

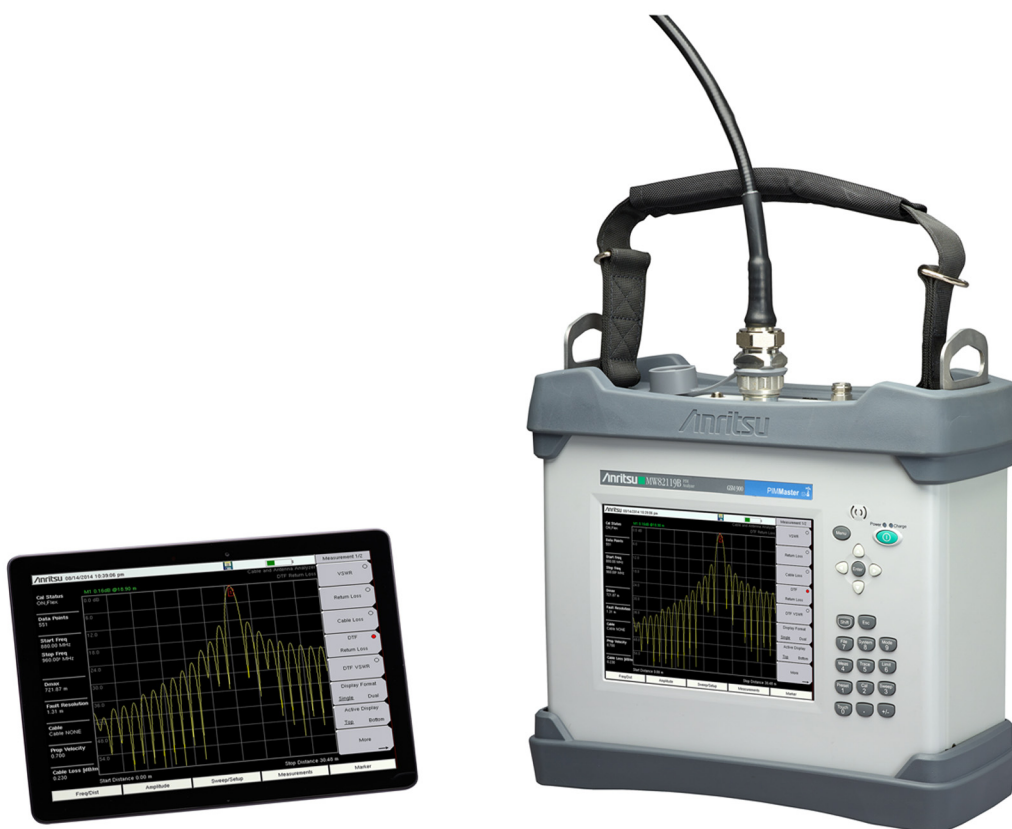
**Anritsu** envision : ensure

# PIM Master™

Passive Intermodulation Analyzer with Site Master™ Cable & Antenna Analyzer

## MW82119B

LTE 600 w/1900 MHz, LTE 700, APT 700, LTE 800, Cellular 850, E-GSM 900, E-GSM 900 w/IM 2, DCS 1800, PCS/AWS, UMTS 2100, LTE 2600



# 4TECT

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## Introduction

Anritsu introduces the first fully integrated Passive Intermodulation (PIM) Analyzer plus Cable and Antenna Analyzer (Option 331) suitable for commissioning and maintaining global wireless networks. This high-performance, battery-operated unit allows operators to fully characterize infrastructure quality by measuring Return Loss, VSWR, Cable Loss, Passive Intermodulation, Distance-to-Fault, and Distance-to-PIM.

## Passive Intermodulation (PIM) Analyzer Highlights

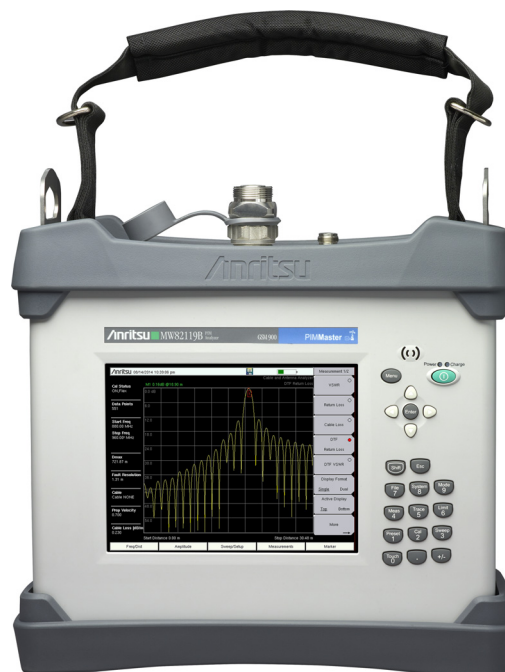
- PIM vs. Time, Swept PIM, Noise Floor, Distance-to-PIM
- 3rd, 5th, and 7th order intermodulation products detected
- 2nd order intermodulation products detected with Option 902
- Test Power: 20 dBm to 46 dBm
- Residual PIM: -125 dBm typical

## Cable and Antenna Analyzer Highlights (Option 331)

- Measurements: RL, VSWR, Cable Loss, DTF, Phase
- Frequency range: 2 MHz to 3 GHz
- Sweep Speed: 1 ms/data point typical
- Calibration: OSL and FlexCal™

## Capabilities and Functional Highlights

- Integrated solution
- Display: 8.4 in (213 mm) daylight viewable
- MIL-STD-810G drop test rated
- Padded soft case for extra protection
- Quick Name Matrix simplifies naming in the field
- High Accuracy Power Meter (Option 19)
- Battery operated: >3.0 hour run time
- IP54 rated for dust and water spray
- Stainless steel lifting rings
- Easy-to-use, menu-driven user interface
- GPS tag measurements (Option 31)



Size: 350 mm x 314 mm x 152 mm (13.8 in x 12.4 in x 6.0 in)  
 Lightweight: 9.2 kg to 12.4 kg (20 lb to 27 lb) depending on options

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**Definitions**

	All specifications and characteristics apply to Revision 2 instruments under the following conditions, unless otherwise stated:
Warm-Up Time	After 10 minutes of warm-up time, where the instrument is left in the on state.
Typical Performance	Typical specifications are not tested and are not warranted. They are generally representative of the nominal characteristic performance.
Uncertainty	A coverage factor of K=2 is applied to the measurement uncertainties.
Calibration Cycle	Recommended calibration cycle is 12 months.
	All specifications subject to change without notice. For the most current data sheet, please visit the Anritsu web site: <a href="http://www.anritsu.com">www.anritsu.com</a>



## General Specifications

### PIM Master Connectors

PIM Test Port	7/16 DIN, female, 50 Ω
Dual USB Type A	2x Type A (connect USB Flash Drive and USB Power Sensor)
USB Mini-B	1x Mini-B (connect to PC for data transfer)
GPS	SMA, female (with GPS option only)
External Power	2.1 mm x 5.5 mm barrel connector, 12 VDC to 15 VDC, < 5.0 A
PIM Test Port Damage Level	+10 dBm (10 mW) continuous, (PIM Rx band) +35 dBm (3 W) continuous, (PIM Tx band)*
IM2/1900 MHz In Test Port	Type N, Female, 50 Ω (Option 902 and Option 600)
IM2/1900 MHz In Test Port Damage Level	+10 dBm (10 mW) continuous, (IM2/1900 MHz Rx band)
VNA Test Port	Type N, female, 50 Ω (Option 331)
VNA Test Port Damage Level	40 dBm continuous
*	Able to survive full reflection of 2 X 46 dBm PIM test tones generated by the MW82119B.

### Display

Size	213 mm (8.4 in) touch screen
Resolution	800 x 600
Pixel Defects	No more than five defective pixels (99.9989% good pixels)

### Battery

Type	Li-Ion
Battery Operation	3.0 hours, typical
Charging Limits	While charging, battery must be 0 °C to +45 °C, Relative Humidity ≤ 80 %

### Power

AC/DC Adapter	Input: 100 VAC to 240 VAC, 50/60 Hz Output: 12 VDC
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### Regulatory Compliance<sup>1</sup>

European Union	EMC 2014/30/EU, EN 61326:2013, CISPR 11/EN 55011, IEC/EN 61000-4-2/3/4/5/6/8/11 Low Voltage Directive 2014/35/EU Safety EN 61010-1:2010 RoHS Directive 2011/65/EU applies to instruments with CE marking placed on the market after July 22, 2017
Australia and New Zealand	RCM AS/NZS 4417:2012
Canada	ICES-1(A)/NMB-1(A)
South Korea	KCC-REM-A21-0004

### Environmental

	MIL-PRF-28800F Class 2
Operating Temperature Range	-10 °C to 55 °C
Storage Temperature Range	-51 °C to 71 °C
Maximum Relative Humidity	95 % RH at 30 °C, non-condensing
Vibration, Sinusoidal	5 Hz to 55 Hz
Vibration, Random	10 Hz to 500 Hz
Half Sine Shock	30 g <sub>n</sub>
Altitude	4600 meters, operating and non-operating
Explosive Atmosphere	MIL-PRF-28800F, Section 4.5.6.3 MIL-STD-810G, Method 511.5, Procedure 1
Ingress Protection (IP)	IP54, IP67 when enclosed in optional transit case

### ESD

PIM Test Port Connector Center Pin	Withstands up to ±15 kV
VNA RF Out Connector Center Pin	Withstands up to ±15 kV

### Size and Weight

Size	350 mm x 314 mm x 152 mm (13.8 in x 12.4 in x 6.0 in)
Weight	9.2 kg to 12.4 kg (20 lb to 27 lb), varies by frequency option

### Warranty

Duration	Standard three-year warranty (one-year warranty on battery)
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1. MW82119B-600 (Option 600) is not compliant with CE and RCM radiated emissions requirements.



**PIM Analyzer Specifications**

**Measurements**

Measurements	PIM vs. Time Noise Floor Distance-to-PIM Swept PIM
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**Setup Parameters**

Frequency	Carrier F1, Carrier F2, Intermodulation Order
Amplitude	Ref Value, Scale, Auto Range (On/Off), Amplitude Tone (On/Off)
Setup	Output Power, Test Duration (1 s to 1,200 s)
Limit Lines	Limit (Upper/Lower), On/Off, Limit Move, Limit Alarm (On/Off, PASS/FAIL indicator)
Markers	Markers 1-6 (On/Off), Delta Markers 1-6 (On/Off), Marker to Peak/Valley, All Markers Off
GPS	On/Off, 3.3/5.0 V
DTP	Cable Velocity, Distance
Save/Recall	Setups (.stp), Measurements (.pim), Limit Lines (.lim), Screen Shots (.jpg) (save only)

**PIM Measurement Ranges**

Test Method	Reverse (reflected) Passive Intermodulation (PIM) per IEC-62037-1
Intermodulation Order	3rd, 5th, and 7th order, when in receive band (user selectable)
RF Test Power	Two CW tones 20 dBm to 46 dBm, 0.1 dBm steps Accuracy: ±0.5 dB (excluding uncertainty)
RF Test Frequency	Accuracy: ±1.0 ppm at 23 °C Stability: ±1.0 ppm from -10 °C to +55 °C, typical Aging: ±1.0 ppm/yr aging, typical
Residual PIM Performance	<-117 dBm, <-125 dBm typical (2x 43 dBm test tones) <-134 dBm, <-140 dBm typical (2x 20 dBm test tones)
PIM Measurement Range	-70 dBm to -140 dBm (Revision 1 instruments) -50 dBm to -140 dBm (Revision 2 instruments)

Band	Option	Frequency Range
LTE 600 w/1900 MHz	Option 600	Tx <sub>1</sub> : 617 MHz to 618 MHz, Tx <sub>2</sub> : 633 MHz to 652 MHz Rx <sub>1</sub> : 663 MHz to 698 MHz, Rx <sub>2</sub> : 1867 MHz to 1888 MHz
LTE 700	Option 700	Tx <sub>1</sub> : 731 MHz to 734.5 MHz, Tx <sub>2</sub> : 746 MHz to 768 MHz Rx <sub>Lower</sub> : 698 MHz to 717 MHz, Rx <sub>Upper</sub> : 777 MHz to 806 MHz
APT 700	Option 701	Tx <sub>1</sub> : 758 MHz to 776 MHz, Tx <sub>2</sub> : 788 MHz to 803 MHz Rx <sub>Lower</sub> : 710 MHz to 748 MHz, Rx <sub>Upper</sub> : 825 MHz to 845 MHz
LTE 800	Option 800	Tx <sub>1</sub> : 791 MHz to 795 MHz, Tx <sub>2</sub> : 811.5 MHz to 821 MHz Rx: 832 MHz to 862 MHz
Cellular 850	Option 850	Tx <sub>1</sub> : 869 MHz to 871 MHz, Tx <sub>2</sub> : 881.5 MHz to 894 MHz Rx: 824 MHz to 849 MHz
E-GSM 900	Option 900	Tx <sub>1</sub> : 925 MHz to 937.5 MHz, Tx <sub>2</sub> : 951.5 MHz to 960 MHz Rx <sub>1</sub> : 880 MHz to 915 MHz
E-GSM 900 w/IM 2	Option 902	Tx <sub>1</sub> : 925 MHz to 937.5 MHz, Tx <sub>2</sub> : 951.5 MHz to 960 MHz Rx <sub>1</sub> : 885 MHz to 915 MHz, Rx <sub>2</sub> : 1877 MHz to 1920 MHz
DCS 1800	Option 180	Tx <sub>1</sub> : 1805 MHz to 1837 MHz, Tx <sub>2</sub> : 1857.5 MHz to 1880 MHz Rx: 1710 MHz to 1785 MHz
PCS/AWS	Option 194	Tx <sub>1</sub> : 1930 MHz to 1945 MHz, Tx <sub>2</sub> : 1965 MHz to 1995 MHz, Tx <sub>3</sub> : 2110 MHz to 2155 MHz Rx <sub>1</sub> : 1850 MHz to 1910 MHz (using Tx <sub>1</sub> and Tx <sub>2</sub> ), Rx <sub>2</sub> : 1710 MHz to 1755 MHz (using Tx <sub>1</sub> and Tx <sub>3</sub> )
UMTS 2100	Option 210	Tx <sub>1</sub> : 2110 MHz to 2112.5 MHz, Tx <sub>2</sub> : 2130 MHz to 2170 MHz Rx <sub>Lower</sub> : 1920 MHz to 1980 MHz, Rx <sub>Upper</sub> : 2050 MHz to 2090 MHz
LTE 2600	Option 260	Tx <sub>1</sub> : 2620 MHz to 2630 MHz, Tx <sub>2</sub> : 2650 MHz to 2690 MHz Rx: 2500 MHz to 2570 MHz



## PIM Analyzer Specifications (continued)

### PIM vs. Time

Description	IM product magnitude vs. time
Test Frequencies	F1, F2, and IM product frequencies fixed, user selectable
Measurements	Peak PIM over measurement duration, Instantaneous PIM

### Noise Floor (Time View)

Description	Noise level vs. time at IM product frequency
Test Frequencies	IM product frequency fixed, user selectable
Measurements	Peak signal level over measurement duration, Instantaneous signal level

### Noise Floor (Spectrum View)

Description	Noise level vs. frequency
Test Frequencies	Swept measurement over Rx band of instrument
Measurements	Peak signal level, Instantaneous signal level

### Distance-to-PIM

Description	IM product magnitude vs. distance
Test Frequencies	F1 or F2 frequency swept to produce range of IM product frequencies for analysis
Fault Resolution	Varies by frequency option, <3 m (<10 ft) typical with Enhanced Resolution activated
Maximum Range	Varies by frequency option and number of Data Points selected
Markers	Standard marker functions plus Marker Table (On/Off)
Trace Overlay	DTP/DTP, DTP/DTF

### Swept PIM

Description	IM product magnitude vs. frequency
Test Frequencies	F1 and F2 frequencies swept to produce range of IM product frequencies
Measurements	Peak PIM over measurement duration, Instantaneous PIM





**Cable and Antenna Analyzer (Option 331)**

**Measurements**

Measurements	VSWR Return Loss Cable Loss Distance-to-Fault (DTF) Return Loss Distance-to-Fault (DTF) VSWR 1-Port Phase Smith Chart (50/75 Ω selectable)
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**Setup Parameters**

Measurement Display	Single/Dual Measurement Display with independent markers
Frequency	Start/Stop, Signal Standard, Start Cal
DTF	Start/Stop, DTF Aid, Units (m/ft), Cable Loss, Propagation Velocity, Cable, Windowing
Windowing	Rectangular, Nominal Side Lobe, Low Side Lobe, Minimum Side Lobe
Amplitude	Top, Bottom, Auto Scale, Full Scale
Sweep	Run/Hold, Single/Continuous, RF Immunity (High/Low), Data Points, Averaging/Smoothing, Output Power (High), RF Pwr When Hold (On/Off)
Data Points	137, 275, 551, 1102, 2204
Markers	Markers 1-6 (On/Off), Delta Markers 1-6 (On/Off), Marker to Peak/Valley, Peak/Valley Auto, Marker Table (On/Off), All Markers Off
Traces	Recall, Copy to Display Memory, No Trace Math, Trace ± Memory, (Trace + Memory)/2, and Trace Overlay (On/Off)
Limit Line	On/Off, Single Limit, Multi-segment Edit, Limit Alarm (On/Off), Pass Fail Message (On/Off), Pass/Fail (Unbounded/Bounded), Warning Limit Offset, Clear Limit
Calibration	Start Cal, Cal Type (Standard/FlexCal™), Disp Valid Cal Temp Range
Save/Recall	Setups (.stp), Measurements (.dat, .vna), Screen Shots (.jpg) (save only)
Application Options	Impedance (50 Ω, 75 Ω, Other)

**Frequency**

Frequency Accuracy	±1.0 ppm at 23 °C
Stability	±1.0 ppm from -10 °C to +55 °C, typical
Aging	±1.0 ppm/yr, typical

**Output Power**

Power Level	-4 dBm, typical
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**Interference Immunity**

On-Channel	+17 dBm @ > 1.0 MHz from carrier frequency
On-Frequency	0 dBm within ± 10 kHz of the carrier frequency

**Measurement Speed**

Return Loss	≤ 1.00 ms/data point, RF immunity low, typical
Distance-to-Fault	≤ 1.25 ms/data point, RF immunity low, typical

**Return Loss**

Measurement Range	0 dB to 60 dB
Resolution	0.01 dB

**VSWR**

Measurement Range	1:1 to 65:1
Resolution	0.01

**Cable Loss**

Measurement Range	0 dB to 30 dB
Resolution	0.01 dB

**Distance-to-Fault**

Vertical Range Return Loss	0 dB to 60 dB
Vertical Range VSWR	1:1 to 65:1
Fault Resolution (meters)	$(1.5 \times 10^8 \times v_p) / \Delta F$ ( $v_p$ = velocity propagation constant, $\Delta F$ is F2-F1 in Hz)
Horizontal Range (meters)	0 to (Data Points-1) x Fault Resolution, to a maximum of 1500 meters (4921 ft)

**1-Port Phase**

Measurement Range	-180 ° to +180 °
Resolution	0.01 °

**Smith Chart**

Resolution	0.01 50/75 Ω Selectable
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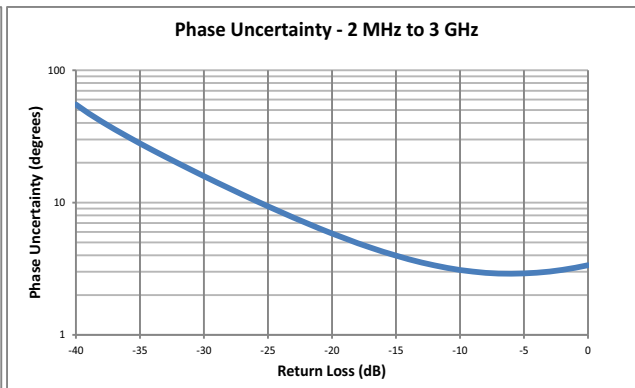
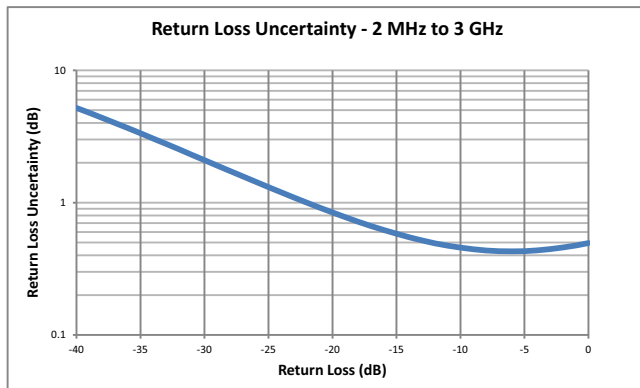


**Cable and Antenna Analyzer (Option 331)** (continued)

**Measurement Accuracy**

Corrected Directivity > 42 dB, OSL Calibration

**Measurement Uncertainty**



**GPS Receiver (Option 31)** (Antenna sold separately)

Setup On/Off, Antenna Voltage 3.3/5.0 V, GPS Info  
 GPS Time/Location Indicator Time, Latitude, Longitude and Altitude on display  
 Time, Latitude, Longitude and Altitude with trace storage  
 Connector SMA(f)



**High Accuracy Power Meter (Option 19)** (requires external USB Power Sensor)

Amplitude	Maximum, Minimum, Offset, Relative On/Off, Units, Auto Scale				
Average	# of Running Averages, Max Hold				
Zero/Cal	Zero On/Off, Cal Factor (Center Frequency, Signal Standard)				
Limits	Limit On/Off, Limit Upper/Lower				
Power Sensor Model	MA24105A	MA24106A	MA24108A/18A/26A	MA24208A/18A	MA24330A/40A/50A
Description	Inline High Power Sensor	High Accuracy RF Power Sensor	Microwave USB Power Sensor	Microwave Universal USB Power Sensor	Microwave CW USB Power Sensor
Frequency Range	350 MHz to 4 GHz	50 MHz to 6 GHz	10 MHz to 8/18/26 GHz	10 MHz to 8/18 GHz	10 MHz to 33/40/50 GHz
Connector	Type N(f), 50 Ω	Type N(m), 50 Ω	Type N(m), 50 Ω (8/18 GHz) Type K(m), 50 Ω (26 GHz)	Type N(m), 50 Ω	Type K(m), 50 Ω (33/40 GHz) Type V(m), 50 Ω (50 GHz)
Dynamic Range	+3 dBm to +51.76 dBm (2 mW to 150 W)	-40 dBm to +23 dBm (0.1 μW to 200 mW)	-40 dBm to +20 dBm (0.1 μW to 100 mW)	-60 dBm to +20 dBm (1 nW to 100 mW)	-70 dBm to +20 dBm (0.1 nW to 100 mW)
Measurand	True-RMS	True-RMS	True-RMS, Slot Power, Burst Average Power	True-RMS, Slot Power, Burst Average Power	Average Power
Measurement Uncertainty	± 0.17 dB <sup>a</sup>	± 0.16 dB <sup>b</sup>	± 0.18 dB <sup>c</sup>	± 0.17 dB <sup>d</sup>	± 0.17 dB <sup>e</sup>
Data sheet (for complete specifications)	11410-00621	11410-00424	11410-00504	11410-00841	11410-00906

- Notes:
- a. Expanded uncertainty with K=2 for power measurements of a CW signal greater than +20 dBm with a matched load. Measurement results referenced to the input side of the sensor.
  - b. Total RSS measurement uncertainty (0 °C to 50 °C) for power measurements of a CW signal greater than -20 dBm with zero mismatch errors.
  - c. Expanded uncertainty with K=2 for power measurements of a CW signal greater than -20 dBm with zero mismatch errors.
  - d. Power uncertainty expressed with two sigma confidence level for CW measurement after zero operation. Includes calibration factor and linearity over temperature uncertainties, but not the effects of mismatch, zero set and drift, or noise.
  - e. Includes linearity over temperature uncertainties, but not the effects of calibration factor, mismatch, zero set and drift, and noise.



**Line Sweep Tools** (for your PC)

**Trace Capture**

Browse to Instrument	View and copy traces from the test equipment to your PC using Windows Explorer
Open Current Files	Open PIM or DAT files
Capture Plots To	The Line Sweep Tools screen, DAT files, Database, or JPEG

**Traces**

Trace Types	Return Loss, VSWR, DTF-RL, DTF-VSWR, Cable Loss, Smith Chart, PIM vs. Time, Swept PIM, Noise Floor, and DTP
Trace Formats	DAT, PIM, CSV, PNG, BMP, JPG, HTML, Data Base, and PDF

**Report Generation**

Report Generator	Includes GPS location along with measurements
Report Format	Create reports in HTML or PDF format
Report Setup	Report Title, Company, Prepared for, Location, Date and Time, Filename, Company logo
Trace Setup	1 Trace Portrait Mode, 2 Trace Portrait Mode, 1 Trace Landscape Mode
PIM Report	Tabular summary report with pass/fail analysis

**Trace Validation**

Presets	7 presets allow "one click" setting of up to 6 markers and one limit line
Marker Controls	6 regular Markers, Marker Peak, Marker Valley, Marker between, and frequency entry
Delta Markers	6 Delta markers
Limit Line	Enable and drag or value entry. Also works with presets
Next Trace Button	Next Trace and Previous trace arrow keys allow quick switching between traces

**Tools**

Cable Editor	Allows creation of custom cable parameters
Distance to Fault	Converts a Return Loss trace to a Distance to Fault trace
Measurement Calculator	Converts Real, Imaginary, Magnitude, Phase, RL, VSWR, Rho, and Transmit power
Signal Standard Editor	Creates new band and channel tables
Renaming Grid	36 user definable phrases for creation of file names, trace titles, and trace subtitles

**Connectivity**

Connections	USB cable, USB Memory Stick
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**easyTest Tools** (for your PC)

**Instrument Mode**

PIM Analyzer Mode, Cable & Antenna Analyzer Mode (Option 331)

**Commands**

Display Image	Allows putting a custom image on the instrument screen
Recall Setup	Places the instrument into a known state
Prompt	Displays instructional messages on the instrument screen
Save	Allows automatic or manual saving of traces

**Connectivity**

Connections	Ethernet, USB cable or USB memory stick
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**Web Remote Control**

Control	Full instrument control through a browser – all instrument functions except power switch
Connections	RJ45 Ethernet jack Third-party Wi-Fi router
Protocol	HTTP/TCP/IP
Physical Layer	Cat 5 Cable, Wi-Fi router compatible
Browser	Designed for use with HTML 5 Compliant Browsers (Google Chrome or Mozilla Firefox preferred)
Operating System	iOS, Windows, Linux, Android operating systems that can host the HTML 5 compliant browser
Remote Hardware	PCs, Tablets, and Smart Phones with Ethernet or Wi-Fi connections
Download	Individual instrument files downloaded via browser Multiple instrument files and directories zipped and downloaded via browser Screen capture capability File downloads are not supported by iOS
Display Modes	Normal: All modes & displays supported Fast: Not currently supported
Password	The instrument can be password protected Passwords may be used to manage who controls the instrument
Users and Devices to Instruments Ratio	One device can view and control many instruments

**Programmable Remote Control**

Functionality	Instrument functionality is available via remote programming. See the MW82119B Programming Manual for details.
Programming Language	Standard Commands for Programmable Instruments (SCPI)
Interfaces	USB, LAN

Ordering Information



<b>Model Number</b>	<b>Description</b>
MW82119B	PIM Master™ Passive Intermodulation Analyzer (must be ordered with ONE frequency option)
<b>Frequency Options</b> (must order one, and only one)	
MW82119B-0600	LTE 600 w/1900 MHz
MW82119B-0700	LTE 700
MW82119B-0701	APT 700
MW82119B-0800	LTE 800
MW82119B-0850	Cellular 850
MW82119B-0900	E-GSM 900
MW82119B-0902	E-GSM 900 w/IM2
MW82119B-0180	DCS 1800
MW82119B-0194	PCS/AWS 1900/2100
MW82119B-0210	UMTS 2100
MW82119B-0260	LTE 2600
<b>Other Options</b>	
MW82119B-0019	High Accuracy Power Meter (requires USB power sensor)
MW82119B-0031	GPS Receiver (requires GPS antenna)
MW82119B-0331	Site Master™ Cable and Antenna Analyzer
MW82119B-0098	Standard Calibration to ISO 17025 and/or Z540.1
MW82119B-0099	Premium Calibration to ISO 17025 and/or Z540.1 plus test data

Standard Accessories



<b>Part Number</b>	<b>Description</b>
2000-1786-R	Soft Carrying Case, Screen Access
2000-1714-R	Shoulder Strap
2000-1691-R	Stylus with Coiled Tether
2000-1797-R	Screen Protector Film, 8.4 in
1091-422-R	Adapter, 7/16 DIN(f) to 7/16 DIN(m), 50 Ω (Connector Saver)
633-75	High-capacity Li-Ion Battery Pack
40-187-R	AC/DC Power Supply
(Country dependent)	AC Power Cable
806-141-R	Automotive Power Adapter, 12 VDC, 60 W
2000-1371-R	Ethernet Cable, 7 ft/213 cm
3-2000-1498	USB A to Mini B Cable, 10 ft/305 cm

Manuals (Soft copy at [www.anritsu.com](http://www.anritsu.com))

<b>Part Number</b>	<b>Description</b>
10580-00400	PIM Master User Guide
10580-00402	PIM Master Measurement Guide
10580-00403	PIM Master Programming Manual
10580-00241	Cable and Antenna Analyzer Measurement Guide
10580-00240	Power Meter Measurement Guide
11410-00473	Troubleshooting Guide – Cable, Antenna, and Components

Optional Accessories

Backpack and Transit Case



Part Number	Description
67135	Anritsu Backpack (for handheld instrument and PC)
760-259-R	Transit Case (holds MW82119A/B PIM Analyzer only)
760-265-R	Transit Case (holds MW82119A/B PIM Analyzer plus accessories)

PIM Analyzer Accessory Kits



Part Number	Description
2000-1745-R	PIM Master Backpack Accessory Kit (Includes common items below plus 67135 backpack)
2000-1746-R	PIM Master Hard Case Accessory Kit (Includes common items below plus 760-260-R transit case)

Part Number	Items Common to Both Accessory Kits
2000-1626-R	PIM Test Cable, 3.0 m, 7/16 DIN(m) to 7/16 DIN(m), 50 Ω
2000-1749-R	Low PIM Termination, 700 MHz to 2600 MHz, 10 W, 7/16 DIN(m), 7/16 DIN(f), 50 Ω
1091-446-R	PIM Standard, -80 dBm ±3 dB at 1730 MHz, with 2 x 20 W, 7/16 DIN(m) to 7/16 DIN(f), 50 Ω
1091-425-R	Low PIM Adapter, 7/16 DIN(f) to N(f), DC to 3.0 GHz, 50 Ω (qty. 2)
1091-426-R	Low PIM Adapter, 7/16 DIN(f) to N(m), DC to 3.0 GHz, 50 Ω (qty. 2)
1091-427-R	Low PIM Adapter, 7/16 DIN(f) to 7/16 DIN(f), DC to 3.0 GHz, 50 Ω
01-510	Adjustable Wrench
01-513-R	1-1/4 in Torque Wrench
971-9-R	Cleaning Wipes
971-10-R	Cleaning Swabs
11410-00726	Equipment Verification Process

Miscellaneous Accessories



Part Number	Description
2000-1374	External Dual Charger for Li-Ion Batteries
633-75	Rechargeable Li-Ion Battery, 7500 mAh
2000-1797-R	Touchscreen Protective Film, 8.4 in
MA2700A	Handheld Interference Hunter (For full specifications, refer to the MA2700A Technical Data Sheet 11410-00692)
2000-1884-R	PIM Hunter™ Test Probe (For full specifications, refer to the 2000-1884-R Technical Data Sheet 11410-00999)
2000-1691-R	Stylus with Coiled Tether

**Power Sensors** (Requires Option 19. For complete ordering information, see the respective data sheet of each sensor)



Model Number	Description
MA24105A	Inline Peak Power Sensor, 350 MHz to 4 GHz, +3 dBm to +51.76 dBm
MA24106A	RF USB Power Sensor, 50 MHz to 6 GHz, +23 dBm
MA24108A	Microwave USB Power Sensor, 10 MHz to 8 GHz, +20 dBm
MA24118A	Microwave USB Power Sensor, 10 MHz to 18 GHz, +20 dBm
MA24126A	Microwave USB Power Sensor, 10 MHz to 26 GHz, +20 dBm
MA24208A	Microwave Universal USB Power Sensor, 10 MHz to 8 GHz, +20 dBm
MA24218A	Microwave Universal USB Power Sensor, 10 MHz to 18 GHz, +20 dBm
MA24330A	Microwave CW USB Power Sensor, 10 MHz to 33 GHz, +20 dBm
MA24340A	Microwave CW USB Power Sensor, 10 MHz to 40 GHz, +20 dBm
MA24350A	Microwave CW USB Power Sensor, 10 MHz to 50 GHz, +20 dBm
MA25100A	RF Power Indicator

**Calibration Components, 50 Ω** (These components are not designed to withstand PIM test power levels. Suitable for cable and antenna analyzer measurements only.)



Part Number	Description
OSLN50A-8	High Performance Type N(m), DC to 8 GHz, 50 Ω
OSLN50A-8	High Performance Type N(f), DC to 8 GHz, 50 Ω
2000-1914-R	Precision Open/Short/Load, 4.3-10(f), DC to 6 GHz, 50 Ω
2000-1915-R	Precision Open/Short/Load, 4.3-10(m), DC to 6 GHz, 50 Ω
2000-1618-R	Precision Open/Short/Load, 7/16 DIN(m), DC to 6.0 GHz 50 Ω
2000-1619-R	Precision Open/Short/Load, 7/16 DIN(f), DC to 6.0 GHz 50 Ω
22N50	Open/Short, N(m), DC to 18 GHz, 50 Ω
22NF50	Open/Short, N(f), DC to 18 GHz, 50 Ω
SM/PL-1	Precision Load, N(m), 42 dB, 6.0 GHz
SM/PLNF-1	Precision Load, N(f), 42 dB, 6.0 GHz

**Precision Adapters** (Recommended for cable and antenna line sweep applications only. Not Low PIM.)



Part Number	Description
34NN50A	N(m) to N(m), DC to 18 GHz, 50 Ω
34NFF50	N(f) to N(f), DC to 18 GHz, 50 Ω
1091-26-R	SMA(m) to N(m), DC to 18 GHz, 50 Ω
1091-27-R	SMA(f) to N(m), DC to 18 GHz, 50 Ω
1091-80-R	SMA(m) to N(f), DC to 18 GHz, 50 Ω
1091-81-R	SMA(f) to N(f), DC to 18 GHz, 50 Ω
1091-172-R	BNC(f) to N(m), DC to 1.3 GHz, 50 Ω
1091-465-R	Adapter, DC to 6 GHz, 4.3-10(f) to N(f), 50 Ω
1091-467-R	Adapter, DC to 6 GHz, 4.3-10(m) to N(f), 50 Ω
510-90-R	7/16 DIN(f) to N(m), DC to 7.5 GHz, 50 Ω
510-91-R	7/16 DIN(f) to N(f), DC to 7.5 GHz, 50 Ω
510-92-R	7/16 DIN(m) to N(m), DC to 7.5 GHz, 50 Ω
510-93-R	7/16 DIN(m) to N(f), DC to 7.5 GHz, 50 Ω
510-96-R	7/16 DIN(m) to 7/16 DIN (m), DC to 7.5 GHz, 50 Ω
510-97-R	7/16 DIN(f) to 7/16 DIN (f), DC to 7.5 GHz, 50 Ω
510-102-R	N(m) to N(m), DC to 11 GHz, 50 Ω, 90 degrees right angle

PIM Analyzer Accessories



Part Number	Description
16DD50-2.75-R	Armored PIM Test Cable, 2.75 m, 7/16 DIN(m) to 7/16 DIN(m), 50 Ω
16DD50-4.0-R	Armored PIM Test Cable, 4.0 m, 7/16 DIN(m) to 7/16 DIN(m), 50 Ω
2000-1626-R	PIM Test Cable, 3.0 m, 7/16 DIN(m) to 7/16 DIN(m), 50 Ω
2000-1783-R	PIM Test Cable, 3.0 m, 7/16 DIN(m) to 7/16 DIN(f), 50 Ω
2000-1845-R	PIM Test Cable, 3.0 m, 7/16 DIN(m) to 4.3-10(m), 50 Ω
2000-1846-R	PIM Test Cable, 3.0 m, 7/16 DIN(m) to 4.3-10(f), 50 Ω
2000-1724-R	Low PIM Termination, 663 MHz to 2800 MHz, 40 W, 7/16 DIN(m), 7/16 DIN(f), 50 Ω
2000-1749-R	Low PIM Termination, 700 MHz to 2600 MHz, 10 W, 7/16 DIN(m), 7/16 DIN(f), 50 Ω
2000-1913-R	Low PIM Termination, 700 MHz to 2600 MHz, 10 W, 4.3-10(m) to 4.3-10(f), 50 Ω
1091-446-R	PIM Standard, -80 dBm ±3 dB at 1730 MHz, with 2 x 20 W, 7/16 DIN(m) to 7/16 DIN(f), 50 Ω
1091-464-R	PIM Standard, -80 dBm at 1730 MHz with 2 x 20 W, 4.3-10(m) to 4.3-10(f), 50 Ω
1091-421-R	Low PIM Adapter, 7/16 DIN(m) to 7/16 DIN(m), DC to 6.0 GHz, 50 Ω
1091-422-R	Low PIM Adapter, 7/16 DIN(m) to 7/16 DIN(f), DC to 6.0 GHz, 50 Ω
1091-423-R	Low PIM Adapter, 7/16 DIN(m) to N(m), DC to 6.0 GHz, 50 Ω
1091-424-R	Low PIM Adapter, 7/16 DIN(m) to N(f), DC to 6.0 GHz, 50 Ω
1091-425-R	Low PIM Adapter, 7/16 DIN(f) to N(f), DC to 6.0 GHz, 50 Ω
1091-426-R	Low PIM Adapter, 7/16 DIN(f) to N(m), DC to 6.0 GHz, 50 Ω
1091-427-R	Low PIM Adapter, 7/16 DIN(f) to 7/16 DIN(f), DC to 6.0 GHz, 50 Ω
1091-431-R	Low PIM Adapter, 45°, 7/16 DIN(m) to 7/16 DIN(f), DC to 3.0 GHz, 50 Ω
1091-432-R	Low PIM Adapter, 45°, 7/16 DIN(f) to 7/16 DIN(f), DC to 3.0 GHz, 50 Ω
1091-433-R	Low PIM Adapter, 4.1-9.5(f) to 7/16 DIN(f), DC to 3.0 GHz, 50 Ω
1091-434-R	Low PIM Adapter, 4.1-9.5(m) to 7/16 DIN(f), DC to 3.0 GHz, 50 Ω
1091-435-R	Low PIM Adapter, 4.1-9.5(f) to N(m), DC to 3.0 GHz, 50 Ω
1091-436-R	Low PIM Adapter, 4.1-9.5(m) to N(m), DC to 3.0 GHz, 50 Ω
1091-440-R	Low PIM Adapter, 4.3-10(f) to 7/16 DIN(f), DC to 6.0 GHz, 50 Ω
1091-441-R	Low PIM Adapter, 4.3-10(m) to 7/16 DIN(f), DC to 6.0 GHz, 50 Ω
1091-442-R	Low PIM Adapter, 4.3-10(f) to N(m), DC to 6.0 GHz, 50 Ω
1091-443-R	Low PIM Adapter, 4.3-10(m) to N(m), DC to 6.0 GHz, 50 Ω
1091-466-R	Low PIM Adapter, 4.3-10(m) to 7/16 DIN(m), DC to 6.0 GHz, 50 Ω
1091-468-R	Low PIM Adapter, 4.3-10(f) to 7/16 DIN(m), DC to 6.0 GHz, 50 Ω
01-510	Adjustable Wrench
01-513-R	1-1/4 in Torque Wrench
01-528-R	Torque Wrench for coupling torque of 4.3-10 connectors, 22 mm opening
971-9-R	Cleaning Wipes
971-10-R	Cleaning Swabs

**Phase-Stable Test Port Cables, Armored w/Reinforced Grip** (Recommended for cable and antenna line sweep applications only. Not low PIM.)



Part Number	Description
15RNFN50-1.5-R	1.5 m, DC to 6 GHz, N(m) to N(f), 50 Ω
15RDFN50-1.5-R	1.5 m, DC to 6 GHz, N(m) to 7/16 DIN(f), 50 Ω
15RDN50-1.5-R	1.5 m, DC to 6 GHz, N(m) to 7/16 DIN(m), 50 Ω
15RNFN50-3.0-R	3.0 m, DC to 6 GHz, N(m) to N(f), 50 Ω
15RDFN50-3.0-R	3.0 m, DC to 6 GHz, N(m) to 7/16 DIN(f), 50 Ω
15RDN50-3.0-R	3.0 m, DC to 6 GHz, N(m) to 7/16 DIN(m), 50 Ω

**Interchangeable Adapter Phase Stable Test Port Cables, Armored w/Reinforced Grip** (Recommended for cable and antenna line sweep applications. Not low PIM. It uses the same ruggedized grip as the Reinforced Grip series cables. Now you can also change the adapter interface on the grip to four different connector types)



Part Number	Description
15RCN50-1.5-R	1.5 m, DC to 6 GHz, N(m), N(f), 7/16 DIN(m), 7/16 DIN(f), 50 Ω
15RCN50-3.0-R	3.0 m, DC to 6 GHz, N(m), N(f), 7/16 DIN(m), 7/16 DIN(f), 50 Ω

**Phase-Stable Test Port Cables, Armored** (Recommended for cable and antenna line sweep applications only. Not Low PIM. Use with tightly spaced connectors and other general purpose applications)



Part Number	Description
15NNF50-1.5C	1.5 m, DC to 6 GHz, N(m) to N(f), 50 Ω
15NN50-1.5C	1.5 m, DC to 6 GHz, N(m) to N(m), 50 Ω
15NDF50-1.5C	1.5 m, DC to 6 GHz, N(m) to 7/16 DIN(f), 50 Ω
15ND50-1.5C	1.5 m, DC to 6 GHz, N(m) to 7/16 DIN(m), 50 Ω
15NNF50-3.0C	3.0 m, DC to 6 GHz, N(m) to N(f), 50 Ω
15NN50-3.0C	3.0 m, DC to 6 GHz, N(m) to N(m), 50 Ω
15NNF50-5.0C	5.0 m, DC to 6 GHz, N(m) to N(f), 50 Ω
15NN50-5.0C	5.0 m, DC to 6 GHz, N(m) to N(m), 50 Ω
15N43M50-1.5C	Test Port Extension Cable, Armored, 1.5 meters, DC to 6GHz, N(m) to 4.3-10(m)
15N43F50-1.5C	Test Port Extension Cable, Armored, 1.5 meter, DC to 6GHz, N(m) to 4.3-10(f)
15N43M50-3.0C	Test Port Extension Cable, Armored, 3 meters, DC to 6 GHz, N(m) to 4.3-10(m)
15N43F50-3.0C	Test Port Extension Cable, Armored, 3 meters, DC to 6 GHz, N(m) to 4.3-10(f)



## Filters



Part Number	Description
1030-114-R	806 MHz to 869 MHz, N(m) to SMA(f), 50 Ω
1030-109-R	824 MHz to 849 MHz, N(m) to SMA(f), 50 Ω
1030-110-R	880 MHz to 915 MHz, N(m) to SMA(f), 50 Ω
1030-111-R	1850 MHz to 1910 MHz, N(m) to SMA(f), 50 Ω
1030-112-R	2400 MHz to 2484 MHz, N(m) to SMA(f), 50 Ω
1030-105-R	890 MHz to 915 MHz, N(m) to N(f), 50 Ω
1030-106-R	1710 MHz to 1790 MHz, N(m) to N(f), 50 Ω
1030-107-R	1910 MHz to 1990 MHz, N(m) to N(f), 50 Ω
1030-149-R	High Pass, 150 MHz, N(m) to N(f), 50 Ω
1030-150-R	High Pass, 400 MHz, N(m) to N(f), 50 Ω
1030-151-R	High Pass, 700 MHz, N(m) to N(f), 50 Ω
1030-152-R	Low Pass, 200 MHz, N(m) to N(f), 50 Ω
1030-153-R	Low Pass, 550 MHz, N(m) to N(f), 50 Ω
1030-155-R	2500 MHz to 2700 MHz, N(m) to N(f), 50 Ω
1030-178-R	1920 MHz to 1980 MHz, N(m) to N(f), 50 Ω
1030-179-R	777 MHz to 798 MHz, N(m) to N(f), 50 Ω
1030-180-R	2500 MHz to 2570 MHz, N(m) to N(f), 50 Ω
2000-1684-R	791 MHz to 821 MHz, N(m) to N(f), 50 Ω
2000-1734-R	Bandpass Filter, 699 MHz to 715 MHz, N(m) to N(f), 50 Ω
2000-1735-R	Bandpass Filter, 776 MHz to 788 MHz, N(m) to N(f), 50 Ω
2000-1736-R	Bandpass Filter, 815 MHz to 850 MHz, N(m) to N(f), 50 Ω
2000-1737-R	Bandpass Filter, 1711 MHz to 1756 MHz, N(m) to N(f), 50 Ω
2000-1738-R	Bandpass Filter, 1850 MHz to 1910 MHz, N(m) to N(f), 50 Ω
2000-1739-R	Bandpass Filter, 880 MHz to 915 MHz, N(m) to N(f), 50 Ω
2000-1740-R	Bandpass Filter, 1710 MHz to 1785 MHz, N(m) to N(f), 50 Ω
2000-1741-R	Bandpass Filter, 1920 MHz to 1980 MHz, N(m) to N(f), 50 Ω
2000-1742-R	Bandpass Filter, 832 MHz to 862 MHz, N(m) to N(f), 50 Ω
2000-1743-R	Bandpass Filter, 2500 MHz to 2570 MHz, N(m) to N(f), 50 Ω
2000-1799-R	Bandpass Filter, 2305 MHz to 2320 MHz, N(m) to N(f), 50 Ω
2000-1911-R	Bandpass Filter, 703 MHz to 748 MHz, N(m) to N(f), 50 Ω
2000-1912-R	Bandpass Filter, 788 MHz to 798 MHz, N(m) to N(f), 50 Ω
2000-1925-R	Bandpass Filter, 663 MHz to 698 MHz, N(m) to N(f), 50 Ω
2000-1926-R	Bandpass Filter, 776 MHz to 806 MHz, N(m) to N(f), 50 Ω



## Attenuators (Recommended for power measurements only. Not Low PIM.)

Part Number	Description
3-1010-122	Attenuator (Bi-directional), 20 dB, 5 W, DC to 12.4 GHz, N(m) to N(f)
3-1010-123	Attenuator (Bi-directional), 30 dB, 50 W, DC to 8.5 GHz, N(m) to N(f)
3-1010-124	Attenuator (Bi-directional), 40 dB, 100 W, DC to 8.5 GHz, N(m) to N(f)

## GPS Antennas



Part Number	Description
2000-1528-R	GPS Antenna, SMA(m) with 5 m (15 ft) cable, 3 dBi gain, requires 5 VDC
2000-1652-R	GPS Antenna, SMA(m) with 0.3 m (1 ft) cable, 5 dBi gain, requires 3.3 VDC or 5 VDC
2000-1760-R	GPS Antenna, SMA(m), 25 dB gain, 2.5 VDC to 3.7 VDC

# 4TECT

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