Spectrum Analyzers

2397 9 kHz to 3 GHz Spectrum Analyzer

AEROFLEX
A passion for performance.

A spectrum analyzer with a user friendly visual interface simplifying many complex measurements at an affordable price

- 9 kHz to 3 GHz fully synthesized frequency range
- Lightweight, portable and rugged construction at <9.4 kg
- Comprehensive marker facility
- Wide input signal range +30 dBm to -110 dBm
- Optional full range tracking generator
- Semi-automated measurements
- Floppy disk drive
- User friendly MMI reduces risk of operator error
- Auto Tune facility
- AM/FM demodulation
- AC/DC operation (option)

A Value for Money product

The 2397 is the latest in the range of spectrum analyzers from IFR providing exceptional performance at an exceptional price.

Frequency Accuracy

The local oscillator system in the 2397 is fully synthesized thus providing accurate frequency measurements with 1 Hz resolution.

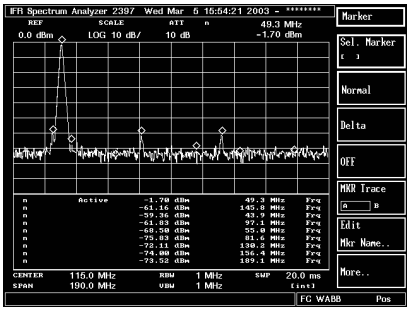
Portability

With a weight of only 9.4 kg the 2397 is one of the lightest spectrum analyzers available. A truly portable unit!

Monochrome Display

The 6 inch TFT monochrome LCD in the 2397 provides a clear, bright, sharp display with a 640 x 480 pixel active display area viewable in high ambient light conditions.

Comprehensive Marker System



Marker table

The marker system allows up to a maximum of 9 markers to be displayed on the screen at any one time. A marker table shows the frequency and level of each marker selected thus allowing multiple signals to be evaluated simultaneously. In addition to the Normal markers 2397 provides Delta, Peak Search, Peak Track, 1/Delta, Marker Track, Marker to Center, and Marker to Reference capabilities.

Measurement Limits

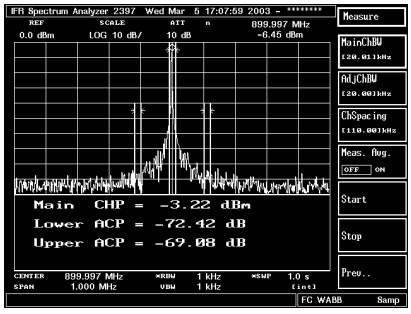
The Limits facility allows an Upper and/or a Lower Limit to be set on the screen of the 2397. Should the signal being displayed fall outside either limit a message will appear on the screen showing which limit has been exceeded and how many times this has happened.

Wide Signal Measurement Range

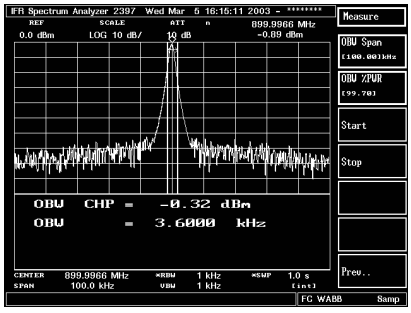
The 50 Ohm input on the 2397 can accept signals between +30 dBm and -110 dBm while providing protection up to 50 Vdc.

Semi-Automated Measurements

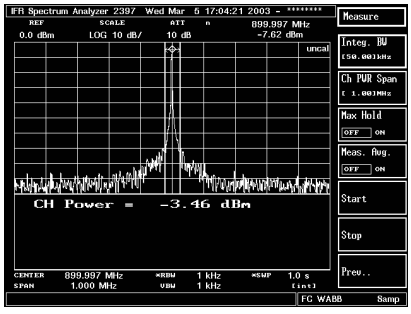
The MMI on the 2397 has been designed to simplify many of the measurements required for the evaluation of today's sophisticated communications systems. These include Adjacent Channel Power, Channel Power, Occupied Bandwidth, Harmonic Distortion, Emission Bandwidth, and X dB Down.



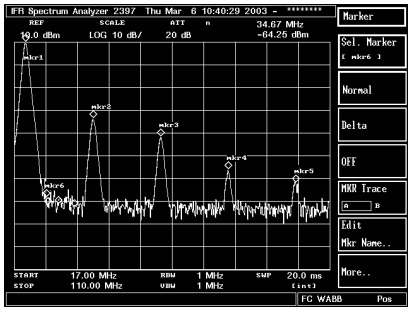
Adjacent Channel Power



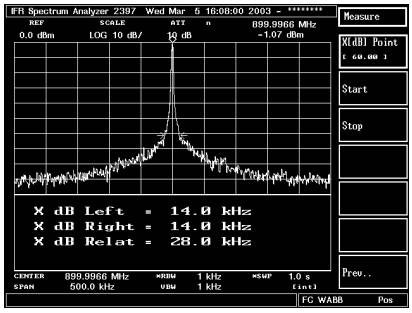
Occupied bandwidth



Channel Power



Marker Label



X dB down

Signal Demodulation

Demodulation of both AM and FM signals allows full testing on a wide range of communications systems. The demodulated signal can be viewed on the screen and is also available on the internal loudspeaker and on headphones via a connector on the front panel. The FM peak deviation and AM modulation depth can be measured using the markers provided in the 2397.

Information Storage

The 2397 is provided with the capability of internally storing up to 1,000 screen traces and 2,000 operational states. The spectrum analyzer is also fitted with a 3.5 inch FDD for bulk storage.

Interfaces

IEEE 488-2, RS-232 and Printer (PCL5) interfaces are provided as standard on the 2397 allowing its integration into automated test systems and the print out of screen displays.

The 2397 has been designed with future flexibility and expansion in mind. The operating system and system memory has the capability to have additional facilities incorporated.

SPECIFICATION

FREQUENCY

Tuning Range

9 kHz to 3 GHz

Resolution

1 Hz

Frequency Span

100 Hz/div to 300 MHz/div in 1, 2, 5 step selections (auto -selected)

Zero span and Full span (9 kHz to 3 GHz)

Manual selection of Start, Stop and Span

Span Accuracy

± 3% of indicated span width

Readout Accuracy

± (Span Accuracy + Frequency Standard Accuracy + 50% of RBW)

Stability

Residual FM <100 Hz p-p at 1 kHz RBW, 1 kHz VBW, (p-p in 20 ms)

Noise Sidebands

-90 dBc/Hz at 10 kHz offset measured at 2.9 GHz

FREQUENCY COUNTER

Resolution

1 Hz, 10 Hz, 100 Hz and 1 kHz

Accuracy

±(Reference frequency error + marker frequency accuracy + counter resolution ± 1 count)

Sensitivity

-70 dBm from 50 kHz to 3 GHz

AMPLITUDE

Measurement Range

+30 dBm to -110 dBm

DANL

50 kHz to 100 kHz <-95 dBm

100 kHz to 1 MHz <-105 dBm

1 MHz to 3 GHz <-105 dBm, typically -115 dBm

300 Hz RBW, 10 Hz VBW

Compression Point

-10 dBm minimum for 1 dB gain compression
100 kHz to 3 GHz at 0 dB attenuation

Displayed Range

100 dB in 10 dB/div log scale, 50 dB in 5 dB/div log scale

20 dB in 2 dB/div log scale, 10 dB in 1 dB/div log scale

10 divisions with linear amplitude scale

Amplitude Units

Log scale mode dBm and dBmV

Linear scale mode V (µV, mV, etc.) or dBV (dBmV only)

Quasi Peak mode dBµV, dBmV or dBm

Display Linearity

5 and 10 dB/div, ±0.15 dB/dB, ± 1.5 dB over 10 divisions

1 and 2 dB/div, ±0.5 dB over 10 divisions

Linear, ± 10 % of Reference Level over 10 divisions

Frequency Response (with 10 dB RF attenuation)

-3 dB to +1dB from 9 kHz to 10 MHz

± 1.5 dB from 10 MHz to 3 GHz

ATTENUATOR

Range

0 dB to 50 dB in 10 dB steps selected manually or automatically coupled to the Reference Level

Accuracy

±0.5 dB/step up to 1.5 dB maximum

REFERENCE LEVEL

Range

-110 dBm to +30 dBm with 1 kHz filter using 1 dB/div scale

Accuracy

±1.5 dB (50 kHz to 3 GHz)

Resolution

0.1 dB steps

Residual Spurious

-85 dBm, with input terminated and 0 dB attenuation

Harmonic Distortion

≤-60 dBc, for -40 dBm input at 0 dB attenuation

Intermodulation

≤-60 dBc, 100 MHz to 3 GHz at -30 dBm input

Other Spurious

≤-60 dBc, 10 MHz to 3 GHz at -30 dBm

RESOLUTION BANDWIDTH

Selection

300 Hz, 1 kHz, 3 kHz, 10 kHz, 30 kHz, 100 kHz, 300 kHz, 1 MHz, 3 MHz

Accuracy

±20%

Selectivity

60 dB/3 dB ratio <15:1

60 dB/6 dB ratio <12:1 for 9 kHz and 120 kHz Quasi Peak filters

Switching Error

±1.0 dB

Video Selection

10 Hz to 1 MHz in 1-3-10 sequence and Full Bandwidth

SWEEP

Rate

50 ms to 1000 s in 1-2-5 sequence, 25 µs to 20 s in Zero Span

Accuracy

20% for <100 ms, 10 % for all other sweep rates

Trigger Source

External, Line, Video, Free run

Trigger Modes

Continuous, Single

Trigger Level

Internal Trigger: Adjustable over 10 divisions

External Trigger: TTL Level (Rear Panel)

Trigger Delay

± One sweep time

DISPLAY

Type

6 inch TFT Monochrome LCD

Digital Resolution

640 H x 480 V active display area

MARKERS

Number

Up to 9 Markers available with 9 Delta Markers

Modes

Normal, Delta, Peak Search, Peak Track, 1/Delta, Marker Track, Marker to Center, Marker to Reference

Marker

Marker track

Marker to center

Marker to reference

Marker to peak

MEMORY

Trace storage

Up to 1,000 traces stored internally

Setup Storage

Up to 2,000 operational states stored internally

External

3.5 inch FDD for bulk storage

Display Traces

2 maximum

INPUTS

RF Input

Type "N" 50 Ohm female connector

Input VSWR

< 1.5:1 from 150 kHz to 3 GHz with 10 dB attenuation

Maximum Input

+30 dBm with 30 dB attenuation, 50 Vdc

LO Emissions

< -70 dBm with 10 dB attenuation

OUTPUTS

IF Output

10.7 MHz nominal

Video Output

0 to 5 VDC, VGA (color) output

Printer Drivers

PCL5 compatible via standard 25 pin female D-Sub Parallel Printer

Probe Power

+15 V, -12 V and Ground INPUTS

RF Input

Type "N" 50 Ohm female connector

Input VSWR

< 1.5:1 from 150 kHz to 3 GHz with 10 dB attenuation

Maximum Input

+30 dBm with 30 dB attenuation, 50 Vdc

LO Emissions

< -70 dBm with 10 dB attenuation

AM DEMODULATION

Demodulation Range

5% to 90% at 1 kHz rate and -20 dBm input level

Input Level Range

-2 dBm to -75 dBm at 1 kHz rate and 50% depth

Frequency Response

20 Hz to 30 kHz with -20 dBm input level

Distortion (at 1 kHz rate)

< 2% at 50% modulation depth and -20 dBm input level

< 5% at 90% modulation depth and -20 dBm input level

FM DEMODULATION

Deviation Range

Up to 100 kHz

Input Level Range

2 dBm to -75 dBm at 50 kHz deviation

Frequency Response

20 Hz to 100 kHz with -20 dBm input level

Distortion (at 1 kHz rate)

< 2% with 5 kHz deviation and -20 dBm input level

< 5% with 20 kHz deviation and -20 dBm input level

FREQUENCY STANDARD

Frequency

10 MHz

Output Level

+5 dBm nominal

Stability

±1 ppm/year or ± 0.1 ppm/year with High Stability Option

Connector

BNC female

External Input

-5 dBm to +15 dBm

INTERFACES

GPIB

Conforms to IEEE 488.1 - 1987, 488.2 - 1992

Subsets

SH1, AH1, T6, L4, SR1, RL1, PP0, DC1, C0, LE0, TE0

RS-232C

Full Duplex

Baud Rate

110 bps, 300 bps, 600 bps, 1200 bps, 2400 bps, 4800 bps, 9600 bps, 19.2 kbps, 38.4 kbps, 57.6 kbps, 115.2 kbps

Parity Check

Odd, Even or None

Data Length

7 bit or 8 bit selectable

Stop Bits

1 bit or 2 bit

Protocol

None, Xon-Xoff, RTS-CTS, DTR-DSR

ENVIRONMENTAL

Operating

0 to 40°C

Storage

-20 to +70°C

Temperature & Humidity

Meets MIL-T-28800E for Type 2, Class 5, non-condensing (85% operating, 90% storage)

Vibration/Shock

Meets MIL-T-28800E for Type 2, Class 5

Altitude

Operational up to 3,000 meters, non-operational to 12,200 meters

PRODUCT SAFETY

Conforms to EN61010-1 for Class 1 portable equipment and is for use in a pollution degree 2 environment. The instrument is designed to operate from an Installation Category II.

ELECTROMAGNETIC COMPATIBILITY

Complies with the limits specified in the following standards:

EN 55011: Class A and EN 50082-1

GENERAL CHARACTERISTICS

Dimensions:

Width

350 mm (13.78 in) including handle

Height

185 mm (7.28 in)

Depth

381 mm (15 in)

Weight

<9.4 kg

Warm-up Time

15 minutes for specified accuracy

POWER REQUIREMENTS

Voltage

100 to 240 Vac ± 10 %

Frequency

50-60 Hz

Power Consumption

90 W maximum with no options fitted

HARDWARE OPTIONS/TRACKING GENERATOR

Frequency Range

100 kHz to 3 GHz

Output Level

0 dBm to -70 dBm

Output Level resolution

0.1 dB step

Absolute Level Accuracy

≤±1.0 dB at 0 dB

Frequency Flatness

≤2.0 dB @ -10 dBm

Signal Purity

Harmonics	*< -15 dBc*
Non-harmonics	*< -25 dBc*
Sub-harmonics	*< -25 dBc*
Leakage	*< -90 dBm*

HIGH STABILITY TIMEBASE (OPTION 03)

Temperature Stability

± 0.2 ppm

Ageing Rate

± 0.1 ppm/year

QUASI-PEAK DETECTOR (OPTION 04)

Quasi-Peak detector and EMC filters

	Band B 9 kHz RBW	*Band C 120 kHz RBW*
Frequency Range	*150 kHz to 30 MHz*	*30 MHz to 1 GHz*
Charge Time (ms)	*1 ±20%*	*1 ±20%*
Discharge Time (ms)	*160 ±20%*	*550 ±20%*
Display Time (ms)	*160 ±20%*	*100 ±20%*

AC/DC POWER SUPPLY (OPTION 6)

DC Voltage	*12 VDC to 21 VDC*
External Battery	*14.4 VDC @ 7 AH*
Operation Time	*1 Hour*

SOFTWARE OPTIONS

OPTION 11 - DISTANCE TO FAULT (DTF)

DTF Measurement

Measurement Range

Up to 99 km (324,720 feet) depending on cable loss

Units

Meters or Feet

Minimum Resolution

For two discontinuities of equal amplitude using maximum span:

13.24 x Vr cm

Where Vr is the relative velocity factor for the cable.

Maximum Measurement Update Rate

20ms for 500 points

Dynamic Range

>60 dB

Distance Accuracy

0.78 meter (30.7 inches") for a single fault

Transmission Line Database

Data for common cables supplied as standard

VSWR or Return Loss Measurement

Calibration

Open Circuit or Short Circuit

Linearity

As spectrum analyzer: <0.15 dB/dB, <1.5 dB over 10 divisions

Accuracy

Linearity + Directivity + Test port mismatch

For RF Bridge 59999/170 at frequencies between 50 MHz and 3 GHz:

Accuracy $< \pm 0.01 + 0.032\rho^2$ *+ linearity*

Where ρ *is the reflection coefficient of system under test.*

ACCESSORY OPTIONS TO MAKE THE MEASUREMENTS

The user can choose from a range of accessories to suit the test regime required.

In order for the DTF option to operate the 2397 must be fitted with the optional tracking generator (2397/1) and the DTF software, option 011.

HARDWARE CONFIGURATIONS

1. VSWR (Return Loss) only

Comprises:

RF Bridge (5 MHz to 3 GHz)	*59999/170*
RF Cable, 0.5m, type N (m) to type N (m)	*54351/022*
Adapter, type N (m) to type N (m)	*54311/175*

2. DTF only

Comprises:

Power Divider, type N	*54311/187*
RF Cable, 0.5m, type N (m) to type N (m)	*54351/022*
Calibration Load, 50 Ohm, type N (m)	*54421/023*

3. VSWR (Return Loss) and DTF

Comprises:

RF Bridge (5 MHz to 3 GHz)	*59999/170*
RF Cable, 0.5m, type N (m) to type N (m)	*54351/022*
Adapter, type N (m) to type N (m)	*54311/175*
Power Divider, type N	*54311/187*
Calibration Load, 50 Ohm, type N (m)	*54421/023*

OPTION 12 - MARKER LABEL EDIT

This software option allows the user to change the marker label from the normal numeric format to a user-defined, 4 digit alpha-numeric label.

OPTION 13 - EMC

This software option, which must be used in conjunction with option 04 (Quasi-peak detectors and filters) provides the user with some of the facilities required for EMC pre-compliance testing. Features include:

Entry of correction factors for:

Test Antenna

Cable Loss

Transducer Characteristics

Addition of Limit Lines

Choice of Log or Linear frequency scales

Semi-automated operation of quasi-peak functions

VERSIONS AND ACCESSORIES

When ordering please quote the full ordering number information.

Versions

2397/0	9 kHz to 3 GHz basic spectrum analyzer
2397/1	2397/0 with tracking generator

Options

03	High Stability Timebase
04	Quasi-Peak Detector and Filters
06	AC/DC Power Supply 80015 (Battery not include, see below)
11	Distance to Fault software
12	Marker Label Edit software
13	EMC software

Supplied Accessories

	Front cover
80010	Soft Carry Case
	Operator's manual
	Program manual
	AC supply lead
	RS-232 cable
	2 x 250 V, 3.15 A fuses

Optional Accessories

46882/595	Maintenance manual
AC2621	Rack Mount kit
80009	Battery pack
59999/170	Return loss bridge
AC5008	DC block N type

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AEROFLEX
A passion for performance.

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Our passion for performance is defined by three attributes represented by these three icons: solution-minded, performance-driven and customer-focused.

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