

# LMR Master™

## Spectrum, Coverage, Cable, Antenna, Filter, P25 / NXDN Modulation Analyzer, CW / P25 / NXDN Signal Generator

### S412E

500 kHz to 1.6 GHz

#### Introduction

The S412E is Anritsu's second generation solution for installing and maintaining public safety systems. Built on Anritsu's ninth generation handheld platform, the S412E combines a high performance receiver / spectrum analyzer with the worlds most advanced hand held vector network analyzer plus a CW / P25 / NXDN signal generator with internally adjustable power from 0 dBm to -120 dBm.

#### Spectrum Analyzer Highlights

- Measurements: Occupied Bandwidth, Channel Power, ACPR, C/I, Coverage Mapping
- Interference Analyzer: Spectrogram, Signal Strength, RSSI, Mapping
- Optional 6 GHz Frequency Coverage
- Dynamic Range: > 95 dB in 10 Hz RBW
- DANL: -152 dBm in 10 Hz RBW
- Phase Noise: -100 dBc/Hz max @ 10 kHz offset at 1 GHz
- Frequency Accuracy:  $\pm 50$  ppb with GPS On

#### VNA Analyzer Highlights

- Broadband coverage of 500 kHz to 1.6 GHz
- 1-path, 2-port Vector Network Analyzer (VNA)
- Optional 6 GHz Frequency Coverage
- Intuitive Graphical User Interface (GUI) with convenient Touch Screen
- VNA-quality error correction for directivity and source match
- Outstanding calibration stability, up to 16 hours
- User-defined overlays for viewing multiple S-Parameters
- Arbitrary data points up to 4001
- IF Bandwidth selections of 10 Hz to 100 kHz
- 100 dB dynamic range to 1.6 GHz
- 850  $\mu$ s/data point sweep speed

#### CW / P25 / NXDN Signal Generator Highlights

- 2 MHz to 1.6 GHz frequency coverage
- Internal Power control from 0 dBm to -120 dBm
- 2.0 dB power Accuracy (Typical)
- Eight P25 and NXDN BER test patterns including 1011 Hz and O.153
- Simultaneous analysis and generation of P25 / NXDN test signals
- Independent control of analysis and generation frequencies and test patterns

#### Capabilities and Functional Highlights

- 3 hour battery operation time
- Touchscreen keyboard
- AM / FM / PM Analyzer
- High Accuracy Power Meter
- On-Screen Coverage Mapping
- Channel Scanner
- GPS tagging of saved traces
- USB Data Transfer
- < 5 minute warm-up time
- 8.4 in. daylight viewable color LCD



LMR Master™ S412E featuring 8.4" Daylight Viewable Touchscreen  
 Compact Size: 273 mm x 199 mm x 91 mm, (10.7 x 7.8 x 3.6 in), Lightweight: 3.6 kg, (7.9 lbs)

# LMR Master™ S412E Specifications



## Spectrum Analyzer

### Measurements

Smart Measurements	Field Strength (uses antenna calibration tables to measure dBm/m <sup>2</sup> or dBmV/m) Occupied Bandwidth (measures 99% to 1% power channel of a signal) Channel Power (measures the total power in a specified bandwidth) ACPR (adjacent channel power ratio) AM/FM/SSB Demodulation (wide/narrow FM, upper/lower SSB), (audio out only) C/I (carrier-to-interference ratio) Emission Mask Coverage Mapping (requires option 0431)
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### Setup Parameters

Frequency	Center/Start/Stop, Span, Frequency Step, Signal Standard, Channel #, Channel Increment
Amplitude	Reference Level (RL), Scale, Attenuation Auto/Level, RL Offset, Pre-Amp On/Off, Detection
Span	Span, Span Up/Down (1-2-5), Full Span, Zero Span, Last Span
Bandwidth	RBW, Auto RBW, VBW, Auto VBW, RBW/VBW, Span/RBW
File	Save, Recall, Delete, Directory Management
Save/Recall	Setups, Measurements, Limit Lines, Screen Shots Jpeg (save only), Save-on-Event
Save-on-Event	Crossing Limit Line, Sweep Complete, Save-then-Stop, Clear All
Delete	Selected File, All Measurements, All Mode Files, All Content
Directory Management	Sort Method (Name/Type/Date), Ascend/Descend, Internal/USB, Copy, Format USB
Application Options	Bias-Tee (On/Off), Impedance (50 Ω, 75 Ω, Other)

### Sweep Functions

Sweep	Single/Continuous, Manual Trigger, Reset, Detection, Minimum Sweep Time, Trigger Type
Detection	Peak, RMS, Negative, Sample, Quasi-peak
Triggers	Free Run, External, Video, Change Position, Manual

### Trace Functions

Traces	Up to three Traces (A, B, C), View/Blank, Write/Hold, Trace A/B/C Operations
Trace A Operations	Normal, Max Hold, Min Hold, Average, # 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	Markers 1-6 each with a Delta Marker, or Marker 1 Reference with Six Delta Markers, Marker Table (On/Off), All Markers Off
Marker Types	Style (Fixed/Tracking), Noise Marker, Frequency Counter Marker Marker Auto-Position Peak Search, Next Peak (Right/Left), Peak Threshold %, Set Marker to Channel, Marker Frequency to Center, Delta Marker to Span, Marker to Reference Level
Marker Table	1-6 markers frequency and amplitude plus delta markers frequency offset and amplitude

### Limit Line Functions

Limit Lines	Upper/Lower, On/Off, Edit, Move, Envelope, Advanced, Limit Alarm, Default Limit
Limit Line Edit	Frequency, Amplitude, Add Point, Add Vertical, Delete Point, 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 Envelope, Update Amplitude, Points (41 max), Offset, Shape Square/Slope
Limit Line Advanced	Type (Absolute/Relative), Mirror, Save/Recall

# LMR Master™ S412E Specifications



## Spectrum Analyzer (continued)

<b>Frequency</b>		Frequency Range	100 kHz to 1.6 GHz, (6 GHz with Option 6)		
		Tuning Resolution	1 Hz		
		Frequency Reference Aging	± 1.0 ppm/year		
		Accuracy	± 1.5 ppm (25 °C ± 25 °C) + aging < ± 50 ppb with GPS on		
		Frequency Span	10 Hz to 1.6 GHz including zero span (10 Hz to 6 GHz with Option 6)		
		Sweep Time	100 ms, 10 µs to 600 seconds in zero span		
		Sweep Time Accuracy	± 2% in zero span		
<hr/>					
<b>Bandwidth</b>		Resolution Bandwidth (RBW)	10 Hz to 3 MHz in 1–3 sequence ± 10% (1 MHz max in zero-span) (–3 dB bandwidth)		
		Video Bandwidth (VBW)	1 Hz to 3 MHz in 1–3 sequence (–3 dB bandwidth) (auto or manually selectable)		
		RBW with Quasi-Peak Detection	200 Hz, 9 KHz, 120 kHz (–6 dB bandwidth)		
		VBW with Quasi-Peak Detection	VBW with Quasi-Peak Detection		
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<b>Spectral Purity</b>		SSB Phase Noise @ 1 GHz	–100 dBc/Hz, –110 dBc/Hz typical @ 10 kHz offset –105 dBc/Hz, –112 dBc/Hz typical @ 100 kHz offset –115 dBc/Hz, –121 dBc/Hz typical @ 1 MHz offset		
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<b>Amplitude Ranges</b>		Dynamic Range	> 95 dB (2.4 GHz), 2/3 (TOI-DANL) in 10 Hz RBW		
		Measurement Range	DANL to +26 dBm		
		Maximum Continuous Input	+35 dBm		
		Display Range	1 to 15 dB/div in 1 dB steps, ten divisions displayed		
		Reference Level Range	–120 dBm to +30 dBm		
		Attenuator Resolution	0 to 55 dB, 5.0 dB steps		
		Amplitude Units	Log Scale Modes: dBm, dBV, dBmv, dBµV Linear Scale Modes: nV, µV, mV, V, kV, nW, µW, mW, W, kW		
<hr/>					
<b>Amplitude Accuracy (single sine wave input &lt; Ref level, and &gt; DANL, auto attenuation)</b>					
		–10 °C to 50 °C after 30 minute warm-up	Typical: ± 0.5 dB, 100 kHz to 6 GHz Maximum: ± 1.3 dB, 100 kHz to 6 GHz		
<hr/>					
<b>Displayed Average Noise Level (DANL)</b>		<b>Preamp Off (Reference level –20 dBm)</b>		<b>Preamp On (Reference level –50 dBm)</b>	
(RBW Normalized to 1 Hz, 0 dB attenuation)		Maximum	Typical	Maximum	Typical
10 MHz to 2.4 GHz		–141 dBm	–146 dBm	–157 dBm	–162 dBm
> 2.4 GHz to 4 GHz		–137 dBm	–141 dBm	–154 dBm	–159 dBm
> 4 GHz to 5 GHz		–134 dBm	–138 dBm	–150 dBm	–155 dBm
> 5 GHz to 6 GHz		–126 dBm	–131 dBm	–143 dBm	–150 dBm
(RBW = 10 Hz, 0 dB attenuation)					
10 MHz to 2.4 GHz		–131 dBm	–136 dBm	–147 dBm	–152 dBm
> 2.4 GHz to 4 GHz		–127 dBm	–131 dBm	–144 dBm	–149 dBm
> 4 GHz to 5 GHz		–124 dBm	–128 dBm	–140 dBm	–145 dBm
> 5 GHz to 6 GHz		–116 dBm	–121 dBm	–133 dBm	–140 dBm
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<b>Spurs</b>		Residual Spurious	< –90 dBm (RF input terminated, 0 dB input attenuation, > 10 MHz)		
		Input-Related Spurious	< –75 dBc (0 dB attenuation, –30 dBm input, span < 1.7 GHz, carrier offset > 4.5 MHz)		
		Exceptions, typical	< –70 dBc @ < 2.5 GHz, with 2072.5 MHz Input < –68 dBc @ F1-280 MHz with F1 Input < –70 dBc @ F1 + 190.5 MHz with F1 Input < –52 dBc @ 7349-2F2 MHz, with F2 Input, where F2 < 2424.5 MHz < –55 dBc @ 190.5 ± F1/2 MHz, F1 < 1 GHz		
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<b>Third-Order Intercept (TOI)</b>		Preamp Off (–20 dBm tones 100 kHz apart, 10 dB attenuation)			
800 MHz		+16 dBm			
2400 MHz		+20 dBm			
200-2200 MHz		+25 dBm, typical			
> 2.2 GHz to 5.0 GHz		+28 dBm, typical			
> 5.0 GHz to 6.0 GHz		+33 dBm, typical			
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<b>Second Harmonic Distortion</b>		Preamp Off, 0 dB input attenuation, –30 dBm input			
50 MHz		–56 dBc			
> 50 MHz to 200 MHz		–60 dBc, typical			
> 200 MHz to 3000 MHz		–70 dBc, typical			
<hr/>					
<b>VSWR</b>		2: 1, typical			

# LMR Master™ S412E Specifications

## Vector Network Analyzer

### Definitions

- All specifications and characteristics apply under the following conditions, unless otherwise stated:
- After 15 minutes of warm-up time, where the instrument is left in the ON state.
- Temperature range is 23 °C ± 5 °C.
- All specifications apply when using internal reference.
- All specifications subject to change without notice. Please visit [www.anritsu.com](http://www.anritsu.com) for most current datasheet.
- Typical performance is the measured performance of an average unit.
- Recommended calibration cycle is 12 months.

### Frequency

Frequency Range: 500 kHz to 1.6 GHz (500 kHz to 6.0 with Option 16)

Frequency Accuracy: 2.5 ppm

Frequency Resolution: 1 Hz

### Typical Test Port Power

LMR Master supports selection of either High (default) or Low test port power. Changing power after calibration can degrade the calibrated performance. Typical power by bands is shown in the following table.

Frequency Range (GHz)	High Port Power (dB)	Low Port Power (dBm)
500 kHz to ≤ 3 GHz	+3	-25 dBm
3 GHz to ≤ 6 GHz	0	-25 dBm

### Transmission Dynamic Range

The transmission dynamic range (the difference between test port power and noise floor) using 100 Hz IF Bandwidth and High Port Power is shown in the following table.

Frequency Range (GHz)	Dynamic Range (dB)
2 MHz to ≤ 4 GHz	100
4 GHz to ≤ 6 GHz	90

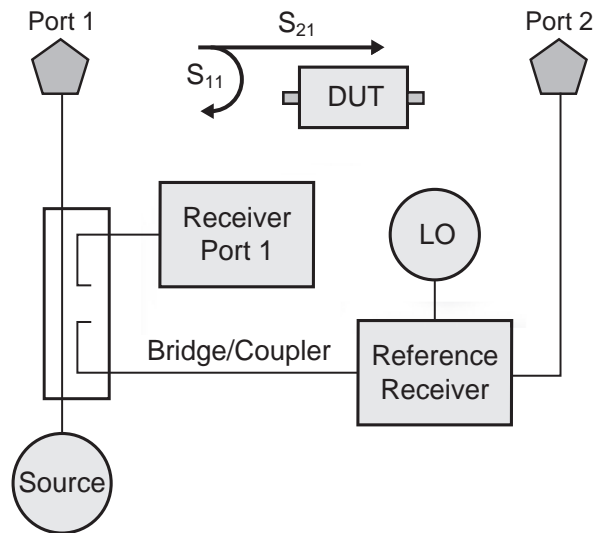
### Typical Sweep Speed

The typical sweep speed for IF Bandwidth of 100 Hz, 1001 data points, and single display is shown in the following table. The two receiver architecture will simultaneously collect  $S_{21}$  and  $S_{11}$  (or  $S_{12}$  and  $S_{22}$ ) in a single sweep.

Frequency Range (GHz)	Typical Sweep Speed (µs/point)
500 kHz to 6 GHz	850

### Block Diagram

As shown in the following block diagram, the LMR Master has a 2-port, 1-path architecture that automatically measures 2 S-parameters with error-correction precision inherent to VNA operation.



The above illustration is a simplified block diagram of LMR Master's 2-port, 1-path architecture. The magnitude AND phase information gained from Vector Network data enables the LMR Master to make significant error corrections and provide improved field measurements.

# LMR Master™ S412E Specifications

## Vector Network Analyzer

### High Port Power

OSLxx50 Calibration Components (N-Connector)  
 Corrected System Performance and Uncertainties:  
 S412E with 1-path, 2-port calibration including  
 isolation using either OSLN50-1 & OSLNF50-1 Calibration Kits



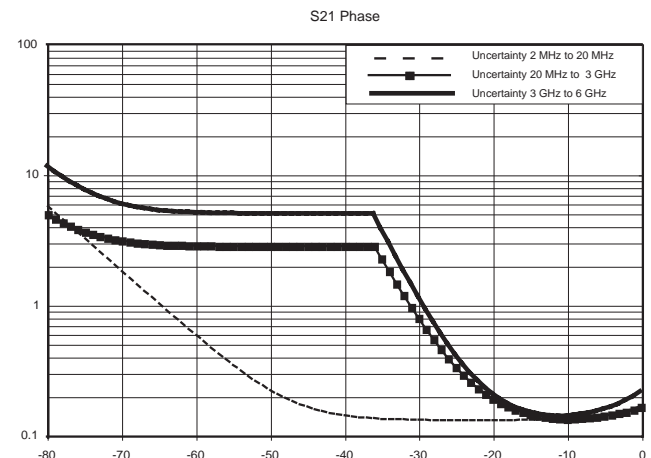
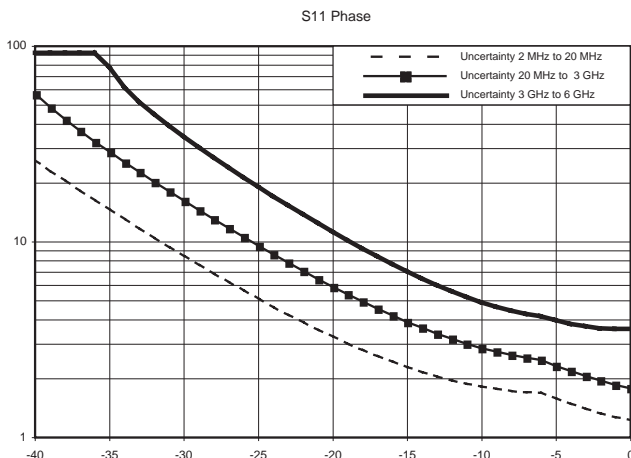
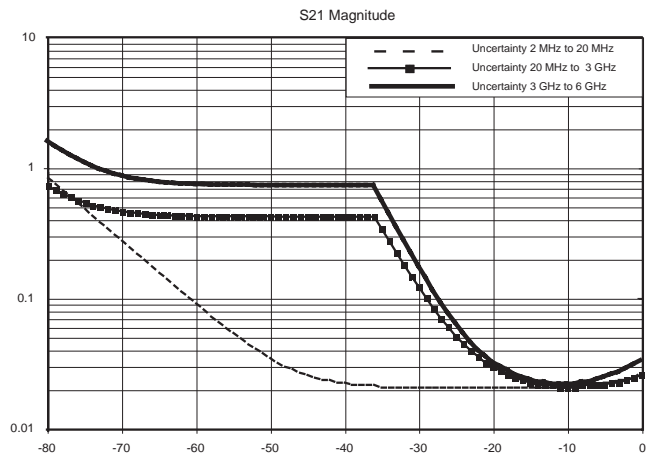
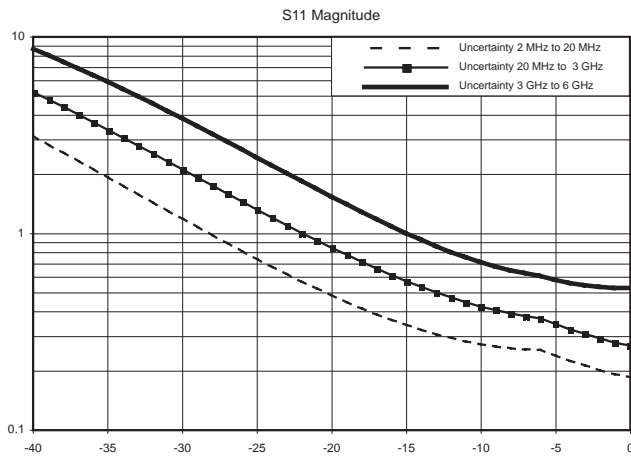
Precision calibration standards come in a convenient configuration for field work.

Frequency Range (GHz)	Directivity (dB)
≤ 6	> 42

Frequency Range (GHz)	Typical High Port Power (dBm)
≤ 3	+3
≤ 6	0

### Measurement Uncertainties

The following graphs provide measurement uncertainty at 23 °C ± 5 °C for the above indicated connector type and calibration. Errors are worst-case contributions of residual directivity, source match, frequency response, network analyzer dynamic range, and connector repeatability. For two-port measurements, transmission tracking, crosstalk, and physical load match termination were added. Isolation calibration and an IF Bandwidth of 10 Hz is used.



# LMR Master™ S412E Specifications

## Vector Network Analyzer

### Low Port Power

OSLxx50 Calibration Components (N-Connectors)  
 Corrected System Performance and Uncertainties:  
 S412E Model with 1-path, 2-port calibration  
 including isolation using either OSLN50-1 or OSLNF50-1  
 Calibration Kits.



Precision calibration standards come in a convenient configuration for field work.

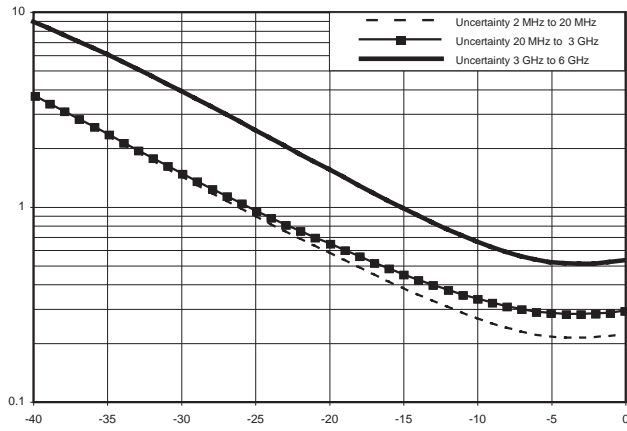
Frequency Range (GHz)	Directivity (dB)
≤ 6	> 42

Frequency Range (GHz)	Typical Low Port Power (dBm)
≤ 3	+25
≤ 6	-25

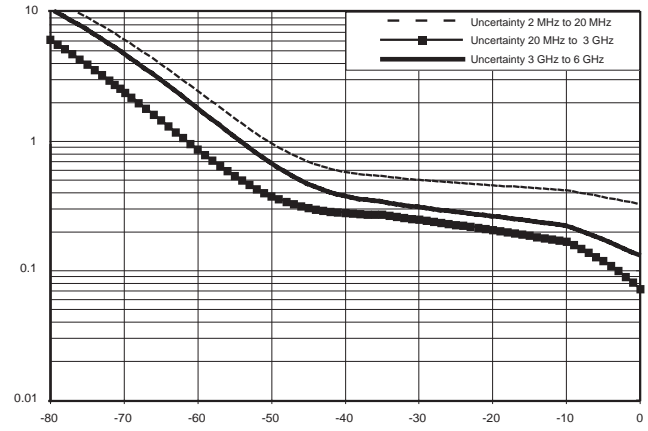
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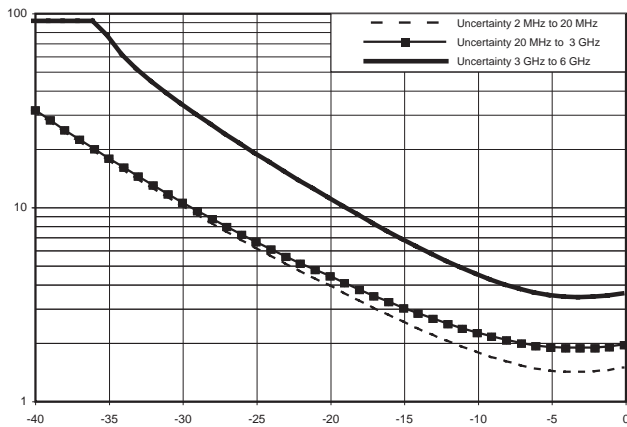
S11 Magnitude



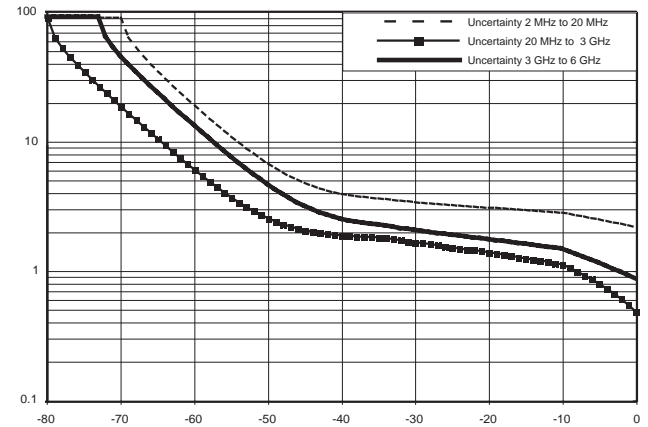
S21 Magnitude



S11 Phase



S21 Phase



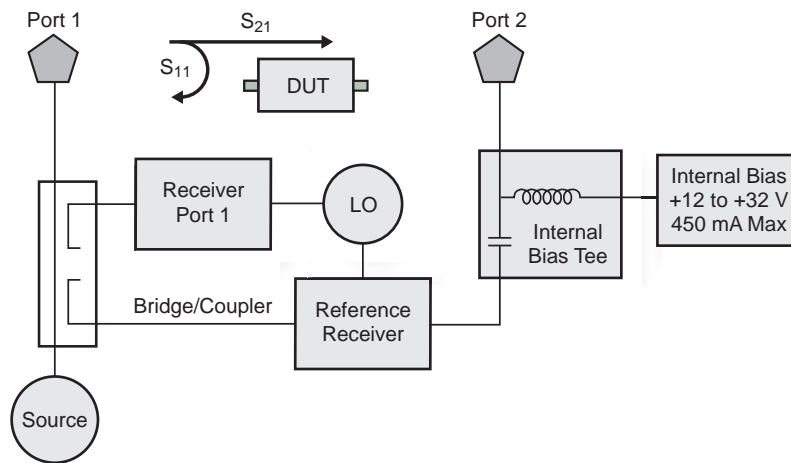
# LMR Master™ S412E Specifications

## VNA Performance Capabilities

### Bias Tee (Option 0010)

For tower mounted amplifier tests, the S412E with optional internal bias tees can supply both DC and RF signals on the center conductor of the cable during measurements. For frequency sweeps in excess of 2 MHz, the LMR Master can supply internal voltage control from +12 to +32 V in 0.1 V steps up to 450 mA. Bias can be directed to VNA Port 2.

<b>Frequency Range</b>	2 MHz to 4/6 GHz at VNA Port 2
<b>Internal Voltage/Current</b>	+12V to +32V at 450 ma. Steady state
<b>Internal Resolution</b>	0.1V
<b>Bias Tee Selections</b>	Internal, Off



The Compact LMR Master offers optional integrated bias tee for supplying DC plus RF to the DUT as shown in this simplified block diagram.

### Vector Voltmeter (Option 0015)

A phased array system relies on phase matched cables for nominal performance. For this class of application, the LMR Master offers this special software mode to simplify phase matching cables at a single frequency. The similarity between the popular vector voltmeter and this software mode ensures minimal training is required to phase match cables. Operation is as simple as configuring the display for absolute or relative measurements. The easy-to-read large fonts show either reflection or transmission measurements using impedance, magnitude, or VSWR readouts. For instrument landing system (ILS) or VHF Omni-directional Range (VOR) applications, a table view improves operator efficiency when phase matching up to twelve cables.

The S412E solution is superior because the signal source is included internally, precluding the need for an external signal generator.

<b>CW Frequency Range</b>	2 MHz to 6 GHz
<b>Measurement Display</b>	CW, Table (Twelve Entries, Plus Reference)
<b>Measurement Types</b>	Return Loss, Insertion
<b>Measurement Format</b>	dB/VSWR/Impedance

# LMR Master™ S412E Specifications



## Interference Analyzer (Option 0025)

Measurements	<p>Spectrum</p> <ul style="list-style-type: none"> <li>Field Strength</li> <li>Occupied Bandwidth</li> <li>Channel Power</li> <li>Adjacent Channel Power (ACPR)</li> <li>AM/FM/SSB Demodulation (Wide/Narrow FM, Upper/Lower SSB), (audio out only)</li> <li>Carrier-to-Interference ratio (C/I)</li> </ul> <p>Spectrogram (Collect data up to one week)</p> <p>Signal Strength (Gives visual and aural indication of signal strength)</p> <p>Received Signal Strength Indicator (RSSI) (collect data up to one week)</p> <ul style="list-style-type: none"> <li>Gives visual and aural indication of signal strength</li> </ul> <p>Signal ID (up to 12 signals)</p> <ul style="list-style-type: none"> <li>Center Frequency</li> <li>Bandwidth</li> <li>Signal Type (FM, GSM, W-CDMA, CDMA, Wi-Fi)</li> <li>Closest Channel Number</li> <li>Number of Carriers</li> <li>Signal-to-Nose Ratio (SNR) &gt; 10 dB</li> </ul> <p>Interference Mapping</p> <ul style="list-style-type: none"> <li>Triangulate location of interference with on display maps</li> </ul>
Application Options	Bias-Tee (On/Off), Impedance (50 Ω, 75 Ω, Other)

## GPS Receiver Option (Option 0031) (Antenna sold separately, P/N 2000-1528-R)

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
High Frequency Accuracy when GPS Antenna is connected	Spectrum Analyzer, Interference Analyzer, CW Signal Analyzers < ± 50 ppb with GPS On, 3 minutes after satellite lock in selected mode
Connector	SMA, Female



## Coverage Mapping (Options 0431)

### Measurements

#### Indoor Mapping

RSSI  
ACPR

#### Outdoor Mapping

RSSI  
ACPR

### Setup Parameters

Frequency	Center/Start/Stop, Span, Freq Step, Signal Standard, Channel #, Channel Increment
Amplitude	Reference Level (RL), Scale, Attenuation Auto/Level, RL Offset, Pre-Amp On/Off, Detection
Span	Span, Span Up/Down (1-2-5), Full Span, Zero Span, Last Span
BW	RBW, Auto RBW, VBW, Auto VBW, RBW/VBW, Span/VBW
Measurement Setup	ACPR, RSSI
Point Distance / Time Setup	Repeat Type Time Distance
Save Points Map	Save KML, JPEG, Tab Delimited
Recall Points Map	Recall Map, Recall KML Points only, Recall KML Points with Map, Recall Default Grid



## Channel Scanner (Option 0027)

Number of Channels	1 to 20 Channels
Measurements	Graph/Table, Max Hold (On/5 sec/Off), Freq/Channel, Current/Max, Single/Dual Color
Scanner	Scan Channels, Scan Frequencies, Scan Customer List, Scan Script Master™
Amplitude	Reference Level, Scale
Custom Scan	Signal Standard, Channel, # of Channels, Channel Step Size, Custom Scan
Frequency Accuracy	± 10 Hz + Time base error
Measurement Range	-110 dBm to +26 dBm
Application Options	Bias-Tee (On/Off), Impedance (50 Ω, 75 Ω, Other)

# LMR Master™ S412E Specifications



## Power Meter

Frequency	Center/Start/Stop, Span, Frequency Step, Signal Standard, Channel #, Full Band
Amplitude	Maximum, Minimum, Offset, Relative On/Off, Units, Auto Scale
Average	Acquisition Fast/Med/Slow, # of Running Averages
Limits	Limit On/Off, Limit Upper/Lower
Frequency Range	10 MHz to 1.6 GHz (S412E), 10 MHz to 6 GHz (Option 6)
Span	1 kHz to 100 MHz
Display Range	-140 dBm to +30 dBm, ≤ 40 dB span
Measurement Range	-120 dBm to +26 dBm
Offset Range	0 dB to +100 dB
VSWR	2:1 typical
Maximum Power	+35 dBm without attenuator
Accuracy	Same as Spectrum Analyzer
Application Options	Impedance (50 Ω, 75 Ω, Other)



## High Accuracy Power Meter (Option 0019) (Requires external USB Power Sensor(s))

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	PSN50	MA24104A	MA24106A	MA24108/18/26A
Description	High Accuracy RF Power Sensor	Inline High Power Sensor	High Accuracy RF Power Sensor	Microwave USB Power Sensor
Frequency Range	50 MHz to 6 GHz	600 MHz to 4 GHz	50 MHz to 6 GHz	10 MHz to 8 GHz (MA24108A) 10 MHz to 18 GHz (MA24118A) 10 MHz to 26 GHz (MA24126A)
Connector	Type N(m), 50 Ω	Type N(m), 50 Ω	Type N(m), 50 Ω	Type N(m), 50 Ω (MA24108/18A) Type K(m), 50 Ω (MA24126A)
Dynamic Range	-30 dBm to +20 dBm (.001 mW to 100 mW)	+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)
VBW	100 Hz	100 Hz	100 Hz	50 kHz
Measurand	True-RMS	True-RMS	True-RMS	True-RMS, Slot Power, Burst Average Power
Measurement Uncertainty	±0.16 dB <sup>1</sup>	±0.17 dB <sup>2</sup>	±0.16 dB <sup>1</sup>	±0.18 dB <sup>3</sup>
Datasheet (for complete specifications)	11410-00414	11410-00483	11410-00424	11410-00504

- Notes:
- 1) Total RSS measurement uncertainty (0 °C to 50 °C) for power measurements of a CW signal greater than -20 dBm with zero mismatch errors.
  - 2) 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.
  - 3) Expanded uncertainty with K=2 for power measurements of a CW signal greater than -20 dBm with zero mismatch errors.

# LMR Master™ S412E Specifications

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## CW Signal Generator

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### Setup Parameters

Generator	On/Off
Tx Output Level	-120 dBm to 0 dBm
Tx Pattern	CW

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### RF Characteristics

Power Level Accuracy	2.0 dB (CW Pattern, temperature range 15 °C to 35 °C, -120 to 0 dBm) Typical
Frequency Range	500 kHz to 1.6 GHz
Frequency Accuracy	Same as Spectrum Analyzer

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# LMR Master™ S412E Specifications



## P25 Analyzer and P25 Talk-Out Coverage (Options 0521, 0522)

### Measurements

P25 Analyzer (Option 0521)	P25 Talk-Out Coverage (Option 0522)
Received Power Frequency Error Modulation Fidelity NAC (hex) Symbol Rate Error BER (1011 Hz, 0.153, Voice, and Control Channel)	BER RSSI Modulation Fidelity

### Graphs

P25 Analyzer (Option 0521)	P25 Talk-Out Coverage (Option 0522)
Constellation Linear Constellation Spectrum (25 kHz span) Histogram Eye Diagram Summary Display	RSSI vs. Time BER vs. Time Modulation Fidelity vs. Time

### Setup Parameters

Frequency	Center Frequency
Amplitude	Reference level, Scale, Ext Attenuation, Auto Range, Adjust Range
Setup	Modulation Type (C4FM, CQPSK), BER pattern (1011 Hz, 0.153, Voice, Control Channel)
Measurement	P25 Analyzer, P25 Coverage
P25 Analyzer	Active Graph, Maximize Active Trace, Graph Type, Symbol Span
Graph Type	Constellation, Linear Constellation, Spectrogram, Histogram, Eye Diagram, Summary
Symbol Span	2, 3, 4, 5
P25 Coverage (Option 522)	USB Memory File Format .p25, .kml, both Log data on / off Display, RSSI vs. Time, BER vs. Time, Mod Fid. vs. Time

### RF Measurements (Option 0521) (temperature range 15 °C to 35 °C)

Received Power dBm	± 1.25 dB, ± 0.5 dB typical
Frequency Error Hz	± 10 Hz + Frequency Reference
Modulation Fidelity %	
BER/MER %	
Symbol Deviation Hz	
Network Access Code Hex	
Symbol Rate Error MHz	

### Measurements (Option 0522)

RSSI, BER, Mod Fid vs. Time

## Signal Generator

### Setup Parameters

Generator	On/Off
Tx Output Level	-120 dBm to 0 dBm
Tx Pattern	1011 Hz, 1011 Hz Cal, Infr, Silence, Busy, Idle, High Dev, Low Dev, 0.153 (v. 52), CW

### RF Characteristics

Power Level Accuracy	2.0 dB (CW Pattern, temperature range 15 °C to 35 °C, -120 to 0 dBm) Typical
Frequency Range	500 kHz to 1.6 GHz
Mod Fidelity	1.25% max, 0.75 typical
Frequency Accuracy	Same as Spectrum Analyzer

# LMR Master™ S412E Specifications



## NXDN Analyzer and NXDN Talk-Out Coverage (Options 0531, 0532)

### Measurements

NXDN Analyzer (Option 0531)	NXDN Talk-Out Coverage (Option 0532)
Received Power Frequency Error Modulation Fidelity RAN (hex) Symbol Rate Error BER (Tone, O.153, Voice, and Control Channel)	BER RSSI Modulation Fidelity

### Graphs

NXDN Analyzer (Option 0531)	NXDN Talk-Out Coverage (Option 0532)
Constellation Linear Constellation Spectrum (25 kHz span) Histogram Eye Diagram Summary Display	RSSI vs. Time BER vs. Time Modulation Fidelity vs. Time

### Setup Parameters

Frequency	Center Frequency
Amplitude	Reference level, Scale, Ext Attenuation, Auto Range, Adjust Range
Setup	Modulation Bandwidth (6.25 kHz and 12.5 kHz), BER pattern (Tone, O.153, Voice, Control Channel)
Measurement	NXDN Analyzer, NXDN Coverage
NXDN Analyzer	Active Graph, Maximize Active Trace, Graph Type, Symbol Span
Graph Type	Constellation, Linear Constellation, Spectrogram, Histogram, Eye Diagram, Summary
Symbol Span	2, 3, 4, 5
NXDN Coverage (Option 0532)	USB Memory File Format .nxdn, .kml, both Log data on / off Display, RSSI vs. Time, BER vs. Time, Mod Fid. vs. Time

### RF Measurements (Option 0531) (temperature range 15 °C to 35 °C)

Received Power dBm	± 1.25 dB, ± 0.5 dB typical
Frequency Error Hz	± 10 Hz + Frequency Reference
Modulation Fidelity %	
BER/MER %	
Symbol Deviation Hz	
Radio Access Number Hex	
Symbol Rate Error mHz	

### Measurements (Option 0532)

RSSI, BER, Mod Fid vs. Time

## Signal Generator

### Setup Parameters

Mod Bandwidth	6.25 kHz, 12.5 kHz
Generator	On/Off
Tx Output Level	-120 dBm to 0 dBm
Tx Pattern	Tone, O.153 (v. 52), High Dev, Low Dev, UDCH Pattern 10, CAC, CW

### RF Characteristics

Power Level Accuracy	2.0 dB (CW Pattern, temperature range 15 °C to 35 °C, -120 to 0 dBm) Typical
Frequency Range	500 kHz to 1.6 GHz
Mod Fidelity	1.25% max
Frequency Accuracy	Same as Spectrum Analyzer

# LMR Master™ S412E Specifications



## AM/FM/PM Signal Analyzers (Option 0509)

### Measurements

	RF Spectrum AM/FM/PM	Audio Spectrum (AM)	Audio Spectrum (FM/PM)	Audio Waveform (AM)	Audio Waveform (FM/PM)	Summary (AM)	Summary (FM/PM)
Graphic Display	Power (dBm) vs. Frequency	Depth (%) vs. Modulation Frequency	Deviation (kHz/rad) vs. Modulation Frequency	Depth (%) vs. Time	Deviation (kHz/rad) vs. Time	None	None
Numerical Displays	Carrier Power Carrier Frequency Occupied Bandwidth	AM Rate RMS Depth (Pk-Pk)/2 Depth SINAD* THD* Distortion/Total Vrms*	FM/PM Rate RMS Deviation (Pk-Pk)/2 Deviation SINAD* THD* Distortion/Total Vrms*	AM Rate RMS Depth (Pk-Pk)/2 Depth SINAD* THD* Distortion/Total Vrms*	FM/PM Rate RMS Depth (Pk-Pk)/2 Depth SINAD* THD* Distortion/Total Vrms*	RMS Depth (AM) Peak + Depth Peak – Depth (Pk-Pk)/2 Depth Carrier Power Carrier Frequency Occupied Bandwidth AM Rate SINAD* THD* Distortion/Total Vrms*	RMS Deviation (FM/PM) Peak + Depth Peak – Depth (Pk-Pk)/2 Depth Carrier Power Carrier Frequency Occupied Bandwidth AM Rate SINAD* THD* Distortion/Total Vrms*

### Setup Parameters

Frequency	Center Freq, Span, Freq Step, Signal Standard, Channel, Channel Increment, Set Carrier Freq
Amplitude	Scale, Power Offset, Adjust Range
Setup	Demod Type (AM, FM, PM), IFBW, Auto IFBW
Measurements	RF Spectrum AM/FM/PM, Audio Spectrum (AM/FM/PM), Audio Waveform (AM/FM/PM), Summary (AM/FM/PM), Average
Marker	On/Off, Delta, Peak Search, Marker Freq to Center, Marker to Ref Lvl, Marker Table, All Markers Off

### Specifications

AM	Modulation Rate: $\pm 1$ Hz (< 100 Hz), $\pm 2\%$ (> 100 Hz) Depth: $\pm 5\%$ for (Modulation rates 10 Hz to 100 kHz)
FM	Modulation Rate: $\pm 1$ Hz (< 100 Hz); $\pm 2\%$ (100 Hz to 100 kHz) Deviation Accuracy: $\pm 5\%$ (100 Hz to 100 kHz)**
PM	Modulation Rate: $\pm 1$ Hz (< 100 Hz); $\pm 2\%$ (100 Hz to 100 kHz) Deviation Accuracy: $\pm 5\%$ (deviation 0 to 93 Rad, rate 10 Hz to 5 kHz)**
IF bandwidth	1 kHz to 300 kHz in 1-3 sequence
Frequency Span	RF Spectrum: 10 kHz to 10 MHz Audio Spectrum: 2 kHz, 5 kHz, 10 kHz, 20 kHz
RBW/VBW	30
Span/RBW	100
Sweep time	50 $\mu$ s to 50 ms (Audio Waveform)

\* Requires Sinewave modulation

\*\* IFBW must be greater than 95% occupied BW

# LMR Master™ S412E Specifications



## LTE Signal Analyzers (Options 0541, 0542, 0546)

### Measurements

RF (Option 0541)	Modulation (Option 0542)	Over-the-Air (OTA) (Option 0546)	Pass/Fail (User Editable)
Channel Spectrum Channel Power Occupied Bandwidth ACLR RF Summary	Constellation Reference Signal Power Sync Signal Power EVM Frequency Error Carrier Frequency Cell ID Sector ID Group ID Control Channel Power RS P-SS S-SS PBCH PCFICH Modulation Summary	Synch Signal Power (Six Strongest) Power Cell ID Sector ID Group ID Dominance	Pass Fail All Pass/Fail RF Pass Fail Demod Measurements Channel Power Occupied Bandwidth ACLR Frequency Error Carrier Frequency Dominance EVM (peak) EVM (rms) RS Power SS Power P-SS Power S-SS Power PBCH Power PCFICH Power Cell ID Group ID Sector ID

### Setup Parameters

Frequency	E-UTRA bands 1 - 21 (tuneable 10 MHz to 4.0 GHz) Center, Signal Standard, Channel #, Closest Channel, Decrement/Increment Channel
Bandwidth	10 MHz
Span	1.4, 3, 5, 10, 15, 20, 30 MHz
Amplitude	Scale/Division, Power Offset, Auto Range, Adjust Range
Sweep	Single/Continuous, Trigger Sweep
Save/Recall	Setup, Measurement, Screen Shot (save only), to Internal/External Memory
Measurement Summary Screens	Overall Measurements, RF Measurements, Modulation Quality

### RF Measurements (Option 0541) (requires Option 0031)

RF Channel Power Accuracy	± 1.5 dB, ± 1.0 dB typical, (RF input -50 dBm to +10 dBm)
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### Modulation (Option 0542) (requires Option 0031)

Frequency Error	± 10 Hz + time base error, 99% confidence level
Residual EVM (rms)	2.0% typical (E-UTRA Test Model 3.1) (RF Input -50 dBm to +10 dBm)

### Over-the-Air (OTA) Measurements (Option 0546) (requires Option 0031)

Scanner	Six strongest Sync Signals
Auto Save	Yes
GPS Tagging and Logging	Yes

# LMR Master™ S412E Specifications

## General Specifications

All specifications and characteristics apply under the following conditions, unless otherwise stated: 1) After 5 minutes of warm-up time, where the instrument is left in the ON state; 2) All specifications apply when using internal reference; 3) All specifications subject to change without notice; 4) Typical performance is the measured performance of an average unit; 5) Recommended calibration cycle is 12 months.

### Setup Parameters

System	Status (Temperature, Battery Info, Serial Number, Firmware Version, Options Installed) Self Test, Application Self Test GPS (see Option 0031)
System Options	Name, Date and Time, Brightness, Volume Language (English, French, German, Spanish, Chinese, Japanese, Korean, Italian, User defined) Reset (Factory Defaults, Master Reset, Update Firmware)
File	Save, Recall, Delete, Directory Management
Save/Recall	Setups, Measurements, Screen Shots Jpeg (save only)
Delete	Selected File, All Measurements, All Mode Files, All Content
Directory Management	Sort Method (Name/Type/Date), Ascend/Descend, Internal/USB, Copy, Format USB
Internal Trace/Setup Memory	2,000 traces, 2,000 Setups
External Trace/Setup Memory	Limited by size of USB Flash drive
Mode Switching	Auto-Stores/Recalls most recently used Setup Parameters in the Mode

### Connectors

VNA Port 1, VNA Port 2, RF In, Signal Gen	Type N, female, 50 Ω
VNA Port 1 Damage Level	23 dBm, ± 50 VDC
RF In	Type N, female, 50 Ω
RF In Damage Level	+35 dBm peak, ± 50 VDC, Maximum Continuous Input (≥ 10 dB attenuation)
GPS	SMA(f)
External Power	5.5 mm barrel connector, 12.5 to 15 VDC, < 4.0 Amps
USB Interface (2)	Type A, Connect USB Flash Drive and Power Sensor
USB Interface	5-pin mini-B, Connect to PC for data transfer
Headset Jack	2.5 mm mini-phone plug
External Reference In	BNC, female, 50 Ω, Maximum Input +10 dBm 1 MHz, 5 MHz, 10 MHz, 13 MHz
External Trigger/Clock Recovery	BNC, female, 50 Ω, Maximum Input ± 50 VDC

### Display

Type	Resistive Touchscreen
Size	8.4" daylight viewable color LCD
Resolution	800 x 600

### Battery

Type	Li-Ion
Battery Operation	3.0 hours, typical

### Electromagnetic Compatibility

European Union	CE Mark, EMC Directive 2004/108/EC Low Voltage Directive 2006/95/EC
Australia and New Zealand	C-tick N274
Interference	EN 61326-1
Emissions	EN 55011
Immunity	EN 61000-4-2/-4-3/-4-4/-4-5/-4-6/-4-11

### Safety

Safety Class	EN 61010-1 Class 1
Product Safety	IEC 60950-1 when used with Company supplied Power Supply

### Environmental

Operating Temperature	-10 °C to 55 °C
Maximum Humidity	95% RH (non-condensing) at 40 °C
Shock	MIL-PRF-28800F Class 2
Storage	-40 °C to 71 °C
Altitude	4600 meters, operating and non-operating

### ESD

RF Port Center Pin	Withstands up to ± 15 kV
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### Size and Weight

Size	273 mm x 199 mm x 91 mm (10.7 in x 7.8 in x 3.6 in)
Weight	3.6 kg, (7.9 lbs)

# LMR Master™ S412E Specifications

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## Master Software Tools (for your PC)

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### Database Management

Full Trace Retrieval	Retrieve spectrum analyzer traces from instrument into one PC directory
Trace Catalog	Index all traces into one catalog
Trace Rename Utility	Rename measurement traces
Group Edit	Titles, subtitles, plot scaling, markers and limit lines, simultaneously on similar files
DAT File Converter	Converts HHST files to MST file format and vice-versa

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### Data Analysis

Trace Math and Smoothing	Compare multiple traces
Data Converter	Convert from/to Return Loss, VSWR, Cable Loss, DTF and also into Smith Charts
Measurement Calculator	Translates into other units

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### Report Generation

Report Generator	Includes GPS, power level, and calibration status along with measurements
Edit Graph	Change scale, limit lines, and markers
Report Format	Create reports in HTML for PDF format
Export Measurements	Export measurements to *.s2p, *.jpg or *.csv format
Notes	Annotate measurements

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### Mapping (GPS Required)

Spectrum Analyzer Mode	MapInfo, MapPoint
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### Folder Spectrogram (Spectrum Monitoring for Interference Analysis and Spectrum Clearing)

Folder Spectrogram – 2D View	Creates a composite file of multiple traces Peak Power, Total Power, Peak Frequency, Histogram, Average Power (Max/Min) File Filter (Violations over limit lines or deviations from averages) Playback
Video Folder Spectrogram – 2D View	Create AVI file to export for management review/reports
Folder Spectrogram – 3D View	Views (Set Threshold, Markers) - 3D (Rotate X, Y, Z Axis, Level Scale, Signal ID) - 2D View (Frequency or Time Domain, Signal ID) - Top Down Playback (Frequency and/or Time Domain)

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### List/Parameter Editors

Traces	Add, delete, and modify limit lines and markers
Antennas, Cables, Signal Standards	Modify instrument's Antenna, Cable, and Signal Standard List
Product Updates	Auto-checks Anritsu website for latest revision firmware
Firmware Upload	Upload new firmware into the instrument
Languages	Add up to two languages and modify non-English language menus
Display	Modify display settings

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### Script Master™

Channel Scanner Mode	Automate scan up to 1200 channels, repeat for sets of 20 channels, repeat all channels
GSM/GPRS/EDGE or W-CDMA/HSDPA Mode	Automate Signal Analysis testing requirements with annotated how-to pictures

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### Connectivity

Connections	Connect to PC using USB
Download	Download measurements and live traces to PC for storage and analysis
Upload	Upload measurements from PC to instrument
Firmware Updates	Create USB Flash Drive for firmware update

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# LMR Master™ S412E Ordering Information

## Ordering Information – Options

	S412E	Description
	500 kHz to 1.6 GHz	LMR Master
	Options	
	S412E-0010	Bias-Tee
	S412E-0006	6 GHz Coverage on Spectrum Analyzer
	S412E-0016	6 GHz Coverage on Vector Network Analyzer
	S412E-0015	Vector Voltmeter
	S412E-0031	GPS Receiver (requires Antenna P/N 2000-1528-R)
	S412E-0019	High-Accuracy Power Meter (requires External Power Sensor)
	S412E-0025	Interference Analyzer (Option 0031 recommended)
	S412E-0027	Channel Scanner
	S412E-0431	Coverage Mapping (requires Option 0031)
	S412E-0501	Distance Domain on Cable Test
	S412E-0509	AM/FM/PM Analyzer
	S412E-0521	P25 Analyzer Measurements
	S412E-0522	P25 Coverage Measurements (requires Options 0031 and 0521)
	S412E-0531	NXDN Analyzer Measurements
	S412E-0532	NXDN Coverage Measurements (requires Options 0031 and 0531)
	S412E-0541	LTE RF Measurements (requires Option 0031)
	S412E-0542	LTE Modulation Quality (requires Option 0031)
	S412E-0546	LTE Over-the-Air Measurements (requires Option 0031)
	S412E-0098	Standard Calibration (ANSI 2540-1-1994)
	S412E-0099	Premium Calibration to Z540 plus test data

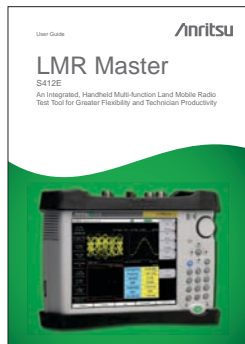
# LMR Master™ S412E Ordering Information

## Power Sensors (For complete ordering information see the respective datasheets of each sensor)



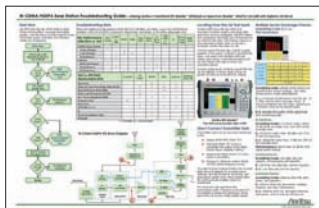
Part Number	Description
PSN50	High Accuracy RF Power Sensor, 50 MHz to 6 GHz, +20 dBm
MA24104A	Inline High Power Sensor, 600 MHz to 4 GHz, +51.76 dBm
MA24106A	High Accuracy RF Power Sensor, 50 MHz to 6 GHz, +23 dBm
MA24108A	Microwave USB Power Sensor, 10 MHz to 8 GHz, +20 dBm
MA24118A	Microwave USB Power Sensor, 10 MHz to 18 GHz, +20 dBm
MA24126A	Microwave USB Power Sensor, 10 MHz to 26 GHz, +20 dBm

## Manuals (soft copy included on Handheld Document Disc and at [www.anritsu.com](http://www.anritsu.com))



Part Number	Description
10920-00060	Handheld Instruments Documentation Disc
10580-00318	LMR Master User Guide (Hard copy included)
10580-00242	2-Port Transmission Measurement for VNA Master - Bias-Tee
10580-00231	Spectrum Analyzer Measurement Guide - Interference Analyzer, Channel Scanner, Gated Sweep, CW Signal Generator, AM/FM/PM Analyzer, Interference Mapping, Coverage Mapping
10580-00234	3GPP Signal Analyzer Measurement Guide - GSM/EDGE, W-CDMA/HSDPA, TD-SCDMA/HSDPA, LTE
10580-00243	P25 and NXDN Measurement Guide
10580-00240	Power Meter Measurement Guide - High Accuracy Power Meter
10580-00319	Programming Manual

## Troubleshooting Guides (soft copy at [www.anritsu.com](http://www.anritsu.com))



Part Number	Description
11410-00551	Spectrum Analyzers Field Users Guide
11410-00472	Interference Troubleshooting Guide
11410-00566	LTE eNode Testing Troubleshooting Guide

## Standard Accessories (included with instrument)

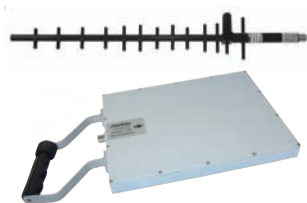


Part Number	Description
10920-00060	Handheld Instruments Documentation Disc
10580-00318	LMR Master User Guide (includes Bias-Tee, GPS Receiver)
3-68736	Soft Carrying Case
2300-498	Master Software Tools (MST) CD Disc
633-44	Rechargeable Li-Ion Battery
40-168-R	AC-DC Adapter
2000-1520-R	USB Flash Drive
806-141-R	Automotive Cigarette Lighter Adapter
3-2000-1498	USB A/5-pin mini-B Cable, 10 feet/305 cm
11410-00486	LMR Master S412E Technical Data Sheet One Year Warranty (Including battery, firmware, and software) Certificate of Calibration and Conformance

# LMR Master™ S412E Ordering Information

## Optional Accessories

### Directional Antennas



Part Number	Description
2000-1411-R	822 MHz to 900 MHz, N(f), 10 dBd, Yagi
2000-1412-R	885 MHz to 975 MHz, N(f), 10 dBd, Yagi
2000-1413-R	1710 MHz to 1880 MHz, N(f), 10 dBd, Yagi
2000-1414-R	1850 MHz to 1990 MHz, N(f), 9.3 dBd, Yagi
2000-1415-R	2400 MHz to 2500 MHz, N(f), 10 dBd, Yagi
2000-1416-R	1920 MHz to 2170 MHz, N(f), 10 dBd, Yagi
2000-1519-R	500 MHz to 3 GHz, log periodic

### Portable Antennas



2000-1200-R	806 MHz to 866 MHz, SMA(m), 50 Ω
2000-1473-R	870 MHz to 960 MHz, SMA(m), 50 Ω
2000-1035-R	896 MHz to 941 MHz, SMA(m), 50 Ω (1/2 wave)
2000-1030-R	1710 MHz to 1880 MHz, SMA(m), 50 Ω (1/2 wave)
2000-1474-R	1710 MHz to 1880 MHz with knuckle elbow (1/2 wave)
2000-1031-R	1850 MHz to 1990 MHz, SMA(m), 50 Ω (1/2 wave)
2000-1475-R	1920 MHz to 1980 MHz and 2110 MHz to 2170 MHz, SMA(m), 50 Ω
2000-1032-R	2400 MHz to 2500 MHz, SMA(m), 50 Ω (1/2 wave)
2000-1361-R	2400 MHz to 2500 MHz, 5000 MHz to 6000 MHz, SMA(m), 50 Ω
2000-1636-R	Antenna Kit (Consists of: 2000-1030-R, 2000-1031-R, 2000-1032-R, 2000-1200-R, 2000-1035-R, 2000-1361-R, and carrying pouch)

### Filters



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
1030-105-R	890 MHz to 915 MHz Band, 0.41 dB loss, N(m) to SMA(f), 50 Ω
1030-111-R	1850 MHz to 1910 MHz, N(m) to SMA(f), 50 Ω
1030-106-R	1710 MHz to 1790 MHz Band, 0.34 dB loss, N(m) to SMA(f), 50 Ω
1030-107-R	1910 MHz to 1990 MHz Band, 0.41 dB loss, N(m) to SMA(f), 50 Ω
1030-112-R	2400 MHz to 2484 MHz, N(m) to SMA(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

### Attenuators



3-1010-122	20 dB, 5 W, DC to 12.4 GHz, N(m) to N(f)
42N50-20	20 dB, 5 W, DC to 18 GHz, N(m) to N(f)
42N50A-30	30 dB, 50 W, DC to 18 GHz, N(m) to N(f)
3-1010-123	30 dB, 50 W, DC to 8.5 GHz, N(m) to N(f)
1010-127-R	30 dB, 150 W, DC to 3 GHz, N(m) to N(f)
3-1010-124	40 dB, 100 W, DC to 8.5 GHz, N(m) to N(f), Uni-directional
1010-121	40 dB, 100 W, DC to 18 GHz, N(m) to N(f), Uni-directional
1010-128-R	40 dB, 150 W, DC to 3 GHz, N(m) to N(f)

### Phase-Stable Test Port Cables, Armored w/ Reinforced Grip (recommended for cable & antenna line sweep applications)



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

# LMR Master™ S412E Ordering Information

## Optional Accessories (continued)

**Phase-Stable Test Port Cables, Armored** (recommended for use with tightly spaced connectors and other general purpose applications)



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

### Adapters



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
510-102-R	N(m) to N(m), DC to 11 GHz, 50 Ω, 90 degrees right angle

### Precision Adapters



34NN50A	Precision Adapter, N(m) to N(m), DC to 18 GHz, 50 Ω
34NFN50	Precision Adapter, N(f) to N(f), DC to 18 GHz, 50 Ω

### Backpack and Transit Case



67135	Anritsu Backpack (For Handheld Instrument and PC)
760-243-R	Large Transit Case with Wheels and Handle

### Miscellaneous Accessories



2000-1528-R	GPS Antenna, SMA(m)
2000-1520-R	USB Flash Drive
2000-1374	External Charger for Li-Ion Batteries
2300-532	Map Master CD









The Master Users Group is an organization dedicated to providing training, technical support, networking opportunities and links to Master product development teams. As a member you will receive the Insite Quarterly Newsletter with user stories, measurement tips, new product news and more.

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