Product Brochure

For MT8870A Universal Wireless Test Set

MX887x Series Measurement Software
MV887x Series Waveforms

Wireless Module Test Solution

Cutting Time and Costs

Versatile Wireless Module Tests

Support for multiple wireless standards assures future-proof testing as wireless standards evolve and develop. Mass production of wireless modules requires flexibility in supporting diversifying standards as well as reduced lead-time and costs through better efficiency.

The MT8870A Universal Wireless Test Set accommodates up to four test modules, supporting flexible and efficient inspection lines.

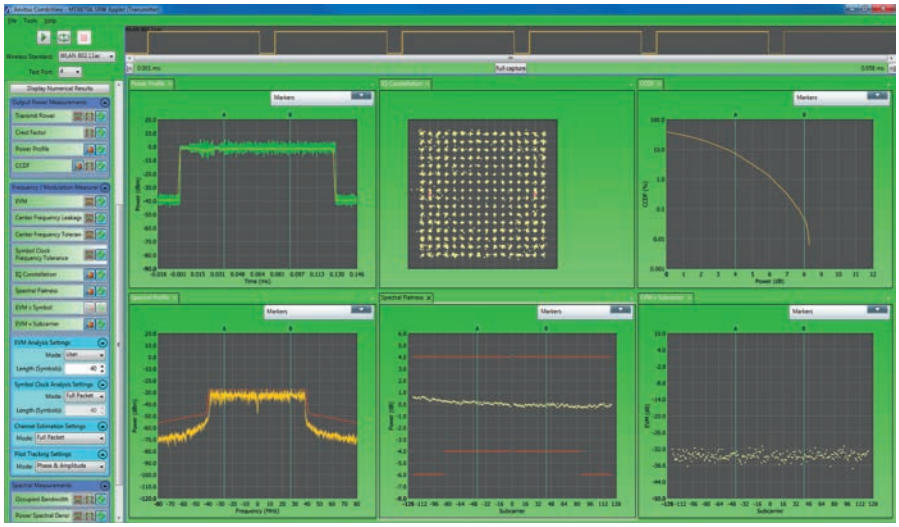
The licensed TX measurement software packages and waveforms make it easy to support each communication standard.

MT8870A Universal Wireless Test Set
MU887000A TRX Test Module

See the separate catalog (MT8870A-E-A-1) for details.

One License Supports Four Modules

To enable Tx measurement software and waveforms, each license is sold separately. One license can be used for up to four TRX test modules, cutting test equipment costs.
A Tx measurement software package is required for Tx tests for each communication standard and a waveforms is required for Rx tests.

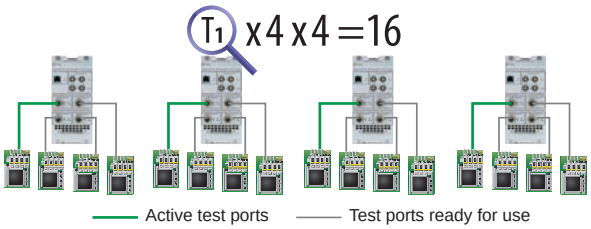


MX887031A WLAN 802.11ac TX Measurement

Flexible Test System Configuration

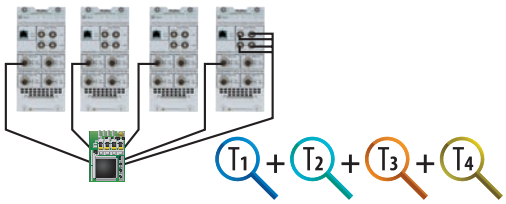
Up to 16 Test Devices

16 Simultaneous Connections: Each MU887000A TRX Test Module has four test ports. Up to four test modules can be installed in one MT8870A Universal Wireless Test Set, supporting simultaneous connection of 16 test devices. This versatility eliminates the need for external combiners and also reduces test fixture calibration.



Up to 4 Measurement Types

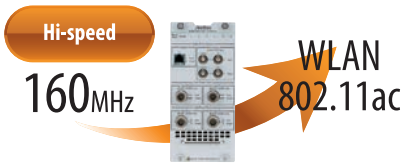
Four simultaneous measurements: Simultaneous testing reduces test times and allows devices to be tested in a realistic multi-wireless environment.



POINT

1 Supports WLAN 802.11ac 160 MHz Wide Bandwidth

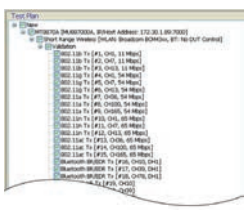
Each MU887000A is equipped with a 160 MHz wideband signal generator and analyzer for support of 802.11ac testing.



2 CombiTest for Controlling Leading Chipsets

The CombiTest PC Software that bundled with the MT8870A automates the entire manufacturing test flow, including chipset calibration and testing. It includes control packages for all leading chipsets, cutting test-system development time and costs.

See page 17 for details



Wireless LAN Measurement Solution

MX887030A WLAN 802.11b/g/a/n TX Measurement
MV887030A WLAN 802.11b/g/a/n Waveforms

The MT8870A Universal Wireless Test Set/MU887000A TRX Test Module supports non-signalling transmitter and receiver tests for all WLAN 802.11b/g/a/n-compliant devices.
The MU887000A-001 6 GHz Frequency Extension Option is required to measure 802.11a/n in 5 GHz band.

Transmitter Test

Installing the MX887030A WLAN 802.11b/g/a/n TX Measurement Software in the MT8870A Universal Wireless Test Set provides support for measurement of key IEEE 802.11-March 2012 Tx characteristics using all installed TRX test modules.

802.11b TX Measurement

● **IEEE 802.11-March 2012 : 802.11b TX Test**

802.11b	Test Items
17.4.7.2	Transmit Power Levels
17.4.7.3	Transmit Power Level Control
17.4.7.4	Transmit Spectrum Mask
17.4.7.5	Transmit Center Frequency Tolerance
17.4.7.6	Chip Clock Frequency Tolerance
17.4.7.7	Transmit power-on and power-down ramp
17.4.7.8	RF Carrier Suppression
17.4.7.9	Transmit Modulation Accuracy

● **Additional 802.11b Measurements**

Test Items
Power crest factor
CCDF
IQ offset
Phase & magnitude error
Occupied bandwidth
Power spectral density

● **Graphical Displays (DSSS)**

Graphs
Power profile
Spectral mask
Constellation diagram
CCDF

802.11a/g/n TX Measurement

● **IEEE 802.11-March 2012 : 802.11a/g/n TX Test**

802.11a	802.11g	802.11n	Test Items
18.3.9.2	19.4.8.2	20.3.20.3	Transmit Power Levels
18.3.9.3	19.5.5	20.3.20.1	Transmit Spectrum Mask
18.3.9.5	19.4.8.3	20.3.20.4	Transmit center frequency tolerance
18.3.9.6	19.4.8.4	20.3.20.6	Symbol Clock frequency tolerance
18.3.9.7.2	19.4.8 (18.3.9.7.2)	20.3.20.7.2	Transmitter center frequency leakage
18.3.9.7.3	19.4.8 (18.3.9.7.3)	20.3.20.2	Transmitter spectral flatness
18.3.9.7.4	19.4.8 (18.3.9.7.4)	20.3.20.7.3	Transmitter constellation error
18.3.9.8	19.4.8 (18.3.9.8)	20.3.20.7.4	Transmitter modulation accuracy test

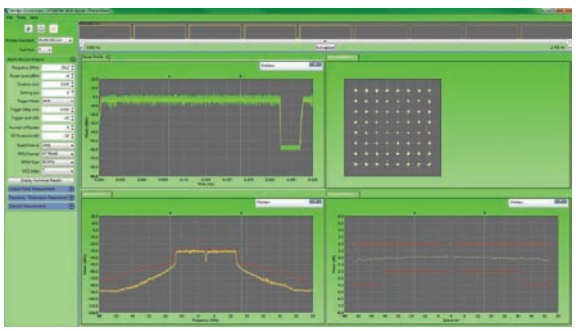
● **Additional 802.11a/g/n Measurements**

Test Items
Power crest factor
CCDF
Occupied bandwidth
Power spectral density

● **Graphical Displays (OFDM)**

Graphs
Power profile
Spectral mask
Constellation diagram
CCDF
Spectral Flatness
EVM against Symbol
EVM against Subcarrier

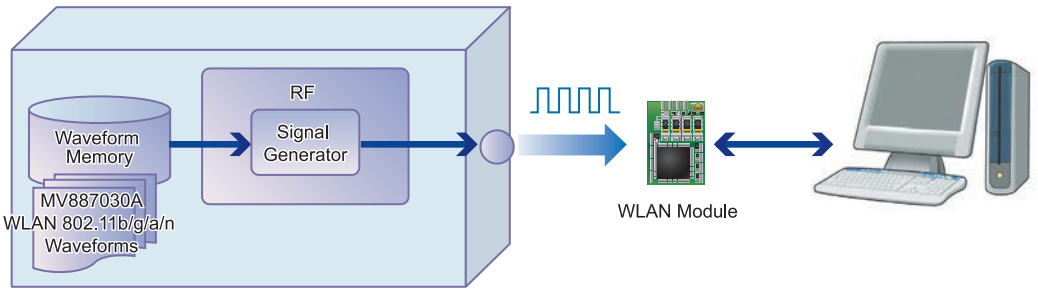
The CombiView software that ships with the MT8870A displays measurement results graphically. Multiple displays can be defined and all numeric results can be displayed in one window.



802.11n TX Measurement using CombiView

Receiver Test

The MV887030A application provides support for transmission of WLAN 802.11b/g/a/n signals from the vector signal generator to the device under test. The number of received packets can then be read using the chipset vendor's control software.



MU887000A TRX Test Module

Waveform Parameter

802.11 Standard	Data Rate/Modulation	Bandwidth	Packet Length	Remarks
802.11b	11, 5.5, 2, 1 Mbps	–	1024 or 100 bytes	Long Preamble
802.11a/g	54, 48, 36, 24, 18, 12, 9 and 6 Mbps	–	1000 or 100 bytes	
802.11n	MCS 0 to 7 and 32	20 MHz and 40 MHz	4096 or 500 bytes	Nss: 1, Guard Interval: Long

802.11b RX Measurement

● **IEEE 802.11-March 2012 : 802.11b RX Test**

802.11b	Test Items
17.4.8.2	Receiver minimum input level sensitivity
17.4.8.3	Receiver maximum input level
17.4.8.4	Receiver adjacent channel rejection*

*: Requires separate signal generator

802.11a/g/n RX Measurement

● **IEEE 802.11-March 2012 : 802.11a/g/n RX Test**

802.11a	802.11g	802.11n	Test Items
18.3.10.2	19.5.2	20.3.21.1	Receiver minimum input level sensitivity
18.3.10.3	19.5.3	20.3.21.2	Adjacent channel rejection*
18.3.10.4		20.3.21.3	Nonadjacent channel rejection*
18.3.10.5	19.5.4	20.3.21.4	Receiver maximum input level

*: Requires separate signal generator

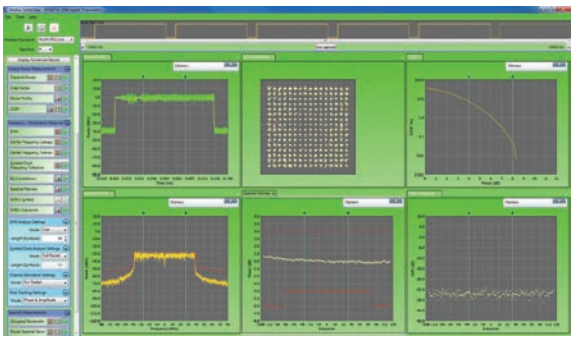
MX887031A WLAN 802.11ac TX Measurement
MV887031A WLAN 802.11ac Waveforms

The MT8870A Universal Wireless Test Set/MU887000A TRX Test Module (with MU887000A-001 6 GHz Frequency Extension) supports non-signalling transmitter and receiver tests for all WLAN 802.11ac-compliant devices.

Transmitter Test

Installing the MX887031A WLAN 802.11ac TX Measurement Software in the MT8870A Universal Wireless Test Set supports in-band wireless measurements defined by the latest IEEE P802.11ac/D5.0 standard (January 2013 provisional version) on all installed TRX test modules. The 802.11ac 20/40/80/160 MHz bandwidths and 256QAM (MCS9) modulation method are supported.

Using the CombiView PC application bundle displays graphs of 802.11ac TX measurements.



802.11ac TX Measurement using CombiView

802.11ac TX Measurement

● **IEEE P802.11ac/D5.0, January 2013 : 802.11ac TX Test**

802.11ac	Test Items
22.3.18.1	Transmit spectrum mask
22.3.18.2	Spectral flatness
22.3.18.3	Transmit center frequency tolerance
22.3.18.3	Symbol Clock frequency tolerance
22.3.18.4	Modulation accuracy
22.3.18.4.2	Transmitter center frequency leakage
22.3.18.4.3	Transmitter constellation error
22.3.18.4.4	Transmitter modulation accuracy (EVM) test
	Transmit power level

● **Additional 802.11ac Measurements**

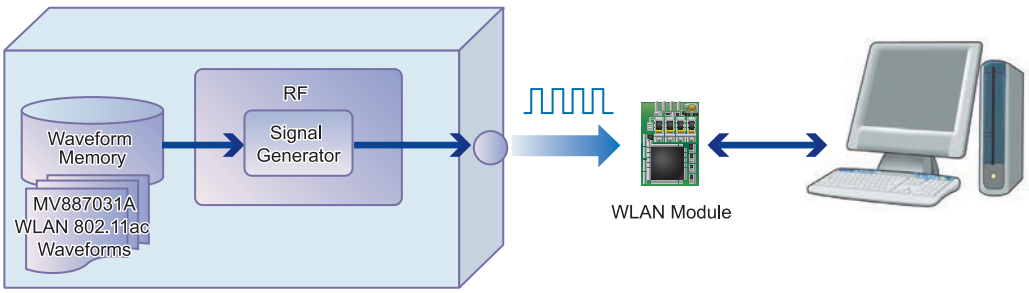
Test Items
Power crest factor
CCDF
Occupied bandwidth
Power spectral density

● **Graphical Displays (OFDM)**

Graphs
Power profile
Spectral mask
Constellation diagram
CCDF
Spectral Flatness
EVM against Symbol
EVM against Subcarrier

Receiver Test

The MV887031A application provides support for transmission of WLAN 802.11ac signals from the vector signal generator to the device under test. The number of received packets can then be read using the chipset vendor's control software.



MU887000A TRX Test Module

Waveform Parameter

802.11 Standard	Data Rate/Modulation	Bandwidth	Packet Length	Remarks
802.11ac	MCS 0 to 9	20, 40, 80, 160 MHz	4096 or 500 bytes	Nss: 1, Guard Interval: Long

802.11ac RX Measurement

● **IEEE P802.11ac/D5.0, January 2013 : 802.11ac RX Test**

802.11ac	Test Items
22.3.19.1	Receiver minimum input level sensitivity
22.3.19.2	Adjacent channel rejection*
22.3.19.3	Nonadjacent channel rejection*
22.3.19.4	Receiver maximum input level

*: Requires separate signal generator

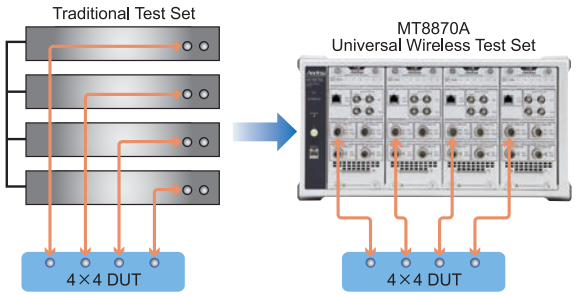
Wireless LAN MIMO Measurement Solution

WLAN 802.11n/11ac MIMO Measurement Function

Installing the MU887000A Tx Test Module*1 in the MT8870A Universal Wireless Test Set with the installed WLAN TRx Measurement Software supports easy set-up and measurement of up to 4×4 Wireless LAN MIMO devices.

∗1: Requires MU887000A-001 6 GHz Frequency Extension option when measuring WLAN 802.11n (5 GHz) or 802.11ac

Normally, measuring each antenna of a MIMO device (streaming) requires a system set-up composed of up to four measuring instruments of the same type as well as synchronized timing of the signal generators required for MIMO measurement and the 10-MHz reference signal generators, plus complex cable connections to control each measuring instrument.
This type of system set-up is not only troublesome for technicians performing MIMO measurements, but also wastes man hours and money. Integrating the MU887000A into the MT8870A main frame solves the problems of synchronizing signals over external cables experienced with conventional MIMO measurement systems to simplify system set-up and slash time and costs.

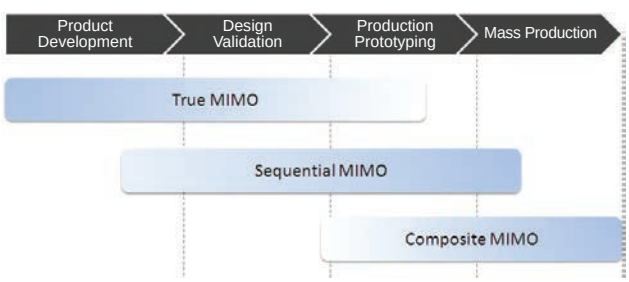


The MX887030A WLAN 802.11b/g/a/n Tx Measurement Software and MV887030A WLAN 802.11b/g/a/n Waveform Files are required for WLAN 802.11n MIMO measurements.
The MX887031A WLAN 802.11ac Tx Measurement Software and MV887031A WLAN 802.11ac Waveform Files are required for WLAN 802.11ac MIMO measurements*2.

∗2: Supports up to 4×4 MIMO WLAN 802.11ac measurements

MIMO Measurement Solutions

The MT8870A is the ideal MIMO measurement solution for WLAN MIMO devices at every stage from R&D to production.



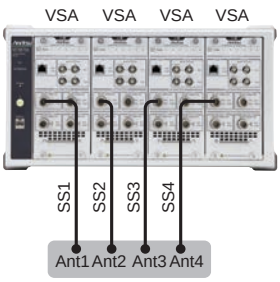
True MIMO

Features

The MT8870A supports parallel measurement of wireless LAN device streaming characteristics using multiple MU887000A units installed in the main frame.
It is ideal for performing streaming measurements from each antenna under conditions closely mimicking a real usage environment at the R&D and design stages. There is no need for troublesome external cable connections, because the timing of each MU887000A unit and the 10-MHz reference frequency are synchronized by the internal connections, offering easy True MIMO measurement.

Transmitter Test

- DUT transmits four MIMO signals simultaneously.
- MU887000A in each slot tests each antenna (stream)
- Fully independent measurements with parallel processing by each MU887000A
- Measurement Results
  Each Power, EVM, Spectral Mask, etc.



Test Sequence:

Antenna 1
Antenna 2
Antenna 3
Antenna 4

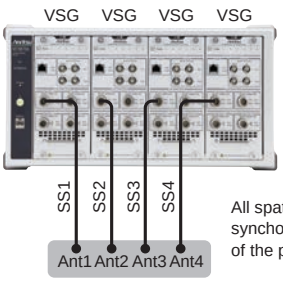
Test Results:

Antenna 1: EVM_1, Power_1, Spectral mask_1 ...
Antenna 2: EVM_2, Power_2, Spectral mask_2 ...
Antenna 3: EVM_3, Power_3, Spectral mask_3 ...
Antenna 4: EVM_4, Power_4, Spectral mask_4 ...

Receiver Test

- Sends test packets for each antenna to TRx Test Module in each slot
- Measurement Results
  Rx Sensitivity of Each Antenna
- Synchronization
  10-MHz Reference Frequency
  Digital Timing

Note: RF Local Frequency Sync not supported



All spatial streams must be synchoronized to the start of the packet.

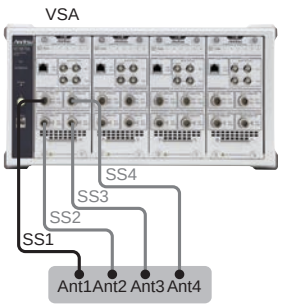
Sequential MIMO

Features

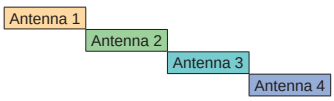
Wireless LAN device MIMO measurements at R&D design require stream measurements from each antenna. Although True MIMO measurement supports an environment in which each antenna is measured simultaneously in parallel, the cost is high because multiple MU887000A units are required. Since one MU887000A can support up to four test ports, the Sequential MIMO measurement functions helps cut costs by switching between antennas to perform accurate sequential measurement of each antenna of the MIMO device.

Transmitter Test

- DUT transmits four MIMO signals simultaneously
- MT8870A switches connected test port and performs TRx test at each antenna (stream)
- Measurement Results
  Each Power, EVM, Spectral Mask, etc.



Test Sequence:

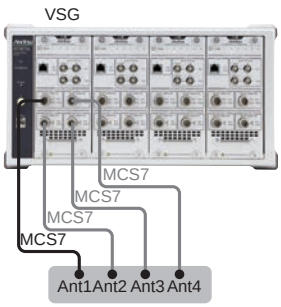


Test Results:

Antenna 1: EVM_1, Power_1, Spectral mask_1 ...
Antenna 2: EVM_2, Power_2, Spectral mask_2 ...
Antenna 3: EVM_3, Power_3, Spectral mask_3 ...
Antenna 4: EVM_4, Power_4, Spectral mask_4 ...

Receiver Test

- MT8870A switches test port and sends test signal to each antenna to perform Rx sensitivity test
- Waveform uses SISO signal
- Measurement Results
  Rx Test for Each Antenna



Composite MIMO

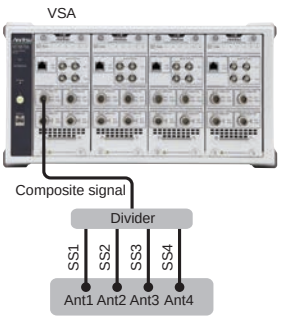
Features

Production-line operators urgently need ways to cut production costs by shortening tact times through reduced measurement times. MIMO device measurement methods currently focus on measuring each antenna one-by-one but viewed from the perspective of reduced tact time and lower costs, production lines could achieve better efficiency and profits with one single measurement of all MIMO device antennas instead of separate measurements of all antennas (total streaming). Installing the MT8870A with one MU887000A supports use of the Composite MIMO measurement function to measure wireless LAN RF characteristics at one time by combining and dividing multiple MIMO signals using an external divider (combiner)*.

*: Recommended Product
Mini-Circuits, ZN4PD1-63 + (Frequency Range: 2000 MHz to 6000 MHz)

Transmitter Test

- DUT transmits three MIMO signals simultaneously
- MT8870A receives composite test signal via combiner, which combines each streaming MIMO signal output from each antenna, and evaluates RF characteristics
- Measurement Results
  Composite Power (individual powers)
  Composite EVM and Spectral Mask Values



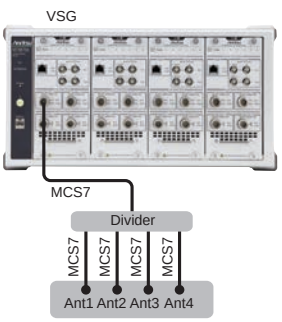
Test Sequence:

Test Results:

EVM_Avg, Power_Avg, Spectral mask_Avg ...

Receiver Test

- Diversity Test (SISO signal)
- Transmits test signal from MT8870A and splits into identical signals at divider (combiner) for input to each antenna
- Since same signal received by multiple antennas, performs better evaluation than Rx sensitivity results obtained from one antenna
- Measurement Results
  Rx Sensitivity (Result is one value only; test specifications of sensitivity changed by number of antennas)



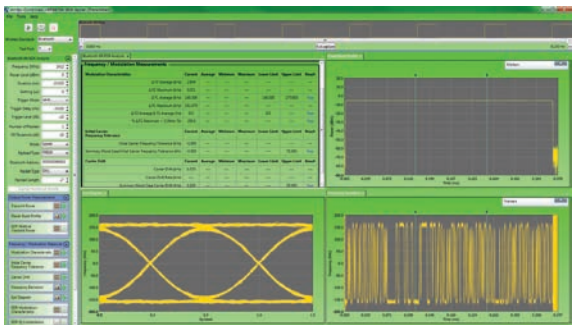
Bluetooth Measurement Solution

MX887040A *Bluetooth* TX Measurement
MV887040A *Bluetooth* Waveforms

The MT8870A Universal Wireless Test Set/MU887000A TRX Test Module supports non-signalling transmitter and receiver tests for *Bluetooth* Basic Rate (BR), Enhanced Data Rate (EDR) and low-energy (Smart) devices.

Transmitter Test

The MX887040A *Bluetooth* TX Measurement Software has two *Bluetooth* TX test modes. The SIG Standard mode measures TX test packets sent from the device under test according to the *Bluetooth* RF Test Specifications. In SIG standard mode, the system returns only measurements that are compatible with the payload type of the captured packets. In Speed Test mode, the system returns results for all enabled measurements regardless of the packet payload.
Because the Speed Test mode supports all BR/EDR measurements for individual packet types, it is ideal for rapid testing on production lines.



***Bluetooth* TX Measurement using CombiView**

Bluetooth TX Measurement

● ***Bluetooth* Test Specification v1.2/2.0/2.0 + EDR/2.1/2.1 + EDR/3.0/3.0 + HS/4.0: RF-PHY.TS.4.0.2/RF-PHY.TS.4.0.3: TX Test**

Specification	Test Items
TRM/CA/01/C	Output Power
TRM/CA/03/C	Power Control
TRM/CA/06/C	TX Output Spectrum – Adjacent Channel Power
TRM/CA/07/C	Modulation Characteristics
TRM/CA/08C	Initial carrier frequency tolerance
TRM/CA/09/C	Carrier Frequency drift
TRM/CA/10/C	EDR relative transmit power
TRM/CA/11/C	EDR Carrier frequency stability
TRM/CA/11/C	EDR Modulation accuracy
TRM/CA/12/C	EDR Differential Phase Encoding
TRM/CA/13/C	EDR In-band Spurious Emissions
TRM/CA/14/C	Enhanced Power Control
TRM-LE/CA/01/C and TRM-LE/CA/02/C	BLE Output power
TRM-LE/CA/03/C and TRM-LE/CA/04/C	BLE In-band Emissions
TRM-LE/CA/05/C	BLE Modulation characteristics
TRM-LE/CA/06/C and TRM-LE/CA/07/C	BLE Carrier frequency offset and drift

● **Graphical Displays (Basic Rate/BLE)**

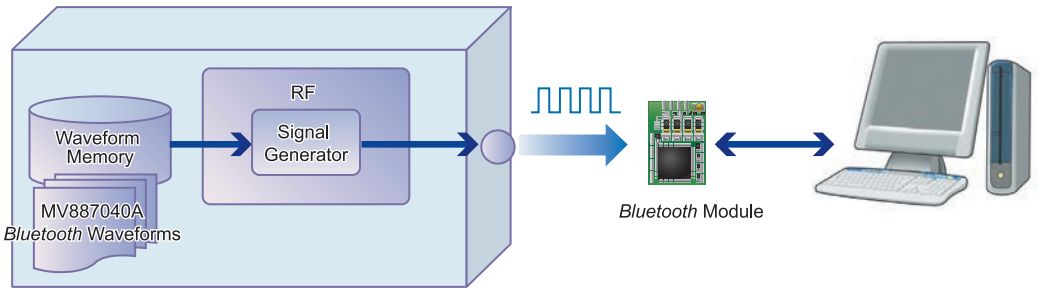
Graphs
Power Burst profile
Frequency deviation
Eye diagram
Spectral profile

● **Graphical Displays (EDR)**

Graphs
Power burst profile
Frequency deviation
IQ constellation diagram
DEVM against symbol
Vector diagram
Spectral profile

Receiver Test

The MV887040A application provides support for transmission of *Bluetooth* signals from the vector signal generator to the device under test. The number of received packets can then be read using the chipset vendor's control software.



MU887000A TRX Test Module

Standard Waveforms

Bluetooth	Waveform Type
Basic Rate	DH1/DH3/DH5
Enhanced Data Rate (EDR)	2-DH1/2-DH3/2-DH5/3-DH1/3-DH3/3-DH5
Bluetooth Low Energy	BLE/PER Report Integrity Test
Others	GFSK/PSK CW (Interference Waveform)

Bluetooth RX Measurement

- ***Bluetooth* Test Specification v1.2/2.0/2.0 + EDR/2.1/2.1 + EDR/3.0/3.0 + HS/4.0: RF-PHY.TS.4.0.2/RF-PHY.TS.4.0.3: RX Test**

Specification	Test Items
RCV/CA/01/C	Sensitivity – single slot packets
RCV/CA/02/C	Sensitivity – multi-slot packets
RCV/CA/06/C	Maximum Input Level
RCV/CA/07/C	EDR Sensitivity
RCV/CA/08/C	EDR BER Floor Performance
RCV/CA/10/C	EDR Maximum Input Level
RCV-LE/CA/01/C and RCV-LE/CA/02/C	BLE Receiver sensitivity
RCV-LE/CA/06/C	BLE Maximum input signal level
RCV-LE/CA/07/C	PER Report Integrity

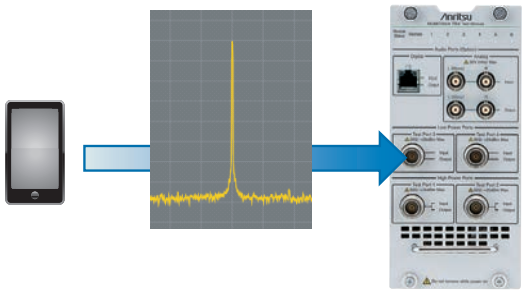
Simple Test Solution / Receiver Test Solution

MX887050A Short Range Wireless Average Power and Frequency Measurement

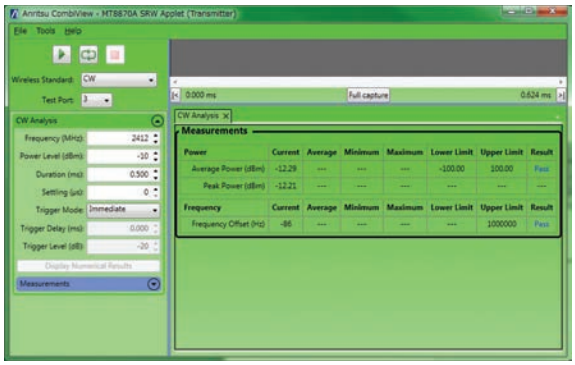
Installing the MX887050A Short Range Wireless Average Power and Frequency Measurement Software in the MT8870A Universal Wireless Test Set provides support for simple tests for WLAN and *Bluetooth* short range wireless. The MX887050A supports CW power and frequency measurements on unmodulated signals and on signals modulated using the methods shown in the table below.

Supported Modulation Methods	
WLAN	DSSS, OFDM
Bluetooth	GFSK, PSK

For Simple Tests



MX887050A
Short Range Wireless Average Power and Frequency Measurement



CW Measurement using CombiView

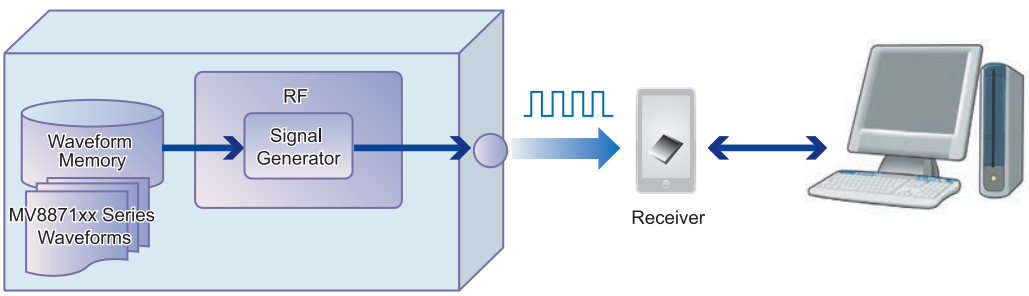
MV8871xx Series Waveforms

The MT8870A/MU887000A supports Rx tests of receivers using the various common communications technologies in widespread use today.

Receiver Test Using Waveforms

The MV8871xx Series Waveforms is a file of waveforms for generating any output waveform standardized by each communications technology. Saving and selecting these files in the internal waveform memory of the MU887000A TRX Test Module makes it easy to output a signal for any waveform pattern from the built-in vector signal generator.
Waveform file generated from the MU887000A TRX Test Module vector signal generator can be used to run sensitivity tests and simple BER Rx tests* on GPS and digital broadcast equipment supporting mobile terminals and communications appliances.

*: An external attenuator is required when running Rx tests at lower levels than the lower output limit of the signal generator.



MU887000A TRX Test Module

Main Specifications of MV8871xxA Series Waveforms

MV887100A GPS Waveforms

Waveform File Name	MV887100A_GPS_0002	MV887100A_GPS_0003
Application	Sensitivity Test/BER Measurement	Parity Detection/Sensitivity Test
Transmitted Data Modulation Method	BPSK	
Satellite ID Number	1	
Reference Standard	GLOBAL POSITIONING SYSTEM STANDARD POSITIONING SERVICE SIGNAL SPECIFICATION	

MV887102A GLONASS Waveforms

Waveform File Name	MV887102A_GLONASS_0001	MV887102A_GLONASS_010x MV887102A_GLONASS_011x
Application	Sensitivity Test/BER Measurement	Simultaneous GPS and GLONASS measurements*, C/No measurements
Transmitted Data Modulation Method	BPSK	BPSK
Satellite ID Number	3	–
Reference Standard	INTERFACE CONTROL DOCUMENT Navigational radio signal In bands L1, L2 Edition 5.1	

∗: MV887100A GPS waveforms license is required to perform simultaneous GPS and GLONASS measurements.

MV887110A DVB-H Waveforms

Waveform File Name	MV887110A_DVBH_0001
Application	Simple BER Measurement
Transmitted Data	PN9fix*
Transmitted Data Modulation Method	QPSK
Encoding Rate	2/3
System Bandwidth	8 MHz
Cell ID	0x0000
Reference Standard	ETSI EN 300 744 V1.5.1 (2004-11)

∗: fix indicates the PN sequence is not continued if the waveform is regenerated from the first position.

MV887111A ISDB-T Waveforms

Waveform File Name	MV887111A_ISDBT_0001	MV887111A_ISDBT_0002	MV887111A_ISDBT_0003	MV887111A_ISDBT_0004
Application	Device Evaluation	Video and Audio Evaluation*1		Simple BER Measurement
Waveform Cycle/Group	2 [Frame]	40 [Frame]	40 [Frame]	4 [Frame]
Transmitted Data	PN23fix*2			
Transmitted Data Modulation Method	Layer A: 64QAM and Layer A: QPSK Layer B: 64QAM	Layer A: QPSK Layer B: 64QAM		Layer A: QPSK or 16QAM Layer B: 64QAM
Guard Interval	1/8			
Encoding Rate	No Encoding	Layer A: 2/3 Layer B: 7/8	Layer A: 2/3 Layer B: 3/4	Layer A: 2/3 or 1/2 Layer B: 3/4 or 7/8
Mode	3			
Reference Standard	ARIB STD-B31			

∗1: Rx not guaranteed for all receivers
∗2: fix indicates the PN sequence is not continued if the waveform is regenerated from the first position.

MV887112A ISDB-Tmm Waveforms

Waveform File Name	MV887112A_ISDBTmm_SSpatA_000x_0M (x = 1 to 6) MV887112A_ISDBTmm_SSpatA_000x_8M (x = 1 to 6) MV887112A_ISDBTmm_SSpatC_000x_0M (x = 7 to 12) MV887112A_ISDBTmm_SSpatC_000x_8M (x = 7 to 12) The XXXX_8M waveform pattern is a waveform with the file name XXXX_0M to which an 8-MHz offset has been added.
Application	Simple BER Measurement
Waveform Cycle/Group	4 [Frame]
Transmitted Data	PN23fix*
Transmitted Data Modulation Method	QPSK or 16QAM
Waveform Format	A type or C type
Guard Interval	1/4
Encoding Rate	1/2 or 2/3
Mode	3
Reference Standard	ARIB STD-B46

∗: fix indicates the PN sequence is not continued if the waveform is regenerated from the first position.

∗ Consult Anritsu for details about each waveform file.

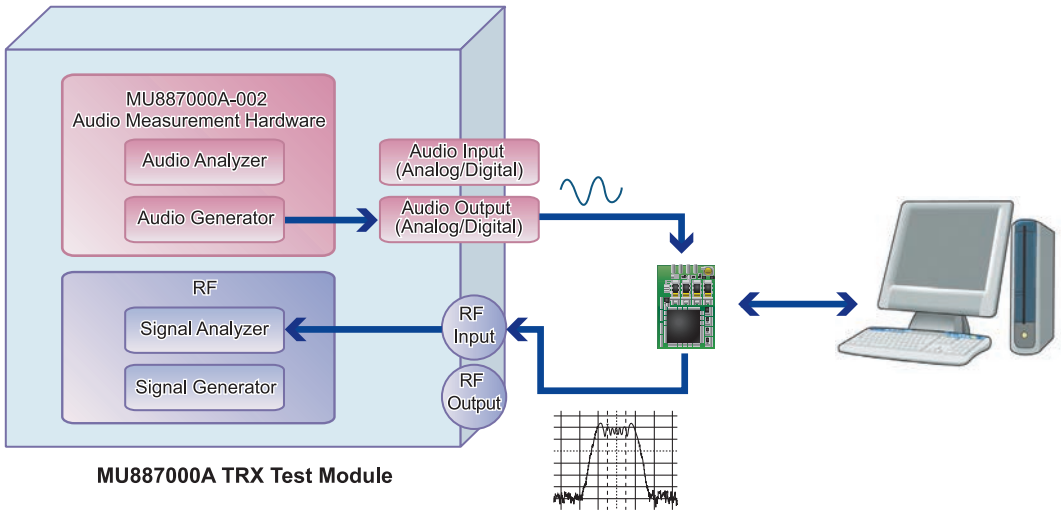
FM/Audio Measurement Solution

MX887070A FM/Audio TRX Measurement
MV887070A FM RDS Waveforms

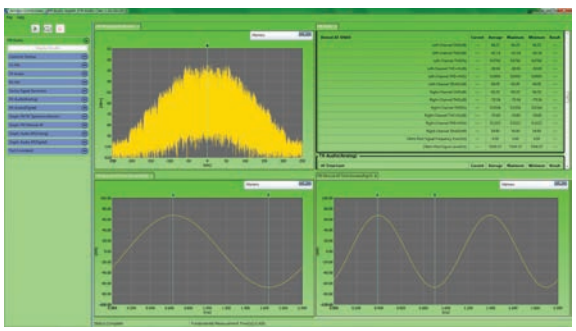
The MT8870A/MU887000A supports TRx tests of FM transceivers and adding an option also supports audio tests.

FM Transmitter Test

Installing the MU887000A-002 Audio Measurement Hardware in the MU887000A TRX Test Module outputs either analog or digital format audio signals for up to 8 multi-tones (stereo left and right channels) from the output connector. The audio signal is available for input to the FM transmitter audio input connector.
The MX887070A FM/Audio TRX Measurement software is used with the built-in signal analyzer of the MU887000A TRX Test Module to execute various audio tests, such as measurement of RF frequency, level and frequency deviation of audio FM signals output from FM transmitters, as well as AF signal frequency, level (up to 12 multi-tones), distortion, stereo crosstalk, etc., when using AF signal waveforms, and analysis of internal data and output of RDS data by decoding data when receiving RDS waveforms.



MU887000A TRX Test Module

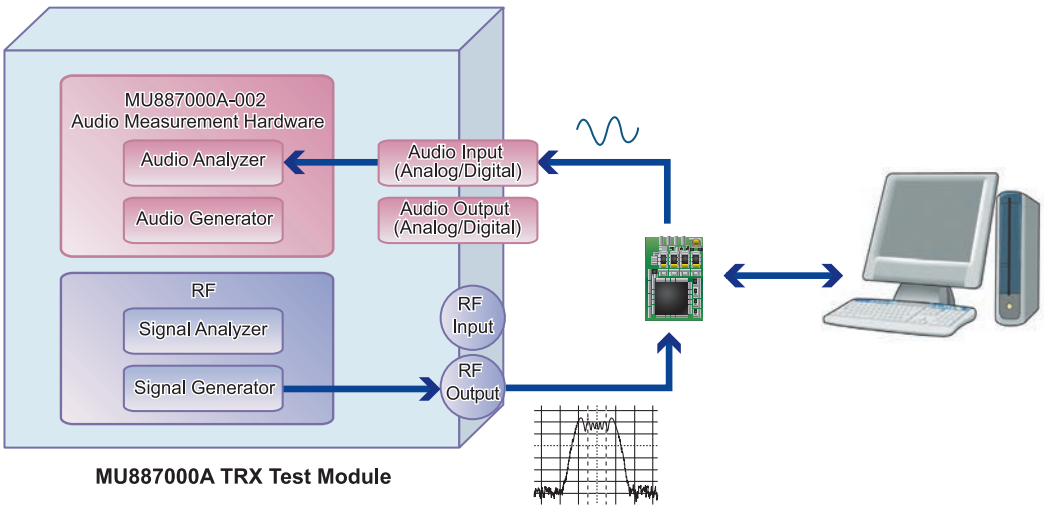


FM Transmitter Test using CombiView

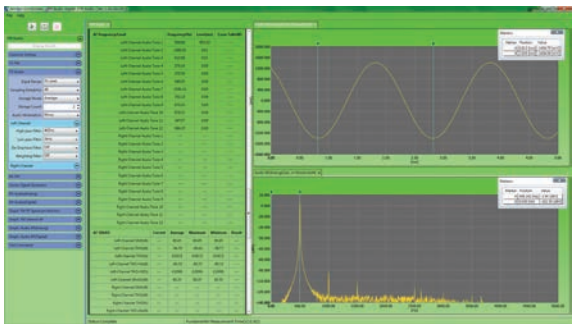
RDS Measurement Results using CombiView

FM Receiver Test

To test FM receivers using the MX887070A FM/Audio TRX Measurement software, the specified test audio signal is frequency modulated and a signal is output from the vector signal generator.
Installing the MU887000A-002 Audio Measurement Hardware in the MU887000A TRX Test Module inputs either analog or digital format audio signals output from the FM receiver to the built-in audio analyzer of the MU887000A to perform audio tests including AF signal frequency and level (up to 12 multi-tones), distortion rate, stereo crosstalk, etc.



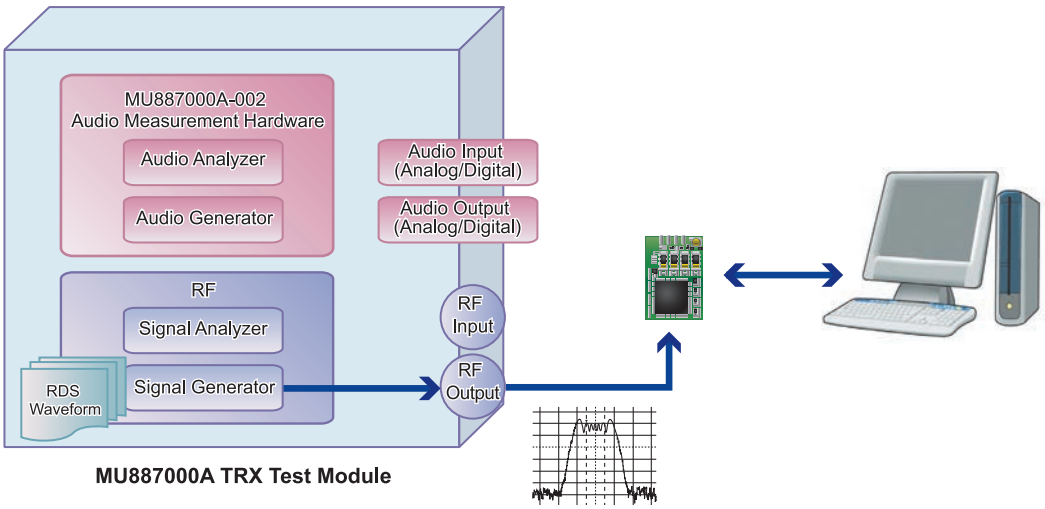
MU887000A TRX Test Module



FM Receiver Test using CombiView (device audio output measurement)

FM Receiver Test RDS (Radio Data System)

Loading the MV887070A FM RDS waveforms supports output of waveforms including transmitted data such as Radio Text data from the built-in vector signal generator based on the FM RDS (Radio Data System) standard.



Main Specifications of FM RDS Waveforms

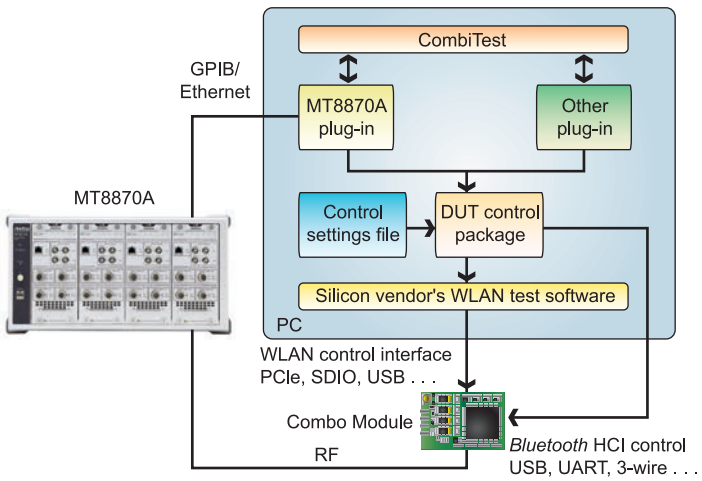
Waveform File Name		MV887070A_FMRDS_0001	MV887070A_FMRDS_0002	MV887070A_FMRDS_0003	MV887070A_FMRDS_0004
Application		DUT RDS Rx Function Test			DUT Rx Test
AF Left Channel	Tone Count	1			
	Tone Frequency	1 kHz			
	Tone Deviation	75 kHz × 0.9			
AF Right Channel	Tone Count	1			
	Tone Frequency	2 kHz			
	Tone Deviation	75 kHz × 0.9			
Pilot Deviation		75 kHz × 0.1			
RDS Deviation		75 kHz × 0.05			
Reference Standard		IEC 62106 Edition 2.0			

∗ Consult Anritsu for details about the FM RDS waveform file.

PC Application

CombiTest Automated Manufacturing

CombiTest is supplied with the instrument as a fast and easy means of building test plans. Just select the required calibration or verification tasks from the menu and drag them to position in the test plan.
Test plans can be as brief or as comprehensive as required and can include transmitter and receiver tasks for both Bluetooth and WLAN. All results are automatically archived to a database.
Control packages developed in partnership with leading silicon vendors result in test plans that configure and control the device under test for each test item as required. When using a control package, fully automated test plans can be created and edited in minutes, eliminating the need to write custom manufacturing test programs.



Specifications

● MX887030A WLAN 802.11b/g/a/n TX Measurement

Common Item	Measuring Object	WLAN Signal Packet
	Frequency Range	2.4 GHz Band: 2412 MHz to 2484 MHz 5 GHz Band: 4920 MHz to 5825 MHz (Required MX887000A-001)
RF Power	Input Setting Range	–65 to +25 dBm (Test port 3 and 4)
	Accuracy	After CAL, 20° to 30°C ±0.7 dB (–30 dBm ≤ Level ≤ +25 dBm), ±1.0 dB (–50 dBm ≤ Level < –30 dBm)
	Bandwidth	40 MHz, 20 MHz (802.11n) 20 MHz (802.11b/g/a)
	Capture Time	Up to 1.34 s
	Pre-trigger	Up to 1.34 s
	Resolution (time domain profile)	5 ns/sample
	CCDF	CCDF defined as a 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.
	Power Distribution Value	A single numeric value called the power distribution value defines the number of dB above the average power below which a user defined percentage of the total number of samples falls.
Spectral Profile Measurement	Span	±65 MHz (802.11n) ±35 MHz (802.11b/g/a)
	Minimum Capture Time	50 µs
	Input Signal Measurement Range (RBW: 100 kHz)	–27 to +25 dBm
	Linearity	CW, RBW: 100 kHz, Same as MU887000A Level Linearity Test port 3 and 4. ±0.2 dB (≥ –55 dBm, 0 to –40 dB)
	Resolution	0.1 dB
	Bandwidth	100 kHz
EVM (Modulation Accuracy)	Measurement Range	–20 to +25 dBm
	Residual EVM	DSSS: <–28 dB (Signal level: >–20 dBm, Averaged over 20 packets) OFDM: <–40 dB (Signal level: >–20 dBm, Averaged over 20 packets, Channel Estimation: FULLPACKET)
	EVM Data Format	dB, %
	Resolution	0.1% or 0.1 dB, All limit checking in dB to 0.1 dB resolution
	Speed	>20 readings/second
DSSS EVM Measurement Setting	RX Filter Type	None, Gaussian, Root Raised Cosine
	Gaussian Filter Setting BT	BT 0.3 to 1.0, Resolution: 0.1
	Root Raised Cosine Filter Setting	α 0.30 to 1.00, Resolution: 0.01
	Measurement Start	It shall be possible to measure EVM from the first data chip of the packet
	Measurement Method	Header or payload. Header measures the EVM of the first 1000 chips of the PLCP preamble and header.
	User Specified Measurement Range	220 to 11000 chips
	Measurement Functional Range	Measurement only possible if channel frequency error <±150 kHz (±60 ppm)
	Carrier Lock	Phase tracking automatically applied as per carrier lock 802.11-2007 18.4.7.8
OFDM EVM Measurement Setting	Channel Estimation	User selection of Long Training Sequence or Full Packet.
	User Specified Measurement Range	Min. 16 symbols, Max. 1000 symbols
	OFDM Pilot Tracking	"Phase tracking only" or "Phase and Amplitude Tracking". Peak and Average EVM on all sub-carriers, dB or percentage Peak and Average on each sub-carrier – frequency domain % vs. sub-carrier EVM vs. Symbol – time domain % vs. Symbol number, 1 to max
DSSS Additional Measurement	Transmit Center Frequency Tolerance	Definition: Average frequency of the DSSS carrier signal Accuracy: ± (Setting frequency × Reference oscillator accuracy + 1 kHz) Resolution: Hz to no decimal places, ppm to one decimal place
	Chip Clock Frequency Tolerance	Definition: Frequency error relative to the 11 MHz chip clock. Measurement averaged over a fully coded DSSS packet with minimum payload length 3300 chips, 300 µs Display format: Hz, ppm Range: ±50 ppm Resolution: Hz to no decimal places, ppm to one decimal place Data Analysis width: 20 µs (220 chips) minimum User Specified measurement range: 3300 to 30250 chips
	Transmit Power-on and Power Down Ramp	Definition: Time for burst to transit from 10 to 90% or 90 to 10% of linear power. Data outputs: 10%, 90%, Delta values Resolution: 5 ns
	RF Carrier Suppression	Method: IEEE Std 802.11-2007 (18.4.7.7), IQ offset method IEEE method: Relative level of the carrier to the highest sideband for a 10101010 test pattern with scrambler disabled, data rate 2 Mbps. IQ Offset method: Calculated from the relative values of the peak frequency response and the channel center frequency with the data rate processing gain.

OFDM Additional Measurement	Transmit Center Frequency Tolerance	Definition: Average frequency of the OFDM carrier signal Data output format: Hz, ppm Accuracy: >1 ms packet, ± (Setting frequency × Reference oscillator accuracy + 1 kHz) Resolution: Hz to no decimal places, ppm to one decimal place Symbol clock frequency tolerance Definition: Frequency error relative to the 250 kHz symbol clock as per 19.4.7.3/17.3.9.5 Measurement averaged over a fully coded OFDM packet with a minimum payload length of 16 symbols (64 µs) Data output format: Hz, ppm Range: ±40 ppm Resolution: ppm to one decimal place User specified measurement range: 16- (Define numbers)
	Transmitter Center Frequency Leakage	Definition: Measurement of the leakage of the center carrier Data output format: dB Resolution: dB to two decimal places Transmitter spectral flatness Definition: Measurement of RF sub-carrier power level Unit of measurement: dB
Additional Measurement (DSSS and OFDM)	Power Spectral Density	The maximum power measured in a 1 MHz bandwidth within the occupied bandwidth of the signal
	Occupied Bandwidth	Measures the frequency range within which the specified percentage power is contained
	Occupied Bandwidth Percentage Range	1 to 99%

● MX887031A WLAN 802.11ac TX Measurement

Common Item	Measuring Object	WLAN Signal Packet
	Frequency Range	5 GHz Band: 4920 MHz to 5825 MHz (Required MX887000A-001)
RF Power	Input Setting Range	–65 to +25 dBm (Test port 3 and 4)
	Accuracy	After CAL, 20° to 30°C ±0.7 dB (–30 dBm ≤ Level ≤ +25 dBm), ±1.0 dB (–50 dBm ≤ Level < –30 dBm)
	Bandwidth	160, 80, 40, 20 MHz
	Capture Time	Up to 1.34 s
	Pre-trigger	Up to 1.34 s
	Resolution (time domain profile)	5 ns/sample
	CCDF	CCDF defined as a 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.
	Power Distribution Value	A single numeric value called the power distribution value defines the number of dB above the average power below which a user defined percentage of the total number of samples falls.
Spectral Profile Measurement	Spectral Profile Measurement Span	±80 MHz
	Minimum Capture Time	50 µs
	Input Signal Measurement Range (RBW: 100 kHz)	–27 to +25 dBm
	Linearity	CW, RBW: 100 kHz ±0.2 dB (≥ –55 dBm, 0 to –40 dB)
	Resolution	0.1 dB
	Measurement Bandwidth	100 kHz
EVM (Modulation Accuracy)	EVM Measurement Range	–20 to +25 dBm
	Residual EVM (Bandwidth: ≤80 MHz)	<–38 dB (Signal level: >–10 dBm, Averaged over 20 packets, Channel estimation: FULLPACKET)
	EVM Data Format	dB, %
	Measurement Resolution	0.1% or 0.1 dB, All limit checking in dB to 0.1 dB resolution
	Measurement Speed	>20 readings/second
OFDM EVM Measurement Setting	Channel Estimation	User selection of Long Training Sequence or Full Packet.
	User Specified Measurement Range	Min. 16 symbols, Max. 1000 symbols
	OFDM Pilot Tracking	"Phase tracking only" or "Phase and Amplitude Tracking". Peak and Average EVM on all sub-carriers, dB or percentage Peak and Average on each sub-carrier – frequency domain % vs. sub-carrier EVM vs. Symbol – time domain % vs. Symbol number, 1 to max.
OFDM Additional Measurement	Transmit Center Frequency Tolerance	Definition: Average frequency of the OFDM carrier signal Data output format: Hz, ppm Accuracy: >1 ms packet, ± (Setting frequency × Reference oscillator accuracy + 1 kHz) Resolution: Hz to no decimal places, ppm to one decimal places Symbol clock frequency tolerance Definition: Frequency error relative to the 250 kHz symbol clock as per 19.4.7.3/17.3.9.5 Measurement averaged over a fully coded OFDM packet with a minimum payload length of 16 symbols (64 µs) Data output format: Hz, ppm Range: ±40 ppm Resolution: ppm to one decimal places User specified measurement range: 16- (Define numbers)
	Transmitter Center Frequency Leakage	Definition: Measurement of the leakage of the center carrier Data output format: dB Resolution: dB to two decimal places Transmitter spectral flatness Definition: Measurement of RF sub-carrier power level Unit of measurement: dB

● MX887040A *Bluetooth* TX Measurement

Common Item	Measuring Object	*Bluetooth* Signal Packet (DH-1, 3, 5 2-DH-1, 3, 5 3-DH-1, 3, 5 LE)
	Frequency Range	2402 MHz to 2480 MHz
	Measurement Mode	'SIG Standard' Supports RF measurements on selected packet types as per the SIG RF test standard.
RF Power	Input Signal Measurement Range	–65 to +25 dBm (Test port 3 and 4)
	Measurement Accuracy	After CAL, 20° to 30°C ±0.7 dB (–30 dBm ≤ Level ≤ +25 dBm), ±1.0 dB (–50 dBm ≤ Level < –30 dBm)
EDR Relative Transmit Power	Input Signal Measurement Range	–35 to +25 dBm
	Measurement	Maximum, Minimum, Average differential power
	Relative Power Measurement Range	Relative power measurement range between the GFSK and π/4DQPSK or 8DSPK sections of the packet.
	Power Measurement Bandwidth	1.3 MHz (IF filter response 'flat' fc ±550 kHz)
	Maximum Resolution (time domain)	0.01 dB
Bluetooth Modulation	GFSK, π/4DQPSK, 8DPSK	
	DEVM (Modulation Accuracy)	
	Input Signal Measurement Range	–20 to +25 dBm
	Residual DEVM	<5% (Signal level: >–20 dBm, Averaged over 10 packets)
	Measurement Resolution	0.1%
	GFSK Modulation	Deviation measurement range: 0 to 350 kHz Accuracy: Modulation index: 0.32, Signal level: >–20 dBm, Averaged over 10 packets 1% (±0.01 × expected deviation [Hz]) (nominal)
	Initial Carrier Frequency Tolerance	Input signal measurement range: –35 to +25 dBm Initial frequency measurement range: 0 to ±150 kHz Resolution: 1 kHz
	Carrier-frequency Drift	Input signal measurement range: –35 to +25 dBm Frequency drift range: 0 to ±200 kHz Time settings: 50 µs, >2000 µs
EDR Carrier Frequency Stability	Measurement Range	±100 kHz
	Resolution	1 kHz
	Accuracy	Signal level: >–20 dBm, Averaged over 10 packets ± (Setting frequency × Reference oscillator accuracy + 500 Hz)
	Displayed Results	Initial frequency error ωi, Frequency error ωo, Frequency error ωi + ωo
EDR Modulation Accuracy	RMS DEVM Range	0 to 30% π/4DQPSK, 0 to 20% 8DPSK
	Peak DEVM Range	0 to 50% π/4DQPSK, 0 to 30% 8DPSK
BLE Modulation Characteristics	GFSK	
	Input Signal Measurement Range	–35 to +25 dBm
	Frequency Deviation Measurement Range	0 to ±500 kHz peak
	Resolution	1 kHz
	Accuracy	Modulation index: 0.5, Signal level: >–20 dBm, Averaged over 10 packets 1% (±0.01 × expected deviation [Hz]) (nominal)
BLE Carrier Frequency Offset and Drift	Input Signal Measurement Range	–35 to +25 dBm
	Frequency Measurement Range	0 to ±500 kHz
	Accuracy	Signal level: >–20 dBm, Averaged over 10 packets ± (Setting frequency × Reference oscillator accuracy + 500 Hz)
	Displayed Results	Carrier frequency error, Frequency drift, Drift rate

● MX887050A Short Range Wireless Average Power and Frequency Measurement

RF Power (CW and Continuously Modulated)	Input Setting Range	–65 to +25 dBm (Test port 3 and 4)
	Frequency Range	2.4 GHz Band: 2402 MHz to 2484 MHz 5 GHz Band: 4920 MHz to 5825 MHz (Require MU887000A-001)
	Measurement Accuracy	After CAL 400 MHz ≤ f ≤ 3.8 GHz, 10° to 40°C ±0.7 dB (–30 ≤ Level ≤ +25 dBm) ±0.9 dB (–55 ≤ Level < –30 dBm) ±1.1 dB (–65 ≤ Level < –55 dBm) 3.8 GHz ≤ f ≤ 6 GHz, 20° to 30°C ±0.7 dB (–30 ≤ Level ≤ +25 dBm) ±0.9 dB (–55 ≤ Level < –30 dBm) ±1.1 dB (–65 ≤ Level < –55 dBm)
	Linearity	CW, RBW: 100 kHz ±0.2 dB (≥–55 dBm, 0 to –40 dB)
Frequency (CW and Continuously Modulated)	Power Measurement Range	–35 to +25 dBm
	Frequency Measurement Range	0 to ±500 kHz (CW, *Bluetooth*) 0 to ±100 kHz (WLAN)
	Accuracy	± (Setting frequency × Reference oscillator accuracy + 500 Hz)

● MV887030A WLAN 802.11b/g/a/n Waveforms

EVM	802.11b	Packet length: 1024 byte, Gaussian filter: BT 0.5 ≤–38 dB rms (2402 MHz to 2484 MHz)
	802.11g	Packet length: 1000 byte, 20° to 30°C ≤–40 dB rms (2402 MHz to 2484 MHz)
	802.11a	Packet length: 1000 byte, 20° to 30°C ≤–38 dB rms (4920 MHz to 5825 MHz)
	802.11n	Packet length: 4096 byte, Long guard interval, Channel bandwidth: 40 MHz, 20° to 30°C ≤–40 dB rms (2402 MHz to 2484 MHz) ≤–38 dB rms (4920 MHz to 5825 MHz)

● MV887040A *Bluetooth* Waveforms

Deviation	Frequency: 2402 MHz to 2480 MHz, GFSK modulation 1% (±0.01 × Deviation Hz) (nominal)
DEVM	Frequency: 2402 MHz to 2480 MHz, π/4-DQPSK or 8-DPSK modulation <5% rms

● MV887112A ISDB-Tmm Waveforms

MER	Frequency: 214.714285 MHz ≥37 dB (total)

● MX887070A FM/Audio TRX Measurement

FM Signal Measurements

Common Item	Target Signals	FM/FM Stereo/RDS (Radio Data System) Signals
	Frequency Range	65 MHz to 110 MHz
Tx Measurements	Measurement Functions	Amplitude Carrier Frequency Frequency Deviation Occupied Bandwidth Pilot Frequency Deviation Audio Frequency Deviation Audio Frequency Pilot Frequency THD THD+N/SINAD SNR
	Audio Filter	Low Pass: OFF, 3 kHz,15 kHz, 20 kHz, 30 kHz High Pass: OFF, 20 Hz, 100 Hz, 400 Hz De-emphasis: OFF, 50 µs, 75 µs Band Pass (Weighting Filter): OFF, A-Weighting (IEC 61672: 2003), C-Message, CCITT (ITU-T O.41)
	Input Level Range	–30 to +15 dBm (Test Port 1/2) –30 to +15 dBm (Test Port 3/4)
	Level Accuracy	At Measurement Bandwidth = 1.2 MHz Test Port 1/2 –30 dBm ≤ Level ≤ +15 dBm, ±0.7 dB at 10° to 40°C Test Port 3/4 –30 dBm ≤ Level ≤ +15 dBm, ±0.7 dB at 10° to 40°C
	Carrier Frequency Accuracy	FM Mono modulation, with 1 kHz Tone, 75 kHz deviation ± (Setting frequency × Reference oscillator accuracy + 1 Hz)
	FM Deviation Measurement Range	1 kHz to 100 kHz
	Residual FM	At Mono, 1 kHz Tone, 75 kHz deviation, demodulation bandwidth: 20 Hz to 15 kHz, using De-emphasis Filter (50 µs) >55 dB
	Demodulation Signal Analysis	No. of FFT Points: 65536 Sampling Rate: 152 kHz FFT window function: Hanning window
Rx Measurements	Measurement Functions	FM Waveform output
	Modulation Method	FM Mono, FM Stereo
	Frequency Deviation	Setting Range: 20 kHz to 100 kHz Distortion: >50 dB (SINAD) [65 MHz to 110 MHz, (SINAD, 20 Hz to 15 kHz, Emphasis On, Mono) Deviation 75 kHz, Tone = 1 kHz] Resolution: 0.1 Hz
	Internal Modulation Signal	AF Tone L channel (Mono): 1 to 8 tones R channel: 1 to 8 tones
	Frequency Range	20 Hz to 20 kHz Resolution: 0.1 Hz

Audio Signal Measurements

With MU887000A-002 Audio Measurement Hardware installed, TRx measurements of analog audio signal from AF Input/Output connector or digital audio signal from AF Digital connector

Tx Measurements	Measurement Functions	Amplitude Frequency Distortion Ratio Measurement Crosstalk THD THD+N/SINAD SNR

	Analog Measurements	All single-tone measurement standard values
		Impedance: 100 kΩ (AC coupling)
		Frequency Measurement
		  Frequency Range: 20 Hz to 20 kHz
		Level Measurement
		  Measurement Range: 1 mVpeak to 5 Vpeak (30 Vrms Max.)
		  Input Range Setting: 50 mVpeak, 500 mVpeak, 5 Vpeak
		  Level Accuracy: ±0.4 dB (20° to 30°C)
		THD+N (Total Harmonic Distortion + Noise)
		  <–60 dB (at 1 kHz, 2 Vpeak, 20 Hz to 20 kHz bandwidth, 5 Vpeak range, 20° to 30°C)
		Crosstalk
		  L/R: >60 dB
		AF Signal Analysis
		  Sampling Rate: 192 kHz
		  No. of FFT Points: 65536
		FFT window function: Hanning window

	Digital Measurement	All single-tone measurement standard values
		Bit Resolution: 16 bits/24 bits
		Sampling Rate
		  Frequency: 16 kHz, 32 kHz, 44.1 kHz, 48 kHz
		AF Signal Analysis
		No. of FFT Points: 16384 (sampling rates of 48 kHz, 44.1 kHz)
		  8192 (sampling rate of 32 kHz)
		  4096 (sampling rate of 16 kHz)
		FFT window function: Hanning window

Rx Measurement	Analog Measurements	All single-tone measurement standard values
		Impedance: 1 Ω (nominal, AC coupling)
		Output Waveform: Single tone, Multi-tone
		Frequency
		  Frequency Range: 20 Hz to 20 kHz
		  Frequency Resolution: 0.01 Hz
		Output Level
		  Level Range: 0 (off), 1 mV to 5 Vpeak (100 kΩ termination)
		Level Resolution: 1 mV (≤5 Vpeak)
		  100 µV (≤500 mVpeak)
		  10 µV (≤50 mVpeak)
		Level Accuracy: ±0.3 dB (At 1 kHz, 100 kΩ termination, 20° to 30°C)
		Max Output Current
		  100 mA (nominal)
		  Do not do short circuit
		THD+N (Total Harmonic Distortion + Noise)
		  <–60 dB (At 1 kHz, 1 Vpeak, 20 Hz to 20 kHz bandwidth, 100 kΩ termination, 20° to 30°C)

	Digital Measurement	All single-tone measurement standard values
		Output Waveform: Single tone, Multi-tone
		Frequency
		  Frequency Range: 20 Hz to 20 kHz (44.1 kHz, 48 kHz sampling)
		  20 Hz to 14 kHz (32 kHz sampling)
		  20 Hz to 7 kHz (16 kHz sampling)
		Frequency Resolution: 0.01 Hz
		Output Level
		  Level Range: Full Scale to (Full Scale – 40 dB)
		  Level Resolution: 0.1 dB
		Bit Resolution: 16 bits/24 bits
		Sampling Rate
		  Frequency: 16 kHz, 32 kHz, 44.1 kHz, 48 kHz

Ordering Information

Please specify the model/order number, name and quantity when ordering.
The names listed in the chart below are Order Names. The actual name of the item may differ from the Order Name.

Model/Order No.	Name
	Main frame
MT8870A	Universal Wireless Test Set
	Standard accessories
	Power Cord: 1 pc
B0666A	Blank Panel: 3 pcs[*1]
	DVD-R: 1 pc
MX880050A	CombiView (DVD-R)
MX880051A	Cellular Application Applet (DVD-R)
MX880052A	SRW Application Applet (DVD-R)
MX880053A	FM/Audio Application Applet (DVD-R)
MX880054A	Signal Generator Application Applet (DVD-R)
MX887900A	MT8870A Utility Tool (DVD-R)
W3605AE	MT8870A Operation Manual (DVD-R)
W3606AE	MU887000A Operation Manual (DVD-R)
	Options
MT8870A-001	GPIB Control
MT8870A-101	GPIB Control Retrofit
	Warranty
MT8870A-ES210	2 Years Extended Warranty Service
MT8870A-ES310	3 Years Extended Warranty Service
MT8870A-ES510	5 Years Extended Warranty Service
	Application parts
B0666A	Blank Panel
B0664A	Rack Mount Kit (MT8870A)
B0665A	Carrying Case (MT8870A)
B0669A	Front Cover for 1MW5U (MT8870A)
J0006	GPIB Cable, 0.5 m
J0007	GPIB Cable, 1.0 m
J0008	GPIB Cable, 2.0 m
J0127A	Coaxial Cord, 1 m (BNC-P · RG-58A/U · BNC-P)
J0127B	Coaxial Cord, 2.0 m (BNC-P · RG-58A/U · BNC-P)
J0127C	Coaxial Cord, 0.5 m (BNC-P · RG-58A/U · BNC-P)
J0576B	Coaxial Cord, 1.0 m (N-P · 5D-2W · N-P)
J0576D	Coaxial Cord, 2.0 m (N-P · 5D-2W · N-P)
J0322A	Coaxial Cord, 0.5 m (SMA-P · SMA-P, DC to 18 GHz, 50Ω)
J0322B	Coaxial Cord, 1.0 m (SMA-P · SMA-P, DC to 18 GHz, 50Ω)
J0322C	Coaxial Cord, 1.5 m (SMA-P · SMA-P, DC to 18 GHz, 50Ω)
J0322D	Coaxial Cord, 2.0 m (SMA-P · SMA-P, DC to 18 GHz, 50Ω)
J0004	Coaxial Adapter (N-P · SMA-J)
J1261A	Ethernet Cable (Shield type, Straight, 1 m)
J1261B	Ethernet Cable (Shield type, Straight, 3 m)
J1261C	Ethernet Cable (Shield type, Crossover, 1 m)
J1261D	Ethernet Cable (Shield type, Crossover, 3 m)

∗1: Installed in empty slots

Model/Order No.	Name
	Test module
MU887000A	TRX Test Module
	Standard accessories
	DVD-R: 1 pc
W3606AE	MU887000A Operation Manual (DVD-R)
	Options
MU887000A-001	6 GHz Frequency Extension
MU887000A-101	6 GHz Frequency Extension Retrofit
MU887000A-002	Audio Measurement Hardware
MU887000A-102	Audio Measurement Hardware Retrofit
	Warranty
MU887000A-ES210	2 Years Extended Warranty Service
MU887000A-ES310	3 Years Extended Warranty Service
MU887000A-ES510	5 Years Extended Warranty Service

Model/Order No.	Name
	Software
MX887010A	Cellular Standards Sequence Measurement
MX887011A	W-CDMA/HSPA Uplink TX Measurement
MX887012A	GSM/EDGE Uplink TX Measurement
MX887013A	LTE FDD Uplink TX Measurement
MX887014A	LTE TDD Uplink TX Measurement
MX887015A	CDMA2000 Reverse Link TX Measurement
MX887016A	1xEV-DO Reverse Link TX Measurement
MX887017A	TD-SCDMA Uplink TX Measurement
MX887030A	WLAN 802.11b/g/a/n TX Measurement[*2]
MX887031A	WLAN 802.11ac TX Measurement[*2]
MX887040A	*Bluetooth* TX Measurement
MX887050A	Short Range Wireless Average Power and Frequency Measurement
MX887070A	FM/Audio TRX Measurement[*3]
	Waveform file
MV887011A	W-CDMA/HSPA Downlink Waveforms
MV887012A	GSM/EDGE Downlink Waveforms
MV887013A	LTE FDD Downlink Waveforms
MV887014A	LTE TDD Downlink Waveforms
MV887015A	CDMA2000 Forward Link Waveforms
MV887016A	1xEV-DO Forward Link Waveforms
MV887017A	TD-SCDMA Downlink Waveforms
MV887030A	WLAN 802.11b/g/a/n Waveforms[*2]
MV887031A	WLAN 802.11ac Waveforms[*2]
MV887040A	*Bluetooth* Waveforms
MV887070A	FM RDS Waveforms
MV887100A	GPS Waveforms
MV887102A	GLONASS Waveforms
MV887110A	DVB-H Waveforms
MV887111A	ISDB-T Waveforms
MV887112A	ISDB-Tmm Waveforms

∗2: Requires MU887000A-001 for 5 GHz (802.11a/n/ac) frequency measurements
∗3: Requires MU887000A-002 for Audio Signal measurements

Note:

Note:

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Specifications are subject to change without notice.

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