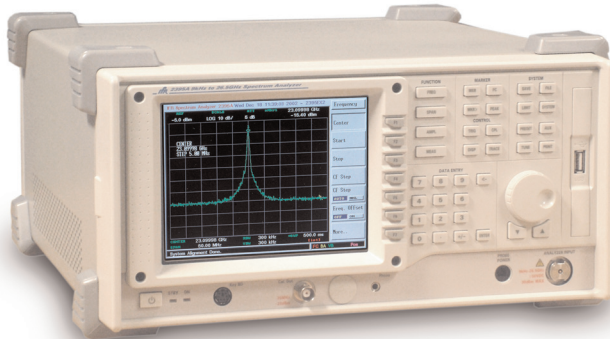


# Spectrum Analyzers

## 2395A 1 kHz to 26.5 GHz Spectrum Analyzer

**AEROFLEX**  
A passion for performance.



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

- 1 kHz to 26.5 GHz fully synthesized frequency range
- Lightweight, portable and rugged construction at 12 kg (26.5 lbs)
- Excellent TFT color display
- Comprehensive marker facility
- Wide input signal range +30 dBm to -110 dBm
- Semi-automated measurements
- USB 2.0 Interface
- Extremely user friendly MMI reduces risk of operator error
- Auto-tune facility
- GPIB as standard
- AM/FM demodulation
- Internal pre-amplifier

### A "Value for Money" Product

The 2395A is the latest in the range of spectrum analyzers from Aeroflex providing exceptional performance at an exceptional price.

### Frequency Accuracy

The local oscillator system in the 2395A is fully synthesized thus providing accurate frequency measurements with 1 Hz resolution.

### Portability

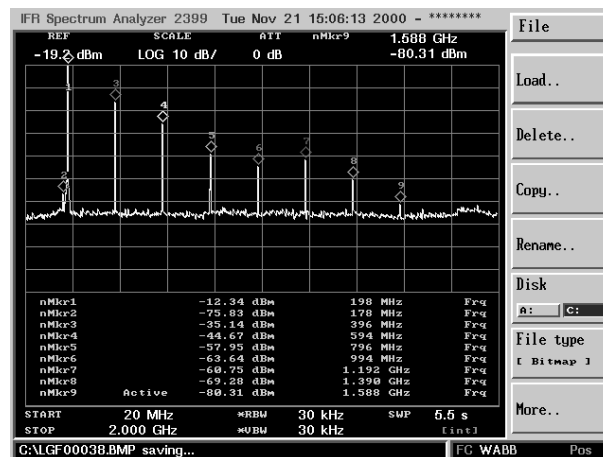
With a weight of only 12 kg (26.5 lbs) the 2395A is one of the lightest microwave spectrum analyzers

available. A truly portable unit!

### Color Display

The 6.4 inch TFT color LCD in the 2395A 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 2395A 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 2395A. 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 2395A can accept signals between +30 dBm and -110 dBm while providing protection to  $\pm 50$  VDC.

## Semi-Automated Measurements

The MMI on the 2395A 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 and Harmonic Distortion.

## Auto-tune Function

Use of this function allows an unknown signal to be quickly captured and displayed on the screen. The 2395A 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 the 2395A 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 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 2395A.

## Information Storage

The 2395A 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 USB 2.0 interface for download to bulk storage.

## Input Connector

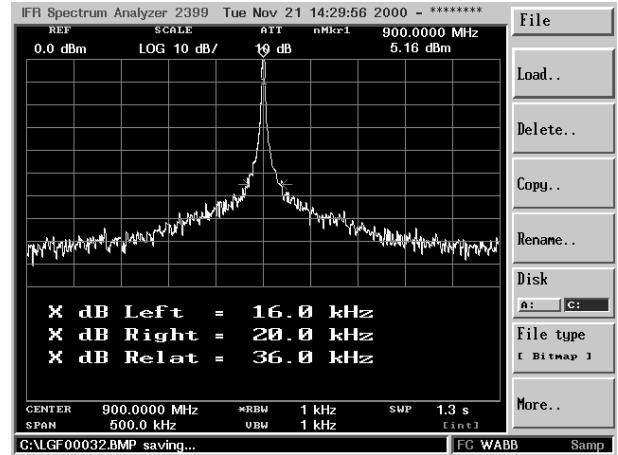
The 2395A input connector is a Planar Crown® adapter and both type N and PC 2.92 mm adapters are supplied. The PC 2.92 mm is required for operation to 26.5 GHz and input specifications are measured with this adapter fitted. The type N adapter can be used for operation up to 18 GHz or where low frequency operation in a type N cable system demands the appropriate connector.

® Planar Crown is a trade mark of Weinschel Corporation.

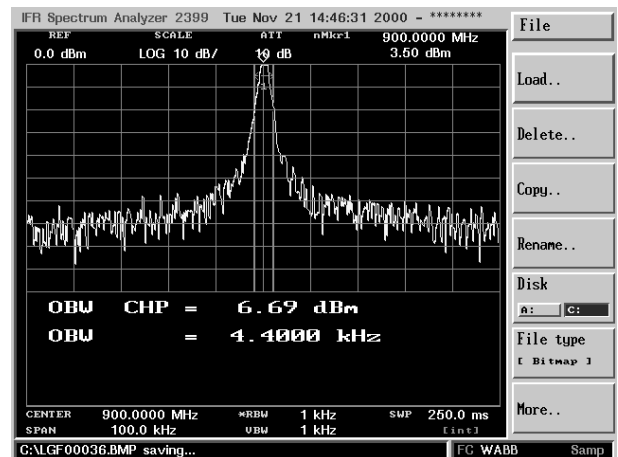
## Interfaces

IEEE 488-2, RS-232 and Printer (PCL5) interfaces are provided as standard on the 2395A allowing its integration into automated test systems and the print-out of screen displays.

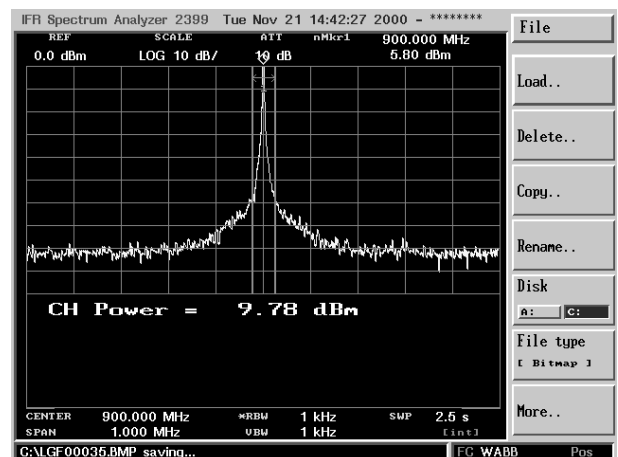
The 2395A has been designed with future flexibility and expansion in mind. The operating system and system memory has the capability to have additional facilities incorporated.



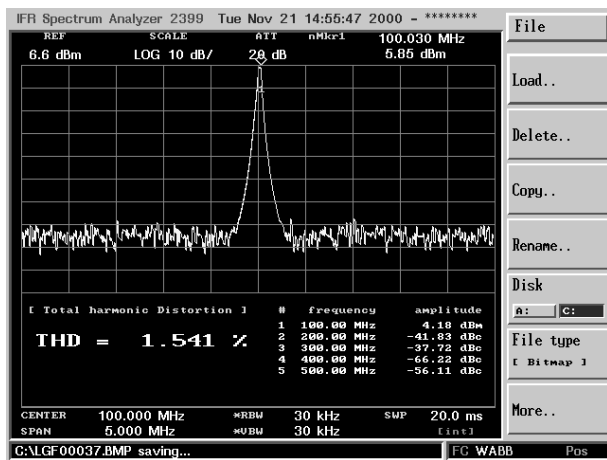
*X dB Down*



*Occupied Bandwidth*



*Channel Power*



Harmonic Distortion

## AMPLITUDE

### Measurement Range

+30 dBm to -110 dBm

### Displayed Average Noise Level (DANL)

300 Hz RBW, 10 Hz VBW, 50  $\Omega$  termination

-105 dBm @ 50 kHz to 100 kHz  
 -110 dBm @ 100 kHz to 2.8 GHz  
 -105 dBm @ 2.8 GHz to 3 GHz  
 -110 dBm @ 3 GHz to 13.2 GHz  
 -100 dBm @ 13.2 GHz to 26.5 GHz

Pre-amp On

-115 dBm @ 50 kHz to 100 kHz  
 -130 dBm @ 100 kHz to 1.8 GHz  
 -129 dBm @ 1.8 GHz to 3 GHz

### 1 dB Compression Point

>-10 dBm, 100 kHz to 26.5 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 ( $\mu$ V, mV, etc.) or dBV (dBmV only). Quasi Peak mode dB $\mu$ V, dBmV or dBm

### Display Linearity

5 and 10 dB/div,  $\pm 0.1$  dB/dB,  $\pm 1.0$  dB over 10 divisions  
 1 and 2 dB/div,  $\pm 0.5$  dB over 10 divisions  
 Linear,  $\pm 10$  % of Reference Level over 10 divisions

### Frequency Response Flatness

1 kHz to 5 MHz -3 dB to +1 dB  
 5 MHz to 2.9 GHz  $\leq \pm 1.0$  dB  
 2.9 GHz to 6.4 GHz  $< \pm 1.5$  dB  
 6.4 GHz to 13.2 GHz  $< \pm 2.2$  dB  
 13.2 GHz to 26.5 GHz  $< \pm 3.0$  dB

Measured with 10 dB of input attenuation at 23°C  $\pm 3^\circ$ C

## ATTENUATOR

### Range

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

### Accuracy

$\pm 0.5$  dB/step up to  $\pm 1.5$  dB maximum

## REFERENCE LEVEL

### Range

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

### Accuracy

$\pm 1.0$  dB (50 kHz to 26.5 GHz)

### Resolution

0.1 dB steps

## SPECIFICATION

### FREQUENCY

#### Tuning Range

1 kHz to 26.5 GHz

Range	Band	Mixing Mode
1 kHz to 3 GHz	0	1
2.9 to 6.4 GHz	1	1
6.3 to 13.2 GHz	2	2
12.9 to 26.5 GHz	3	4

#### Resolution

1 Hz

#### Frequency Span Width

100 Hz/div to 2000 MHz/div in 1, 2, 5 step selections (auto-selected)  
 Zero span and Full span (1 kHz to 26.5 GHz)  
 Manual selection of Start, Stop and Span

#### Span Accuracy

$< \pm 3\%$  of indicated span width

#### Readout Accuracy

$\pm$  (Span Accuracy + Frequency Standard Accuracy + 50% of RBW)

#### Stability

Residual FM  $\leq 100 \times N$  Hz p-p at 1 kHz RBW, 1 kHz VBW  
 (p-p in 200 ms)

#### Noise Sidebands

$< -90 + 20 \text{ Log} N$  dBc/Hz

where N is mixing mode shown in frequency table (previous page)

## FREQUENCY COUNTER

#### Resolution

1 Hz, 10 Hz, 100 Hz and 1 kHz

#### Accuracy

$\pm$  (Reference frequency error + frequency readout accuracy + counter resolution  $\pm 1$  count)

#### Sensitivity

$< -70$  dBm from 50 kHz to 26.5 GHz

## 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 26.5 GHz

-65 dBc 1 MHz to 100 MHz

(at -30 dBm input, 0 dB input attenuation)

## Other Spurious

-60 dBc (10 MHz to 26.5 GHz at -30 dBm input)

## 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 4)

100 Hz, 30 Hz, 10 Hz (Digital Resolution Bandwidth, Option 5)

### Accuracy

±10% (Digital Resolution Bandwidth, Option 5)

±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

### Switching Error

<±1.0 dB referred to 3 kHz resolution bandwidth

### Video Bandwidth

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

## SWEEP

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### Rate (full screen)

20 ms to 1000 s in 1-2-5 sequence, 25 μs to 100 s in Zero Span

### Sweep Rate 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 (Rear): TTL Level

### Trigger Delay

± One sweep time

## DISPLAY

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### Type

6.4 in. 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

USB 2.0 interface for bulk storage (USB 1.1 compatible)

### Display Traces

2 max

## INPUTS

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### RF Input

50 Ohm Planar Crown® connector

Supplied with Type (N) and PC 2.92 mm (f) adapters

### Input VSWR (1 kHz - 26.5 GHz)

≤1.5 : 1 with 10 dB Input Attenuation, with 2.92 mm female adapter

### 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

### Cal Signal

20 MHz, -20 dBm ±0.3 dB from front panel BNC connector

## FREQUENCY STANDARD

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### Frequency

10 MHz

### Output Level

+5 dBm nominal

### Temperature Stability

< ±0.2 ppm/°C 0°C to 40°C

### Aging Rate

< ±1 ppm/yr

### Connector

BNC female

### External Input

-5 dBm to +15 dBm

## INTERFACES

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### GPIO

Conforms to IEEE 488.1 – 1987, 488.2 – 1992

### Subsets

SH1, AH1, T6, L4, SR1, RL1, PPO, DC1, C0, LEO, TEO

### 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 m (19,842 ft.), non-operational to 12,200 m (40,026 ft.).

## 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 COMPATABILITY

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Complies with the limits specified in the following standard:  
EN61326

## 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/26.5 lbs (without options)

### Warm-up Time

15 minutes for specified accuracy

## POWER REQUIREMENTS

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### Voltage

100 to 240 VAC ±10 %

### Frequency

50 to 60 Hz

### Power Consumption

100 W max (without options fitted)

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## HARDWARE OPTIONS

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### HIGH STABILITY TIMEBASE (OPTION 03)

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#### Temperature Stability

< ±0.2 ppm/°C 0°C to 40°C

#### Ageing Rate

< ±0.1 ppm/yr

### QUASI-PEAK DETECTOR (OPTION 04)

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#### Quasi-Peak detector and EMC filters

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 ±20%	1 ±20%
Discharge Time (ms)	160 ±20%	550 ±20%
Display Time (ms)	160 ±20%	100 ±20%

### DIGITAL RESOLUTION BANDWIDTH FILTERS (OPTION 05)

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#### Bandwidths

100 Hz, 30 Hz, 10 Hz

#### Bandwidth accuracy

±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 13.2 GHz reduces DANL by typically 5 dB from the values in the 300 Hz resolution bandwidth filter.

### AC/DC POWER SUPPLY (OPTION 6)

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#### DC Voltage

12 VDC to 21 VDC

#### External Battery

14.4 VDC @ 7 AH

## SOFTWARE OPTIONS

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### MARKER LABEL EDIT (OPTION 12)

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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.

### EMC ANALYZER SOFTWARE (OPTION 13)

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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  
Upto 3 GHz  
Radiated, conducted emissions

## VERSIONS, OPTIONS AND ACCESSORIES

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*When ordering please quote the full ordering number information.*

### Ordering

#### Numbers

2395A/0

#### Versions

1 kHz to 26.5 GHz Spectrum Analyzer

#### Options

03

High stability timebase

04

Quasi-peak detectors and filters

05

Digital resolution bandwidth filters

06

AC/DC power supply

12

Marker label edit software

13

EMC analyzer software

### Supplied Accessories

Front cover

CD ROM Containing: Operation manual and Programming manual

AC supply lead

RS-232 cable

2 x 250 V, 3.15 A fuses

### Optional Accessories

Maintenance manual

AC2621

Rack mount kit

AC5008

DC block N type

80010

Soft carry case

For the very latest specifications visit [www.aeroflex.com](http://www.aeroflex.com)

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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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