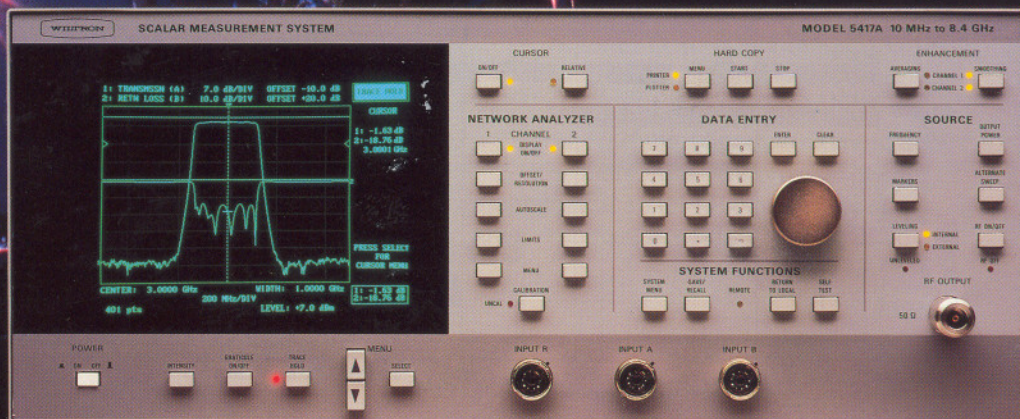


WILTRON

5400A Series Scalar Measurement Systems

Eleven Models — 1 MHz to 26.5 GHz



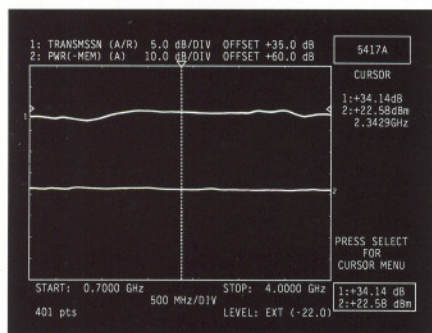
Economy and Performance in a Compact Package

A Broad Range of Measurement Applications

The compact and accurate Wiltron 5400A is an ideal solution for characterization of the microwave components in radar warning systems and other electronic warfare equipment, cellular repeaters, and most advanced telecommunications relay systems. Below are a few examples.

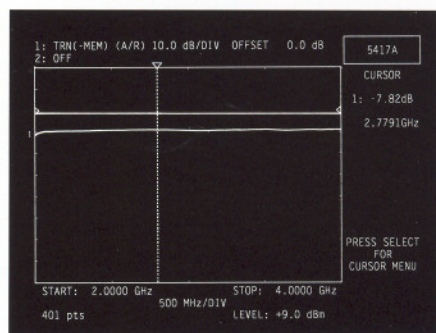
Amplifiers

Minimum gain, gain variation, and input match over a specified frequency range. Gain at specified output power. Gain variation with bias change. Output power over a specified frequency range at 1 dB gain compression.



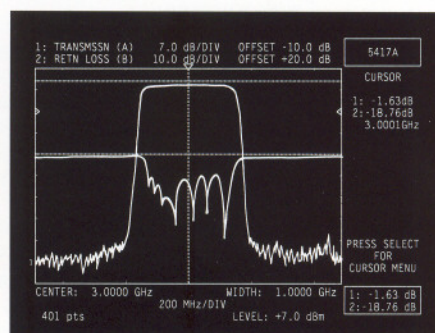
Mixers

Isolation LO-to-RF. Isolation LO-to-IF. Isolation RF-to-IF. SSB conversion loss versus input frequency, holding IF fixed. Conversion loss versus LO power. 1 dB conversion compression point.



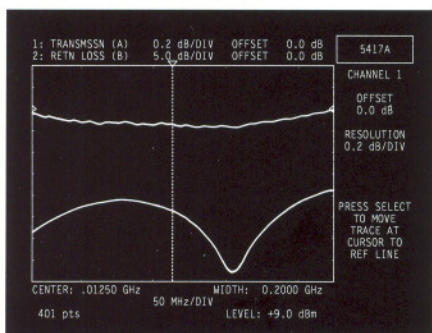
Filters

Broadband and narrowband characteristics. Passband, 3 dB, and skirt characteristics, all measured without renormalization. Cursor functions allow rapid location of desired bandwidths or trace max/min points.



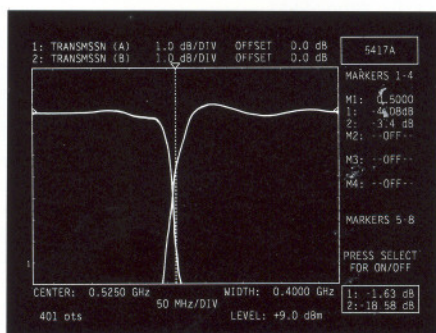
Isolators

Forward and reverse transmission loss. A smoothing circuit that averages noise at low signal levels and 71 dB dynamic range assure that actual low level characteristics can be determined clearly.



Diplexers & Multiplexers

The dual-channel display lets you normalize A and B channels and observe both outputs simultaneously. The zoom feature lets you concentrate on cross-over points or on response variations within the passband.



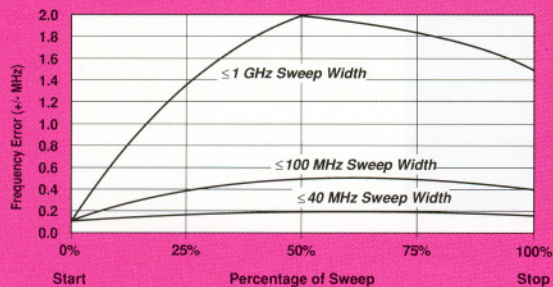
General Specifications — Model Summary

MODEL/SPECIFICATION ^①		Units	RF MODELS			MICROWAVE MODELS							
			5407A	5409A	5411A	5417A	5447A	5419A	5437A	5428A	5431A	5430A	5436A
Frequency Range		GHz	0.001 to 1.0	0.001 to 2.0	0.001 to 3.0	0.01 to 8.4	0.01 to 20.0	2.0 to 8.4	2.0 to 20.0	8.0 to 12.4	10.0 to 16.0	12.4 to 20.0	17.0 to 26.5
Output Power (@25°C)	Internally Leveled, Maximum	dBm	+12 ^②	+12 ^②	+12 ^②	+10	+10	+10	+10	+10	+10	+10	+7
	With Option 2, 2A, or 2B; 70 dB Step Attenuator (10 dB Steps)	dBm	+10 ^②	+10 ^②	+10 ^②	+7	+7	+7	+7	+7	+7	+7	+4
Power Level Accuracy	With Leveled Power	dB	±1.0 ^③	±1.0 ^③	±1.0 ^③	±1.0	±1.0	±1.0	±1.0	±1.0	±1.0	±1.0	±1.0
	With Option 2, 2A, or 2B; 70 dB Step Attenuator (10 dB Steps)	Add dB	±1.0 ^③	±1.0 ^③	±1.5 ^③	±1.5	±1.9	±1.5	±1.9	±1.5	±1.5	±1.5	±3.0
	Step Attenuator Accuracy, Between 10 dB Steps	dB	±0.4	±0.4	±0.4	±0.4	±0.5	±0.4	±0.4	±0.4	±0.5	±0.4	±0.7
Leveled Power Variation	With Frequency	dB	±0.3 ^③	±0.4 ^③	±0.6 ^③	±0.5	±0.75	±0.4	±0.5	±0.4	±0.4	±0.5	±1.0
	With Frequency; With Option 2, 2A, or 2B; 70 dB Step Attenuator (10 dB Steps)	dB	±1.0 ^③	±1.1 ^③	±1.3 ^③	±1.0	±1.0	±0.9	±1.0	±0.9	±0.9	±1.0	±2.5
Source SWR	With Leveled Power	SWR	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.7
	With Leveled Power; 70 dB Step Attenuator (10 dB Steps)	SWR	<1.5	<1.5	<1.5	<1.5	<1.8	<1.5	<1.8	<1.5	<1.5	<1.5	<2.0
Signal Purity	Harmonics	dBc	<-40	<-40	<-40	<-40 (≤2 GHz) <-50 (>2 GHz)	<-40 (≤2 GHz) <-60 (>2 GHz)	<-50	<-60	<-50	<-50	<-50	<-50
	Non-Harmonics	dBc	<-60	<-60	<-60	<-50 (≤2 GHz) <-60 (>2 GHz)	<-50 (≤2 GHz) <-60 (>2 GHz)	<-60	<-60	<-60	<-60	<-60	<-60
	Residual FM (Measured in 30 Hz to 15 kHz post-detection BW)	kHz peak	<10	<10	<10	<7	<10	<7	<10	<10	<10	<10	<30
Frequency Accuracy (See Sweep Width Error Charts below)	Start Frequency Error	kHz	±100	±100	±100	±200	±200	±200	±200	±200	±200	±200	±200
RF Output Connector (50Ω Standard, 75Ω Optional ^④)			Type N (f)	Type N (f)	Type N (f)	Type N (f)	Type N (f)	Type N (f)	Type N (f)	Type N (f)	Type N (f)	Type N (f)	K (f)

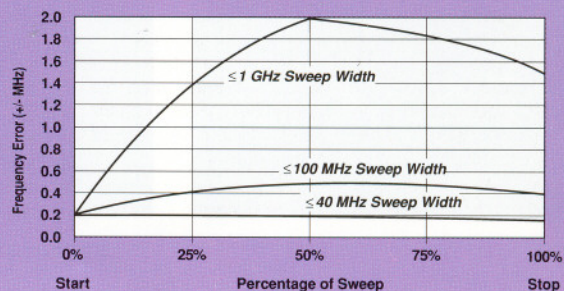
① At maximum specified output power. ② For Option 4, 75Ω output, subtract 2.0 dB. ③ For Option 4, 75Ω output, add 0.2 dB.
④ Option 4, 75Ω available on RF Models 5407A, 5409A, and 5411A only.

Frequency Error with Sweep Width (In Swept Frequency Mode):

RF Models —
5407A, 5409A, 5411A:



Microwave Models —
5417A, 5419A, 5428A, 5430A, 5431A, 5436A, 5437A, 5447A:



General Specifications — All Models

MEASUREMENTS

Function: The 5400A Series measures the swept frequency transmission, reflection and power characteristics of microwave devices using a built-in microwave source, remote detectors, and SWR Autotesters.

There are eleven models, each covering a different frequency range (see table on page 10). Measurements are displayed on two independent channels in dB, dBm, or SWR.

Measurement Modes: Transmission (dB), Return Loss (dB), SWR (linear SWR), and power (dBm)

Frequency Range: Depends on model, see table on page 10.

ANALYZER

Dynamic Range: 71 dB (–55 to +16 dBm) with Wiltron 560 Series or 5400 Series Detectors and SWR Autotesters.

Inputs: Two inputs (three optionally) — A, B, and R (Option 5) — accept detected outputs from Wiltron 560 Series or 5400 Series Detectors and SWR Autotesters, remote from the instrument.

Channels: Two channels are used to select and simultaneously display any two inputs from A, B, or R (Option 5). The inputs can also be displayed as ratios A/R or B/R.

Display Resolution:

Horizontal: 101, 201, or 401 points over selected frequency range

Vertical: 0.025 dB

Graticule: Ten vertical divisions. Horizontal axis is automatically scaled in frequency increments of 1, 2, 5. Graticule On/Off button turns all graticule lines off. Tick marks remain on axis to indicate graticule position.

Scaling:

Resolution: 0.1 dB(m) to 10 dB(m) per division in 0.1 dB steps with independent control for each channel.

Offset range: –99.9 dB to +99.9 dB in 0.1 dB steps.

Autoscale: Automatically selects offset and resolution to provide optimum display of test data.

Trace Update Time: Typically less than 130 ms for single-channel, 101 point resolution, depending on frequency range and the averaging and smoothing settings.

CRT Intensity: Both the graticule and the data are independently adjustable from off to bright.

External VGA Monitor Output: Rear panel connection is provided to drive a VGA color display. Colors are selectable via a menu.

Cursor: The numerical amplitude of the test data and frequency are displayed for both channels. The frequency is continuously variable with the tuning knob over the displayed range. Cursor position remains fixed on the display as the sweep frequency range is changed.

Relative Cursor: Displays the amplitude and frequency difference between the Cursor and Relative Cursor for both channels. A menu selection reverses the position of the two cursors.

Cursor Functions: Automatic cursor searches for trace Maximum, Minimum, dB Level, dB Bandwidth, Next Marker, and Active Marker may be performed.

Data Correction: System frequency response errors are removed for transmission measurements with a through line calibration and for reflection measurements with an open-short calibration. Calibration data is stored at 0.002 dB resolution over the selected frequency range. Calibration is maintained at all resolutions. At narrower frequency ranges, interpolation is used to maintain the chosen number of frequency data points.

Smoothing: Analog filtering, adjustable in five levels, individually settable for each channel to reduce noise on low-level traces.

Averaging: 2, 4, 8, 16, 32, 64, 128, or 256 successive traces may be averaged together to remove unwanted noise. Channels may be independently set.

Limit Lines: Two lines, either straight or complex, for each trace for comparison of trace data with predetermined values. Complex lines may be made from up to 10 individually-editable segments. Trace data may be compared with limit lines for Pass/Fail testing.

Save/Recall: Nine sets of front-panel set-ups and four sets of calibrations can be stored for later recall. Stored set-ups may be previewed on the CRT or printed prior to selection. Four setups may include calibration data and trace memory.

SOURCE

Frequency Range: 1 MHz to 26.5 GHz in eleven models. See table on page 10.

Start-Stop: Sweeps upward from start frequency to stop frequency. Start frequency must be less than stop frequency.

Center-Width: Sweeps upward from CENTER – (WIDTH/2) to CENTER + (WIDTH/2).

Alternate Sweep: Sweeps alternately between frequency ranges set differently for Channel 1 and Channel 2.

CW: Provides single frequency entered as start frequency as above (both channels turned off).

Frequency Resolution:

RF Models (5407A, 5409A, 5411A): ±1 kHz

Microwave Models (5417A, 5419A, 5428A, 5430A, 5431A, 5436A, 5437A, and 5447A): ±10 kHz

Start Frequency Accuracy:

RF Models (5407A, 5409A, 5411A): ±100 kHz

Microwave Models (5417A, 5419A, 5428A, 5430A, 5431A, 5436A, 5437A, and 5447A): ±200 kHz

Output Power: Depends on model; see table on page 10.

Power Level Control, Internally Leveled: Front panel control adjusts power over a 10 dB range (standard) or from –70.0 dBm to maximum leveled power when Option 2, 2A, or 2B 70 dB Step Attenuator is installed.

Power Level Control, Externally Leveled (Option 6): Front panel control adjusts power over a 10 dB range determined by external leveling detector output.

Leveling (With External Detector): Levels output power at remote test position where directional detector samples RF power and provides a positive or negative polarity detected signal of 30 to 200 mV to rear panel BNC connector.

Attenuator: Option 2 (RF Models), 2A (20 GHz models) or 2B (26.5 GHz model) adds a 70 dB Step Attenuator (10 dB steps). See table on page 10 for accuracy specifications.

Markers: The numerical amplitude of the test data and frequency are displayed for both channels. The frequency is continuously variable with the keypad or tuning knob over the entire instrument frequency range. Markers remain fixed at the set frequency, independent of sweep frequency range.

Horizontal Output: Rear panel BNC connector, 0 to +10V ramp coincident with sweep in all sweep modes.

Reverse Power Protection: Up to 1 Watt RF.

APPLICATION FUNCTIONS

Applications functions speed and ease the task of characterizing antennas, filters, amplifiers, and other microwave devices.

Trace Functions: Save the minimum and maximum values of successive sweeps or the combination of the two. Ideal for acquiring data on drift or gain variation against temperature.

Cursor Functions: Supplement the cursors by adding an automatic search to find the minimum and maximum levels of the displayed trace, "X" dB above or below the min/max point, or a selected bandwidth. This function can be set to repeat continuously.

Amplifier Testing: Determines the gain compression point over the operating frequency range of an amplifier by successively incrementing the source power and measuring the amount of compression until a preset limit is exceeded.

GPIB

Interface: IEEE-488 Interface/GPIB Plotter Control is optional on all instruments (Option 3). All front panel controls are GPIB-controllable except power on/off. Configurable for instrument control or for control of GPIB plotter.

Data Transfer The 5400A Series does not require an external controller; nevertheless, it is capable of providing high speed data transfer of test data and normalization data to an external GPIB controller.

GPIB Indicators: The following conditions are indicated:

Remote: Operating on GPIB

Talk: Talking on GPIB

Listen: Listening on GPIB

SRQ: Sending a service request

Local Lockout: Disabling the RETURN TO LOCAL pushbutton. The instrument can then be placed in local mode only via GPIB.

PRINTER/PLOTTER

Plotter: The GPIB interface is compatible with HP 7440A, HP 7470A, and HP 7475A plotters. Display traces, markers, cursor, and graticule information are copied. When overlay traces are desired, data traces only can be plotted. Output may be scaled using P1 and P2 controls.

Printer: Parallel printer interface is compatible with most Epson FX-compatible dot-matrix printers and the HP 2225C Ink Jet Printer. Hard copy output in graphical or tabular format can be selected. Selections include graphics with measurement parameters, test data tabulated for 26, 51, 101, 201, or 401 points, marker parameters only, stored setup parameters, or a listing of the complex limit lines.

Internal Print and Plot Buffer: After approximately 5 seconds of formatting, a new test can be conducted while previously taken test data are being printed or plotted out from an internal printer buffer.

INPUT/OUTPUT CONNECTIONS

Horizontal Sweep Ramp Output: 0 to +10V nominal

GPIB: Connects 5400A to controller or plotter.

Rear panel GPIB connector (Option 3).

Parallel Printer (Centronics): Connects 5400A to printer.

Rear panel.

VGA Output: Connects 5400A to external VGA color display (not supplied). Rear panel connector.

External Leveling: Option 6 adds external leveling capability. Levels output power at remote test position where directional detector samples RF power and provides a positive or negative polarity detected signal of 30 to 200 mV to rear panel BNC connector.

GENERAL

Nonvolatile Memory: Retains front-panel control settings in memory for up to 10 years. Whenever instrument is turned on, control settings come on at the same functions and values existing when power was removed.

Self Test: Performs a self test every time power is applied or when SELF TEST pushbutton is pressed. If an error is detected, a diagnostic code appears, identifying the cause and location of the error.

Temperature Range:

Operating: 0°C to +50°C

Storage: -40°C to +70°C

Power: 115V +10%/-20%, 230V +10%/-20%,
48-63 Hz, 300 VA maximum

Dimensions: 177 H x 432 W x 476 D mm + 10 mm for feet
(7 H x 17 W x 18.75 D in. + 0.375 in. for feet)

Weight: 16 kg (35 lb.)