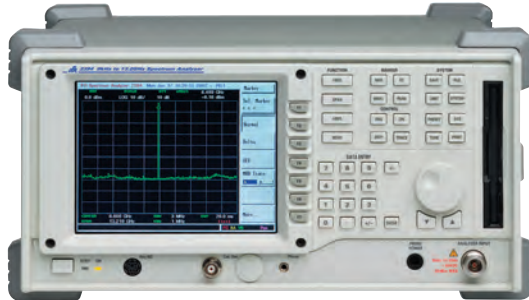


# Spectrum Analyzers

## 2394 9 kHz to 13 GHz Spectrum Analyzer

**AEROFLEX**  
A passion for performance.



A spectrum analyzer with outstanding performance and a user friendly visual interface simplifying many complex measurements

- 9 kHz to 13 GHz fully synthesized frequency range
- Lightweight, portable and rugged construction at 12 kg
- Excellent TFT color display
- Comprehensive marker facility
- Wide input signal range +30 dBm to -110 dBm
- Semi-automated measurements
- Floppy disk drive
- Extremely user friendly MMI reduces risk of operator error
- Tune facility
- GPIB as standard
- AM/FM demodulation

### A Value for Money Product

The 2394 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 2394 is fully synthesized thus providing accurate frequency measurements with 1 Hz resolution.

### Portability

With a weight of only 12 kg the 2394 is one of the lightest microwave spectrum analyzers available. A truly portable unit!

### Color Display

The 6.4 inch TFT color LCD in the 2394 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 2394 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 2394. 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 2394 can accept signals between +30 dBm and -110 dBm while providing protection to  $\pm 50$  VDC.

## Semi-Automated Measurements

The MMI on the 2394 has been designed to simplify many of the measurements required for the evaluation of today's sophisticated communications systems. These include Adjacent Channel Power, X dB Down, Occupied Bandwidth, Channel Power, Harmonic Distortion.

## Tune Function

Use of this function allows an unknown signal to be quickly captured and displayed on the screen. The 2394 will search its complete frequency range for the highest level signal, capture it, display it in the center of the screen with both the span and resolution bandwidths being automatically set to the optimal state for best viewing.

## Spectral Purity

The phase noise on 2394 is specified at -90 dBc at 10 kHz offset which allows its use for evaluating the spectral purity and noise performance of systems and sub-systems.

## 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 loud-speaker 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 2394.

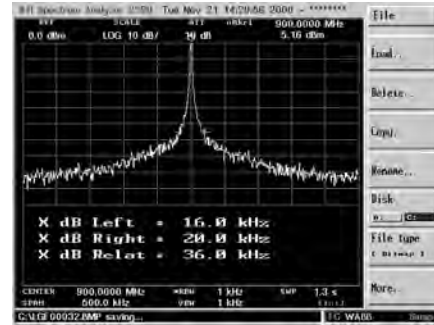
## Information Storage

The 2394 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.

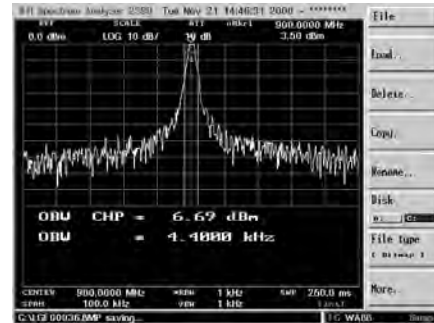
## Interfaces

IEEE 488-2, RS-232 and Printer (PCL5) interfaces are provided as standard on the 2394 allowing its integration into automated test systems and the print-out of screen displays.

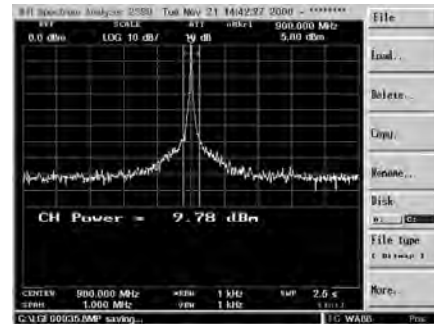
The 2394 has been designed with future flexibility and expansion in mind. The operating system and system memory has the capability to have additional facilities incorporated.



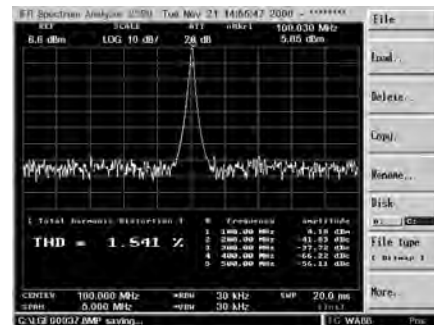
*X dB down*



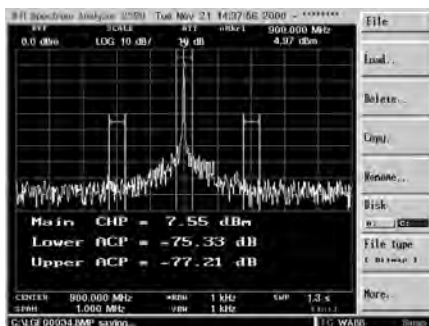
*Occupied Bandwidth*



*Channel Power*



*Harmonic Distortion*



*Adjacent Channel Power*

## SPECIFICATION

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### FREQUENCY

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#### Tuning Range

9 kHz to 13 GHz

Range	Band
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9 kHz to 3 GHz	0
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2.9 GHz to 6.4 GHz	1
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6.3 GHz to 13 GHz	2
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All ranges employ fundamental mixing.

#### Resolution

1 Hz

#### Frequency Span Width

100 Hz/div to 1000 MHz/div in 1, 2, 5 step selections (auto-selected)

Zero span and Full span (9 kHz to 13 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 200 ms)

#### Noise Sidebands

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

-98 dBc/Hz at 100 kHz offset measured at 2.9 GHz

### FREQUENCY COUNTER

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#### Resolution

1 Hz, 10 Hz, 100 Hz and 1 kHz

#### Accuracy

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

#### Sensitivity

<-70 dBm from 50 kHz to 13 GHz

### AMPLITUDE

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#### Measurement Range

+30 dBm to -110 dBm

#### DANL

50 kHz to 100 kHz -95 dBm, typically -105 dBm

100 kHz to 2.8 GHz -100 dBm, typically -110 dBm

2.8 GHz to 3.0 GHz -95 dBm, typically -105 dBm

3.0 GHz to 13 GHz -105 dBm, typically -115 dBm

300 Hz RBW, 10 Hz VBW

#### 1 dB Compression Point

>-10 dBm, 100 kHz to 13 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, ±0.1 dB/dB, ± 1.0 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

±1.5 dB from 5 MHz to 13 GHz and -3 dB to + 1 dB from 9 kHz to 5 MHz with 10 dB RF attenuation

### ATTENUATOR

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#### Range

0 dB to 55 dB in 5 dB steps selected manually or automatically coupled to the Reference Level

#### Accuracy

±0.5 dB/step up to ± 1.0 dB maximum

### REFERENCE LEVEL

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#### Range

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

#### Accuracy

±1.0 dB (50 kHz to 13 GHz)

#### Resolution

0.1 dB steps

#### Residual Spurious

-85 dBm (input terminated, 0 dB attenuation)

#### Harmonic Distortion

-60 dBc (-40 dBm input at 0 dB attenuation)

#### Intermodulation Distortion

-70 dBc 100 MHz to 13 GHz

-65 dBc 1 MHz to 100 MHz (at -30 dBm input, 0 dB input attenuation)

#### Other Spurious

-60 dBc (10 MHz to 13 GHz at -30 dBm)

### RESOLUTION BANDWIDTH

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#### Selection

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

9 kHz and 120 kHz (Quasi-Peak Detector Option)

100 Hz, 30 Hz, 10 Hz (Digital Resolution Bandwidth Option)

#### Accuracy

±20%

#### Selectivity

-60 dB/3 dB ratio <15:1 except 3 MHz filter

50 dB/3 dB ratio <15:1 60 dB/6 dB ratio <12:1 for 9 kHz and 120 kHz Quasi Peak filters

#### RBW Switching Error

<±1.0 dB referred to 3 kHz resolution bandwidth

## Video Selection

10 Hz to 1 MHz in 1-3-10 sequence plus full BW

## SWEEP

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### Rate (full screen)

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

### Sweep Rate Accuracy

$< \pm 20\%$  for  $< 100$  ms,  $\pm 10\%$  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 (Rear): TTL Level

### Trigger Delay

$\pm$  One sweep time

## DISPLAY

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### Type

6.4 inch TFT Color LCD

### Digital Resolution

640 H x 480 V active display area

## MARKERS

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### Number

Up to 9 colored Markers available plus Delta Marker

### Modes

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

### Marker

Marker Track, Marker to Center, Marker to Reference, Marker to Peak

## MEMORY

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### Trace storage

Up to 1,000 stored 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

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### RF Input

Type "N" 50 Ohm female connector

### Input VSWR

Band 0:  $\leq 1.5 : 1$  with 10 dB Input Attenuation

Band 1:  $\leq 1.4 : 1$  with 10 dB Input Attenuation

Band 2:  $\leq 1.4 : 1$  with 10 dB Input Attenuation

### Maximum Input

+30 dBm with 10 dB attenuation, 50 VDC

### LO Emissions

-70 dBm with 0 dB attenuation

## OUTPUTS

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### IF Output

10.7 MHz nominal

### Video Output

0 to 5 VDC, VGA output

### Printer Drivers

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

### Probe Power

+15 V, -12 V and Ground

## FREQUENCY STANDARD

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### Frequency

10 MHz

### Output Level

+5 dBm nominal

### Temperature Stability

$< \pm 2$  ppm

### Aging Rate

$< \pm 1$  ppm/year

### Connector

BNC female

### External Input

-5 dBm to +15 dBm

## INTERFACES

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### 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

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### Operating

0 to 40°C

### Storage

-20 to +60°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

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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

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Complies with the limits specified in the following standards:  
EN 55011: Class A and EN 50082-1

## GENERAL CHARACTERISTICS

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### DIMENSIONS

350 mm (13.78 in) W, 185 mm (7.28 in) H, 395 mm (15.5 in) D including handle

### Weight

<12 kg (without options)

### Warm-up Time

15 minutes for specified accuracy

## POWER REQUIREMENTS

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### Voltage

90 to 250 VAC  $\pm$  10 %

### Frequency

50-60 Hz

### Power Consumption

100 W maximum without options fitted

## HARDWARE OPTIONS

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### HIGH STABILITY TIMEBASE (OPTION 03)

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#### Temperature Stability

< $\pm$ 0.2 ppm

#### Ageing Rate

< $\pm$ 0.1 ppm/year

## QUASI-PEAK DETECTOR (OPTION 04)

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### Quasi-Peak detector and EMC filters

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

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## DIGITAL RESOLUTION BANDWIDTH FILTERS (OPTION 05)

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### Bandwidths

100 Hz, 30 Hz, 10 Hz

### Bandwidth accuracy

$\pm$ 20%

### Selectivity (-60 dB/-3 dB)

<5:1

### Maximum span

1 MHz

### Sweep times for 10 kHz span

RBW 100 Hz	<0.9 sec
30 Hz	<3 sec
10 Hz	<4.5 sec

Displayed Average Noise Levels (DANL) between 1 MHz and 13 GHz reduces DANL by typically 5 dB from the values in the 300 Hz resolution bandwidth filter.

## SOFTWARE OPTIONS

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### OPTION 12 - MARKER LABEL EDIT

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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.

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## OPTION 13 - EMC

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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, OPTIONS AND ACCESSORIES

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### Versions

2394/0            9 kHz to 13 GHz spectrum analyzer

### Options

03            High stability timebase  
04            Quasi-Peak Detectors & Filters  
05            Digital Resolution Bandwidth Filters  
12            Marker label edit software  
13            EMC software

### Supplied Accessories

Front cover  
Operation manual  
Programming manual  
AC supply lead  
RS-232 cable  
2 x 250 V, 3.15 A fuses  
80010            Soft carry case

### Optional Accessories

Maintenance manual  
AC2621            Rack Mount kit  
59999/170        Return loss bridge (5 MHz to 3 GHz, type N (f))  
AC5008            DC block N type  
80010            Soft carry case



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