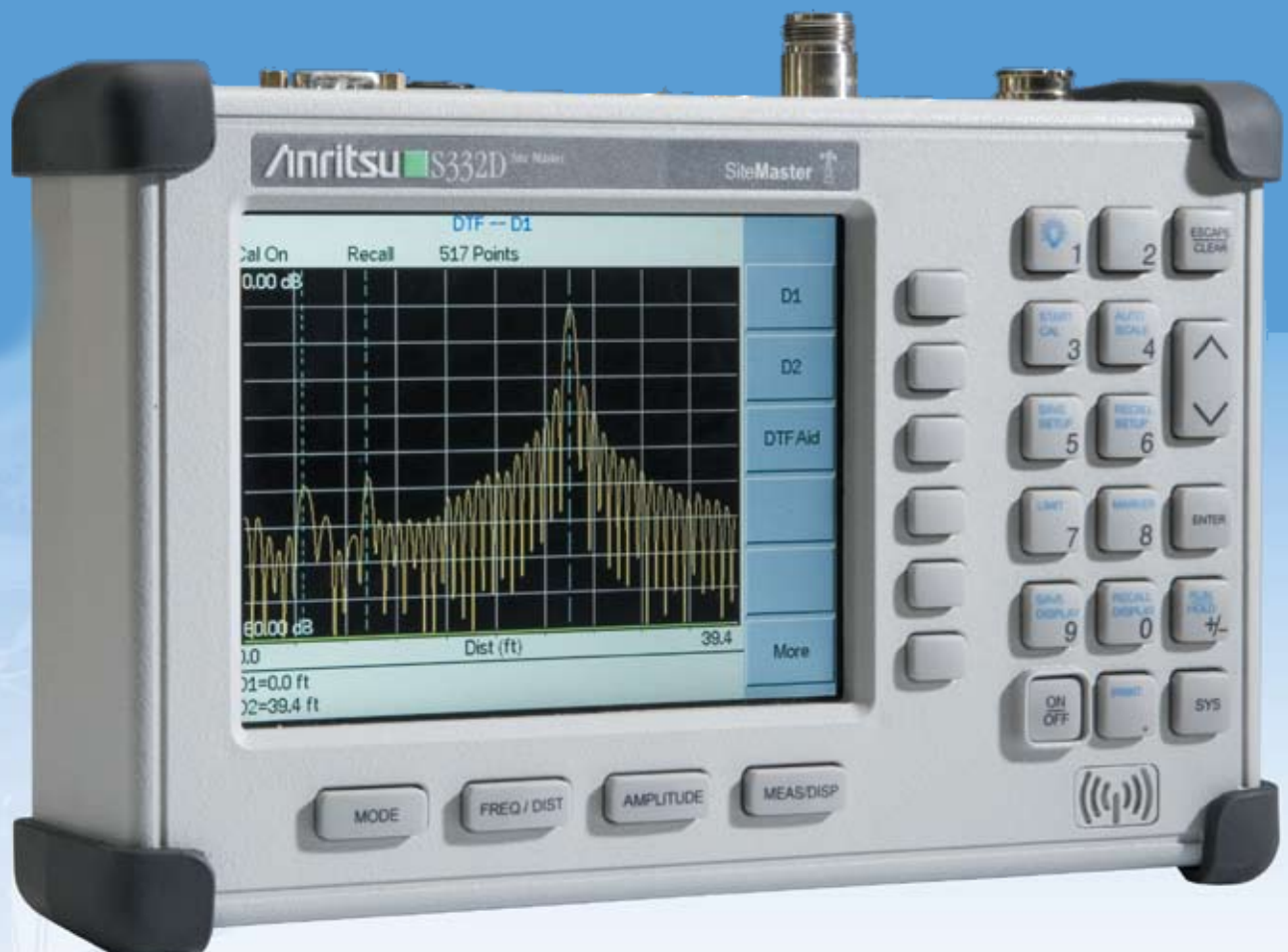


Site Master™ S331D

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.**

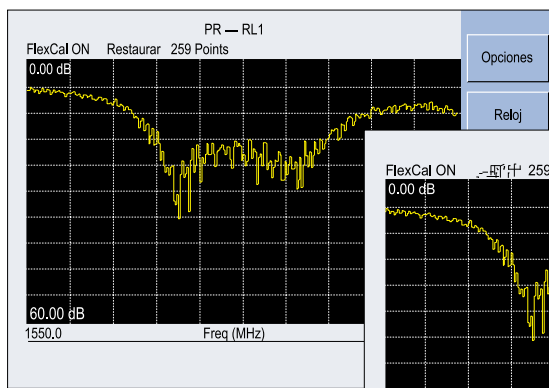


Rugged and Reliable

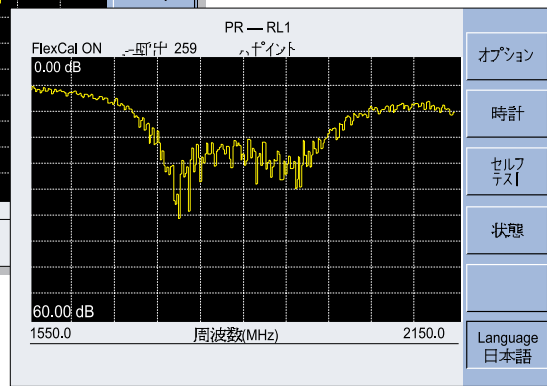
Because the Site Master was designed specifically for field environments, it can easily withstand the day-to-day punishment of field use. The analyzer is almost impervious to the bumps and bangs typically encountered by portable field-equipment.

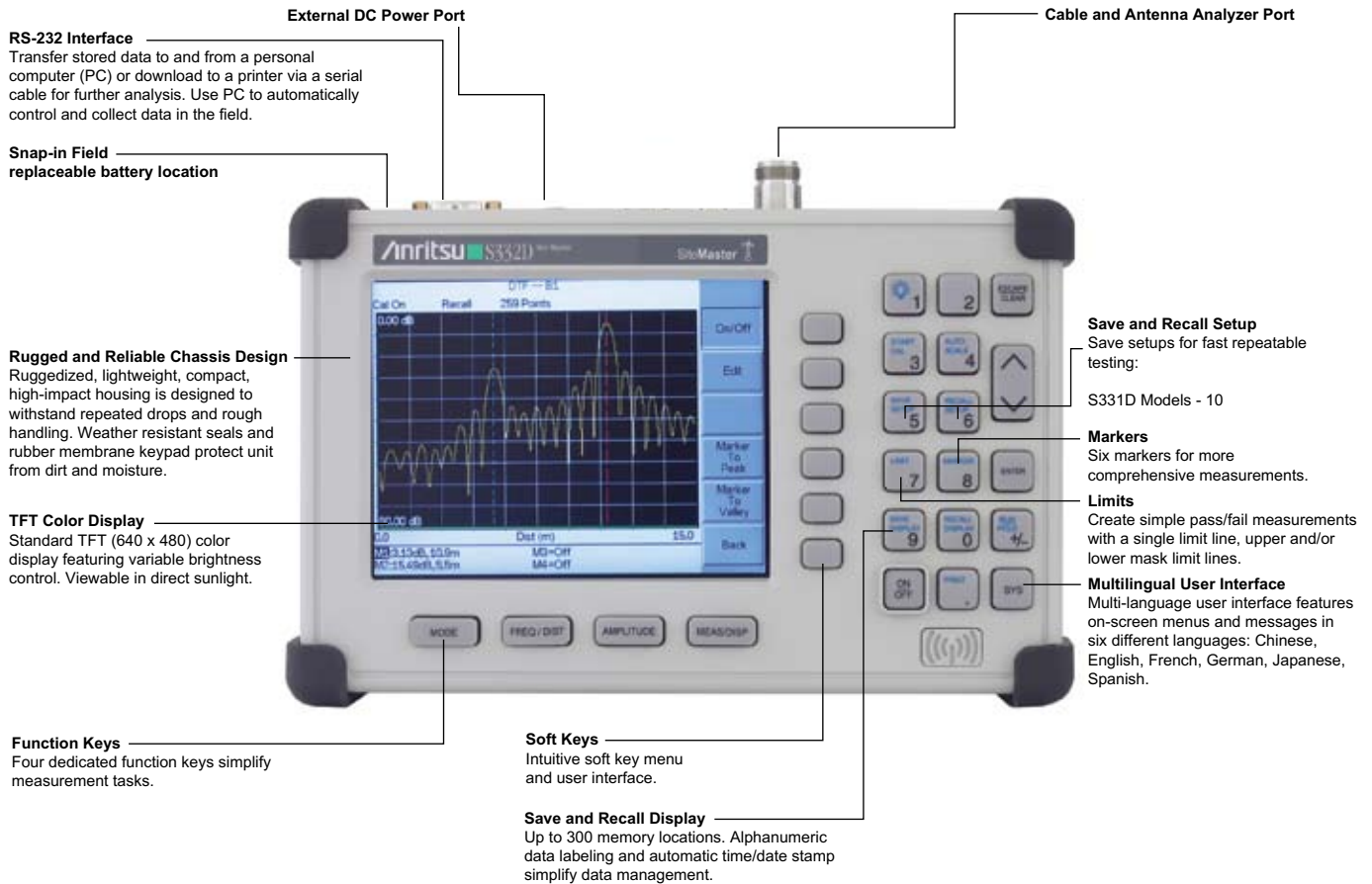
Easy-to-Use

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.





Function	Benefits
Cable and Antenna Analyzer	Characterize antenna system and pinpoint location of faults
Standard TFT Color Display	Display is viewable in direct sunlight
Power Monitor	
High Accuracy Power Meter	Performs accurate RMS power measurements for both CW and modulated signals

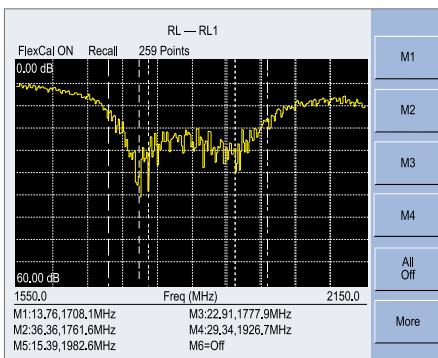
Cable and Antenna Analysis – Increase System Uptime

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.

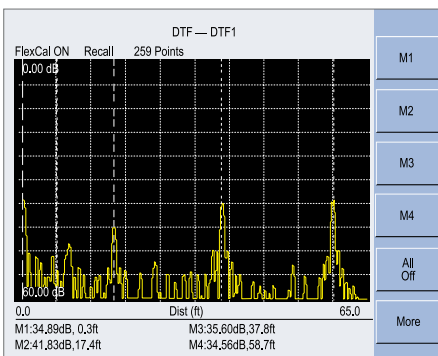
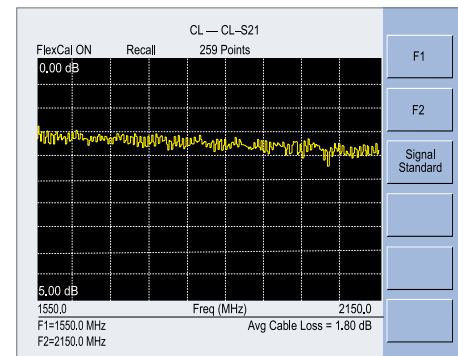


Return Loss, SWR

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.



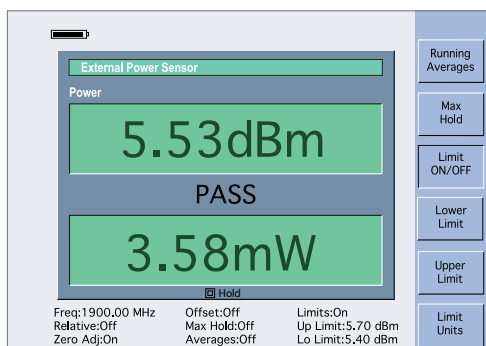
Site Master Power Measurement Options

Power Monitor (Option 5, S331D)

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.



S332D Site Master with
560-7N50B Detector



High Accuracy Power Meter (Option 19, S331D)

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

Master Software Tools™

Master Software Tools provides the user with comprehensive data management and post processing tools which augment the capabilities of the Site Master. This software provides a simple and easy way to manage, archive, analyze, print measurement reports, customize your cable list, antenna list, signal standards list and keep your Site Master up to date with the latest instrument firmware. Master Software Tools (MST) is a Windows program which is included with every Site Master instrument. For the most current version of Master Software Tools, please visit www.us.anritsu.com.

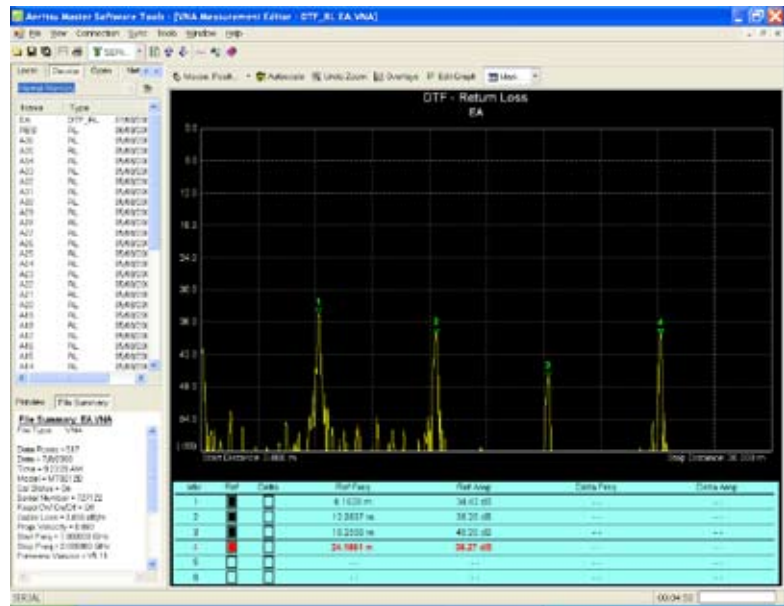


Figure 1, DTF trace transferred to MST

- 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
- View Spectrogram displays in 3D
- 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.

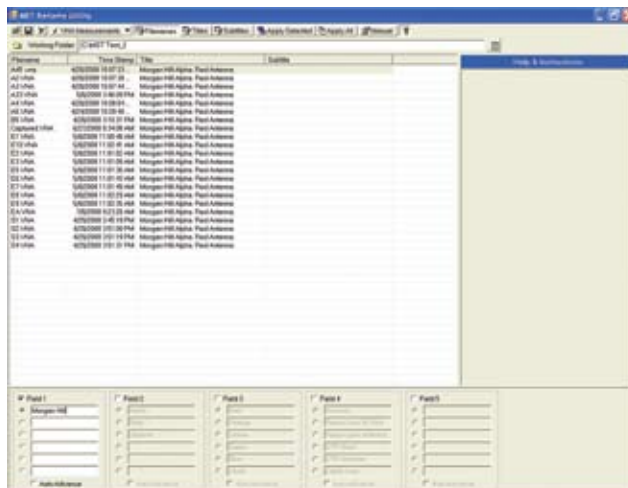


Figure 2, Update file names with the Trace Rename utility

Specifications

Cable and Antenna Analyzer (S331D)

Frequency Range: 25 MHz to 4.0 GHz
Frequency Accuracy: $\leq \pm 50$ ppm @ $+25^\circ\text{C}$
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) = $(1.5 \times 10^9) \times (V_p)/DF$
Where V_p is the cable's relative propagation velocity
and where DF is the stop frequency minus the start
frequency (in Hz).

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
Input 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
Input Connector: Type N, female, 50 Ω
Complete Technical Datasheet: p/n 11410-00483

Power Monitor (Option 5 S331D)

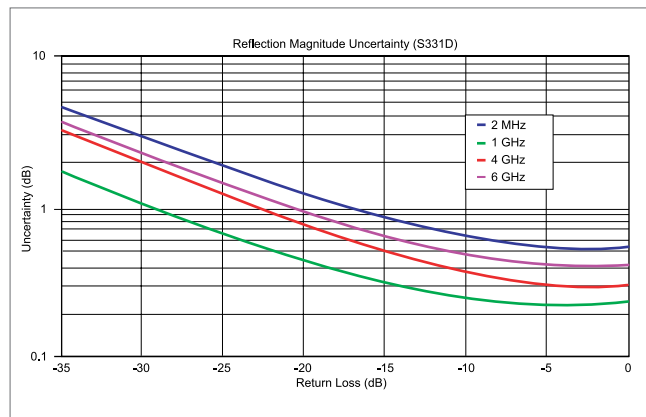
Display Range: -80 to $+80$ dBm (10 pW to 100 kW)
Measurement Range: -50 to $+16$ dBm (10 nW to 40 mW)
Offset Range: 0 to $+60$ dB
Resolution: 0.1 dB, 0.1W
Accuracy: ± 1 dB

General

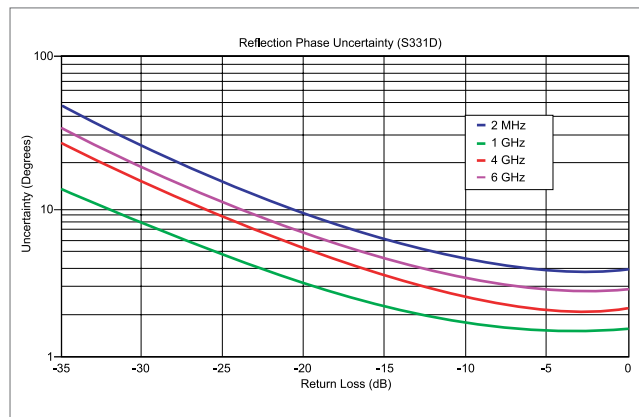
Language Support: Chinese, English, French, German, Japanese, Spanish
Internal Trace Memory: 300 traces
Setup Configuration: 10
Display: TFT color LCD with adjustable backlight
Inputs and Outputs Ports:
RF Out: Type N, female, 50 Ω
Maximum Input without Damage: $+23$ dBm, ± 50 VDC
Serial Interface: RS-232 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 $+71^\circ\text{C}$ (Recommend the battery be stored
separately between 0°C and $+40^\circ\text{C}$ for any prolonged
non-operating storage period.)
Environmental: MIL-PRF-28800F Class 2
Power Supply:
External DC Input: $+12.5$ to $+15$ volt dc, 3A max
Internal NiMH battery: 10.8 volts, 1800 mAh
Dimensions:
Size (w x h x d): 254 mm x 178 mm x 61 mm (10.0 in x 7.0 in x 2.4 in)
Weight: < 2.28 kg (< 5 lbs) includes battery

Specifications (Continued)

The following graphs provide measurement uncertainty accuracy at $23^{\circ} \pm 3^{\circ} \text{ C}$ 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.

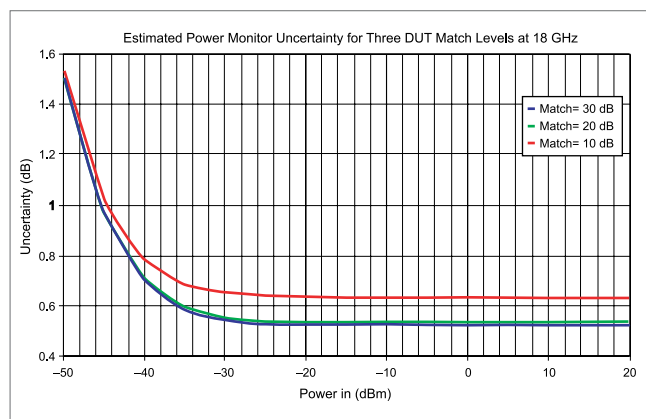


Reflection Magnitude Uncertainty

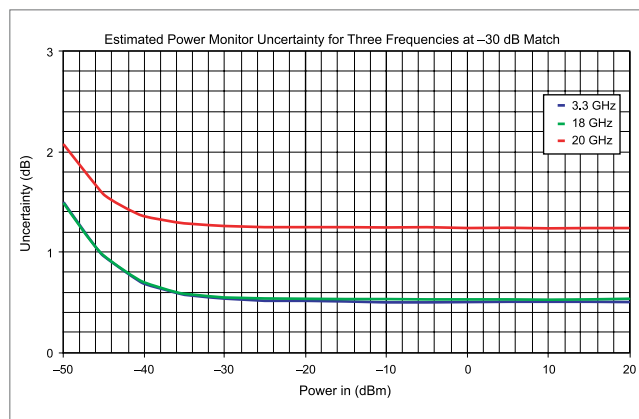


Reflection Phase Uncertainty

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

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

Ordering Information

Basic Models

S331D Cable and Antenna Analyzer (25 MHz to 4.0 GHz)

Options

Option 5 Power Monitor - requires external detector (S331D/S332D)

Option 19 High Accuracy Power Meter (S331D/S332D)
(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

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
15RDFN50-1.5-R Test Port Cable Armored w/Reinforced Grip
1.5 m, D(f)-N(m), 6 GHz, 50 Ω
15RDFN50-3.0-R Test Port Cable Armored w/Reinforced Grip
3.0 m, D(f)-N(m), 6 GHz, 50 Ω
15RDN50-1.5-R Test Port Cable Armored w/Reinforced Grip
1.5 m, D(m)-N(m), 6 GHz, 50 Ω
15RDN50-3.0-R Test Port Cable Armored w/Reinforced Grip
3.0 m, D(m)-N(m), 6 GHz, 50 Ω

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
2000-767 Precision Open/Short/Load, DC to 4 GHz, 7/16 DIN(m), 50 Ω
2000-768 Precision Open/Short/Load, DC to 4 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
34NFN50 Precision Adapter, N(f)-N(f), DC to 18 GHz, 50 Ω

Adapters

1091-26 Adapter, N(m)-SMA(m), DC to 18 GHz, 50 Ω
1091-27 Adapter, N(m)-SMA(f), DC to 18 GHz, 50 Ω
1091-80-R Adapter, N(f)-SMA(m), DC to 18 GHz, 50 Ω
1091-81-R Adapter, N(f)-SMA(f), DC to 18 GHz, 50 Ω
1091-172 Adapter, N(m)-BNC(f), DC to 1.3 GHz, 50 Ω
510-90 Adapter, 7/16 DIN(f)-N(m), DC to 7.5 GHz, 50 Ω
510-91 Adapter, 7/16 DIN(f)-N(f), DC to 7.5 GHz, 50 Ω
510-92 Adapter, 7/16 DIN(m)-N(m), DC to 7.5 GHz, 50 Ω
510-93 Adapter, 7/16 DIN(m)-N(f), DC to 7.5 GHz, 50 Ω
510-96 Adapter, 7/16 DIN(m)-7/16 DIN(m), DC to 7.5 GHz, 50 Ω
510-97 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 Cables

3-806-151 Cable, 0.46 m, N(m)-N(m), 4 GHz, 50 Ω
806-186-R Cable, 0.91 m, N(m)-N(f), 4 GHz, 50 Ω
806-187-R Cable, 0.91 m, N(m)-N(m), 4 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
15NN50-5.0C Test Port Cable Armored, 5.0 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
15NNF50-5.0C Test Port Cable Armored, 5.0 meters, N(m)-N(f),
6 GHz, 50 Ω

Ordering Information (Continued)

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
65701	3 GHz Offset Cal Kit consisting of one each: 3-1010-119, 10 dB Attenuator, DC to 6 GHz, 2 W, 3-806-151, 4 GHz Cable, 18" (46 cm)
2300-347	Handheld Software Tools CDROM



15RNFN50-1.5-R
Test Port Cable Armored with Reinforced Grip



67135
SiteMaster Backpack



ODTF-1
Optical DTF Module, 1550 nm



1091-379-R
Adapter with Reinforced Grip



ICN50B
InstaCal™ Calibration Module

Power Monitor Detectors

5400-71N50	Detector, .001 to 3 GHz, N(m), 50 Ω
5400-71N75	Detector, .001 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

Power Monitor Extender Cables

800-109	7.6 m (25 ft)
800-111	30.5 m (100 ft)

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)
65701	3 GHz Offset Cal Kit consisting of one each: 3-1010-119, 10 dB Attenuator, DC to 6 GHz, 2 W, 3-806-151, 4 GHz Cable, 18" (46 cm)

Product Literature

10580-00079	S331D Site Master User's Guide
10580-00100	S331D Site Master Programming Guide

