Product Brochure

Anritsu

Site Master™ S331D

Cable and Antenna Analyzer, 25 MHz to 4 GHz

Site Master™ is the Preferred Cable and Antenna Analyzer of Wireless Service Providers, Contractors, and Installers.

Cost Savings and Quality Improvement

Wireless market competition requires operators to reduce per site maintenance expense. Site Master's Frequency Domain Reflectometry (FDR) techniques break away from the traditional fix-after-failure maintenance process by finding small, hard to identify problems before major failures occur.

Sixty to eighty percent of a typical cell site's problems are caused by problematic cables, connectors and antennas. When cables or antennas are contaminated with moisture, damaged, or mispositioned during storms, Site Master identifies the problem quickly. Antenna degradation reduces the cell coverage pattern and can cause dropped calls. Site Master can pinpoint the antenna problem from ground level in a few seconds making climbing the antenna tower unnecessary.

A poorly installed weather seal will corrode connectors and, if undetected, will eventually damage an expensive coaxial cable. Site Master has the sensitivity to identify the connector problem before the cable is damaged. Distance-To-Fault provides the clearest indication of troubled areas.

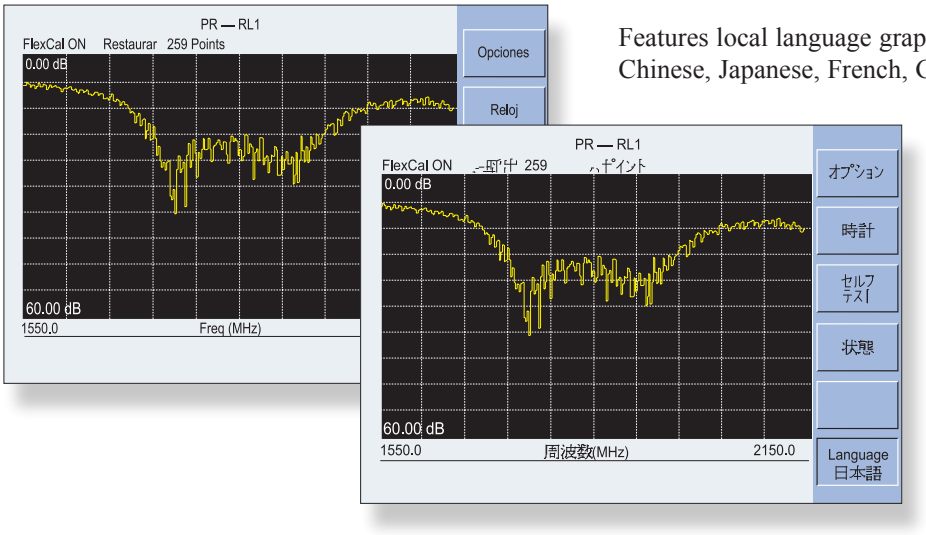
Site Master Revolutionizes Cable and Antenna Sweeping in the Wireless Industry.

Rugged and Reliable

Because the Site Master was designed specifically for field environments, it can easily withstand the day-to-day punishment of field use. The analyzer is almost impervious to the bumps and bangs typically encountered by portable field-equipment.

Easy-to-Use

Site Master operation is straightforward; measurements are obtained through a menu-driven user interface that is easy to use and requires little training. The large, and high-resolution TFT color display makes test interpretation easy and quick. A full range of markers enable the user to make accurate measurements. Limit lines simplify measurements allowing users to create quick and simple pass/fail tests.



Features local language graphical user interface support in English, Chinese, Japanese, French, German, and Spanish.

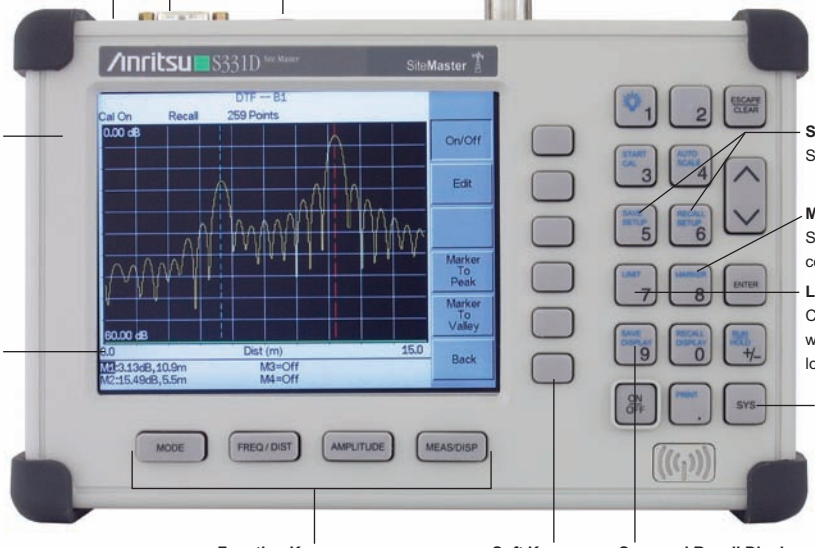
Site Master is a multi-functional field solution

RS-232 Interface
Transfer stored data to and from a personal computer (PC) or download to a printer via a serial cable for further analysis. Use PC to automatically control and collect data in the field.

Snap-in Field replaceable battery location

External DC Power Port

Cable and Antenna Analyzer Port



Rugged and Reliable Chassis Design
Ruggedized, lightweight, compact, high-impact housing is designed to withstand repeated drops and rough handling. Weather resistant seals and rubber membrane keypad protect unit from dirt and moisture.

TFT Color Display
Standard TFT (640 x 480) color display featuring variable brightness control. Viewable in direct sunlight.

Save and Recall Setup
Save setups for fast repeatable testing

Markers
Six markers for more comprehensive measurements.

Limits
Create simple pass/fail measurements with a single limit line, upper and/or lower mask limit lines.

Multilingual User Interface
On-screen menus and messages in six different languages: Chinese, English, French, German, Japanese, Spanish.

Function Keys
Four dedicated function keys simplify measurement tasks.

Soft Keys
Intuitive soft key menu and user interface.

Save and Recall Display
Up to 300 memory locations. Alphanumeric data labeling and automatic time/date stamp simplify data management.

Site Master Highlights

- Frequency Range: 25 MHz to 4 GHz
- Measurements: Return Loss / VSWR, Cable Loss, Distance-To-Fault (DTF), Optical DTF
- Sweep Speed: 2.5 msec / data point
- Accuracy: > 42 dB corrected directivity
- Display: TFT color with adjustable backlight
- Calibration: OSL, InstaCal™, and FlexCal™
- RF Immunity: Performs accurate measurements in co-located cell sites
- Signal Standard List / Cable Standard List: Quickly locates commonly used cables and frequency standards
- Trace Overlay: Monitors changes with reference traces over time
- Limit Lines: Single and Segmented Limit lines
- Language Support: Chinese, English, French, German, Japanese, Spanish
- Handheld Software Tools: Downloads traces, creates reports, compares traces, and renames files

Options

- High Accuracy Power Meter (Option 19): Performs high accuracy terminating or inline power measurements.
- Power Monitor (Option 5): Performs accurate broadband power measurements using external detector

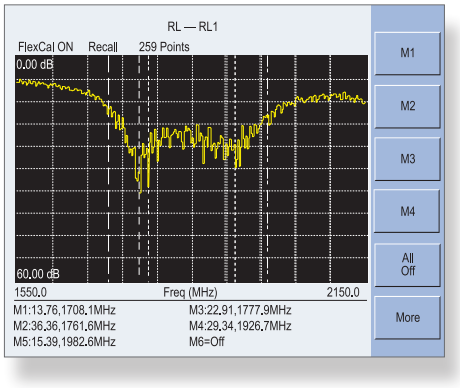
Cable and Antenna Analysis – Increase System Uptime

FDR Technique

Frequency Domain Reflectometry, (FDR), and Time Domain Reflectometry, (TDR), have similar acronyms, and both techniques are used to test transmission lines. But, that's where the similarities end. TDRs are not sensitive to RF problems: the TDR stimulus is a DC pulse, not RF. Thus, TDRs are unable to detect system faults that often lead to system failures. Additionally, FDR techniques save costly, time-consuming trouble shooting efforts by testing cable feed-line and antenna systems at their proper operating frequency. Deficient connectors, lightning arrestors, cables, jumpers, or antennas are replaced before call quality is compromised.

Quick, Simple Measurements

Site Master performs various RF measurements aimed at simplifying cable feedline and antenna analysis: Return Loss, SWR, Cable Loss and Distance-to-Fault (DTF). A single key selection on the main menu activates the desired measurement mode.

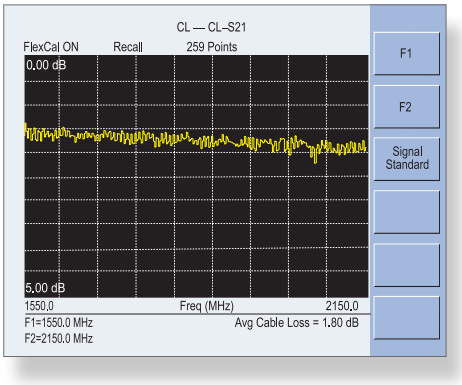


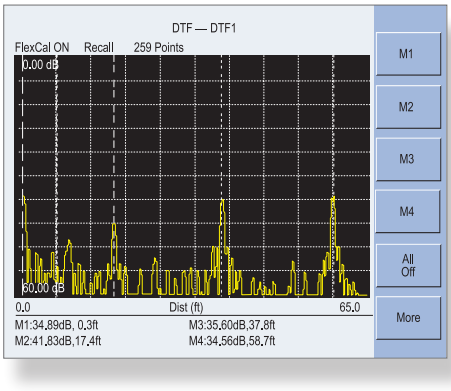
Return Loss, SWR

Return Loss and SWR "system" measurements ensure conformance to system performance engineering specifications. Measurement easily toggles between either one of the two modes and can be performed without climbing the tower.

Cable Loss

Cable Loss measurements measure the level of insertion loss within the cable feed-line system. Insertion loss can be verified prior to deployment, when you have access to both ends of the cable, or on installed cables without access to the opposite end. Site Master automatically calculates and displays the average cable loss so there is no more guess work or a need to perform calculations in the field.





Distance-to-Fault

Although a Return Loss test can tell users the magnitude of signal reflections, it cannot tell the precise location of a fault within the feed-line system. Distance-To-Fault measurements provide the clearest indication of trouble areas as it tells us both the magnitude of signal reflection and the location of the signal anomaly.

Distance-To-Fault measurement capability is built into all Site Master models as a standard feature. Return Loss (SWR) measurement data is processed using Fast Fourier Transform and the resulting data indicates Return Loss (SWR) versus distance. Distance-to-Fault measurements indicating Return Loss or SWR versus time is available with Handheld Software Tools™.

OSL Calibration

Open-Short-Load (OSL) calibration is standard for the S331D. All errors from source match, directivity and frequency response are mathematically removed allowing for accurate vector corrected Return Loss, Cable Loss, VSWR, and DTF measurements. Directivity is usually the main contributor to measurement uncertainty, and corrected directivity of 42 dB or better is common using Anritsu's precision components.

FlexCal™

The Site Master FlexCal™ broadband calibration feature is an OSL-based calibration method. It offers field technicians a simple and convenient way to troubleshoot and identify faulty antenna system components, because it eliminates the need for multiple instrument calibrations and calibration setups. Field technicians can now perform a broadband calibration and change the frequency range after calibration without having to recalibrate the instrument. A zoom-in/zoom-out capability is available in Return Loss, Cable Loss or VSWR mode. Because the resolution and maximum distance are dependent on the frequency range, field technicians can even change the frequency range in DTF mode to produce the desired fault resolution and horizontal range needed for the measurement, without performing additional calibrations.

InstaCal™ Calibration

The InstaCal Calibration module is available in the S331D and users can cut the time required to calibrate the Site Master by as much as 50 percent. With InstaCal, users are only required to connect the InstaCal calibration module once and the calibration process will be done automatically. Directivity specification for the InstaCal module is 38 dB for the entire frequency range allowing the user to make fast and accurate measurements.

RF Immunity

In today's wireless environment it is very common that there will be other RF activity present when making a measurement. In order to make accurate measurements in hostile RF environments, the receiver has to be able to reject the unwanted signals. Special dithering techniques are applied to the Site Master when making a measurement, and the Site Master can reject signals up to +17 dBm ensuring accurate measurements in RF rich environments.

Optical Distance-To-Fault

The ODTF-1 accessory module can be used with Anritsu's handheld cable & antenna analyzers to make high resolution Optical DTF (Distance-To-Fault) measurements.

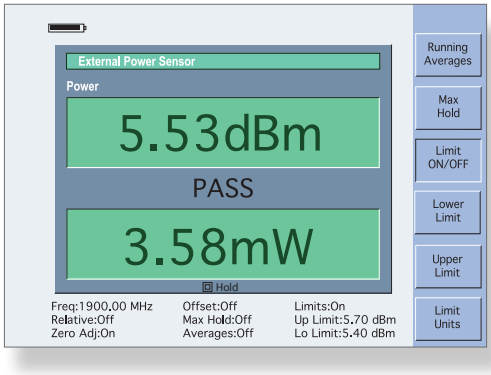
The combination of the Site Master and ODTF-1 module provides users with an efficient solution for characterizing both RF and Fiber Optic systems such as Remote Radio Head configured BTS systems.

Site Master Power Measurement Options

Power Monitor (Option 5)

Use Anritsu's 560 and 5400 series detector to measure broadband power. They are an excellent solution to measure an 18 GHz microwave link carrying the Base Station T1/E1 link. The detectors use precision high return loss detectors with excellent impedance match designed to minimize mismatch uncertainty (See uncertainty curves on page 11). Measurement range is from –50 to +16 dBm and the display range is from –80 to +80 dBm. There are several detectors available designed for different frequency ranges.

S331D Site Master with
560-7N50B Detector



High Accuracy Power Meter (Option 19)

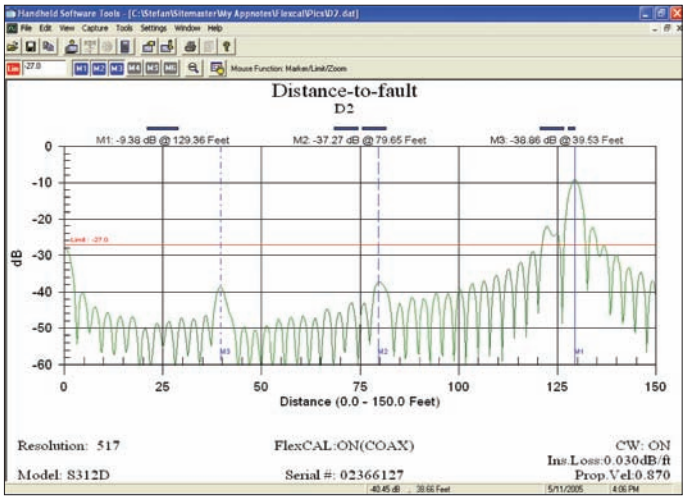
Anritsu's High Accuracy Power Meter option enables users to make high accuracy RMS measurements, perfect for both CW and digitally modulated signals such as CDMA/EV-DO, GSM/EDGE, and WCDMA/HSDPA. This option requires sensor PSN50 or MA24104A. The PSN50 sensor provides high accuracy measurements from 50 MHz to 6 GHz with a dynamic range from –30 to +20 dBm. The MA24104A is an Inline High Power Sensor with a frequency range from 600 MHz to 4 GHz and can measure signals as high as 150 W. Both of the sensors are equipped with an RS-232 interface for fast and easy connection to the Site Master.

PSN50 High Accuracy Power Sensor

MA24104A Inline High Power Sensor

Handheld Software Tools™

Although Site Master features built-in analytical and reporting functions, users can also download measurement data to a PC for additional analysis or report generation. Site Master's user friendly Software Tools is a Windows® program designed specifically for cable and antenna analysis and will run on any computer with Windows 95/98/NT4/2000/ME/XP/Vista test data can be analyzed and compared to historical performance.



- Up to 300 Site Master trace memory locations can be downloaded with a single menu selection
- Build historical records with an unlimited number of traces in one document
- Intelligent Trace Renaming features allow you to rename hundreds of traces in minutes instead of hours.
- Edit and create custom signal standards and cable lists
- Create custom reports
- Copy markers and limit lines from one trace to all the traces in a specific folder with easy to use group edit functions
- Use the Product Update feature to make sure you always use the latest instrument firmware.

Specifications

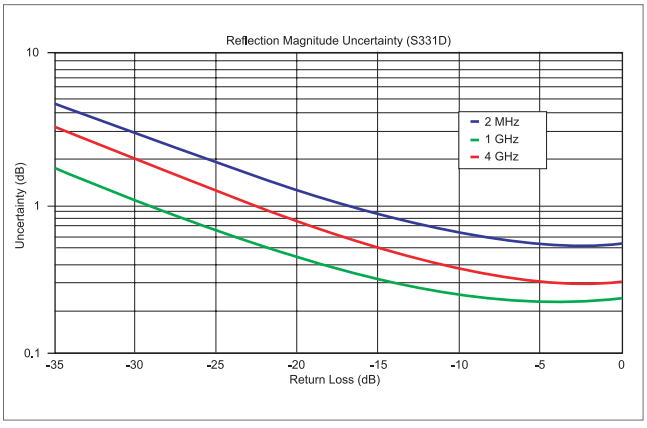
Cable and Antenna Analyzer		
Frequency Range	25 MHz to 4.0 GHz	
Frequency Accuracy	≤ ±50 ppm @ +25 °C	
Frequency Resolution	1 kHz (CW On) 100 kHz (CW Off)	
Output Power	0 dBm typical	
Immunity to Interfering Signals	On-channel: +17 dBm On-frequency: –5 dBm	
Measurement Speed	≤ 2.5 msec / data point (CW ON)	
Number of Data Points	130, 259, 517	
Return Loss	Range: 0.00 to 60.00 dB Resolution: 0.01 dB	
VSWR	Range: 1.00 to 65.00 Resolution: 0.01	
Cable Loss	Range: 0.00 to 30.00 dB Resolution: 0.01 dB	
Measurement Accuracy	> 42 dB corrected directivity after calibration	
Distance-to-Fault	Vertical Range	Return Loss: 0.00 to 60.00 dB VSWR: 1.00 to 65.00
	Horizontal Range	0 to (# of data pts –1) x Resolution to a maximum of 1497m (4912 ft), # of data pts = 130, 259 or 517
	Horizontal Resolution (Rectangular Windowing)	Resolution (meter) = (1.5×10^8) x (Vp)/ΔF Where Vp is the cable's relative propagation velocity and where DF is the stop frequency minus the start frequency (in Hz).
Power Monitor (Option 5)		
Display Range	–80 to +80 dBm (10 pW to 100 kW)	
Measurement Range	–50 to +16 dBm (10 nW to 40 mW)	
Offset Range	0 to +60 dB	
Resolution	0.1 dB, 0.1W	
Accuracy	± 1 dB	
High Accuracy Power Meter (Option 19)		
Compatible Sensors	PSN50 and MA24104A	
PSN50 High Accuracy Power Sensor	Frequency Range: 50 MHz to 6 GHz Measurement Range: –30 to +20 dBm Linearity: ± 0.13 dB Connector: Type N, male, 50 Ω Complete Technical Datasheet: p/n 11410-00423	
MA24104A Inline High Power Sensor	Frequency Range: 600 MHz to 4 GHz Measurement Range: +3 dBm to +51.76 dBm (2 mW to 150 W) Linearity: ± 0.13 dB Connectors: Type N, female, 50 Ω Complete Technical Datasheet: p/n 11410-00483	
General		
Language Support	Chinese, English, French, German, Japanese, Spanish	
Internal Trace Memory	300 traces	
Setup Configuration	10 setups	
Display:	TFT color LCD with adjustable backlight	
Inputs and Outputs Ports	RF Out: Type N, female, 50 Ω Maximum Input without Damage: +23 dBm, ±50 VDC	
Serial Interface	RS-232 9 pin D-sub, three wire serial	
Electromagnetic Compatibility	Meets European Community requirements for CE marking	
Safety	Conforms to EN 61010-1 for Class 1 portable equipment	
Temperature	Operating: –10 °C to 55 °C, humidity 85% or less Non-operating: –51 °C to +71 °C (Recommend the battery be stored separately between 0 °C and +40 °C for any prolonged non-operating storage period.)	
Environmental	MIL-PRF-28800F Class 2	
Power Supply	External DC Input: +12 to +15 volt dc, 3A max Internal NiMH battery: 10.8 volts, 1800 mAH	
Dimensions	Size: 254 mm x 178 mm x 61 mm (10.0 in x 7.0 in x 2.4 in) (w x h x d) Weight: < 2.28 kg (< 5 lbs) includes battery	

Specifications (Continued)

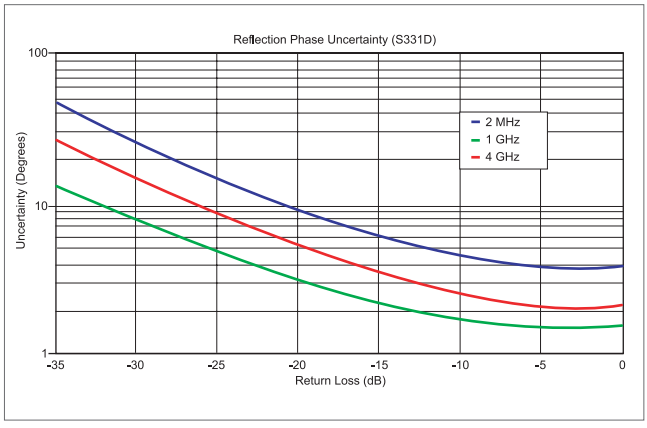
Power Monitor - Detectors

Model	Frequency Range	Impedance	Return Loss	Input Connector	Frequency Response
5400-71N50	0.001 to 3 GHz	50 Ω	26 dB	N(m)	±0.2 dB, <1 GHz ±0.3 dB, <3 GHz
5400-71N75	0.001 to 3 GHz	75 Ω	26 dB, <2 GHz 20 dB, <3 GHz	N(m)	±0.2 dB, <1 GHz ±0.5 dB, <3 GHz
560-7N50B	0.01 to 20 GHz	50 Ω	15 dB, <0.04 GHz 22 dB, <8 GHz 17 dB, <18 GHz 14 dB, <20 GHz	N(m)	±0.5 dB, <18 GHz ±1.25 dB, <20 GHz
560-7S50B	0.01 to 20 GHz	50 Ω	15 dB, <0.04 GHz 22 dB, <8 GHz 17 dB, <18 GHz 14 dB, <20 GHz	WSMA(m)	±0.5 dB, <18 GHz ±1.25 dB, <20 GHz
560-7K50	0.01 to 40 GHz	50 Ω	12 dB, <0.04 GHz 22 dB, <8 GHz 17 dB, <18 GHz 15 dB, <26.5 GHz 14 dB, <32 GHz 13 dB, <40 GHz	K(m)	±0.5 dB, <18 GHz ±1.25 dB, <26.5 GHz ±2.2 dB, <32 GHz ±2.5 dB, <40 GHz
560-7VA50	0.01 to 50 GHz	50 Ω	12 dB, <0.04 GHz 19 dB, <20 GHz 15 dB, <40 GHz 10 dB, <50 GHz	V(m)	±0.8 dB, <20 GHz ±2.5 dB, <40 GHz ±3.0 dB, <50 GHz

The following graphs provide measurement uncertainty accuracy at 23 °C ±3 °C after vector error correction for the standard N connector types. The errors are worst-case contributions of residual directivity, source match, frequency response, network analyzer dynamic range, and connector repeatability. In preparing these graphs, Fixed CW is ON. Calibration components 22N50 and 28N50-2 are used.

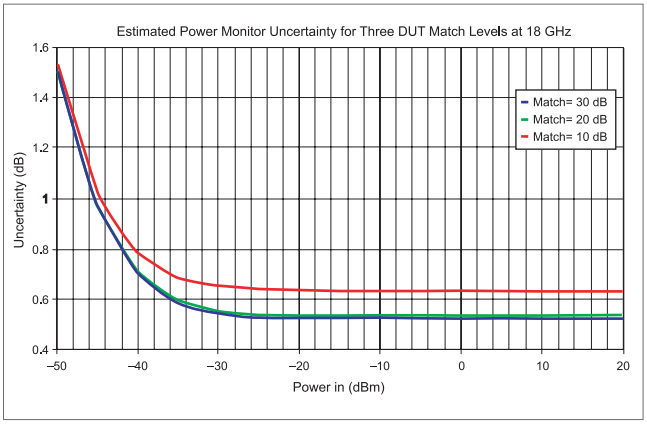


Reflection Magnitude Uncertainty

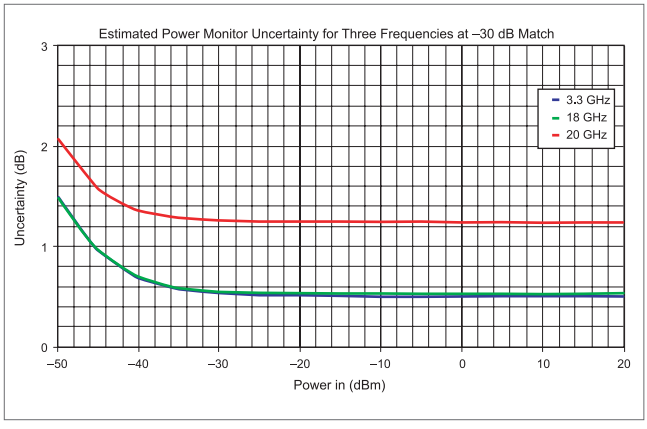


Reflection Phase Uncertainty

Using the 560-7N50B detector, the following curves show estimated power monitor uncertainties for various DUT match.



Estimated Power Monitor Uncertainty for Three DUT Match Levels at 18 GHz



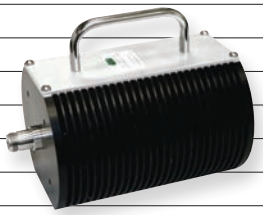
Estimated Power Monitor Uncertainty for Three Frequencies at –30 dB Match

Ordering Information

Basic Model	
S331D	Cable and Antenna Analyzer (25 MHz to 4.0 GHz)
Options	
Option 5	Power Monitor - requires external detector
Option 19	High Accuracy Power Meter (sensor not included)
Standard Accessories	
65717	Soft Carrying Case
633-27	Rechargeable Battery, Ni-MH
40-168-R	AC–DC Adapter
806-141	Automotive Cigarette Lighter 12 Volt DC Adapter
2300-347	Handheld Software Tools CDROM
800-441	Serial Interface Cable (null modem type)
551-1691-R	USB to RS-232 Adapter Cable
10580-00079	S331D Site Master User's Guide
	One-Year Warranty
Calibration Components	
ICN50B	InstaCal™ Calibration Module, 2 MHz to 6.0 GHz, N(m), 50 Ω
OSLN50-1	Precision Open/Short/Load, DC to 6 GHz, 42 dB, 50 Ω, N(m)
OSLNF50-1	Precision Open/Short/Load, DC to 6 GHz, 42 dB, 50 Ω, N(f)
22N50	Open/Short, DC to 18 GHz, N(m), 50 Ω
SM/PL-1	Precision Load, DC to 6 GHz, 42 dB, N(m), 50 Ω
22NF50	Open/Short, DC to 18 GHz, N(f), 50 Ω
SM/PLNF-1	Precision Load, DC to 6 GHz, 42 dB, N(f), 50 Ω
2000-1618-R	Precision Open/Short/Load, DC to 6 GHz, 7/16 DIN(m), 50 Ω
2000-1619-R	Precision Open/Short/Load, DC to 6 GHz, 7/16 DIN(f), 50 Ω
22N75	Open/Short, DC to 3 GHz, N(m) 75 Ω
26N75A	Precision Termination, DC to 3 GHz, N(m) 75 Ω
22NF75	Open/Short, DC to 3 GHz, N(f) 75 Ω
26NF75A	Precision Termination, DC to 3 GHz, N(f) 75 Ω
12N50-75B	Matching Pad, DC to 3 GHz, 50 Ω to 75 Ω
Precision Adapters	
34NN50A	Precision Adapter, N(m)-N(m), DC to 18 GHz, 50 Ω
34NFNF50	Precision Adapter, N(f)-N(f), DC to 18 GHz, 50 Ω
Adapters	
510-90-R	Adapter, 7/16 DIN(f)-N(m), DC to 7.5 GHz, 50 Ω
510-91-R	Adapter, 7/16 DIN(f)-N(f), DC to 7.5 GHz, 50 Ω
510-92-R	Adapter, 7/16 DIN(m)-N(m), DC to 7.5 GHz, 50 Ω
510-93-R	Adapter, 7/16 DIN(m)-N(f), DC to 7.5 GHz, 50 Ω
510-96-R	Adapter, 7/16 DIN(m)-7/16 DIN(m), DC to 7.5 GHz, 50 Ω
510-97-R	Adapter, 7/16 DIN(f)-7/16 DIN(f), DC to 7.5 GHz, 50 Ω
Adapters w/ Reinforced Grip	
1091-379-R	Adapter w/ Reinforced Grip, 7/16 DIN(f)-7/16 DIN(f), DC to 6 GHz, 50 Ω
Test Port Cable Armored	
15NN50-1.5C	Test Port Cable Armored, 1.5 meters, N(m)-N(m), 6 GHz, 50 Ω
15NN50-3.0C	Test Port Cable Armored, 3.0 meters, N(m)-N(m), 6 GHz, 50 Ω
15NNF50-1.5C	Test Port Cable Armored, 1.5 meters, N(m)-N(f), 6 GHz, 50 Ω
15NNF50-3.0C	Test Port Cable Armored, 3.0 meters, N(m)-N(f), 6 GHz, 50 Ω

Ordering Information (Continued)

Test Port Cables, Armored w/ Reinforced Grip	
15RNFN50-1.5-R	Test Port Cable Armored w/Reinforced Grip 1.5 m, N(f)-N(m), 6 GHz, 50 Ω
15RNFN50-3.0-R	Test Port Cable Armored w/Reinforced Grip, 3.0 m, N(f)-N(m), 6 GHz, 50 Ω
15RDFN50-1.5-R	Test Port Cable Armored w/Reinforced Grip 1.5 m, 7/16 DIN(f)-N(m), 6 GHz, 50 Ω
15RDFN50-3.0-R	Test Port Cable Armored w/Reinforced Grip 3.0 m, 7/16 DIN(f)-N(m), 6 GHz, 50 Ω
15RDN50-1.5-R	Test Port Cable Armored w/Reinforced Grip 1.5 m, 7/16 DIN(m)-N(m), 6 GHz, 50 Ω
15RDN50-3.0-R	Test Port Cable Armored w/Reinforced Grip 3.0 m, 7/16 DIN(m)-N(m), 6 GHz, 50 Ω
Attenuators	
3-1010-119	Attenuator, 10 dB, 2 W, DC to 6 GHz
3-1010-122	Attenuator, 20 dB, 5 W, DC to 12.4 GHz, N(m)-N(f)
42N50-20	Attenuator, 20 dB, 5 W, DC to 18 GHz, N(m)-N(f)
3-1010-123	Attenuator, 30 dB, 50 W, DC to 8.5 GHz, N(m)-N(f)
42N50A-30	Attenuator, 30 dB, 50 W, DC to 18 GHz, N(m)-N(f)
1010-127-R	Attenuator, 30 dB, 150 W, DC to 3 GHz, N(m)-N(f)
3-1010-124	Attenuator, 40 dB, 100 W, DC to 8.5 GHz, N(m)-N(f), Uni-directional
1010-121	Attenuator, 40 dB, 100 W, DC to 18 GHz, N(m)-N(f)
1010-128-R	Attenuator, 40 dB, 150 W, DC to 3 GHz, N(m)-N(f)
Miscellaneous Accessories	
633-27	Rechargeable Battery, Ni-MH
806-141	Automotive Cigarette Lighter/12 Volt DC Adapter
40-168-R	AC/DC Adapter
2000-1029	Battery Charger, NiMH, w/ Universal Power Supply
551-1691-R	USB to RS-232 Adapter Cable
800-441	Serial Interface Cable
65717	Soft Carrying Case
67135	Site Master Backpack
760-243-R	Transit Case
ODTF-1	Optical DTF Module, 1550 nm, Single Mode
2300-347	Handheld Software Tools CDROM
Power Monitor Detectors	
5400-71N50	Detector, 1 MHz to 3 GHz, N(m), 50 Ω
5400-71N75	Detector, 1 MHz to 3 GHz, N(m), 75 Ω
560-7N50B	Detector, 10 MHz to 20 GHz, N(m), 50 Ω
560-7S50B	Detector, 10 MHz to 20 GHz, WSMA(m), 50 Ω
560-7K50	Detector, 10 MHz to 40 GHz, K(m), 50 Ω
560-7VA50	Detector, 10 MHz to 50 GHz, V(m), 50 Ω
High Accuracy Power Meter Accessories	
PSN50	High Accuracy Power Sensor, 50 MHz to 6 GHz
MA24104A	Inline High Power Sensor, 600 MHz to 4 GHz
40-168-R	AC-DC Adapter
800-441	Serial Interface Cable
3-1010-122	Attenuator, 20 dB, 5 W, DC to 12.4 GHz, N(m)-N(f)
1010-127-R	Attenuator, 30 dB, 150 W, DC to 3 GHz, N(m)-N(f)
3-1010-123	Attenuator, 30 dB, 50 W, DC to 8.5 GHz, N(m)-N(f)
3-1010-124	Attenuator, 40 dB, 100 W, DC to 8.5 GHz, N(m)-N(f), Uni-directional
1010-128-R	Attenuator, 40 dB, 150 W, DC to 3 GHz, N(m)-N(f)
Product Literature	
10580-00079	S331D Site Master User's Guide
10580-00100	S331D Site Master Programming Guide



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