L25 33N, L26 33N, L27 33N

X228 1
X228 12
X228 14
X228 16
X228 17
X228 19
X228 21
X228 23
X228 2

RF_DOWN2_N 012:5B
SER_A_RESET_N 010:2E;012:1B;012:5B;013:1B;013:5B;014:5B
RF_DOWN1_N 012:1B;013:1B
SER_A_STRB_A 010:2B;012:3B;012:7B;013:3B;013:7B;014:7B
SER_A_IN 010:2D;012:1C;012:5C;013:1C;013:5C;014:5D
SER_A_OUT 010:2B;012:1B;012:5B;013:1B;013:5B;014:5B
SER_A_STRB_D 010:2D;012:3C;012:7C;013:3C;013:7C;014:7D
SER_A_CLK2 010:2D
SER_A_INT_N 010:2E;012:1C;012:5C;013:1C;013:5C;014:5D
DIAG 003:7E;008:3D;008:7D;009:3D;009:7D;010:6D;014:8D

C89 15P — L45 82N — C88 15P

X228 8
X228 9
X228 10 (SLOTADR1)
X228 6
X228 4

018:4E MI_OVP2_N — X228 22
018:4E OVP_DIAG2 — X228 24
018:4F OVP_ID20 — X228 25
018:4F OVLD_ATT2_N — X228 26
018:4F OL_SET2_N — X228 27
018:4F BP2_ON — X228 28
018:4F OL_CLR2_N — X228 29
018:4E OVP_ID21 — X228 30
X228 5
X228 7
X228 13
X228 15
X228 18
X228 20
X228 3
X228 11 (SLOTADR0)

OVERLOAD PROTECTION 1

X225 1 — OVP_ID11 018:2C
X225 2
X225 3
X225 4
X225 5
X225 6
X225 7
X225 8 — MI_OVP1_N 018:2C
X225 9
X225 10 — OVP_DIAG1 018:2C
X225 11 — OVP_ID10 018:2C
X225 12 — OVLD_ATT1_N 018:2C
X225 13 — OL_SET1_N 018:2C
X225 14 — BP1_ON 018:2C
X225 15 — OL_CLR1_N 018:2C
X225 16

OVERLOAD PROTECTION 2

X227 1 — OVP_ID21 018:7E
X227 2
X227 3
X227 4
X227 5
X227 6
X227 7 — MI_OVP2_N 018:7E
X227 8
X227 9 — OVP_DIAG2 018:7E
X227 10 — OVP_ID20 018:7E
X227 11 — OVLD_ATT2_N 018:7E
X227 12 — OL_SET2_N 018:7E
X227 13 — BP2_ON 018:7E
X227 14 — OL_CLR2_N 018:7E
X227 15
X227 16

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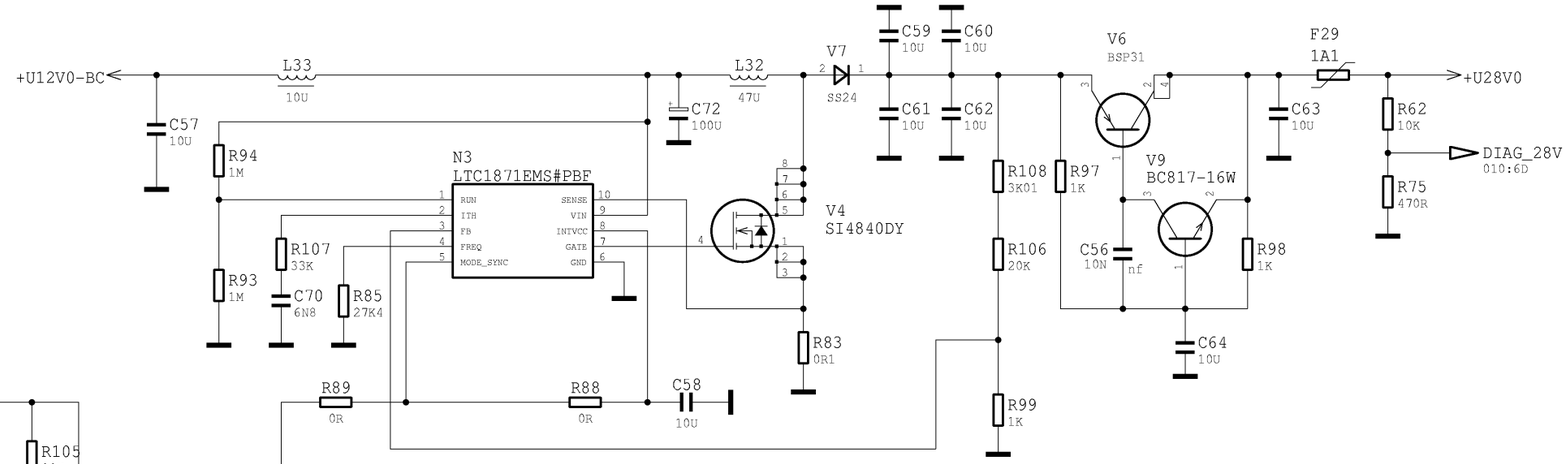
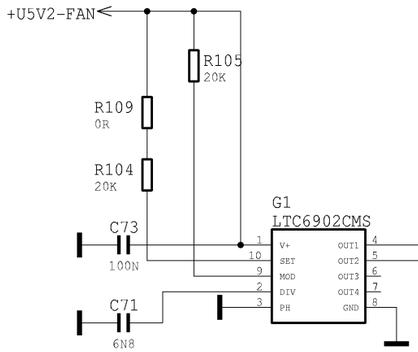
SMU	Datum: Date: 08/06/16	Abteilung: Dept.: 1GPK	Name: Name: eichfeld	Zeichn.Nr.:/Drawing No.: 1141.3653.01 S		

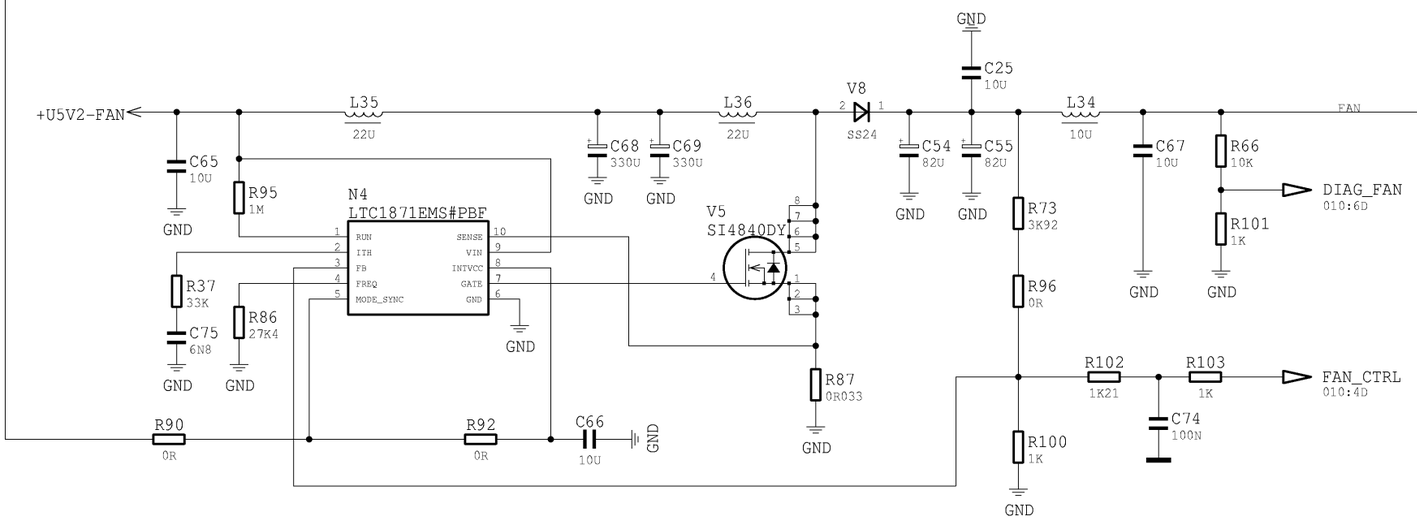
FAN BOOST CONVERTER

28V BOOST CONVERTER

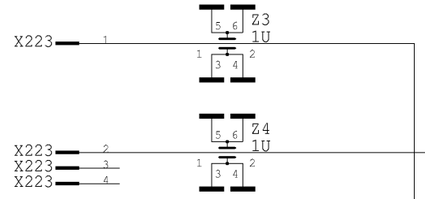




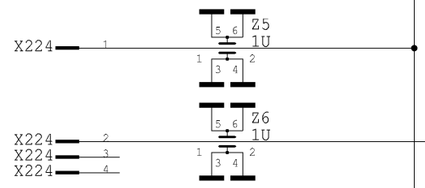
FAN BOOST CONVERTER



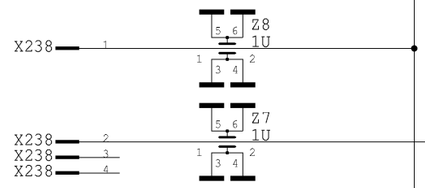
FAN 1 /DIGITAL



FAN 2 /ANALOG



FAN 3 /POWER SUPPLY



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SMU	Datum: Date: 08/06/16	Abteilung: Dept.: 1GPK	Name: Name: eichfeld		Zeichn.Nr.:/Drawing No.: 1141.3653.01 S		