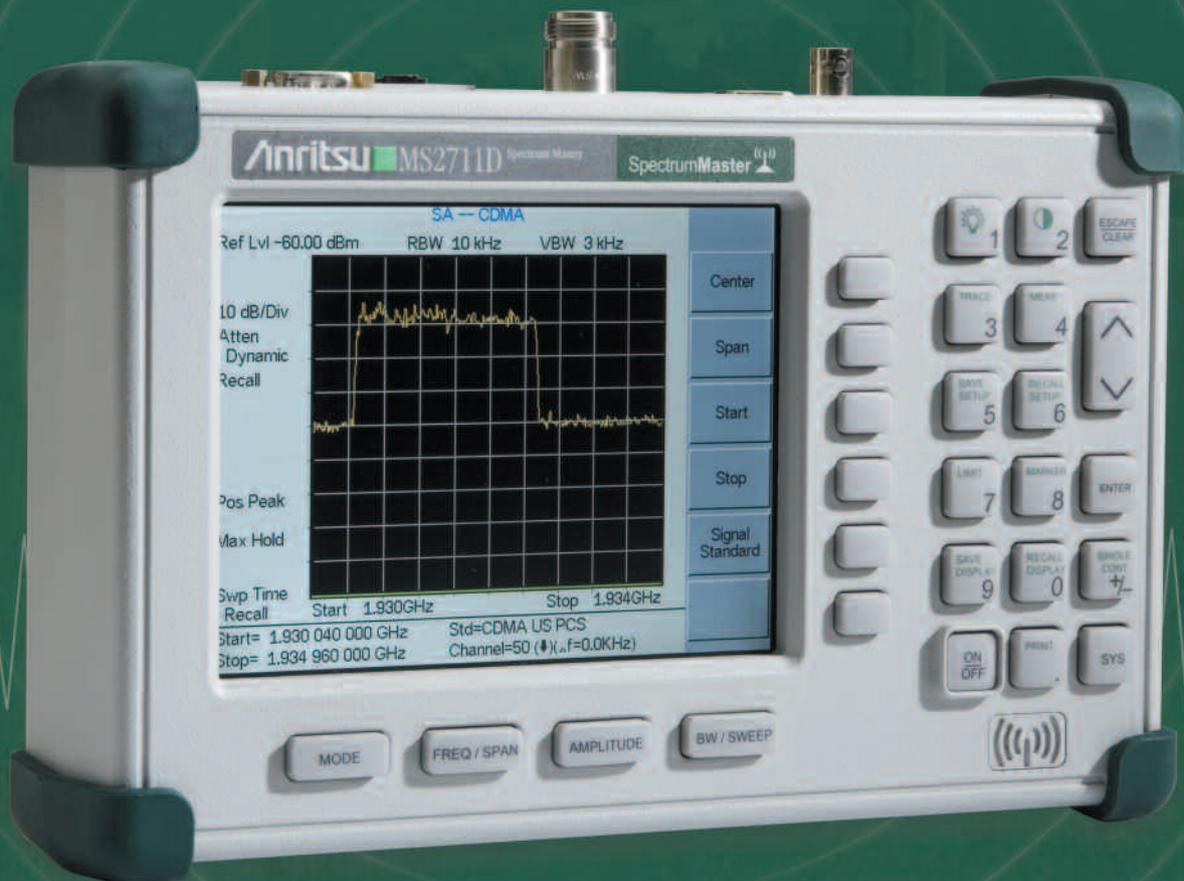


# Spectrum Master™ MS2711D

Fast, Accurate, Repeatable, Portable Spectrum Analysis



# Accurate | Rugged | Easy to use – Powerful

The Anritsu Spectrum Master MS2711D provides ultimate measurement flexibility in a package that is ruggedized for field environments and light enough for mobile applications. Unlike traditional spectrum analyzers, the MS2711D features a rugged, ultra-lightweight, battery-operated design that allows users to conduct spectrum analysis measurements – anywhere, anytime.

With the MS2711D, you can locate, identify, record, and solve communication systems problems quickly and easily, and with incredible accuracy. Whether you are installing, maintaining, or troubleshooting, the MS2711D provides exceptional performance combined with ease-of-use and broad functionality – making it a perfect solution for conducting field measurements in the 100 kHz to 3.0 GHz frequency range. For instance, it is perfect for locating the source of interfering signals. The addition of Option 25, Interference Analysis, makes the instrument particularly well suited for the application.

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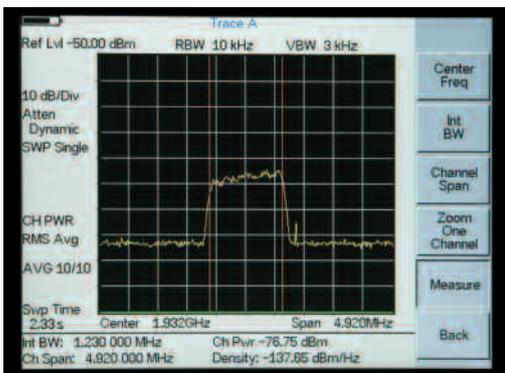
## Rugged and Reliable

Because the MS2711D was designed specifically for field environments, it can easily withstand the day-to-day punishment of field use. The analyzer is almost impervious to the bumps and bangs typically encountered by portable field-based equipment.

## Easy-to-Use

At less than five pounds, the MS2711D is the lightest fully-functional spectrum analyzer available. Operation is straightforward; measurements are obtained through a menu-driven user interface that is easy to use and requires little training. The daylight viewable TFT display is large and high-resolution, making interpreting test results easy and quick.

A full range of marker capabilities — such as peak, center, and delta functions — give users fast and comprehensive analysis of displayed signals. Limit lines simplify amplitude measurements, allowing users to create quick, simple, pass/fail tests. Frequency, span, and amplitude functions are easily configured for optimum performance. Used together with the Save Setup feature, these functions make testing easier and faster for users of all experience levels.



# Spectrum Analysis For Field Applications

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## Options

The MS2711D's capabilities expand to meet your needs. Available options include a built-in bias tee (option 10) for biasing amplifiers under test, a frequency converter controller module (option 6) to drive Anritsu frequency extension modules, an internal signal source (option 21) for transmission measurements, and an internal power meter (option 29) for accurate power measurement. External power monitor (option 5) for broadband power measurements to 50 GHz, and interference analysis (option 25) to provide a spectrogram display of signals over time, RSSI and signal strength with audible indicator. Also available are a Channel Scanner (option 27), CW Signal Generator (option 28), and a built-in GPS receiver (option 31).

## Powerful Trace Management

The unit's internal memory stores up to 10 test setups and 300 measurement traces. The stored data can be easily downloaded to a personal computer (PC) or a printer via an RS-232 serial cable. A notebook computer can be used with the RS-232 interface for automated control and data collection in the field. Handheld Software Tools™ is a powerful data analysis software that comes with every MS2711D. This software allows you to print professional reports for your customers documenting your measurements and saving the traces for future comparison.



## ≤-135 dBm Noise Floor

To meet the challenges of today's wireless systems, the revolutionary MS2711D handheld spectrum analyzer incorporates a pre-amp which increases the analyzer's sensitivity and dynamic range, and improves measurement time. The built-in pre-amp makes the MS2711D particularly effective in measuring low-level signals.

The handheld spectrum analyzer's sensitivity is ≤-135 dBm (100 Hz RBW; full span). With the preamplifier turned on, the MS2711D can identify and make measurements on low-level signals much faster than previously possible.

## +43 dBm Maximum Safe Input Level

Unlike any other spectrum analyzer on the market today, the MS2711D can tolerate an input signal of +43 dBm (20 watts) – without damage. You can be assured that the MS2711D can survive in even the toughest RF environments.



## Light Weight

Weighing less than five pounds fully loaded including a NiMH battery, this fully functional handheld spectrum analyzer is light enough to take anywhere, including up a tower.

## “Smart” Measurements

The MS2711D has dedicated routines for one-button measurements of field strength, channel power, occupied bandwidth, Adjacent Channel Power Ratio (ACPR), C/I, and interference analysis. These are increasingly critical measurements for today’s wireless communication systems. The simple interface for these complex measurements significantly reduces test time and increases analyzer usability.

## Fast Sweep Speed

The MS2711D can do a full span sweep in  $\leq 1.1$  seconds, and sweep speed in zero span can be set from less than  $50 \mu\text{s}$  up to 200 seconds. Fast sweeps simplify the capture of intermittent interfering signals.

## AM/FM/SSB Demodulator

A built-in demodulator for AM, narrowband FM, wideband FM and single sideband (selectable USB and LSB) allows a technician to easily identify interfering signals.

## Dynamic Attenuation

With Dynamic Attenuation enabled, the MS2711D automatically activates or de-activates the built-in preamplifier according to the overall input signal amplitude. Dynamic attenuation tracks the input signal level, automatically adjusting the attenuation level to protect the MS2711D in situations of high RF signal levels, or enhancing the instrument’s sensitivity in situations of low-level RF signal input.



## High Accuracy Power Meter (Option 19)

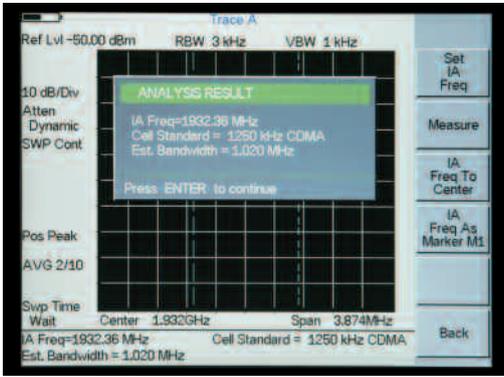
Anritsu’s PSN50 sensor makes high accuracy power measurements from 50 MHz to 6 GHz. The sensor provides true RMS measurements from  $-30$  to  $+20$  dBm enabling users to make accurate measurements for CW and digitally modulated signals such as CDMA/EV-DO, GSM/EDGE, and WCDMA/HSDPA. The sensor is equipped with an RS-232 interface for fast and easy connection to the MS2711D. Power is displayed in both dBm and Watts. Upper and lower limits can be turned on for Pass/Fail measurements.

## Transmission Measurement (Option 21)

An optional built-in 25 MHz to 3 GHz signal source provides the capability to measure loss or gain of two-port devices such as filters, cables, attenuators and amplifiers.

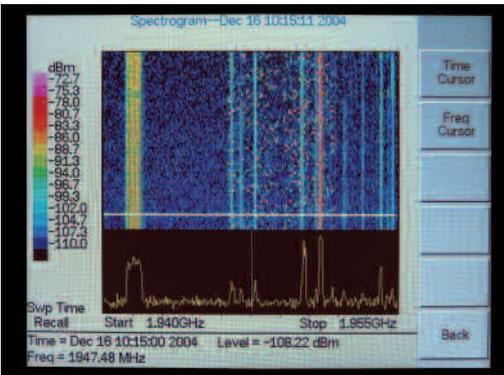
## CW Signal (Option 28)

When used with a 61534 Attenuator Kit, provides a CW signal from  $-6$  dBm to  $-80$  dBm in 1 dB step from 25 MHz to 2 GHz. The attenuator connected to the RF port can be varied from 0 to 90 dB in 1 dB steps and the splitter divides the signal into two signals: One is fed into the device under test and one is fed into the Spectrum Analyzer Receiver port. The display shows the output power and the frequency. The CW Signal mode and the Power Monitor mode can be operated simultaneously in units with both options installed providing the user with the flexibility to send out and monitor a signal at the same time.



## Carrier to Interference Measurement

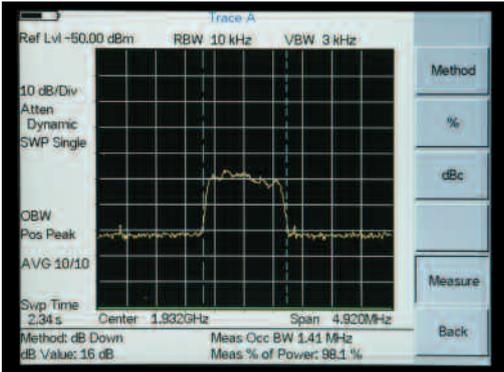
As more 802.11 access points are installed, there will be an increasing level of interference in the 2.4 GHz band occupied by this service and other devices such as cordless telephones. This measurement capability makes it simple for an access point installer to determine if the level of interference is sufficient to cause difficulty for users in the intended service area, and can show the need to change to another access channel.



## Interference Analysis

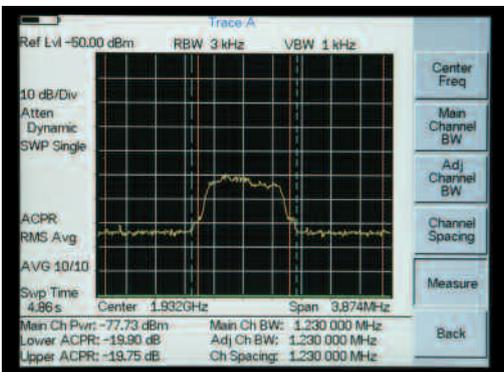
Interference Analysis is option 25 in the MS2711D. The capabilities delivered by this option are a spectrogram display that shows multiple sweeps over time with color being used to show signal amplitude. This is a powerful means of seeing interfering signals as they come and go. A received signal strength indicator (RSSI) is part of this option. RSSI shows a graph of the signal strength at a single frequency over time. Also included is an audible signal strength indicator used with a directional antenna to determine the direction of arrival of a signal.

The audible output can be heard using the built-in speaker or, for privacy, a set of headphones.



## Occupied Bandwidth

This measurement calculates the bandwidth containing the total integrated power occupied in a given signal bandwidth. There are two different methods of calculation depending on the technique used to modulate the carrier. The user can specify percent of power or the “x” dB down point, where “x” can be from 3 dB to 120 dB below the carrier.

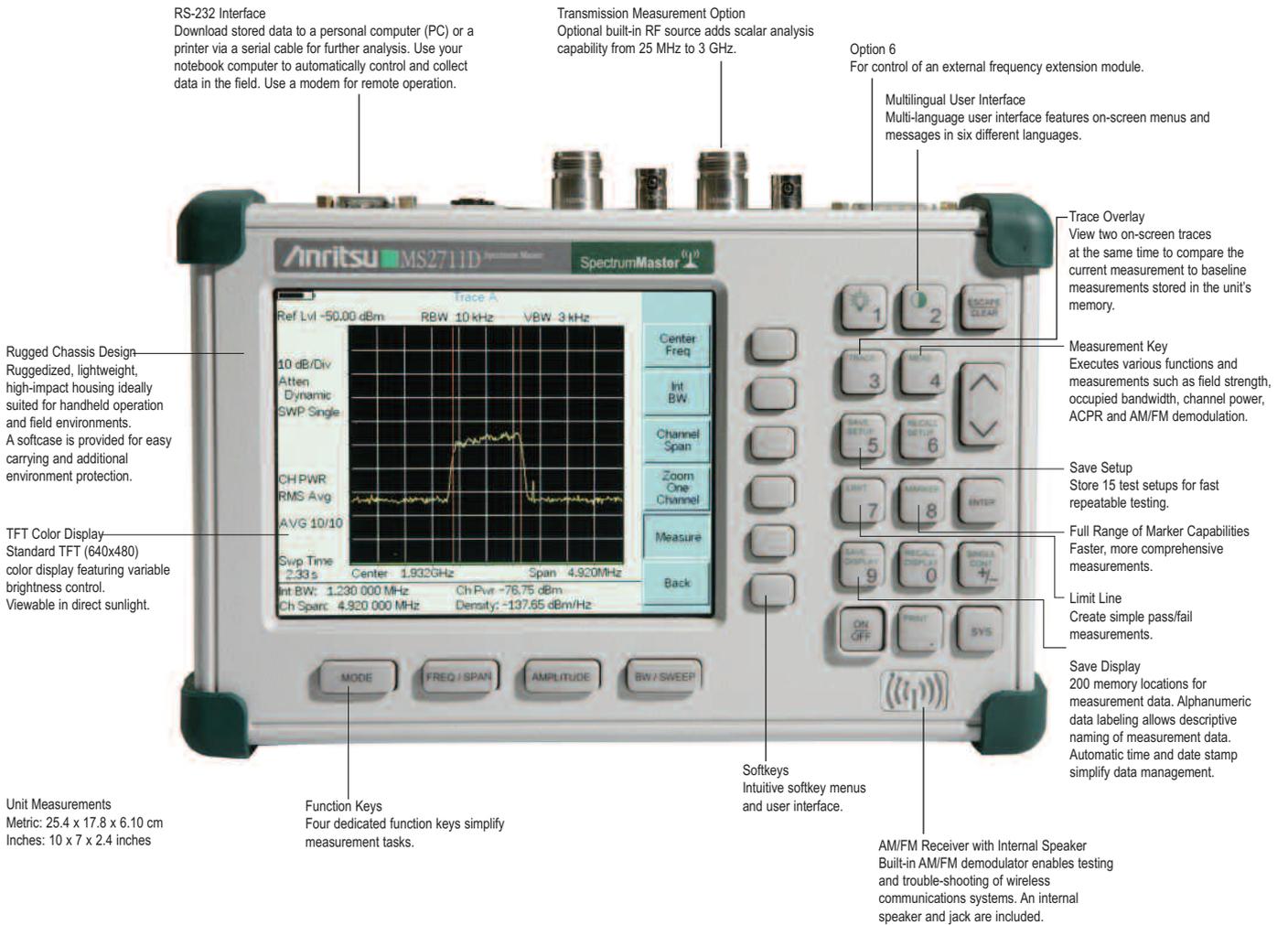


## Adjacent Channel Power Ratio

A common transmitter measurement is that of adjacent channel leakage power. This is the ratio of the amount of leakage power in an adjacent channel to the total transmitted power in the main channel. This measurement is used to replace the traditional two-tone intermodulation distortion (IMD) test for system non-linear behavior.

The result of an ACPR measurement can be expressed either as a power ratio or a power density. In order to calculate the upper and lower adjacent channel values, the MS2711D allows the adjustment of four parameters to meet specific measurement needs: main channel center frequency, measurement channel bandwidth, adjacent channel bandwidth and channel spacing. When an air interface standard is specified in the MS2711D, all these values are automatically set to the normal values for that standard.

# Spectrum Master – Fast, Accurate, Repeatable, Portable Spectrum Analysis



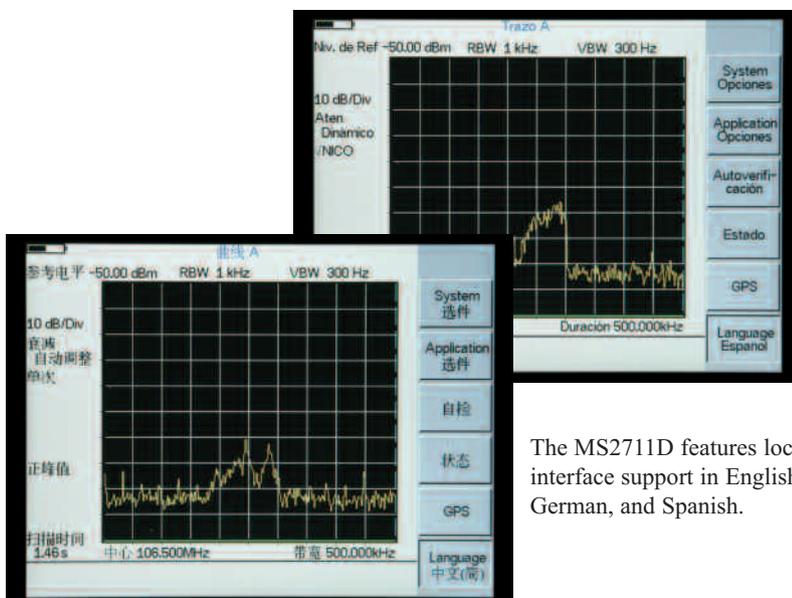
# Flexibility and Ease of Use

The FCN4760 is a block down converter for the 4.7 to 6.0 GHz frequency range. It is designed to work with an Anritsu Spectrum Master MS2711D equipped with Option 6.

This converter is primarily intended for field use by fixed wireless engineers who are responsible for the design, deployment and optimization of 802.11a networks. It is also used to conduct interference analysis measurements to determine the level of interference and locate the sources of interference.



MS2711D Spectrum Master with FCN4760 block down converter



The MS2711D features local language graphical user interface support in English, Chinese, French, German, and Spanish.

# Specifications

## Frequency

**Frequency Range:** 100 kHz to 3.0 GHz (tuneable to 9 kHz)

**Frequency Reference:** Aging:  $\pm 1$  ppm/yr, Accuracy:  $\pm 2$  ppm

**Frequency Span:** 10 Hz to 2.99 GHz in 1, 2, 5 step selections in auto mode, plus zero span

**Sweep Time:**  $\leq 1.1$  sec full span;  $\leq 50$   $\mu$ sec to 20 sec selectable in zero span

**Resolution bandwidth (-3 dB width):** 100 Hz to 1 MHz in 1-3 sequence,  $\pm 5\%$

**Video bandwidth (-3 dB):** 3 Hz to 1 MHz in 1-3 sequence,  $\pm 5\%$  typical

**SSB Phase Noise (1 GHz) at 30 kHz Offset:**  $\leq -75$  dBc/Hz

**Spurious Responses Input Related:**  $\leq -45$  dBc

**Spurious Residual Responses:**  $\leq -90$  dBm,  $\geq 10$  MHz

$\leq -80$  dBm,  $< 10$  MHz

(10 kHz RBW, pre-amp on)

## Amplitude

**Total Level Accuracy:**

$\pm 1$  dB typical ( $\pm 1.5$  dB max),  $\geq 10$  MHz to 3 GHz,

$\pm 2$  dB typical  $< 10$  MHz for input signal levels

$\geq -60$  dBm, excluding input VSWR mismatch

**Measurement Range:** +20 dBm to -135 dBm

**Input Attenuator Range:** 0 to 51 dB, selected manually or automatically coupled to the reference level. Resolution in 1 dB steps.

**Displayed Average Noise Level (Input terminated, 0 dB attenuation,**

**RMS detection, 100 Hz RBW):**

$\leq -135$  dBm,  $\geq 10$  MHz (preamp on)

$\leq -115$  dBm,  $< 10$  MHz (preamp on)

**Dynamic Range:**  $> 65$  dB typical

**Display Range:** 1 to 15 dB/division, in 1 dB steps, 10 divisions displayed

**Scale Units:** dBm, dBV, dBmV, dB $\mu$ V, V, W

**RF Input VSWR:** (with  $\geq 20$  dB attenuation), 1.5:1 typical, (10 MHz to 2.4 GHz)

## General

**Internal Trace Memory:** 300 maximum

**Setup Storage:** 10 test setups

**Display:** VGA Monochrome or VGA Color (option 3) with adjustable backlight

**Inputs and Outputs Ports:**

RF Out: Type N, female, 50 Ohm

Maximum Input without Damage: +23 dBm,  $\pm 50$  VDC

RF In: Type N, female, 50 Ohm

Maximum Input without Damage: +43 dBm (peak),  $\pm 50$  VDC

**Serial Interface:** RS-232 9 pin D-sub, three wire serial

**Electromagnetic Compatibility:** Meets European community requirements for CE marking.

**Safety:** Conforms to EN 61010-1 for Class 1 portable equipment

**Temperature:**

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

Non-operating:  $-51^{\circ}$  C to  $+71^{\circ}$  C (Recommend the battery be stored separately between  $0^{\circ}$  C and  $40^{\circ}$  C for any prolonged storage period.)

**Environmental:** MIL-PRF-28800F Class 2

**Power Supply:**

External DC Input: +12.5 to +15 VDC, 3A max

Internal: NiMH battery: 10.8 VDC, 1800 mAh

**Dimensions:**

Size (W x H x D): 25.4 cm x 17.8 cm x 6.10 cm (10.0 in x 7.0 in x 2.4 in)

Weight: 2.14 kg (4.7 lbs.) includes battery, 2.28 kg (5 lbs)

includes transmission measurement signal source

# Options

## Option 5 – Power Monitor (requires external detector)

**Detector Range:** 1A peak 150 ms, 300 mA max steady state  
**Offset Range:** -50 to +20 dBm, 10 nW to 100 nW  
**Display Range:** -80 to 80 dBm  
**Resolution:** 0.1 dB, 0.1 xW  
**Measurement Accuracy:** ±1 dB maximum for >-40 dBm and <18 GHz

## Option 6 – Frequency Converter Control Module

Connector providing internal control signals to drive an external Anritsu frequency extension module

## Option 10A – Bias Tee Specifications

**Voltage:** 12 to 24 Vdc  
**Power:** 6 W max, steady state

## Option 19 – High Accuracy Power Meter PSN50

### Sensor:

Measurement Range: -30 to +20 dBm  
Frequency Range: 50 MHz to 6 GHz  
Input Connector: Type N, male, 50 Ohm  
Max Input with 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: 20 nW max  
Zero Set: 20 nW  
Zero Drift: 10 nW max\*\*  
Sensor Linearity: ±0.13 dB max  
Instrumentation Accuracy: 0.00 dB  
Sensor Cal Factor Uncertainty: ±0.06 dB  
Temperature Compression: ±0.06 dB max  
Continuous Digital Modulation Uncertainty: +0.06 dB (+17 to +20 dBm)  
\*Excludes mismatch errors.  
Excludes noise, zero set, zero drift for levels <-20 dBm.  
Excludes digital modulation uncertainty between +17 and +20 dBm.  
\*\*After 30 minutes warm-up

### System:

Measurement Resolution: 0.01 dB  
Offset Range: ±60 dB  
Power Requirements: Supply Voltage: 8 to 18 VDC  
Supply Current: <100 mA

## Option 21 – Transmission Measurement Specifications

**Frequency Range:** 25 MHz to 3 GHz  
**Frequency Resolution:** 10 Hz  
**Output Power Level:** -10 dBm typical  
**Dynamic Range:** 80 dB, 25 MHz to 2 GHz  
60 dB, >2 GHz to 3 GHz  
(when using dynamic attenuation)  
**Output Impedance:** 50 Ohm

## Option 25 – Interference Analyzer

Signal Strength with audible tone option  
RSSI  
Spectrogram

## Option 27 – Channel Scanner

**Frequency Range:** 100 kHz to 3.0 GHz  
**Frequency Accuracy:** ±10 Hz + Time base error, 99% Confidence level  
**Measurement Range:** +20 dBm to -110 dBm  
**Channel Power:** ±1 dB typical (±1.5 dB max)  
**Adjacent Channel Power Accuracy:** ±0.75 dBc

## Option 28 – CW Signal Generator

Requires CW Signal Generator Kit (part number 61534)  
CW signal from -6 dBm to -80 dBm in 1 dB step from 25 MHz to 2 GHz when using 61534 attenuator kit.

## Option 29 – Power Meter Specifications

**Frequency Range:** 3 MHz to 3.0 GHz  
**Measurement Range:** -80 dBm to +20 dBm  
(+80 dBm with 60 dB external attenuator)  
**Display Range:** -80 dBm to +80 dBm  
**Offset Range:** 0 to +60 dB  
**Accuracy\*\*:** ±1 dB typical (±1.5 dBm max), ≥10 MHz to 3 GHz  
±2 dB typical, 3 MHz to <10 MHz  
**VSWR:** 1.5:1 typical ( $P_{in}$  > -30 dBm, >10 MHz to 2.4 GHz)  
**Maximum Power:** +20 dBm (0.1W) without external attenuator  
\*\*(Excludes Input VSWR)

## Option 31 – GPS

GPS Location Indicator  
Latitude, Longitude and Altitude on Display  
Latitude, Longitude and Altitude with trace storage

## FCN4760 – Frequency Converter Specifications

### Frequency:

Frequency Range: 4.7 GHz to 6 GHz  
Frequency Resolution: 10 Hz

### Frequency Reference:

Aging ±1 ppm/yr  
Accuracy: ±2 ppm  
SSB Phase Noise (6 GHz) at 30 kHz Offset: ≤-65 dBc/Hz  
Spurious Responses Input Related: ≤-45 dBc  
Spurious Residual Responses: ≤-90 dBm

### Amplitude:

Measurement Range: -40 dBm to -100 dBm  
Sensitivity (displayed average noise level): -100 dBm  
Accuracy: ±1.25 dB typical (±1.75 dB max.)  
Maximum Input Level without Damage: -5 dBm

### General:

Input and Output Ports: RF In: Type N, female, 50 Ohm  
RF Out (to MS2711D): Type N, male, 50 Ohm  
Communication Interface: Proprietary

**Electromagnetic Compatibility:** Meets European community requirements for CE marking

**Safety:** Conforms to EN 61010-1 for Class 1 portable equipment

**Operating Temperature:** -10 °C to 50 °C, humidity 85% or less -50 °C to -80 °C

**Power Dissipation:** 850 mW max

### Dimensions:

Size (W x H x D): 6.6 cm x 10.9 cm x 3.3 cm (2.6 in. x 4.3 in. x 1.3 in.)  
Weight: <0.45 kg (<1 lb.)

# Ordering Information

**Model:** MS2711D - Handheld Spectrum Analyzer: 100 kHz to 3 GHz

## Standard Accessories Include

10580-00097	MS2711D Spectrum Master User's Guide
48258	Soft Carrying Case
40-168	AC – DC Adapter with Power Cord
806-62	Automotive Cigarette Lighter/12 Volt DC Adapter
2300-347	Handheld Software Tools CDROM

## Serial Interface Cable

Rechargeable battery, NiMH  
Daylight viewable TFT color display now included at no extra charge  
One Year Warranty

## Options

Option 5	Power Monitor (requires external detector)
Option 6	Frequency Converter Control Module
Option 10A	Bias Tee
Option 19	High Accuracy Power Meter (PSN50 sensor not included)
Option 21	Transmission Measurement
Option 25	Interference Analyzer (best with directional antenna)
Option 27	Channel Scanner
Option 28	CW Signal Generator (requires CW Signal Generator Kit p/n: 61534)
Option 29	Power Meter
Option 31	GPS (requires GPS antenna)

## Optional Accessories

FCN4760	Frequency Converter, 4.7 to 6.0 GHz
PSN50	High Accuracy Power Sensor, 50 MHz to 6 GHz
34NN50A	Precision Adapter, DC to 18 GHz, 50 Ohm, N(m) to N(m)
34NFN50C	Precision Adapter, DC to 18 GHz, 50 Ohm, N(f) to N(f)
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 6.0 GHz, 50 Ohm
510-91	Adapter, 7/16 DIN (f)-N(f), DC to 6.0 GHz, 50 Ohm
510-92	Adapter, 7/16 DIN (m)-N(m), DC to 6.0 GHz, 50 Ohm
510-93	Adapter, 7/16 DIN(m)-N(f), DC to 6.0 GHz, 50 Ohm
510-96	Adapter 7/16 DIN (m) to 7/16 DIN (m), DC to 6.0 GHz, 50 Ohm

1030-109	Filter, Bandpass, 836.5 MHz Ctr Freq, 25.8 MHz BW, N(m) to SMA(f), 50 Ohm
1030-110	Filter, Bandpass, 897.5 MHz Ctr Freq, 35 MHz BW, N(m) to SMA(f), 50 Ohm
1030-111	Filter, Bandpass, 1.88 GHz Ctr Freq, 63.1 MHz BW, N(m) to SMA(f), 50 Ohm
1030-112	Filter, Bandpass, 2.442 GHz Ctr Freq, 85.1 MHz BW, N(m) to SMA(f), 50 Ohm

61534 CW Signal Generator Kit with variable step attenuator

510-97	Adapter 7/16 DIN (f) to 7/16 DIN (f), 7.5 GHz
48258	Spare soft carrying case
40-168	Spare AC/DC adapter
806-62	Spare automotive cigarette lighter/12 Volt DC adapter
800-441	Spare serial interface cable
760-235	Transit case for Anritsu Handheld Spectrum Analyzer
2300-347	Anritsu Handheld Software Tools CDROM
10580-00097	MS2711D Spectrum Master User's Guide (spare)
10580-00098	MS2771D Spectrum Master Programming Manual
10580-00099	MS2711D Spectrum Master Maintenance Manual
633-27	Rechargeable battery, NiMH
551-1691	USB to Serial adapter
70-28	Headset

2000-1029	Battery charger, NiMH with universal power supply
2000-1030	Portable antenna, 50 Ohm, SMA(m) 1.71-1.88 GHz
2000-1031	Portable antenna, 50 Ohm, SMA(m) 1.85-1.99 GHz
2000-1032	Portable antenna, 50 Ohm, SMA(m) 2.4-2.5 GHz
2000-1035	Portable antenna, 50 Ohm, SMA(m) 896-941 MHz
2000-1200	Portable antenna, 50 Ohm, SMA(m) 806-869 MHz

2000-1473	SMA(m), 870 to 960 MHz, 50 Ohm
2000-1474	SMA(m), 1.71 to 1.88 GHz, 50 Ohm
2000-1475	SMA(m), 1920 to 1980, 2.11 to 2.17 GHz, 50 Ohm

2000-1411	Portable YAGI Antenna, N(f), 822-900 MHz, 10 dBd
2000-1412	Portable YAGI Antenna, N(f), 885-975 MHz, 10 dBd
2000-1413	Portable YAGI Antenna, N(f), 1.71-1.88 GHz, 10 dBd
2000-1414	Portable YAGI Antenna, N(f), 1.85-1.99 GHz, 9.3 dBd
2000-1415	Portable YAGI Antenna, N(f), 2.4-2.5 GHz, 12 dBd
2000-1416	Portable YAGI Antenna, N(f), 1.92-2.23 GHz, 12 dBd

## Printer

2000-1214	HP DeskJet 450 printer Includes: interface cable, black print cartridge, and US power cable
2000-1216	Black print cartridge for DeskJet 450 printer
2000-1217	Rechargeable battery for DeskJet 450 printer
2000-1218	Power cable (UK) for DeskJet printer
2000-663	Power cable (Europe) for DeskJet printer
2000-664	Power cable (Australia) for DeskJet printer
2000-667	Power cable (So. Africa) for DeskJet printer
2000-753	Null Modem Serial-to-Parallel converter cable

# Ordering Information (Continued)

## Power Monitor - Detectors

The 5400 and 560 Series Detectors use zero-biased Schottky diodes. Measurement range is  $-55$  dBm to  $+16$  dBm using single cycle per sweep AC detection, auto-zeroing with DC detection during the frequency sweep. Extender cables of over 3000 feet can be used with the MS2711D Spectrum Master.

Model	Frequency Range	Impedance	Return Loss	Input Connector	Frequency Response
5400-71N50	0.001 to 3 GHz	50 Ohm	26 dB	N(m)	$\pm 0.2$ dB, <1 GHz $\pm 0.3$ dB, <3 GHz
560-7N50B	0.01 to 20 GHz	50 Ohm	15 dB, <0.04 GHz 22 dB, <8 GHz 17 dB, <18 GHz 14 dB, <20 GHz	N(m)	$\pm 0.5$ dB, <18 GHz $\pm 1.25$ dB, <20 GHz
560-7S50B	0.01 to 20 GHz	50 Ohm	15 dB, <0.04 GHz 22 dB, <8 GHz 17 dB, <18 GHz 14 dB, <20 GHz	WSMA(m)	$\pm 0.5$ dB, <18 GHz $\pm 1.25$ dB, <20 GHz
560-7K50	0.01 to 40 GHz	50 Ohm	12 dB, <0.04 GHz 22 dB, <8 GHz 17 dB, <18 GHz 15 dB, <26.5 GHz 14 dB, <32 GHz 13 dB, <40 GHz	K(m)	$\pm 0.5$ dB, <18 GHz $\pm 1.25$ dB, <26.5 GHz $\pm 2.2$ dB, <32 GHz $\pm 2.5$ dB, <40 GHz
560-7VA50	0.01 to 50 GHz	50 Ohm	12 dB, <0.04 GHz 19 dB, <20 GHz 15 dB, <40 GHz 10 dB, <50 GHz	V(m)	$\pm 0.8$ dB, <20 GHz $\pm 2.5$ dB, <40 GHz $\pm 3.0$ dB, <50 GHz

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