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LMR MasterTM Land Mobile Radio Modulation Analyzer and Signal Analyzer, Vector Network Analyzer, Spectrum Analyzer

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 world's most advanced handheld vector network analyzer plus a powerful vector signal generator with internally adjustable power from 0 dBm to -130 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: 120 ppb standard (25 °C \pm 25 °C); < 50 ppb after 3 minutes with GPS lock

VNA Analyzer Highlights

- Broadband coverage of 500 kHz to 1.6 GHz
- 1-path, 2-port Vector Network Analyzer (VNA) w/ quad trace display
- 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
- Arbitrary data points up to 4001
- IF Bandwidth selections of 10 Hz to 100 kHz
- 100 dB transmission dynamic range
- 850 µs/data point sweep speed

Land Mobile Radio Signal Analyzer Highlights

- Analyzes Narrowband FM analog systems
- Analyzes P25 (TIA-102.CAAA-C), P25 Phase 2 (TIA-102.CCAA), DMR (MotoTRBO[™]), NXDN[™], and ITC-R PTC digital systems
- 500 kHz to 1.6 GHz frequency coverage
- Internal signal generator: 0.1 dB resolution, 0 dBm to -130 dBm (spec to -120 dBm)
- 2.0 dB signal generator accuracy (Typical)
- P25/P25p2, NXDN, and ETSI DMR BER test patterns including 1011 Hz, 1031 Hz, and 0.153
- Simultaneous analysis and generation of analog and digital LMR signals
- Independent control of both receive/transmit frequencies and test patterns

Capabilities and Functional Highlights

- 3 hour battery operation time
- Analog FM and digital LMR analyzer
- High accuracy internal power meter
- On-screen LMR Coverage Mapping (Outdoor and Indoor)
- Complies with MIL-PRF-28800 Class 2
- GPS tagging of saved traces
- USB data transfer
- < 5 minute warm-up time
- 8.4 inch daylight-viewable TFT LCD color resistive touchscreen allows use while wearing gloves



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

Spectrum Analyzer	
Measurements	
Smart Measurements	Field Strength (uses antenna calibration tables to measure dBm/m ² 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)
	ACPR (Adjacent Channel Power Ratio) AM/FM/SSB Audio Demodulation (Wide/Narrow FM, AM, Upper/Lower SSB)
	C/I (carrier-to-interference ratio)
	Emission Mask
	Coverage Mapping (requires option 0431)
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	$A \to B, B \leftrightarrow C, Max$ Hold, Min Hold
Trace C Operations	A \rightarrow C, B \leftrightarrow C, Max Hold, Min Hold, A – B \rightarrow C, B – A \rightarrow 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
Frequency	
Frequency Range	100 kHz to 1.6 GHz, (6 GHz with Option 6)
Tuning Resolution	1 Hz
Frequency Reference Aging	1.0 ppm/year
Frequency Reference Accuracy	120 ppb (25 °C \pm 25 °C) + aging, < 50 ppb + aging with GPS lock
	120 ppb (25 $^{\circ}C \pm 25 ^{\circ}C)$ + aging, < 50 ppb + aging with GPS lock 100 Hz to 1.6 GHz including zero span (100 Hz to 6 GHz with Option 6)
Frequency Span	
Sweep Time Sweep Time Accuracy	100 ms, 10 μs to 600 seconds in zero span ± 2% in zero span
Bandwidth	10 Hz to 2 MHz in 1, 2 continuous \pm 10% (1 MHz may in zero cosh) (2 dD bandwidth)
Resolution Bandwidth (RBW)	10 Hz to 3 MHz in 1–3 sequence \pm 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	Auto VBW is On, RBW/VBW = 1

Spectral Purity				
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		
Amplitude Ranges				
Dynamic Range	> 95 dB (2.4 GHz), 2/3 (TOI-DANL) in 10 Hz RBW		
Measurement Range	DANL to +26 dBm			
Maximum Continuous Input	+33 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, o			
		uV, mV, V, kV, nW, μW, mW,	•	
Amplitude Accuracy (single sir	ie wave input < Ref lev	el, and > DANL, auto	attenuation)	
-10 °C to 50 °C after	Typical: $\pm 0.5 dB 100 kJ$	Hz to 6 CHz		
30 minute warm-up	Typical: ± 0.5 dB, 100 kł Maximum: ± 1.3 dB, 100			
Displayed Average Noise Lev				
Displayed Average Noise Leve	. ,	np Off	Prean	np On
		evel –20 dBm)		evel –50 dBm)
(RBW = 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
	-120 UDIII	-131 UDIII	-143 UDIII	-150 UBIII
(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
Spurs				
Residual Spurious	< -90 dBm (RF input ter	minated, 0 dB input attenua	ation, > 10 MHz)	
Input-Related Spurious	< -75 dBc (0 dB attenua	tion, -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		
Third-Order Intercept (TOI) (tones 100 kHz apart, 1	L0 dB attenuation))	
800 MHz	+16 dBm			
2400 MHz	+20 dBm			
200 MHz to 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			
Second Harmonic Distortion (Preamp Off, 0 dB inpu	t attenuation, –30 dBm	n input)	
50 MHz	-56 dBc			
> 50 MHz to 200 MHz	-60 dBc, typical			
> 200 MHz to 3000 MHz	-70 dBc, typical			
	, ,,			

2:1, typical

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 25 °C ± 5 °C.
- All specifications apply when using internal reference.
- All specifications subject to change without notice. Please visit www.anritsu.com for most current data sheet.
- 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 GHz 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	High Port Power	Low Port Power
500 kHz to \leq 3 GHz	+3 dB	–25 dBm
3 GHz to \leq 6 GHz	0 dB	–25 dBm

Transmission Dynamic Range

The transmission dynamic range (the difference between test port power and noise floor) using 10 Hz IF Bandwidth and High Port Power is shown in the following table.

Frequency Range	Dynamic Range
2 MHz to \leq 4 GHz	100 dB
4 GHz to \leq 6 GHz	90 dB

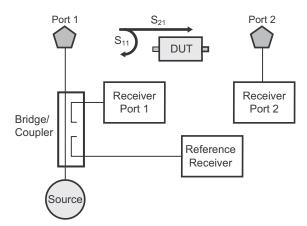
Typical Sweep Speed

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 S₂₁ and S₁₁ (or S₁₂ and S₂₂) in a single sweep.

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

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.

High Port Power

LMR Master[™] S412E

OSLxx50 Calibration Components (N-Connector) Corrected System Performance and Uncertainties:

Vector Network Analyzer (Continued)

S412E with 1-path, 2-port calibration including isolation using either OSLN50-1 or OSLNF50-1 Calibration Kits.

Frequency Range	Directivity
≤ 6 GHz	> 42 dB
Frequency Range	Typical High Port Power
Frequency Range ≤ 3 GHz	Typical High Port Power +3 dBm

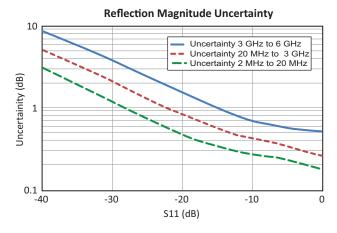
Precision calibration standards come in a convenient configuration for field work.

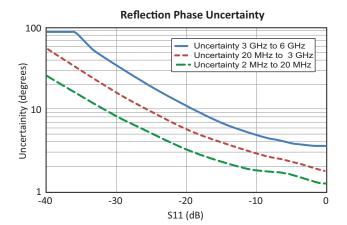
Transmission Magnitude Uncertainty

Measurement Uncertainties

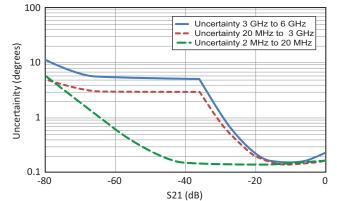
The following graphs provide measurement uncertainty at 23 °C \pm 5 °C for the above indicated connector type and calibration. Errors are worse-case contributions of residual directivity, source match, frequency response, network analyzer dynamic range, and connector repeatability. For two-port measurements,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

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Transmission Phase Uncertainty





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Vector Network Analyzer (Continued)

Low 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 or OSLNF50-1 Calibration Kits.

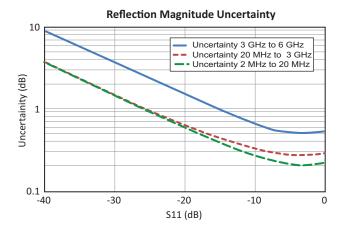
Frequency Range	Directivity
≤ 6 GHz	> 42 dB
Frequency Range	Typical Low Port Power
Frequency Range ≤ 3 GHz	-25 dBm



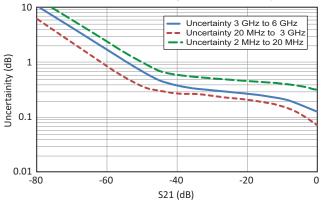
Precision calibration standards come in a convenient configuration for field work.

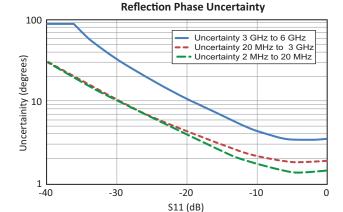
Measurement Uncertainties

The following graphs provide measurement uncertainty at 23 °C \pm 5 °C for the above indicated connector type and calibration. Errors are worse-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.

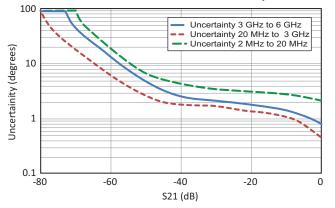


Transmission Magnitude Uncertainty





Transmission Phase Uncertainty

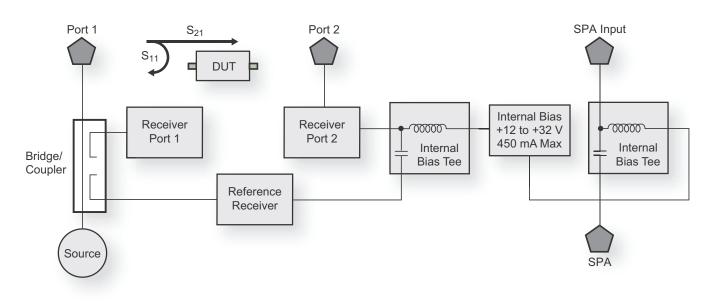


Vector Network Analyzer (Continued)

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 is available on VNA Port 2 and the SPA Input (RF In) for use with antenna pre-amplifiers.

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

Distance Domain (Option 0501)

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's DTF mode exploits a user-specified band of full power operational frequencies (instead of DC pulses from TDR approaches) to more precisely identify discontinuities. The VNA converts S-parameters from frequency domain into distance 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 distance domain analysis is available on transmission measurements.

Option 0501 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 minimize or prevent downtime of the system.

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

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

Maximum Distance (4001 data points, 1.6 GHz span)	374.9 m (1,229.9 feet)
Maximum Distance (4001 data points, 6.0 GHz span)	99.9 m (327.75 feet)
Minimum Distance Resolution (1.6 GHz span)	18.7 cm (7.36 inch)
Minimum Distance Resolution (6.0 GHz span)	4.99 cm (1.97 inch)
Measurement Display	Return Loss, VSWR
Measurement Format	dB, VSWR

NBFM Analyzer and Coverage Mapping

Measurements	
NBFM Analyzer	NBFM Talk-Out Coverage (requires Option 0031 GPS and a suitable GPS antenna)
Carrier Power	RSSI
Carrier Frequency	SINAD
requency Error	THD
M Deviation (Peak, Average, RMS)	
1odulation Rate	
SINAD	
Quieting	
-HD	
Dccupied Bandwidth (% Int Pwr or > dBc method)	
Decoded CTCSS/DCS/DTMF	
Encoded CTCSS/DCS/DTMF	

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NBFM Analyzer	NBFM Talk-Out Coverage	
Spectrum Audio Spectrum Audio Waveform/Scope Summary Display	Outdoor measured values are overlayed on a geo-tagged map, or displayed on a value vs. time graph. Captured data is exportable to both KML and CSV text (Requires option 0031 GPS and a suitable GPS antenna). Indoor measured values are referenced by creating touchscreen points on a floorplan.	

Setup Parameters			
Frequency	Center Frequency		
Amplitude	Reference level, Scale, Ext Attenuation, Auto Range, Adjust Range		
Setup	Tone Type (CTCSS, DCS, DTMF)		
Filters	High Pass (300 Hz, 3 kHz, None) and Low Pass (300 Hz, 3 kHz, 15 kHz, None) De-emphasis (On, Off)		
Measurement	NBFM Analyzer, NBFM Coverage, Quieting, SINAD		
Auto Scan	Detection and frequency lock when RF In $> +10$ dBm, FM or CW signal		
Tx Patterns	CW, FM w/ CTCSS/DCS/DTMF, FM w/ CTCSS/DCS/DTMF + Tone Modulation, FM + Tone Modulation		
NBFM Analyzer	 Active Graph, Maximize Active Trace, Graph Type, Audio Span, Audio Sweep Time, Occupied Bandwidth Frequency Display (Carrier or Error) 		
Graph Type	Spectrum, Audio Spectrum, Audio Waveform/Scope, Summary Display		
NBFM Coverage (requires Option 0031 GPS)			
RF Measurements (temperatur	re range 15 °C to 35 °C)		
Received Power dBm	$m \pm 1.25 \text{ dB}, \pm 0.5 \text{ dB typical}$		
Frequency Error Hz	± 10 Hz + Frequency Reference		
SINAD/Quieting	Audio In port conforms to TIA-603-D for input voltage and impedance		
Additional Summary Measurements	Deviation		
	Modulation Rate		
	THD		
	Occupied Bandwidth		
Tone Decode	CTCSS/DCS (standard tones per TIA-603-D), DTMF		
Coverage Measurements			

RSSI, SINAD, THD

NBFM Signal Generator

Setup Parameters

GeneratorOn / OffTX Output Level0.1 dB resolution, 0 dBm to -130 dBm (spec to -120 dBm)Frequency AccuracySame as Spectrum Analyzer

Interference Analyzer (Option 0025)

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Measuremer	its Spectrum
	Field Strength
	Occupied Bandwidth
	Channel Power
	Adjacent Channel Power Ratio (ACPR)
	AM/FM/SSB Demodulation (Wide/Narrow FM, Upper/Lower SSB), (audio out only)
	Carrier-to-Interference ratio (C/I)
	Spectrogram (Collect data up to one week)
	Signal Strength (Gives visual and aural indication of signal strength)
	Received Signal Strength Indicator (RSSI) (collect data up to one week)
	Gives visual and aural indication of signal strength
	Signal ID (up to 12 signals)
	Center Frequency
	Bandwidth
	Signal Type (FM, GSM, W-CDMA, CDMA, Wi-Fi)
	Closest Channel Number
	Number of Carriers
	Signal-to-Nose Ratio (SNR) > 10 dB
	Interference Mapping
	Triangulate location of interference with on display maps
Application Optic	ns Bias-Tee (On/Off), Impedance (50 Ω, 75 Ω, Other)
GPS Receiver Option (O	ption 0031) (Antenna sold separately)
Set	up On/Off, Antenna Voltage 3.3/5.0 V, GPS Info
GPS Time/Location Indicat	or Time, Latitude, Longitude and Altitude on display

GPS Time/Location Indicator	Time, Latitude, Longitude and Altitude on display Time, Latitude, Longitude and Altitude with trace storage
GPS-Enhanced Frequency Accuracy	< 50 ppb with GPS On, 3 minutes after satellite is locked in selected mode (Applies to Spectrum Analyzer, Interference Analyzer, LMR Signal Analyzers)
Connector	SMA, Female

Coverage Mapping (Options 0431)

Measurements		
Indoor Mapping	Outdoor Mapping	
RSSI	RSSI	
ACPR	ACPR	

Setup Parameters

Frequency Amplitude	Center/Start/Stop, Span, Freq Step, Signal Standard, Channel #, Channel Increment 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

Image 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 + Frequency Reference
Measurement Range	-110 dBm to +26 dBm
Application Options	Bias-Tee (On/Off), Impedance (50 Ω , 75 Ω , Other)

CW Signal Generator -m

Setup Parameters

On/Off
0.1 dB resolution, 0 dBm to -130 dBm (spec to -120 dBm)
CW, AM w/ 1 kHz, FM w/ 1 kHz
2.0 dB (CW Pattern, temperature range 15 °C to 35 °C, –120 dBm to 0 dBm) Ty

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

Internal Power Meter

Frequency	y 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 (Standard), 10 MHz to 6 GHz (Option 6)	
Span	1 kHz to 100 MHz	
Display Range	-140 dBm to +30 dBm, \leq 40 dB span	
Measurement Range	-120 dBm to +26 dBm	
Offset Range	0 dB to +100 dB	
VSWR	2:1 typical	
Maximum Power	Same as RF In Damage Level	
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	MA24105A	MA24106A	MA24108A/18A/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	350 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(f), 50 Ω	Type N(m), 50 Ω	Type N(m), 50 Ω (MA24108A/18A)
				Type K(m), 50 Ω (MA24126A)
Dynamic Range	-30 dBm to +20 dBm (0.001 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	\pm 0.16 dB ¹	$\pm 0.17 \ dB^2$	\pm 0.16 dB ¹	\pm 0.18 dB ³
Data sheet (for complete specifications)	11410-00414	11410-00621	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.

P25/P25p2 Analyzer and P25/P25p2 Talk-Out Coverage (Options 0521, 0522)

	Measu	irements	
P25/P25p2 Ana (Option 052		P25/P25p2 Talk-Out Coverage (Option 0522, requires Option 0031 GPS)	
Received Power		BER	
Frequency Error		RSSI	
Modulation Fidelity		Modulation Fidelity	
IAC (hex) Symbol Rate Error			
BER (1011 Hz for P25, 1031 Hz for P25p2	2), 0.153, Voice, and		
Control Channel)	-), 0.200, 10.00, 4.14		
Symbol Deviation			
Color Code (P25p2 only)			
		raphs	
P25/P25p2 Ana (Option 052		P25/P25p2 Talk-Out Coverage (Option 0522, requires Option 0031 GPS)	
Constellation (P25 only)		Outdoor measured values are overlayed on a geo-tagged map, or	
inear Constellation		displayed on a value vs time graph, and are exportable to both KML and CSV text (Requires option 0031 GPS and a suitable GPS antenna	
Spectrum [Spans (kHz) = 25, 50, 100, 5	00, 1000, 5000]		
listogram ye Diagram		Indoor measured values are referenced by creating touchscreen point	
Summary Display		on a floorplan.	
DMA Power Profile (P25p2 only)			
Standards Compliance	P25: Relevant sections of TIA	A-102.CAAA-C	
	P25 Phase 2: Relevant sectio		
Setup Parameters			
• Frequency	Center Frequency		
Amplitude	Reference level, Scale, Ext Attenuation, Auto Range, Adjust Range		
Setup	P25 Modulation Types: C4FM, CQPSK		
	P25 BER patterns: 1011 Hz,	0.153 (V.52), Voice, Control Channel	
		es: CQPSK Base & Mobile Station	
		031 Hz, Silence, Voice, Control Channel	
Measurement	P25 Analyzer, P25 Coverage		
P25/P25p2 Analyzer	Active Graph, Maximize Active Trace, Graph Type, Symbol Span		
Graph Type	Constellation, Linear Constellation, Spectrogram, Histogram, Eye Diagram, Summary		
Eye Diagram Symbol Span	2, 3, 4, 5		
P25/P25p2 Coverage (Option 0522, requires Option 0031 GPS)	LISB Memory File Format n2	5 kml both	
	 USB Memory File Format .p25, .kml, both Log data on / off 		
RF Measurements (Option 05)	21) (temperature range 1	.5 °C to 35 °C)	
Received Power dBm	\pm 1.25 dB, \pm 0.5 dB typical		
Frequency Error Hz	± 10 Hz + Frequency Referen	nce	
Additional Summary Measurements	Modulation Fidelity %		
	BER/MER %		
	Symbol Deviation (Hz)		
	Network Access Code Hex		
	Symbol Rate Error (MHz)		
Measurements (Option 0522)	RSSI, BER, Modulation Fideli	ty	
ignal Generator			
Setup Parameters			
Concreter	On/Off		
Generator	0.1 dB resolution, 0 dBm to -130 dBm (spec to -120 dBm)		
Tx Output Level	0.1 dB resolution, 0 dBm to -	P25: 1011 Hz, 1011 Hz Cal, Intfr, Silence, Busy, Idle, High Dev, Low Dev, 0.153 (v. 52), CW, AM and FM	
Tx Output Level	P25: 1011 Hz, 1011 Hz Cal, 2 Base Station (Selectable time		
Tx Output Level P25 Tx Patterns	P25: 1011 Hz, 1011 Hz Cal, 2 Base Station (Selectable time	Intfr, Silence, Busy, Idle, High Dev, Low Dev, O.153 (v. 52), CW, AM and FN eslot): 1031 Hz, 1031 Hz Cal, Silence, CW, AM, FM	
Tx Output Level P25 Tx Patterns P25p2 Tx Patterns RF Characteristics	P25: 1011 Hz, 1011 Hz Cal, Base Station (Selectable time Mobile Station (Selectable time	Intfr, Silence, Busy, Idle, High Dev, Low Dev, O.153 (v. 52), CW, AM and FN eslot): 1031 Hz, 1031 Hz Cal, Silence, CW, AM, FM neslot): 1031 Hz, 1031 Hz Cal, Silence, CW, AM, FM	
Tx Output Level P25 Tx Patterns P25p2 Tx Patterns RF Characteristics Power Level Accuracy	P25: 1011 Hz, 1011 Hz Cal, Base Station (Selectable time Mobile Station (Selectable time	Intfr, Silence, Busy, Idle, High Dev, Low Dev, O.153 (v. 52), CW, AM and FN eslot): 1031 Hz, 1031 Hz Cal, Silence, CW, AM, FM	
Tx Output Level P25 Tx Patterns P25p2 Tx Patterns RF Characteristics Power Level Accuracy Frequency Range	P25: 1011 Hz, 1011 Hz Cal, 3 Base Station (Selectable time Mobile Station (Selectable time 2.0 dB (CW Pattern, tempera 500 kHz to 1.6 GHz	Intfr, Silence, Busy, Idle, High Dev, Low Dev, O.153 (v. 52), CW, AM and FM eslot): 1031 Hz, 1031 Hz Cal, Silence, CW, AM, FM neslot): 1031 Hz, 1031 Hz Cal, Silence, CW, AM, FM	
Tx Output Level P25 Tx Patterns P25p2 Tx Patterns RF Characteristics Power Level Accuracy	P25: 1011 Hz, 1011 Hz Cal, 3 Base Station (Selectable time Mobile Station (Selectable time 2.0 dB (CW Pattern, tempera	Intfr, Silence, Busy, Idle, High Dev, Low Dev, O.153 (v. 52), CW, AM and FM eslot): 1031 Hz, 1031 Hz Cal, Silence, CW, AM, FM neslot): 1031 Hz, 1031 Hz Cal, Silence, CW, AM, FM	

DMR2 Analyzer and DMR2 Talk-Out Coverage (Options 0591, 0592)

	Meas	urements	
DMR2 Analyzer (Option 0591)		DMR2 Talk-Out Coverage (Option 0592, requires Option 0031 GPS)	
Received Power		BER	
Frequency Error		RSSI	
Modulation Fidelity		Modulation Fidelity	
Color Code (decimal)			
RX & TX Timeslot			
Symbol Rate Error			
Symbol Deviation			
BER Mobile Station: 1031 Hz, O.153, Voi Control Channel			
Base Station: 1031 Hz, 1031 Hz 1% BER Silence, TSCC	, 0.153, 0.153 1% BER,		
		raphs	
DMR2 Analy: (Option 059		DMR2 Talk-Out Coverage (Option 0592, requires Option 0031 GPS)	
Constellation		Outdoor measured values are overlayed on a geo-tagged map, or	
Linear Constellation		displayed on a value vs. time graph, and are exportable to both KML and CSV text (Requires option 0031 GPS and a suitable GPS antenna)	
Spectrum [Spans (kHz) = 25, 50, 100, 5	00, 1000, 5000]	Indoor measured values are referenced by creating touchscreen point	
Histogram		on a floorplan.	
Eye Diagram			
Summary Display			
Setup Parameters Frequency	Center Frequency		
Amplitude		Attenuation, Auto Range, Adjust Range	
Setup	Modulation Type (Base Station, Mobile Station), BER pattern (1031 Hz, O.153, Voice, Control Channe Silence, Idle)		
Measurement	DMR2 Analyzer, DMR2 Cover	-	
DMR2 Analyzer		ve Trace, Graph Type, Symbol Span	
Graph Type	Constellation, Linear Conste	llation, Spectrogram, Histogram, Eye Diagram, Summary	
Eye Diagram Symbol Span	2, 3, 4, 5		
DMR2 Coverage (Option 0592, requires Option 0031 GPS)	USB Memory File Format .dmr2, .kml, both Log data on / off		
RF Measurements (Option 05	91) (temperature range	15 °C to 35 °C)	
Received Power dBm	\pm 1.25 dB, \pm 0.5 dB typical		
Frequency Error Hz	± 10 Hz + Frequency Refere	ence	
Additional Summary Measurements	Modulation Fidelity %		
	BER/MER %		
	Symbol Deviation Hz		
	Color Code Decimal		
	Receive Timeslot		
	Transmit Timeslot		
	Symbol Rate Error (MHz)		
Measurements (Option 0592)	RSSI, BER, Modulation Fidel	itv	
	ROOT, DER, MOUULAUUT FILLE	ις γ	
📷 Signal Generator			
Setup Parameters			

Generator Tx Output Level Tx Pattern	On/Off 0.1 dB resolution, 0 dBm to –130 dBm (spec to –120 dBm) (Selectable timeslot) 1031 Hz, 0.153 (v. 52), Silence, 1031 Hz with 1% BER, 0.153 (v. 52) with 1% BER,
1x Tuttern	TSCC (only available in Base Station Modulation Type), CW, AM and FM
RF Characteristics	
Power Level Accuracy	2.0 dB (CW Pattern, temperature range 15 °C to 35 °C, -120 dBm 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

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

Measurements				
NXDN Analyz (Option 053		NXDN Talk-Out Coverage (Option 0532, requires Option 0031 GPS)		
Received Power Frequency Error		BER RSSI		
Modulation Fidelity		Modulation Fidelity		
RAN (decimal)				
Symbol Rate Error	Channel			
3ER (1031 Hz, 0.153, Voice, and Control Symbol Deviation	Channel)			
		Graphs		
NXDN Analyz		NXDN Talk-Out Coverage		
(Option 053		(Option 0532, requires Option 0031 GPS)		
Constellation		Outdoor measured values are overlayed on a geo-tagged map and		
inear Constellation		exportable to both KML and CSV text (Requires option 0031 GPS and suitable GPS antenna).		
Spectrum [Spans (kHz) = 25, 50, 100, 5	00, 1000, 5000]	Indoor measured values are referenced by creating touchscreen point		
Histogram Eye Diagram		on a floorplan.		
Summary Display				
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),			
		53, Voice, Control Channel)		
Measurement	NXDN Analyzer, NXDN Cove	-		
NXDN Analyzer		tive Trace, Graph Type, Symbol Span		
Graph Type		ellation, Spectrogram, Histogram, Eye Diagram, Summary		
Eye Diagram Symbol Span	2, 3, 4, 5			
NXDN Coverage (Option 0532, requires Option 0031 GPS)	USB Memory File Format .r Log data on / off	ıxdn, .kml, both		
RF Measurements (Option 05	31) (temperature range	15 °C to 35 °C)		
Received Power dBm	± 1.25 dB, ± 0.5 dB typica	1		
Frequency Error Hz	± 10 Hz + Frequency Refer	rence		
Additional Summary Measurements	Modulation Fidelity % BER/MER %			
	Symbol Deviation (Hz)			
	Radio Access Number (RAN	I) Decimal		
	Symbol Rate Error (MHz)	, ,		
Measurements (Option 0532)				
	RSSI, BER, Modulation Fide	lity		
Signal Generator				
Setup Parameters				
Modulation Bandwidth Generator	6.25 kHz, 12.5 kHz			
Tx Output Level	On/Off 0.1 dB resolution, 0 dBm to -130 dBm (spec to -120 dBm)			
Tx Patterns (9600 and 4800)	0.1 dB resolution, 0 dBm to -130 dBm (spec to -120 dBm) 1031 Hz, 0.153 (v. 52), High Dev, Low Dev, UDCH Pattern 10, CAC, 1031 Hz DTS, FACCH3 DTS, Framed PN9, CW, AM, FM			
RF Characteristics				
Power Level Accuracy	2.0 dB (CW Pattern, tempe	rature range 15 °C to 35 °C, -120 dBm to 0 dBm) Typical		
Frequency Range	500 kHz to 1.6 GHz			
Mod Fidelity	1.25 % max			
Tiod Tidelicy				

PTC Analyzer and PTC Talk-Out Coverage (Options 0721, 0722)

Measurements				
PTC Analyzer (Option 0721) Received Power Frequency Error 4FSK: BER, Modulation Fidelity, Symbol Deviation, Symbol Rate Error II/4 DQPSK: Error Vector Magnitude, BER, IQ Imbalance, Phase Error,				
				Magnitude Error, Symbol Rate Error
PTC Analyzo	er	PTC Talk-Out Coverage		
(Option 072		(Option 0722, requires Option 0031 GPS)		
Constellation Linear Constellation Spectrum [Spans (kHz) = 25, 50, 100, 5 Histogram Eye Diagram Summary Display	00, 1000, 5000]	Outdoor measured values are overlayed on a geo-tagged map, or displayed on a value vs time graph, and are exportable to both KML and CSV text (Requires option 0031 GPS and a suitable GPS antenna Indoor measured values are referenced by creating touchscreen point on a floorplan.		
Setup Parameters				
Frequency Amplitude Setup Measurement PTC Analyzer Graph Type	Modulation Type (4FSK, DQPS TX pattern Preamble + PN9, F PTC Analyzer, PTC Coverage Active Graph, Maximize Active Constellation, Linear Constella	tenuation, Auto Range, Adjust Range 6K) Symbol Rate (ksps) (6, 8, 12, 16) PN9 Only, CW, AM 1 kHz tone, FM 1 kHz tone e Trace, Graph Type, Symbol Span ation, Spectrogram, Histogram, Eye Diagram, Summary		
Eye Diagram Symbol Span	2, 3, 4, 5			
PTC Coverage (Option 0722, requires Option 0031 GPS)	USB Memory File Format .mtd, .kml, both Log data on / off			
RF Measurements (Option 07)	21) (temperature range 1!	5 °C to 35 °C)		
Received Power dBm	\pm 1.25 dB, \pm 0.5 dB typical			
Frequency Error Hz Additional Summary Measurements	± 10 Hz + Frequency Referen Error Vector Magnitude % Phase Error degrees Magnitude Error % IQ Imbalance dB BER % Symbol Deviation (Hz) Radio Access Number (Hex) Symbol Rate Error (MHz)	ce		
Measurements (Option 0722)	RSSI, BER, Modulation Fidelity	y		
Signal Generator				
Setup Parameters Modulation Type Symbol Rate (ksps) Generator Tx Output Level	4FSK, П/4 DQPSK 6, 8, 12, 16 On/Off 0.1 dB resolution, 0 dBm to -:	130 dBm (spec to -120 dBm)		
Tx Pattern	Preamble + PN9, PN9 Only, C	W, AM 1 kHz tone, FM 1 kHz tone		
RF Characteristics Power Level Accuracy Frequency Range Mod Fidelity	2.0 dB (CW Pattern, temperat 500 kHz to 1.6 GHz 1.75 % max	cure range 15 °C to 35 °C, -120 dBm to 0 dBm) Typical		

AM/FM/PM Signal Analyzers (Option 0509)

	Measurements						
Display Type	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*

* Requires Sinewave modulation

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: ± 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 μs to 50 ms (Audio Waveform)

** IFBW must be greater than 95 % occupied BW

TTE Signal Analyzers (Options 0541, 0542, 0546)

			1	1
RF (Option 0541)		Demodulation (Option 0542)	Over-the-Air (OTA) (Option 0546)	Pass/Fail (User Editable)
Channel Spectrum	Powe	r vs. Resource Block (RB)	Scanner	View Pass/Fail Limits
Channel Power	RB	Power (PDSCH)	Cell ID (Group, Sector)	All, RF, Modulation
Occupied Bandwidth	Act	ive RBs, Utilization %,	S-SS Power, RSRP, RSRQ, SINR	
ACPR	Cha	nnel Power, Cell ID	Dominance	Available Measurements
pectral Emission Mask		FP, Frame EVM by modulation	Modulation Results – On/Off	Channel Power
Category A or B (Opt 1)		tellation	Tx Test	Occupied Bandwidth
RF Summary		5K, 16 QAM, 64 QAM	Scanner	ACLR
a Summary	-	dulation Results	RS Power of MIMO antennas	
				Frequency Error
		ef Signal Power (RS)	Cell ID, Average Power	Carrier Frequency
		nc Signal Power (SS)	Delta Power (Max-Min)	Dominance
		/M – rms, peak, max hold	Graph of Antenna Power	EVM peak, rms
	Fr	equency Error – Hz, ppm	Modulation Results – On/Off	RS Power
	C	arrier Frequency	Mapping	RS EVM
	C	ell ID	On-screen	SS, P-SS, S-SS Power
	Cont	rol Channel Power	S-SS Power, RSRP, RSRQ,	SS, P-SS, S-SS EVM
	Bar	Graph or Table View	or SINR	PBCH Power
		P-SS, S-SS	Scanner	PBCH EVM
		CH, PCFICH, PHICH, PDCCH	Modulation Results – Off	PCFICH Power
		al Power (Table View)		PCFICH EVM
	EVN	· ,		PHICH Power, EVM
		dulation Results		PDCCH Power, EVM
				Cell, Group, Sector ID
		me Alignment		1 1 1 1 1
		llation Summary		OSTP
		udes EVM by modulation		Tx Time Alignment
		nna Icons		
		etects active antennas (1/2)		
Setup Parameters				
•	quency	E-UTRA bands 1 – 5 7 – 14 1	17 – 21, 23 – 25 (tunable 10 MHz to -	4 0 GHz)
	lacity		nel #, Closest Channel, Decrement/I	,
Ban	dwidth			
Ddii	dwidth	1.4, 3, 5, 10, 15, 20 MHz		
	Span	Auto, 1.4, 3, 5, 10, 15, 20, 30		
Am	plitude	Scale/Division, Power Offset, A	Auto Range, Adjust Range	
	Sweep	Single/Continuous, Trigger Sw	еер	
EVN	1 Mode	Auto, PBCH only		
Save	/Recall		Shot (save only), to Internal/External	Memory
Measurement Summary S			asurements, Modulation Measuremen	
RF Measurements (Opt	ions 0!	541)		
RF Channel Power Ac	curacy	± 1.5 dB, ± 1.0 dB typical, (R	F input –50 dBm to +10 dBm) (Optio	n 0541)
	,		F input –30 dBm to +10 dBm) (Optio	
Demodulation Measure	ments			-
Frequenc		± 10 Hz + Frequency Reference	ce, 99 % confidence level	
Residual EVM			del 3.1, RF Input –50 dBm to +10 dE	m) for BW $< 10 \text{ MHz}$
Residual Evi	(1113)		del 3.1, RF Input –50 dBm to +10 dE	,
Over-the-Air (OTA) Mea	asuren		· · · · · · · · · · · · · · · · · · ·	•
	canner	Six strongest signals if presen	t	
5			er and Modulation Results with GPS t	agging
۸	0 6 2010			233.13
Aut	o Save	Scanner — three strongest sig RS Power — strongest signal	inais ir present	
М	apping	Map On-screen S-SS Power, R	SRP, RSRQ, or SINR of Cell ID with st	rongest signal
		Scalliner — tillee stronuest sid		
		Scanner — three strongest sig Save and Export Scanner data	: *.kml, *.mtd (tab delimited)	

IEEE802.16 Fixed WiMAX Signal Analyzers (Options 0046, 0047)

Measurements			
RF (Option 0046)	Demodulation (Option 0047)	Over-the-Air (OTA)	Pass/Fail (User Editable)
Channel Spectrum Channel Power Occupied Bandwidth Power vs. Time Channel Power Preamble Power Data Burst Power Crest Factor ACPR	Constellation RCE (RMS/Peak) EVM (RMS/Peak) Frequency Error Carrier Frequency Base Station ID Spectral Flatness Adjacent Subcarrier Flatness EVM vs. Subcarrier/Symbol RCE EVM Frequency Error Carrier Frequency Base Station ID	There are no additional OTA Measurements. RF Measurements and Demodulation can be made OTA.	Channel Power Occupied Bandwidth Burst Power Preamble Power Crest Factor Frequency Error Carrier Frequency EVM RCE Base Station ID

Setup Parameters		
Bandwidth	1.25, 1.50, 2.50, 3.50, 5.00, 5.50, 6.00, 7.00, 10.00 MHz	
Cyclic Prefix Ratio (CP)	1/4, 1/8, 1/16, 1/32	
Span	5, 10, 15, 20 MHz	
Frame Length	2.5, 5.0, 10.0 ms	
Frequency	Center, Signal Standard, Channel #, Closest Channel, Decrement/Increment Channel	
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, Signal Quality Measurements	
RF Measurements (Option 00	46) (temperature range 15 °C to 35 °C)	
RF Channel Power Accuracy	\pm 1.5 dB, \pm 1.0 dB typical, (RF input -50 dBm to +20 dBm)	
Demodulation (Option 0047)	(temperature range 15 °C to 35 °C)	
Frequency Error	0.07 ppm + Frequency Reference, 99 % confidence level	
Residual EVM (rms)	3 % typical, 3.5 % maximum (RF Input -50 dBm to +20 dBm)	

IEEE 802.16 Mobile WiMAX Signal Analyzers (Options 0066, 0067, 0037)

Demodulation (Option 0067)	Over-the-Air (OTA) (Option 0037)	Pass/Fail (User Editable)
Constellation	Channel Power Monitor	Channel Power
RCE (RMS/Peak)	Preamble Scanner (Six)	Occupied Bandwidth
EVM (RMS/Peak)	Preamble	Downlink Bust Power
Frequency Error	Relative Power	Uplink Burst Power
CINR	Cell ID	Preamble Power
Base Station ID	Sector ID	Crest Factor
Sector ID	PCINR	Frequency Error
Spectral Flatness	Dominant Preamble	Carrier Frequency
Adjacent Subcarrier Flatness	Base Station ID	EVM
EVM vs. Subcarrier/Symbol		RCE
RCE (RMS/Peak)		Sector ID
EVM (RMS/Peak)		
Frequency Error		
CINR		
Base Station ID		
Sector ID		
DL-MAP (Tree View)		
	Constellation RCE (RMS/Peak) EVM (RMS/Peak) Frequency Error CINR Base Station ID Sector ID Spectral Flatness Adjacent Subcarrier Flatness EVM vs. Subcarrier/Symbol RCE (RMS/Peak) EVM (RMS/Peak) Frequency Error CINR Base Station ID Sector ID	ConstellationChannel Power MonitorRCE (RMS/Peak)Preamble Scanner (Six)EVM (RMS/Peak)Preamble Scanner (Six)Frequency ErrorRelative PowerCINRCell IDBase Station IDSector IDSpectral FlatnessDominant PreambleAdjacent Subcarrier FlatnessBase Station IDEVM vs. Subcarrier/SymbolRCE (RMS/Peak)Frequency ErrorCINRBase Station IDSector IDScetor IDDominant PreambleBase Station IDBase Station IDSector IDFrequency ErrorCINRBase Station IDBase Station IDSector ID

DL-MAP Auto Decoding	Convolutional Coding (CC), Convolutional Turbo Coding (CTC)
Bandwidths	3.50, 5.00, 7.00, 8.75, 10.00 MHz
Cyclic Prefix Ratio (CP)	1/8
Span	5, 10, 20, 30 MHz
Frame Lengths	5, 10 ms
Demodulation	Auto, Manual, FCH
Frequency	Center, Signal Standard, Channel #, Closest Channel, Decrement/Increment Channel
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, Signal Quality Measurements
RF Measurements (Option 00	66) (Temperature range 15 °C to 35 °C)
RF Channel Power Accuracy	\pm 1.5 dB, \pm 1.0 dB typical, (RF input –50 dBm to +20 dBm)
Demodulation (Option 0067)	(Temperature range 15 °C to 35 °C)
Frequency Error	0.02 ppm + Frequency Reference, 99 % confidence level
Residual EVM (rms)	2.5 % typical, 3.0 % maximum, (RF Input –50 dBm to +20 dBm)
Over-the-Air (OTA) Measuren	ients (Option 0037)

Over-the-Air (OTA) Measurements (Option 0037)

Channel Power Monitor Over time (one week), measurement time interval 1 to 60 sec Preamble Scanner Six Strongest Preambles Auto Save Yes GPS Logging Yes

General Specifications

All specifications and characteristics apply to rev 2 instruments 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 and is not warranted; 5) Recommended calibration cycle is 12 months; 6) Performance Sweep Mode.

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, Russian, 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 Input Damage Level	+33 dBm peak, \pm 50 VDC, Maximum Continuous Input (\geq 10 dB attenuation)
GPS	SMA(f)
External Power	5.5 mm barrel connector, 12.5 VDC 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	3.5 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	
Туре	Resistive TFT Touchscreen
Size	8.4 inch daylight viewable color LCD
Resolution	800 x 600
Pixel Defects	No more than one defective pixel (99.9997% good pixels)
Battery	
Туре	Li-Ion, 6300 mAh rated capacity
Battery Operation	3.0 hours, typical
Electromagnetic Compatibility	4
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 Anritsu 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 \pm 15 kV
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)
-	

Database Management	
Full Trace Retrieval	Retrieve spectum 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
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
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
Mapping (GPS Required)	
Spectrum Analyzer Mode	MapInfo, MapPoint
Folder Spectrogram (Spectrum	n 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)
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
Languages	Add up to two languages and modify non-English language menus
Display	Modify display settings
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/HSPA+	
Mode	Automate Signal Analysis testing requirements with annotated how-to pictures
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

Anritsu Tool Box and Line Sweep Tools (for your PC) Q.

Line Sweep Tools (LST) is a free PC based program that increases productivity for people who deal with numerous Cable and Antenna traces every day. LST is the next generation of Anritsu's familiar Handheld Software Tools (HHST) and shares its uncomplicated user interface, giving a new face to the term "ease of use."

Cable Editor ¹	Instrument Cable Lists may be retrieved from the instrument, modified as required, and uploaded back into instrument.
Distance to Fault ² (DTF)	Easily convert Return Loss or VSWR traces to Distance to Fault traces with one button press.
Measurement Calculator	Provides quick conversion between commonly used measurement units such as VSWR, RL, and others.
Signal Standard Editor ¹	Signal Standard Lists may be retrieved from the instrument, modified as required, and uploaded back into instrument.
Naming Grid	A naming grid function makes changing file names, trace titles, and trace subtitles from field values to those required by contract simple and quick. Once the naming grid is populated with user defined file name segments, a few simple button presses will then fill out the file, title, and sub-title names. Quickly applied to multiple traces, the naming grid can save time, increase efficiency and accuracy.
Presets	Presets make applying markers and a limit line to similar traces quick and easy. They only need to be set once, and recorded. After this, applying them to a similar trace requires only one button push. This speeds up trace processing and makes providing consistent marker and limit line settings easy.
Report Generator	The report generator creates a professional PDF or HTML based report. Reports may include GPS ³ location, power level ³ , company logo ⁴ , instrument and calibration status along with a display of all open traces. It also may contain additional information such as addresses and phone numbers.
Capture	Plots to Screen, Database, *.dat, *.jpg
Connect	To PC using USB, Ethernet, Serial
$Download/Upload^1$	Lists/measurements and live traces to PC for storage and analysis.
Supported File Types	Input: *.dat, *.vna, *.mna, *.pim, *.tm Output: *.dat, *.vna, *.pim, *.tm, *.csv, *.bmp, *.jpg, *.png

4. Optionally set by user

Instrument type/model must match original
 Only *.dat and *.vna file types supported
 Model dependent

Ordering Information – Options

	S412E 500 kHz to 1.6 GHz	Description Vector Network Analyzer
	100 kHz to 1.6 GHz	Spectrum Analyzer
متىلاس	10 MHz to 1.6 GHz	Power Meter
-	500 kHz to 1.6 GHz	CW Signal Generator
NBFM	10 MHz to 1.66 GHz	NBFM Analyzer
	Options S412E-0010	High Voltage Variable Bias Tee
	S412E-0501	Distance Domain
	S412E-0031	GPS Receiver (requires suitable GPS antenna)
(and the second s	S412E-0019	High-Accuracy Power Meter (requires External Power Sensor)
	S412E-0025	Interference Analyzer (Option 0031 recommended)
Intabl	S412E-0027	Channel Scanner
	S412E-0006	6 GHz Coverage on Spectrum Analyzer
	S412E-0016	6 GHz Coverage on Vector Network Analyzer
MAG	S412E-0015	Vector Voltmeter
	S412E-0431	Coverage Mapping (requires Option 0031)
ren	S412E-0509	AM/FM/PM Analyzer
775	S412E-0521	P25/P25p2 Analyzer Measurements
	S412E-0522	P25/P25p2 Coverage Measurements (requires Options 0031 and 0521)
DMR 2	S412E-0591 S412E-0592	DMR2 Analyzer Measurements DMR2 Coverage Measurements (requires Options 0031 and 0591)
	S412E-0531 S412E-0532	NXDN Analyzer Measurements NXDN Coverage Measurements (requires Options 0031 and 0531)
	S412E-0721 S412E-0722	PTC Analyzer PTC Coverage Measurements (requires Options 0031 and 0721)
DIE	S412E-0541 S412E-0542 S412E-0546	LTE RF Measurements (requires Option 0031) LTE Modulation Quality (requires Option 0031) LTE Over-the-Air Measurements (requires Option 0031)
FW	S412E-0046 S412E-0047	IEEE 802.16 Fixed WiMAX RF Measurements (requires Option 0031) IEEE 802.16 Fixed WiMAX Demodulation (requires Option 0031)
IMW	S412E-0066 S412E-0067	IEEE 802.16 Mobile WiMAX RF Measurements (requires Option 0031) IEEE 802.16 Mobile WiMAX Demodulation (requires Option 0031)
	S412E-0037	IEEE 802.16 Mobile WIMAX Demodulation (requires Option 0031) IEEE 802.16 Mobile WIMAX Over-the-Air Measurements (requires Option 0031)
	S412E-0098 S412E-0099	Standard Calibration (ANSI Z540-1-1994) Premium Calibration (ANSI Z540-1-1994) plus printed test data

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)
2000-1654-R	Soft Carrying Case
2300-498	Master Software Tools (MST) CD Disc
2300-530	Anritsu Tool Box with Line Sweep Tools (LST) DVD Disc
633-44	Rechargeable 6300 mAh Li-Ion Battery
40-187-R	AC-DC Adapter
806-141-R	Automotive Cigarette Lighter 12V VDC 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 Conformance

Power Sensors (For complete ordering information see the respective data sheets of each se

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Model Number	Description
PSN50	High Accuracy RF Power Sensor, 50 MHz to 6 GHz, +20 dBm
MA24105A	Inline High/Peak Power Sensor, 350 MHz to 4 GHz, +3 dBm to +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 Instruments Documentation Disc and at www.anritsu.com)

User Guide	/inritsu
LMR Mas 5412E An Integrated: Handbett Rudli-fu Treat Tool for Greater Flexibility a	nction Land Mobile Radio nd Technician Productivity

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Part Number	Description	
10920-00060	Handheld Instruments Documentation Disc	
10580-00318	LMR Master User Guide (Hard copy included)	
10580-00289	Vector Network Analyzer Measurement Guide	
10580-00243	Land Mobile Radio Measurement Guide	
10580-00241	Cable and Antenna Analyzer Measurement Guide	
10580-00244	Spectrum Analyzer Measurement Guide	
	- Interference Analyzer, Channel Scanner, Gated Sweep, CW Signal Generator, AM/FM/PM Analyzer, Interference Mapping, Coverage Mapping	
10580-00240	Power Meter Measurement Guide	
	- High Accuracy Power Meter	
10580-00234	3GPP Signal Analyzer Measurement Guide	
	- GSM/EDGE, W-CDMA/HSDPA, TD-SCDMA/HSDPA, LTE	
10580-00236	WiMAX Signal Analyzer Measurement Guide	
	- Fixed WiMAX, Mobile WiMAX	
10580-00319	Programming Manual	

Troubleshooting Guides (Soft copy at www.anritsu.com)

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Part Number	Description	
11410-00551	Spectrum Analyzers	
11410-00472	Interference	
11410-00566	LTE eNode Testing	
11410-00473	Cable, Antenna, and Component Troubleshooting Guide	
11410-00427	Understanding Cable & Antenna Analysis White Paper	

Optional Accessories

Calibration Components, 50 Ω



Directional Antennas



OSLN50-1 Precision Open/Short/Load, N(m), 42 dB, 6.0 GHz, 50 Ω OSLNF50-1 Precision Open/Short/Load, N(f), 42 dB, 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, 50 Ω SM/PLNF-1 Precision Load, N(f), 42 dB, 6.0 GHz, 50 Ω

Part Number Description

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	
2000-1412-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	
2000-1617-R 600 MHz to 21 GHz, N(f), 5-8 dBi to 12 GHz, 0-6 dBi to 21 0 log periodic	GHz,

Portable Antennas



Part Number	Description
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 $\mathbf{\Omega}$ (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)
2000-1487	Telescoping Whip Antenna, BNC **
	* Requires 1091-27-R SMA(f) to N(m) adapter
	** Requires 1091-172-R BNC(f) to N(m) adapter

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
1030-105-R	890 MHz to 915 MHz, N(m) to N(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, N(m) to N(f), 50 Ω
1030-107-R	1910 MHz to 1990 MHz, N(m) to N(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

Optional Accessories (Continued)

Attenuators

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Part Number	Description
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)

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Part Number Description

1.5 m, DC to 6 GHz, N(m) to N(f), 50 Ω
1.5 m, DC to 6 GHz, N(m) to 7/16 DIN(f), 50 Ω
1.5 m, DC to 6 GHz, N(m) to 7/16 DIN(m), 50 Ω
3.0 m, DC to 6 GHz, N(m) to N(f), 50 Ω
3.0 m, DC to 6 GHz, N(m) to 7/16 DIN(f), 50 Ω
3.0 m, DC to 6 GHz, N(m) to 7/16 DIN(m), 50 Ω

Phase-Stable Test Port Cables, Armored (Recommended for 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

Adapters



Part Number	Description
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
510-90-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
1091-379-R	Tuff-Grip TMA Bypass Adapter, 7/16 DIN(f) - 7/16 DIN(f), DC to 6 GHz, 50 Ω

	510-102-R	$N(m)$ to $N(m),$ DC to 11 GHz, 50 $\Omega,$ 90 degrees right angle
Precision Adapters		
(1772)	Part Number	Description
and the second se	34NN50A	Precision Adapter, N(m) to N(m), DC to 18 GHz, 50 Ω



34NN50A	Precision Adapter, N(m) to N(m), DC to 18 GHz, 50 Ω
34NFNF50	Precision Adapter, N(f) to N(f), DC to 18 GHz, 50 Ω

Optional Accessories (Continued)

Backpack and Transit Case



Part Number Description

67135 Anritsu Backpack (For Handheld Instrument and PC)

760-243-R Large Transit Case with Wheels and Handle

Miscellaneous Accessories



Part Number	Description
2000-1528-R	GPS Antenna, SMA(m) with 15 foot cable
2000-1652-R	GPS Antenna, SMA(m) with 1 foot cable
633-44	Extra Rechargeable 6300 mAh Battery Pack
633-75	Extra Extended Capacity Rechargeable 7500 mAh Battery Pack
2000-1374	External Charger for Li-Ion Batteries
2300-532	Map Master CD
2000-1653	Anti-glare Screen Cover (package of 2)
66864	Rack Mount Kit, Master Platform

InterChangeable Adaptor Phase Stable Test Port Cables, Armored w/Reinforced Grip (recommended for cable and antenna line sweep applications. It uses the same ruggedized grip as the Reinforced grip series cables. Now you can also change the adaptor 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