Spectrum Master™

High Performance Handheld Spectrum Analyzer

MS2723C

9 kHz to 13 GHz

Introduction

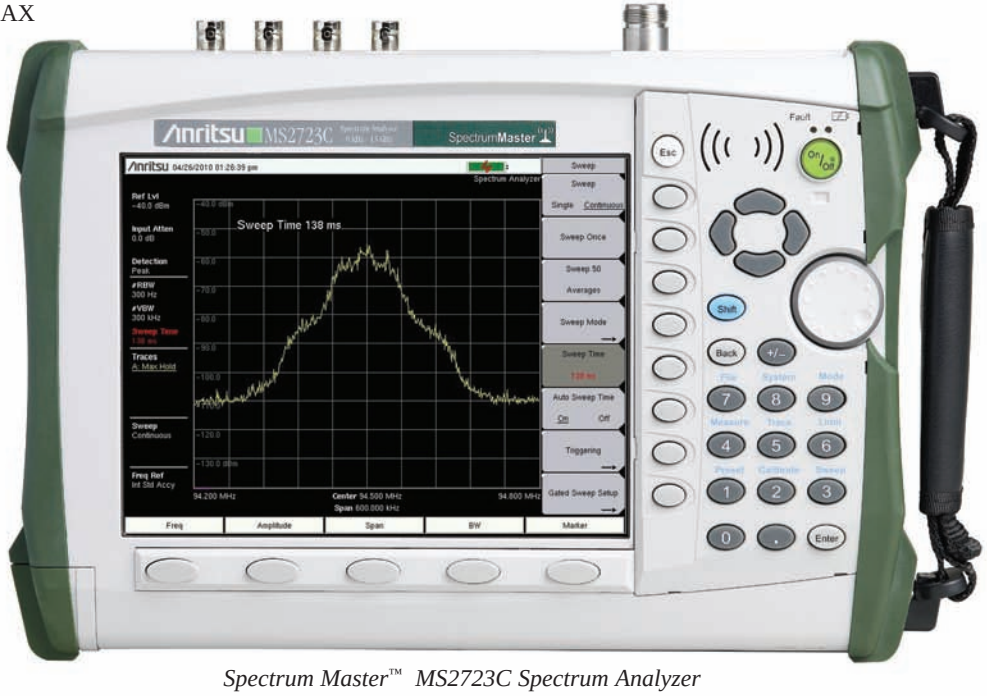
Anritsu's high performance handheld spectrum analyzer provides the wireless professional the performance needed for the most demanding measurements in harsh RF and physical environments. Whether it is for spectrum monitoring, broadcast proofing, interference analysis, RF and microwave measurements, regulatory compliance, or Wi-Fi and wireless network measurements, the Spectrum Master is the ideal instrument to making fast and reliable measurements.

Spectrum and Interference Analyzer Highlights

- Measure: Occupied Bandwidth, Channel Power, ACPR, C/I
- Interference Analyzer: Spectrogram, Signal Strength, RSSI
- Dynamic Range: > 104 dB in 1 Hz RBW
- DANL: –160 dBm in 1 Hz RBW
- Phase Noise: –100 dBc/Hz @ 10 kHz offset at 1 GHz
- Frequency Accuracy: ± 25 ppb with GPS On
- 1 Hz to 10 MHz Resolution Bandwidth (RBW)
- Traces: Normal, Max Hold, Min Hold, Average, # of Averages
- Detectors: Peak, Negative, Sample, Quasi-peak, and true RMS
- Markers: 6, each with a Delta Marker, or 1 Reference with 6 Deltas
- Limit Lines: up to 40 segments with one-button envelope creation
- Trace Save-on-Event: crossing limit line or sweep complete

Capabilities and Functional Highlights

- LTE, TD-LTE
- GSM/EDGE
- W-CDMA/HSPA+
- TD-SCDMA/HSPA+
- CDMA, EV-DO
- Fixed, Mobile WiMAX
- AM/FM/SSB Demodulator
- Zero-span IF Output
- GPS tagging of stored traces
- Internal Preamplifier standard
- High Accuracy Power Meter
- 4, 6, 8, 18, 26 GHz USB Sensors
- Channel Scanner
- 8.4 inch Display
- < 5 minute warm-up time
- 3 hour battery operation time
- Ethernet/USB Data Transfer
- MST Remote Access Tool



Spectrum Master™ MS2723C Spectrum Analyzer
Handheld Size: 315 mm x 211 mm x 77 mm (12.4 in x 8.3 in x 3.0 in), Lightweight: 3.5 kg (7.8 lbs)

Spectrum Master™ MS2723C Spectrum Analyzer Specifications



Spectrum Analyzer

Measurements	
Smart Measurements	Field Strength (uses antenna calibration tables to measure dBm/m² 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 (recall limit lines as emission mask)
Setup Parameters	
Frequency	Center/Start/Stop, Span, Frequency Step, Signal Standard, Channel #
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
Application Options	Impedance (50 Ω, 75 Ω, Other)
Sweep Functions	
Sweep	Single/Continuous, Manual Trigger, Reset, Detection, Minimum Sweep Time, Trigger Type
Sweep Mode	Fast, Performance, No FFT
Detection	Peak, RMS/Avg, Negative, Sample, Quasi-peak
Triggers	Free Run, External, Video, Delay, Level, Slope, Hysteresis, Holdoff, Force Trigger Once
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/Large), 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, Number of Points (41), Offset, Shape Square/Slope
Limit Line Advanced	Type (Absolute/Relative), Mirror, Save/Recall
Frequency	
Frequency Range	9 kHz to 13 GHz (usable to 0 Hz), Preamp 100 kHz to 13 GHz
Tuning Resolution	1 Hz
Frequency Reference	Aging: ± 1.0 ppm/10 years Accuracy: ± 0.3 ppm (25 °C ± 25 °C) + aging
External Reference Frequencies	1, 1.2288, 1.544, 2.048, 2.4576, 4.8, 4.9152, 5, 9.8304, 10, 13, 19.6608 MHz
Frequency Span	10 Hz to 13 GHz including zero span
Sweep Time	10 µs to 600 seconds in zero span
Sweep Time Accuracy	± 2% in zero span
Bandwidth (Performance Sweep Mode)	
Resolution Bandwidth (RBW)	1 Hz to 10 MHz in 1–3 sequence ± 10% (–3 dB bandwidth)
Video Bandwidth (VBW)	1 Hz to 10 MHz in 1–3 sequence (–3 dB bandwidth)
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

Spectrum Analyzer (continued)

Spectral Purity	
SSB Phase Noise at 1 GHz	–100 dBc/Hz @ 10 kHz offset from carrier (–104 dBc/Hz typical) –102 dBc/Hz @ 100 kHz offset from carrier (–107 dBc/Hz typical) –107 dBc/Hz @ 1 MHz offset from carrier (–114 dBc/Hz typical) –120 dBc/Hz @ 10 MHz offset from carrier (–129 dBc/Hz typical)
Amplitude Ranges	
Dynamic Range	> 104 dB @ 2.4 GHz, 2/3 (TOI-DANL) in 1 Hz RBW
Measurement Range	DANL to +30 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 65 dB, 5 dB steps
Amplitude Units	Log Scale Modes: dBm, dBV, dBmv, dBµV Linear Scale Modes: nV, µV, mV, V, kV, nW, µW, mW, W, kW
Maximum Continuous Input	+30 dBm Peak, ± 50 VDC (≥ 10 dB Attn) +23 dBm Peak, ± 50 VDC (< 10 dB Attn) +13 dBm Peak, ± 50 VDC (Preamp On)
Amplitude Accuracy (single sine wave input < Ref level, and > DANL, auto attenuation, Performance Sweep Mode)	
20 °C to 30 °C after 30 minute warm-up	Typical: ± 0.5 dB, 100 kHz to 13 GHz Maximum: ± 1.3 dB, 100 kHz to 13 GHz
–10 °C to 50 °C after 60 minute warm-up	Add ± 1.0 dB, 100 kHz to 13 GHz
Displayed Average Noise Level (DANL) (RMS detection, VBW/Avg type = Log., Ref Level = –20 dBm for preamp Off and –50 dBm for preamp On, Performance Sweep Mode)	
(DANL in 1 Hz RBW, 0 dB attenuation)	Preamp Off
10 MHz to 4 GHz	–141 dBm
> 4 GHz to 9 GHz	–134 dBm
> 9 GHz to 13 GHz	–129 dBm
	Preamp On
10 MHz to 4 GHz	–160 dBm
> 4 GHz to 9 GHz	–156 dBm
> 9 GHz to 13 GHz	–152 dBm
Spurs	
Residual Spurs	Preamp Off (RF input terminated, 0 dB input attenuation) –90 dBm 9 kHz to 13 GHz Preamp On (RF input terminated, 0 dB input attenuation) –100 dBm 1 MHz to 13 GHz
Input-Related Spurs	(0 dB attenuation, –30 dBm input, span < 1.7 GHz) –60 dBc, –70 dBc typical
Third-Order Intercept (TOI) (–20 dBm tones 100 kHz apart, –20 dBm Ref level, 0 dB input attenuation, preamp Off)	
2.4 GHz	+15 dBm
50 MHz to 13 GHz	+20 dBm typical
P1dB	
< 4 GHz	+5 dBm typical
4 GHz to 13 GHz	+12 dBm typical
Second Harmonic Distortion	
50 MHz	–54 dBc
< 4 GHz	–60 dBc typical
> 4 GHz	–75 dBc typical
VSWR	
>10 dB input attenuation	
< 13 GHz	1:5:1 typical

Spectrum Master™ MS2723C Spectrum Analyzer Specifications

GPS Receiver Option (Option 0031)

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	Spectrum Analyzer, Interference Analyzer, Signal Analyzers
when GPS Antenna is connected	< ± 25 ppb with GPS On, 3 minutes after satellite lock in selected mode
GPS Lock – after antenna is disconnected	< ± 50 ppb for 3 days, 0 °C to 50 °C ambient temperature
Connector	SMA, female

Secure Data Option (Option 0007)

For highly secure data handling requirements, this software option prevents the storing of measurement setup or data information onto any internal file storage location. Instead, setup and measurement information is stored ONLY to the external USB memory location. A simple factory preset prepares the Spectrum Master for transportation while the USB memory remains behind in the secure environment. The Spectrum Master cannot be switched between secure and non-secure operation by the user once configured for secure data operation.



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 (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
Measurands	True-RMS	True-RMS	True-RMS	True-RMS, Slot Power, Burst Average Power
Measurement Uncertainty	± 0.16 dB[1]	± 0.17 dB[2]	± 0.16 dB[1]	±0.18 dB[3]
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.

Spectrum Master™ MS2723C Spectrum Analyzer Specifications

Interference Analyzer (Option 0025)

Measurements	Spectrum
	Field Strength
	Occupied Bandwidth
	Channel Power
	Adjacent Channel Power (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 72 hours)
	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
	Save current point location and direction
	Save/Recall points/map
	Delete last saved point
	Delete all points
	Speaker on/off
	Volume
	Reset Max/Min hold
Application Options	Impedance (50 Ω, 75 Ω, Other)

Channel Scanner (Option 0027)

Number of Channels	1 to 20 Channels (Power Levels)
Measurements	Graph/Table, Max Hold (On/5 sec/Off), Frequency/Channel, Current/Maximum, 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 Range	9 kHz to 13 GHz
Frequency Accuracy	± 10 Hz + Time base error
Measurement Range	–110 dBm to +30 dBm
Application Options	Impedance (50 Ω, 75 Ω, Other)

Zero Span IF Output (Option 0089)

Mode	Spectrum Analyzer/Span/Zero Span
Center Frequency	140 MHz
Output Level	–40 dBm to –20 dBm typical
	For a signal at Reference Level: –43 dBm to +30 dBm (Preamp Off) or –60 dBm to –40 dBm (Preamp On)
IF Bandwidths	Up to 30 MHz (3 dB bandwidth)
RF Attenuation	Auto
Connector	BNC female

GSM/GPRS/EDGE Signal Analyzers (Options 0040, 0041)

Measurements

RF (Option 0040)	Demodulation (Option 0041)	Over-the-Air (OTA)	Pass/Fail (User Editable)
Channel Spectrum	Phase Error	There are no additional OTA	Measurements
Channel Power	EVM	Measurements.	Channel Power
Occupied Bandwidth	Origin Offset		Occupied Bandwidth
Burst Power	C/I	RF Measurements and	Burst Power
Average Burst Power	Modulation Type	Demodulation can be made OTA	Average Burst power
Frequency Error	Magnitude Error		Frequency Error
Modulation Type	BSIC (NCC, BCC)		Phase Error
BSIC (NCC, BCC)			EVM
Multi-channel Spectrum			Origin Offset
Power vs. Time (Frame/Slot)			C/I
Channel Power			Magnitude Error
Occupied Bandwidth			Script Master™
Burst Power			
Average Burst Power			
Frequency Error			
Modulation Type			
BSIC (NCC, BCC)			

Setup Parameters

GSM/EDGE Select	Auto, GSM, EDGE
Frequency	Center, Signal Standard, Channel #, Closest Channel, Decrement/Increment Channel
Amplitude	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 Screen	Overall Measurements

RF Measurements (Option 0040)

Frequency Error	± 10 Hz + time base error, 99% confidence level
Occupied Bandwidth	Bandwidth within which 99% of the power transmitted on a single channel lies
Burst Power Error	± 1.5 dB, ± 1 dB typical, (–50 dBm to +20 dBm)

Demodulation (Option 0041)

GSMK Modulation Quality (RMS Phase) Measurement Accuracy	± 1 deg
Residual Error (GSMK)	1 deg
8 PSK Modulation Quality (EVM) Measurement Accuracy	± 1.5%
Residual Error (8 PSK)	2.5%

W-CDMA/HSDPA Signal Analyzers (Options 0044, 0045 or 0065, 0035)

Measurements

RF (Option 0044)	Demodulation (Option 0045 or 0065)	Over-the-Air (OTA) (Option 0035)	Pass/Fail (User Editable)

Band Spectrum
Channel Spectrum
  Channel Power
  Occupied Bandwidth
  Peak-to-Average Power
Spectral Emission Mask
Single carrier ACLR
Multi-carrier ACLR
RF Summary
	Code Domain Power Graph
	  P-CPICH Power
	  Channel Power
	  Noise Floor
	  EVM
	  Carrier Feed Through
	  Peak Code Domain Error
	  Carrier Frequency
	  Frequency Error
	  Control Channel Power
	  Abs/Rel/Delta Power
	  CPICH, P-CCPCH
	  S-CCPCH, PICH
	  P-SCH, S-SCH
	HSDPA
	  Power vs. Time
	  Constellation
	Code Domain Power Table
	  Code, Status
	  EVM, Modulation Type
	  Power, Code Utilization
	  Power Amplifier Capacity
	Codogram
	Modulation Summary
		Scrambling Code Scanner (Six)
		  Scrambling Codes
		  CPICH
		  E_C/I_O
		  E_C
		  Pilot Dominance
		  OTA Total Power
		Multipath Scanner (Six)
		  Six Multipaths
		  Tau
		  Distance
		  RSCP
		  Relative Power
		  Multipath Power
			Measurements
			  Max Output Power
			  Frequency Error
			  EVM
			  CPICH
			  Occupied Bandwidth
			  Spectral Mask
			  ACLR
			  PCDE
			  P-CCPCH
			  S-CCPCH
			  Code Spread 3
			  PICH
			  Code 128
			Script Master™
			
			Test Models
			  1 (16), (32), (64)
			  2
			  3 (16), (32)
			  4 (+CPICH), (-CIPCH)
			  5 (2 HS), (4 HS), (8 HS)

Setup Parameters

Scrambling Code, Threshold	Auto, Manual
User Selectable	Scrambling Code, S-CCPCH Spread, S-CCPCH Code, PICH Code, Threshold, Max Amp Power, CPICH Power, Frequency Error Average
Maximum Spreading Factor	256, 512
Frequency	Center, Signal Standard, Channel #, Closest Channel, Decrement/Increment Channel
Amplitude	Scale/Division, Power Offset, Auto Range, Adjust Range, Units (dBm/Watts)
Marker	Six Markers, Table On/Off
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 0044)

RF Channel Power Accuracy	± 1.25 dB, ± 0.7 dB typical, (temperature range 15 °C to 35 °C)
Occupied Bandwidth Accuracy	± 100 kHz
Adjacent Channel Leakage Ratio (ACLR)	–54 dB/–59 dB ± 0.8 dB @ 5 MHz/10 MHz offset, typical, Bands I – VI, VIII – XIV, XVII –54 dB/–57 dB ± 1.0 dB @ 5 MHz/10 MHz offset, typical, Band VII

Demodulation (Option 0045 for W-CDMA only or 0065 for W-CDMA and HSDPA)

W-CDMA Modulations	QPSK, QPSK-DTX (Codecs: AMR 4.75, 5.9, 7.4, 12.2 kbps, DTX 7.4, 12,2 kbps)
HSDPA Modulations	QPSK, 16 QAM, 64 QAM
EVM Accuracy	± 2.5%, 6% ≤ EVM ≤ 25%
Residual EVM	2.5% typical
Code Domain Power	± 0.5 dB for code channel power > –25 dB, 16, 32, 64 DCPH (test model 1), 16, 32 DCPH (test model 2, 3)
CPICH (dBm) Accuracy	± 0.8 dB typical

Over-the-Air (OTA) Measurements (Option 0035)

Scrambling Code Scanner	Six strongest Scrambling Codes
Multipath Scanner	Multipath power of six signals relative to strongest pilot

cdmaOne/CDMA2000 1X Signal Analyzers (Option 0042, 0043, 0033)

Measurements

RF (Option 0042)	Demodulation (Option 0043)	Over-the-Air (OTA) (0ption 0033)	Pass/Fail (User Editable)
Channel Spectrum Channel Power Occupied Bandwidth Peak-to-Average Power Spectral Emission Mask Multi-carrier ACPR RF Summary	Code Domain Power Graph Pilot Power Channel Power Noise Floor Rho Carrier Feed Through Tau RMS Phase Error Frequency Error Abs/Rel/ Power Pilot Page Sync Q Page Code Domain Power Table Code Status Power Multiple Codes Code Utilization Modulation Summary	Pilot Scanner (Nine) PN E_c/I_o Tau Pilot Power Channel Power Pilot Dominance Multipath Scanner (Six) E_c/I_o Tau Channel Power Multipath Power Limit Test – 10 Tests Averaged Rho Adjusted Rho Multipath Pilot Dominance Pilot Power Pass/Fail Status	Measurements Channel Power Occupied Bandwidth Peak-to-Average Power Spectral Mask Test Frequency Error Channel Frequency Frequency error Pilot Power Noise Floor Rho Carrier Feed Through Tau RMS Phase Error Code Utilization Measured PN Pilot Dominance Multipath Power

Setup Parameters

PN Setup	PN Trigger (No Trigger, GPS, External), PN Search Type (Auto, Manual), PN Offset
Walsh Codes	64, 128
Measurement Speed	Fast, Normal, Slow
External Trigger Polarity	Rising, Falling
Number of Carriers	1 to 5
Carrier Bandwidth	1.23, 1.24, 1.25 MHz
Frequency	Center, Signal Standard, Channel #, Closest Channel, Decrement/Increment Channel
Amplitude	Scale/Division, Power Offset, Auto Range, Adjust Range, Units (dBm/Watts)
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 0042)

RF Channel Power Accuracy	± 1.5 dB, ± 1.0 dB typical, (RF input –50 dBm to +20 dBm)

Demodulation (Option 0043)

Frequency Error	± 10 Hz + time base error, 99% confidence level (in slow mode)
Rho Accuracy	± 0.005, for Rho > 0.9
Residual Rho	> 0.995, typical, > 0.99 maximum, (RF input –50 dBm to +20 dBm)
PN Offset	1 x 64 chips
Pilot Power Accuracy	± 1.0 dB typical, relative to channel power
Tau	± 0.5 µs typical, ± 1.0 µs maximum

Over-the-Air (OTA) Measurements (Option 0033)

Pilot Scanner	Nine strongest pilots
Multipath Scanner	Multipath power of six signals relative to strongest pilot
Limit Test	Average of ten tests compared to limit

CDMA2000 1xEV-DO Signal Analyzers (Option 0062, 0063, 0034)

Measurements

RF (Option 0062)	Demodulation (Option 0063)	Over-the-Air (OTA) (Option 0034)	Pass/Fail (User Editable)
Channel Spectrum Channel Power Occupied Bandwidth Peak-to-Average Power Power vs. Time Pilot & MAC Power Channel Power Frequency Error Idle Activity On/Off Ratio Spectral Emission Mask Multi-carrier ACPR RF Summary	MAC Code Domain Power Graph Pilot & MAC Power Channel Power Frequency Error Rho Pilot Rho Overall Data Modulation Noise Floor MAC Code Domain Power Table Code Status Power Code Utilization Data Code Domain Power Active Data Power Data Modulation Rho Pilot Rho Overall Maximum Data CDP Minimum Data CDP Modulation Summary	Pilot Scanner (Nine) PN E_C/I_O Tau Pilot Power Channel Power Pilot Dominance Mulitpath Scanner (Six) E_C/I_O Tau Channel Power Multipath Power	Measurements Channel Power Occupied Bandwidth Peak-to-Average Power Carrier Frequency Frequency Error Spectral Mask Noise Floor Pilot Power RMS Phase Error Tau Code Utilization Measured PN Pilot Dominance Mulitpath Power

Setup Parameters

PN Setup	PN Trigger (No Trigger, GPS, External), PN Search Type (Auto, Manual), PN Offset
Walsh Codes	64, 128
Measurement Speed	Fast, Normal, Slow
External Trigger Polarity	Rising, Falling
Slot Type	Auto, Active, Idle
Number of Carriers	1 to 5
Carrier Bandwidth	1.23, 1.24, 1.25 MHz
Frequency	Center, Signal Standard, Channel #, Closest Channel, Decrement/Increment Channel
Amplitude	Scale/Division, Power Offset, Auto Range, Adjust Range, Units (dBm/Watts)
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 0062)

RF Channel Power Accuracy	± 1.5 dB, ± 1.0 dB typical, (RF input –50 dBm to +20 dBm)

Demodulation (Option 0063)

EV-DO Compatibility	Rev 0 and Rev A
Frequency Error	± 20 Hz + time base error, 99% confidence level
Rho Accuracy	± 0.01, for Rho > 0.9
Residual Rho	> 0.995 typical, > 0.99, maximum (RF input –50 dBm to +20 dBm)
PN Offset	Within 1 x 64 chips
Pilot Power Accuracy	± 1.0 dB typical, relative to channel power
Tau	± 0.5 µs typical, ± 1.0 µs maximum

Over-the-Air (OTA) Measurements (Option 0034)

Pilot Scanner	Nine strongest pilots
Multipath Scanner	Multipath power of six signals relative to strongest pilot

LTE Signal Analyzers (Options 0541, 0542, 0543, 0546)

Measurements

RF (Option 0541)	Modulation (Option 0542)	Over-the-Air (OTA) (Option 0546)	Pass/Fail (User Editable)
Channel Spectrum Channel Power Occupied Bandwidth ACPR Spectral Emission Mask 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	Scanner (Up to six Sync Signals) Sync Signal Power Cell ID Sector ID Group ID Dominance Modulation Results (strongest sync signal)	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 (tunable 10 MHz to 4.0 GHz) Center, Signal Standard, Channel #, Closest Channel, Decrement/Increment Channel
Bandwidth	1.4, 3, 5, 10, 15, 20 MHz (15, 20 MHz requires Option 0543)
Span	Auto, 1.4, 3, 5, 10, 15, 20, 30 MHz
Amplitude	Scale/Division, Power Offset, Auto Range, Adjust Range
Sweep	Single/Continuous, Trigger Sweep
EVM Mode	Auto, PBCH only
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 0541)

RF Channel Power Accuracy	± 1.5 dB, ± 1.0 dB typical, (RF input –50 dBm to +10 dBm)

Modulation Measurements (Option 0542)

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)

BW = 15 MHz, 20 MHz (Option 0543)

Bandwidths	15 MHz, 20 MHz

Over-the-Air (OTA) Measurements (Option 0546)

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

TD-LTE Signal Analyzers (Options 0551, 0552, 0543, 0556)

Measurements

RF (Option 0551)	Modulation (Option 0552)	Over-the-Air (OTA) (Option 0556)	Pass/Fail (User Editable)
Channel Spectrum Channel Power Occupied Bandwidth Power vs. Time Frame View Sub-Frame View Total Frame Power DwPTS Power Transmit Off Power Cell ID Timing Error ACLR Spectral Emission Mask RF Summary	Constellation Reference Signal Power Sync Signal Power EVM Frequency Error Carrier Frequency Cell ID Control Channel Power RS P-SS S-SS PBCH PCFICH Modulation Summary	Scanner (Up to six Sync Signals) Sync Signal Power Cell ID Sector ID Group ID Dominance Modulation Results (strongest sync signal)	Pass Fail All Pass/Fail RF Pass Fail Demodulation 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 Frame Power DWPTS Power Transmit Off Power Timing Error

Setup Parameters

Frequency	E-UTRA bands 33 - 40 (tunable 10 MHz to 4.0 GHz) Center, Signal Standard, Channel #, Closest Channel, Decrement/Increment Channel, Step Size, Frequency History
Bandwidth	1.4, 3, 5, 10, 15, 20 MHz (15, 20 MHz requires Option 0543)
Span	Auto, 1.4, 3, 5, 10, 15, 20, 30 MHz
Amplitude	Scale/Division, Power Offset, Auto Range, Adjust Range
Sweep	Single/Continuous, Trigger Sweep
EVM Mode	Auto, PBCH only
Trigger	Trigger Source (No Trig/Ext), Trigger Polarity (Rising/Falling)
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 0551)

RF Channel Power Accuracy	± 1.5 dB, ± 1.0 dB typical, (RF input –30 dBm to +10 dBm)

Modulation Measurements (Option 0552)

Frequency Error	± 10 Hz + time base error, 99% confidence level
Residual EVM (rms)	2.0% typical (E-UTRA Test Model 3.1) (RF Input -30 dBm to +10 dBm)

BW = 15, 20 MHz (Option 0543)

Bandwidths	15 MHz, 20 MHz

Over-the-Air (OTA) Measurements (Option 0556)

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

Spectrum Master™ MS2723C Spectrum Analyzer Specifications

Fixed and Mobile WiMAX Signal Analyzers (Options 0046, 0047, 0066, 0067, 0037)

Measurements

RF (Option 0046 - Fixed) (Option 0066 - Mobile)	Demodulation (Option 0047 - Fixed) (Option 0067 - Mobile)	Over-the-Air (OTA) (Option 0037 - Mobile)	Pass/Fail (User Editable)
Channel Spectrum Channel Power Occupied Bandwidth Power vs. Time Channel Power Preamble Power Downlink Burst Power (Mobile) Uplink Burst Power (Mobile) Data Burst Power (Fixed) Crest Factor (Fixed) ACPR RF Summary	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 (Mobile) Base Station ID Sector ID (Mobile) DL-MAP (Tree View) (Mobile) Modulation Summary	Channel Power Monitor Preamble Scanner (Six) Preamble Relative Power Cell ID Sector ID PCINR Dominant Preamble Base Station ID	Pass Fail All Pass/Fail RF Pass Fail Demod Measurements Channel Power Occupied Bandwidth Downlink Bust Power Uplink Burst Power Preamble Power Crest Factor Frequency Error Carrier Frequency EVM RCE Sector ID (Mobile)

Setup Parameters

Fixed WiMAX Bandwidth	1.25, 1.50, 2.50, 3.50, 5.00, 5.50, 6.00, 7.00, 10.00 MHz
Fixed WiMAX Cyclic Prefix Ratio (CP)	1/4, 1/8, 1/16, 1/32
Fixed WiMAX Span	5, 10, 15, 20 MHz
Fixed WiMAX Frame Length	2.5, 5.0, 10.0 msec
Mobile WiMAX Zone Type	PUSC
Mobile WiMAX DL-MAP Auto Decoding	Convolutional Coding (CC), Convolutional Turbo Coding (CTC)
Mobile WiMAX Bandwidths	3.50, 5.00, 7.00, 8.75, 10.00 MHz
Mobile WiMAX Cyclic Prefix Ratio (CP)	1/8
Mobile WiMAX Span	5, 10, 20, 30 MHz
Mobile WiMAX Frame Lengths	5, 10 msec
Mobile WiMAX 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 0046 – Fixed, Option 0066 - Mobile)

RF Channel Power Accuracy	± 1.5 dB, ± 1.0 dB typical, (RF input –50 dBm to +20 dBm)

Demodulated Signal Analyzer (Option 0047 – Fixed, Option 0067 – Mobile)

Frequency Error	± 10 Hz + time base error, 99% confidence level
Fixed WiMAX Residual EVM (rms)	3% typical, 3.5% maximum (RF Input –50 dBm to +20 dBm)
Mobile WiMAX Residual EVM (rms)	2.5% typical, 3.0% maximum, (RF Input –50 dBm to +20 dBm)

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 Tagging and Logging	Yes

TD-SCDMA/HSDPA Signal Analyzers (Options 0060, 0061, 0038)

Measurements

RF (Option 0060)	Demodulation (Option 0061)	Over-the-Air (OTA) (Option 0038)	Pass/Fail (User Editable)
Channel Spectrum Channel Power Occupied Bandwidth Left Channel Power Left Channel Occ B/W Right Channel Power Right Channel Occ B/W Power vs. Time Six Slot Powers Channel Power (RRC) DL-UL Delta Power UpPTS Power DwPTS Power On/Off Ratio Slot Peak-to-Average Power Spectral Emission RF Summary	Code Domain Power/Error (QPSK/8 PSK/16 QAM) Slot Power DwPTS Power Noise Floor Frequency Error Tau Scrambling Code EVM Peak EVM Peak Code Domain Error CDP Marker Modulation Summary	Code Scan (32) Scrambling Code Group Tau E_C/I_O Pilot Dominance Tau Scan (Six) Sync-DL# Tau E_C/I_O DwPTS Power Pilot Dominance Record Run/Hold	Pass Fail All Pass/Fail RF Pass Fail Demod Measurements Occupied Bandwidth Channel Power Channel Power RCC On/Off Ratio Peak-to-Average Ratio Frequency Error EVM Peak EVM Peak Code Domain Error Tau Carrier Feedthrough Noise Floor

Setup Parameters

Slot Selection	Auto, 0-6
Trigger	Trigger Type (No Trigger/GPS/External), External Trigger (Rising/Falling), Tau Offset
SYNC-DL Code	Auto, 0-31
Scrambling/Midamble Code	Auto, 0-127
Maximum Users	Auto, 2, 4, 6, 8, 10, 12, 14, 16
Measurement Speed	Fast, Normal, Slow
User Selectable	Uplink Switch Point, Number of Carriers (1, 3), Tau Offset
Demodulation Type	Auto, QPSK, 8 PSK, 16 QAM
Frequency	Center, Signal Standard, Channel #, Closest Channel, Decrement/Increment Channel
Amplitude	Scale/Division, Power Offset, Auto Range, Adjust Range, Units (dBm/Watts)
Sweep	Hold/Run, 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 0060)

RF Channel Power Accuracy (RRC)	± 1.5 dB, ± 1.0 dB typical, (slot power –40 dBm to +10 dBm)
Frequency Error	± 20 Hz + time base error, in the presence of a downlink slot

Demodulation (Option 0061)

Supported Modulation	QPSK, 8 PSK, 16 QAM, MBMS
Residual EVM (rms)	3% typical, P-CCPH slot power > -50 dBm
PN Offset	Within 1 x 64 chips
Pilot Power Accuracy	± 1.0 dB typical
Timing Error (Tau) for Dominant SYNC-DL	± 0.2 µs (external trigger)
Spreading Factor	1, 16

Over-the-Air (OTA) Measurements (Option 0038)

Code Scanner	32 Sync Codes and associated Scrambling Code Groups
Tau Scanner	Six strongest Sync Codes
Auto Save	Yes
GPS Tagging and Logging	Yes

Spectrum Master™ MS2723C Spectrum Analyzer 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) Apply when using internal reference and performance sweep mode; 3) 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, S/N, Firmware Ver, IP Address, Options Installed) Self Test, Application Self Test GPS (see Option 0031)
System Options	Name, Date and Time, Ethernet Configuration, Display, Volume Display (Brightness, Default Colors, Black and White, Night Vision, High Contrast) Language (English, French, German, Spanish, Chinese, Japanese, Korean, Italian, User defined) Share Center Frequency and Power Offset between Modes 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	> 13,000 traces
External Trace/Setup Memory	Limited by size of USB Flash drive or Compact Flash module
Mode Switching	Auto-Stores/Recalls most recently used Setup Parameters in the Mode
Connectors	
RF In	Type N, female, 50 Ω, Maximum Input +30 dBm, ± 50 VDC
GPS	SMA Female
External Power	5.5 mm barrel connector, 12 VDC to 15 VDC, < 5.0 Amps
LAN Connection	RJ48C, 10/100 Mbps, Connect to PC or LAN for Remote Access
USB Interface (2)	Type A, Connect Flash Drive and Power Sensor
USB Interface	5-pin mini-B, Connect to PC for data transfer
Headset Jack	2.5 mm barrel connector
External Reference In	BNC, female, 50 Ω, Maximum Input +10 dBm
External Reference Out	BNC, female, 50 Ω, 10 MHz
External Trigger	BNC, female, 50 Ω, Maximum Input ± 5 VDC
IF Out	BNC, female, 50 Ω, 140 MHz
Display	
Size	8.0 inch
Resolution	800 x 600
Battery	
Type	Li-Ion
Battery Operation	3 hours, typical
Electromagnetic Compatibility	
European Union	CE Mark, EMC Directive 89/336/EEC, 92/31/EEC, 93/68/EEC and Low Voltage Directive 73/23/EEC, 93/68/EEC
Australia and New Zealand	C-tick N274
Interference	EN 61326-1
Emissions	EN 55011
Immunity	EN 61000-4-2/-3/-4/-5/-6/-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	85%
Shock	MIL-PRF-28800F Class 2
Storage	–51 °C to 71 °C
Altitude	4600 meters, operating and non-operating
Size and Weight	
Size	315 mm x 211 mm x 77 mm, (12.4 in x 8.3 in x 3.0 in)
Weight	3.5 kg, (7.8 lbs)

Master Software Tools (for your PC)

Database Management	
Full Trace Retrieval	Retrieve all 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
Mobile WiMAX OTA Option	Google Earth, Google Maps, MapInfo
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)
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
Pass/Fail	Create, download, or edit Signal Analysis Pass/Fail Limits
VSG Pattern Converter	Import user-defined patterns (ASCII text or MATLAB file format required)
Languages	Add up to two languages or modify non-English language menus
Mobile WiMAX	DL-MAP Parameters
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/HSDPA Mode	Automate Signal Analysis testing requirements with annotated how-to pictures
Connectivity	
Connections	Connect to PC using USB, LAN, or Direct Ethernet connection
Download	Download measurements and live traces to PC for storage and analysis
Upload	Upload measurements from PC to instrument
Firmware Updates	Product Update: download latest firmware version
Remote Access Tool	Remote control and monitoring of instrument (via Ethernet port) over the Internet

Ordering Information

MS2723C	Description
9 kHz to 13 GHz	Spectrum Analyzer
Options	
MS2723C-0007	Secure Data Operation
MS2723C-0031	GPS Receiver (requires Antenna P/N 2000-1528-R)
MS2723C-0019	High-Accuracy Power Meter (requires Power Sensor)
MS2723C-0025	Interference Analyzer
MS2723C-0027	Channel Scanner
MS2723C-0089	Zero-Span IF Output
MS2723C-0009	I/Q Demodulation Hardware
MS2723C-0040	GSM/GPRS/EDGE RF Measurements*
MS2723C-0041	GSM/GPRS/EDGE Demodulation*
MS2723C-0044	W-CDMA/HSDPA RF Measurements*
MS2723C-0045	W-CDMA Demodulation*
MS2723C-0065	W-CDMA/HSDPA Demodulation*
MS2723C-0035	W-CDMA/HSDPA Over-the-Air (OTA) Measurements**
MS2723C-0060	TD-SCDMA/HSDPA Measurements*
MS2723C-0061	TD-SCDMA/HSDPA Demodulation*
MS2723C-0038	TD-SCDMA/HSDPA Over-the-Air (OTA) Measurements*
MS2723C-0541	LTE RF Measurements*
MS2723C-0542	LTE LTE Modulation Measurements*
MS2723C-0546	LTE Over-the-Air (OTA) Measurements**
MS2723C-0543	LTE BW = 15 MHz, 20 MHz (Requires Option 0541, 0542, 0551 or 0552)
MS2723C-0551	TD-LTE RF Measurements*
MS2723C-0552	TD-LTE Modulation Measurements*
MS2723C-0556	TD-LTE Over-the-Air (OTA) Measurements**
MS2723C-0042	cdmaOne/CDMA2000 1X RF Measurements*
MS2723C-0043	cdmaOne/CDMA2000 1X Demodulation*
MS2723C-0033	cdmaOne/CDMA2000 1X Over-the-Air (OTA) Measurements**
MS2723C-0062	CDMA2000 1xEV-DO RF Measurements*
MS2723C-0063	CDMA2000 1xEV-DO Demodulation*
MS2723C-0034	CDMA2000 1xEV-DO Over-the-Air (OTA) Measurements**
MS2723C-0046	IEEE 802.16 Fixed WiMAX RF Measurements*
MS2723C-0047	IEEE 802.16 Fixed WiMAX Demodulation*
MS2723C-0066	IEEE 802.16 Mobile WiMAX RF Measurements*
MS2723C-0067	IEEE 802.16 Mobile WiMAX Demodulation*
MS2723C-0037	IEEE 802.16 Mobile WiMAX Over-the-Air (OTA) Measurements*
MS2723C-0098	Standard Calibration (ANSI Z540-1-1994)
MS2723C-0099	Premium Calibration (ANSI Z540-1-1994 plus test data) *Requires Option 0009, **Requires Option 0009, and Option 0031

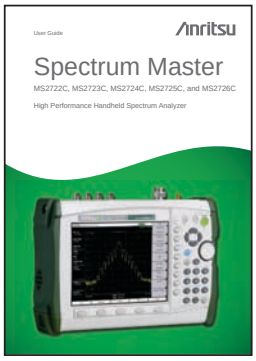
Power Sensors (For complete ordering information see the respective datasheets of each sensor)



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, 150 W
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

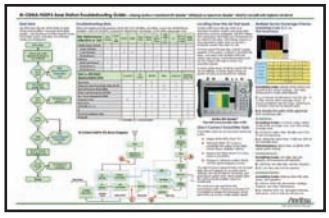
Spectrum Master™ MS2723C Spectrum Analyzer Specifications

Manuals (soft copy included on Handheld Instruments Documentation Disc and at www.anritsu.com)



Part Number	Description
10920-00060	Handheld Instruments Documentation Disc
10580-00277	Spectrum Master User Guide (Hard copy included) - Bias-Tee, GPS Receiver
10580-00244	Spectrum Analyzer Measurement Guide - Interference Analyzer, Channel Scanner, IF Output
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
10580-00235	3GPP2 Signal Analyzer Measurement Guide - CDMA, EV-DO
10580-00236	WiMAX Signal Analyzer Measurement Guide - Fixed WiMAX, Mobile WiMAX
10580-00278	Programming Manual
10580-00279	Maintenance Manual

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



11410-00551	Spectrum Analyzers
11410-00472	Interference
11410-00466	GSM/GPRS/EDGE Base Stations
11410-00566	LTE eNodeB Testing
11410-00463	W-CDMA/HSDPA Base Stations
11410-00465	TD-SCDMA/HSDPA Base Stations
11410-00467	cdmaOne/CDMA2000 1X Base Stations
11410-00468	CDMA2000 1xEV-DO Base Stations
11410-00470	Fixed WiMAX Base Stations
11410-00469	Mobile WiMAX Base Stations

Standard Accessories (included with instrument)

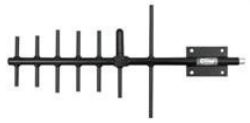




10920-00060	Handheld Instruments Documentation Disc
10580-00277	Spectrum Master User Guide (includes Bias-Tee and GPS Receiver)
2300-498	Master Software Tools (MST) CD Disc
65729	Soft Carrying Case
633-44	Rechargeable Li-Ion Battery
40-168-R	AC/DC Power Supply
806-141-R	Automotive Cigarette Lighter 12 Volt DC Adapter
2000-1371-R	Ethernet Cable, 7 feet/213 cm
3-2000-1498	USB A-mini B Cable, 10 feet/305 cm
1091-27-R	Type N male to SMA female adapter
1091-172	Type N male to BNC female adapter
11410-00524	MS2723C Spectrum Master Technical Data Sheet
	One Year Warranty (Including battery, firmware, and software) Certificate of Calibration and Conformance

Optional Accessories

Directional Antennas



2000-1411-R	824 MHz to 896 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 3000 MHz, log periodic
2000-1617	600 MHz to 21000 MHz, N(f), 5-8 dBi to 12 GHz, 0-6 dBi to 21 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
2000-1616	20 MHz to 21000 MHz, N(f), 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)

Mag Mount Broadband Antenna



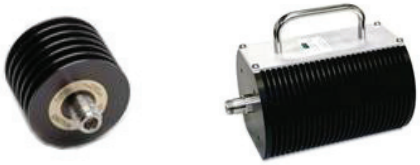
2000-1647-R	Cable 1: 698-1200 MHz 2 dBi peak gain, 1700-2700 MHz 5 dBi peak gain, N(m), 50 Ω, 10 ft Cable 2: 3000-6000 MHz 5 dBi peak gain, N(m), 50 Ω, 10 ft Cable 3:GPS 26 db gain, SMA(m), 50 Ω, 10 ft
2000-1645-R	694-894 MHz 3 dBi peak gain, 1700-2700 MHz 3dBi peak gain, N(m), 50 Ω, 10 ft
2000-1646-R	750-1250 MHz 3 dBi peak gain, 1650-2000 MHz 5 dBi peak gain, 2100-2700 MHz 3 dBi peak gain, N(m), 50 Ω, 10 ft
2000-1648-R	1700-6000 MHz 3 dBi peak gain,N(m), 50 Ω, 10 ft

Bandpass 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
1030-155-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)

Optional Accessories (continued)

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
1091-379-R	7/16 DIN(f) to 7/16 DIN(f), DC to 6 GHz, 50 Ω, w/ Reinforced Grip
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
34NFNF50	Precision Adapter, N(f) to N(f), DC to 18 GHz, 50 Ω

Miscellaneous Accessories



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

Backpack and Transit Case



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

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.

Visit us to register today: www.anritsu.us/smiusignup

To receive a quote to purchase a product or order accessories visit our online ordering site: www.ShopAnritsu.com

Training at Anritsu

Anritsu has designed courses to help you stay up to date with technologies important to your job.
For available training courses visit: www.anritsu.com/training

Anritsu Corporation
5-1-1 Onna, Atsugi-shi, Kanagawa, 243-8555 Japan
Phone: +81-46-223-1111
Fax: +81-46-296-1238

• **U.S.A.**
Anritsu Company
1155 East Collins Boulevard, Suite 100,
Richardson, TX, 75081 U.S.A.
Toll Free: 1-800-ANRITSU (267-4878)
Phone: +1-972-644-1777
Fax: +1-972-671-1877

• **Canada**
Anritsu Electronics Ltd.
700 Silver Seven Road, Suite 120, Kanata,
Ontario K2V 1C3, Canada
Phone: +1-613-591-2003
Fax: +1-613-591-1006

• **Brazil**
Anritsu Electrônica Ltda.
Praça Amadeu Amaral, 27 - 1 Andar
01327-010 - Bela Vista - São Paulo - SP - Brasil
Phone: +55-11-3283-2511
Fax: +55-11-3288-6940

• **Mexico**
Anritsu Company, S.A. de C.V.
Av. Ejército Nacional No. 579 Piso 9, Col. Granada
11520 México, D.F., México
Phone: +52-55-1101-2370
Fax: +52-55-5254-3147

• **U.K.**
Anritsu EMEA Ltd.
200 Capability Green, Luton, Bedfordshire LU1 3LU, U.K.
Phone: +44-1582-433280
Fax: +44-1582-731303

• **France**
Anritsu S.A.
12 Avenue du Québec,
Bâtiment Iris 1-Silic 638,
91140 VILLEBON SUR YVETTE, France
Phone: +33-1-60-92-15-50
Fax: +33-1-64-46-10-65

• **Germany**
Anritsu GmbH
Nemetschek Haus, Konrad-Zuse-Platz 1
81829 München, Germany
Phone: +49 (0) 89 442308-0
Fax: +49 (0) 89 442308-55

• **Italy**
Anritsu S.p.A.
Via Elio Vittorini, 129, 00144 Roma, Italy
Phone: +39-06-509-9711
Fax: +39-06-502-2425

• **Sweden**
Anritsu AB
Borgafjordsgatan 13, 164 40 KISTA, Sweden
Phone: +46-8-534-707-00
Fax: +46-8-534-707-30

• **Finland**
Anritsu AB
Teknobulevardi 3-5, FI-01530 VANTAA, Finland
Phone: +358-20-741-8100
Fax: +358-20-741-8111

• **Denmark**
Anritsu A/S (for Service Assurance)
Anritsu AB (for Test & Measurement)
Kirkebjerg Allé 90 DK-2605 Brøndby, Denmark
Phone: +45-7211-2200
Fax: +45-7211-2210

• **Russia**
Anritsu EMEA Ltd.
Representation Office in Russia
Tverskaya str. 16/2, bld. 1, 7th floor.
Russia, 125009, Moscow
Phone: +7-495-363-1694
Fax: +7-495-935-8962

• **United Arab Emirates**
Anritsu EMEA Ltd.
Dubai Liaison Office
P O Box 500413 - Dubai Internet City
Al Thuraya Building, Tower 1, Suite 701, 7th Floor
Dubai, United Arab Emirates
Phone: +971-4-3670352
Fax: +971-4-3688460

• **Singapore**
Anritsu Pte. Ltd.
60 Alexandra Terrace, #02-08, The Comtech (Lobby A)
Singapore 118502
Phone: +65-6282-2400
Fax: +65-6282-2533

• **India**
Anritsu Pte. Ltd.
India Branch Office
3rd Floor, Shri Lakshminarayan Niwas, #2726, 80 ft Road,
HAL 3rd Stage, Bangalore - 560 075, India
Phone: +91-80-4058-1300
Fax: +91-80-4058-1301

• **P. R. China (Hong Kong)**
Anritsu Company Ltd.
Units 4 & 5, 28th Floor, Greenfield Tower, Concordia Plaza,
No. 1 Science Museum Road, Tsim Sha Tsui East,
Kowloon, Hong Kong, P.R. China
Phone: +852-2301-4980
Fax: +852-2301-3545

• **P. R. China (Beijing)**
Anritsu Company Ltd.
Beijing Representative Office
Room 2008, Beijing Fortune Building,
No. 5 , Dong-San-Huan Bei Road,
Chao-Yang District, Beijing 100004, P.R. China
Phone: +86-10-6590-9230
Fax: +86-10-6590-9235

• **Korea**
Anritsu Corporation, Ltd.
8F Hyunjuk Bldg. 832-41, Yeoksam-Dong,
Kangnam-ku, Seoul, 135-080, Korea
Phone: +82-2-553-6603
Fax: +82-2-553-6604

• **Australia**
Anritsu Pty Ltd.
Unit 21/270 Ferntree Gully Road, Notting Hill
Victoria, 3168, Australia
Phone: +61-3-9558-8177
Fax: +61-3-9558-8255

• **Taiwan**
Anritsu Company Inc.
7F, No. 316, Sec. 1, Neihu Rd., Taipei 114, Taiwan
Phone: +886-2-8751-1816
Fax: +886-2-8751-1817Fax: +886-2-8751-1817

®Anritsu All trademarks are registered trademarks of their respective companies. Data subject to change without notice. For the most recent specifications visit: www.anritsu.com

11410-00524, Rev. C Printed in United States 2010-11

©2010 Anritsu Company. All Rights Reserved.