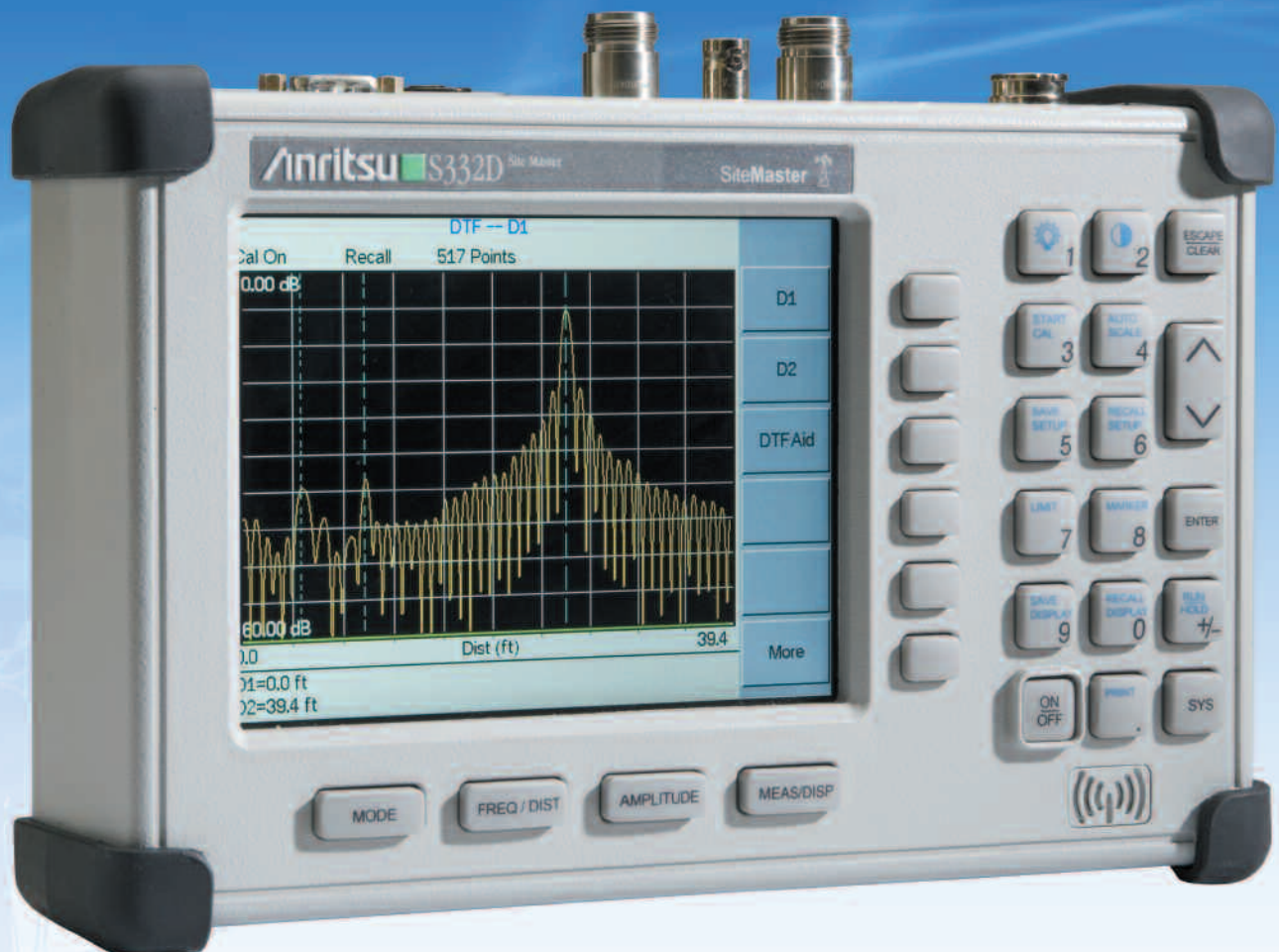


# Site Master™ S331D/S332D

Cable and Antenna Analyzer, 2 MHz to 6 GHz  
Spectrum Analyzer, 100 kHz to 3 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.

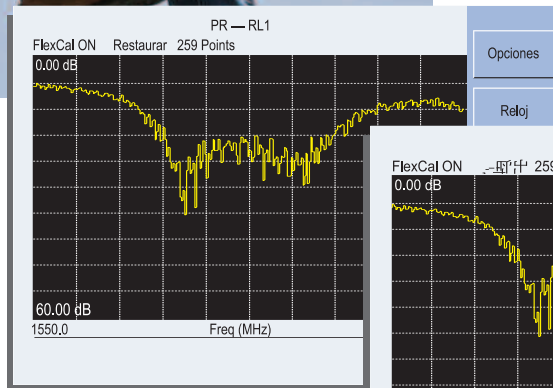
**Site Master  
Revolutionizes  
Cable and  
Antenna  
Sweeping in  
the Wireless  
Industry.**

## Rugged and Reliable

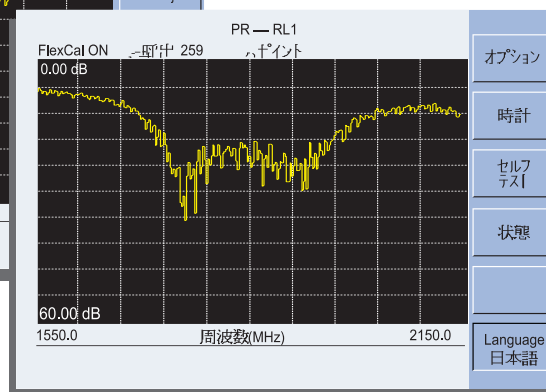
Because the Site Master was designed specifically for field environments, it can easily withstand the day-to-day punishment of field use. The analyzer is almost impervious to the bumps and bangs typically encountered by portable field-equipment.

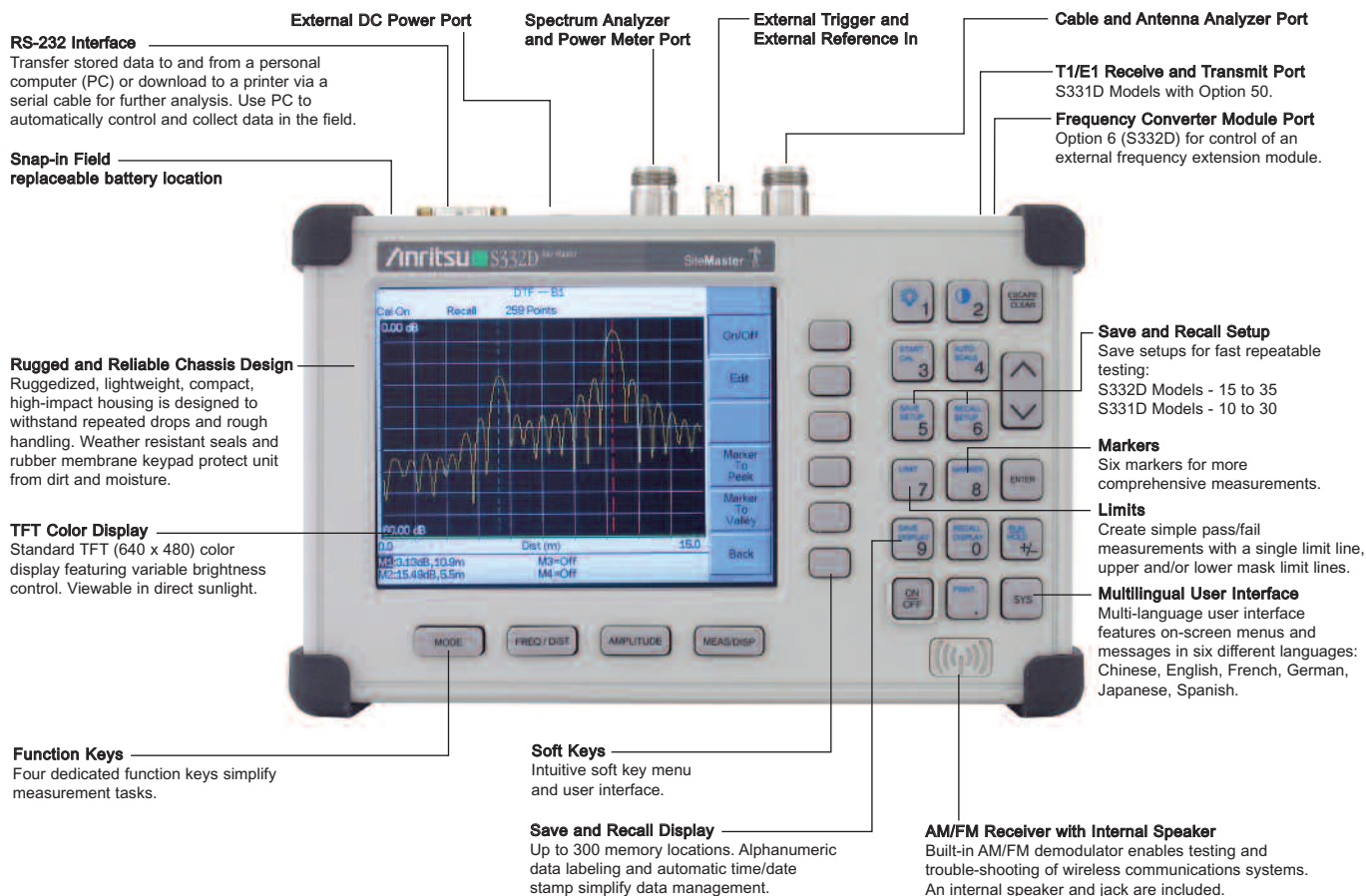
## Easy-to-Use

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 (S331D/S332D)           | Characterize antenna system and pinpoint location of faults  |
| Spectrum Analyzer (S332D)                          | Easily locate, identify and record various signals with high accuracy  |
| AM/FM Demodulator (S332D)                          | Built-in demodulator for AM, narrow band FM, wide band FM, and SSB allows technician to listen to and identify interfering signals                 |
| Standard TFT Color Display (S331D/S332D)           | Display is viewable in direct sunlight   |
| Power Monitor (S331D/S332D)                        | Performs accurate broadband power measurements using an external detector  |
| High Accuracy Power Meter (S331D/S332D)            | Performs accurate RMS power measurements for both CW and modulated signals   |
| Power Meter (S331D/S332D)                          | Performs accurate power measurements up to 3 GHz without the need of an external detector  |
| Frequency Converter Interface (S332D)              | Make measurement from 4.7 GHz to 6 GHz using an external detector  |
| 2 MHz and 6 GHz Frequency Extensions (S331D/S332D) | Extend the lower and upper frequency ranges of the cable and antenna analyzer to 2 MHz and 6 GHz for optimum frequency coverage                    |
| Built-in +12V to +24V variable Bias Tee (S332D)    | No need to use external power to bias an amplifier   |
| Transmission Measurement (S332D)                   | Perform a 2-port measurement and measure the insertion gain, loss, and isolation of Tower Mounted Amplifiers, filters, attenuators, and antennas   |
| Interference Analyzer (S332D)                      | Identify and locate interfering signals that cause dropped calls and coverage problems. Intermittent problems can be identified using spectrograms |
| Channel Scanner (S332D)                            | Measure frequency, bandwidth and power of multiple transmitted signals   |
| CW Signal Generator (S332D)                        | CW source to test low noise amplifiers, repeaters, and BTS receivers   |
| GPS Receiver (S331D/S332D)                         | Provides location (latitude, longitude, altitude) and UTC time information   |
| T1/E1 Analyzer (S331D)                             | Simplifies the task of determining if the source of problems is on the wireline or the wireless side   |

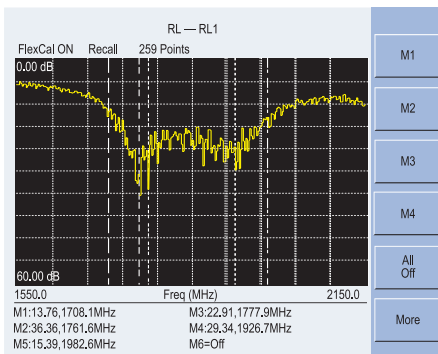
# Cable and Antenna Analysis – Increase System Uptime

## 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.

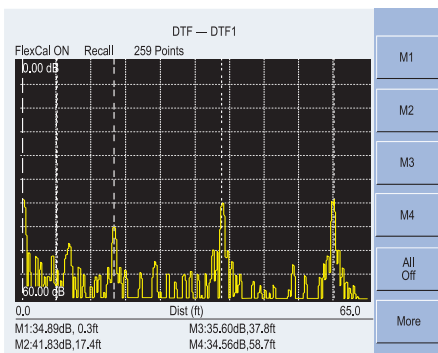
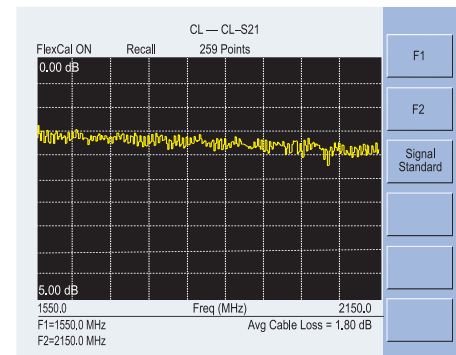


## Return Loss, SWR

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™.



# New Options Provide Cable and Antenna Analysis Coverage from 2 MHz to 6 GHz

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## 2 MHz Frequency Extension (Option 2, S331D/S332D)

The standard Site Master spans 25 MHz to 4000 MHz. Option 2 extends the lower frequency range of the cable and antenna analyzer to 2 MHz.

## 6 GHz Frequency Extension (Option 16, S331D/S332D)

Option 16 extends the standard 25 MHz to 4000 MHz frequency range of the cable and antenna analyzer to 25 MHz to 6000 MHz. Option 16 used in conjunction with option 2 provides continuous coverage of the cable and antenna analyzer from 2 MHz to 6 GHz.

## OSL Calibration

Open-Short-Load (OSL) calibration is standard for the S331D and S332D. 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 S332D 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

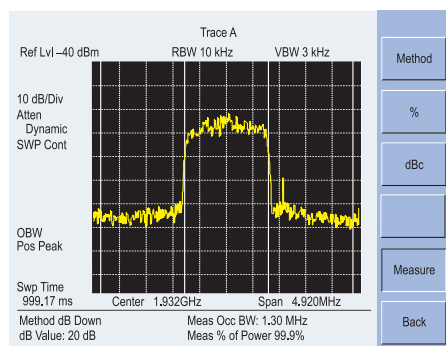
In today's wireless environment it is very common that there will be other RF activity present when making a measurement. In order to make accurate measurements in hostile RF environments, the receiver has to be able to reject the unwanted signals. Special dithering techniques are applied to the Site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

# Spectrum Analysis – Anywhere, Anytime (S332D)

The Site Master S332D integrated Spectrum Analysis capability provides the “ultimate” in measurement flexibility for field environments and applications requiring mobility. With the S332D you can locate, identify, record and solve communication systems problems quickly and easily, and with incredible accuracy – making it a perfect solution for conducting field measurements in the 100 kHz to 3 GHz frequency range.

## Smart Measurements

The S332D has dedicated routines for measurements of field strength, channel power, occupied bandwidth, Adjacent Channel Power Ratio (ACPR), Carrier-to-Interference, and interference analysis. These are increasingly critical measurements for today’s wireless communication systems. The simple interface for these complex measurements significantly reduces test time and increases analyzer usability.



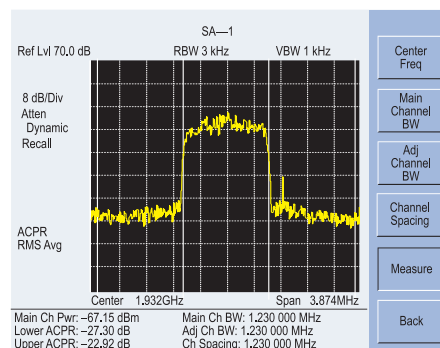
## Occupied Bandwidth

This measurement calculates the bandwidth containing the total integrated power occupied in a given signal bandwidth. There are two different methods of calculation depending on the technique used to modulate the carrier. The user can specify percent of power or the “x” dB down point, where “x” can be from 1 dB to 120 dB below the carrier.

## Adjacent Channel Power Ratio

A common transmitter measurement is that of adjacent channel leakage power. This is the ratio of the amount of leakage power in an adjacent channel to the total transmitted power in the main channel. This measurement is used to replace the traditional two-tone intermodulation distortion (IMD) test for system non-linear behavior.

The result of an ACPR measurement can be expressed either as a power ratio or a power density. In order to calculate the upper and lower adjacent channel values, the S332D allow the adjustment of four parameters to meet specific measurement needs: main channel center frequency, measurement channel bandwidth, adjacent channel bandwidth and channel spacing.



## AM/FM/SSB Demodulator

A built-in demodulator for AM, narrowband FM, wideband FM and single sideband (selectable USB and LSB) allow a technician to easily identify interfering signals.

## 6 GHz Frequency Extension

The FCN4760 is a block down converter for the 4.7 to 6.0 GHz frequency range. It is designed to work with an Anritsu Site Master S332D equipped with Option 6.

This converter is primarily intended for field use by fixed wireless engineers who are responsible for the design, deployment and optimization of 802.11a networks. It is also used to conduct interference analysis measurements to determine the level of interference and locate the sources of interference.



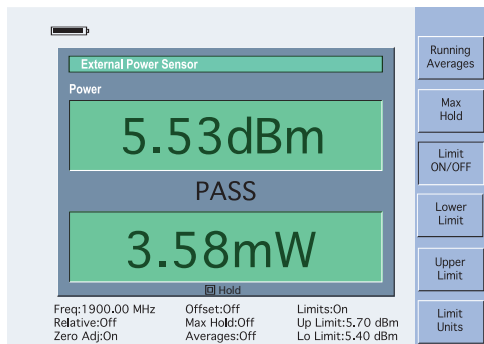
## Frequency Converter Control Module Interface (Option 6, S332D)

Connector providing internal control signals to work with the FCN4760, a block down converter designed for the 4.7 to 6 GHz frequency ranges.

# Site Master Power Measurement Options

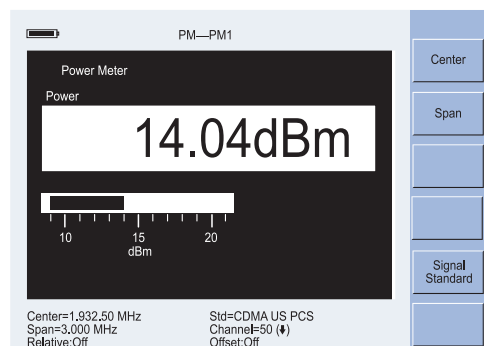
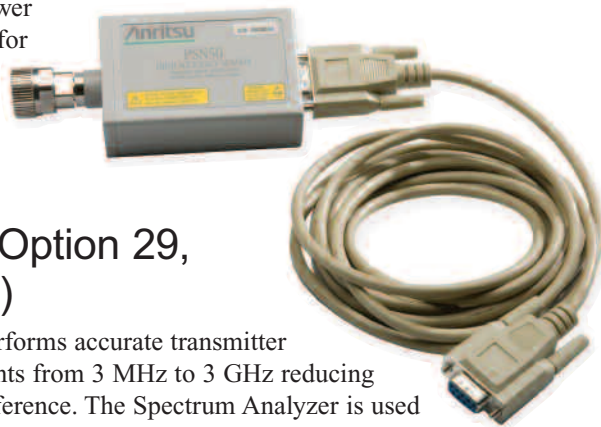
## Power Monitor (Option 5, S331D/S332D)

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.



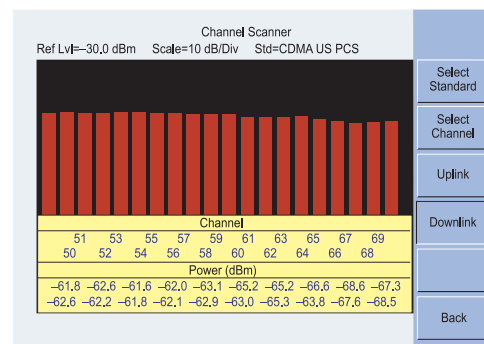
## High Accuracy Power Meter (Option 19, S331D/S332D)

Anritsu's PSN50 sensor makes high accuracy power measurement from 50 MHz to 6 GHz. The sensor provides true RMS measurements from  $-30$  to  $+20$  dBm enabling users to make accurate measurements for CW and digitally modulated signals such as CDMA/EV-DO, GSM/EDGE, and WCDMA/HSDPA. The sensor is equipped with an RS-232 interface for fast and easy connection to the Site Master. Power is displayed in both dBm and Watts. Upper and lower limits can be turned on for Pass/Fail measurements.



## Power Meter (Option 29, S331D/S332D)

The power meter tool performs accurate transmitter power meter measurements from 3 MHz to 3 GHz reducing coverage holes and interference. The Spectrum Analyzer is used to measure the channel power and results can be displayed in dBm or Watts. No external detector is required.



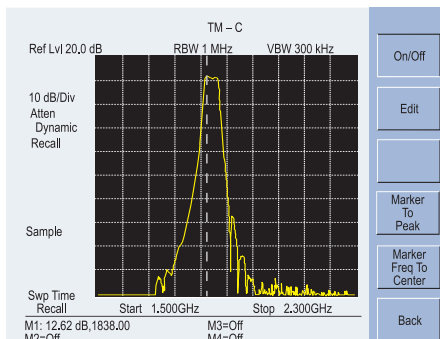
## Channel Scanner (Option 27, S332D)

The Channel Scanner option measures the power of multiple transmitted signals, and is very useful for measuring the channel power of AMPS, iDEN, GSM, and TDMA networks.

# Site Master Options (Continued)

## Built-in Bias Tee (Option 10A, S332D)

Built-in power supply can be turned on as needed to place +12 to +24V (variable in 1V steps) on the center conductor of the RF In port. It is designed to deliver 6W steady state.



## Transmission Measurement (Option 21, S332D)

Built-in signal source from 25 MHz to 3 GHz provides the capability to make 2-port measurements and measure gain, loss, or isolation of devices such as filters, cables, attenuators, amplifiers, and antennas.

## Interference Analyzer (Option 25, S332D)

The interference analyzer option displays interference in four different ways: Spectrogram, RSSI, Signal Strength, Signal ID.

### Spectrogram

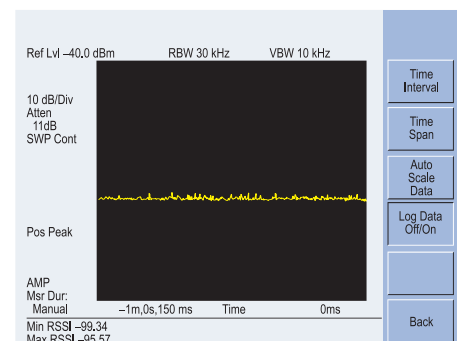
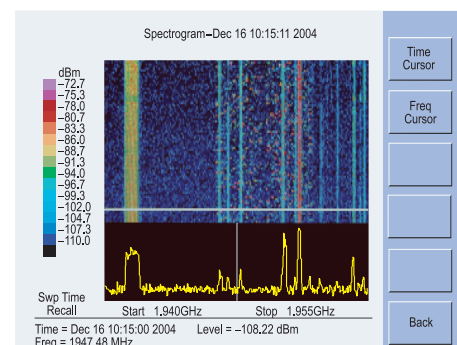
The Site Master Spectrogram is a three dimensional display of frequency, power and time of the spectrum activity to identify intermittent interference and track signal levels over time. The Site Master can save a history up to three days.

### RSSI

RSSI measurement is useful to observe the signal strength of a single frequency over time. The data can be collected for up to seven days.

### Locating an Interfering Signal

Connect a directional antenna to the Site Master and locate the interfering source by measuring the strength of the interfering signal. Signal strength is indicated as an audible beep.





# Site Master Options (Continued)

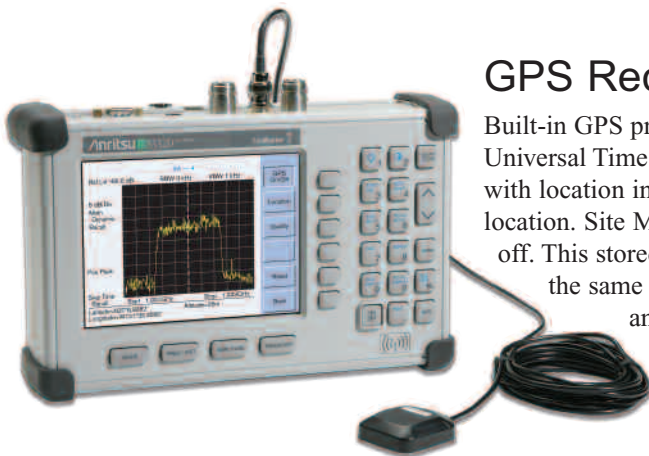
## CW Signal (Option 28, S332D)

Provides a CW signal from  $-6$  dBm to  $-80$  dBm in 1 dB step from 25 MHz to 2 GHz. The attenuator connected to the RF port can be varied from 0 to 90 dB in 1 dB steps and the splitter divides the signal into two signals: One is fed into the device under test and one is fed into the Spectrum Analyzer Receiver port. The display shows the output power and the frequency. The CW Signal mode and the Power Monitor mode can be operated simultaneously in units with both options installed providing the user with the flexibility to send out and monitor a signal at the same time.



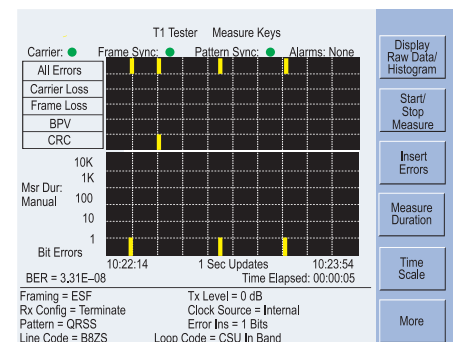
## GPS Receiver (Option 31, S331D/S332D)

Built-in GPS provides location information (latitude, longitude, and altitude) and Universal Time (UT) information. Site Master can stamp each trace with location information to check if the measurements are taken at the right location. Site Master stores the GPS location information until the unit is turned off. This stored location information can be used to stamp traces taken indoors at the same cell site location. The GPS option is offered with a magnet mount antenna with a 15-foot ( $\sim 5$ m) cable to mount on the car or other useful surface.



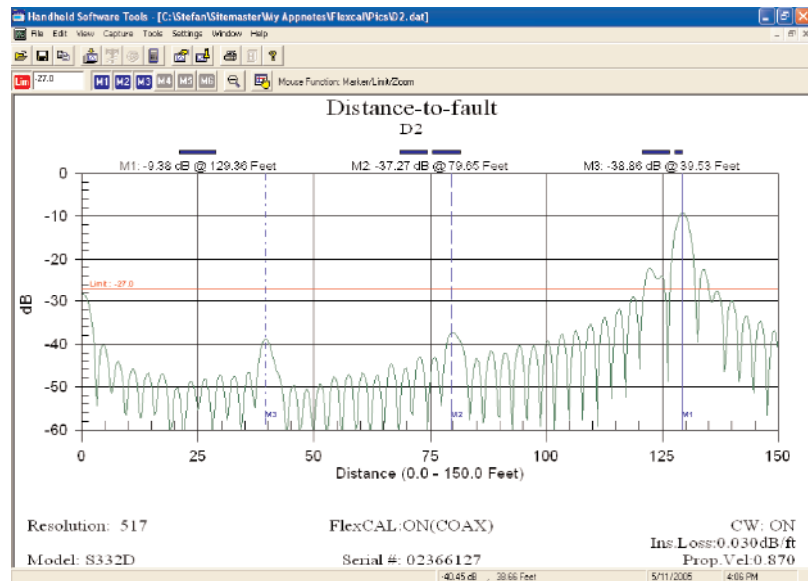
## T1/E1 Analyzer (Option 50, S331D)

Site Master built-in T1/E1 Analyzer performs T1/E1 functional tests, simplifying the task of determining if the source of the problem is on the wireline or the wireless side. Site Master can display the T1/E1 data in histogram form and collect the data for up to two days. Site Master can also measure the voltage (Vpp) of the signal and it can also be displayed as dBdsx.



# 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. 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.
- Familiar Windows 95/98/NT4/2000/ME/XP interface simplifies data analysis and report generation.
- Intelligent drag and drop automatically converts traces to a common scale and speeds fault identification.
- Supports long file names for easy measurement data identification.



# Specifications

## Cable and Antenna Analyzer (S331D/S332D)

Frequency Range: 25 MHz to 4.0 GHz  
Frequency Accuracy:  $\leq \pm 75$  ppm @  $+25^{\circ}\text{C}$   
Frequency Resolution: 100 kHz  
Output Power:  $< 0$  dBm ( $-10$  dBm nominal)  
Immunity to Interfering Signals: On-channel:  $+17$  dBm  
On-frequency:  $-5$  dBm  
Measurement Speed:  $\leq 3.5$  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 1197m (3929 ft),  
# of data pts = 130, 259 or 517  
Horizontal Resolution (Rectangular Windowing):  
Resolution (meter) =  $(1.5 \times 108) \times (\text{Vp})/\text{DF}$   
Where Vp is the cable's relative propagation velocity  
and where DF is the stop frequency minus the start  
frequency (in Hz).

## Spectrum Analyzer (S332D)

### Frequency:

Frequency Range: 100 kHz to 3.0 GHz (tunable to 9 kHz)  
Frequency Reference  
(Internal Timebase) Aging:  $\pm 1$  ppm/yr  
Accuracy:  $\pm 2$  ppm  
Frequency Span: 10 Hz to 2.99 GHz in 1, 2, and 5 step selections  
in auto mode, plus zero span  
Sweep Time:  $\leq 1.1$  sec full span  
 $\leq 50$   $\mu\text{sec}$  to 20 sec selectable in zero span  
Resolution Bandwidth ( $-3$  dB): 100 Hz to 1 MHz in 1-3 sequence  $\pm 5\%$   
Accuracy  
Video Bandwidth ( $-3$  dB): 3 Hz to 1 MHz in 1-3 sequence  $\pm 5\%$   
Accuracy typical  
SSB Phase Noise (1 GHz) @ 30 kHz Offset:  $\leq -75$  dBc/Hz  
Spurious Responses Input Related:  $\leq -45$  dBc  
Spurious Residual Responses:  $\leq -90$  dBm,  $\geq 10$  MHz  
 $\leq -80$  dBm,  $< 10$  MHz  
(10 kHz RBW, pre-amp on)

### Amplitude:

Total Level Accuracy:  $\pm 1$  dB typical ( $\pm 1.5$  dBm max),  $\leq 10$  MHz to 3 GHz  
 $\pm 2$  dB typical,  $< 10$  MHz for input signal levels  
 $\geq -60$  dBm, excludes input VSWR mismatch  
Measurement Range:  $+20$  dBm to  $-135$  dBm  
Input Attenuator Range: 0 to 51 dB, selected manually or automatically  
coupled to the reference level. Resolution in  
1 dB steps  
Displayed Average Noise Level:  $\leq -135$  dBm,  $\geq 10$  MHz (preamp on)  
 $\leq -115$  dBm,  $< 10$  MHz (preamp on) for  
input terminated, 0 dB attenuation, RMS  
detection, 100 Hz RBW  
Dynamic Range:  $> 65$  dB, typical  
Display Range: 1 to 15 dB/division, in 1 dB steps, 10 divisions displayed  
Scale Units: dBm, dBV, dBmV, dBmV, V, W  
RF Input VSWR: (with  $\geq 20$  dB atten.), 1.5:1 typical, (10 MHz to 2.4 GHz)  
2 MHz Frequency Extension (Option 2 S331D/S332D)  
Cable & antenna frequency range: 2 MHz to 4000 MHz (All other specs  
remain the same as standard S33xD)  
6 GHz Frequency Extension (Option 16 S331D/S332D)  
Cable & antenna frequency range: 25 MHz to 6000 MHz (All other specs  
remain the same as standard S33xD)  
Power Monitor (Option 5 S331D/S332D)  
Detector 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:  $\pm 1$  dB

## Bias Tee (Option 10A S332D)

Voltage:  $+12\text{V}$  to  $+24\text{V}$  (variable in 1V steps)  
Power: 6W steady state  
Current: 6W/Voltage (V)

## High Accuracy Power Meter PSN50 (Option 19 S331D/S332D)

### Sensor:

Measurement Range:  $-30$  to  $+20$  dBm  
Frequency Range: 50 MHz to 6 GHz  
Input Connector: Type N, male, 50 $\Omega$   
Max Input without Damage:  $+33$  dBm,  $\pm 25$  VDC  
Input Return Loss: 50 MHz to 2 GHz:  $\geq 26$  dB  
2 GHz to 6 GHz:  $\geq 20$  dB

### Accuracy:

Total RSS Measurement Uncertainty (0 to 50C):  $\pm 0.16$  dB\*  
Noise: 20 nW max  
Zero Set: 20 nW  
Zero Drift: 10 nW max\*\*  
Sensor Linearity:  $\pm 0.13$  dB max  
Instrumentation Accuracy: 0.00 dB  
Sensor Cal Factor Uncertainty:  $\pm 0.06$  dB  
Temperature Compression:  $\pm 0.06$  dB max  
Continuous Digital Modulation Uncertainty:  $+0.06$  dB ( $+17$  to  $+20$  dBm)  
\*Excludes mismatch errors.  
Excludes noise, zero set, zero drift for levels  $< -20$  dBm.  
Excludes digital modulation uncertainty between  $+17$  and  $+20$  dBm.  
\*\*After 30 minute warm-up

### System:

Measurement Resolution: 0.01 dB  
Offset Range:  $\pm 60$  dB

## Power Requirements:

Supply Voltage: 8 to 18 Vdc  
Supply Current:  $< 100$  mA

## Transmission Measurement (Option 21 S332D)

Frequency Range: 25 MHz to 3.0 GHz  
Frequency Resolution: 10 Hz  
Output Power Level:  $-10$  dBm typical  
Dynamic Range: 80 dB, 25 MHz to 2 GHz  
60 dB,  $> 2$  GHz to 3 GHz

Output Impedance: 50 $\Omega$

## Channel Scanner (Option 27 S332D))

Frequency Range: 100 kHz to 3.0 GHz  
Frequency Accuracy:  $\pm 10$  Hz + Time base error, 99% confidence level  
Measurement Range:  $+20$  dBm to  $-100$  dBm  
Channel Power:  $\pm 1$  dB typical ( $\pm 1.5$  dB max)  
Adjacent Channel Power Accuracy:  $\pm 0.75$  dBc

## Power Meter (Option 29 S331D/S332D)

Frequency Range: 3 MHz to 3.0 GHz  
Measurement Range:  $-80$  dBm to  $+20$  dBm ( $+80$  dBm with  
60 dB external attenuator)  
Display Range:  $-80$  dBm to  $+80$  dBm  
Offset Range: 0 to  $+60$  dB  
Accuracy\*\*\*:  $\pm 1$  dB typical ( $\pm 1.5$  dBm max),  $> 2$  GHz to 3 GHz  
 $\pm 2$  dB typical, 3 MHz to  $< 10$  MHz  
VSWR: 1.5:1 typical ( $P_{in}$   $> -30$  dBm, 10 MHz to 2.4 GHz)  
Maximum Power:  $+20$  dBm (0.1W) without external attenuator  
\*\*\*Excludes Input VSWR

## GPS (Option 31 S331D/S332D)

GPS Location Indicator  
Latitude, Longitude, and Altitude on Display  
Latitude, Longitude, and Altitude with trace storage

## T1 Analyzer (Option 50 S331D)

Line Coding: AMI, B8ZS  
Framing Modes: D4 (Superframe)  
ESF (Extended Superframe)  
Connection Configurations: Terminate (100 $\Omega$ )  
Bridge ( $\geq 1000\Omega$ )  
Monitor (Connect via 20 dB pad in DSX)  
Receiver Sensitivity: 0 to  $-36$  dBdSx  
Transmit Level: 0 dB,  $-7.5$  dB, and  $-15$  dB  
Clock Sources: External  
Internal 1.544 MHz  $\pm 30$  ppm  
Pulse Shapes: Conform to ANSI T1.403

Pattern Generation and Detection: PRBS: 2-9, 2-11, 2-15, 2-20, 2-23  
Inverted and non-inverted, QRSS,  
1-in-8 (1-in-7), 2-in-8, 3-in-24,  
All ones, All zeros, T1-Daly,  
User defined ( $\leq 32$  bits)

Circuit Status Reports: Carrier present, Frame ID and Sync,  
Pattern ID and Sync

Alarm Detection: AIS (Blue Alarm), RAI (Yellow Alarm)

Error Detection: Frame Bits, Bit, BER, BPV, CRC, Error Sec

Error Insertion: Bit, BPV, Framing Bits, RAI, AIS

Loopback Modes: Self loop, CSU, NIU, User defined, In-band or Data  
Link

Level Measurements: Vp-p ( $\pm 5\%$ )

Data Log: Continuous, up to 48 hrs.

## E1 Analyzer (Option 50 S331D)

Line Coding: AMI, HDB3

Framing Modes: PCM30, PCM30CRC, PCM31, PCM31CRC

Connection Configurations: Terminate (75 $\Omega$ , 120 $\Omega$ )  
Bridge ( $\geq 1000\Omega$ )  
Monitor (Connect via 20 dB pad in DSX)

Receiver Sensitivity: 0 to  $-43$  dB

Transmit Level: 0 dB,  $-7.5$  dB, and  $-15$  dB

Clock Sources: External

Internal 2.048 MHz  $\pm 30$  ppm

Pulse Shapes: Conform to ITU G.703

Pattern Generation and Detection: PRBS: 2-9, 2-11, 2-15, 2-20, 2-23  
Inverted and non-inverted, QRSS,  
1-in-8 (1-in-7), 2-in-8, 3-in-24, All  
ones, All zeros, T1-Daly, User defined  
( $\leq 32$  bits)

Circuit Status Reports: Carrier present, Frame ID and Sync, Pattern ID  
and Sync

Alarm Detection: AIS, RAI, MMF

Error Detection: Frame Bits, Bit, BER, BPV, CRC, E-Bits, Error Sec

Error Insertion: Bit, BPV, Framing Bits, RAI, AIS

Loopback Modes: Self loopback

Level Measurements: Vp-p ( $\pm 5\%$ )

Data Log: Continuous, up to 48 hrs.

## General

Language Support: Chinese, English, French, German, Japanese,  
Spanish

Internal Trace Memory: 300 traces

Setup Configuration: S332D - 15 to 35, S331D - 10 to 30

Display: TFT color LCD with adjustable backlight

Inputs and Outputs Ports:

RF Out: Type N, female, 50 $\Omega$

Maximum Input without Damage:  $+23$  dBm,  $\pm 50$  VDC

RF In: Type N, female, 50 $\Omega$

Maximum Input without Damage:  $+43$  dBm (peak),  $\pm 50$  VDC

Ext. Trig In: BNC, female (5V TTL) (S332D Models only)

Ext. Freq Ref In (2 to 20 MHz): Shared BNC, female, 50 $\Omega$ ,

( $-15$  dBm to  $+10$  dBm) (S332D Models only)

T1/E1 (Receive and Transmit): Bantam Jack (S331D Models with  
Option 50 only)

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:  $-10^{\circ}\text{C}$  to  $55^{\circ}\text{C}$ , humidity 85% or less

Non-operating:  $-51^{\circ}\text{C}$  to  $+71^{\circ}\text{C}$  (Recommend the battery be stored  
separately between  $0^{\circ}\text{C}$  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

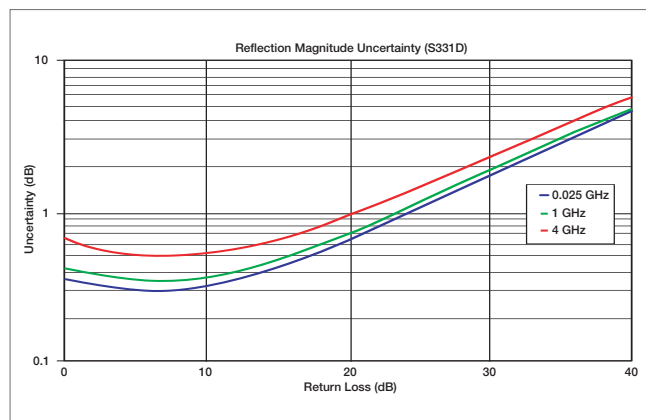
Dimensions:

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)

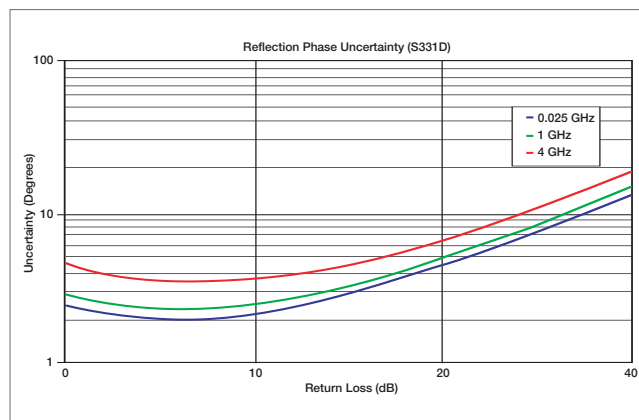
Weight:  $< 2.28$  kg ( $< 5$  lbs) includes battery

# 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.

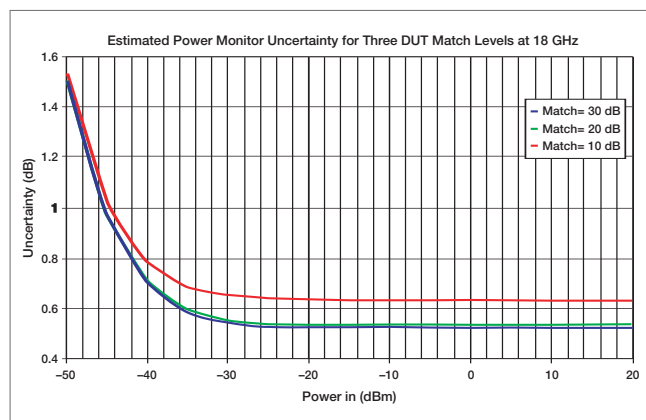


Reflection Magnitude Uncertainty

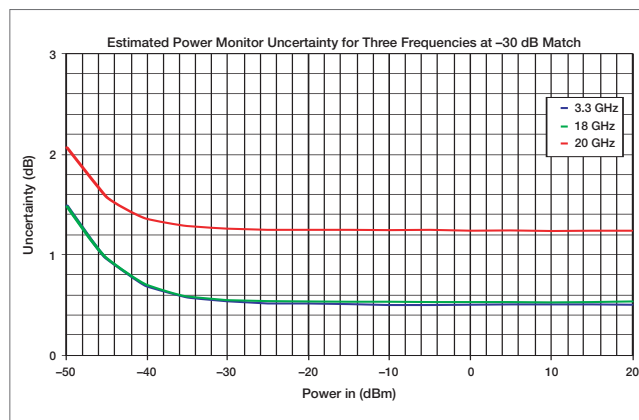


Reflection Phase Uncertainty

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

# Ordering Information

## Basic Models

|       |   |
|-------|---|
| S331D | Cable and Antenna Analyzer (25 MHz to 4.0 GHz)  |
| S332D | Cable and Antenna Analyzer (25 MHz to 4.0 GHz),<br>Spectrum Analyzer (100 kHz to 3.0 GHz) |

## Options

|            |   |
|------------|---|
| Option 2   | 2 MHz frequency extension (S331D/S332D)   |
| Option 5   | Power Monitor - requires external detector (S331D/S332D)                                |
| Option 6   | Frequency Converter Control Module Interface - can not be ordered with Option 5 (S332D) |
| Option 10A | +12 to +24V Variable (1V steps) Bias Tee (S332D)  |
| Option 16  | 6 GHz frequency extension,<br>Cable & Antenna Analyzer (S331D/S332D)                    |
| Option 19  | High Accuracy Power Meter (S331D/S332D)<br>(PSN50 sensor not included)                  |
| Option 21  | Transmission Measurement (S332D)  |
| Option 25  | Interference Analyzer - requires color display and requires directional antenna (S332D) |
| Option 27  | Channel Scanner (S332D)   |
| Option 28  | CW Signal Generator - requires<br>CW Signal Generator Kit (S332D)                       |
| Option 29  | Power Meter - does not require<br>external detector (S331D/S332D)                       |
| Option 31  | GPS Receiver for location information.<br>Includes GPS antenna (S331D/S332D)            |
| Option 50  | T1/E1 Analyzer - can not be ordered with<br>Option 5 (S331D)                            |

## Standard Accessories

|             |   |
|-------------|---|
| 10580-00079 | S331D/S332D Site Master User's Guide            |
| 2300-347    | Anritsu Handheld Software Tools CDROM           |
| 48258       | Soft Carrying Case                              |
| 633-27      | Rechargeable Battery, NiMH                      |
| 40-168      | AC-DC Adapter with Power Cord                   |
| 806-141     | Automotive Cigarette Lighter/12 Volt DC Adapter |
| 800-441     | Serial Interface Cable<br>One Year Warranty     |

## Optional Accessories

|            |  |
|------------|--|
| FCN4760    | Frequency Converter, 4.7 GHz to 6 GHz  |
| 1N50C      | Limiter, N(m) to N(f), 50Ω, 10 MHz to 18 GHz   |
| 65701      | Offset Cal Kit consisting of one each:<br>3-1010-119, 10 dB Attenuator, DC to 6 GHz 2W<br>3-806-151, 4 GHz Cable, 18 in. (46 cm) |
| 2000-1410  | Magnet mount GPS antenna with 15 ft. cable   |
| 61534      | CW Signal Generator Kit with variable step attenuator  |
| 551-1691-R | USB to RS-232 adapter cable  |
| 48258      | Soft Carrying Case   |
| 760-243-R  | Transit Case   |
| 633-27     | Rechargeable Batter, NiMH  |
| 2000-1029  | Battery Charger, NiMH, with Universal Power Supply   |
| 40-168     | AC/DC Adapter  |
| 806-141    | Automotive Cigarette Lighter/12Volts DC Adapter  |
| 800-441    | Serial Interface Cable   |
| 806-16     | Bantam Plug to Bantam Plug   |
| 806-116    | Bantam Plug to BNC   |
| 806-117    | Bantam "Y" Plug to RJ48  |
| 2300-347   | Software Tools   |

## Calibration Components

|            |  |
|------------|--|
| ICN50      | InstaCal™ Calibration Module,<br>25 MHz to 4.0 GHz, N(m), 50Ω N(m)-N(f)<br>Open/Short, DC to 18 GHz, N(m), 50Ω |
| 22N50      | Open/Short, DC to 18 GHz, N(f), 50Ω  |
| 22NF50     | Precision Load, DC to 6 GHz, 42 dB, N(m), 50Ω  |
| SM/PL-1    | Precision Load, DC to 6 GHz, 42 dB, N(f), 50Ω  |
| SM/PLNF-1  | Precision Open/Short/Load, DC to 6 GHz, 42 dB, 50Ω, N(m)   |
| OSLN50-1   | Precision Open/Short/Load, DC to 6 GHz, 42dB, 50Ω, N(m)  |
| OSLN50LF-1 | Precision Open/Short/Load, DC to 4 GHz, 7/16 DIN(m), 50Ω   |
| 2000-767   | Precision Open/Short/Load, DC to 4 GHz, 7/16 DIN(m), 50Ω   |
| 2000-768   | Precision Open/Short/Load, DC to 4 GHz, 7/16 DIN(m), 50Ω   |
| 22N75      | Open/Short, DC to 3 GHz, N(m) 75Ω  |
| 22NF75     | Open/Short, DC to 3 GHz, N(m) 75Ω  |
| 26N75A     | Precision Termination, DC to 3 GHz, N(m) 75Ω   |
| 26NF75A    | Precision Termination, DC to 3 GHz, N(f) 75Ω   |
| 12N50-75B  | Matching Pad, DC to 3 GHz, 50Ω to 75Ω  |

## Adapters

|          |   |
|----------|---|
| 34NN50A  | Precision Adapter, N(m)-N(m), DC to 18 GHz, 50Ω     |
| 34NFFN50 | Precision Adapter, N(f)-N(f), DC to 18 GHz, 50Ω     |
| 1091-26  | Adapter, N(m)-SMA(m), DC to 18 GHz, 50Ω             |
| 1091-27  | Adapter, N(m)-SMA(f), DC to 18 GHz, 50Ω             |
| 1091-80  | Adapter, N(f)-SMA(m), DC to 18 GHz, 50Ω             |
| 1091-81  | Adapter, N(f)-SMA(f), DC to 18 GHz, 50Ω             |
| 1091-172 | Adapter, N(m)-BNC(f), DC to 1.3 GHz, 50Ω            |
| 510-90   | Adapter, 7/16 DIN(f)-N(m), DC to 7.5 GHz, 50Ω       |
| 510-91   | Adapter, 7/16 DIN(f)-N(f), DC to 7.5 GHz, 50Ω       |
| 510-92   | Adapter, 7/16 DIN(m)-N(m), DC to 7.5 GHz, 50Ω       |
| 510-93   | Adapter, 7/16 DIN(m)-N(f), DC to 7.5 GHz, 50Ω       |
| 510-96   | Adapter, 7/16 DIN(m)-7/16DIN(m), DC to 7.5 GHz, 50Ω |
| 510-97   | Adapter, 7/16 DIN(f)-7/16DIN(f), DC to 7.5 GHz, 50Ω |

## Test Port Cable Armored

|              |  |
|--------------|--|
| 15NN50-1.5C  | Test Port Cable Armored, 1.5 meters,<br>N(m)-N(m), 6 GHz, 50Ω        |
| 15NN50-3.0C  | Test Port Cable Armored, 3.0 meters,<br>N(m)-N(m), 6 GHz, 50Ω        |
| 15NN50-5.0C  | Test Port Cable Armored, 5.0 meters,<br>N(m)-N(m), 6 GHz, 50Ω        |
| 15NNF50-1.5C | Test Port Cable Armored, 1.5 meters,<br>N(m)-N(f), 6 GHz, 50Ω        |
| 15NNF50-3.0C | Test Port Cable Armored, 3.0 meters,<br>N(m)-N(f), 6 GHz, 50Ω        |
| 15NNF50-5.0C | Test Port Cable Armored, 5.0 meters,<br>N(m)-N(f), 6 GHz, 50Ω        |
| 15ND50-1.5C  | Test Port Cable Armored, 1.5 meters,<br>N(m)-7/16 DIN(m), 6 GHz, 50Ω |
| 15NDF50-1.5C | Test Port Cable Armored, 5.0 meters,<br>N(m)-7/16 DIN(f), 6 GHz, 50Ω |

# Ordering Information (Continued)

## Portable Antennas

|           |   |
|-----------|---|
| 2000-1030 | SMA(m), 1.71 to 1.88 GHz, 50Ω               |
| 2000-1031 | SMA(m), 1.85 to 1.99 GHz, 50Ω               |
| 2000-1032 | SMA(m), 2.4 to 2.5 GHz, 50Ω                 |
| 2000-1035 | SMA(m), 896 to 941 MHz, 50Ω                 |
| 2000-1361 | SMA(m), 5725 to 5825 MHz, 50Ω               |
| 2000-1200 | SMA(m), 806 to 869 MHz, 50Ω                 |
| 2000-1473 | SMA(m), 870 to 960 MHz, 50Ω                 |
| 2000-1474 | SMA(m), 1.71 to 1.88 GHz, 50Ω               |
| 2000-1475 | SMA(m), 1920 to 1980, 2.11 to 2.17 GHz, 50Ω |

## 61532 Antenna Kit:

2000-1030, 2000-1031, 2000-1032, 2000-1035, 2000-1200, and 2000-1361

## Directional Antennas

|           |  |
|-----------|--|
| 2000-1411 | Portable Yagi Antenna, 10 dBd, N(f), 822 to 900 MHz    |
| 2000-1412 | Portable Yagi Antenna, 10 dBd, N(f), 885 to 975 MHz    |
| 2000-1413 | Portable Yagi Antenna, 10 dBd, N(f), 1710 to 1880 MHz  |
| 2000-1414 | Portable Yagi Antenna, 9.3 dBd, N(f), 1850 to 1990 MHz |
| 2000-1415 | Portable Yagi Antenna, 12 dBd, N(f), 2400 to 2500 MHz  |
| 2000-1416 | Portable Yagi Antenna, 12 dBd, N(f), 1920 to 2230 MHz  |

## Band Pass Filters

|          |                                       |
|----------|---------------------------------------|
| 1030-105 | 890 to 915 MHz Band, N(m)-N(f), 50Ω   |
| 1030-106 | 1710 to 1790 MHz Band, N(m)-N(f), 50Ω |
| 1030-107 | 1910 to 1990 MHz Band, N(m)-N(f), 50Ω |
| 1030-109 | 824 to 849 MHz Band, N(m)-N(f), 50Ω   |
| 1030-110 | 880 to 915 MHz Band, N(m)-N(f), 50Ω   |

## Attenuators

|            |  |
|------------|--|
| 42N50-20   | 20 dB, 5W, DC to 18 GHz, N(m)-N(f)                     |
| 42N50A-30  | 30 dB, 50W, DC to 18 GHz, N(m)-N(f)                    |
| 1010-121   | 40 dB, 100W, DC to 18 GHz, N(m)-N(f)                   |
| 3-1010-122 | 20 dB, 5W, DC to 12.4 GHz, N(m)-N(f)                   |
| 3-1010-123 | 30 dB, 50W, DC to 8.5 GHz, N(m)-N(f)                   |
| 3-1010-124 | 40 dB, 100W, DC to 8.5 GHz, N(m)-N(f), Uni-directional |

## High Accuracy Power Meter Accessories

|            |  |
|------------|--|
| PSN50      | High Accuracy Power Sensor, 50 MHz to 6 GHz  |
| 40-168     | AC-DC Adapter  |
| 800-441    | Serial Interface Cable   |
| 3-1010-122 | Attenuator, 20 dB, 5 Watt, DC to 12.4 GHz, N(m)-N(f)   |
| 3-1010-123 | Attenuator, 30 dB, 50 Watt, DC to 8.5 GHz, N(m)-N(f)   |
| 3-1010-124 | Attenuator (Uni-directional), 40 dB, 100 Watt, DC to 8.5 GHz, N(m)-N(f)  |
| 65701      | 3 GHz Offset Cal Kit consisting of one each:<br>3-1010-119, 10 dB Attenuator, DC to 6 GHz, 2W<br>3-806-151, 4 GHz Cable, 18" (46 cm) |

## Printers

|           |   |
|-----------|---|
| 2000-1214 | HP DeskJet Printer, Model 450: Includes printer cable, 2000-1216 black print cartridge and U.S. power cord. Also includes 2000-753 serial-to-parallel Centronics converter cable and 1091-310 Centronics-to DB25 adapter. Rechargeable battery is optional and is not included. |
| 2000-1216 | Black Print Cartridge   |
| 2000-1217 | Rechargeable Battery for DeskJet Printer, Model 450   |
| 2000-1218 | Power Cable (U.K.) for DeskJet Printer  |
| 2000-663  | Power Cable (Europe) for DeskJet Printer  |
| 2000-664  | Power Cable (Australia) for DeskJet Printer   |
| 2000-667  | Power Cable (S. Africa) for DeskJet Printer   |
| 2000-753  | Null Modem Serial-to-Parallel Centronics Converter Cable  |

## Product Literature

|             |   |
|-------------|---|
| 10580-00079 | S331D/S332D Site Master User's Guide      |
| 10580-00100 | S331D/S332D Site Master Programming Guide |



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