Technical Data Sheet

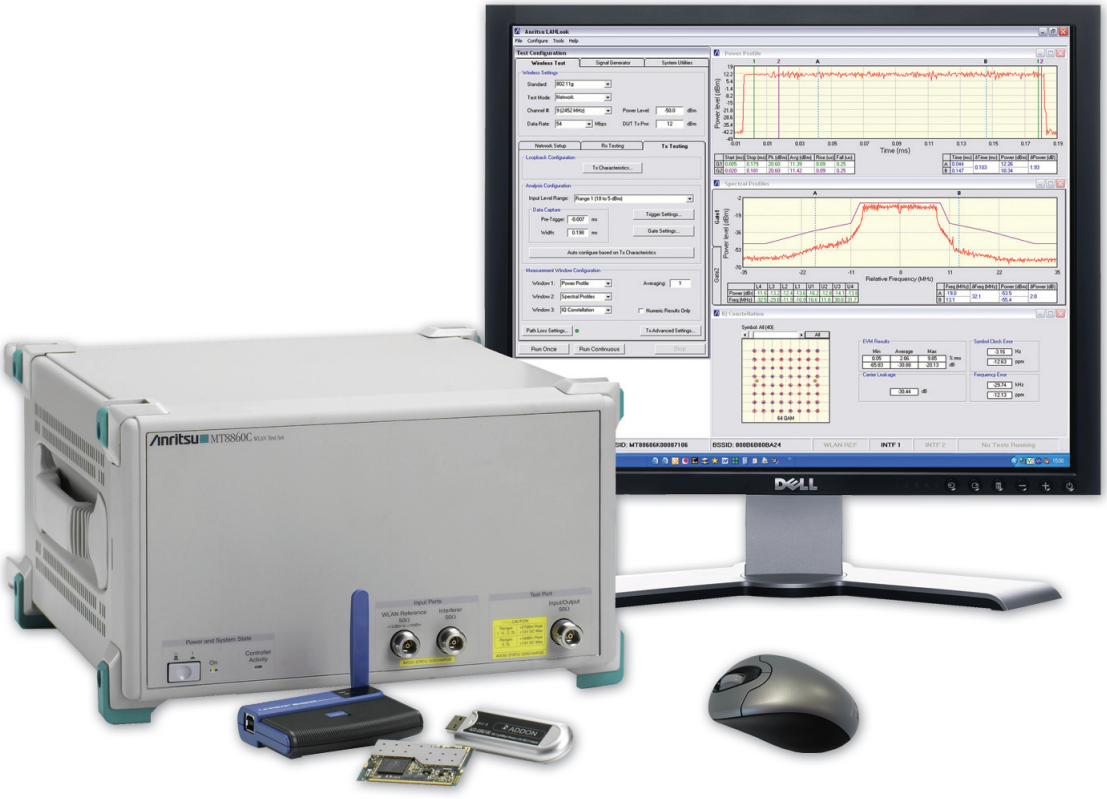
WLAN Test Set

MT8860C

Introduction

This document provides specifications for the MT8860C WLAN Test Set and lists ordering information and option and accessory codes.

A color brochure is also available (part number 11410-00393) from the Anritsu website (*www.us.anritsu.com*). The color brochure provides a detailed description of the MT8860C and highlights its features and benefits when testing a wide range of WLAN products..



Specifications

Characteristic / Parameter		Specification		
Wireless Test Mode		Standards supported: IEEE Std 802.11b-1999 IEEE Std 802.11g-2003 IEEE Std 802.11a-1999 (Option 14) IEEE Std 802.11n-2009 (Option 17) IEEE Std 802.11-2007		
Supported Channels				
802.11b / 802.11g (DSSS)		Channels 1 to 14 (2412 – 2484 MHz)		
802.11g (OFDM)		Channels 1 to 13 (2412 – 2472 MHz)		
802.11a		Channels 36, 40, 44, 48 (5150 – 5250 MHz) Channels 52, 56, 60 ,64 (5250 – 5350 MHz) Channels 100, 104, 108, 112, 116, 120, 124, 128, 132, 136, 140 (5470 – 5725 MHz) Channels 149, 153, 157, 161,165 (5725 – 5825 MHz)		
802.11n (20 MHz channel bandwidth)	Frequency Band			
	2.4 GHz	Channels 1 to 13 (2412 – 2472 MHz)		
	5 GHz	Channels 36, 40, 44, 48 (5150 – 5250 MHz) Channels 52, 56, 60 ,64 (5250 – 5350 MHz) Channels 100, 104, 108, 112, 116, 120, 124, 128, 132, 136, 140 (5470 – 5725 MHz) Channels 149, 153, 157, 161,165 (5725 – 5825 MHz)		
802.11n (40 MHz channel bandwidth)	Frequency Band	40 MHz channels are specified in the format (Primary Channel, Secondary), where Secondary = ±1		
		Secondary = +1	Secondary = –1	
	2.4 GHz	Primary Channels 1 to 9	Primary Channels 5 to 13	
	5 GHz	Primary Channels 36, 44 Primary Channels 52, 60 Primary Channels 100, 108, 116, 124, 132 Primary Channels 149, 157	Primary Channels 40, 48 Primary Channels 56, 64 Primary Channels 104, 112, 120, 128, 136 Primary Channels 153, 161	
Data Rates and Modulation				
802.11b / 802.11g (DSSS)		1 Mbps 11-chip Barker DBPSK 2 Mbps 11-chip Barker DQPSK 5.5 Mbps CCK DQPSK 11 Mbps CCK DQPSK		
802.11g (OFDM) 802.11a		6, 9, 12, 18, 24, 36, 48, 54 Mbps OFDM (BPSK, QPSK, 16-QAM, 64-QAM)		
802.11n (non-HT)		PPDU Types:	20 MHz, 40MHz Upper, 40 MHz Lower, 40 MHz Duplicate	
		1 Mbps 11-chip Barker DBPSK 2 Mbps 11-chip Barker DQPSK 5.5 Mbps CCK DQPSK 11 Mbps CCK DQPSK 6, 9, 12, 18, 24, 36, 48, 54 Mbps OFDM (BPSK, QPSK, 16-QAM, 64-QAM)		
802.11n (HT)		PPDU HT Formats:	HT-Mixed Mode, (HT-Greenfield: Tx test only)	
		PPDU Types:	20 MHz, 40 MHz, (40 MHz Upper, 40 MHz Lower: Tx test only), 40 MHz Duplicate	
		Modulation & Coding Scheme:	MCS Index 0 to 7 and MCS 32 (Duplicate)	
		Guard Interval:	HT-Mixed Mode:	Long (800 ns), Short (400 ns)
			HT-Greenfield:	Long (800 ns) only
		Data Rates:	20 MHz channel b/w:	6.5, 7.2, 13, 14.4, 19.5, 21.7, 26, 28.9, 39, 43.3, 52, 57.8, 58.5, 65, 72.2 Mbps
			40 MHz channel b/w:	6, 6.7, 13.5, 15, 27, 30, 40.5, 54, 60, 81, 90, 108, 120, 121.5, 135, 150 Mbps
		Modulation:	OFDM (BPSK, QPSK, 16-QAM, 64-QAM)	

Characteristic / Parameter	Specification	
Operating Modes	Two modes of operation are supported; Network Mode and Direct Mode	
Network Mode (802.11b, 802.11g, 802.11a only)	In Network mode, standard protocol messaging is used to establish a network connection between the MT8860C and a WLAN device. Once aconnection is made, the receiver and transmitter characteristics of the device under test (DUT) can be tested	
Receiver Measurements	Packet Error Rate (PER) at defined level Frame Reception Rate (FRR) at defined level	
Unicast Packet Type	The MT8860C transmits data packets containing the MAC address of the DUT and automatically calculates the PER or FRR based on the number of acknowledgement (ACK) packets it receives in response from the DUT. PER (%) = [1 - (ACKs received from DUT / data packets transmitted by MT8860C)] x 100 FRR (%) = (ACKs received from DUT / data packets transmitted by MT8860C) x 100	
Broadcast Packet Type	MT8860C transmits data packets containing the broadcast address (FFFFFFFFFFFF). The PER/FRR is calculated externally and requires access to the DUT receive frame registers. These are normally available from the DUT client software under “Advanced Information”. PER (%) = [1 - (good packets reported by DUT / data packets transmitted by MT8860C)] x 100 FRR (%) = (good packets reported by DUT / data packets transmitted by MT8860C) x 100	
Transmitter Measurements		
Data Frame Type	The MT8860C transmits ICMP echo request packets and then analyzes the echo reply packets returned by the DUT in response	
	Supported Measurements	All transmitter measurements stated in the 802.11b and 802.11g / 802.11a sections are supported (see below)
ACK Frame Type	The MT8860C transmits Unicast packets and then analyzes the ACK packets returned by the DUT in response. This testing methodology is specified by the CTIA / Wi-Fi Alliance in the CWG Test Plan that is used to evaluate the RF Performance of Wi-Fi Mobile	
	Supported Measurements	ACK frames have a short time duration, As a result, analysis is limited to the following measurements;
	(802.11b / 802.11g DSSS)	Average, Peak and Crest Factor Power Power-On and Power-Down Ramp Spectrum Mask / Mask Segment Occupied Bandwidth (OBW), Power Spectral Density (PSD) RF Carrier Suppression
	(802.11g OFDM / 802.11a)	Average, Peak and Crest Factor Power Power-On and Power-Down Ramp CCDF
Network Mode Configuration Settings		
MT8860C Role (Connection Type)	Infrastructure and Ad-Hoc	
Infrastructure	Supports Access Point and Client (STA) modes	
Ad-Hoc	Supports creating and joining a network	
SSID (Network Name)	Supported in Access Point and Ad-Hoc creation modes (32 characters maximum)	
Beacon Configuration	The MT8860C periodically transmits beacon management frames so that a connection can be established and maintained with a DUT. The following beacon parameters can be adjusted;	
	Beacon Interval: Operational Rate Set: DSSS Preamble Format:	20 to 1000 (default 200) All Rates, Multiple Rates, Single Rate, User-defined Long, Short
	NOTE: The Beacon Interval represents a number of time units (TU), with 1 TU being equal to 1024µs	
	In addition, the following Information Elements can included in the beacon (and other) management frames;	
	ERP Information Element	
	Country Information Element	The parameters regional code, first channel number, number of channels and maximum transmit power level can be specified
	Vendor Specific Information Element	Up to 32 characters can be specified in the contents field
IP Properties	The IP settings of the DUT can be assigned manually or automatically via DHCP	
Direct Mode (802.11b, 802.11g, 802.11a, 802.11n)	In Direct mode, the DUT is controlled directly by using the appropriate chipset vendor control software	
Receiver Measurements	The MT8860C transmits a defined number of packets to the DUT. Chipset vendor control software is required to read the DUT receiver packet count register	
Transmitter Measurements	The DUT is configured for continuous transmission using chipset vendor control software. The MT8860C acts as a transmitter analyzer for measurements on the packets received. All transmitter measurements stated in the 802.11b, 802.11g / 802.11a and 802.11n sections are supported (see below)	

Characteristic / Parameter	Specification	
802.11b Measurements	The following applies to data rates of 1, 2, 5.5 and 11 Mbps that use DSSS modulation	
Transmit Power Levels	IEEE Std 802.11b-1999 / IEEE Std 802.11-2007 (18.4.7.1)	
Definition	Average, peak and crest factor power measurements derived from gate 1 or 2	
Damage Level	> +27 dBm	
Dynamic Range	Low Noise Mode:	+24 dBm to –50 dBm average power (+27 dBm peak)
	Low ACP Mode:	+20 dBm to –50 dBm average power (+23 dBm peak)
Accuracy (CW)	Data Frame Type:	± 0.6 dB (+24 dBm to –30 dBm) ± 1.0 dB (–30 dBm to –50 dBm)
	ACK Frame Type:	± 0.8 dB (+24 dBm to –30 dBm) ± 1.2 dB (–30 dBm to –50 dBm)
Resolution	dBm to 2 decimal places	
Capture Width	10 µs to 5.95 ms	
Time Resolution	0.1 µs marker resolution with 10 µs time window	
Transmit Power Level Control	IEEE Std 802.11b-1999 / IEEE Std 802.11-2007 (18.4.7.2)	
Definition	Peak and Average Power specification as for 18.4.7.1	
Transmit Spectrum Mask	IEEE Std 802.11b-1999 / IEEE Std 802.11-2007 (18.4.7.3)	
Definition	Spectrum measurement derived from gate 1 or 2	
Gate Width	From gate 1 or 2, 50 µs to 5.95 ms	
Frequency Span	70 MHz (fc ± 35 MHz)	
Flatness over Frequency Span	± 1 dB	
Linearity	± 0.8 dB (50 dB dynamic range CW measurements)	
Resolution	dBr to 1 decimal place	
Range (modulated carrier power)	Low Noise Mode:	+24 dBm to –40 dBm
	Low ACP Mode:	+20 dBm to –40 dBm
Dynamic Range	> 50 dB (usable dynamic range with Dither Mode set to ON)	
Receiver Resolution Bandwidth	Equivalent to 100 kHz Gaussian	
Noise Floor (for all supported channels)	–110 dBm (with Input Level Range 3L selected)	
Spurious Specification (for all supported channels)	<–52 dBc (with Dither Mode set to ON)	
Measurement Configuration		
Dither Mode	OFF Default mode ON Additional Signal processing removes spurs from the spectral measurement	
RF Optimization Mode	User selection of Low Noise or Low ACP (default Low Noise)	
Transmit Center Frequency Tolerance	IEEE Std 802.11b-1999 / IEEE Std 802.11-2007 (18.4.7.4)	
Definition	Average Frequency of the DSSS carrier signal	
Data Output Format	Hz and ppm	
Accuracy	± 1 kHz ± reference frequency oscillator error (ppm) for measurement gate > 1 ms	
Resolution	Hz to 2 decimal places, ppm to 2 decimal places	
Chip Clock Frequency Tolerance	IEEE Std 802.11b-1999 / IEEE Std 802.11-2007 (18.4.7.5)	
Definition	Frequency error relative to 11MHz chip clock. Measurement averaged over a fully coded DSSS packet with minimum payload length of 3,300 chips (300 µs)	
Data Output Format	Hz and ppm	
Range	± 50 ppm	
Resolution	Hz to 2 decimal places, ppm to 2 decimal places	
Analysis Length	3,300 to 30,250 chips (default 5,500 chips)	
Transmit Power-On & Power-Down Ramp	IEEE Std 802.11b-1999 / IEEE Std 802.11-2007 (18.4.7.6)	
Definition	Time for the burst to transition from 10% to 90% or 90% to 10% of linear power	
Resolution	0. 1µs	
Data Outputs	10%, 90% and delta values	
RF Carrier Suppression	IEEE Std 802.11b-1999 / IEEE Std 802.11-2007 (18.4.7.7)	
Definition	Relative level of the carrier to highest sideband for a 10101010 test pattern, scrambler disabled, data rate 2 Mbps	
Range	As spectral mask range	
Dynamic Range	As spectral mask dynamic range	
Flatness	As spectral mask flatness	
Linearity	As spectral mask linearity	
Resolution	As spectral mask resolution	

Characteristic / Parameter	Specification	
Transmit Modulation Accuracy	IEEE Std 802.11b-1999 / IEEE Std 802.11-2007 (18.4.7.8)	
Definition	Peak and Average Error Vector Magnitude measurement performed for DBPSK and DQPSK modulated packets. Measurement averaged over a fully coded DSSS packet with minimum payload length of 220 chips (20 µs)	
Measurement Accuracy	< 10% residual RMS EVM; +24 dBm to –45 dBm	
Modulation	Setting Data rate 1, 2, 5.5 or 11 Mbps	
Displayed Measurement Range	1% to 100% dependent on modulation	
Measurement Configuration		
EVM Calculation Method	rms Error Vector	The EVM measurement is performed using the 'classic' definition for EVM (rms Error Vector) and is calculated using chips that are transmitted during the PSDU (payload) of the packet
	11b Modulation Accuracy	The EVM measurement is performed using the definition in 18.4.7.8 and is calculated over 1,000 chips that are transmitted during the PLCP preamble and header
RX Filter Selection	Selectable between; None Gaussian, BT 0.3 to 1.0 (default 0.5), resolution 0.1 Root Raised Cosine, α 0.30 to 1.00 (default 0.35), resolution 0.01	
Analysis Length	220 to 11,000 chips (default 1,000 chips)	
Receiver Minimum Input Sensitivity	IEEE Std 802.11b-1999 / IEEE Std 802.11-2007 (18.4.8.1)	
Definition	Packet Error Rate (PER) at defined power level	
Power Range	See Reference Radio Transmitter section	
Mode	Network:	MT8860C forms a connection with the DUT. Unicast and Broadcast Packets supported
	Direct:	MT8860C transmits defined number of packets
Data Packet Structure	Complies with 802.11 specifications for MAC header formatting, scrambling, encoding, interleaving and calculation of the appropriate CRC/FCS checksum	
Number of Transmitted Packets	1 to 10,000 (default 500)	
Payload Length	60 to 1,500 bytes (default 1,024 bytes)	
Preamble Format	Long or Short	
Payload	All 0's, 0101, Counting, PN7, 1010, Random (Payload data scrambled over the air)	
Data Rates	1, 2, 5.5 or 11 Mbps	
Network Mode Settings		
Inter-packet Interval	0 to 65535 ms	
Inter-packet Resolution	1 ms	
DUT TX Power Level	–30 to +30 dBm This is the expected power level of the ACK packet transmitted by the DUT in response to a correctly received Unicast packet. This value is used by the MT8860C to calculate the amount of return path attenuation required to prevent MT8860C reference radio receiver saturation	
Direct Mode Settings		
Inter-packet Spacing	0 to 200 slots (default 5 slots)	
Inter-packet Resolution	20 µs	
DUT MAC Address Range	00-00-00-00-00-00 to FF-FF-FF-FF-FF-FF	
Receiver Maximum Input Level	IEEE Std 802.11b-1999 / IEEE Std 802.11-2007 (18.4.8.2)	
Definition	Receiver PER specification as for 18.4.8.1 (above)	
Receiver Adjacent Channel Rejection	IEEE Std 802.11b-1999 / IEEE Std 802.11-2007 (18.4.8.3)	
Definition	Adjacent Channel measurements made with external modulated signal source (e.g.MG3700A) using Interferer input port	
Additional TX Measurements		
Occupied Bandwidth (OBW)	Measures the frequency range within which the specified percentage power is contained	
Occupied Bandwidth Percentage	1 to 99%	
Power Spectral Density (PSD)	As per ETSI EN 300-328 (4.3.2 / 5.7.3). The maximum power measured in a 1 MHz bandwidth within the occupied bandwidth of the signal	
Additional RX Measurements		
Frame Reception Rate (FRR)	As defined in the CTIA / Wi-Fi Alliance CWG RF Test Plan FRR (%) = (ACKs received from DUT / data packets transmitted by MT8860C) x 100 Specification as for 18.4.8.1 (above)	

Characteristic / Parameter	Specification	
802.11g Measurements **802.11a Measurements**	The following applies to data rates 6, 9, 12, 18, 24, 36, 48 and 54 Mbps that use OFDM modulation (For DSSS data rates, please refer to the 802.11b measurement section above)	
Transmit Power Levels	IEEE Std 802.11g-2003 / IEEE Std 802.11-2007 (19.4.7.1) IEEE Std 802.11a-1999 / IEEE Std 802.11-2007 (17.3.9.1)	
Definition	Average, peak and crest factor power measurements on OFDM modulated signals on the supported channels	
Damage Level	> +27 dBm	
Dynamic Range	+18 dBm to -50 dBm average power (+27 dBm peak)	
Accuracy (CW)	Data Frame Type:	± 0.6 dB (+18 dBm to –30 dBm) ± 1.0 dB (–30 dBm to –50 dBm)
	ACK Frame Type:	± 0.8 dB (+18 dBm to –30 dBm) ± 1.2 dB (–30 dBm to –50 dBm)
Resolution	dBm to 2 decimal places	
Capture Width	10 µs to 5.95 ms	
Time Resolution	0.1 µs marker resolution with 10 µs time window	
Transmit Spectrum Mask	IEEE Std 802.11g-2003 / IEEE Std 802.11-2007 (19.5.4) IEEE Std 802.11a-1999 / IEEE Std 802.11-2007 (17.3.9.2)	
Definition	Display of Spectrum measurement derived from gate 1 or 2	
Gate Width	From gate 1 or 2, 50 µs to 5.95 ms	
Frequency Span	70 MHz (fc ± 35 MHz)	
Flatness over Frequency Span	± 1 dB	
Linearity	± 0.8 dB (50 dB dynamic range CW measurements)	
Resolution	dBr to 1 decimal place	
Range (modulated carrier power)	+18 dBm to –40 dBm	
Dynamic Range	(Usable dynamic range for signals with 8 dB crest factor and Dither Mode set to ON) ± 11 MHz from fc; 30 dB (typical 46 dB) ± 20 MHz from fc; 40 dB (typical 48 dB) ± 30 MHz from fc; 43 dB (typical 50 dB)	
Receiver Resolution Bandwidth	Equivalent to 100 kHz Gaussian	
Noise Floor (for all supported channels) 802.11g 802.11a	(With Input Level Range 3L selected) -110 dBm -105 dBm	
Spurious Specification (for all supported channels) 802.11g 802.11a	(With Dither Mode ON) < –45 dBc < –43 dBc	
Measurement Configuration		
Dither Mode	OFF Default mode ON Additional Signal processing removes spurs from the spectral measurement	
Transmit Center Frequency Tolerance	IEEE Std 802.11g-2003 / IEEE Std 802.11-2007 (19.4.7.2) IEEE Std 802.11a-1999 / IEEE Std 802.11-2007 (17.3.9.4)	
Definition	Average Frequency of the OFDM carrier signal	
Data Output Format	Hz and ppm	
Accuracy	± 1 kHz ± reference frequency oscillator error (ppm) for measurement gate >1 ms	
Resolution	Hz to 2 decimal places, ppm to 2 decimal places	
Symbol Clock Frequency Tolerance	IEEE Std 802.11g-2003 / IEEE Std 802.11-2007 (19.4.7.3) IEEE Std 802.11a-1999 / IEEE Std 802.11-2007 (17.3.9.5)	
Definition	Frequency error relative to 250 kHz symbol clock as per 19.4.7.3 / 17.2.9.5. Measurement averaged over a fully coded OFDM packet with minimum payload length of 16 symbols (64 µs)	
Data Output Format	Hz and ppm	
Range	± 40 ppm	
Resolution	Hz to 2 decimal places, ppm to 2 decimal places	
Analysis Length	16 to 500 symbols (default 55 symbols)	
Transmitter Center FrequencyLeakage	IEEE Std 802.11g-2003 / IEEE Std 802.11-2007 (19.4.7) IEEE Std 802.11a-1999 / IEEE Std 802.11-2007 (17.3.9.6.1)	
Definition	Measurement of the leakage of the center carrier	
Data Output Format	dB	
Resolution	dB to 2 decimal places	

Characteristic / Parameter	Specification	
Transmitter Spectral Flatness	IEEE Std 802.11g-2003 / IEEE Std 802.11-2007 (19.4.7) IEEE Std 802.11a-1999 / IEEE Std 802.11-2007 (17.3.9.6.2)	
Definition	Graphical display of RF sub-carrier power level Display includes limit lines (as per 17.2.9.6.2) Overall Pass/ Fail status indicated For measurement failure, a numeric measurement result of the failing sub-carrier(s) is reported	
Unit of Measurement	dBr	
Transmitter Modulation Accuracy	IEEE Std 802.11g-2003 / IEEE Std 802.11-2007 (19.7.2.7) IEEE Std 802.11a-1999 / IEEE Std 802.11-2007 (17.3.9.6.3)	
Definition	Peak and Average EVM. Measurement averaged over a fully coded OFDM packet with minimum payload length of 16 symbols (64 µs)	
Measurement Accuracy 802.11g 802.11a	(54 Mbps, +18 dBm to –45 dBm) < 2% residual RMS EVM < 2.3% residual RMS EVM (typical < 2%)	
Modulation Setting	Data rates 6, 9, 12, 18, 24, 36, 48 or 54 Mbps	
Data Output Format	Peak and Average EVM pilots only, dB or percentage Peak and Average EVM on each sub carrier (frequency domain), % vs sub-carrier –26 to +26 EVM vs Symbol (time domain), % vs symbol number, 1 to specified analysis length	
Measurement Configuration		
Analysis Length	16 to 500 symbols (default 40 symbols)	
OFDM Pilot Tracking	User selection of Phase tracking only or Phase and Amplitude tracking (default Phase tracking only)	
Channel Estimation	User selection of Long Training Sequence or Full Packet (default Long Training Sequence)	
Receiver Minimum Input Sensitivity	IEEE Std 802.11g-2003 / IEEE Std 802.11-2007 (19.5.1) IEEE Std 802.11a-1999 / IEEE Std 802.11-2007 (17.3.10.1)	
Definition	Packet Error Rate (PER) at defined power level	
Power Range	See Reference Radio Transmitter section	
Mode	Network:	MT8860C forms a connection with the DUT. Unicast and Broadcast Packets supported
	Direct:	MT8860C transmits defined number of packets
Data Packet Structure	Adheres to relevant 802.11 specifications for MAC header formatting, scrambling, encoding, interleaving and calculation of the appropriate CRC/FCS checksum	
Number of Transmitted packets	1 to 10,000 (default 500)	
Payload Length	60 to 1,500 bytes (default 1,024 bytes)	
Payload	All 0's, 0101, Counting, PN7, 1010, Random (Payload data is scrambled over the air)	
Data Rates	6, 9, 12, 18, 24, 36, 48 or 54 Mbps	
Network Mode Settings		
Inter-packet Interval	0 to 65535 ms	
Inter-packet Resolution	1 ms	
DUT TX Power Level	–30 to +30 dBm This is the expected power level of the ACK packet transmitted by the DUT in response to a correctly received Unicast packet. This value is used by the MT8860C to calculate the amount of return path attenuation required to prevent MT8860C reference radio receiver saturation.	
Direct Mode Settings		
Inter-packet Spacing	0 to 200 slots (default 5 slots)	
Inter-packet Resolution	9 µs	
DUT MAC Address Range	00-00-00-00-00-00 to FF-FF-FF-FF-FF-FF	
Receiver Adjacent Channel Rejection	IEEE Std 802.11g-2003 / IEEE Std 802.11-2007 (19.5.2) IEEE Std 802.11a-1999 / IEEE Std 802.11-2007 (17.3.10.2)	
Definition	Adjacent Channel measurements made with external modulated signal source (e.g. MG3700A) using Interferer input port	
Receiver Maximum Input Level	IEEE Std 802.11g-2003 / IEEE Std 802.11-2007 (19.5.3) IEEE Std 802.11a-1999 / IEEE Std 802.11-2007 (17.3.10.4)	
Definition	Receiver PER specification as for 19.5.1 (above)	
Additional TX Measurements		
CCDF	CCDF defined as percentage of samples against dB, where percentage of samples is normalized to the average power in the gate, and dB is defined as the relative value of samples greater than the average	
Measurement Scales	Y-axis, Log scale, fixed values of 100, 10, 1, 0.1, 0.01% X-axis, dB scale, fixed values of 0 to 12dB	

Characteristic / Parameter	Specification		
Occupied Bandwidth (OBW)	Measures the frequency range within which the specified percentage power is contained		
Occupied Bandwidth Percentage	1 to 99%		
Power Spectral Density (PSD)	As per ETSI EN 300-328 (4.3.2 / 5.7.3). The maximum power measured in a 1 MHz bandwidth within the occupied bandwidth of the signal		
Additional RX Measurements			
Frame Reception Rate (FRR)	As defined in the CTIA / Wi-Fi Alliance CWG RF Test Plan FRR (%) = (ACKs received from DUT / data packets transmitted by MT8860C) x 100 Specification as for 19.5.1 (above)		
802.11n Measurements	The following applies to the 11n High Throughput (HT) modes that use OFDM modulation (For non-HT modes, please refer to the 802.11b, 802.11g, 802.11a measurement sections above)		
Transmit Power Levels	IEEE Std 802.11n-2009 (20.3.21.3)		
Definition	Average, peak and crest factor power measurements on HT OFDM modulated signals on the supported channels		
Damage Level	> +27 dBm		
Dynamic Range	20 MHz channel b/w:	+18 dBm to –50 dBm average power (+27 dBm peak)	
	40 MHz channel b/w:	+16 dBm to –50 dBm average power (+27 dBm peak)	
Accuracy (CW)	± 0.6 dB (+18 dBm to –30 dBm) ± 1.0 dB (–30 dBm to –50 dBm)		
Resolution	dBm to 2 decimal places		
Capture Width	10 µs to 5.95 ms		
Time Resolution	0.1 µs marker resolution with 10 µs time window		
Transmit Spectrum Mask	IEEE Std 802.11n-2009 (20.3.21.1)		
Definition	Display of Spectrum measurement derived from gate 1 or 2		
Gate Width	From gate 1 or 2, 50 µs to 5.95 ms		
Frequency Span	20 MHz channel b/w:	70 MHz (fc ± 35 MHz)	
	40 MHz channel b/w:	130 MHz (fc ± 65 MHz)	
Flatness over Frequency Span	± 1 dB		
Linearity	± 0.8 dB (50 dB dynamic range CW measurements)		
Resolution	dBr to 1 decimal place		
Range (modulated carrier power)	20 MHz channel b/w:	+18 dBm to –40 dBm	
	40 MHz channel b/w:	+16 dBm to –40 dBm	
Dynamic Range	20 MHz channel b/w:	(For signals with 8 dB crest factor and Dither Mode set to ON) ± 11 MHz from fc; 30 dB (typical 46 dB) ± 20 MHz from fc; 40 dB (typical 48 dB) ± 30 MHz from fc; 43 dB (typical 50 dB)	
	40 MHz channel b/w:	(For signals with 10 dB crest factor and Dither Mode set to ON) ± 60 MHz from fc; 43 dB (typical 48 dB)	
Receiver Resolution Bandwidth	Equivalent to 100 kHz Gaussian		
Noise Floor (for all supported channels)	2.4 GHz frequency band:	(With Input Level Range 3L selected) –110 dBm	
	5 GHz frequency band:	(With Input Level Range 3L selected) –105 dBm	
Spurious Specification (for all supported channels)	2.4 GHz frequency band: (With Dither Mode ON)	20 MHz channel b/w:	<–45 dBc
		40 MHz channel b/w:	± (25 MHz to 40 MHz); <–30 dBc ± (40 MHz to 50 MHz); <–40 dBc ± (50 MHz to 60 MHz); <–45 dBc ± (60 MHz to 65 MHz); <–48 dBc
	5 GHz frequency band: (With Dither Mode ON)	20 MHz channel b/w:	<–43 dBc
		40 MHz channel b/w:	± (25 MHz to 40 MHz); <–30 dBc ± (40 MHz to 50 MHz); <–40 dBc ± (50 MHz to 60 MHz); <–45 dBc ± (60 MHz to 65 MHz); <–48 dBc
Measurement Configuration			
Dither Mode	OFF Default mode ON Additional Signal processing removes spurs from the spectral measurement		
Transmit Center Frequency Tolerance	IEEE Std 802.11n-2009 (20.3.21.4)		
Definition	Average Frequency of the HT OFDM carrier signal		
Data Output Format	Hz and ppm		
Accuracy	± 1 kHz ± reference frequency oscillator error (ppm) for measurement gate >1 ms		
Resolution	Hz to 2 decimal places, ppm to 2 decimal places		

Characteristic / Parameter	Specification		
Symbol Clock Frequency Tolerance	IEEE Std 802.11n-2009 (20.3.21.6)		
Definition	Frequency error relative to 250 kHz symbol clock as per 20.3.21.6. Measurement averaged over a fully coded HT OFDM packet with minimum payload length of 16 symbols (64 µs)		
Data Output Format	Hz and ppm		
Range	± 40 ppm		
Resolution	Hz to 2 decimal places, ppm to 2 decimal places		
Analysis Length	16 to 500 symbols (default 55 symbols)		
Transmitter Center Frequency Leakage	IEEE Std 802.11n-2009 (20.3.21.7.2)		
Definition	Measurement of the leakage of the center carrier		
Data Output Format	dB		
Resolution	dB to 2 decimal places		
Transmitter Spectral Flatness	IEEE Std 802.11n-2009 (20.3.21.2)		
Definition	Graphical display of RF sub-carrier power level Display includes limit lines (as per 20.3.21.2) Overall Pass/ Fail status indicated For measurement failure, a numeric measurement result of the failing sub-carrier(s) is reported		
Unit of Measurement	dBr		
Transmitter Modulation Accuracy	IEEE Std 802.11n-2009 (20.3.21.7.3 / 20.3.21.7.4)		
Definition	Peak and Average EVM. Measurement averaged over a fully coded HT OFDM packet with minimum payload length of 16 symbols (64 µs)		
Measurement Accuracy	2.4 GHz frequency band:	20 MHz channel b/w:	(72.2 Mbps, +18 dBm to –45 dBm) <2% residual RMS EVM
		40 MHz channel b/w:	(150 Mbps, +16 dBm to –45 dBm) <2% residual RMS EVM
	5 GHz frequency band:	20 MHz channel b/w:	(72.2 Mbps, +18 dBm to –45 dBm) <2.3% residual RMS EVM (typical < 2%)
		40 MHz channel b/w:	(150 Mbps, +16 dBm to –45 dBm) <2.3% residual RMS EVM (typical < 2%)
Modulation Settings	PPDU Format:	HT-Mixed Mode, HT-Greenfield	
	PPDU Type:	20 MHz, 40 MHz Upper, 40 MHz Lower, 40 MHz Duplicate	
	Modulation & Coding Scheme:	MCS Index 0 to 7 and MCS 32 (Duplicate)	
	Guard Interval:	HT-Mixed Mode:	Long (800 ns), Short (400 ns)
		HT-Greenfield:	Long (800 ns) only
Data Output Format	Peak and Average EVM pilots only, dB or percentage Peak and Average EVM on each sub carrier (frequency domain), % vs sub-carrier –26 to +26 EVM vs Symbol (time domain), % vs symbol number, 1 to specified analysis length		
Measurement Configuration			
Analysis Length	16 to 500 symbols (default 40 symbols)		
OFDM Pilot Tracking	User selection of Phase tracking only or Phase and Amplitude tracking(default Phase tracking only)		
Channel Estimation	User selection of Long Training Sequence or Full Packet (default Long Training Sequence)		
Receiver Minimum Input Sensitivity	IEEE Std 802.11n-2009 (20.3.22.1)		
Definition	Packet Error Rate (PER) at defined power level		
Power Range	–20 dBm to –100 dBm at MT8860C test port		
Mode	Direct: MT8860C transmits defined number of packets		
Data Packet Structure	Complies with 802.11 specifications for MAC header formatting, scrambling, encoding, interleaving and calculation of the appropriate CRC/FCS checksum		
Number of Transmitted Packets	1 to 10,000 (default 500)		
Payload Length	50 to 1772 bytes		
Data Rates	20 MHz channel b/w:	6.5, 7.2, 13, 14.4, 19.5, 21.7, 26, 28.9, 39, 43.3, 52, 57.8, 58.5, 65, 72.2 Mbps	
	40 MHz channel b/w:	6, 6.7, 13.5, 15, 27, 30, 40.5, 54, 60, 81, 90, 108, 120, 121.5, 135, 150 Mbps	

Characteristic / Parameter	Specification	
Direct Mode Settings		
Inter-packet Spacing	10 to 1000 µs	
DUT MAC Address range	Valid Unicast MAC address only. Broadcast and Multicast MAC addresses not supported.	
Receiver Adjacent Channel Rejection	IEEE Std 802.11n-2009 (20.3.22.2)	
Receiver Non-adjacent Channel Rejection	IEEE Std 802.11n-2009 (20.3.22.3)	
Definition	Adjacent Channel measurements made with external modulation signal source (e.g., MG3700A) using external interferer port	
Receiver Maximum Input Level	IEEE Std 802.11n-2009 (20.3.22.4)	
Definition	Receiver PER specification as for 20.3.22.1 (above)	
Additional TX Measurements		
CCDF	CCDF defined as percentage of samples against dB, where percentage of samples is normalized to the average power in the gate, and dB is defined as the relative value of samples greater than the average	
Measurement Scales	Y-axis, Log scale, fixed values of 100, 10, 1, 0.1, 0.01% X-axis, dB scale, fixed values of 0 to 12 dB	
Occupied Bandwidth (OBW)	Measures the frequency range within which the specified percentage power is contained	
Occupied Bandwidth Percentage	1 to 99%	
Power Spectral Density (PSD)	As per ETSI EN 300-328 (4.3.2 / 5.7.3). The maximum power measured in a 1 MHz bandwidth within the occupied bandwidth of the signal	
TX Measurement Controls		
Averaging	1 to 1,000 (default 1)	
Triggers	4 trigger sources are available; Free Run, RF, Video and External In Network Mode operation, the RF trigger (rising edge) must be selected	
Free Run	Continuous unsynchronised	
RF Edge	RF triggering on rising or falling edge, detected at RF input User set level	
RF Edge Dynamic Range	+18 dBm to –40 dBm average power with Input Level Range set to AUTO	
Video	Video triggering on rising or falling edge, detected at IF	
Video Trigger Dynamic Range	(+18 dBm to –50 dBm average power with Input Level Range set to AUTO) Triggers at –10 dB below average power level (DSSS data rates) Triggers at –20 dB below average power level (OFDM data rates)	
External	TTL input, BNC on Rear Panel	
Measurement Gates	Two gates for Power, Spectrum, Frequency and CCDF measurements. Gate positions set directly by remote command	
Settable Gate Range	10 µs to 5.95 ms	
TX Analysis auto-configure function	Using this function, the following parameters are automatically configured by the MT8860C; Input Level Range Pre-trigger Capture Width Trigger settings Measurement Gate settings	
Reference Radio Transmitter (802.11b, 802.11g, 802.11a only)	Network and Direct Modes	
Supported Channels	802.11b / 802.11g (DSSS)	Channels 1 to 14 (2412 – 2484 MHz)
	802.11g (OFDM)	Channels 1 to 13 (2412 – 2472 MHz)
	802.11a	Channels 36, 40, 44, 48 (5150 – 5250 MHz) Channels 52, 56, 60 ,64 (5250 – 5350 MHz) Channels 100, 104, 108, 112, 116, 120, 124, 128, 132, 136, 140 (5470 – 5725 MHz) Channels 149, 153, 157, 161, 165 (5725 – 5825 MHz)
Output Power (for supported channels)	802.11b / 802.11g	–3 to –100 dBm (settable to 0 dBm but performance unwarranted)
	802.11a	–8 to –100 dBm (settable to 0 dBm but performance unwarranted)
Power Accuracy (for supported channels, CW, 18 to 28° C)	802.11 b / 802.11g	± 1.0 dB (–3 dBm to –90 dBm) ± 2.0 dB typical (<–90 dBm to –100 dBm)
	802.11a	± 1.0 dB (–8 dBm to –90 dBm) ± 2.0 dB typical (<–90 dBm to –100 dBm)
Settable resolution	0.1 dB	
Output Impedance	50 < 2:1 VSWR	
Frequency Accuracy	± 20 ppm	

Characteristic / Parameter	Specification	
Modulation Accuracy (for supported channels, unless stated)	802.11b / 802.11g (DSSS)	< 10% RMS EVM; 11 Mbps, <–20 dBm (channels 1 to 13)
	802.11g (OFDM)	< 5.6% RMS EVM; 54 Mbps, <–20 dBm (nominal < 4%) Nominally <5.6% RMS EVM, 54 Mbps, <–3 to –20 dBm
	802.11a	< 5.6% RMS EVM; 54 Mbps, <–20 dBm
Reference Radio Receiver (802.11b, 802.11g, 802.11a only)	Network Mode only	
Supported Channels	See Reference Radio Transmitter Section (above)	
Maximum Safe Input	+27 dBm Peak Power	
Damage Level	+32 dBm peak power (excluding range 3, +18 dBm)	
Input VSWR (for supported channels)	802.11b 802.11g	Nominally < 1.5:1
	802.11a	Nominally < 1.6:1
Minimum Receive Sensitivity (for < 1% PER)	802.11b / 802.11g	–50 dBm (1 Mbps) –45 dBm (11 Mbps)–-50 dBm (6 Mbps) –30 dBm (54 Mbps)
	802.11a	–50 dBm (6 Mbps) –27 dBm (54 Mbps)
Signal Generator Mode (802.11b, 802.11g, 802.11a only)	In this mode, MT8860C can be configured to transmit a continuous RF signal at the Test Port NOTE: Transmitter measurements are not supported. For receiver testing, chipset vendor control software is required to directly configure the device under test (DUT) and read the receiver packet count register	
Transmit Modes	CW (single carrier) Continuous Framed (dynamic duty cycle) Continuous Modulated (100% duty cycle) Carrier Suppression (100% duty cycle, 0101 payload, scrambler disabled)	
Supported Channels	See Reference Radio Transmitter Section (above)	
Data Rates and Modulation	Applicable when the transit mode is set to Continuous Framed or Continuous Modulated	
802.11b / 802.11g (DSSS)	1 Mbps 11-chip Barker DBPSK 2 Mbps 11-chip Barker DQPSK 5.5 Mbps CCK DQPSK 11 Mbps CCK DQPSK	
802.11g (OFDM) 802.11a	6, 9, 12, 18, 24, 36, 48, 54 Mbps OFDM (BPSK, QPSK, 16-QAM, 64-QAM)	
Data Packet Structure (Continuous Framed and Continuous Modulated)	Adheres to relevant 802.11 specifications for MAC header formatting, scrambling, encoding, interleaving and calculation of the appropriate CRC/FCS checksum	
Payload Length	60 to 1,500 bytes (default 1,024 bytes)	
Payload	All 0's, 0101, Counting, PN7, 1010, Random (Payload data is scrambled over the air)	
Inter-packet Spacing (Continuous Framed)	0 to 200 slots (default 5 slots)	
Inter-packet Resolution	802.11b / 802.11g (DSSS)	20 µs
	802.11g (OFDM) 802.11a	9 µs
DUT MAC Address range	00-00-00-00-00-00 to FF-FF-FF-FF-FF-FF	
Output Power (for supported channels)	See Reference Radio Transmitter Section (above)	
Power Accuracy (for supported channels, CW, 18 to 28° C)	See Reference Radio Transmitter Section (above)	
Settable resolution	See Reference Radio Transmitter Section (above)	
Output Impedance	See Reference Radio Transmitter Section (above)	
Frequency Accuracy	See Reference Radio Transmitter Section (above)	
Modulation Accuracy (for supported channels, unless stated)	See Reference Radio Transmitter Section (above)	
General		
Path Loss Table	Compensation for cable and system loss can be specified for each supported channel. Independent values can be specified for the TX and RX paths. When the path loss table is enabled, the TX and RX path loss values for the selected channel are applied to both the measurement results and MT8860C transmitted power level.	
Reference Frequency Oscillator	10 MHz TCXO fitted as standard	
Frequency	10 MHz	
Aging	<± 1 ppm / year, <± 2.5 ppm /10 years	
Drift (Temperature Coefficient)	<± 0.5 ppm, 0 to +45°C	

Characteristic / Parameter	Specification	
Inputs & Outputs		
Front Panel Inputs & Outputs		
Test Port In / Out (for supported channels)	Provides connection to DUT, N-type (f), 50• nominal	
	Maximum Input Power:	+27 dBm Peak (Input Level Ranges 1, 1L, 2 2L) +18 dBm Peak (Input Level Ranges 3, 3L)
	VSWR:	Nominally < 1.5:1 (2.4 GHz frequency band) Nominally < 1.6:1 (5 GHz frequency band)
Interferer Input (for supported channels)	Provides input for external signal source (e.g. MG3700A), N-type (f)	
	Maximum Input Power:	+ 27 dBm
	VSWR:	Nominally < 1.5:1 (2.4 GHz frequency band) Nominally < 1.6:1 (5 GHz frequency band)
	Loss to Test Port In/ Out: (using supplied test data)	Nominally 22 dB ± 1 dB (2.4 GHz frequency band) Nominally 24 dB ± 1 dB (5 GHz frequency band)
WLAN Reference Input	Allows an external reference radio to be used for DUT receiver measurements using only the leveling loop and attenuator of MT8860C. In this mode, no measurements are supported by MT8860C. For correct leveling operation, the external radio must transmit a signal with the following characteristics;	
	Packet duration:	> 110 µs
	Input Level Range:	+12 dBm to +18 dBm average power
	Maximum Input Power:	+27 dBm
Rear Panel Inputs & Outputs		
GPIB	All MT8860C parameters (except the supply switch) are remotely programmable. The GPIB is designed in accordance with IEEE 488.2	
Ethernet RJ45	Allows MT8860C to be remotely programmed by a LAN-connected computer. The following LAN interface protocols and related [port numbers] are supported; VXI-11 using VISA Sockets LAN [5025] TELNET [5024] File Transfer Protocol (FTP) [23]	
10 MHz out	As Reference Frequency Oscillator specification, TTL	
10 MHz in	TTL	
Digital Inputs	BNC, TTL	
Input 1	BNC, TTL input for the external trigger source	
Input 2	BNC, TTL input TX signal for External Reference radio. The TX signal must be the same length as the transmission from the external WLAN radio	
Digital Outputs		
Output 1	BNC, TTL compatible The user can select between one of the following; 1. The TX trigger signal from the internal reference radio 2. The trigger signal from the MT8860C when the signal trigger is set to RF 3. The trigger signal from the MT8860C when the signal trigger is set to Video (default setting)	
Output 2	BNC, TTL compatible The user can select between one of the following; 1. The TX trigger signal from the internal reference radio (default setting) 2. The trigger signal from the MT8860C when the signal trigger is set to RF 3. The trigger signal from the MT8860C when the signal trigger is set to Video	
Power Requirements		
AC Supply	85 to 264V	
Frequency	47 to 63 Hz	
Power	100 VA	
Dimensions and Weight		
Dimensions (D x W x L)	180 mm x 320 mm x 350 mm	
Weight	< 10 kg	
Rated Range of Use		
Operating Temperature Range	+5°C to +40°C	
Operating Humidity	< 75% non condensing	

Characteristic / Parameter	Specification	
Conditions of Storage		
Temperature	–20°C to +70°C	
Safety	Conforms with the product safety standard BS EN 61010-1 (Equivalent to IEC 61010-1) for class 1 portable equipment, for use in a Pollution Degree 2 environment. The instrument is designed to be operated from an Installation Category 2 supply	
Electromagnetic Compatibility (EMC)	Conforms to the protection requirements of EN61326; RF emission and immunity class A	
MN8861A		
Supported Channels 802.11n HT 2.4 GHz (20 MHz channel bandwidth)	Channels 1 - 13 (2412 - 2472 MHz)	
Supported Channels 802.11n HT 5 GHz (20 MHz channel bandwidth)	Channels 36, 40, 44, 48 (5150 - 5250 MHz) Channels 52, 56, 60, 64 (5250 - 5350 MHz) Channels 100, 104, 108, 112, 116, 120, 124, 128, 132, 136, 140 (5470 - 5725 MHz) Channels 149, 153, 157, 161, 165 (5725 - 5825 MHz)	
Supported Channels 802.11n HT 2.4 GHz (40 MHz channel bandwidth)	Secondary = +1	Secondary = –1
	Primary = 1 - 9	Primary = 9 - 13
Supported Channels 802.11n HT 5 GHz (40 MHz channel bandwidth)	Secondary = +1	Secondary = –1
	Primary = 36, 44, 52, 60, 100, 108, 116, 124, 132, 149, 157	Primary = 40, 48, 56, 64, 104, 112, 120, 128, 136, 153, 161
PPDU HT Format	HT-Mixed Mode	
PPDU Types	20 MHz, 40 MHz, 40 MHz Duplicate	
Modulation and coding scheme	MCS index 0 - 7 and MCS 32 (Duplicate)	
Guard interval	Long (800 ns), Short (400 ns)	
Data Rates (20 MHz channel b/w)	6.5, 7.2, 13, 14.4, 19.5, 21.7, 26, 28.9, 39, 43.3, 52, 57.8, 58.5, 65, 72.2 Mbps	
Data Rates (40 MHz channel b/w)	6, 6.7, 13.5, 15, 27, 30, 40.5, 54, 60, 81, 90, 108, 120, 121.5, 135, 150 Mbps	
Modulation	OFDM (BPSK, QPSK, 16-QAM, 64 QAM)	
Packet spacing	10 - 1000 µs	
Number of packets	1 - 10000	
Output Power 2.4 GHz (supported channels) MT8860C output	–20 dBm to –100 dBm (settable to –3 dBm, unwarranted)	
Output Power 5 GHz (supported channels) MT8860C output	–20 dBm to –100 dBm (settable to –8 dBm, unwarranted)	
Power accuracy (supported channels)	± 1.0 dB (-20 to –90 dBm, CW 18 to 28° C) 2.4 GHz ± 1.0 dB (-20 to –90 dBm, CW 18 to 28° C) 5 GHz ± 2.0 dB typical (<–90 dBm to –100 dBm, CW 18 to 28° C)	
Settable resolution	0.1 dB	
Radio specification	Complies with IEEE Std 802.11n-2009 radio specification for transmit spectral mask, modulation accuracy, and spectral flatness.	
MN8861A Supplementary Specification		
Connectors		
Test Port	N (m)	
Digital interface Tx On line	BNC TTL output connectors to Digital In 2 on MT8860C Active High for the length of the packet	
Control interface	USB	
General		
Power supply (supplied)	85 to 264 V AC	
Frequency	47 to 63 Hz	
Power	<20 VA	
Size and Weight		
Dimensions	85 mm (h) x 115 mm (w) x 72 mm (d)	
Weight	<0.6 kg	
Operating temperature range	+5°C to +40° C	
Operating humidity	<75% non-condensing	
Safety	Complies to BS EN 61010-1 (equivalent to IEC 61010-1)	
EMC	Conforms to the protection requirements of EEC Council Directive 89/336/EEC	

Ordering Information

Part number	
MT8860C	WLAN Test Set with 802.11b/g measurements
Supplied Accessories	Power cable Ethernet cable Cat 5E cross-over patch cable N-type termination plug (6 GHz, 50 Ω) fitted to the WLAN Reference Input MT8860C WLAN Test Set Operation manual (printed copy) MT8860C WLAN Test Set Remote programming manual (printed copy) Product CD containing; • LANLook software • Source code for LANLook • CombiTest + MT8860x Plug-in Production Test software • Ethernet Communicator software • Source code for Ethernet Communicator • National Instruments VISA Run-Time engine • CombiTest MT8860x Plug-in Operation Manual (pdf) • MT8860C WLAN Test Set Operation manual (pdf) • MT8860C WLAN Test Set Remote programming manual (pdf)
Options and accessories	
MT8860C-001 (Option 1)	Rack mount kit (CANNOT be ordered with option 2)
MT8860C-002 (Option 2)	Front panel handles (CANNOT be ordered with option 1)
MT8860C-014 (Option 14)	802.11a transmitter and receiver measurements
MT8860C-114 (Option 114)	Retrofit 802.11a transmitter and receiver measurements
MT8860C-017 (Option 17)	802.11n transmitter and receiver measurements (Requires MN8861A Receiver Accessory for 802.11n receiver measurement support, sold separately)
MN8861A	Receiver Accessory for MT8860C
MT8860C-117 (Option 117)	Retrofit, 802.11n transmitter and receiver measurements (RequiresMN8861A Receiver Accessory for 802.11n receiver measurement support, sold separately)
MT8860C-098 (Option 98)	Standard calibration to ISO 17025 and ANSI/NCSLI Z540-1 (Certificate of calibration only)
MT8860C-099 (Option 99)	Premium calibration to ISO 17025 and ANSI/NCSLI Z540-1 (Certificate of calibration with test report and uncertainty data included)
2000-1613-R	Bluetooth / dual band WLAN antenna and adapter
2000-1548-R	N-type termination plug (6 GHz, 50 Ω)
2100-2	GPIB cable, 2m
2000-1371-R	Ethernet cable
3-806-152	Cat 5E cross-over patch cable
B0329G	Protective cover (CANNOT be ordered with option 1 or option 2)
13000-00258	MT8860C WLAN Test Set Operation Manual
13000-00259	MT8860C WLAN Test Set Remote Programming Manual

Notes

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