

# Site Master™

Transmission Line and Antenna Analyzer

2 MHz - 20 GHz



*The World's Leading Cable and Antenna System Analyzer*

# THE LEADING CABLE AND ANTENNA ANALYZER FOR WIRELESS PROFESSIONALS

Anritsu's Site Master cable and antenna analyzer is the preferred choice of service providers, network operators and contractors worldwide who install, deploy, maintain and troubleshoot wireless communication systems.

Featuring an advanced synthesizer-based, handheld, battery-operated design, Site Master helps wireless field engineers and technicians detect cable feedline and antenna system problems before they become costly, time-consuming system failures. Superior immunity to ambient RF levels, and excellent directivity and source match ensure accurate and repeatable measurements.

## Easy-to-Use

Site Master's menu driven interface requires little training and simplifies the field engineers and technicians task of deployment, site-to-site maintenance and troubleshooting by identifying, recording and solving problems without sacrificing measurement accuracy.

- Store ten test setups for fast repeatable testing.
- Store up to 200 measurement traces in nonvolatile memory.
- Quickly select cable type and test parameters without setup error.
- Multilingual user interface features on screen menus and messages in 6-different languages.
- InstaCal® calibration module simplifies Site Master calibration.

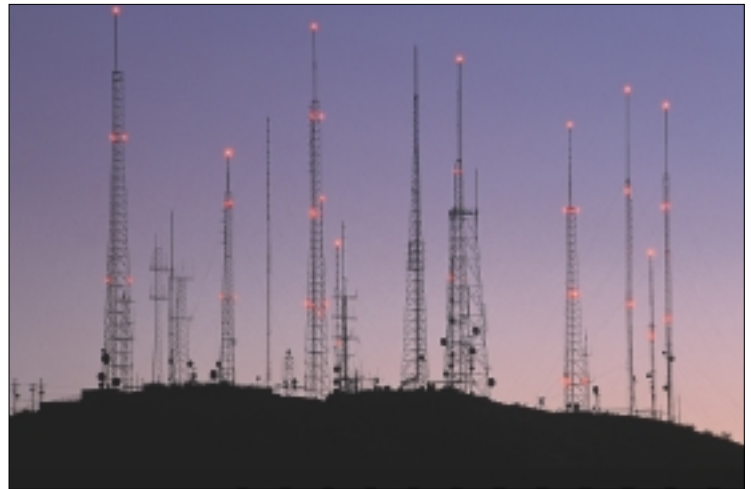
## Accurate, Repeatable Measurements

Utilizing vector error correction, Site Master delivers accurate, reliable and repeatable Return Loss/SWR and Fault Location measurements. Site Master's high immunity to interference allows users to conduct measurements of an active site without the loss of accuracy.

- Locate long range problems with 517 data points.
- Superior immunity to on-channel interference for testing at co-located antenna sites.
- Large, high-resolution display allows for easy viewing and trace interpretation under a variety of conditions.
- Full range of marker and limit functions facilitate quick, comprehensive measurements.

## Rugged and Reliable

Designed specifically for field environments, Site Master withstands harsh environments and rough handling. Built-in energy conservation combined with a rechargeable battery pack allows users to extend battery life beyond an eight hour work day. Site Master can also be operated from a 12.5 Vdc source such as an AC-DC adapter or automotive cigarette lighter adapter, which also simultaneously charges the battery.



## Powerful Data Analysis Software

Powerful data analysis software comes with every Site Master unit, providing users with an easy method of analyzing system performance, trends and problems in addition to professional report generation.

- Site Master PC software is Windows 95/98/2000/ME and NT workstation compatible and supports long alpha-numeric file names for descriptive data labeling.
- Store an unlimited number of data traces for comparison to historical performance.
- Quickly and easily download data traces from the Site Master to a PC database with a single menu selection.



*Site Master Software Tools provides a data base to compare maintenance interval performance to site commissioning data. The Distance-To-Fault display pinpoints problem areas before they degenerate into failures. In the graph to the left, a loosened connector changes the return loss characteristic from 38 dB to 33 dB (< 0.05 SWR increase). Although the above cable sweeps appear to meet specifications, they are indicative of a probable loose weather seal which will eventually allow water intrusion.*

# The Picture is Actual Size . . .

## RS-232 Interface

Download stored data to a personal computer (PC) or a printer via a serial cable for further analysis. Use your notebook computer to automatically control and collect data in the field. Use a modem for remote operation.

## Rugged Chassis Design

Ruggedized, lightweight, high-impact housing ideally suited for handheld operation and field environments. A softcase is provided for easy carrying and additional environmental protection.

## Large High Resolution Display

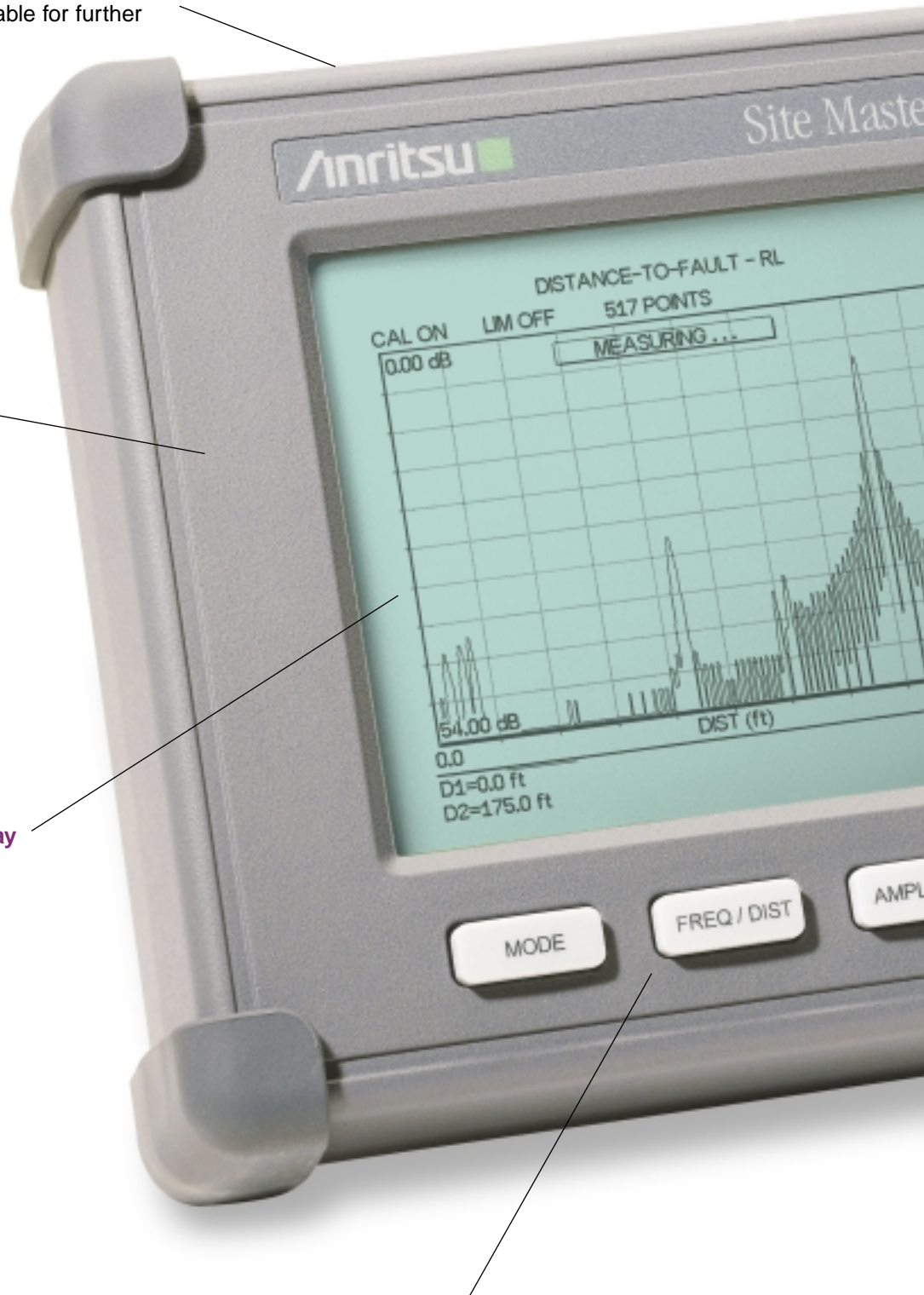
High resolution (640x480) display featuring contrast and back-lighting capability. Easy viewing under a variety of lighting conditions.

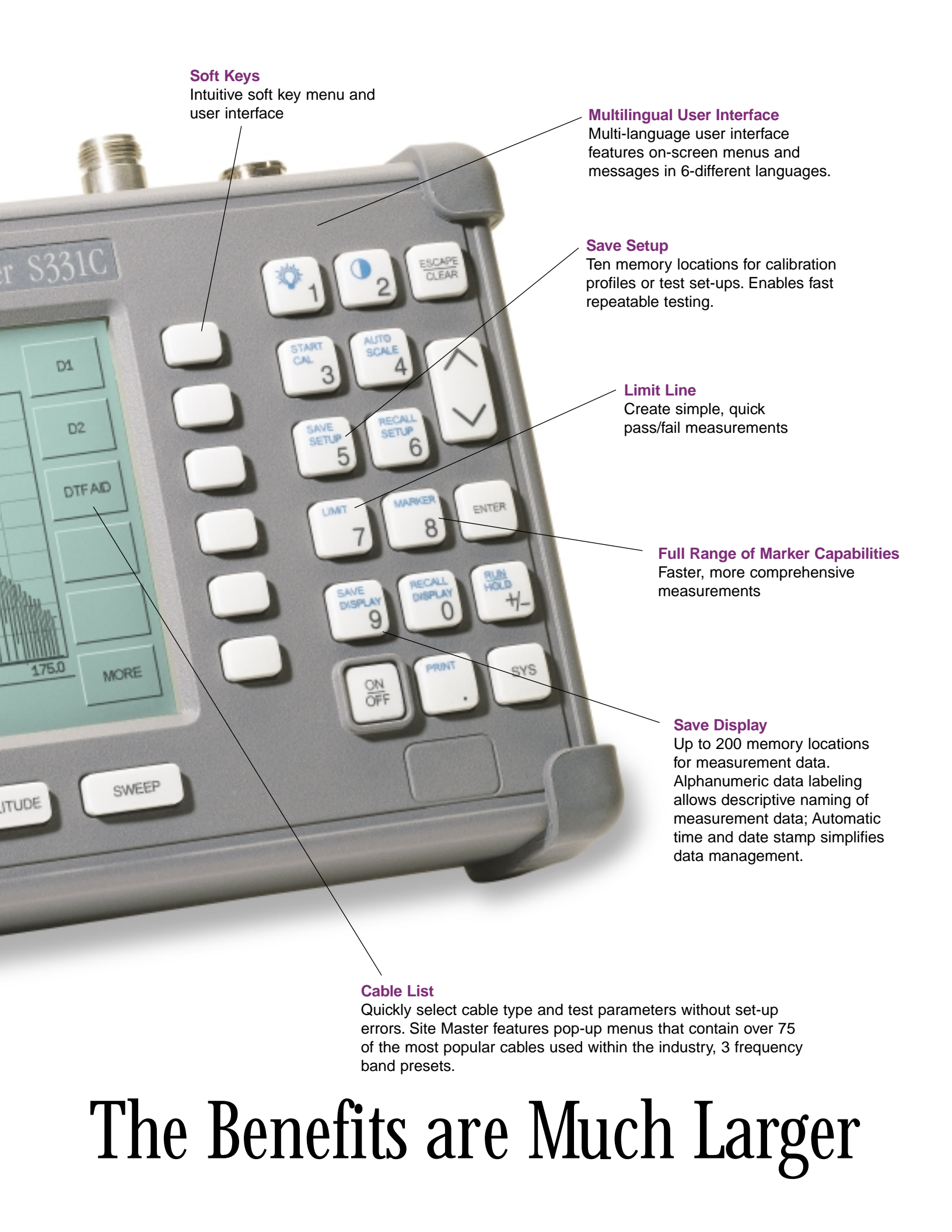
## Unit Measurements

Metric: 2.54 x 17.8 x 6.10 cm  
Inches: 10 x 7 x 2.4 in

## Function Keys

Four dedicated function keys simplify measurement tasks.





**Soft Keys**

Intuitive soft key menu and user interface

**Multilingual User Interface**

Multi-language user interface features on-screen menus and messages in 6-different languages.

**Save Setup**

Ten memory locations for calibration profiles or test set-ups. Enables fast repeatable testing.

**Limit Line**

Create simple, quick pass/fail measurements

**Full Range of Marker Capabilities**

Faster, more comprehensive measurements

**Save Display**

Up to 200 memory locations for measurement data. Alphanumeric data labeling allows descriptive naming of measurement data; Automatic time and date stamp simplifies data management.

**Cable List**

Quickly select cable type and test parameters without set-up errors. Site Master features pop-up menus that contain over 75 of the most popular cables used within the industry, 3 frequency band presets.

# The Benefits are Much Larger

# EASY-TO-USE, REDUCES ERROR, INCREASES SYSTEM UPTIME

## 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.

Site Master's approach to preventive maintenance pays for itself quickly. A poorly installed cable, connector, or connector weather seal will degrade system performance and, if undetected, will eventually damage expensive coaxial cable. Only Site Master has the sensitivity to identify cable, connector and antenna related problems before system performance is compromised.

## 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 feedline and antenna systems at their proper operating frequency.

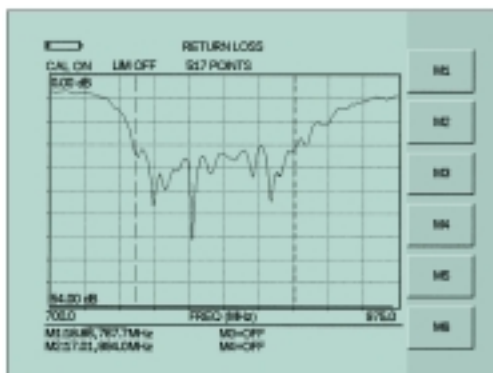
Deficient connectors, lightning arrestors, cables, jumpers, or antennas are replaced before call quality is compromised.

## Quick, Simple Measurements

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

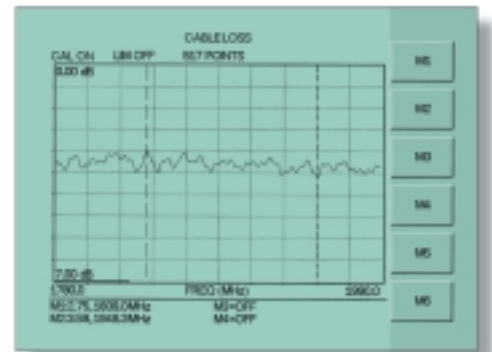
## Return Loss, SWR

Return Loss and/or 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

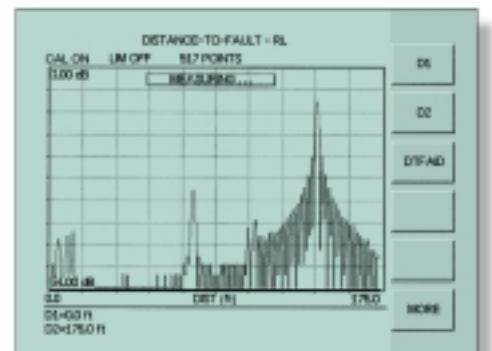
Cable Loss measurements measure the level of insertion loss within the cable feedline system. Insertion loss can be verified prior to deployment, when you have access to both ends of the cable, or on installed cables without access to the opposite end.



## Distance-to-Fault

Although a Return Loss test can tell users the magnitude of signal reflections, it can not tell the precise location of a fault within the feedline system. Distance-To-Fault measurements provide the clearest indication of trouble areas (screen display below) 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.



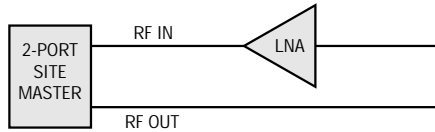
*Distance-To-Fault pinpoints the location and reflection amplitude of transmission line components.*

# SITE MASTER S251C FOR 2-PORT/TOWER TOP APPLICATIONS

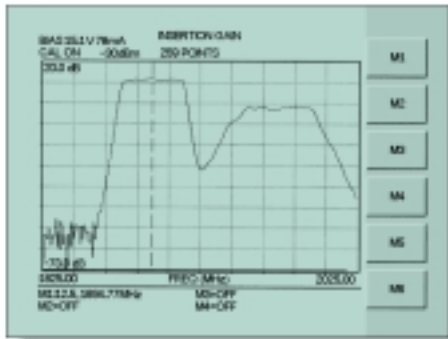
Performance enhancing design trends such as high sector-to-sector isolation, tower-mounted amplifiers and duplexed antennas add new complexities to site installation, deployment, maintenance and troubleshooting. To help simplify performance verification for these systems, a second test port for isolation, gain and insertion loss measurements is required. Addressing this need, the Site Master S251C features a second test-port for testing sector-to-sector isolation, tower-mounted amplifiers and duplexed antennas.

## Gain

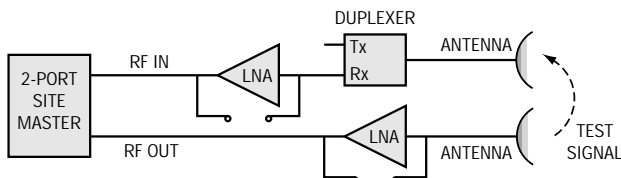
The Site Master S251C, features a selectable output power at +6 dBm or -30 dBm and an optional, built-in Bias Tee, to enable two-port insertion gain measurement of Tower Mounted Amplifiers (TMA) without the need of an external supply through the PDU (Power Distribution Unit) and an external attenuator. This greatly simplifies the technician's task of verifying amplifier and system performance during installation or periodic maintenance and troubleshooting intervals. Site Master's industry leading high RF interference immunity allows test



*Amplifier Gain Test Measurement.*



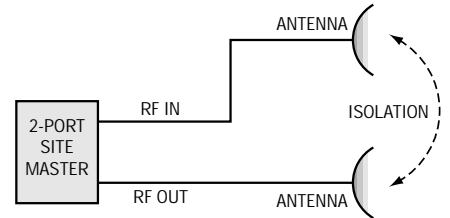
signal injection between antennas with a minimum of interference induced distortion and is designed to perform both installation and maintenance tests from ground level.



*Site Master's high dynamic range enables LNA measurements at ground level.*

## Isolation

Improving isolation between antenna sectors can reduce cell-to-cell RF Interference and improve system coverage and capacity. To address this measurement requirement, the Site Master S251C features high dynamic range, which ensures that antenna isolation is accurately measured during deployment and during periodic maintenance intervals – including the extremely high >90 dB isolation ranges required at RF-RF repeater sites.



*Accurately measure antenna isolation with Site Master's high dynamic range.*

Measuring antenna isolation during periodic maintenance intervals conveniently verifies antenna position after harsh weather. If the antenna has been moved from the installed mounting angle, the change in side lobe and back lobe coupling magnitudes between the antennas causes a clear performance change. Tx-Rx isolation of duplexers and filters is easily tested with Site Master's >90 dB dynamic range. Filters are easily aligned and verified to manufacturer's specifications.

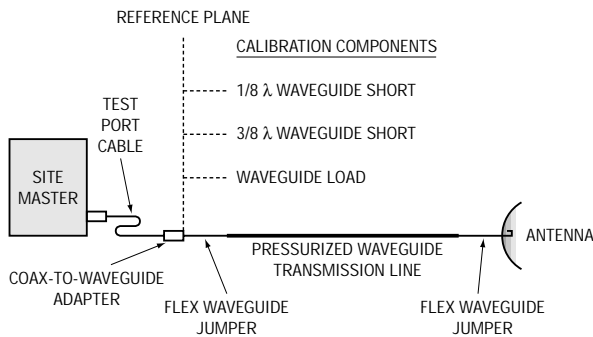


# SITE MASTER S800 SERIES FOR MICROWAVE APPLICATIONS

The Site Master S800 series, is the most accurate and convenient tool available for field installation, verification, troubleshooting and repair of microwave communication systems. Difficult test specifications are easy to verify. The S800 series improves quality and reduces maintenance expenses by providing vector corrected calibration and a convenient user interface. These new microwave Site Master models test both waveguide and coaxial cables more conveniently than laboratory-sized scalar analyzers or microwave test sets.

## Vector Error Correction

Vector error correction within the S800 series improves the quality and convenience of measurements compared to traditional scalar techniques. Accuracy and repeatability account for errors such as test port match and source match errors. Vector correction allows the test port to achieve the highest commercial directivity to 50 dB (frequency range dependent) using relatively small calibration components.



*Vector Correction Avoids Bulky Waveguide Coupler*

## Waveguide Calibration

The test port interface to the waveguide under test is a small coaxial-to-waveguide adapter rather than a bulky precision coupler.

The calibration components include two offset shorts, 1/8 and 3/8 wavelength, and a precision load. The two offset shorts eliminate reference error suffered by scalar systems when only a single waveguide short is used to determine the 0.0 dB reflection reference level. Site Master's innovative flange design mates to square, rectangular or circular flanges. For a given waveguide size, only one calibration set is required. Site Master's waveguide calibration components are built with precision alignment pins that mate the companion coaxial to waveguide adapters. As a result, proper alignment of waveguide is fast and convenient.

## Waveguide Dispersion

Vector error correction also improves the quality of Distance-To-Fault data. Not only is the reflection magnitude more accurate, but the waveguide dispersion correction for fault location (different frequencies propagate at different speeds) is more accurate and repeatable. The post-vector corrected data accounts for the non-dispersive length of coaxial cable preceding the input of the waveguide under test. Unlike scalar-based systems, the Site Master S800 Series do not suffer reflection magnitude errors (a failure looks better than actual) and length inaccuracies in proportion to the relative lengths of the coaxial input cable and waveguide under test.



# SITE MASTER WITH INTEGRATED SPECTRUM ANALYSIS CAPABILITY

Site Master models S114C and S332C add spectrum analysis capability to the standard cable and antenna analyzer function of Site Master. Now technicians and field engineers can identify and solve RF system problems like coverage, interference, antenna alignment, and in-band interference from unwanted sources among other path related signal problems in addition to cable and antenna analysis measurements.

- Wide dynamic range, featuring -97dBm DANL
- Increased video bandwidth selection
- Quick zoom-in, zoom-out display
- Manual and automatic coupling/decoupling of span, RBW and VBW functions
- Manual and automatic attenuator control
- Field strength measurement
- Occupied bandwidth measurement
- Channel power measurement
- Adjacent channel power measurement



## Signal Mapping

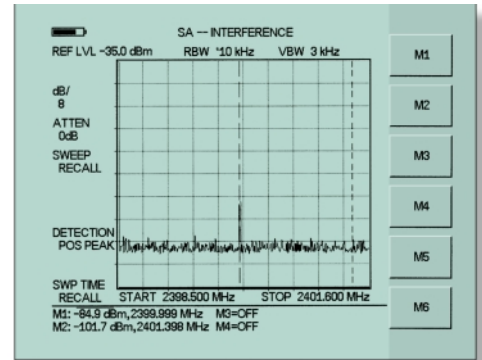
Ideal for site surveys and other signal mapping applications, the Site Master Models S114C and S332C can optimize placement of antennas and access points in a WLAN or WPBX network. Identification of potential in-band interference as well as transmitted signal quality can be easily performed as the installer moves about the installation site.

## Field Maintenance

Ideal for field maintenance, the Site Master S114C, S332C simplifies the task of going site-to-site identifying, recording and solving problems. Moreover, these tasks can be completed in a fraction of the time required to haul bench-top or other "portable" equipment to the field. Featuring a synthesizer-based design and built-in measurement functions allow for easy verification of system performance. User-frequency menu functions, high sensitivity, and excellent repeatability pinpoint the smallest RF signal levels. Harmonics, Occupied Bandwidth, Channel Power and potential interference can be measured before small problems grow into big, costly, time-consuming headaches and unwanted site down time.

## RF Interference

Identifying the RF Interference problems can be very difficult. Site Master's low noise floor make small signals easily detectable.



## Channel Power

Performing channel power measurements help to determine if a transmitter is operating in compliance with system specifications by measuring the power and power spectral density in a given channel bandwidth. Another common transmitter measurement is adjacent channel leakage power that measures the amount (or ratio) of power leakage into adjacent radio channels.

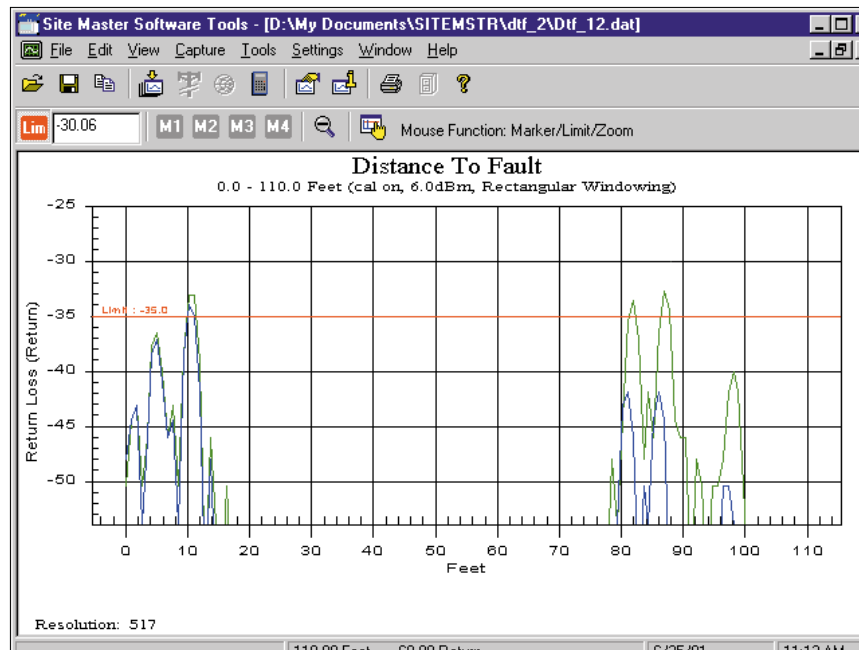




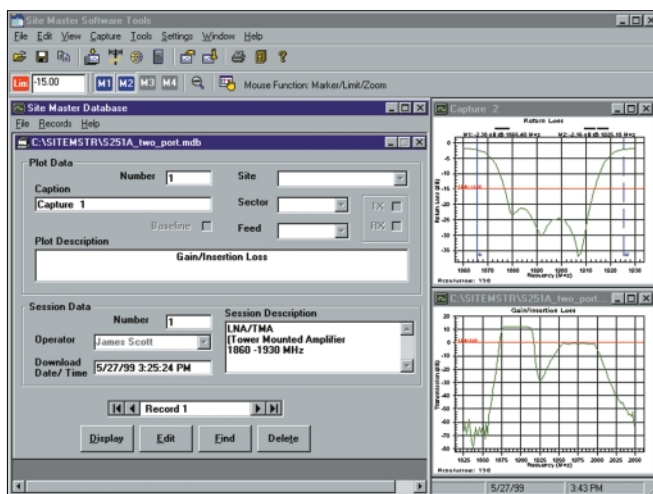
# PC SOFTWARE TOOLS FOR PROFESSIONAL ANALYSIS AND REPORT GENERATION

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 95/98/2000/ME or NT. Test data can be analyzed and compared to historical performance.

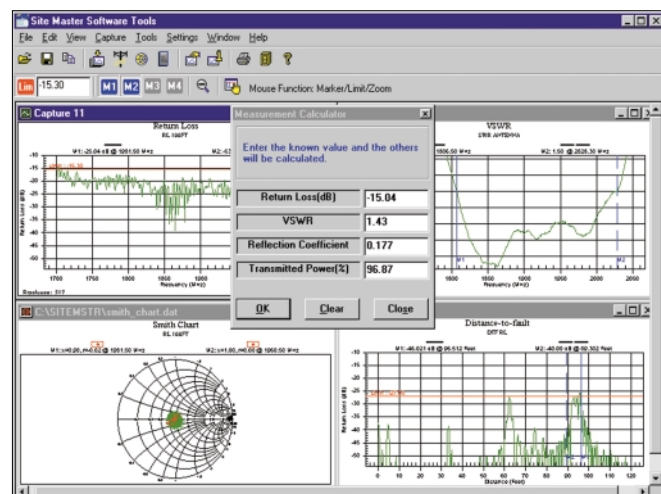
- Up to 200 Site Master trace memory locations can be down loaded with a single menu selection.
- Build historical records with an unlimited number of traces in one document.
- Familiar Windows 95/98/2000/ME and NT interface simplifies data analysis and report generation.
- Intelligent drag-and drop automatically converts traces to a common scale and speeds fault identification.
- Supports long file names for easy measurement data identification.
- Smith Chart function displays S11 vector magnitude and phase data, allowing system components to be impedance matched for optimum performance.



Create professional reports with Site Master software tools. The above plot illustrates connector related problems that can be easily understood.



Create new database files or add to an existing database. Site Master Software Tools quickly stores antenna system test data to a single relational database file.



Analysis displays include MilliRho ( $m\rho$ ) reflection coefficient data format or  $S_{11}$  Smith Chart. The on-screen measurement calculator now also includes Transmitted power percentage. Print outs support multiple plots per page.

# NEVER BEFORE HAS ONE ANALYZER FAMILY SOLVED SO MANY ANTENNA SYSTEM PROBLEMS

| Anritsu Site Master Models   | S113C      | S114C        | S331C     | S332C        | S251C   | S810A        | S818A      | S820A      |
|--|------------|--------------|-----------|--------------|---|--------------|------------|------------|
| <b>Frequency Range (MHz)</b>   | 2-1600     | 2-1600       | 25-4000   | 25-4000      | 625-2500  | 3.3-10.5 GHz | 3.3-18 GHz | 3.3-20 GHz |
| <b>Resolution kHz</b>  | 10         | 10           | 100       | 100          | 10  | 1 MHz        | 1 MHz      | 1 MHz      |
| <b>Markers</b>   | 6          | 6            | 6         | 6            | 6   | 4            | 4          | 4          |
| <b>Display Point (Max.)</b>  | 517        | 517          | 517       | 517          | 517   | 130          | 130        | 130        |
| <b>Interference Immunity (dBm)</b><br>On-Frequency <sup>(1)</sup><br>On-Channel <sup>(2)</sup> | +10<br>+17 | +10<br>+17   | -5<br>+17 | -5<br>+17    | +10 RF Out; +30 dBc RF In <sup>(3)</sup><br>+17 | -10<br>N/A   | -10<br>N/A | -10<br>N/A |
| <b>Calibration: Instrument Configurations</b>  | 10         | 10           | 10        | 10           | 10  | 6            | 6          | 6          |
| <b>Data Storage Reporting:</b>   |            |              |           |              |   |              |            |            |
| Alpha Numeric  | Yes        | Yes          | Yes       | Yes          | Yes   | No           | No         | No         |
| Time/Date Stamp  | Yes        | Yes          | Yes       | Yes          | Yes   | No           | No         | No         |
| Numeric  | Yes        | Yes          | Yes       | Yes          | Yes   | Yes          | Yes        | Yes        |
| Memory Locations (Max.)  | 200        | 200          | 200       | 200          | 200   | 70           | 70         | 70         |
| <b>Measurement Characteristics<sup>(4)</sup></b>   |            |              |           |              |   |              |            |            |
| Return Loss  | ✓          | ✓            | ✓         | ✓            | ✓   | ✓            | ✓          | ✓          |
| SWR  | ✓          | ✓            | ✓         | ✓            | ✓   | ✓            | ✓          | ✓          |
| Cable Loss   | ✓          | ✓            | ✓         | ✓            | ✓   | ✓            | ✓          | ✓          |
| DTF  | ✓          | ✓            | ✓         | ✓            | ✓   | ✓            | ✓          | ✓          |
| Insertion Gain   |            |              |           |              | ✓   |              |            |            |
| Isolation  |            |              |           |              | ✓   |              |            |            |
| Insertion Loss   |            |              |           |              | ✓   |              |            |            |
| <b>Spectrum Analysis</b>   | N/A        | 0.1-1600 MHz | N/A       | 0.1-3000 MHz | N/A   | N/A          | N/A        | N/A        |

1. On-Frequency Interference Immunity is specified to within ±10 kHz of the carrier frequency.
2. On-Channel Interference Immunity is specified at >1 MHz of the carrier frequency.
3. In most field applications, Immunity is typically better because interfering signals are modulated and varying in frequency rather than CW. Measurements were made in CW mode by injecting a signal into the Site Master through a coupler.
4. All Anritsu Site Master models include Return Loss, SWR, Cable Loss, and Distance-To-Fault.



Whether your system is cellular, PCS/DCS, 3G, paging, data, SMR, WLAN/WPBX or any other type of wireless service covering the 2 MHz to 20 GHz frequency range, Site Master by Anritsu offers a cable and antenna analyzer solution for you.

# SITE MASTER OPTIONS AND ACCESSORIES

## RF Power Monitor (Option 5)

The optional RF Power Monitor features precision, high return loss (low SWR) detectors. This excellent impedance match significantly reduces the largest component of power measurement error, mismatch uncertainty. Display formats include absolute power (dBm or Watts) and relative power (dBr or %). Built-in Auto-Averaging automatically reduces the effects of noise while zeroing control allows optimum measurement accuracy at low power levels.

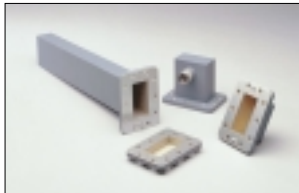


## Bias Tee (Option 10A-S251C Only)

The optional bias tee is integrated inside the Site Master and is designed for applications where both DC and RF signals must be applied to a device under test, such as a tower mounted amplifier (TMA). DC voltages of up to 15 volts at 0.24 amps may be applied to test devices with negligible effect on RF performance as an RF input DC block isolates the input port from the applied bias voltage.

## Microwave Accessories

Calibration components mate directly to a variety of commercial and standard military flanges – eliminating the necessity of bulky, precision waveguide couplers. A few examples of waveguide adapters are 35UA187N, 35UM40N, and 35UM58.



*InstaCal® Module ICN50*

## InstaCal™ Calibration Module\*

The InstaCal calibration module is available for all one-port Site Master models (S113C, S114C, S331C and S332C). With InstaCal, users can cut the time required to calibrate the Site Master by as much as 50%. Moreover, InstaCal reduces the potential for calibration error. With discrete calibration components users are required to connect, disconnect, and reconnect the various calibration components during the calibration process, which greatly increases the potential for calibration/measurement error. With InstaCal, users are only required to connect the InstaCal calibration module once – the calibration process sequences automatically, ensuring an accurate calibration of the Site Master. The benefit is calibrated measurements in much less time.

\*The InstaCal™ Calibration Module exhibits slightly degraded directivity performance compared to precision loads. Users having applications that require DTF-RL measurements > |38 dB| may want to consider using precision load calibration components in place of the InstaCal calibration module for greater measurement accuracy.

*InstaCal™ Module ICN50*



# UNIVERSAL WAVEGUIDE COMPONENT ACCESSORIES

| Precision Waveguide Calibration Components |  |                    |                |  |
|--|--|--------------------|----------------|--|
| Part Number                                | Description                              | Freq Range         | Waveguide Type | Compatible Flanges   |
| xxUM40                                     | 1/8, 3/8 λ Offset Short and Load, Metric | 3.30 to 4.90 GHz   | WR229, WG11A   | PDR40  |
| xxUM48                                     | 1/8, 3/8 λ Offset Short and Load, Metric | 3.95 to 5.85 GHz   | WR187, WG12    | CAR48, PAR48, UAR48, PDR48   |
| xxUM58                                     | 1/8, 3/8 λ Offset Short and Load, Metric | 4.90 to 7.05 GHz   | WR159, WG13    | CAR58, PAR58, UAR58, PDR58   |
| xxUM70                                     | 1/8, 3/8 λ Offset Short and Load, Metric | 5.85 to 8.20 GHz   | WR137, WG14    | CAR70, PAR70, UAR 70, PDR70  |
| xxUM84                                     | 1/8, 3/8 λ Offset Short and Load, Metric | 7.05 to 10.00 GHz  | WR112, WG15    | CBR84, UBR84, PBR84, PDR84   |
| xxUM100                                    | 1/8, 3/8 λ Offset Short and Load, Metric | 8.20 to 12.40 GHz  | WR90, WG16     | CBR100, UBR100, PBR100, PDR100   |
| xxUM120                                    | 1/8, 3/8 λ Offset Short and Load, Metric | 10.00 to 15.00 GHz | WR75, WG17     | CBR120, UBR120, PBR120, PDR120   |
| xxUM140                                    | 1/8, 3/8 λ Offset Short and Load, Metric | 12.40 to 18.00 GHz | WR62, WG18     | CBR140, UBR140, PBR140, PDR140   |
| xxUM220                                    | 1/8, 3/8 λ Offset Short and Load, Metric | 17.00 to 26.50 GHz | WR42, WG20     | CBR220, UBR220, PBR220, PDR220   |
| xxUA229                                    | 1/8, 3/8 λ Offset Short and Load, US     | 3.30 to 4.90 GHz   | WR229, WG11A   | CPR229F, CPR229G, UG-1350/U, UG-1351/U, UG-1726/U, UG-1727/U   |
| xxUA187                                    | 1/8, 3/8 λ Offset Short and Load, US     | 3.95 to 5.85 GHz   | WR187, WG12    | CPR187F, CPR187G, UG-1352/U, UG-1353/U, UG-1728/U, UG-1729/U, UG-148/U, UG-149A/U                      |
| xxUA159                                    | 1/8, 3/8 λ Offset Short and Load, US     | 4.90 to 7.05 GHz   | WR159, WG13    | CPR159F, CPR159G, UG-1354/U, UG-1355/U, UG-1730/U, UG-1731/U   |
| xxUA137                                    | 1/8, 3/8 λ Offset Short and Load, US     | 5.85 to 8.20 GHz   | WR137, WG14    | CPR137F, CPR137G, UG-1356/U, UG-1357/U, UG-1732/U, UG-1733/U, UG-343B/U, UG-344/U, UG-440B/U, UG-441/U |
| xxUA112                                    | 1/8, 3/8 λ Offset Short and Load, US     | 7.05 to 10.00 GHz  | WR112, WG15    | CPR112F, CPR112G, UG-1358/U, UG-1359/U, UG-1734/U, UG-1735/U, UG-52B/U, UG-51/U, UG-137B/U, UG-138/U   |
| xxUA90                                     | 1/8, 3/8 λ Offset Short and Load, US"    | 8.20 to 12.40 GHz  | WR90, WG16     | CPR90F, CPR90G, UG-1360/U, UG-1361/U, UG-1736/U, UG-1737/U, UG-40B/U, UG-39/U, UG-135/U, UG-136B/U     |
| xxUA75                                     | 1/8, 3/8 λ Offset Short and Load, US     | 10.00 to 15.00 GHz | WR75, WG17     | WR75   |
| xxUA62                                     | 1/8, 3/8 λ Offset Short and Load, US     | 12.40 to 18.00 GHz | WR62, WG18     | UG-541A/U, UG-419/U, UG-1665/U, UG1666/U   |
| xxUA42                                     | 1/8, 3/8 λ Offset Short and Load, US     | 17.00 to 26.50 GHz | WR42, WG20     | UG-596A/U, UG-595/U, UG-597/U, UG-598A/U   |
| xxCMR229                                   | 1/8, 3/8 λ Offset Short and Load, CMR    | 3.30 to 4.90 GHz   | WR229, WG11A   | CMR229   |
| xxCMR187                                   | 1/8, 3/8 λ Offset Short and Load, CMR    | 3.95 to 5.85 GHz   | WR187, WG12    | CMR187, UG1475/U, UG1480/U   |
| xxCMR159                                   | 1/8, 3/8 λ Offset Short and Load, CMR    | 4.90 to 7.05 GHz   | WR159, WG13    | CMR159   |
| xxCMR137                                   | 1/8, 3/8 λ Offset Short and Load, CMR    | 5.85 to 8.20 GHz   | WR137, WG14    | CMR137, UG1476/U, UG1481/U   |
| xxCMR112                                   | 1/8, 3/8 λ Offset Short and Load, CMR    | 7.05 to 10.00 GHz  | WR112, WG15    | CMR112, UG1477/U, UG1482/U   |
| xxCMR90                                    | 1/8, 3/8 λ Offset Short and Load, CMR    | 8.2 to 12.4 GHz    | WR90, WG16     | CMR90, UG1478/U, UG1483/U  |
| xxUER40                                    | 1/8, 3/8 λ Short and Load, UER           | 3.30 to 4.90 GHz   | WR229, WG11A   | UER40  |
| xxUER48                                    | 1/8, 3/8 λ Short and Load, UER           | 3.95 to 5.85 GHz   | WR187, WG12    | UER48  |
| xxUER58                                    | 1/8, 3/8 λ Short and Load, UER           | 4.90 to 7.05 GHz   | WR159, WG13    | UER58  |
| xxUER70                                    | 1/8, 3/8 λ Short and Load, UER           | 5.85 to 8.20 GHz   | WR137, WG14    | UER70  |
| xxUER84                                    | 1/8, 3/8 λ Short and Load, UER           | 7.05 to 10.00 GHz  | WR112, WG15    | UER84  |
| xxUER100                                   | 1/8, 3/8 λ Short and Load, UER           | 8.2 to 12.4 GHz    | WR90, WG16     | UER100   |

Note: Part Number Ordering Information    Prefix (xx) - 23 for 1/8 λ Offset Short  
 - 24 for 3/8 λ Offset Short  
 - 26 for Precision Waveguide Load

| Precision Waveguide-to-Coaxial Adapters |                               |                    |                |  |
|---|-------------------------------|--------------------|----------------|--|
| Part Number                             | Description                   | Freq Range         | Waveguide Type | Compatible Flanges   |
| 35UM40N                                 | Coaxial Adapter, N(m), Metric | 3.30 to 4.90 GHz   | WR229, WG11A   | PDR40  |
| 35UM48N                                 | Coaxial Adapter, N(m), Metric | 3.95 to 5.85 GHz   | WR187, WG12    | CAR48, PAR48, UAR48, PDR48   |
| 35UM58N                                 | Coaxial Adapter, N(m), Metric | 4.90 to 7.05 GHz   | WR159, WG13    | CAR58, PAR58, UAR58, PDR58   |
| 35UM70N                                 | Coaxial Adapter, N(m), Metric | 5.85 to 8.20 GHz   | WR137, WG14    | CAR70, PAR70, UAR 70, PDR70  |
| 35UM84N                                 | Coaxial Adapter, N(m), Metric | 7.05 to 10.00 GHz  | WR112, WG15    | CBR84, UBR84, PBR84, PDR84   |
| 35UM100N                                | Coaxial Adapter, N(m), Metric | 8.20 to 12.40 GHz  | WR90, WG16     | CBR100, UBR100, PBR100, PDR100   |
| 35UM120N                                | Coaxial Adapter, N(m), Metric | 10.00 to 15.00 GHz | WR75, WG17     | CBR120, UBR120, PBR120, PDR120   |
| 35UM140N                                | Coaxial Adapter, N(m), Metric | 12.40 to 18.00 GHz | WR62, WG18     | CBR140, UBR140, PBR140, PDR140   |
| 35UM220K                                | Coaxial Adapter, K(m), Metric | 17.00 to 26.50 GHz | WR42, WG20     | CBR220, UBR220, PBR220, PDR220   |
| 35UA229N                                | Coaxial Adapter, N(m), US     | 3.30 to 4.90 GHz   | WR229, WG11A   | CPR229F, CPR229G, UG-1350/U, UG-1351/U, UG-1726/U, UG-1727/U   |
| 35UA187N                                | Coaxial Adapter, N(m), US     | 3.95 to 5.85 GHz   | WR187, WG12    | CPR187F, CPR187G, UG-1352/U, UG-1353/U, UG-1728/U, UG-1729/U, UG-148/U, UG-149A/U                      |
| 35UA159N                                | Coaxial Adapter, N(m), US     | 4.90 to 7.05 GHz   | WR159, WG13    | CPR159F, CPR159G, UG-1354/U, UG-1355/U, UG-1730/U, UG-1731/U   |
| 35UA137N                                | Coaxial Adapter, N(m), US     | 5.85 to 8.20 GHz   | WR137, WG14    | CPR137F, CPR137G, UG-1356/U, UG-1357/U, UG-1732/U, UG-1733/U, UG-343B/U, UG-344/U, UG-440B/U, UG-441/U |
| 35UA112N                                | Coaxial Adapter, N(m), US     | 7.05 to 10.00 GHz  | WR112, WG15    | CPR112F, CPR112G, UG-1358/U, UG-1359/U, UG-1734/U, UG-1735/U, UG-52B/U, UG-51/U, UG-137B/U, UG-138/U   |
| 35UA90N                                 | Coaxial Adapter, N(m), US     | 8.20 to 12.40 GHz  | WR90, WG16     | CPR90F, CPR90G, UG-1360/U, UG-1361/U, UG-1736/U, UG-1737/U, UG-40B/U, UG-39/U, UG-135/U, UG-136B/U     |
| 35UA75N                                 | Coaxial Adapter, N(m), US     | 10.00 to 15.00 GHz | WR75, WG17     | WR75   |
| 35UA62N                                 | Coaxial Adapter, N(m), US     | 12.40 to 18.00 GHz | WR62, WG18     | UG-541A/U, UG-419/U, UG-1665/U, UG1666/U   |
| 35UA42K                                 | Coaxial Adapter, K(m), US     | 17.00 to 26.50 GHz | WR42, WG20     | UG-596A/U, UG-595/U, UG-597/U, UG-598A/U   |
| 35CMR229N                               | Coaxial Adapter, N(m), CMR    | 3.30 to 4.90 GHz   | WR229, WG11A   | CMR229   |
| 35CMR187N                               | Coaxial Adapter, N(m), CMR    | 3.95 to 5.85 GHz   | WR187, WG12    | CMR187, UG1475/U, UG1480/U   |
| 35CMR159N                               | Coaxial Adapter, N(m), CMR    | 4.90 to 7.05 GHz   | WR159, WG13    | CMR159   |
| 35CMR137N                               | Coaxial Adapter, N(m), CMR    | 5.85 to 8.20 GHz   | WR137, WG14    | CMR137, UG1476/U, UG1481/U   |
| 35CMR112N                               | Coaxial Adapter, N(m), CMR    | 7.05 to 10.00 GHz  | WR112, WG15    | CMR112, UG1477/U, UG1482/U   |
| 35CMR90N                                | Coaxial Adapter, N(m), CMR    | 8.2 to 12.4 GHz    | WR90, WG16     | CMR90, UG1478/U, UG1483/U  |
| 35UER40N                                | Coaxial Adapter, N(m), UER    | 3.30 to 4.90 GHz   | WR229, WG11A   | UER40  |
| 35UER48N                                | Coaxial Adapter, N(m), UER    | 3.95 to 5.85 GHz   | WR187, WG12    | UER48  |
| 35UER58N                                | Coaxial Adapter, N(m), UER    | 4.90 to 7.05 GHz   | WR159, WG13    | UER58  |
| 35UER70N                                | Coaxial Adapter, N(m), UER    | 5.85 to 8.20 GHz   | WR137, WG14    | UER70  |
| 35UER84N                                | Coaxial Adapter, N(m), UER    | 7.05 to 10.00 GHz  | WR112, WG15    | UER84  |
| 35UER100N                               | Coaxial Adapter, N(m) UER     | 8.2 to 12.4 GHz    | WR90, WG16     | UER100   |

# SPECIFICATIONS

All specifications apply when calibrated at ambient temperature after a five minute warm up. Typical values are given for reference, and are not guaranteed.

## Return Loss

Range: 0.00 to 54.00 dB  
Resolution: 0.01 dB

## SWR

Range: 1.00 to 65.00  
Resolution: 0.01

## Distance-To-Fault

Vertical Range:  
Return Loss: 0.00 to 54.00 dB  
SWR : 1.00 to 65.00

### Horizontal Range:

Range: 0 to (# of data pts -1) x Resolution to a maximum of 1000 m (3281 ft.), # of data pts. = 130, 259, 517

### Horizontal Resolution, Rectangular Windowing:

For Coax,  
Resolution (meter) =  
 $1.5 \times 10^8 (v_p / \Delta \text{ Frequency})$

Where:  $v_p$  is the cable's relative propagation velocity.  
 $\Delta$  Frequency is the stop frequency minus the start frequency (in Hz).

### For Waveguide,

Resolution (meter) =  
 $1.5 \times 10^8 (\sqrt{1 - (F_c / F_s)^2}) / \Delta \text{ Frequency}$

Where:  $F_c$  is the waveguide's cutoff frequency (in Hz).

$F_s$  is the start frequency (in Hz).

$\Delta$  Frequency is the stop frequency minus the start frequency (in Hz).

## Gain/Insertion Loss

Range: -90 to +50 dB  
Resolution: 0.1 dB

## RF Power Monitor Option

Display Range: -80.0 to +80.0 dBm, or 10.0 pW to 100.0 kW  
Detector Range -50.0 to +20.0 dBm, or 10.0  $\mu$ W to 100.0 mW  
Offset Range: 0.0 to +60.0 dB  
Resolution: 0.1 dB or 0.1 x W

## Transmission Line Loss (one-port)

Range: 0.00 to 20.00 dB  
Resolution: 0.01 dB

## Test Port Connector

Precision N female

## Maximum Input Without Damage

N(f) Test Ports: +20 dBm, 50  $\Omega$ , +50 Vdc  
RF Power Detector: +20 dBm, 50  $\Omega$ , +50 Vdc

## SPECTRUM ANALYZER

### Frequency

Frequency Range: 100 kHz to 1.6 GHz, S114C  
100 kHz to 3.0 GHz, S332C

Frequency Reference: Aging:  $\pm 1$  ppm/yr.  
Accuracy:  $\pm 2$  ppm

Frequency Span: 0 Hz (zero span)  
100 kHz to 1.6 GHz, S114C  
100 kHz to 3.0 GHz, S332C

Sweep Time:  $\geq 650$  ms (full span)  
500 ms (zero span)

### Resolution Bandwidth:

10 kHz, 30 kHz, 100 kHz, 1 MHz

Accuracy:  $\pm 20\%$  typical

### Video Bandwidth:

100 Hz to 300 kHz in 1-3 sequence

### SSB Phase Noise

(1 GHz) @ 30 kHz Offset: -75 dBc/Hz

## Spurious Responses

Input Related:  $\leq -45$  dBc

## Spurious

Residual Responses:  $\leq -95$  dBm

## Amplitude

Measurement Range: -97 dBm to +20 dBm, typical

Dynamic Range:  $\geq 65$  dB, typical

## Maximum

Safe Input Level: +20 dBm max. measurement safe input  
+27 dBm max. input (damage)  
+27 dBm Peak Pulse Power  
+50 Vdc

## Displayed Average Noise Level:

$\leq -97$  dBm (>300 kHz, typical)  
 $\leq -80$  dBm (100 kHz to 300 kHz, typical)

Display Range: 2 to 15 dB/div. In 1 dB steps.  
Ten divisions displayed.

## RF Input VSWR: 2.0:1

Total Level Accuracy:  $\pm 2$  dB,  $\geq 300$  kHz, typical  
 $\pm 3$  dB, <300 kHz, typical

## GENERAL

RS-232: 9 pin D-sub, three wire serial

## Electromagnetic Compatibility:

Complies with European Community Requirements for CE marking.

## Temperature:

Operating:  $-0^\circ\text{C}$  to  $50^\circ\text{C}$

Storage:  $-20^\circ\text{C}$  to  $75^\circ\text{C}$

Operation at temperatures to  $-10.0^\circ\text{C}$  is normal. However, please note that the LCD display will fade at low temperature extremes.

## Weight:

Site Master A Series, 1.36 kgs. (3.0 lbs.) nominal, includes battery  
Site Master C Series, 1.81 kgs. (4.0 lbs.) nominal, includes battery  
Site Master 332C, 2.14 kgs. (4.76 lbs.) nominal, includes battery

## Size :

A Series: 20.3 x 17.8 x 5.72 cm (8 x 7 x 2.25 in.)  
C Series: 25.4 x 17.8 x 6.10 cm (10 x 7 x 2.4 in.)

## MEASUREMENT ACCURACY

### Return Loss and SWR

Accuracy =  $< 0.9 + |20 \log(1 \pm 10^{-E\Delta/20})|$  dB, typical.  
where  $E\Delta$  = Directivity - Measured Return Loss

Directivity is the largest source of return loss measurement uncertainty. The quality of the load or termination used for calibration determines directivity performance. Loads can be verified using a vector network analyzer calibrated with either sliding load or TRL.

### Directivity:

Precision 7/16 Components:  
 $\geq 45$  dB ( $\leq 3.5$  GHz),  
 $\geq 42$  dB (3.5 to 4.0 GHz)

N Components: SM/PL, SM/PNFL

$\geq 42$  dB ( $\leq 3.5$  GHz),  
 $\geq 40$  dB (3.5 to 4.0 GHz)

28N50A:

$\geq 40$  dB, ( $\leq 18$  GHz)

InstaCal™: ICN50

$\geq 38$  dB (<3.5 GHz),  
 $\geq 35$  dB (3.5 to 4.0 GHz)

Precision Waveguide Load:

$\geq 45$  dB (frequency range dependent)



*The protective softcase is designed to hold calibration components. Velcro adjustments on the shoulder strap allow convenient, one hand operation.*

## Cable Loss Accuracy

Accuracy:  $< \pm 1.0$  dB typical, for insertion losses of  $< 4.0$  dB.

Assumes cable return loss  $> 26$  dB.

Accuracy is improved using ripple averaging. Set the frequency sweep such that 5 to 6 ripple cycles are visible. Calibrate the Site Master and place markers at an adjacent peak and valley. Sum the marker values and divide by two. For cable loss greater than 4.0 dB, see formula in technical notes.

Repeatability:  $< \pm 0.05$  dB, typical

Cable Loss is determined by measuring one end of the cable and disconnecting the opposite end from any antennas or other devices. This open circuit condition return loss is measured and divided by two. This test is excellent for trouble shooting or verifying previously installed cables. For best results comparing measurements to historic data, always disconnect the opposite cable end at the same position and avoid simultaneous tests of multiple cable or connector types.

## Distance-To-Fault Accuracy:

The Fast Fourier Transform which calculates the DTF display provides an exact indication of electrical length. This relates to physical length through knowledge of the cable's propagation velocity,  $v_p$ :

$$d = (c * n * v_p) / (2 * \Delta f)$$

Distance is displayed according to the accuracy of  $v_p$ . In the equation above, c is the speed of light, n the number of ripples in the frequency domain display and  $\Delta f$  is frequency sweep range. Cable manufacturers specify the  $v_p$  of cables. When this specification is not available, the  $v_p$  value is easily determined by measuring a known length of cable.

Non-phase stable cables will cause small measurement errors because bending of the cable changes the physical length of the cable's center conductor and outer ground shield. The Open, Short and Load components used during calibration create a phase "reference plane" from which Site Master bases the vector error correction formulas. The physical length of the cable is allowed to change as it flexes, the phase relationship of the calibrated reference plane position and the actual cable end position also changes - creating errors.



*Panel connections include a 9 pin D-sub RS-232, precision test port connector, DC power input, and an optional RF detector connection for the Power Monitor operation.*

# ORDERING INFORMATION

|             |   |
|-------------|---|
| Model S113C | (2 MHz to 1600 MHz), Built in DTF                                       |
| Model S114C | (2 MHz to 1600 MHz), Built in DTF, Spectrum Analysis (100 kHz-1.6 GHz)  |
| Model S251C | (625 MHz to 2500 MHz), Built in DTF                                     |
| Model S331C | (25 MHz to 4000 MHz), Built in DTF                                      |
| Model S332C | (25 MHz to 4000 MHz), Built in DTF, Spectrum Analysis (100 kHz-3.0 GHz) |
| Model S810A | (3.3 GHz to 10.5 GHz), Built in DTF                                     |
| Model S818A | (3.3 GHz to 18.0 GHz), Built in DTF                                     |
| Model S820A | (3.3 GHz to 20.0 GHz), Built in DTF                                     |

## Standard Accessories Includes

User's Guide  
 Soft Carrying Case  
 AC-DC Adapter with Power Cord  
 Automotive Cigarette Lighter/12 Volt DC Adapter  
 One Year Warranty  
 CD ROM containing Fault Location (DTF), Smith Chart and Software Management Tools  
 Serial Interface Cable  
 Rechargeable Battery, NiMH (All Models Except S800A Series)  
 InstaCal® (S113C, S114C, S331C and S332C Only)



## Optional Accessories

|               |   |
|---------------|---|
| Option 5      | RF Power Monitor (RF Detector not included)   |
| Option 10A    | Bias Tee, 240 mA (S251C Only)   |
| 5400-71N50    | RF Detector, N(m), 50 Ohm, 1 to 3000 MHz  |
| 560-7N50B     | RF Detector, N(m), 50 Ohm, 10 MHz to 20 GHz   |
| 560-7K50      | RF Detector, K(m), 50 Ohm, 10 MHz to 40 GHz   |
| 560-7VA50     | RF Detector, V(m), 50 Ohm, 10 MHz to 50 GHz   |
| 42N50A-30     | Attenuator, 30 dB, 50 Watt, DC to 18 GHz, N(m) to N(f)  |
| 42N50-20      | Attenuator, 20 dB, 5 Watt, DC to 18 GHz, N(m) to N(f)   |
| 1N50C         | Limitter, N(m) to N(f), 50 Ohm, 10 MHz to 20 GHz  |
| ICN50         | InstaCal™ Calibration Module, 50 Ohm, 2 MHz to 4.0 GHz, N(m) (S113C, S114C, S331C and S332C Only) |
| 22N50         | Precision N(m) Short/Open, 18 GHz   |
| 22NF50        | Precision N(f) Short/Open, 18 GHz   |
| SM/PL         | Precision N(m) Load, 42 dB, 4.0 GHz   |
| SM/PLNF       | Precision N(f) Load, 42 dB, 4.0 GHz   |
| OSLN50LF      | Precision Open/Short/Load, DC to 4.0 GHz, 50 Ohm, N(m)  |
| OSLNF50LF     | Precision Open/Short/Load, DC to 4.0 GHz, 50 Ohm, N(f)  |
| 2000-767      | Precision Open/Short/Load, 7/16 (m), 4.0 GHz  |
| 2000-768      | Precision Open/Short/Load, 7/16 (f), 4.0 GHz  |
| 28N50-2       | Precision N(m) Load, 40 dB, 18 GHz  |
| 28NF50-2      | Precision N(f) Load, 40 dB, 18 GHz  |
| 22K50         | Precision K(m) Short/Open, 40 GHz   |
| 22KF50        | Precision K(f) Short/Open, 40 GHz   |
| 28K50         | Precision Termination, DC to 40 GHz, 50 Ohm, K(m)   |
| 28KF50        | Precision Termination, DC to 40 GHz, 50 Ohm, K(f)   |
| 15NN50-1.5C   | Test Port Cable Armored, 1.5 meter, N(m) to N(m), 6.0 GHz   |
| 15NN50-3.0C   | Test Port Cable Armored, 3.0 meter, N(m) to N(m), 6.0 GHz   |
| 15NN50-5.0C   | Test Port Cable Armored, 5.0 meter, N(m) to N(m), 6.0 GHz   |
| 15NNF50-1.5C  | Test Port Cable Armored, 1.5 meter, N(m) to N(f), 6.0 GHz   |
| 15NNF50-3.0C  | Test Port Cable Armored, 3.0 meter, N(m) to N(f), 6.0 GHz   |
| 15NNF50-5.0C  | Test Port Cable Armored, 5.0 meter, N(m) to N(f), 6.0 GHz   |
| 15ND50-1.5C   | Test Port Cable Armored, 1.5 meter, N(m) to 7/16 DIN(m), 6.0 GHz                                  |
| 15NDF50-1.5C  | Test Port Cable Armored, 1.5 meter, N(m) to 7/16 DIN(f), 6.0 GHz                                  |
| 15NNF50-1.5B  | Test Port Cable Armored, 1.5 meter, N(m) to N(f), 18 GHz  |
| 15KKF50-1.5A  | Test Port Cable Armored, 1.5 meter, K(m) to K(f), 26.5 GHz  |
| 15RKKF50-1.5A | Test Port Cable Armored, 1.5 meter, RK(m) to R(f), 26.5 GHz                                       |

|             |   |
|-------------|---|
| 1091-26     | Adapter, DC to 18 GHz, 50 Ohm, N(m) to SMA(m)                                 |
| 1091-27     | Adapter, DC to 18 GHz, 50 Ohm, N(m) to SMA(f)                                 |
| 1091-80     | Adapter N(f) to SMA(m), 18 GHz  |
| 1091-81     | Adapter N(f) to SMA(f), 18 GHz  |
| 1091-172    | Adapter, DC to 1.3 GHz, 50 Ohm, N(m) to BNC(f)                                |
| 510-90      | Adapter 7/16(f) to N(m), 7.5 GHz  |
| 510-91      | Adapter 7/16(f) to N(f), 7.5 GHz  |
| 510-92      | Adapter 7/16(m) to N(m), 7.5 GHz  |
| 510-93      | Adapter 7/16(m) to N(f), 7.5 GHz  |
| 510-96      | Adapter 7/16 DIN(m) to 7/16 DIN(m), 7.5 GHz                                   |
| 510-97      | Adapter 7/16 DIN(f) to 7/16 DIN(f), 7.5 GHz                                   |
| 34NN50A     | Precision N(m) to N(m) Adapter, 18 GHz  |
| 34NFN50     | Precision N(f) to N(f) Adapter, 18 GHz  |
| 34RKNF50    | Precision Ruggedized K(m) to N(f) Adapter, 20 GHz                             |
| 34RSN50     | Precision Ruggedized WSMA(m) to N(m) Adapter, 20 GHz                          |
| K220B       | Precision K(m)-K(m) Adapter, 40 GHz   |
| K222B       | Precision K(f)-K(f) Adapter, 40 GHz   |
| D41955      | Spare Soft Carrying Case (S800A series)                                       |
| 48258       | Spare Soft Carrying Case (S113C, S114C, S331C, S332C, and S251C)              |
| 40-115      | Spare AC/DC Adapter   |
| 806-62      | Spare Automotive Cigarette Lighter/12 Volts DC adapter                        |
| 800-441     | Spare Serial Interface Cable  |
| 760-215A    | Transit Cases for Anritsu Site Master (S113C, S114C, S331C, S332C, and S251C) |
| 760-213     | Transit Case for S800 Series Site Master                                      |
| 2300-347    | Anritsu Site Master Software Tools  |
| 10580-00060 | Anritsu Site Master S113C, S114C, S331C, S332C User's Guide                   |
| 10580-00065 | Anritsu Site Master S251C User's Guide  |
| 10580-00014 | Anritsu Site Master S810A, S818A User's Guide                                 |
| 10580-00030 | Anritsu Site Master S820A User's Guide  |

|           |   |
|-----------|---|
| 633-27    | Rechargeable Battery, NiMH (C Series only)        |
| 2000-1029 | Battery Charger, NiMH with Universal Power Supply |
| 2000-1030 | Portable Antenna, 50 Ohm, SMA(m), 1.71-1.88 GHz   |
| 2000-1031 | Portable Antenna, 50 Ohm, SMA (m), 1.85-1.99 GHz  |
| 2000-1032 | Portable Antenna, 50 Ohm, SMA (m), 2.4-2.5 GHz    |
| 2000-1034 | Portable Antenna, 50 Ohm, SMA (m), 806-869 MHz    |
| 2000-1035 | Portable Antenna, 50 Ohm, SMA (m), 902-960 MHz    |



## Printers

|           |   |
|-----------|---|
| 2000-766  | HP DeskJet Printer, model 350<br>Includes: Interface Cable, Black Print Cartridge, and US Power Cable             |
| 2000-753  | Spare Serial-to-Parallel Converter Cable  |
| 2000-661  | Black Print Cartridge   |
| 2000-663  | Power Cable (Europe) for DeskJet Printer  |
| 2000-664  | Power Cable (Australia) for DeskJet Printer   |
| 2000-665  | Power Cable (U.K.) for DeskJet Printer  |
| 2000-667  | Power Cable (So. Africa) for DeskJet Printer  |
| 2000-1008 | Seiko DPU-414-30B Thermal Printer<br>Includes: Internal Battery, Thermal Printer Paper, Serial Cable, Power Cable |
| 2000-1012 | Spare Serial 9 pin (male) to 9 pin (female) cable (for Seiko DPU-414-30B)   |
| 2000-755  | Five (5) rolls of Thermal Paper   |
| 2000-1002 | U.S. Adapter (for Seiko DPU-414-30B)  |
| 2000-1003 | Euro Adapter (for Seiko DPU-414-30B)  |
| 2000-1194 | Japan Adapter (for Seiko DPU-414-30B)   |

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