



# IFR-1900 CSA UWC-136 Digital PCS Radio Test Set

*Engineered for maximum performance, the IFR-1900 CSA is an all in one PCS solution for today's dual band/ dual mode mobile and base station equipment*



- The industry accepted simulator for TIA/EIA-136 conformance testing
- Tri-Band, 400/800 MHz and 1900 MHz PCS test capable
- Comprehensive TIA/EIA-136 conformance testing
- Analog and digital authentication compliance testing option
- TIA/EIA-136 hyperband handoff
- Fully automated remote testing ability with RS-232 or IEEE-488 (GPIB) interfaces
- Intuitive test set up screens for easy "Guided" user testing
- VSELP and ACELP vocoder functions allow verification of voice quality
- Full featured 2 GHz service monitor with spectrum analyzer and tracking generator
- Standard constellation IQ display for quick assessment of digital mobile or base station transmitter modulation

### Fully Featured TIA/EIA-136 (TDMA) Test Solution

The IFR-1900 CSA provides you with the industry's only accepted test solution for TIA/EIA-136 analysis, including critical adjacent power measurements and power measurements down to -40 dBm, which allows the user to test the base station

without taking it off-line.

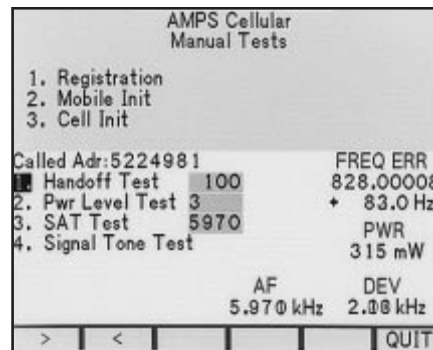
It is capable of performing the critical dual-mode analog/digital authentication and protocol compliance tests for TIA/EIA-136 dual mode mobiles.

As for flexibility, the IFR-1900 CSA provides the capability to perform both mobile and base station conformance testing. And with the VSELP and ACELP vocoder technology as standard features, the IFR-1900 CSA can handle today's latest technology.

The IFR-1900 CSA comes with a wide array of application software options. The AC1036 Protocol Conformance Test Software provides an excellent way to verify software conformance of TIA/EIA-136 mobiles. Other applications software supports automated tests for the most widely used base station applications.

### AMPS Solutions

Engineered to be a true dual-mode test solution, the IFR-1900 CSA also incorporates AMPS and NAMPS mobile and base station compliance test features.



Full AMPS testing modes are available with the IFR-1900 CSA

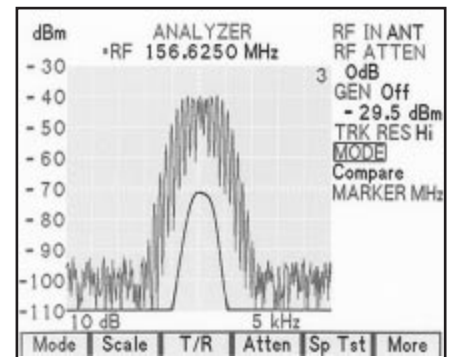
Automatic test routines and user defined print outs enhance manual mode testing for both mobiles and base stations.

Open control channel simulations, voice channel signaling, home/roam condition, home SID, SAT, DSAT, DST, DCC, SINAD reference points, RF power windows, and other AMPS/NAMPS functions and signaling routines allow complete AMPS and NAMPS system testing.

### A Full Complement of Service Monitor Functions to 2 GHz.

The IFR-1900 CSA gives you full frequency domain analysis to 2 GHz with a fully featured spectrum analyzer and tracking generator built-in.

The IFR-1900 CSA also offers a full complement of standard service monitor features including a full span digitized oscilloscope to 1 MHz, DVM and SINAD functions, frequency and channel tables, selectable IF filters, and a wide variety of displays.



The IFR-1900 CSA gives you full featured service monitor functions

# IFR-1900 CSA

In addition to the 2 GHz RF generator, the IFR-1900 CSA also provides full audio/data generator capabilities, full level control and measurement facilities and precision power control features for enhanced sensitivity and high accuracy testing needs.

Analog paging encoding/decoding, DTMF, tone coded squelch, digital squelch, AM modulation/demodulation along with two separate AF generators and cross band duplex gives added test versatility in a variety of wireless systems.

## Software Options Make Complex Testing Simple

As with every IFR test set, you get the advantage of IFR applications engineering support.

Our comprehensive portfolio of application software options are designed to automate and expand the functionality of your instrument.

Plus, on-going software support means that you can easily upgrade your IFR-1900 CSA when test and service requirements change.

AC1009W - EasySpan™ is a Windows-based software utility which extracts spectrum analyzer and tracking generator traces from the IFR-1900 CSA.

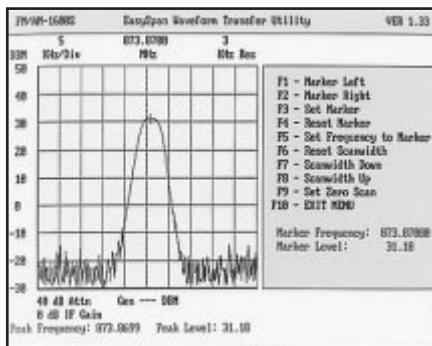
AC1017 - AutoCell-Series II is a comprehensive program for FCC compliance testing of Lucent Series II cell sites.

AC1019 - EasySweep™ is a swept measurement utility designed to test antennas and transmission lines.

AC1020D - AutoCell NTD provides automated testing of Northern Telecom cell sites.

AC1021 - CellScan™ cellular utility software simplifies combiner alignment, monitoring RF levels and base stations on DAMPS, NT400 or PCS cellular channel sets.

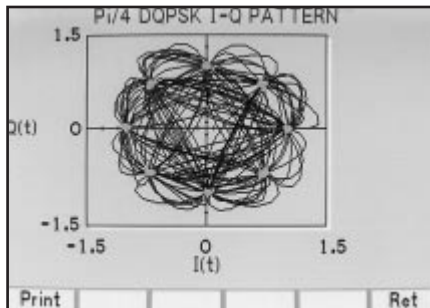
AC1027 - AutoCell-882/884 is an autotest program for performing acceptance tests on Ericsson 884/882/882D/882M/882DM base stations.



EasySpan Software

## Dynamic IQ Constellation Display Simplifies Analysis

The IFR-1900 CSA provides you with a dynamic constellation display for precise RF modulation analysis of DQPSK digitally modulated waveforms from 10 MHz to 2010 MHz. This unique IFR-1900 CSA feature gives a near real time display for testing and troubleshooting, an ability that points out the cause of the trouble in digital radios.



*IQ Constellation display allows for comprehensive digital modulation testing*

## Complex Functionality Made Easy

Even with its elaborate capabilities, the IFR-1900 CSA was developed to execute complex tests simply and with minimal operator training.

Using field-proven front panel and user man-machine interfaces, the IFR-1900 CSA gives you the performance and ease-of-use features that reduces your testing and training time.

Its test macro command programming language (TMAC) can be easily configured to perform automatic base station testing and remote terminal, single and multi-mode, single and multiband equipment. This powerful capability allows you to create and save simple "one button" test routines for future use. This flexibility means you can create and execute complex and repeatable routines no matter what your level of expertise.

A new color VGA display gives IFR-1900 CSA users vivid screen clarity. Extensive use of softkeys reduces your complex cellular / PCS parametric and protocol tests to fast, simple and manageable routines.

## Specification

### RF Signal Generator

#### (T/R) AND DUPLEX CONNECTOR

**Frequency Range**  
10 MHz to 2010 MHz

**Resolution**  
100 Hz

**Accuracy**  
Same as Master Oscillator

**Range**  
-127 dBm to +10 dBm into 50 Ω  
(T/R Connector: -30 dBm maximum with reverse power present)

**Resolution**  
0.1 dB

**Accuracy**  
± 1.5 dB (≥-110 dBm)

**Duplex Connector Input Protection**  
Alarm sounds when level exceeds +20 dBm.

### Modulation

#### EXTERNAL

**Generator IF Output Frequency Range**  
88 MHz to 90 MHz

**Level Range**  
-30 dBm to +25 dBm into 50 Ω

**Residual FM**  
<10 Hz RMS

**SSB Phase Noise**  
<-94 dBc/Hz (20 kHz Offset)

**Residual AM**  
<0.3% RMS (50 Hz to 15 kHz BW)

**Non-Harmonics**  
<-50 dBc

**Nominal Input Frequency for Generator IF In**  
90 MHz

**Input Level**  
-26 dBm to +28 dBm into 50 Ω

**Signal Bandwidth**  
8.5 MHz

**System Gain**  
28 dB ± 7dB, from GEN IF Input to T/R Ports

#### INTERNAL FM

**Range**  
Off and ±100 Hz to ±100 kHz Dev.

**Accuracy**  
± 5% (1 kHz to 20 kHz Dev, 1 kHz rate)  
± 10% (1 kHz Dev and >20 kHz Dev, 1 kHz rate)

**Resolution**  
100 Hz

**Modulation Rate**  
1 kHz to 10 kHz - 5% accuracy

**Waveforms**  
Sine, Square, Triangle

#### INTERNAL PHASE/QUADRATURE (IQ)

**RF Ranges**  
10 MHz to 2010 MHz

**IQ Error Vector Magnitude**  
5% from ideal DQPSK waveform (TIA/EIA-136)

**IQ Origin Offset**  
<-30 dBc

### AF Signal Generators

#### AF Generators #1 and #2

**Range**  
10 Hz to 40 kHz

**Resolution**  
0.1 Hz ≤ 2 kHz  
1 Hz > 2 kHz

**Accuracy**  
±0.1%

**Waveforms**  
Sinewave, Square, Triangle, Ramp, Pulse

### Audio Frequency Counter

**Frequency Range**  
10 Hz to 200 kHz (in 4 decade ranges)

**Accuracy**  
Same as Master Oscillator

**Resolution**  
0.1 Hz (10 Hz to 2 kHz)  
1 Hz (>2 kHz to 20 kHz)  
10 Hz (>20 kHz to 40 kHz)

**Input Waveform**  
Sine or Square

**External Level**  
0.5 VRMS to 30 VRMS (SINAD/BER input)  
0.1 VRMS to 3.5 VRMS (EXT MOD input)

## RF Counter

**Frequency Range**  
10 MHz to 2010 MHz

**Accuracy**  
Same as Master Oscillator

**Resolution**  
1 Hz (fc <20 MHz)  
10 Hz (fc >20 MHz)

**Minimum Level**  
-60 dBm (ANT connector)

## RF Frequency Error Meter

**Frequency Digital Meter Range**  
0 Hz to  $\pm 150$  kHz

**Bar Graph Meter Range**  
0 to  $\pm 100$  kHz (in 4 decade ranges)

**Accuracy**  
Same as Master Oscillator  $\pm$  LSD

**Resolution**  
1 Hz ( $\pm 1$  Hz to  $\pm 10$  kHz)  
10 Hz ( $> \pm 10$  kHz to  $\pm 150$  kHz)

**Minimum Level**  
-60 dBm (ANT Input Port)

## RF Power Meter

**Frequency Range**  
100 MHz to 2010 MHz

**Input Level**  
0.05 mW to 50 W RMS (<900 MHz, 1-2-5 sequence, 4 decade)  
0.05 mW to 10 W RMS (>900 MHz, 1-2-5 sequence, 4 decade)

**Resolution**  
1 %

**Accuracy**  
 $\pm 6\%$  ( $> 5$  W and  $< 50$  W, at Typical Operational Ambient Temperature)

## LOW LEVEL POWER METER

**Frequency Range**  
Same as standard RF power meter

**Input level**  
-40 dBm to -10 dBm

**Accuracy**  
12% typical

## Receiver

**Frequency Range**  
10 MHz to 2010 MHz

**Sensitivity**  
<-80 for 10 dB SINAD  
(1 kHz rate, 6 kHz Dev, FM 2, ANT Input Port)

**Demodulation Output Level**  
(FM): 5 Vp-p  $\pm 15\%$  (at full scale into 600  $\Omega$ )  
(PM): 40 mVRMS  $\pm 15\%$  (5 Rad, into 600  $\Omega$ )  
(AM): 1 VRMS  $\pm 15\%$  (80 % modulation, into 600  $\Omega$ )  
(SSB): 1.15 VRMS  $\pm 15\%$  (Beat tone, into 600  $\Omega$ )

**Receive IF Output Signal Frequency**  
88 MHz to 90 MHz

**IF Bandwidth**  
8.5 MHz

## FM Deviation Meter

**Deviation Range**  
 $\pm 100$  Hz to  $\pm 100$  kHz

**Resolution**  
100 Hz (20 kHz ranges)  
1 kHz ( $> 20$  kHz ranges)

**Accuracy**  
 $\pm 5\% \pm 2$  counts + source residual FM  
(300 kHz IF,  $< 15$  kHz rate)

**Modulation Rate**  
100 Hz to 40 kHz

**Carrier Range**  
100 MHz to 2010 MHz

**Minimum Carrier Level**  
-60 dBm (ANT Input Port)

## PM Deviation Meter

**Deviation Range**  
0 Rad to 10 Rad (Peak)

**Resolution**  
0.01 Rad (deviation  $\leq 5$  Rad)  
0.1 Rad (deviation  $> 5$  Rad)

**Carrier Range**  
100 MHz to 2010 MHz

**Minimum Carrier Level**  
-60 dBm (ANT Input Port)

## AM Modulation Meter

**Modulation Range**  
1 % to 90 %

**Resolution**  
1 %

**Accuracy**  
 $\pm 5\%$  of full scale  $\pm 1$  count + source residual AM  
(30 % to 90 %)

**Carrier Range**  
100 MHz to 2010 MHz

**Minimum Carrier Level**  
-60 dBm (ANT Input Port)

## Distortion Meter

**Distortion Range**  
0.1 % to 20 %

**Resolution**  
0.1 %

**Accuracy**  
 $\pm 0.5\%$  distortion  $\pm 1$  count (1 % to 10 %)  
 $\pm 2\%$  distortion  $\pm 1$  count ( $> 10\%$ )

**Signal Frequency**  
700 Hz to 1.4 kHz

**Signal Level**  
0.1 VRMS to 30 VRMS (SINAD/BER input)

## Error Vector Magnitude (EVM) Meter

**Input Range**  
NT 400 Channels  
Cellular 800 MHz Channels  
PCS 1900 MHz Channels

**Minimum Carrier Level**  
-60 dBm (ANT connector)

**EVM Range**  
0 to 100 %

**EVM Resolution**  
0.01 %

**Meter Residual EVM**  
<2 % indication

**Accuracy**  
 $\pm 3.0\%$  indication,  $\pm 1$  LSD + meter residual EVM

## SINAD Meter

**Range**  
3 dB to 30 dB

**Resolution**  
0.1 dB

**Accuracy**  
 $\pm 1$  dB  $\pm 1$  count (at 12 dB SINAD)

**Signal Frequency**  
700 Hz to 1.4 kHz

**Signal Level**  
0.1 VRMS to 30 VRMS (SINAD/BER input)

## Digital Multimeter

### VOLTMETER (DC/AC)

**Ranges**  
200 mV to 200 V (full scale, decade sequence,  
150  $\Omega$ , 600  $\Omega$ , 1 M $\Omega$  selectable)

**Maximum Input**  
1000 VDC  
500 VAC

**Resolution**  
3.5 digit (maximum resolution 0.1 mV on 200 mV range)

**Accuracy**  
 $\pm 5\%$  of full scale  $\pm 1$  count (AC, where ACV\*kHz  
< 140)  
 $\pm 1\%$  of full scale  $\pm 1$  count (DC)

**Frequency**  
DC, 50 Hz to 20 kHz

**Input Impedance**  
1 M $\Omega$  ( $\pm 5\%$ )  
150  $\Omega$  ( $\pm 5\%$ )  
600  $\Omega$  ( $\pm 5\%$ )

### OHMMETER

**Ranges**  
200  $\Omega$  to 20 M $\Omega$  (full scale, decade sequence)

**Resolution**  
3.5 digit (maximum resolution 0.1 on 200 range)

**Accuracy**  
 $\pm 5\%$  or 0.1 ( $\pm 1$  count)

### CURRENT METER (DC/AC)

**Ranges**  
20 mA to 2 A (full scale, decade sequence, 20 A maximum when using external shunt)

**Resolution**  
3.5 digit (maximum resolution 0.01 mA on 20 mA range)

**Accuracy**  
 $\pm 5\%$  or 0.1 mA  $\pm 1$  count

## Oscilloscope

**Vertical BW**  
1 MHz (-3 dB)

**Input Ranges**  
1 mV / Div to 50 V / Div (1-2-5 sequence, 8 divisions)

**Max Input Vertical**  
200 V Peak

**Accuracy Vertical**  
 $\pm 5\%$  of full scale  
 $\pm 10\%$  of full scale (1 mV and 2 mV ranges)

**Resolution Vertical**  
Full Scale / 256

**Coupling Vertical**  
AC, DC, GND

**Horizontal Sweep Rate**  
1  $\mu$ Sec / Div to 100 msec / Div (1-2-5 sequence, 10 divisions)

**Accuracy Horizontal**  
 $\pm 1\%$  of Full Scale

**Resolution Horizontal**  
Full Scale / 400

**External Input Impedance Horizontal**  
1 M $\Omega$  (shunted by 27 pF nominal)

**Internal Signal Routing**  
425 kHz IF  
Demod Audio  
Function Generator  
SINAD/BER  
RF Power  
EXT MOD

## Spectrum Analyzer

**Range**  
10 MHz to 2010 MHz

**Frequency Span Range**  
1 kHz/Div to 100 MHz/Div plus Zero Scan  
(10 divisions in a 1-2-5 sequence)

**Accuracy**  
 $\pm 5\%$  of Span Width

**Reference Accuracy**  
See Master Oscillator

**Display**  
Log, 10 dB/Div and 2 dB/Div

**Vertical Resolution**  
Full Scale/256

**Displayed Range (Dynamic)**  
60 dB (0 dB Attenuation, Span  $< 1$  MHz/Div)

**Bandwidth Switching Error**  
 $< 2$  dB (5 kHz/Div thru 1 MHz/Div)  
 $< 3$  dB ( $< 5$  kHz/Div or  $> 1$  MHz/Div)

# IFR-1900 CSA

## Overall Accuracy

- ± 4 dB (10 MHz to 400 MHz) (normalized)
- ± 5 dB (>400 MHz to 2010 MHz) (normalized)
- ± 2 dB Log Linearity

## Input Attenuator

- 0 dB, 20 dB, 40 dB (User selectable, ANT Input Port)
- 40 dB, 60 dB, 80 dB, (User selectable Pwr <2 W, T/R Port)
- 60 dB, 80 dB, 100 dB, (User selectable, Pwr >2 W, T/R Port)

## Bit Error Meter (BER)

## Range

1x10<sup>-3</sup> to 1x10<sup>-5</sup>

## Data Rates

75, 150, 300, 600, 1200, 2400, 4800 bps & 16 kbps

## Data Pattern Size

100 to 100,000 bits

## Data Pattern Type

Random, Fixed and User Defined

## Input/Output (I/O)

## IEEE 488.1-1987 Internally Assigned GPIB

### Addresses

System Control Processor (GPIB Address=4)  
TDMA Control Processor (GPIB Address=5)

## RS-232 (Asynchronous) SCSI-1 External Video

### Port Operation Mode

VGA Compliant

## Frequency Reference Ports

BNC Input for External 10 MHz Sync  
BNC Output of Internal 10 MHz Sync

## Dedicated Printer Port

25-Pin D-Sub, Centronics Compatible

## IQ Output Interface

BNC Connector

## TDMA Timeslot Sync

BNC Connector

## Master Oscillator

## Frequency Standard

10 MHz (Nominal)

## Temp Stability

±0.01 ppm (0 to 50°C)

## General Characteristics

## Dimensions

188 mm (7.4 in) H, 478 mm (18.8 in) W, 635 mm (25 in) D (with bail handle and front panel cover in place)

## Weight

Less than 21.8 kg (48 lb)

## Operating Temperature Range

0 to 50°C

## POWER REQUIREMENTS

### Line

105 - 130 to 210 - 260 VAC  
50 to 60 Hz @ 200 W Maximum

## DISPLAY

### Type

Color, Active Matrix LCD

### Size

96 mm (3.8 in) wide, 86 mm (3.4 in) high

### Resolution

640 pixel x 480 pixels.

## Versions & Accessories

When ordering please quote the full ordering number information.

### Ordering Numbers

1900	IFR-1900 CSA Service Monitor
1900-c	IFR-1900 CSA Service Monitor with Certificate of Calibration
AC510	Paging Encoder for Flex, GSC and NEC D3
AC1009W	EasySpan for Windows (Waveform Transfer)
AC1017	AutoCell-Series II (Lucent Series II)
AC1019	EasySweep (Swept Antenna Measurements)
AC1020D	AutoCell-NTD (Northern Telecom Cell Sites)
AC1021	CellScan
AC1027	AutoCell-882/884 (Ericsson)
AC1036	TIA/EIA-136 Conformance Software
AC1048	SSD Update & Authentication Test
AC1201	Telescoping Antenna
AC3403	TMAC Users Manual
AC4103	Return Loss Bridge Kit(5 MHz to 2 GHz) (Includes AC1019)
AC8645	Microphone
AC9153	Soft Padded Carrying Case

### Versions

### Accessories

EasySpan, EasySweep, AutoCell and CellScan are copyrighted by IFR Systems, Inc.



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