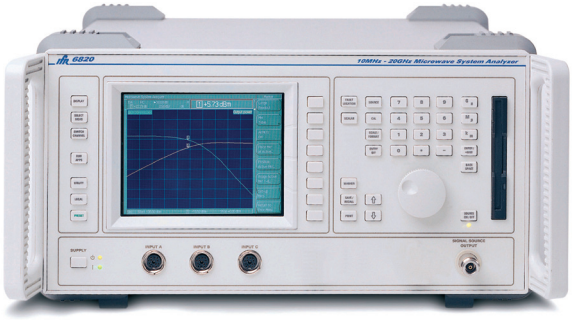
Microwave

6820 Series RF & Microwave Scalar Analyzer



6820 series Microwave Scalar Analyzers for fast and accurate testing in field and factory

- Precision scalar network measurements
- 3 GHz, 8.4 GHz, 20 GHz, 24 GHz, 40 GHz and 46 GHz frequency versions
- Low noise synthesized signal source with optional step attenuator
- Internal modulation options - Pulse Modulator and/or FM and Pulse generator
- Real time transmission line Fault Location with 0.1% accuracy
- EEPROM corrected scalar detectors for accurate measurements
- Applications interface allows guided and automatic testing
- Modular design for rapid service
- 3.5 in disk drive for results storage

Five Frequency Versions

The 6820 series of scalar analyzers covers the most commonly required frequency bands in 5 versions. A comprehensive range of accessories is available to support each of these units.

6820 series Scalar Analyzers	
6821	1 MHz to 3 GHz Scalar Analyzer
6822	10 MHz to 8.4 GHz Scalar Analyzer
6823	10 MHz to 20 GHz Scalar Analyzer
6824	10 MHz to 24 GHz Scalar Analyzer
6825	10 MHz to 46 GHz Scalar Analyzer
6825R	10 MHz to 40 GHz Scalar Analyzer

Synthesized Source

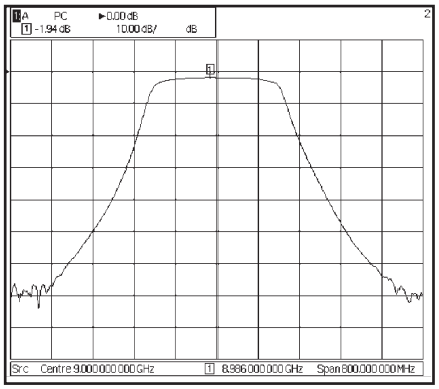
The synthesized source has low phase noise and 1 Hz frequency resolution. VCOs are used for frequencies above 3 GHz and an integrated RF synthesizer for the 1 MHz to 3 GHz range. Optionally increased output power is available from 3 to 24 GHz. Internal filtering results in excellent harmonic performance of <-50 dBc for improved scalar measurement accuracy. Optional step attenuators are available to set low output powers for amplifier or receiver testing.

In CW mode the source can be used for local oscillator substitution. A power sweep is provided for amplifier gain compression testing. External FM can be applied by connecting an AF generator to the rear panel. The internal modualtion option provides frequency modulation of the source or pulse patterns for internal or external pulse modulators. The internal pulse modulator option allows either an external pulse generator to be connected via a rear panel BNC connector or utilizes the pulse patterns available from the internal modulation option. The pulse patterns may be configured and selected in either single pulse or multi-pulse formats.

When used with the scalar analyzer the source provides a swept synthesized output for frequency characterization of components and systems.

Scalar Analyzer

The three input scalar analyzer provides network characterization of components and systems. Simultaneous measurement of insertion and return loss are displayed on the 6820 color screen. Excellent measurement accuracy is assured by the use of EEPROM corrected detectors.



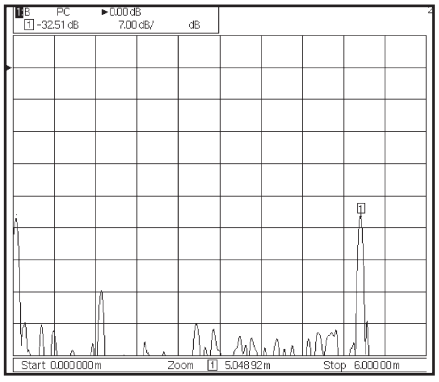
Bandpass filter insertion loss measurement

Each detector is individually characterized for linearity and frequency response to provide a measurement accuracy close to that achieved with a power sensor. A range of autotesters with high directivity is available for return loss measurements.

Fault Location

Fault location software is standard on all 6820 series instruments. Many modern communication systems rely on a coaxial or waveguide feed between the transmitter and antenna. The fast fault location facility of the 6820 can quickly locate the position of faults causing poor return loss in the feed, which can seriously impact system performance.

Measurement resolution and accuracy is assured by the use of a synthesized source with up to 1601 measurement points.



Fault location measurement of a coaxial feed and antenna

Simplified User Interface

Integration of the source and scalar analyzer, and the built-in applications facility, makes operations faster and simpler. The operator uses a single interface to set up any measurement. This saves time and is easier than writing software to perform comprehensive network measurements.

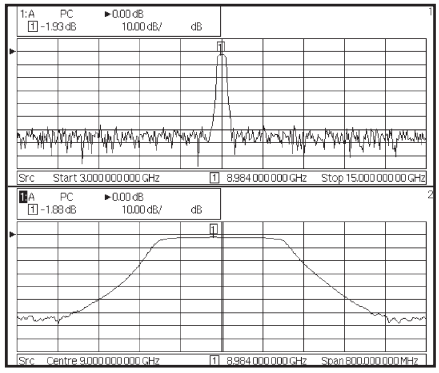
Eight softkeys give rapid access to all commonly used parameters. Softkeys are shaped to inform the user of the action that the key will perform, e.g. enter data, select from list, move to another menu or immediate action. All commonly accessed functions are no more than one level deep, so that the instrument operation is easily learnt.

Applications Interface

An applications interface is built into the 6820 series which allows the user to create their own measurement routines and guide the operator through the test procedure. For example it can display on the 6820 screen how to set up the measurement, lead the operator through a calibration, show where to connect the device under test and then test the device's performance against predefined limits. The applications facility can reduce the incidence of operator error, improve measurement repeatability, provide guidance to infrequent users or simplify complex test procedures.

Color Display

A large TFT color display is fitted to the 6820 displaying up to four measurements on two channels. Scalar measurements can be displayed simultaneously on independent channels.



Dual channel display, showing wide band and narrow band frequency sweeps

Comprehensive Markers

Up to eight markers are available. The marker menus provide the tools that are most commonly used in each of the measurement modes.

In scalar mode markers automatically calculate peak to peak ripple, N-dB bandwidth, -1 dB bandwidth and find maximum and minimum signal levels. This simplifies device characterization and reduces test time.

For fault location measurements the next peak left/right feature identifies the position and magnitude of each of the discontinuities along the transmission line. The peak find softkey quickly locates the biggest discontinuity on the line.

Fast Field Repair

6820 has a modular architecture with modules slotted onto a common mother board. In the event of a module failure the instrument can be repaired by module replacement to reduce instrument downtime. Following a repair, software routines realign the replaced module.

Manufacturing Test

To the production manager the 6820 offers reduced programming time, reduced test time and simplified archiving of results. 6820 is fully compliant with the IEEE 488.2 GPIB standard. A full 401 data points can be transferred over the GPIB in typically <50 ms. Individual data points can be repetitively read in typically 10 ms. This enables full results archiving with minimal time penalty.

Continuity of test is essential in a production environment. A failed test system can result in expensive loss of output. 6820 with its field replaceable modules minimizes any output loss due to test system failure.

Installing and Maintaining Systems

During the installation period of a microwave system it is always necessary to revalidate key parameters. 6820 provides a comprehensive solution for installation teams. It is housed in a ruggedized case, has secure handles and can be supplied with a protective carrying case.

For systems with long waveguide or coaxial feeds the 6820 is used by the installation team to measure return loss and if necessary fault location. The synthesized source with 1601 measurement points ensures precise fault location measurements. AC Detection can be used for return loss and fault location measurements in the presence of interfering signals, a common cause of poor measurement performance in the field. In this mode the source output is chopped and the resulting pulsed signal is demodulated and processed in such a way that interference and zero drift are effectively cancelled.

By archiving results onto disk, or the internal instrument memory, the 6820 forms the basis of a preventative maintenance system. Experience shows that degradation in the antenna feed is the major source of system field failures. 6820 has the accuracy to monitor and identify gradual system degradation with time.

Additionally, the synthesized microwave source may be used in conjunction with the optional step attenuators, to carry out system sensitivity tests. The internal pulse modulator and modulation options with both single pulse and multi-pulse capability offers the ability to perform tangential sensitivity and range tests for many different types of radar systems

Results Logging and Outputting

Measurement results can either be saved to internal non-volatile memory or to 3.5 in disk. Traces saved onto disk can then be archived or imported into a spreadsheet for viewing.

An alternative method for displaying results in a standard word processor document or in a graphics package is to use the optional MIPlot software. MIPlot captures the measurement data either via the GPIB or from a saved trace on disk. This data can then be embedded into a document and reformatted, colors changed, markers and text added.

SPECIFICATION

SOURCE

Functionality

Synthesized CW
Synthesized sweeper for use with scalar analyzer
CW Power sweep
External Modulation Optional Internet Modulation, FM + Pulse driver (Option 023)

Optional Internal Pulse Modulator (Option 025)

Frequency Range

6821	*1 MHz to 3 GHz*
6822	*10 MHz to 8.4 GHz*
6823	*10 MHz to 20 GHz*
6824	*10 MHz to 24 GHz*
6825	*10 MHz to 46 GHz*
6825R	*10 MHz to 40 GHz*

Resolution (Settable)

1 Hz to 46 GHz

CW Accuracy

(Frequency Standard error x Frequency) ± 10 Hz

Swept Accuracy (Typical)

300 µs Step Time

1 MHz to 3 GHz	*<20 kHz*
3 GHz to 46 GHz	*<200 kHz*

1 ms Step Time

1 MHz to 3 GHz	*<1 kHz*
3 GHz to 46 GHz	*<10 kHz*

10 ms Step Time

1 MHz to 3 GHz	*<100 Hz*
3 GHz to 46 GHz	*<1 kHz*

Levelled Power Range

6821/2/3/4 standard

1 MHz to 3 GHz	*-10 dBm to +10 dBm*
3 GHz to 24 GHz	*-10 dBm to +5 dBm*

6825 & 6825R

10 MHz to 8 GHz	*-10 dBm to +8 dBm*	*+10 dBm typ*
8 GHz to 20 GHz	*-10 dBm to +5 dBm*	*+7 dBm typ*
20 GHz to 24 GHz	*-10 dBm to +4 dBm*	*+6 dBm typ*
24 GHz to 40 GHz	*-10 dBm to 0 dBm*	*+3 dBm typ*
40 GHz to 46 GHz	*-10 dBm to 0 dBm typ**	

** Excluding the effect of connector moding*

6822/3/4 + option 030 (higher power)

1 MHz to 24 GHz	*-10 dBm to +10 dBm*

6821 + option 010 (110 dB Step Attenuator)

1 MHz to 3 GHz	*-120 dBm to +8 dBm*

6822/3 + option 011 (70 dB Step Attenuator)

10 MHz to 3 GHz	*-80 dBm to +8 dBm*
3 GHz to 20 GHz	*-80 dBm to +2 dBm + option 030 (higher power)*
3 GHz to 20 GHz	*-80 dBm to +7 dBm*

6822/3/4 + option 012 (90 dB Step Attenuator)

10 MHz to 3 GHz	*-100 dBm to +8 dBm*
3 GHz to 24 GHz	*-100 dBm to +2 dBm + option 030 (higher power)*
3 GHz to 24 GHz	*-100 dBm to +7 dBm*

6825 & 6825R + Option 013 (70 dB Step Attenuator)

10 MHz to 8 GHz	*-80 dBm to +6 dBm*	*+8 dBm typ*
8 GHz to 20 GHz	*-80 dBm to +2 dBm*	*+4 dBm typ*

20 GHz to 24 GHz	-80 dBm to +1 dBm	+3 dBm typ
24 GHz to 40 GHz	-80 dBm to -3 dBm	0 dBm typ

Note: 1. For option 002 (Field Replaceable connectors) guaranteed levelled output is reduced by 0.5 dB

2. For option 025, (internal pulse modulator) the guaranteed levelled output is reduced as the option specification.

Settable Power Resolution

0.01 dB

Power Sweep Range (from Maximum Levelled Power) Without Attenuator

>20 dB (except when option 025, internal pulse modulation is fitted)

Internal Levelling Accuracy at 0 dBm (no options fitted, option 030)

1 MHz to 3 GHz, ±0.7 dB
3 GHz to 24 GHz, ±1.0 dB
24 GHz to 40 GHz, ±1.5 dB

Levelled Power Accuracy With Options 010, 012, 013

1 MHz to 3 GHz
<±1 dB (±0.3 dB ±2% of attenuator setting dB whichever is greater)
3 GHz to 24 GHz
<±1 dB (±1 dB ±4% of attenuator setting in dB whichever is greater)
24 GHz to 40 GHz
-<±1.5 dB (±1.0 dB or 4% of attenuator setting in dB whichever is greater)

Linearity (No Options Fitted, Option 030) Over Levelled Power Range Relative to 0 dBm

1 MHz to 40 GHz <±0.5 dB

Power Stability With Temperature (Typical)

1 MHz to 40 GHz <0.1 dB/°C

Harmonics and Sub-Harmonics Over Levelled Power Range Harmonics

<70 MHz, <-25 dBc

70 MHz to 24 GHz, <-50 dBc

24 GHz to 40 GHz, <-20 dBc

Spurious Signals (Typical)

For carrier frequencies <375 MHz

Offset: 30 kHZ to 150kHZ, <-50 dBc

>150KHz <-55dBc

For carrier frequencies >375 MHz

Offset: 30 kHz to 150 kHz, <-50 dBc

>150KHz <-60dBc

Phase Noise <dBc/Hz in CW mode

CW Freq	Frequency offset		
	1 kHz	10 kHz	100kHz
0.25 GHz	-86	-95	-108
0.5 GHz	-98	-112	-134
1 GHZ	-92	-106	-128
2 GHz	-86	-100	-122
4 GHz	-80	-92	-100
10 GHz	-72	-84	-90
20 GHz	-66	-78	-82
24 GHz	-64	-76	-80
40 GHz	-63	-75	-79

Source Match (Typical)

1 MHz to 3 GHz , 15 dB

3 GHz to 20 GHz, 10 dB

20 GHz to 40 GHz, 8 dB

Output Connector

6821/2/3; Precision N Type, female

6824: Precision 3.5 mm, female

6825: Precision 2.92 mm female

or optional field replaceable connectors

Modulation

External Frequency Modulation

Peak deviation (1 V peak input)

10 MHz - 375 MHz	1 kHz to 5 MHz
375 MHz - 750 MHz	250 Hz to 1.25 MHz
750 MHz - 1.5 GHz	500 Hz to 2.5 MHz
1.5 GHz - 3 GHz	1 kHz to 5 MHz
3 GHz - 46 GHz	20 kHz to 1 MHz

Accuracy (1 kHz modulating frequency) 20-400 kHz deviation
±3 % of indication ±1 Hz excluding residual FM

-3 dB bandwidth, AC coupled mode

10 MHz - 3 GHz	<100 Hz to >1 MHz typical
3 GHz - 46 GHz	<100 Hz to >500 kHz typical

-3 dB bandwidth, DC coupled mode

10 MHz - 3 GHz	DC to >1 MHz typical
3 GHz - 46 GHz	DC to >500 kHz typical

Option 023 Internal Modulation Generator

FM Source

Modulation signal sinewave, 0.1 Hz to 500 kHz, resolution 0.1 Hz
Other specifications as for External Frequency Modulation except:

Accuracy (1 kHz modulating frequency) 20-400 kHz deviation ±5 % of indication ±1 Hz excluding residual FM

Pulse Generator Source

Modes	Single Pulse, Pulse Pattern
Pulse Pattern	Pulse patterns comprising up to 256 pulse width/ PRI pairs can be set up, stored and recalled
Trigger Modes	External, Internal continuous
Pulse Widths (PW)	120 ns to >1 second
Resolution	120 ns
Pulse Period (PRI)	240ns to 7 seconds (PRF <1 Hz to 4.16 MHz)
Resolution	120 ns
Pulse Delay	Zero to 100 ms where zero is <120 ns referred to trigger or sync pulse falling edge
Resolution	120 ns
Sync Output	120 ns pulse referred to trigger. Available at trigger socket

Inputs/Outputs

Trigger in/out	Rear panel BNC connector provides either trigger input or sync output dependant upon trigger mode. TTL level

Options 025a & 025b Internal Pulse Modulator

Option 25a (6822 and 6823)

Frequency Range	50 MHz to 18 GHz (8.4 GHz for 6822)
	Usable to 20GHz

RF Output Range *The levelled power range is reduced by:*

< 3 dB up to 6 GHz

< 4 dB up to 14 GHz

< 4.5 dB up to 18 GHz

when pulse modulation is selected

RF Level Accuracy *Adds ± 0.3 dB to the levelled power accuracy specification when pulse modulation is enabled and for powers of < -1 dBm*

Source Harmonics (with Pulse Modulation enabled)

50 MHz - 2 GHz	*< -35 dBc*
2 GHz - 20 GHz	*< -50 dBc*

On/Off Ratio

50 MHz - 1 GHz	*> 55 dB*
1 GHz - 9 GHz	*> 60 dB*
9 GHz - 17 GHz	*> 70 dB*
17 GHz - 18 GHz	*> 80 dB*
18GHz - 20GHz	*> 80 dB (typical)*

Rise/Fall Times	*(measured at 10% and 90%)*
Rise Time	*< 8 ns (Typically < 5 ns)*
Fall Time	*< 12 ns (Typically < 9 ns)*

Option 25b (6824, 6825 and 6825R)

Frequency Range *50 MHz to 40 GHz (24 GHz for 6824)*

RF Output Range *The levelled power range is reduced by:*

< 4 dB up to 12 GHz

< 5 dB up to 20 GHz

< 6 dB up to 30 GHz

< 8 dB up to 40 GHz

when pulse modulation is selected

RF Level Accuracy *Adds ± 0.3 dB to the levelled power accuracy specification when pulse modu of < -3 dBm*

Source Harmonics (with Pulse Modulation enabled)

50 MHz - 375 MHz	*< -40 dBc*
375 MHz - 24 GHz	*< -50 dBc*
24 GHz - 40 GHz	*< -20 dBc*

On/Off Ratio

50 MHz - 10 GHz	*> 60 dB*
10 GHz - 26.5 GHz	*> 60 dB (typically > 70 dB)*
26.5 GHz - 40 GHz	*> 60 dB (typically > 80 dB)*

Rise/Fall Times	*(measured at 10% and 90% of edge)*
Rise Time	*< 7 ns (Typically < 6 ns)*
Fall Time	*< 11 ns (Typically < 10 ns)*

Pulse Modulation Control

Modes *Pulse, Pulse CW*

External (via rear panel BNC connector)

Internal (if Opt 23 fitted)

Control

Control of pulse modulation is:

Internal via soft key menu when the modulation generator option (Opt 023) is fitted or

External via the rear panel BNC Mod in/out socket.

Level is TTL, High = On, Low = Off.

When pulse mod Off is selected the output is the selected CW output level

Pulse CW *In both internal or external modes, allows setting of output Level in the 'On' condition for reference or calibration.*

SCALAR ANALYZER

SYSTEM FEATURES

Frequency Range

As per source frequency range

Number of Inputs

3 detector inputs

Number of Measurement Points

User selectable from 2 to 1601

Applications

Return loss vs frequency
Insertion loss vs frequency
Fault Location
Voltage vs frequency

Detection Modes

AC and DC

Noise Reduction

Averaging, 1 to 1000
Smoothing, 0.01 to 20%

Power Measurements

Using scalar detectors

Detector Correction

Frequency response and linearity read from EEPROM for 6230A/L and fault locators.
Support for 6230 and autotesters.

INSERTION LOSS MEASUREMENTS

Measurement Dynamic Range, AC Scalar Detection, with 623XA Detector

Max source output to -60 dBm
Max source output to -65 dBm (with averaging)

Typical values:

>65 dB (10 MHz to 40 GHz)
>75 dB (1 MHz to 3 GHz) only with 6232A

Measurement Update Rate

401 points in 270 ms with DC detection

Calibration

Through path calibration or short and short/open calibrations for single ended insertion loss

Inputs

Single input or ratio

Accuracy

Linearity + mismatch

Linearity (applies after normalization)

Linearity (for Power Levels >-50 dBm)

±0.2 dB / 10 dB but not >0.5 dB in total

RETURN LOSS MEASUREMENTS

Measurement Update Rate

401 points in 270 ms with DC detection

Calibration

Short, Open, Short/Open

Inputs

Single input or ratio

Accuracy

Linearity + directivity + test port mismatch

Linearity (for Power Levels >-45 dBm)

±0.2 dB / 10 dB but not > 0.5 dB in total

FAULT LOCATION MEASUREMENTS

Measurement Range

Up to 25 km depending on cable or waveguide loss

Units

Feet or meters

Number of Measurement Points

User selectable from 50 to 1601

Minimum Resolution

For two equal amplitude discontinuities using maximum sweep width

6821: 12.18 x Vr cm
6822: 4.32 x Vr cm
6823: 1.82 x Vr cm
6824: 1.51 x Vr cm
6825: 0.91 x Vr cm

where Vr is the relative velocity factor for the transmission line

Measurement Update Rate

512 points in 250 ms, DC detection

Dynamic Range

DC detection 70 dB
AC detection 80 dB

Distance Accuracy

3 mm or 0.1% of range for a single fault

Transmission Line Database

Data supplied as standard

Required Accessory

624X series fault locator or 658X series transmission line test head or accessory power divider (see optional accessories)

FREQUENCY STANDARD

Internal 10 MHz OCXO

Drift

± 5 in 10^8 over 0 to 55°C

Ageing

± 2 in 10^7 per year (OCXO)

External Frequency Standard

1 MHz or 10 MHz, Connector: BNC

REAR PANEL CONNECTORS

RS-232

9 way D-type connector, male
Baud rate 300 to 9600

GPIB Interface

GPIB is IEEE 488.1 and 488.2 compatible. The interface has 2 functions.
-Instrument control with full Talk/Listen capability
-Control of plotter using HPGL. Plotter is buffered to permit measurements to proceed whilst plotting.

Frequency Standard In/Out BNC

10 MHz input or 10 MHz output selectable from front panel

Mod In/Out BNC

Mod in/out

Rear panel BNC connector, TTL level. Impedance approx 100 Ω

Printer Output

25 way D-type connector
Parallel interface.
Drivers supplied for PCL DeskJet and LaserJet printers. Printer is buffered to permit measurements to proceed whilst printing.

External Monitor

Standard VGA, 640 by 480 color output
15 way high density D-type female connector

Voltage Output

Auxiliary 9-pin connector
Settable for 0 to 10 V ramp, fixed voltage or chart recorder drive

External Levelling Input

Input voltage range: 0 to +1 V
Connector: BNC

GENERAL FEATURES

Number of Display Channels

2

Number of Measurements

4 (2 per display channel)

Number of Measurement Points

2 to 1601 for one trace, scalar

Display

Color active matrix TFT liquid crystal display with 16.5 cm (6.5 in) visible diagonal

Data Storage

3.5 in floppy disc drive, 1.44 Mb. Trace storage in DOS format.

Limits

4 stores of 12 segments each. Each segment defines an upper limit, upper and lower limits, or a point. Any store can be applied to any trace.

MARKERS

8 per trace plus separate delta marker

Marker Functions

Marker, delta marker, minimum, maximum, search left, search right, N-dB bandwidth (with center frequency), marker tracking.

Scalar Analyzer

Active marker Max / Min
Max / Min Tracking
Find PK-PK
PK-PK Tracking
Search Right / Left
Bandwidth / Optional CF / DF (Q)
dB / Octave, dB / Decade Readout
Delta Marker On / Off
-1 dB gain compression

Fault Location

Find Max / Track Max
Next PK Right / Left
Set PK Level
Delta marker On / Off

General

Marker Table
Assign Active MKR / Position Active MKR
Set-up Markers (i.e. On / Off, Position)
Large Readout
All Off

Marker Resolution

Frequency: 6 digits or 1 Hz, user selectable
Power: 0.01 dB
Voltage: 1 nV

Measurement Manipulation

Display live measurement.
Display trace memory.
Display live measurement relative to trace memory.
Measurement hold may be applied for each trace.
Any input or ratio of inputs may be assigned to any one or more than one trace(s). A trace may display absolute power, power relative to a path calibration or power minus a trace memory.

Input Offsets

An offset in the range -99.99 dB to +99.99 dB in 0.01 dB steps may be applied per detector input.

Weight - Variant and Option Dependent

16 kg (35 lb)

Size (Not including front handles)

230 mm H x 430 mm W x 570 mm D
9 in H x 17 in W x 22 in D

Power Supply

100-240 V~ (Limit 90-264 V~)
50-60 Hz (Limit 45-66 Hz)

108-118 V~ (Limit 90-132 V~)
50-400Hz (Limit 45-440 Hz)

200 W maximum

Rated Range of Use

Temperature	*0 to 50°C*
6825 and 6825R only	*+5°C to 45°C only*
Humidity	*Up to 93% RH at 40°C*

Conditions of Storage and Transportation

Temperature	*-40 to +71°C*
Humidity	*Up to 93% RH at 40°C*
Altitude	*Up to 4570 m (15000 ft)*

ELECTROMAGNETIC COMPATIBILITY

Conforms with the protection requirements of the EEC Council Directive 89/336/EEC. Conforms with the limits specified in the following standards:
IEC/EN61326-1 : 1997, RF Emission Class B, Immunity Table 1, Performance Criteria B

SAFETY

Conforms with the requirements of EEC Council Directive 73/23/EEC (as amended) and the product safety standard IEC/EN 61010-1 : 2001 + C1 : 2002 + C2 : 2003 for class 1 portable equipment, for use in a Pollution Degree 2 environment. The instrument is designed to be operated from an Installation Category 2 supply.

VERSIONS AND OPTIONS

When ordering please quote the full ordering number information.

Ordering Numbers	Versions
6820	**Scalar Analyzers**
6821	1 MHz to 3 GHz Scalar Analyzer
6822	10 MHz to 8.4 GHz Scalar Analyzer
6823	10 MHz to 20 GHz Scalar Analyzer
6824	10 MHz to 24 GHz Scalar Analyzer
6825	10 MHz to 46 GHz Scalar Analyzer
6825R	10 MHz to 40 GHz Scalar Analyzer
	Supplied Accessories
46882/350	Operating Manual
46882/354	Getting Started Guide
46882/360	Remote Operating Manual
43123/076	AC Supply Lead
37591/755	Front Panel Cover
	Options
002	Field Replaceable Precision N (f) or 3.5 mm (f) RF Connectors for Source Output. (not available on 6821)or 2.92 mm (f) RF connector for 6825&6825R
010	3 GHz 110 dB Step Attenuator (only available for 6821)
011	20 GHz 70 dB Step Attenuator (only available for 6822/6823)
012	26.5 GHz 90 dB Step Attenuator (not available for 6821/6825/6825R)
013	40 GHz 70 dB Step Attenuator (only available for 6825 & 6825R)
023	Internal Modulation Generator (FM &Pulse)
025	Internal Pulse Modulator (Opt 25a 6822/6823), (Opt 25b 6824/6825/6825R)
030	Higher Output Power (not applicable to 6821/6825/6825R)
	Complementary Product
6146	500 MHz to 18 GHz Pulse Modulator
54441/019	AC Power Supply for 6146
6147	70 MHz to 40 GHz Pulse Modulator

Note : All specifications quoted are for operation at calibration temperature ±3°C.

Specifications involving Type N connectors above 18 GHz are not traceable to national standards as these do not exist at present.

Specifications involving 2.92 mm connectors above 40 GHz are not traceable to national standards as these do not exist at present.

Typical specifications are non-warranted.

ACCESSORIES

6230A/L SCALAR DETECTORS

6230A series	Standard Detectors (-65 dBm to +20 dBm) typical
6230A	10 MHz to 20 GHz, N type (m)
6232A	1 MHz to 3 GHz, N Type (m)
6233A	10 MHz to 26.5 GHz, 3.5 mm (m)
6234A	10 MHz to 46 GHz, 2.92 mm (m)
6230L series	Low VSWR detectors (-59 dBm to +26 dBm typical)
6230L	10 MHz to 20 GHz, N type (m)
6233L	10 MHz to 26.5 GHz, 3.5 mm (m)
6234L	10 MHz to 46 GHz, 2.92 mm (m)

AUTOTESTERS AND RF BRIDGE

	Autotesters
59999/158	10 MHz to 18 GHz N (m)
59999/159	10 MHz to 18 GHz N (f)
59999/168	10 MHz to 40 GHz 2.92 mm (m)
59999/169	10 MHz to 40 GHz 2.92 mm (f)
	RF Bridge
59999/170	5 MHz to 2 GHz N (f)

FAULT LOCATORS

	Fault Locators
6242F	10 MHz to 3 GHz, N (f)
6242M	10 MHz to 3 GHz, N (m)
6240F	10 MHz to 20 GHz, N (f)
6240M	10 MHz to 20 GHz, N (m)
6243F	10 MHz to 26.5 GHz, 3.5 mm (f)
6243M	10 MHz to 26.5 GHz, 3.5 mm (m)
6241	10 MHz to 20 GHz, 7 mm
	Microwave Ruggedized Cables for Fault Locators
54311/197	1.5 m, 18 GHz, N (m) to Right Angle N (m)
54311/198	3.0 m, 18 GHz, N (m) to Right Angle N (m)
54311/201	1.5 m, 26.5 GHz, 3.5 mm (m) to Right Angle 3.5 mm (m)
54311/202	3.0 m, 26.5 GHz, 3.5 mm (m) to Right Angle 3.5 mm (m)
	RF Ruggedized Cables for Fault Locators
54311/199	1.5 m, 3 GHz, N (m) to Right Angle N (m)
54311/200	3.0 m, 3 GHz, N (m) to Right Angle N (m)
	Microwave Ruggedized Cables
54311/116	1.5 m, 20 GHz, N (m) to N (m)
54311/109	3.0 m, 20 GHz, N (m) to N (m)
54311/117	1.5 m, 26.5 GHz, 3.5 mm (m) to 3.5 mm (m)
54311/110	3.0 m, 26.5 GHz, 3.5 mm (m) to 3.5 mm (m)
	Fault Locator and Scalar Detector DC Cables
43139/099	1.5 m, DC Cable
43139/100	3.0 m, DC Cable
43139/101	10 m, DC Cable
43139/102	25 m, DC Cable
43139/103	50 m, DC Cable

ACCESSORIES

	Power Splitters/Dividers
54311/123	Power Splitter DC to 18 GHz, Type N

54311/124	Power Splitter DC to 26.5 GHz, 3.5 mm
54311/161	Power Splitter DC to 40 GHz, 2.92 mm
54311/187	Power Divider DC to 18 GHz
54311/188	Power Divider DC to 26.5 GHz

RF Ruggedized Cables for Bridges and Dividers

54311/195	1.5 m, 3 GHz, N (m) to N (m)
54311/196	3.0 m, 3 GHz, N (m) to N (m)

Fixed Loads

54421/020	7 mm Fixed Load
54421/021	3.5 mm (f) Fixed Load
54421/022	3.5 mm (m) Fixed Load
54421/023	N (m) Fixed Load
54421/024	N (f) Fixed Load

Precision Adapters

54311/175	N (m) to N (m)
54311/167	N (m) to N (f)
54311/174	N (f) to N (f)
54311/176	N (f) to 3.5 mm (f)
54311/177	N (m) to 3.5 mm (f)
54311/178	N (m) to 3.5 mm (m)
54311/185	N (f) to 3.5 mm (m)
54311/137	N (m) to TNC (f)
54311/138	N (m) to TNC (m)
54311/139	N (f) to TNC (f)
54311/186	N (f) to TNC (m)
54311/203	7 mm to N (f)
54311/204	7 mm to TNC (m)
54311/205	7 mm to TNC (f)
54311/136	TNC (m) to TNC (m)
54311/107	3.5 mm (f) to 3.5 mm (f)
54311/165	3.5 mm (m) to 3.5 mm (f)
54311/164	3.5 mm (m) to 3.5 mm (m)
54311/162	2.92 mm (m) to 2.92 mm (m)
54311/206	2.92 mm (m) to 2.92 mm (f)
54311/207	2.92 mm (f) to 2.92 mm (f)

Standard Adapters

54311/133	N (f) to SMA (f)
54311/134	N (m) to SMA (f)
54311/135	TNC (m) to SMA (m)

Miscellaneous Electrical Cables

54311/170	Positive Voltage Measurement Cable
54311/112	Negative Voltage Measurement Cable
43129/189	GPIB Cable
43139/042	BNC (m) to BNC (m) 1.5 m
46884/560	Parallel Printer Interface Cable
43137/604	Autotester Adapter Cable 0.5 m
43139/104	Autotester Adapter Cable 1.5 m

Standard Microwave Cables

54351/022	0.5 m, 18 GHz, N (m) to N (m)
54351/025	0.5 m, 26.5 GHz, 3.5 mm (m) to 3.5 mm (m)
54351/027	0.5 m, 40 GHz, 2.92 mm (m) to 2.92 mm (m)

Attenuators

56534/901	Precision Fixed Coaxial Attenuator 3 dB DC to 18 GHz 5 W, N(m) to N(f)
56534/902	Precision Fixed Coaxial Attenuator 6 dB DC to 18 GHz 5 W, N(m) to N(f)
56534/903	Precision Fixed Coaxial Attenuator 10 dB DC to 18 GHz 5 W, N(m) to N(f)
56534/904	Precision Fixed Coaxial Attenuator 20 dB DC to 18 GHz 5 W, N(m) to N(f)

Software Support

59000/327	MIPlot Software Pack
59000/371	Guided Scalar Measurements

MISCELLANEOUS

46885/038	Rack Mount Kit for 6800
46880/351	Maintenance Manual
84501	Soft Carrying Case
46662/695	Flight Case
54152/001	3.5 mm Torque Wrench
54211/008	Compact Keyboard

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