

# 20 GHz High Performance Handheld Spectrum Analyzer

## MS2724B Spectrum Master™

### Introduction

Continuous frequency coverage from 9 kHz to 20 GHz gives the wireless professional the performance needed for the most demanding measurements in harsh RF and physical environments.

Whether you need spectrum monitoring, WiFi and WiFi5 installation and testing, RF and microwave signal measurements or cellular signal measurements, the MS2724B Spectrum Master is the tool to make your job easier and more productive.

### High Performance Highlights

- 9 kHz to 20 GHz Input
- 1 Hz to 3 MHz RBW Range
- Very Low Phase Noise  
(-104 dBc/Hz typical at 10 kHz offset at 2 GHz)
- Built-in AM/FM/SSB Demodulator
- Built-in Pre-amplifier
- 65 dB Step Attenuator
- True RMS Detection
- 2+ Hours of Battery Life
- 3.4 kg (7.5 lb)
- 3G Modulation options
- GPS Receiver option
- Quasi-peak detector and CISPR bandwidths



The Anritsu MS2724B is the most advanced ultra-portable spectrum analyzer on the market, featuring unparalleled performance at a modest price.

## Features and Options

### Functions

**Multiple Marker:** Display up to six markers on screen. Each marker includes a delta marker, effectively allowing up to 12 markers on screen. The user may also set marker 1 to be the reference for 6 delta markers.

**Marker Table:** Display a table of up to six marker frequency and amplitude values plus delta marker frequency offset and amplitude.

### Upper/Lower Limit

**Fixed and segmented:** Each upper and lower limit can be made up of between one and 40 segments.

### Smart Measurements

**Occupied Bandwidth:** Measures 99% to 1% power channel of a signal.

**Channel Power:** Measures the total power in a specified bandwidth.

**C/I:** Measures carrier to interference ratio.

**ACPR:** Measures power levels in the channels immediately above and below the center channel.

**Field Strength:** Uses antenna calibration tables to measure dBm/meter<sup>2</sup> or dBmV/meter.

## Specifications

### Frequency

**Frequency Range:** 9 kHz to 20 GHz

**Preamp:** 100 kHz to 4 GHz

**Tuning Resolution:** 1 Hz

**Frequency Reference:**

**Aging:**  $\pm 1$  ppm per 10 years

**Accuracy:**  $\pm 0.3$  ppm (25 °C  $\pm 25$  °C) + aging

**Frequency Span:** 10 Hz to 20 GHz plus 0 Hz (zero span)

**Span Accuracy:** Same as frequency reference accuracy

**Sweep Time:**

Zero span: 10  $\mu$ s to 600s

Spans >0 Hz: Sweep time is automatically optimized.

Can be manually increased

**Sweep Time Accuracy:**  $\pm 2\%$  in zero span

**Sweep Trigger:** Free run, Single, Video, External

**Resolution Bandwidth:** (-3 dB) 1 Hz to 3 MHz in 1-3 sequence  $\pm 10\%$ , 200 Hz, 9 kHz, 120 kHz when quasi-peak detector selected, 10 MHz demodulation bandwidth

**Video Bandwidth:** (-3 dB) 1 Hz to 3 MHz in 1-3 sequence

**SSB Phase Noise:**

Offset from carrier	Max	
	9 kHz to 13 GHz	13 GHz to 20 GHz
10, 20 and 30 kHz	-95 dBc/Hz	-91 dBc/Hz
100 kHz	-97 dBc/Hz	-93 dBc/Hz
1 MHz	-105 dBc/Hz	-102 dBc/Hz
10 MHz	-120 dBc/Hz	-116 dBc/Hz

### Amplitude

**Measurement Range:** DANL to +30 dBm

**Display Range:** 1 to 15 dB/div in 1 dB steps. Ten divisions displayed.

**Amplitude Units:**

**Log Scale Modes:** dBm, dBV, dBmv, dB $\mu$ V

**Linear Scale Modes:** nV,  $\mu$ V, mV, V, kV, nW,  $\mu$ W, mW, W, kW

**Attenuator Range:** 0 to 65 dB

**Attenuator Resolution:** 5 dB steps

### Overall Amplitude Accuracy

(20 °C to 30 °C, 30 minute warmup):

$\pm 1.3$  dB

**Full Temperature Range:** -10 to +55 °C add

$\pm 1.2$  dB

**Frequency Flatness:** >4 GHz add

$\pm 1.5$  dB

**Conditions:** 50  $\Omega$  source, single sinewave input  $\leq$ Reference Level, and  $\geq$ DANL, 60 minute warm-up, auto-attenuation

### Second Harmonic Distortion

(0 dB input attenuation, -30 dBm input):

50 to 500 MHz -50 dBc

500 to 800 MHz -45 dBc

800 to 3000 MHz -60 dBc

>3 GHz -70 dBc

### Third Order Intercept (TOI):

(-20 dBm tones 100 kHz apart, -20 dBm Ref level,

0 dB input attenuation, preamplifier off)

Frequency	Min
2.4 GHz	+12 dBm

Frequency	Typical
50 MHz to 500 MHz	>6 dBm
500 MHz to 2 GHz	>8 dBm
2 to 6 GHz	>10 dBm
6 to 20 GHz	>12 dBm

### Dynamic Range 2/3 (TOI-DANL) in 1 Hz RBW:

2.4 GHz 101 dB min

### Displayed Average Noise Level (DANL) in 1 Hz RBW:

Frequency	Preamplifier On	Equivalent Noise Figure, 23 °C
10 MHz to 1 GHz	-159 dBm	15 dB
1 GHz to 3 GHz	-156 dBm	18 dB
3 to 4 GHz	-154 dBm	20 dB

Frequency	Preamplifier Off	Equivalent Noise Figure, 23 °C
10 MHz to 4 GHz	-139 dBm	35 dB
4 GHz to 10 GHz	-136 dBm	38 dB
10 GHz to 13 GHz	-130 dBm	44 dB
13 GHz to 20 GHz	-136 dBm	38 dB

## Options Specifications

### *Demodulation Hardware (Option 9)*

Hardware needed to run any of the demodulation options

### *High Accuracy Power Meter (Option 19) Specifications using PSN50*

#### PSN50 Sensor:

**Measurement Range:** -30 dBm to +20 dBm  
**Frequency Range:** 50 MHz to 6 GHz  
**Input Connector:** Type N, male, 50 Ω  
**Max Input Without Damage:** +33 dBm, ±25 VDC  
**Input Return Loss:** 50 MHz to 2 GHz: ≥26 dB  
2 GHz to 6 GHz: ≥20 dB

#### PSN50 Accuracy:

**Total RSS Measurement Uncertainty (0 °C to 50 °C):** ±0.16 dB\*  
**Noise:** 20 nW max  
**Zero Set:** 20 nW  
**Zero Drift:** 10 nW max\*\*  
**Sensor Linearity:** ±0.13 dB max  
**Sensor Cal Factor Uncertainty:** ±0.06 dB  
**Temperature Compensation:** ±0.06 dB max  
**Continuous digital modulation uncertainty:** ±0.06 dB (+17 to +20 dBm)

#### PSN50 System:

**Measurement Resolution:** 0.01 dB  
**Offset Range:** ±60 dB  
**Power Requirements:**  
**Supply Voltage:** 8 to 18 Vdc (supplied by instrument via USB connector)  
**Supply Current:** <100 mA

### *High Accuracy Power Meter (Option 19) Specifications using MA24106A*

#### Sensor

**Measurement Range:** -40 to +23 dBm  
**Frequency Range:** 50 MHz to 6 GHz  
**Input Connector:** Type N, male, 50 Ω  
**Max Input Without Damage:** +33 dBm, ±25 VDC  
**Input Return Loss:** 50 MHz to 2 GHz: >26 dB  
2 GHz to 6 GHz: >20 dB

#### Accuracy

**Total RSS Measurement Uncertainty (0 to 50 °C):** ±0.16 dB\*  
**Noise:** 2.5 nW max  
**Zero Set:** 10 nW  
**Zero Drift:** 3 nW max\*\*  
**Sensor Linearity:** ±0.18 dB max  
**Instrumentation Accuracy:** 0.00 dB  
**Sensor Cal Factor Uncertainty:** ±0.06 dB  
**Temperature Compensation:** ±0.06 dB max  
**Continuous Digital Modulation Uncertainty:**  
±0.02 dB (< +18 dBm)  
±0.10 dB (>= +18 dBm)

### *Interference Analyzer (Option 25)*

**Signal Strength:** Gives visual and aural indication of signal strength

**RSSI:** Collect data up to 72 hours

**Spectrogram:** Collect data up to 72 hours

**Signal ID:** Monitors one particular frequency or scan the span and identify up to 12 signals. Identifies CDMA, GSM and WCDMA signals with Signal-to-noise ratio greater than 10 dB.

### *Channel Scanner (Option 27)*

**Number of Channels:** 1 to 20

### *GPS (Option 31)*

**GPS Location Indicator:** Latitude, Longitude and Altitude on display  
Latitude, Longitude and Altitude with trace storage

#### GPS High Frequency Accuracy when GPS antenna is connected:

±25 ppb with GPS ON, 3 minutes after satellite lock in the selected operating mode

#### Internal High Accuracy, when GPS antenna is not connected:

Better than ±50 ppb for 3 days from a High Accuracy GPS Lock and within 0 °C to 50 °C ambient temperature

**Connector:** Reverse polarity BNC

### *cdmaOne and CDMA2000 1xRTT Over The Air (Option 33) and EVDO Over The Air (Option 34)*

**Over the Air Measurement:** Nine strongest pilots with Tau and Ec/Io  
Six multipaths relative to strongest pilot

### *GSM/GPRS/EDGE RF Measurements (Option 40)*

**Occupied Bandwidth:** Bandwidth within which 99% of the power transmitted on a single channel lies

**Burst Power:** ±1 dB typical for -50 dBm to +20 dBm (±1.5 dB max)

**Frequency Error:** ±10 Hz + time base error, 99% confidence level

### *GSM/GPRS/EDGE Demodulator (Option 41)*

**GSMK Modulation Quality (RMS Phase) Measurement Accuracy:** ±1 deg

**Residual Error (GSMK):** 1 deg

**8PSK Modulation Quality (EVM) Measurement Accuracy:** ±1.5%

**Residual Error (8PSK):** 2.5%

### *CDMA RF Measurements (Option 42) and EVDO RF Measurements (Option 62)*

**Channel Power Accuracy:** ±1 dB typical for RF Input from +20 dBm to -50 dBm (±1.5 dB maximum)

### *cdmaOne and CDMA2000 1xRTT Demodulator (Option 43)*

**Residual Rho:** >0.995 typical for RF Input from +20 dBm to -50 dBm (>0.99 dB maximum)

**Rho Accuracy:** ±0.005 for Rho > 0.9

**Frequency Error:** ±10 Hz + Time base error, 99% confidence level (in slow mode)

**PN Offset:** within 1 x 64 chips

**Pilot Power Accuracy:** ±1 dB typical, relative to Channel Power

**Tau:** ± 0.5 μs typical (±1 μs maximum)

### *WCDMA/HSDPA OTA (Option 35)*

**Resolution:** 0.1 dB

\* Excludes mismatch errors.

Excludes noise, zero set, zero drift for levels <-20 dBm.

Excludes digital modulation uncertainty between +17 and +20 dBm.

\*\* After 30 min warm-up

\*\*\* Depends on reference level, input signal level and single channel conditions

\*\*\*\* Will vary with amount of data burst traffic

### *WCDMA/HSDPA RF Measurements (Option 44)*

**Frequency Ranges:** 824 to 894 MHz, 1710 to 2170 MHz, 2300 to 2700 MHz

**RF Channel Power (Temperature range 15 °C to 35 °C):**

±0.7 dB typical      ±1.25 dB max

**Occupied Bandwidth Accuracy:** ±100 kHz

**Residual Adjacent Channel Leakage Ratio (ACLR)\*\*\***

**(824 to 894 MHz, 1710 to 2170 MHz):** -51 dB typical at 5 MHz offset

-59 dB typical at 10 MHz offset

**Leakage Ratio (ACLR)\*\*\***

**(2300 to 2700 MHz):** -51 dB typical at 5 MHz offset

-57 dB typical at 10 MHz offset

**ACLR Accuracy (Single Channel Active)**

**(824 to 894 MHz, 1710 to 2170 MHz):**

±0.8 dB for ACLR ≥ -45 dB at 5 MHz offset

±0.8 dB for ACLR ≥ -50 dB at 10 MHz offset

**ACLR Accuracy (Single Channel Active) (2300 to 2700 MHz):**

±1.0 dB for ACLR ≥ -45 dB at 5 MHz offset

±1.0 dB for ACLR ≥ -50 dB at 10 MHz offset

**Frequency Error:**

±10 Hz + time base error, 99% confidence level

### *WCDMA Demodulation and WCDMA/HSDPA Demodulator (Options 45 and 65)*

Option 45 is for measuring W-CDMA. Option 65 is for measuring both W-CDMA and HSDPA. All the capability of option 45 is included in option 65.

**EVM Accuracy\*\*\* (824 to 894 MHz, 1710 to 2170 MHz):**

(3GPP Test Model 4) ±2.5%; 6 ≤ EVM ≤ 25%

**EVM Accuracy\*\*\* (2300 MHz to 2700 MHz):**

(3GPP Test Model 5) ±2.5%; 6 ≤ EVM ≤ 20%

**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

**Scrambling Code:** 3 seconds

### *EVDO Demodulator (Option 63)*

Demodulator Measurements are EVDO Rev A compatible.

**Residual Rho:** >0.995 typical for RF Input from +20 dBm to -50 dBm

(>0.99 dB maximum)

**Rho Accuracy:** ±0.01 for Rho >0.9

**Frequency Error:** ±20 Hz + Time base error, 99% confidence level

**PN Offset:** within 1 x 64 chips

**Pilot Power Accuracy:** ±1 dB typical relative to Channel Power

**Tau:** ±0.5 μs typical (±1 μs maximum)

### *Fixed WiMAX RF Measurements (Option 46)*

**Channel Power Accuracy\*\*\*\*:** ±1 dB Typical for +20 dBm to -50 dBm

(±1.5 dB max)

### *Fixed WiMAX Demodulator (Option 47)*

**Residual EVM (rms):** 3% for +20 dBm to -50 dBm (3.5% max.)

**Frequency Error:** ±0.1 ppm + time base error, 99% confidence level

### *Mobile WiMAX Over the Air (OTA) Measurements (Option 37)*

**Time Interval:** 1sec – 60 sec

**Measurement duration:** 72 hours max

**Auto Save:** Yes

**GPS logging:** Yes

### *Mobile WiMAX RF Measurements (Option 66)*

**Channel Power Accuracy:** ±1 dB Typical (±1.5 dB max)

for +20 dBm to -50 dBm

### *Mobile WiMAX Demodulator (Option 67)*

**For +20 dBm to -50 dBm, Residual EVM (rms):** 2.5% typical (3% max)

**Frequency Error:** ±0.02 ppm + time base error, 99% confidence level

### *TD-SCDMA RF Measurements (Option 60)*

**Channel Power (RRC):** ±1 dB typical, 1.5 dB max

(slot power from +10 dBm to -40 dBm)

### *TD-SCDMA Demodulator (Option 61)*

**Residual EVM (rms):** 3% typical (for P-CCPCH slot, slot power > -50 dBm)

**Freq Error Accuracy:** ±10 Hz typical + time base error

(in the presence of a downlink slot)

**Timing Error (Tau) for dominant SYNC-DL code:**

±0.2 μs (external trigger)

**Supported Modulation:** QPSK

**Spreading Factor:** 1, 16

### *TD-SCDMA Over the Air (OTA) Measurements (Option 38)*

32 codes displaying Ec/Io, Tau

### *IF Output (Option 89)*

This option adds an IF output connector and used in zero span to see the signals present in the user-selected IF Bandwidth.

**IF Frequency:** 37.8 MHz typical for signal at center frequency

**IF Bandwidth:** 7 MHz, 10 MHz, 16 MHz, typical.

**Output Power Level:**

-20 to -45 dBm typical given:

RF Input Level = +30 to -43 dBm with Preamp OFF

-40 to -60 dBm with Preamp ON

Reference Level set at RF Input Level

Auto RF Attenuation

### *Gated Sweep (Option 90)*

The option adds gated sweep to the spectrum analyzer mode, giving the user the capability to view pulsed or burst signals only when they are on, or conversely look at the spectrum only when a signal is off.

**Trigger Signal:** External TTL input, user selectable high of low level

**Gate Delay:** 0 to 65 ms typical

**Gate Length:** 1 μs to 65 ms typical

\* Excludes mismatch errors.

Excludes noise, zero set, zero drift for levels < -20 dBm.

Excludes digital modulation uncertainty between +17 and +20 dBm.

\*\* After 30 min warm-up

\*\*\* Depends on reference level, input signal level and single channel conditions

\*\*\*\* Will vary with amount of data burst traffic

## General

**RF Input VSWR:** ( $\geq 10$  dB input attenuation)

1.5:1 typical <13 GHz  
2:1 typical 13 to 20 GHz

**Maximum Continuous Input:** ( $\geq 10$  dB input attenuation) +30 dBm

**Input Damage Level:**

$\geq 10$  dB input attenuation,  $> +30$  dBm,  $\pm 50$  Vdc

**ESD Damage Level:** ( $\geq 10$  dB input attenuation)  $> 10$  kV

**External Reference Frequencies:** 1, 1.2288, 1.544, 2.048, 2.4576, 4.8, 4.9152, 5, 9.8304, 10, 13 and 19.6608 MHz at  $-10$  dBm to  $+10$  dBm

**Battery Life:** 2.3 hours typical

### Display

**Bright daylight-viewable color transmissive LCD:** Full SVGA, 8 in.

### Languages

Built-in English, Spanish, Italian, French, German, Japanese, Korean, and Chinese. The instrument also has the capability to have two customized languages installed from Master Software Tools.

### Marker Modes

**6 Markers, 9 Modes:** Normal, Delta, Marker to Peak, Marker to Center, Marker to Reference Level, Next Peak Left, Next Peak Right, All Markers Off, Noise Marker, Frequency Counter Marker (1 Hz resolution), Markers Tracking or Fixed, Marker 1 reference for all deltas.

### Sweeps

Full span, Zero span, Span Up/Span Down

### Detection

Peak, Negative peak, Sample, RMS, Quasi-peak

### Memory

Trace and Setup storage is limited only by the capacity of the installed Compact Flash card or USB Flash drive. For a 256 MB card, storage is greater than 13000 spectrum analyzer traces and over 10000 setups.

### Traces

**Displayed Traces:** Three Traces with trace overlay. Trace A is always the live data; Traces B and C can be either stored data or traces which have been mathematically manipulated. Also Trace C can show max hold or min hold.

### Interfaces

Type N female RF connector for Spectrum Analyzer input  
Reverse polarity BNC jack for optional GPS antenna connector  
BNC female connectors for ext. reference and ext. trigger  
5-pin Mini-B USB 2.0 for data transfer to a PC  
USB 2.0 Host connector used with PSN50 High Accuracy Power Meter and USB Flash Drives  
RJ45 connector for Ethernet 10/100 Base T  
2.5 mm 3-wire headset connector

### Size and Weight

**Size:** 313W x 211H x 77D mm (12W x 8H x 3D in.)

**Weight:** 3.4 kg (<7.5 lbs.) typical

### Environmental

MIL-PRF-28800F class 2

**Operating:**  $-10^{\circ}$  C to  $55^{\circ}$  C, humidity 85% or less

**Storage:**  $-51^{\circ}$  C to  $71^{\circ}$  C

**Altitude:** 4600 meters, operating and non-operating

### Safety

Conforms to EN 61010-1 for Class 1 portable equipment

### Electromagnetic Compatibility

Meets European Community requirements for CE marking.

## Ordering Information

### Model

#### MS2724B Handheld Spectrum Analyzer

9 kHz to 20 GHz

### Options

Option MS2724B-009	IQ Demodulation Hardware
Option MS2724B-019	High Accuracy Power Meter (Power Sensor not included)
Option MS2724B-025	Interference Analysis
Option MS2724B-027	Channel Scanner
Option MS2724B-031	GPS (includes GPS antenna)
Option MS2724B-033	cdmaOne and CDMA2000 1xRTT (OTA) (requires Opt. 009, 031)
Option MS2724B-034	EVDO Over The Air (OTA) Measurement (requires Option 009, 031)
Option MS2724B-035	W-CDMA/HSDPA OTA (requires Opt. 009)
Option MS2724B-037	Mobile WiMAX Over The Air (OTA) Measurement (requires Opt. 009)
Option MS2724B-038	TD-SCDMA Over The Air (OTA) Measurements (requires Opt. 009)
Option MS2724B-040	GSM/GPRS/EDGE RF Meas (requires Opt. 009)
Option MS2724B-041	GSM/GPRS/EDGE Demod (requires Opt. 009)
Option MS2724B-042	CDMA RF Measurement (requires Opt. 009)
Option MS2724B-043	cdmaOne and CDMA2000 1xRTT demodulator (requires Opt. 009)
Option MS2724B-044	W-CDMA/HSDPA RF Measurement (requires Opt. 009)
Option MS2724B-045*	W-CDMA Demodulation (requires Opt. 009)
Option MS2724B-046	Fixed WiMAX RF Measurement (requires Opt. 009)
Option MS2724B-047	Fixed WiMAX Demodulation (requires Opt. 009)
Option MS2724B-060	TD-SCDMA RF Measurement (requires Opt. 009)
Option MS2724B-061	TD-SCDMA Demodulation (requires Opt. 009)
Option MS2724B-062	EVDO RF Measurement (requires Opt. 009)
Option MS2724B-063	EVDO Demodulator (requires Opt. 009)
Option MS2724B-065*	W-CDMA/HSDPA Demodulation (requires Opt. 009)
Option MS2724B-066	Mobile WiMAX RF Measurement (requires Opt. 009)
Option MS2724B-067	Mobile WiMAX Demodulator (requires Opt. 009)
Option MS2724B-090	Gated Sweep

### Standard Accessories Include:

10580-00175	User's Guide
65729	Soft Carrying Case
40-168-R	AC – DC Adapter
806-141	Automotive Cigarette Lighter/12 Volt DC Adapter
2300-498	CD ROM containing Master Software Tools
2000-1371	Ethernet Cable
3-806-152	Cross-over Ethernet Cable
633-44	Rechargeable battery, Li-Ion
1091-27	Type-N male to SMA female adapter
1091-172	Type-N male to BNC female adapter
2000-1520-R	2 GB USB Flash Drive
3-2000-1498	USB Type A to Mini-B Cable
	One Year Warranty

### Optional Accessories:

3-2000-1567	512 MB Compact Flash
2000-1520-R	2 GB USB Flash Drive
42N50A-30	30 dB, 50 watt, Bi-directional, DC to 18 GHz, N(m) to N(f) Attenuator
34NN50A	Precision Adapter, DC to 18 GHz, 50 $\Omega$ , N(m) to N(m)
34NFN50C	Precision Adapter, DC to 18 GHz, 50 $\Omega$ , N(f) to N(f)
15NNF50-1.5B	Test port cable, armored, 1.5 meter N(m) to N(f) 18 GHz
15NN50-1.5C	Test port cable armored, 1.5 meter, N(m) to N(m), 6 GHz
15NN50-3.0C	Test port cable armored, 3.0 meter, N(m) to N(m), 6 GHz
15NN50-5.0C	Test port cable armored, 5.0 meter, N(m) to N(m), 6 GHz
15NNF50-1.5C	Test port cable armored, 1.5 meter, N(m) to N(f), 6 GHz
15NNF50-3.0C	Test port cable armored, 3.0 meter, N(m) to N(f), 6 GHz
15NNF50-5.0C	Test port cable armored, 5.0 meter, N(m) to N(f), 6 GHz
15ND50-1.5C	Test port cable armored, 1.5 meter, N(m) to 7/16 DIN(m), 6.0 GHz
15NDF50-1.5C	Test port cable armored, 1.5 meter, N(m) to 7/16 DIN(f), 6.0 GHz
510-90	Adapter, 7/16 DIN(f) to N(m), DC to 7.5 GHz, 50 $\Omega$
510-91	Adapter, 7/16 DIN(f) to N(f), DC to 7.5 GHz, 50 $\Omega$
510-92	Adapter, 7/16 DIN(m) to N(m), DC to 7.5 GHz, 50 $\Omega$
510-93	Adapter, 7/16 DIN(m) to N(f), DC to 7.5 GHz, 50 $\Omega$
510-96	Adapter 7/16 DIN(m) to 7/16 DIN(m), DC to 7.5 GHz, 50 $\Omega$
510-97	Adapter 7/16 DIN(f) to 7/16 DIN(f), DC to 7.5 GHz, 50 $\Omega$
1030-105-R	Band Pass Filters, 890-915 MHz, N(m) to N(f), 50 $\Omega$
1030-106-R	Band Pass Filters, 1710-1790 MHz, N(m) to N(f), 50 $\Omega$
1030-107-R	Band Pass Filters, 1910-1990 MHz, N(m) to N(f), 50 $\Omega$
1030-109-R	Band Pass Filters, 824-849 MHz, N(m) to SMA(f), 50 $\Omega$
1030-110-R	Band Pass Filters, 880-915 MHz, N(m) to SMA(f), 50 $\Omega$
1030-111-R	Band Pass Filters, 1850-1910 MHz, N(m) to SMA(f), 50 $\Omega$
1030-112-R	Band Pass Filters, 2400-2484 MHz, N(m) to SMA(f), 50 $\Omega$
1030-114-R	Band Pass Filters, 806-869 MHz, N(m) to SMA(f), 50 $\Omega$
65729	Spare soft carrying case
40-168-R	Spare AC/DC adapter

\* All the capability of option 45 is included in option 65. They cannot be ordered together.

806-141	Spare automotive cigarette lighter/12 Volt DC adapter	2000-1035	Portable Antenna, SMA(m) 896 to 941 MHz, 50 Ω
760-243-R	Transit case with wheels and retractable handle for Anritsu MS2724B Handheld Spectrum Analyzer	2000-1200	Portable Antenna, SMA(m) 806 to 866 MHz, 50 Ω
2300-498	Anritsu Master Software Tools	2000-1361	Portable Antenna, SMA(m) 5725 to 5825 MHz, 50 Ω
10580-00175	Anritsu HHS A User's Guide, Model MS2724B (spare)	2000-1473	Portable Antenna, SMA(m) 870 to 960 MHz, 50 Ω
10580-00176	Anritsu HHS A Programming Manual, Model MS2724B	2000-1474	Portable Antenna, SMA(m) 1.71 to 1.88 GHz, 50 Ω
10580-00177	Anritsu HHS A Maintenance Manual, Model MS2724B	2000-1475	Portable Antenna, SMA(m) 1.92 to 1.98 GHz and 2.11 to 2.17 GHz, 50 Ω
633-44	Rechargeable battery, Li-Ion	61532	Antenna Kit: 2000-1030, 2000-1031, 2000-1032, 2000-1035, 2000-1200, and 2000-1361
2000-1374	Dual battery charger, Li-Ion with universal power supply		
2000-1411-R	Portable Yagi Antenna, 10 dBd, N(f) 822 to 900 MHz		
2000-1412-R	Portable Yagi Antenna, 10 dBd, N(f) 885 to 975 MHz		
2000-1413-R	Portable Yagi Antenna, 10 dBd, N(f) 1.71 to 1.88 GHz		
2000-1414-R	Portable Yagi Antenna, 9.3 dBd, N(f) 1.85 to 1.99 GHz		
2000-1415-R	Portable Yagi Antenna, 10 dBd, N(f) 2.4 to 2.5 GHz		
2000-1416-R	Portable Yagi Antenna, 10 dBd, N(f) 1.92 to 2.17 GHz		
2000-1030	Portable Antenna, SMA(m) 1.71 to 1.88 GHz, 50 Ω		
2000-1031	Portable Antenna, SMA(m) 1.85 to 1.99 GHz, 50 Ω		
2000-1032	Portable Antenna, SMA(m) 2.4 to 2.4835 GHz, 50 Ω		

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