

Anritsu envision : ensure

VNA Master™

MS2024B / MS2025B / MS2034B / MS2035B

500 kHz to 4 GHz 500 kHz to 6 GHz 500 kHz to 4 GHz 500 kHz to 6 GHz Vector Network Analyzer
9 kHz to 4 GHz 9 kHz to 6 GHz + Spectrum Analyzer



Portable Powerful Handheld S-Parameters

4TECT

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VNA Master MS202xB/3xB Features

Overview



Introduction

The VNA Master™ MS202xB/3xB series is a compact handheld multi-function instrument that offers a portable yet powerful vector network analyzer, allowing you to do S-parameter analysis in the field — anytime, anywhere. The VNA Master MS203xB models also offer a high-performance spectrum analyzer with industry-leading low noise floor. The VNA Master offers unmatched measurement breadth, depth, and precision; reducing the number of different tools needed to analyze modern communication systems in the field, on a tower, on a flightline, or in a vehicle.

Standard features are:

- 1 path, 2-port vector network analyzer: 500 kHz to 4 GHz or 6 GHz
- Spectrum analyzer: 9 kHz to 4 GHz or 6 GHz
- Fast 850 μ s/data point sweep speed, with ultimate flexibility in the number of points from 2 to 4001
- 15 minute warm-up, multi-term polynomial VNA calibration, 16 hour calibration stability
- -162 DANL in 1 Hz RBW (normalized) on VNA Master MS203xB spectrum analyzer combo models

VNA Master MS202xB/3xB offers many options, including:

- Four models, including two with spectrum analyzer combos and two with extended coverage up to 6 GHz
- Distance domain for distance-to-fault analysis of antennas, coax runs, connector/splice assemblies
- Vector voltmeter
- Internal bias tee (for both VNA and Spectrum Analyzer applications)
- High accuracy power meter (works with Anritsu external USB power sensors)
- PIM Hunting
- AM/FM/PM modulation analyzer
- Interference analyzer with spectrogram function
- Channel scanner
- Indoor/outdoor coverage mapping
- GPS receiver

Site engineers can use the VNA Master MS202xB/3xB to accurately and quickly test and verify the installation and commissioning of base stations, mobiles, and portables. The VNA Master is equally suited for preventative maintenance and troubleshooting to help ensure the operation of wireless network infrastructures, including broadband and microwave backhaul systems.

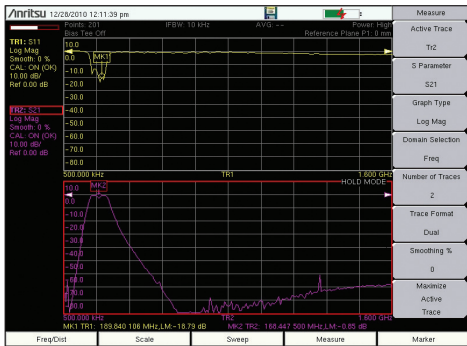


VNA Master MS202xB/3xB

VNA Master MS202xB/3xB Features



2-Port Vector Network Analyzer



The VNA Master's 2-port analyzer provides simultaneous measurement of S_{21} insertion loss and S_{11} return loss.

2-Port Vector Network Analyzer

VNA Master features a 2-port vector network analyzer to be able to test and verify the performance of feedline, filtering, and antenna components. This includes:

- Connectors
- Cables/jumpers
- Antenna isolators
- Multicouplers/diplexers/duplexers
- Tower mounted amplifiers

2-port transmission measurements can help identify poor filter adjustment, antenna isolation, and degraded tower mounted amplifiers. The goal of these measurements is to maximize the system coverage and capacity with problem-free base stations.

Antenna System Failure Mechanisms

Maintenance is an on-going requirement as antenna system performance can degrade at any point in time due to:

- Loose connectors
- Improperly weatherized connectors
- Pinched cables
- Poor grounding
- Corroded connectors
- Lightning strikes
- Strong winds misaligning antennas
- Water intrusion into cables
- Bullet holes, nails, or rodent damage to the cable

Making Measurements Easier

The VNA Master provides features for making measurements easier to perform and for analyzing test results such as:

- Fast sweep speed, measurement point selection, and flexible display formats make it easy to view and adjust base station RF system performance
- High RF immunity mode for testing in harsh RF environments
- Trace overlay compares reference traces to see changes over time
- Limit lines and alarming for providing reference standards
- High and low power output selection to test tower-top components without climbing the tower
- Internal bias tee to power up TMAs for testing when offline
- GPS tagging of data to verify location of tests
- User-selectable menu scheme offers choice of either full VNA capability or simplified cable and antenna user interface

Measurements

1-port measurements

- VSWR, return loss, phase, linear polar, log polar
- Smith chart
- Log/mag/2 (1-port cable loss)
- Distance-to-fault (DTF) return loss
- Distance-to-fault (DTF) VSWR

Windowing functions in distance domain

- Rectangular
- Normal side lobe
- Low side lobe
- Minimum side lobe

2-port measurements

- Log mag insertion loss/gain, phase, linear polar, log polar, group delay

Calibration

- User-variable Data Points from 2 to 4001
- Full S_{11} (open, short, load)
- 1P2P, (open, short, load, through)
- Response S_{11}
- Response S_{21}

Sweep Functions

- Run/hold, single/continuous
- RF immunity (high/low)
- Averaging/smoothing
- Output power (high/low)

Trace Functions

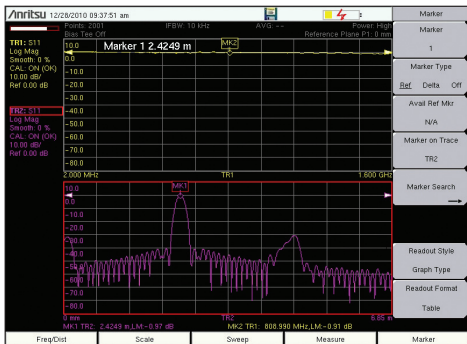
- Save/recall, copy to display memory
- No trace math, trace \pm memory
- Trace overlay

Marker Functions

- 1-8 markers each with a delta marker
- Marker to peak/valley
- Marker to/peak valley between markers
- Marker table

Limit Line Functions

- Limit lines
 - Single limit
 - Multi-segment (41)
 - Limit alarm
- Limit line edit
 - Frequency, amplitude
 - Add/delete point
 - Next point left/right
 - Move limit

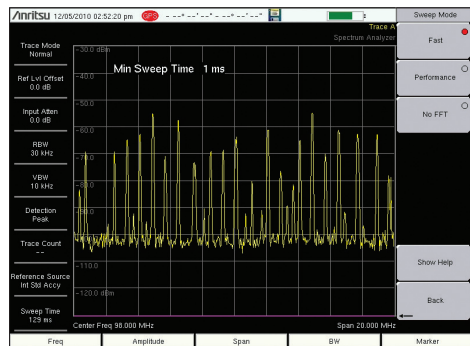


The VNA Mode in the VNA Master with standard Distance Domain allows simultaneous viewing of cable return loss and distance to fault.

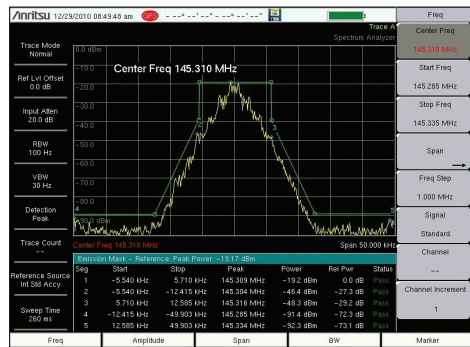
VNA Master MS202xB/3xB Features



Spectrum Analyzer



The spectrum analyzer mode in the VNA Master MS203xB offers fast sweep speeds for interference hunting intermittent signals.



The Spectrum Analyzer mode in the VNA Master MS203xB offers automated measurements including occupied bandwidth, adjacent channel power, and emission mask, as shown above. The mask can be quickly created using the standard limit line editor. The emission mask measurement function automatically moves the trace to match the peak of a modulated signal to conform to common mask standards.

Spectrum Analyzer

The VNA Master MS203xB models feature the most powerful handheld spectrum analyzer in their class with unmatched performance in:

- Sensitivity
- Dynamic range
- Phase noise
- Frequency accuracy
- Sweep speed

The goal of Spectrum Analyzer measurements is to be able to accurately monitor, measure, and analyze RF signals and their environments. It finds rogue signals, measures carriers and distortion, and verifies base stations' signal performance. It validates carrier frequency and identifies desired and undesired signals.

Simple But Powerful

The VNA Master features dedicated routines for one-button measurements. For more in-depth analysis, the technician has control over settings and features that are not found even on lab-grade benchtop spectrum analyzers. For example, the VNA Master MS203xB models offers:

- Multiple sweep detection methods – Peak, negative, true RMS, Quasi-peak, sample
- Advanced marker functions – noise marker, tracking marker, peak search, sequential peak search, delta markers
- Advanced marker functions – noise marker, tracking marker, peak search, sequential peak search, delta markers
- Advanced limit line functions – automatic envelope creation, relative limits, limit mirror, point/segment/line adjustment
- Save-on-Event – automatically saves a sweep when crossing a limit line

The VNA Master offers full control over bandwidth and sweep settings, or can be set to automatically optimize for best possible trade-off between accuracy and speed.

GPS-Assisted Frequency Accuracy

With GPS Option 31 the frequency accuracy is reduced to < 50 ppb (parts per billion). Also all measurements can be GPS tagged for exporting to maps.

Rx Noise Floor Testing

The VNA Master can measure the receive noise floor on a base station's uplink channel using the channel power measurement. An elevated noise floor indicates interference that can lead to call blocking, denial of service, call drops, low data rates, and lowered system capacity.

Measurements

- One button measurements
 - Field strength – in dBm/m² or dBmV/m
 - Occupied bandwidth - 1% to 99% of power
 - Emission mask
 - Channel power - in specified bandwidth
 - ACPR - adjacent channel power ratio
 - AM/FM/SSB demodulation - audio only
 - C/I - carrier-to-interference ratio

Sweep Functions

- Sweep
 - Single/continuous, manual trigger, reset, minimum sweep time
- Detection
 - Peak, RMS, negative, sample, Quasi-peak
- Triggers
 - Free run, external, video, change Position, manual

Trace Functions

- Traces
 - 1-3 traces (A, B, C), view/blank, write/hold
- Trace A operations
 - Normal, max hold, min hold, average, Number of averages, (always the live trace)
- Trace B operations
 - A → B, B ← C, max hold, min hold
- Trace C Operations
 - A → C, B ← C, max hold, min hold, A - B → C,
 - B - A → C, relative reference (dB), scale

Marker Functions

- Markers
 - 1-6 markers each with a delta marker, or marker 1 reference with 6 delta markers
- Marker types
 - Fixed, tracking, noise, frequency counter
- Marker auto-position
 - Peak search, next peak (right/left), peak threshold %, to channel, to center, To reference level, delta marker to span
- Marker table
 - 1-6 markers' frequency & amplitude plus delta markers' frequency offset and amplitude

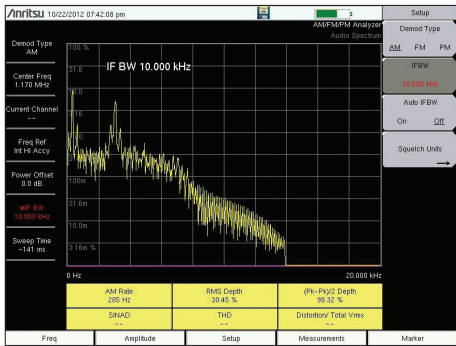
Limit Line Functions

- Limit lines
 - Upper/lower, limit alarm, default Limit
- Limit line edit
 - Frequency, amplitude, add/delete point, Add vertical, next point left/right
- Limit line move
 - To current center frequency, by dB or Hz, to marker 1, offset from marker 1
- Limit line envelope
 - Create, update amplitude, number of points (41), offset, shape square/slope
- Limit line advanced
 - Absolute/relative, mirror, save/recall

VNA Master MS202xB/3xB Features



AM/FM/PM Analyzer (Option 509)

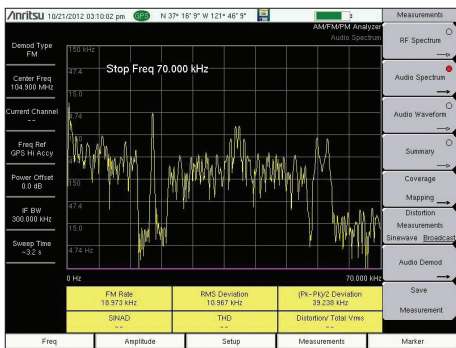


AM audio spectrum

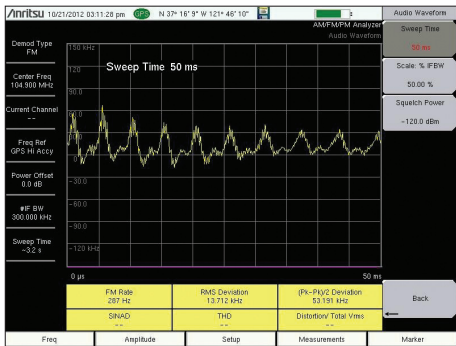
AM/FM/PM Analyzer

VNA Master comes with AM/FM/SSB audio demodulation as standard. By adding option 509, the instrument becomes capable of measuring, analyzing, and displaying key modulation parameters of the RF spectrum, audio spectrum, audio waveform and even includes a demodulation summary. Amplitude modulation (AM), frequency modulation (FM), and phase modulation (PM) are fully supported.

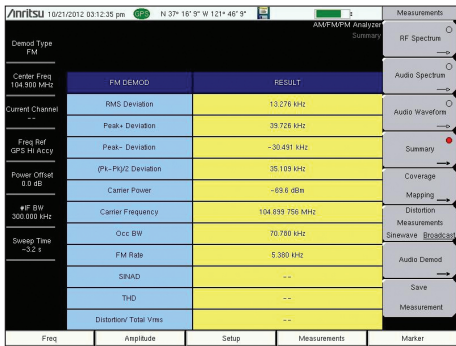
- The **RF spectrum view** displays the spectrum with carrier power, frequency, and occupied BW
- **Audio spectrum** shows the demodulated audio spectrum along with the Rate, RMS deviation, Pk-Pk/2 deviation, SINAD, total harmonic distortion (THD), and distortion/total
- An **Audio waveform** oscilloscope display is included with all three modulation formats that shows the time-domain demodulated waveform
- The **modulation summary** display shows all of the RF and modulation parameters for each modulation format on one screen



FM with sub carriers



Demodulated audio waveform



Modulation Summary

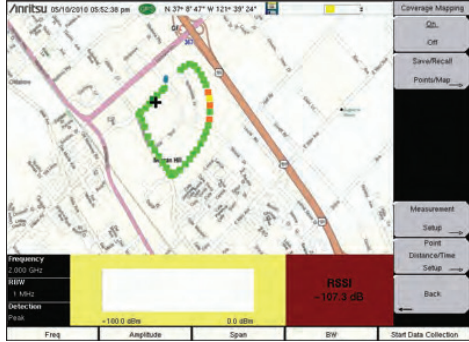
VNA Master MS202xB/3xB Features



Coverage Mapping (Option 431)



There is a growing demand for coverage mapping solutions. Anritsu's Coverage Mapping measurements option provides wireless service providers, public safety users, land mobile radio operators, and government officials with indoor and outdoor mapping capabilities.

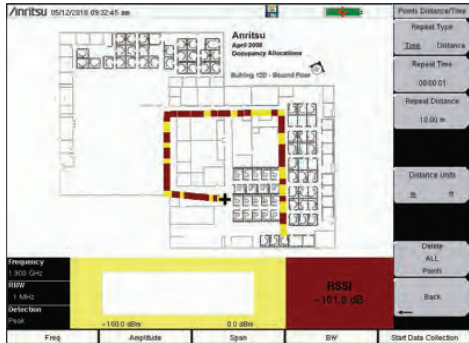


Outdoor Mapping

Outdoor Mapping

With a GPS antenna connected to the instrument and a valid GPS signal, the instrument monitors RSSI and ACPR levels automatically. Using a map created with Map Master, the instrument displays maps, the location of the measurement, and a special color code for the power level. The refresh rate can be set up in time (1 sec, minimum) or distance.

The overall amplitude accuracy coupled with the GPS update rate ensures accurate and reliable mapping results.



Indoor Mapping

Indoor Mapping

When there is no GPS signal valid, the Spectrum Master uses a start-walk-stop approach to record RSSI and ACPR levels. You can set the update rate, start location, and end location and the interpolated points will be displayed on the map.



Saved KML File

Export KML Files

Save files as KML or JPEG. Open kml files with Google Earth™. When opening up a pin in Google Earth, center frequency, detection method, measurement type, and RBW are shown on screen.



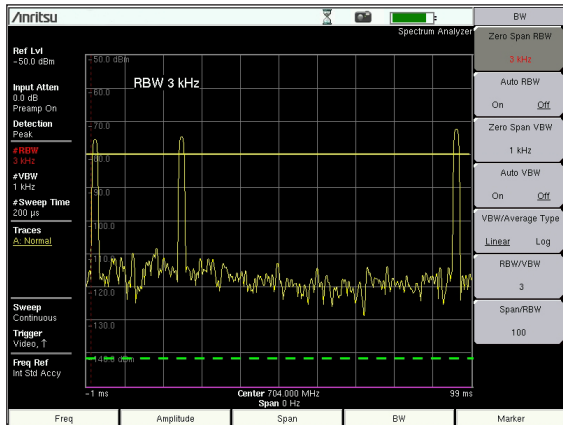
Create Maps with Map Master

Map Master

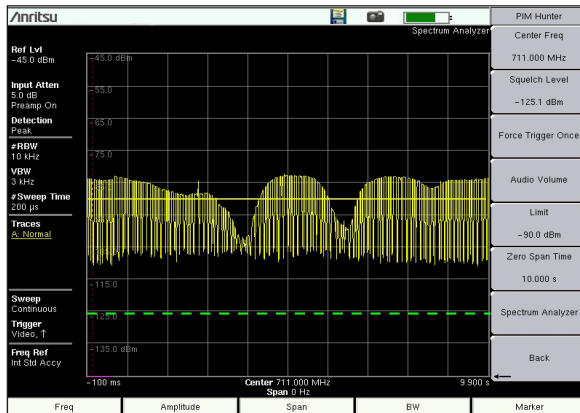
When there is no GPS signal valid, the Spectrum Master uses a start-walk-stop approach to record RSSI and ACPR levels. You can set the update rate, start location, and end location and the interpolated points will be displayed on the map.

VNA Master MS202xB/3xB Features

PIM Hunting



100 ms Zero Span Time



10 Second Zero Span Time

Available on Anritsu solutions with spectrum analyzer capabilities, the PIM Hunting measurement is an optimized zero span function that enables users to hunt and find PIM sources. Together with a PIM Hunter™ probe (P/N 200-1884-R), users can quickly and easily sweep suspected areas for PIM while the PIM Master™ MW82119B RF tones illuminate sources. All key controls needed to conduct a PIM hunting exercise are available in this mode, including:

- **Center Frequency:** Utilizing the IM product frequency generated by the PIM Master test equipment, set the center frequency of the IM product that is being hunted.
- **Squelch Level (green dotted line):** Equivalent to the video trigger function, this is used to show active traces that are above the set limit while signals below the squelch level will be static.
- **Force Trigger Once:** Use to reset the squelch and limit line levels if the trace is not moving.
- **Audio Volume:** As the user is PIM hunting, a variable tone will get higher in pitch as they get closer to the PIM source (i.e., IM signal level rises). The user can adjust the volume as needed.
- **Limit (solid yellow line):** Use to set the Pass/Fail limit of PIM level being hunted.
- **Zero Span Time:** This settable time scale is used to show how many IM pulses the user want to see.

VNA Master MS202xB/3xB Features

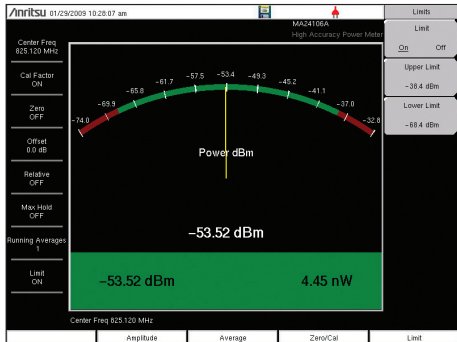


Power Meter

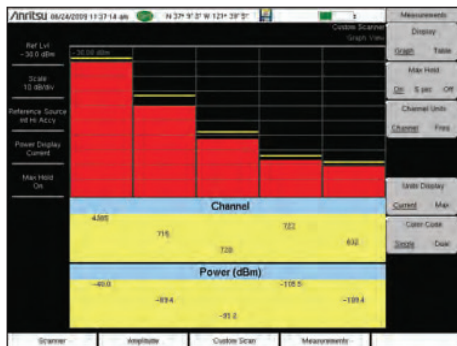
High Accuracy Power Meter (Option 19)



The VNA Master supports many different power measurements, including the channel scanner, high accuracy power meter, and channel power measurement.



High Accuracy Power Meter



Channel Scanner



High Accuracy Power Sensors

PC Power Meter

These power sensors can be used with a PC running Microsoft Windows® via USB. They come with PowerXpert™ application, a data analysis, and control software. The application has abundant features, such as data logging, power versus time graph, big numerical display, and many more, that enable quick and accurate measurements.

High Accuracy Power Meter (Option 19)

Anritsu's high accuracy power meter option enables you to make high accuracy RMS measurements. This capability is perfect for measuring both CW and digitally modulated signals such as CDMA/EV-DO, GSM/EDGE, and W-CDMA/HSPA+. You can select from a wide range of USB sensors delivering better than ± 0.16 dB accuracy. An additional benefit of using the USB connection is that a separate DC supply (or battery) is not needed because the necessary power is supplied by the USB port.

- MA24105A inline high power sensor, 350 MHz to 4 GHz, +3 dBm to +51.76 dBm, true-RMS
- MA24106A high accuracy RF power sensor, 50 MHz to 6 GHz, -40 dBm to +23 dBm, true-RMS
- MA24108A/18A/26A microwave USB power sensor, 10 MHz to 8/18/26 GHz, -40 dBm to +20 dBm, true-RMS, slot power, burst average power
- MA24208A/18A, microwave universal USB power sensor, 10 MHz to 8/18 GHz, -60 dBm to +20 dBm, true-RMS, slot power, burst average power
- MA24330A/40A/50A, microwave CW USB power sensor, 10 MHz to 33/40/50 GHz, -70 dBm to +20 dBm, average power

Channel Scanner (Option 27)

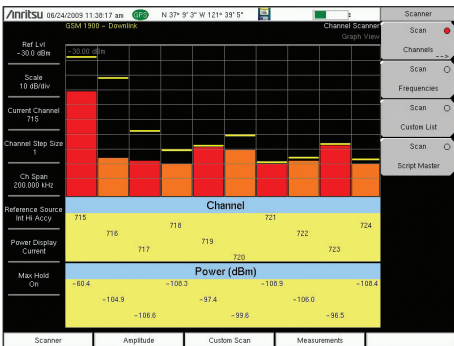
The channel scanner option measures the power of multiple transmitted signals, making it very useful for simultaneously measuring channel power of up to 20 channels in GSM, TDMA, CDMA, W-CDMA, HSDPA, and public safety networks. You can select the frequencies or the scanned data to be displayed, either by frequencies or the channel number. And in the custom setup menu, each channel can be custom built with different frequency bandwidth, or with channels from different signal standards. With Script Master, scans can be automated for up to 1200 channels.

VNA Master MS202xB/3xB Features



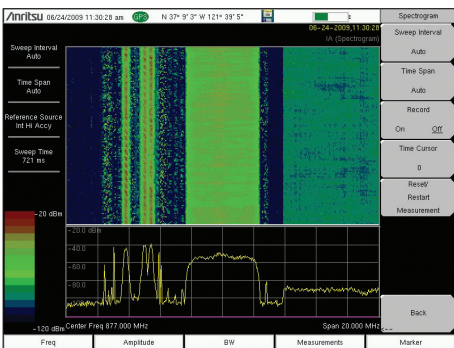
Interference Analyzer (Option 25)

Channel Scanner (Option 27)



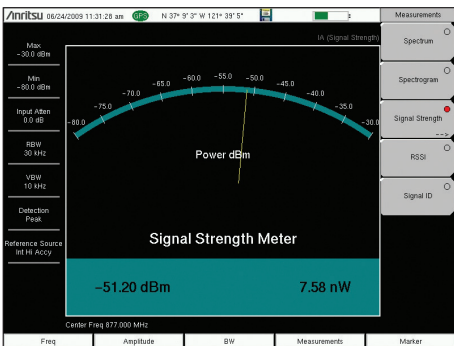
Channel Scanner

Works on any signal and is useful when looking for IM or harmonics. Can help spot signals widely separated in frequency that turn on and off together.



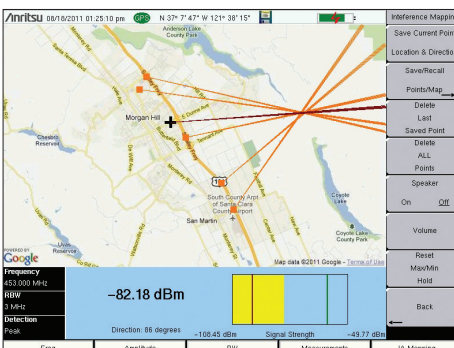
Spectrogram

For identifying intermittent interference and tracking signal levels over time for up to 72 hours with an external USB flash drive.



Signal Strength Meter

Can locate an interfering signal, by using a directional antenna and measuring the signal strength and by an audible beep proportional to its strength.



Interference Mapping

Eliminates the need to use printed maps and draw lines to triangulate location. Use on-screen maps generated with GPS coordinates with Map Master™.

Interference Analyzer (Option 25) Channel Scanner (Option 27)

Interference is a continuously growing problem for wireless network operators. Compounding the problem are the many sources that can generate interference such as:

- Intentional radiators
- Unintentional radiators
- Interference

Interference causes Carrier-to-Interference degradation, robbing the network of capacity. In many instances, interference can cause an outage to a sector, a cell, and/or neighboring cells. The goal of these measurements is to resolve interference issues as quickly as possible.

Monitoring Interference

The VNA Master offers many tools for monitoring intermittent interferers over time to determine patterns:

- Spectrogram
- Received Signal Strength Indicator
- Remote Monitoring over the Internet
- Save-on-Event – crossing a limit line

Master Software Tools for your PC features diagnostic tools for efficient analysis of the data collected during interference monitoring. These features include:

- Folder Spectrogram – creates a composite file of multiple traces for quick review
- Movie playback – playback data in the familiar frequency domain view
- Histogram – filter data and search for number of occurrences and time of day
- 3D Spectrogram – for in-depth analysis with 3-axis rotation viewing control

Identifying Interference

The VNA Master provides several tools to identify the interference – either from a neighboring wireless operator, illegal repeater or jammer, or self-interference:

- Signal ID (up to 12 signals at once)
- Signal Analyzer Over-the-Air Scanners
- Channel Scanner (up to 1200 channels, 20 at a time)

Locating Interference

Once interference has been identified, the Signal Strength Meter with its audible output beep coupled with a directional antenna makes finding the interference easier.

Interference Analyzer Measurements

- Spectrogram
- Signal Strength Meter
- Received Signal Strength Indicator (RSSI)
- Signal ID (up to 12 signals)
 - FM
 - GSM/GPRS/EDGE
 - W-CDMA/HSPA+
 - CDMA/EV-DO
 - Wi-Fi
- Spectrum
 - Field Strength – in dBm/m² or dBmV/m
 - Occupied Bandwidth – 1% to 99% of power
 - Channel Power – in specified bandwidth
 - ACPR – adjacent channel power ratio
 - AM/FM/SSB audio monitor
 - C/I – carrier-to-interference ratio

Channel Scanner

- Scan
 - 20 channels at once, by frequency or channel
 - Noncontiguous channels
 - Different channel bandwidths in one scan
- Display
 - Current plus Max hold display
 - Graph View
 - Table View
- Script Master™
 - Up to 1200 Channels
 - Auto-repeat sets of 20 channels and total
 - Auto-save with GPS tagging

Interference Mapping

- Save Current Point with Location and Direction
- Save/Recall Points & Map
- Audible Output of RSSI
- Reset Max/Min Hold

VNA Master MS202xB/3xB Features



Distance Domain Analysis

Distance Domain

Distance-to-Fault Analysis is a powerful field test tool to analyze cables for faults, including minor discontinuities that may occur due to a loose connection, corrosion, or other aging effects. By using Frequency Domain Reflectometry (FDR), the VNA Master sweeps a user-specified band of full power operational frequencies (instead of fast narrow pulses from TDR-type approaches) to more precisely identify discontinuities. The VNA Master converts S-parameters from frequency domain into distance (or time) domain on the horizontal display axis, using a mathematical computation called Inverse Fourier Transform. Connect a reflection at the opposite end of the cable and the discontinuities appear versus distance to reveal any potential maintenance issues. When access to both ends of the cable is convenient, a similar time domain analysis is available on transmission (S_{21}) measurements.

Distance Domain will improve your productivity with displays of the cable in terms of discontinuities versus distance. This readout can then be compared against previous measurements (from stored data) to determine whether any degradations have occurred since installation (or the last maintenance activity). More importantly, you will know precisely where to go to fix the problem and so minimize or prevent downtime of the system.

Wire Cable Bundle Diagnostics for Aircraft and Shipboard

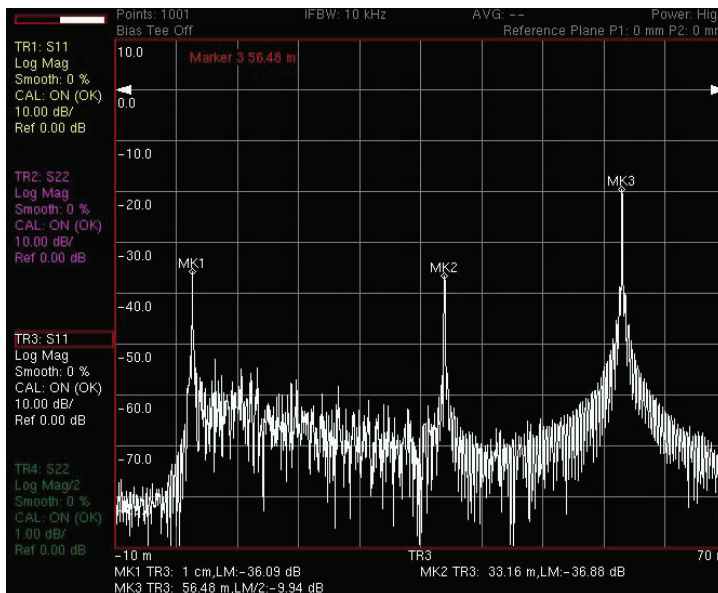
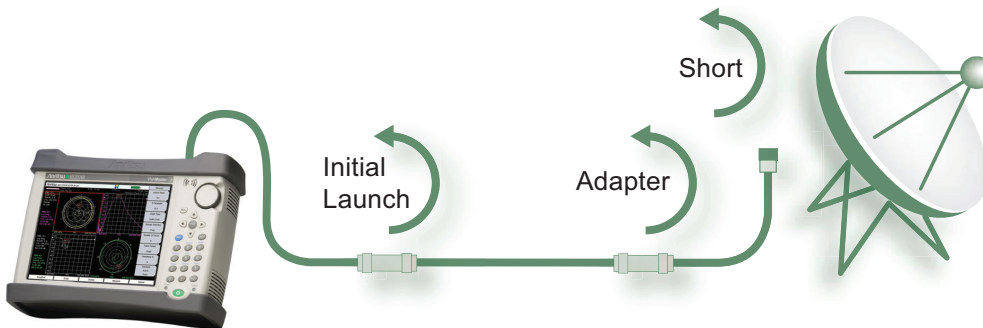
This innovative new Distance-to-Fault technique finds damaged aircraft wire bundles at bulkheads or other points of vulnerability. It uses the Time Domain option and Frequency Domain Reflectometry with special fixtures to launch high frequency sweep signals into the wiring harnesses. Find out more by downloading Anritsu's Application Note 11410-00565, "Troubleshoot Wire Cable Assemblies with Frequency-Domain-Reflectometry."

Measurements

- DTF Return Loss
- DTF Insertion Loss

Setup Parameters

- Start Distance
- Stop Distance
- Start Frequency (FDR)
- Stop Frequency (FDR)
- Windowing: Rectangular, Nominal Side Lobe, Low Side Lobe, Minimum Side Lobe
- Propagation Velocity
- Cable Loss
- Units: meters or feet
- Distance Info display



This illustration shows a typical cable measurement scenario with an adapter between the near and far end of the cable. With a short on the far end, the VNA Master can convert frequency domain results into corresponding distance-domain readout. Moving left to right, we can see the initial launch (MK1), the intermediate adapter (MK2), and the short at the far end of the cable (MK3). It is easy to interpret the discontinuities as normal or faults by simply looking at the location and amplitude of the peaks. Since the short shows as -20 dB, this means that the one-way cable loss must be 10 dB.

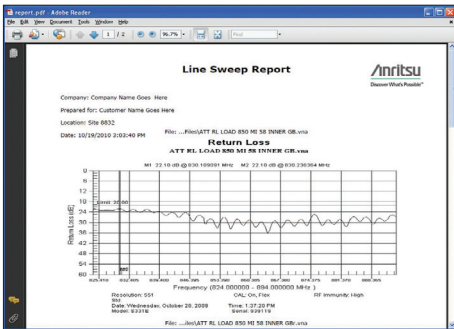
VNA Master MS202xB/3xB Features

Line Sweep Tools and Master Software Tools (for your PC)



Trace Validation

Marker and Limit Line presets allow quick checks of traces for limit violations.



Line Sweep Tools™

Line Sweep Tools increases productivity for people who deal with dozens of Cable and Antenna traces every day.

User Interface

Line Sweep Tools has a user interface that will be familiar to users of Anritsu's Hand Held Software Tools. This will lead to a short learning curve.

Marker and Limit Line Presets

Presets make applying markers and a limit line to similar traces, as well as validating traces, a quick task.

Renaming Grid

A renaming grid makes changing file names, trace titles, and trace subtitles from field values to those required for a report much quicker than manual typing and is less prone to error.

Report Generator

The report generator will generate a professional PDF of all open traces with additional information such as contractor logos and contact information.

Line Sweep Features

Presets

7 sets of 8 markers and 1 limit line
Next trace capability

File Types

Input: HHST DAT, VNA, and some MNA measurements.
Return Loss (VSWR), Cable Loss, DTF-RL, DTF-VSWR, PIM
Output: LS DAT, MNA, VNA, CSV, PNG, BMP, JPG, PDF

Report Generator

Logo, title, company name, customer name, location, date and time, filename, PDF, HTML, all open traces

Tools

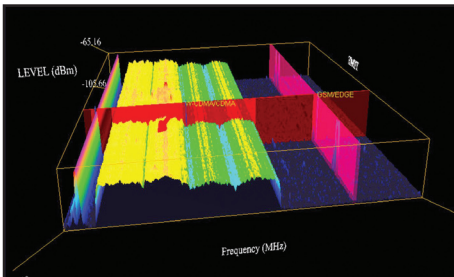
Cable Editor
Distance-to-Fault
Measurement calculator
Signal Standard Editor
Renaming Grid

Interfaces

Serial, Ethernet, USB

Capture Plots to

Screen, Database, DAT files, JPEG, Instrument



3D Spectrogram

For in-depth analysis with 3-axis rotation viewing, threshold, reference level, and marker control. Turn on Signal ID to see the types of signals.

Master Software Tools™

Master Software Tools (MST) is a powerful PC software post-processing tool designed to enhance the productivity of technicians dealing with spectrum analyzer traces.

Folder Spectrogram

Folder Spectrogram – creates a composite file of up to 15,000 multiple traces for quick review, also create:

- Peak Power, Total Power, and Peak Frequency plotted over time
- Histogram – filter data and plot number of occurrences over time
- Minimum, Maximum, and Average Power plotted over frequency
- Movie playback – playback data in the familiar frequency domain view
- 3D Spectrogram – for in-depth analysis with 3-axis rotation viewing control

Master Software Tools Features

Spectrum Analyzer Database Management

Full Trace Retrieval
Trace Catalog
Group Edit
Trace Editor

Data Analysis

Trace Math and Smoothing
Data Converter
Measurement Calculator

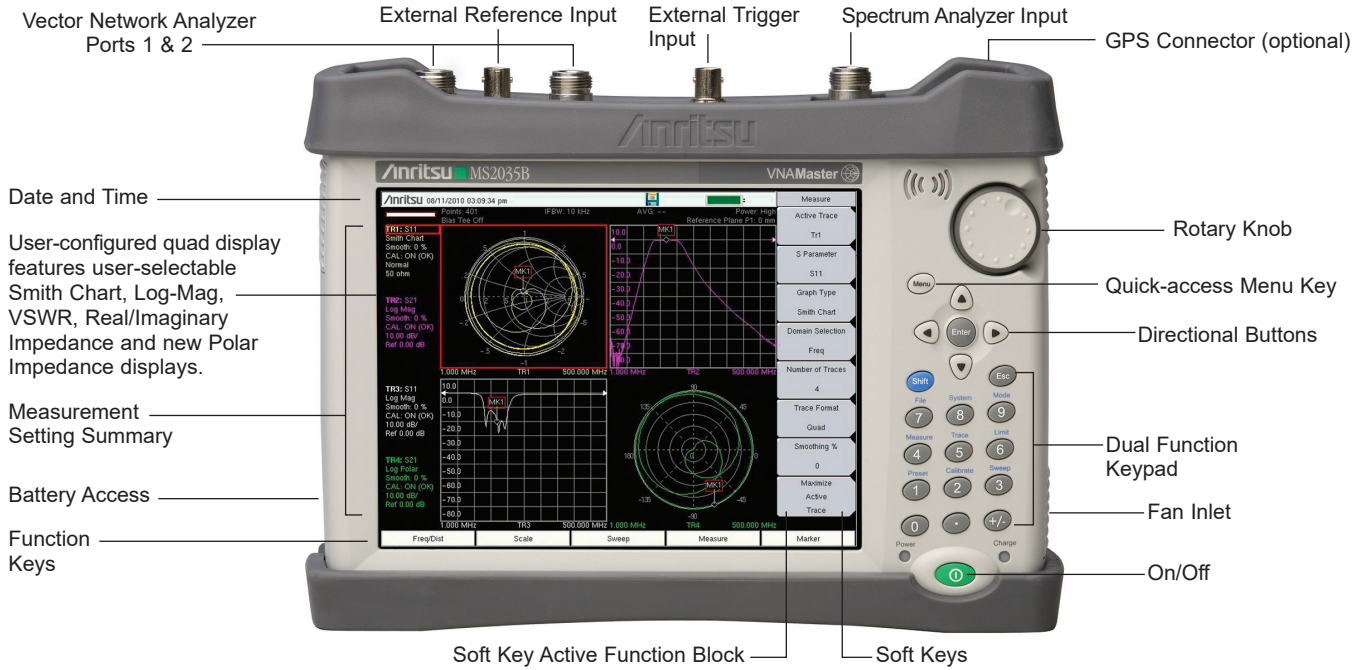
Folder Spectrogram

Folder Spectrogram – 2D View
Video Folder Spectrogram – 2D View
Folder Spectrogram – 3D View

List/Parameter Editors

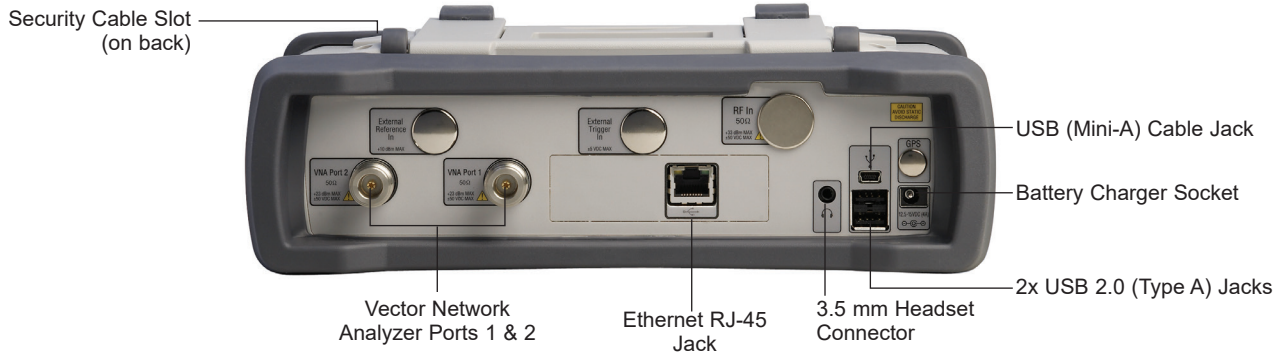
Traces
Antennas, Cables, Signal Standards
Pass/Fail
Languages

VNA Master MS202xB/3xB Features

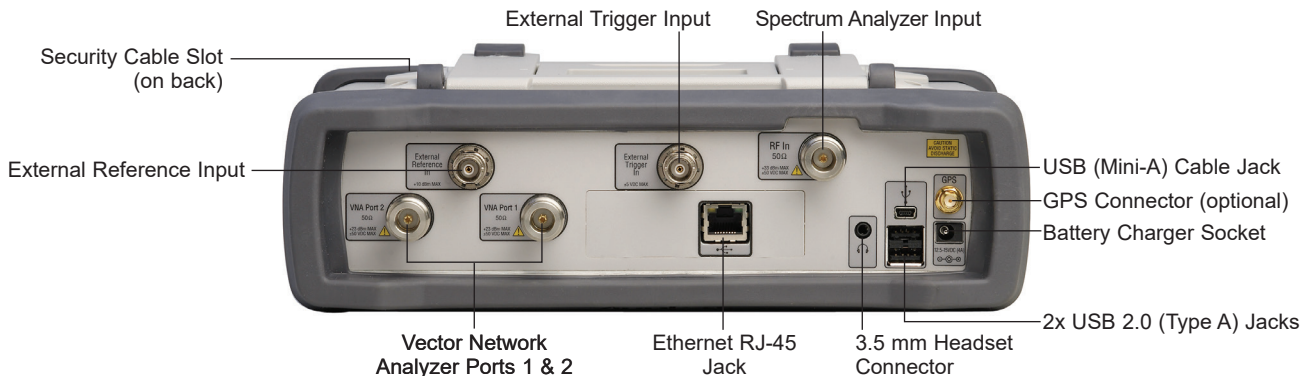


Size: 273 (W) x 199 (H) x 91 (D) mm (10.7 x 7.8 x 3.6 in.). Weight: 3.5 kg (7.6 lbs)

MS2024/25B VNA Master

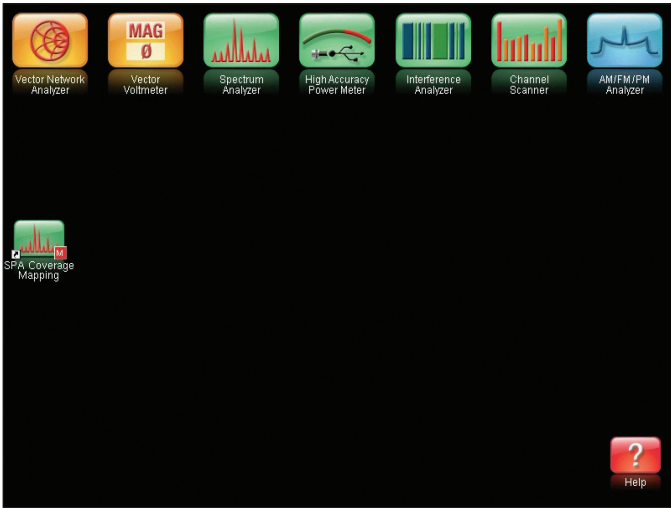


MS2034/35B VNA Master + Spectrum Analyzer



ALL CONNECTORS ARE CONVENIENTLY LOCATED ON THE TOP PANEL, LEAVING THE SIDES CLEAR FOR HANDHELD USE

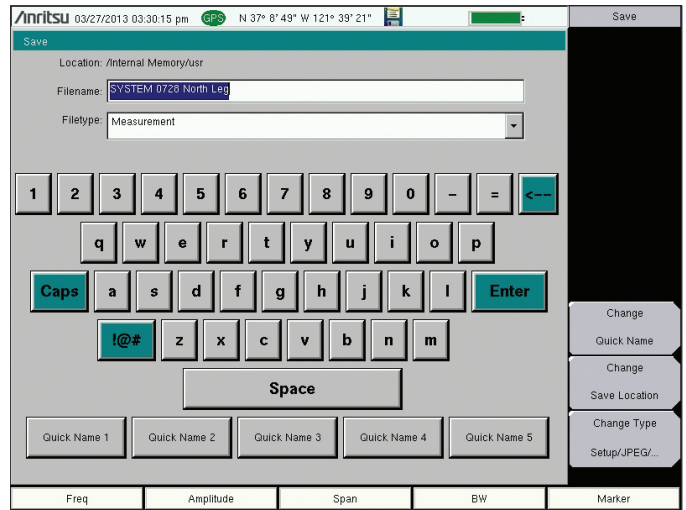
VNA Master MS202xB/3xB Features



TOUCHSCREEN MENU

The Menu Key activates the touchscreen menu for one button access to all of the Analyzers.

User defined shortcuts can be created for one-button access to commonly used functions.



TOUCHSCREEN KEYBOARD

A built-in touchscreen keyboard saves valuable time in the field when entering trace names.

For Cable and Antenna Analysis, a Quick Name Matrix can be customized for quickly naming your line sweeps.



TILT BAIL IS INTEGRATED INTO THE CASE FOR USER CONVENIENCE AND BETTER SCREEN VIEWING.

VNA Master MS202xB/3xB Ordering Information

Ordering Information – Options

MS2024B	MS2025B	MS2034B	MS2035B	
VNA Master™ 500 kHz to 4 GHz	VNA Master™ 500 kHz to 6 GHz	VNA Master™ 500 kHz to 4 GHz 9 kHz to 4 GHz	VNA Master™ 500 kHz to 6 GHz 9 kHz to 6 GHz	Vector Network Analyzer Spectrum Analyzer
Options				Description
MS2024B-0010	MS2025B-0010	MS2034B-0010	MS2035B-0010	Built-in Bias-Tee, +12 to +32 V variable
MS2024B-0015	MS2025B-0015	MS2034B-0015	MS2035B-0015	Vector Voltmeter
MS2024B-0019	MS2025B-0019	MS2034B-0019	MS2035B-0019	High-Accuracy Power Meter (requires external USB sensor, sold separately)
-	-	MS2034B-0025	MS2035B-0025	Interference Analysis, 9 kHz to 4 GHz ¹
-	-	MS2034B-0027	MS2035B-0027	Channel Scanner, 9 kHz to 4 GHz ¹
MS2024B-0031	MS2025B-0031	MS2034B-0031	MS2035B-0031	GPS Receiver ²
MS2024B-0098	MS2025B-0098	MS2034B-0098	MS2035B-0098	Z-540 Calibration
MS2024B-0099	MS2025B-0099	MS2034B-0099	MS2035B-0099	Premium Calibration
-	-	MS2034B-0431	MS2035B-0431	Coverage Mapping ³
-	-	MS2034B-0509	MS2035B-0509	AM/FM/PM Demodulation Analyzer

Notes:

- 1) GPS Option 31 recommended.
- 2) Requires external GPS antenna (sold separately).
- 3) Requires GPS Option 31

Standard Accessories (Included with instrument)



Part Number	Description
2000-1654-R	Soft Carrying Case
2000-1371-R	Ethernet Cable, 2.1 m (7 ft)
2000-1691-R	Stylus with Coiled Tether
2000-1797-R	Screen Protector Film (x2, one factory installed, one spare)
633-75	Rechargeable Li-Ion Battery, 7500 mAh
40-187-R	AC-DC Adapter
806-141-R	Automotive Power Adapter, 12 VDC, 60 W
3-2000-1498	USB A/5-pin mini-B Cable, 10 ft/305 cm

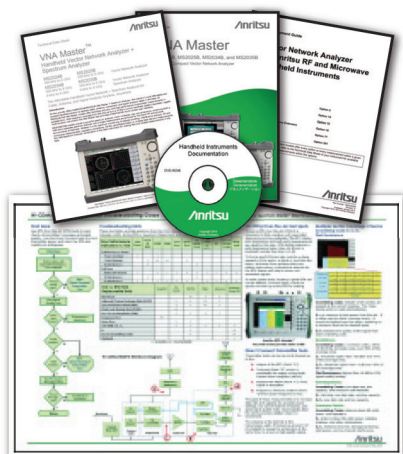
Manuals



Part Number	Description
10580-00244	Spectrum Analyzer Measurement Guide
10580-00240	Power Meter Measurement Guide
10580-00289	VNA Measurement Guide
10580-00301	VNA Master User Guide
10580-00302	VNA Master Programming Manual
10580-00303	VNA Master Maintenance Manual
11410-00206	Time Domain for Vector Network Analyzers
11410-00214	Reflectometer Measurements – Revisited
11410-00270	What is Your Measurement Accuracy?
11410-00373	Distance-to-Fault
11410-00387	Primer on Vector Network Analysis
11410-00424	USB Power Sensor MA24106A
11410-00504	Microwave USB Power Sensor MA241x8A
11410-00531	Practical Tips on Making “Vector Voltmeter (VVM)” Phase Measurements using VNA Master (Option 15)
11410-00545	VNA Master + Spectrum Analyzer Brochure
11410-00549	VNA Master + Spectrum Analyzer Technical Data Sheet
11410-00472	Measuring Interference
11410-00476	Essentials of Vector Network Analysis
11410-00565	Troubleshoot Wire Cable Assemblies with Frequency-Domain Reflectometry
11410-00700	Evaluation of RF Network Testing
11410-00601	Effectively Testing 700 MHz Public Safety LTE Broadband and P25 Narrowband Networks
11410-00608	Finding Radio Frequency Interferers
11410-00818	High Q Notch Filter Measurements

VNA Master MS202xB/3xB Ordering Information

Related Literature, Application Notes, Manuals



Part Number	Description
10580-00244	Spectrum Analyzer Measurement Guide
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