



Universal Wireless Test Set

MT8870A

Measurement Software

MX8870xxA Series

Waveforms

MV887xxxA Series



Building Production Line Efficiency

Suitable for Non-signalling Testing of Wireless Communication Device

Support for multiple wireless standards assures future-proof testing as wireless standards evolve and develop.

Mass production of smartphone and wireless modules requires flexibility in supporting diversifying standards as well as reduced lead-time and costs through better efficiency.

The Universal Wireless Test Set MT8870A accommodates up to four TRX Test Modules MU887000A/01A (MU88700xA), supporting flexible and efficient inspection lines.

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



Universal Wireless Test Set
TRX Test Module
MT8870A
MU88700xA



One License Supports Four Modules



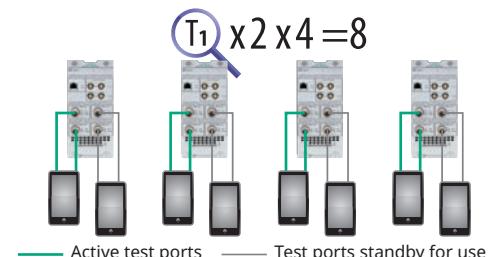
The TX measurement software packages and waveforms can each be licensed separately. One license can be used for up to four TRX test modules, cutting test equipment costs. A TX measurement software package is required for TX tests for each communication standard and a waveform is required for RX tests.

Flexible Test System Configuration

Up to
8
Units

Simultaneous 8 Units Connection:

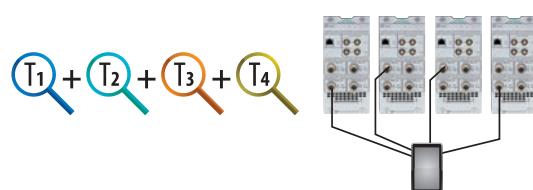
Since LTE mobiles have RX diversity antenna, both TRX and RX diversity antennas must be adjusted and tested. The MU88700xA supports four ports in one module for connecting two LTE terminals. Up to four modules can be installed in one MT8870A, supporting connection of up to eight LTE terminals and simultaneous testing up to four terminals.



Up to
4
Measurement
Types

Four Simultaneous Measurements:

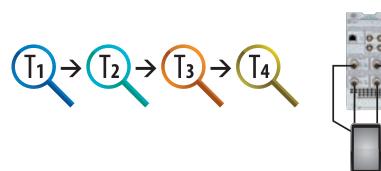
Recent smartphones support various wireless interfaces, such as *Bluetooth* and *WLAN*, in addition to cellular. Test times are cut by testing multiple wireless standards simultaneously.



Continuous
Measurements
1
by
Module

Continuous Measurements of Multiple Communications Standards:

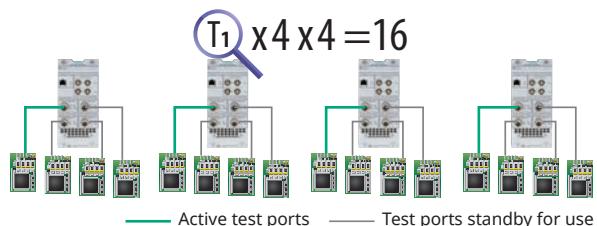
Licensing the TX measurement software packages and waveforms support continuous multiple measurements with one MU88700xA.



Up to
16
Test Devices

16 Simultaneous Connections:

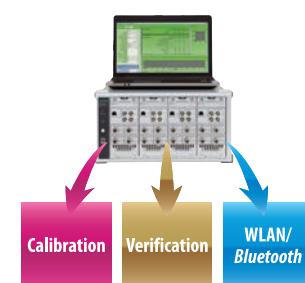
Each MU88700xA has four test ports. Up to four test modules can be installed in one MT8870A, supporting simultaneous connection of 16 test devices. This versatility eliminates the need for external combiners and also reduces test fixture calibration.



POINT

Supports Flexible Line Changes

Generally, wireless device production lines are divided into different processing stages such as calibration, inspection, and function testing. Using different equipment at each stage causes problems, such as different test times, as well as the need to provide spare capacity to cover any faults at each process. Since the MT8870A has high versatility due to its modular configuration, it minimizes the need for spare capacity when reconfiguring the production line, etc.



Measurement Software MX8870xxA Series/Waveforms MV887xxxA Series

Cellular Measurement Solution

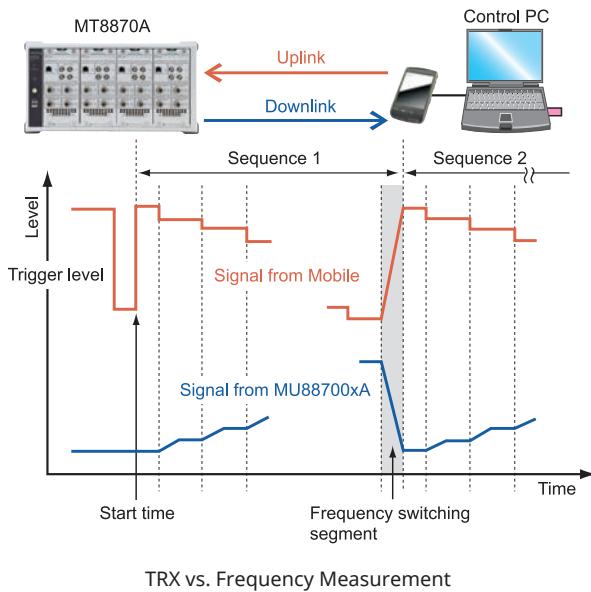
Cellular Standards Sequence Measurement

Installing the Cellular Standards Sequence Measurement software MX887010A package in the MT8870A can be operated with preconfigured frequency and level in a sequence list to the signal generator and signal analyzer.

This software is able to greatly reduce calibration and verification time in conjunction with a chipset that supports capability for high-speed calibration and sequence measurement.

*1: Sequence measurement requires TX Measurement software MX88701xA
*2: Requires Waveforms MV88701xA for downlink signal modulation waveforms

MX887010A



W-CDMA/HSPA Uplink TX Measurement

W-CDMA/HSPA Downlink Waveforms

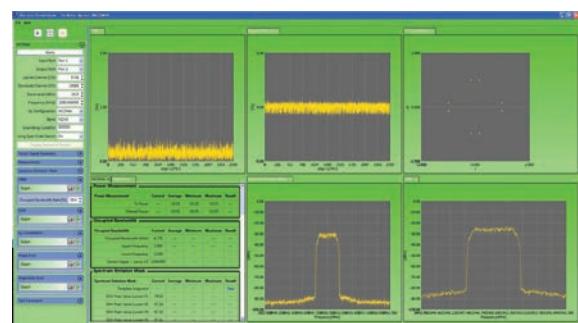
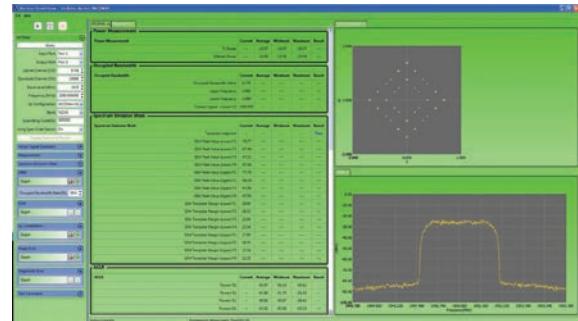
MX887011A

MV887011A

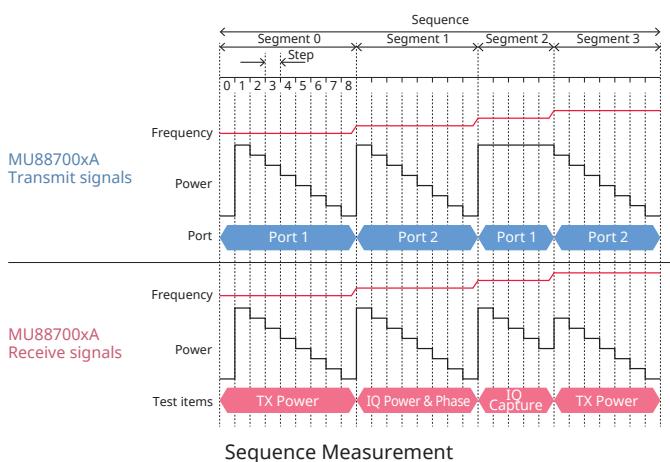
Installing the W-CDMA/HSPA Uplink TX Measurement software MX887011A in the MT8870A provides support for the following 3GPP W-CDMA and HSPA related TX characteristics measurements.

TX Power
Frequency Error
Occupied Bandwidth
Spectrum Mask
Adjacent Channel Leakage Power
Modulation Analysis

Additionally, the package of W-CDMA/HSPA Downlink Waveforms MV887011A contains downlink signals required for non-signaling measurements; sending the downlink signal for production is as easy as selecting the waveform file.



W-CDMA/HSPA Uplink TX Measurement using CombiView



Measurement Software MX8870xxA Series/Waveforms MV887xxxA Series

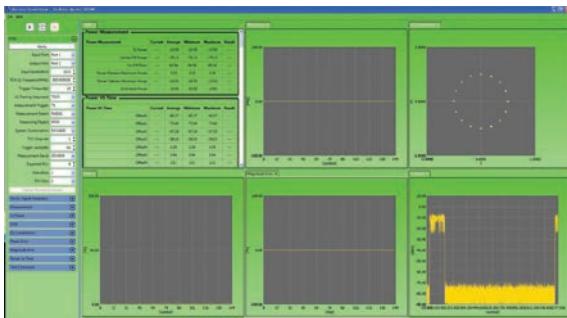
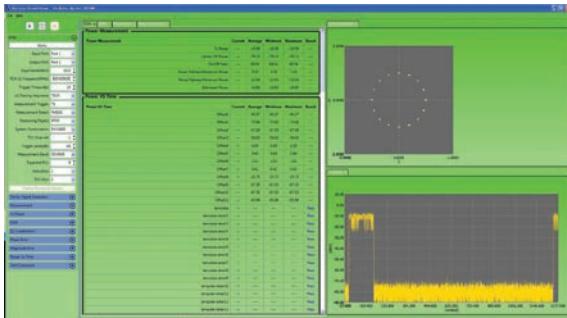
Cellular Measurement Solution (continued)

GSM/EDGE Uplink TX Measurement GSM/EDGE Downlink Waveforms

Installing the GSM/EDGE Uplink TX Measurement software MX887012A in the MT8870A provides support for the following 3GPP GSM and EDGE related TX characteristics measurements.

- TX Power
- Power vs. Time
- TX Frequency
- Phase Error
- EVM
- Origin Offset
- Output RF Spectrum

Additionally, the package of GSM/EDGE Downlink Waveforms MV887012A contains downlink signals required for non-signaling measurements; sending the downlink signal for production is as easy as selecting the waveform file.



GSM/EDGE Uplink TX Measurement using CombiView

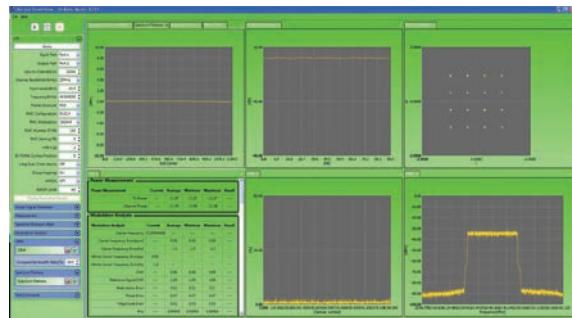
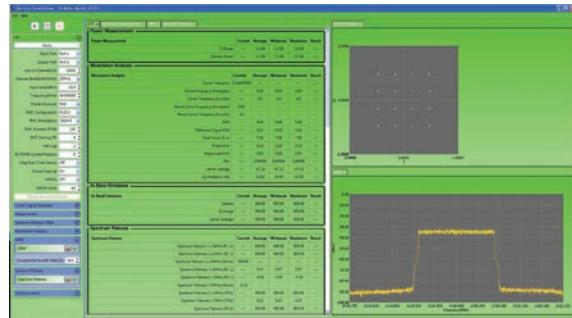
MX887012A MV887012A

LTE FDD Uplink TX Measurement LTE FDD Downlink Waveforms

Installing the LTE FDD Uplink TX Measurement software MX887013A in the MT8870A provides support for the following 3GPP LTE FDD related TX characteristics measurements.

- TX Power
- Frequency Error
- Occupied Bandwidth
- Spectrum Mask
- Adjacent Channel Leakage Power
- Modulation Analysis

Additionally, the package of LTE FDD Downlink Waveforms MV887013A contains downlink signals required for non-signaling measurements; sending the downlink signal for production is as easy as selecting the waveform file.



LTE FDD Uplink TX Measurement using CombiView

MX887013A MV887013A

Measurement Software MX8870xxA Series/Waveforms MV887xxxA Series

Cellular Measurement Solution (continued)

LTE TDD Uplink TX Measurement

LTE TDD Downlink Waveforms

Installing the LTE TDD Uplink TX Measurement software MX887014A in the MT8870A provides support for the following 3GPP LTE TDD related TX characteristics measurements.

TX Power

Frequency Deviation

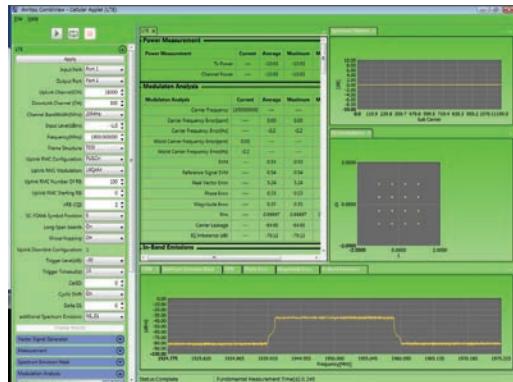
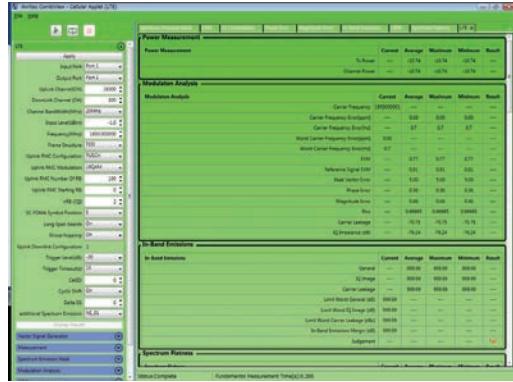
Occupied Bandwidth

Spectrum Mask

Adjacent Channel Leakage Power

Modulation Analysis

Additionally, the package of LTE TDD Downlink Waveforms MV887014A contains downlink signals required for non-signaling measurements, sending the downlink signal for production is as easy as selecting the waveform file.



LTE TDD Uplink TX Measurement using CombiView

MX887014A

MV887014A

CDMA2000 Reverse Link TX Measurement

CDMA2000 Forward Link Waveforms

MX887015A

MV887015A

Installing the CDMA2000 Reverse Link TX Measurement software MX887015A in the MT8870A provides support for the following 3GPP2 CDMA2000 related TX characteristics measurements.

TX Power

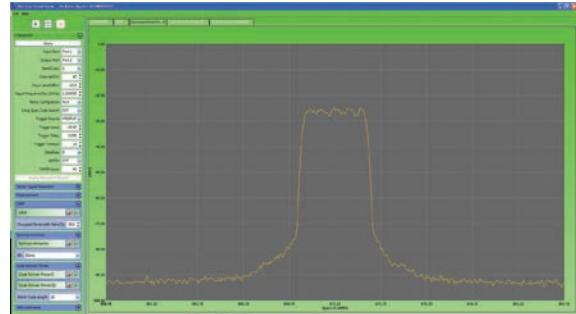
Modulation Analysis

Occupied Bandwidth

Code Domain Power

Spurious Emissions

Additionally, the package of CDMA2000 Forward Link Waveforms MV887015A contains downlink signals required for non-signaling measurements; sending the downlink signal for production is as easy as selecting the waveform file.



CDMA2000 Reverse Link TX Measurement using CombiView

Measurement Software MX8870xxA Series/Waveforms MV887xxxA Series

Cellular Measurement Solution (continued)

1xEV-DO Reverse Link TX Measurement

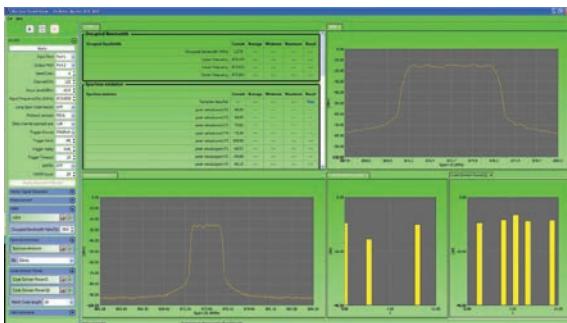
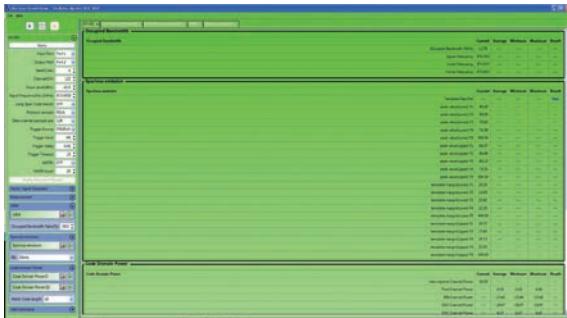
1xEV-DO Forward Link Waveforms

Installing the 1xEV-DO Reverse Link TX Measurement software MX887016A in the MT8870A provides support for the following 3GPP2 CDMA2000 1xEV-DO related TX characteristics measurements.

TX Power

Modulation Analysis
Occupied Bandwidth
Code Domain Power
Spurious Emissions

Additionally, the package of 1xEV-DO Forward Link Waveforms MV887016A contains downlink signals required for non-signaling measurements; sending the downlink signal for production is as easy as selecting the waveform file.



1xEV-DO Reverse Link TX Measurement using CombiView

MX887016A

MV887016A

TD-SCDMA Uplink TX Measurement

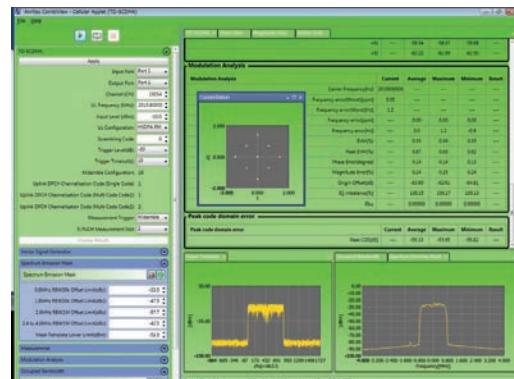
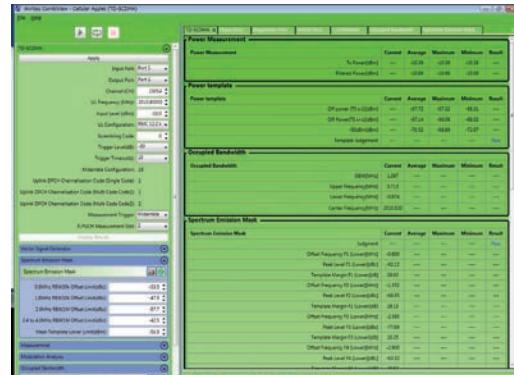
TD-SCDMA Downlink Waveforms

Installing the TD-SCDMA Uplink TX Measurement software MX887017A in the MT8870A provides support for the following 3GPP TD-SCDMA (1.28 Mcps TDD) related TX characteristics measurements.

TX Power

Frequency Deviation
Occupied Bandwidth
Spectrum Mask
Adjacent Channel Leakage Power
Modulation Analysis

Additionally, the package of TD-SCDMA Downlink Waveforms MV887017A contains downlink signals required for non-signaling measurements; sending the downlink signal for production is as easy as selecting the waveform file.



TD-SCDMA Uplink TX Measurement using CombiView

MX887017A

MV887017A

Measurement Software MX8870xxA Series/Waveforms MV887xxxA Series

Cellular Measurement Solution (continued)

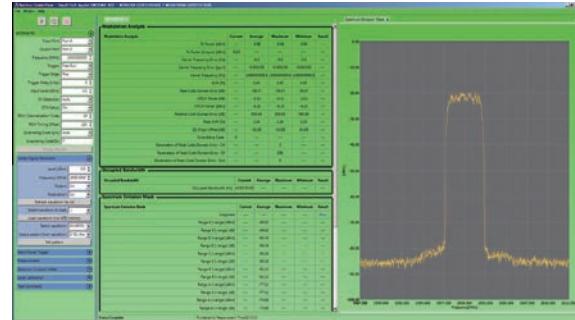
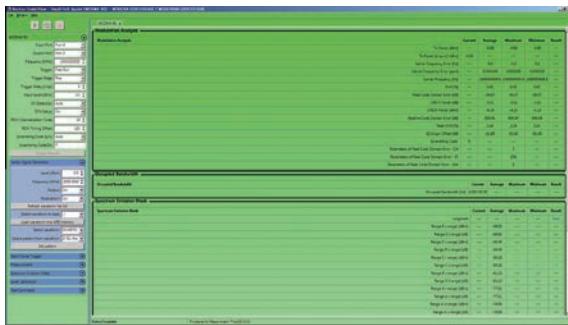
W-CDMA/HSPA Downlink TX Measurement

W-CDMA/HSPA Uplink Waveforms

Installing the W-CDMA/HSPA Downlink TX Measurement software MX887021A in the MT8870A provides support for the following 3GPP W-CDMA and HSPA related TX characteristics measurements.

- TX Power
- Frequency Deviation
- Occupied Bandwidth
- Spectrum Mask
- Adjacent Channel Leakage Power
- Modulation Analysis

Additionally, the package of W-CDMA/HSPA Uplink Waveforms MV887021A contains uplink signals required for non-signaling measurements, sending the uplink signal for production is as easy as selecting the waveform file.



W-CDMA/HSPA Downlink TX Measurements using CombiView

MX887021A

MV887021A

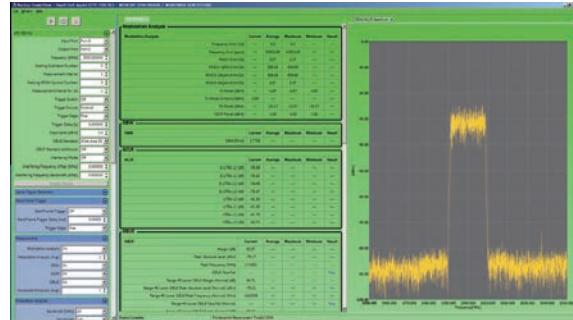
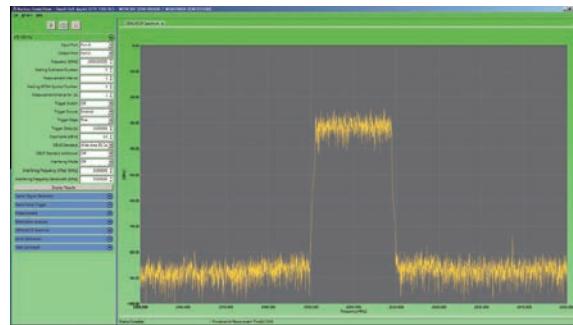
LTE FDD Downlink TX Measurement

LTE FDD Uplink Waveforms

Installing the LTE FDD Downlink TX Measurement software MX887023A in the MT8870A provides support for the following 3GPP LTE FDD related TX characteristics measurements.

- TX Power
- Frequency Deviation
- Occupied Bandwidth
- Spectrum Mask
- Adjacent Channel Leakage Power
- Modulation Analysis

Additionally, the package of LTE FDD Uplink Waveforms MV887023A contains uplink signals required for non-signaling measurements, sending the uplink signal for production is as easy as selecting the waveform file.



LTE FDD Downlink TX Measurements using CombiView

Measurement Software MX8870xxA Series/Waveforms MV887xxxA Series

WLAN Measurement Solution

WLAN 802.11b/g/a/n TX Measurement

WLAN 802.11b/g/a/n Waveforms

MX887030A

MV887030A

The MT8870A/MU88700xA supports non-signalling transmitter and receiver tests for all WLAN 802.11a/b/g/n-compliant devices. The 6 GHz Frequency Extension option MU88700xA-001 is required to measure 802.11a/n in 5 GHz band.

Transmitter Test

Installing the MX887030A in the MT8870A 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)

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

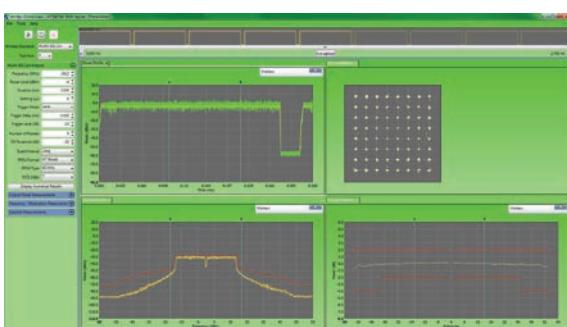
Additional 802.11a/g/n Measurements

Test Items
Power crest factor
CCDF
Occupied bandwidth
Power spectral density

Graphical Displays (OFDM)

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.



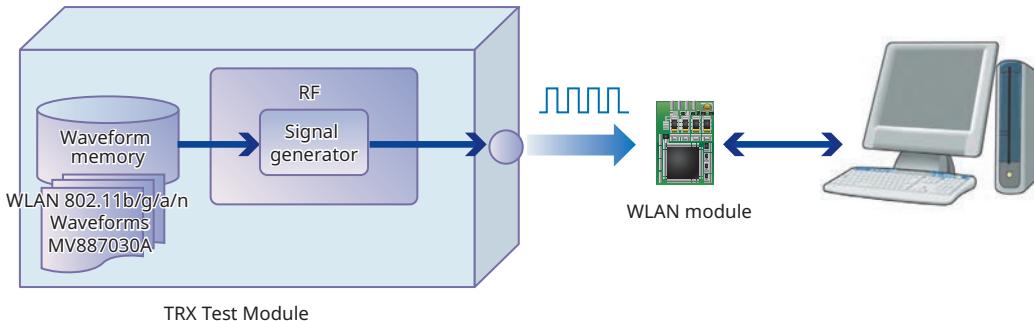
802.11n TX Measurement using CombiView

Measurement Software MX8870xxA Series/Waveforms MV887xxxA Series

WLAN Measurement Solution (continued)

Receiver Test

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



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

Measurement Software MX8870xxA Series/Waveforms MV887xxxA Series

WLAN Measurement Solution (continued)

WLAN 802.11ac TX Measurement

MX887031A

WLAN 802.11ac Waveforms

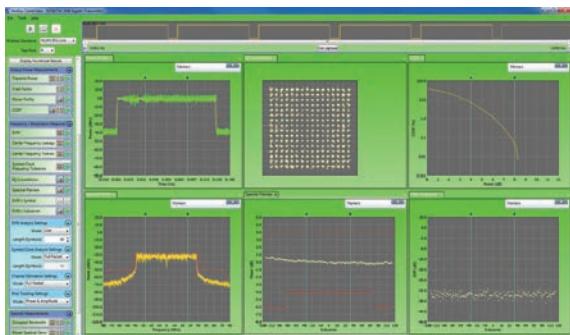
MV887031A

The MT8870A/MU88700xA supports non-signalling transmitter and receiver tests for all WLAN 802.11ac-compliant devices. The 6 GHz Frequency Extension option MU88700xA-001 is required.

Transmitter Test

Installing the WLAN 802.11ac TX Measurement software MX887031A in the MT8870A supports in-band wireless measurements defined by the latest IEEE 802.11ac/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.



WLAN 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

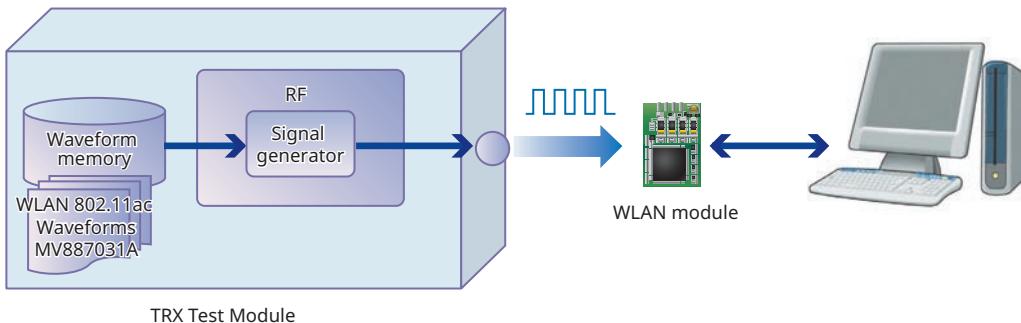
Graphical Displays (OFDM)

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

WLAN Measurement Solution (continued)

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.



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

Measurement Software MX8870xxA Series/Waveforms MV887xxxA Series

WLAN Measurement Solution (continued)

WLAN 802.11p TX Measurement

WLAN 802.11p Waveforms

MX887032A

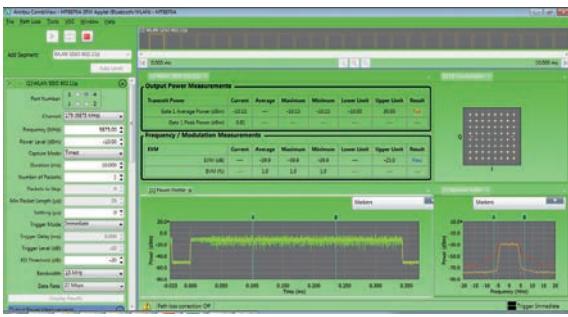
MV887032A

The MT8870A/MU88700xA supports non-signalling TRX tests for all WLAN 802.11p-compliant communications devices. The 6 GHz Frequency Extension option MU88700xA-001 is required to measure 802.11p in 5.9 GHz band.

Transmitter Test

Installing the WLAN 802.11p TX Measurement software MX887032A in the MT8870A supports in-band wireless measurements for the 700 MHz and 5.9 GHz bands defined by IEEE 802.11p.

Using the CombiView PC application displays graphs of WLAN 802.11p TX measurements.



WLAN 802.11p TX Measurement using CombiView

802.11p TX Measurement

IEEE Std. 802.11 – 2010/2012: 802.11p TX Test

802.11p	Test Items
18.3.9.2	Transmit power levels
18.3.9.3	Transmit spectrum mask
18.3.9.5	Transmit center frequency tolerance
18.3.9.6	Symbol clock frequency tolerance
18.3.9.7.2	Transmitter center frequency leakage
18.3.9.7.3	Transmitter spectral flatness
18.3.9.7.4	Transmitter constellation error

Additional 802.11p Measurements

Test Items
Power crest factor
CCDF
Occupied bandwidth
Power spectral density

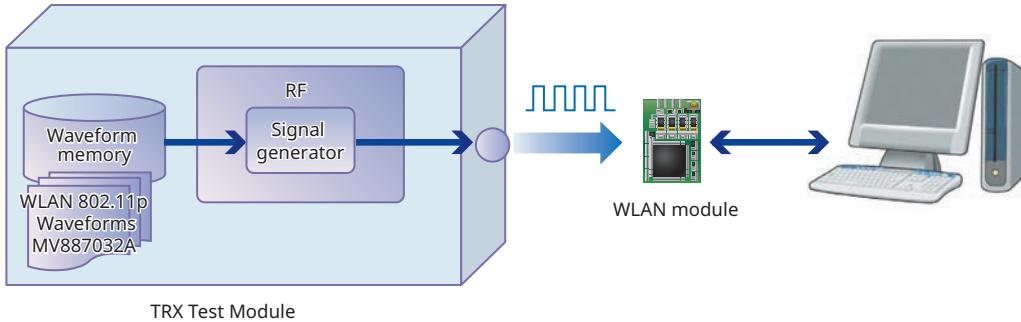
Graph Displays (OFDM)

Power profile
Spectral mask
CCDF
IQ constellation
Spectral flatness
EVM vs. Symbol
EVM vs. Subcarrier
Frequency error vs. Time
Phase error vs. Symbol

WLAN Measurement Solution (continued)

Receiver Test

The MV887032A supports non-signalling RX tests of WLAN 802.11p devices under test (DUT) by sending WLAN 802.11p test signals from the MU887000A installed in the vector signal generator. Reading the number of packets received by the DUT requires the chipset vendor's control software.



Waveform Parameter

Bandwidth	Data Rate	Packet Length
5 MHz	1.5, 2.25, 3, 4.5, 6, 9, 12, 13.5 Mbps	1000 bytes
10 MHz	3, 4.5, 6, 9, 12, 18, 24, 27 Mbps	1000 bytes
20 MHz	6, 9, 12, 18, 24, 36, 48, 54 Mbps	1000 bytes

802.11p RX Measurement

IEEE Std. 802.11 – 2010/2012: 802.11p RX Test

802.11p	Test Items
18.3.10.2	Receiver minimum input sensitivity
18.3.10.3	Adjacent channel rejection*
18.3.10.4	Nonadjacent channel rejection*
18.3.10.5	Receiver maximum input level

*: Requires separate signal generator

WLAN MIMO Measurement Solution

WLAN 802.11n/11ac MIMO Measurement Function

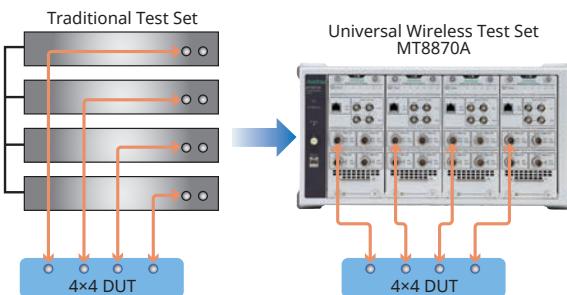
Installing the MU88700xA*1 in the MT8870A with the installed WLAN TRX Measurement software supports easy set-up and measurement of up to 4x4 WLAN MIMO devices.

*1: Requires 6 GHz Frequency Extension option MU88700xA-001 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 MU88700xA 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.



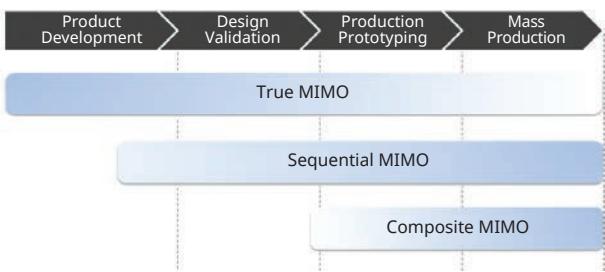
The MX887030A and MV887030A are required for WLAN 802.11n MIMO measurements.

The MX887031A and MV887031A are required for WLAN 802.11ac MIMO measurements*2.

*2: Supports up to 4x4 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

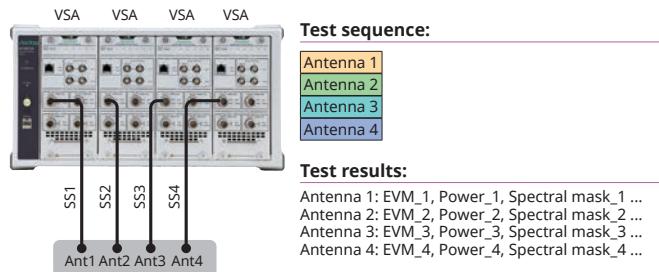
Features

The MT8870A supports parallel measurement of WLAN device streaming characteristics using multiple MU88700xA 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 MU88700xA unit and the 10-MHz reference frequency are synchronized by the internal connections, offering easy True MIMO measurement.

Transmitter Test

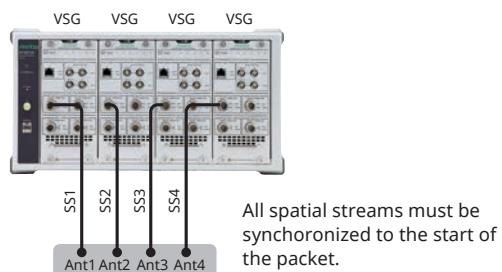
- DUT transmits four MIMO signals simultaneously.
- MU88700xA in each slot tests each antenna (stream)
- Fully independent measurements with parallel processing by each MU88700xA
- Test results
 - Each TX power (Cross power), EVM, Spectral mask, etc.



Receiver Test

- Sends test packets for each antenna to TRX Test Module in each slot
- Test results
 - RX sensitivity of each antenna
- Synchronization
 - 10-MHz reference frequency
 - Digital timing

Note: RF local frequency sync. not supported



WLAN MIMO Measurement Solution (continued)

Sequential MIMO

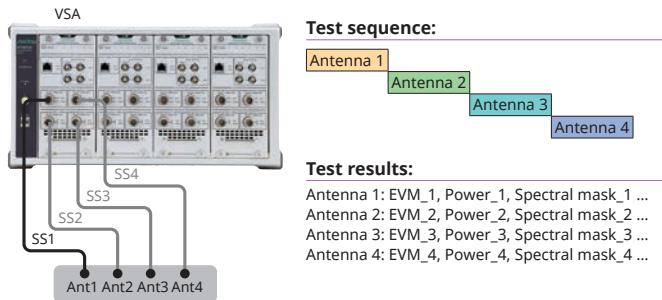
Features

WLAN 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 MU88700xA units are required. Since one MU88700xA 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

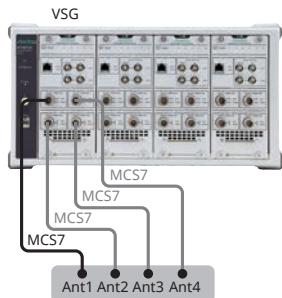
- DUT transmits four MIMO signals simultaneously
- MT8870A switches connected test port and performs TRX test at each antenna (stream)
- Test results
 - Each TX power (Cross power^{*3}), EVM, Spectral mask, etc.

***3:** There are limitation on the combination of test ports used for cross power measurements.



Receiver Test

- MT8870A switches test port and sends test signal to each antenna to perform RX sensitivity test
- Waveform uses SISO signal
- Test results
 - RX test for each antenna



Composite MIMO

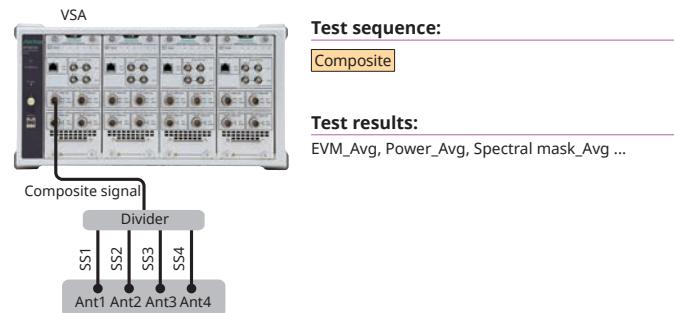
Features

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 MU88700xA supports use of the Composite MIMO measurement function to measure WLAN 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)

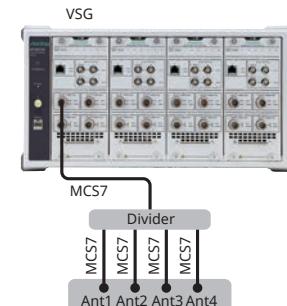
Transmitter Test

- 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
- Test results
 - Composite power (individual powers)
 - Composite EVM and spectral mask values



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
- Test results
 - RX sensitivity (result is one value only; test specifications of sensitivity changed by number of antennas)



Measurement Software MX8870xxA Series/Waveforms MV887xxxA Series

Bluetooth Measurement Solution

Bluetooth TX Measurement

Bluetooth Waveforms

MX887040A

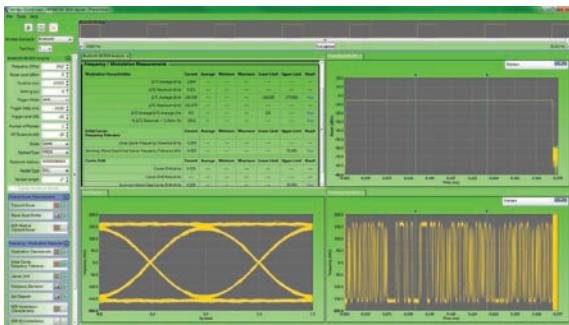
MV887040A

The MT8870A/MU88700xA supports non-signalling transmitter and receiver tests for Basic Rate (BR), Enhanced Data Rate (EDR) and Bluetooth low-energy (BLE) devices.

Transmitter Test

The Bluetooth TX Measurement software MX887040A 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 Core Specification v1.2/2.0/2.0 + EDR/2.1/2.1 + EDR/3.0/3.0 + HS/4.0/4.1/4.2: RF-PHY.TS.4.2.0: TX Test

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

Graphical Displays (BR/BLE)

Graphs
Power Burst profile
Frequency deviation
Eye diagram
Spectral profile

Graphical Displays (EDR)

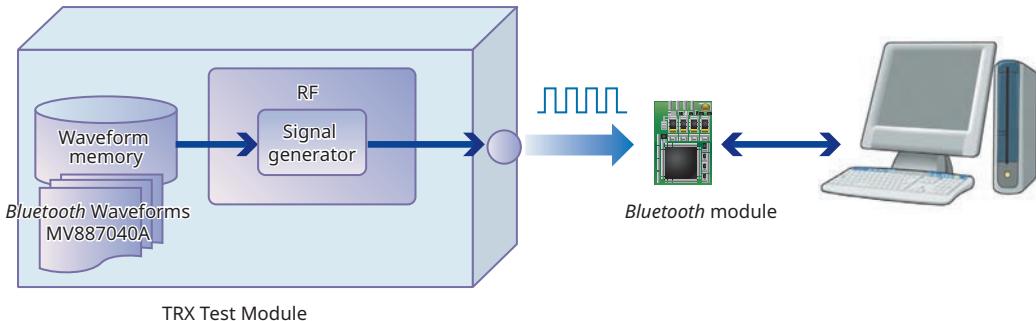
Power burst profile
Frequency deviation
IQ constellation diagram
DEVM against symbol
Vector diagram
Spectral profile

Measurement Software MX8870xxA Series/Waveforms MV887xxxA Series

Bluetooth Measurement Solution (continued)

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.



Standard Waveforms

Bluetooth	Waveform Type
Basic Rate (BR)	DH1/DH3/DH5
Enhanced Data Rate (EDR)	2-DH1/2-DH3/2-DH5/3-DH1/3-DH3/3-DH5
Bluetooth Low Energy (BLE)	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/4.0/4.1/4.2: RF-PHY.TS.4.2.0: RX Test

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

Measurement Software MX8870xxA Series/Waveforms MV887xxxA Series

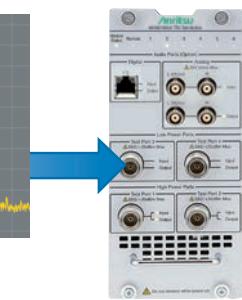
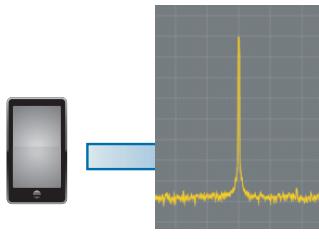
Simple Test Solution

Short Range Wireless Average Power and Frequency Measurement MX887050A

Installing the Short Range Wireless Average Power and Frequency Measurement software MX887050A in the MT8870A provides support for simple tests for WLAN and Bluetooth connectivity 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



Short Range Wireless Average Power
and Frequency Measurement
MX887050A



CW Measurement using CombiView

Measurement Software MX8870xxA Series/Waveforms MV887xxxA Series

IEEE 802.15.4 Measurement Solution

IEEE 802.15.4 TX Measurement

MX887060A

IEEE 802.15.4 Waveforms

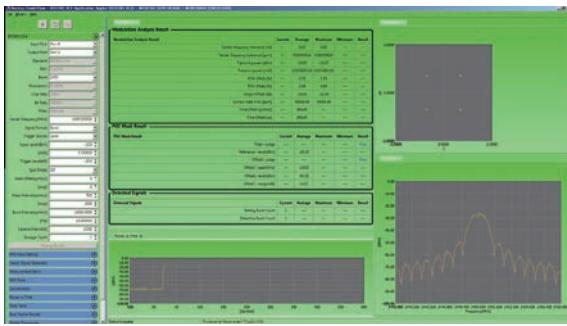
MV887060A

The MT8870A/MU88700xA support IEEE 802.15.4-recommended O-QPSK modulation signal TRX tests of communications devices.

Transmitter Test

Installing the IEEE 802.15.4 TX Measurement software MX887060A in the MT8870A supports measurement of the key TX characteristics recommended by the IEEE 802.15.4 standard released in 2011.

The CombiView PC application can display the various 802.15.4 TX measurement results in graphical format.



802.15.4 TX Measurement

IEEE 802.15.4 - 2011: 802.15.4 TX Measurements

802.15.4	Test Items
10.3.2	Transmit power spectral density (PSD) mask
10.3.3	Symbol rate
10.3.6	TX-to-RX turnaround time*
10.3.7	RX-to-TX turnaround time
10.3.8	Error vector magnitude (EVM)
10.3.9	Transmit center frequency tolerance
10.3.10	Transmit power

*: With trigger function

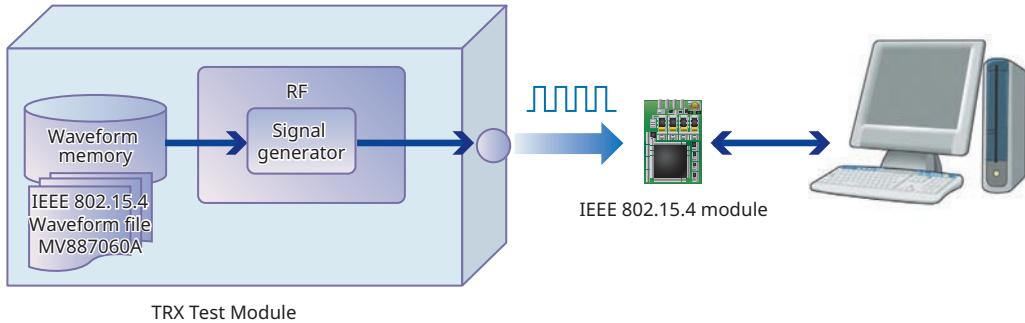
Graphical Displays

Spectral mask
Constellation diagram
Power vs. Time

IEEE 802.15.4 Measurement Solution (continued)

Receiver Test

With a vector signal generator built into the MU88700xA, transmitting the test signal from the selected package of IEEE 802.15.4 Waveforms MV887060A supports RX tests of IEEE 802.15.4 devices. The specified number of packets is sent from the MU88700xA to the device under test (DUT). The chipset developer's control software is required to capture packets received by the DUT.



Waveform Parameter

Waveform Name	Modulation	Band	Data Rate	Chip Rate	Filter	Signal Length
MV887060A_ZB2450_0001	O-QPSK	2450 MHz	250 kbps	2000 kchip/s	Half-sine	1664 chip
MV887060A_ZB2450_0002	O-QPSK	2450 MHz	250 kbps	2000 kchip/s	Half-sine	1024 chip
MV887060A_ZB915_0001	O-QPSK	915 MHz	250 kbps	1000 kchip/s	Half-sine	832 chip
MV887060A_ZB915_0002	O-QPSK	915 MHz	250 kbps	1000 kchip/s	Half-sine	1024 chip
MV887060A_ZB868_0001	O-QPSK	868 MHz	100 kbps	400 kchip/s	Half-sine	832 chip
MV887060A_ZB868_0002	O-QPSK	868 MHz	100 kbps	400 kchip/s	Half-sine	1024 chip
MV887060A_ZB780_0001	O-QPSK	780 MHz	250 kbps	1000 kchip/s	Raised cosine (roll-off 0.8)	832 chip
MV887060A_ZB780_0002	O-QPSK	780 MHz	250 kbps	1000 kchip/s	Raised cosine (roll-off 0.8)	1024 chip

802.15.4 RX Measurement

IEEE 802.15.4 - 2011: 802.15.4 RX Measurements

802.15.4	Test Items
10.3.4	Receiver sensitivity
10.3.5	Receiver interference rejection*
10.3.11	Receiver maximum input level of required signal

*: Sold separately, requires signal generator

Measurement Software MX8870xxA Series/Waveforms MV887xxxA Series

Z-Wave Measurement Solution

Z-Wave TX Measurements

MX887061A

Z-Wave Waveforms

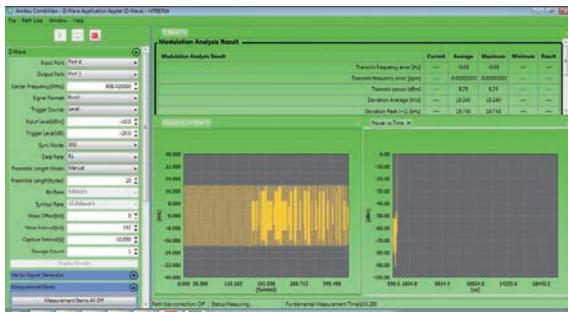
MV887061A

The MT8870A/MU88700xA supports non-signalling TRX tests of ITU-T G.9959-compliant communications devices.

Transmitter Test

Installing the Z-Wave TX Measurement software MX887061A in the MT8870A supports the key TX measurements defined by ITU-T G.9959 - 2012.

Using the CombiView PC application bundle displays graphs of various Z-Wave TX measurement results.



Z-Wave TX Measurements using CombiView

ITU-T G.9959 TX Measurement

ITU-T G.9959 2012 TX Measurements

ITU-T G.9959	Test Items
7.1.2.2	Data rates
7.1.2.5.1	Transmit frequency error
7.1.2.5.2	Transmit power adjustments (conducted)

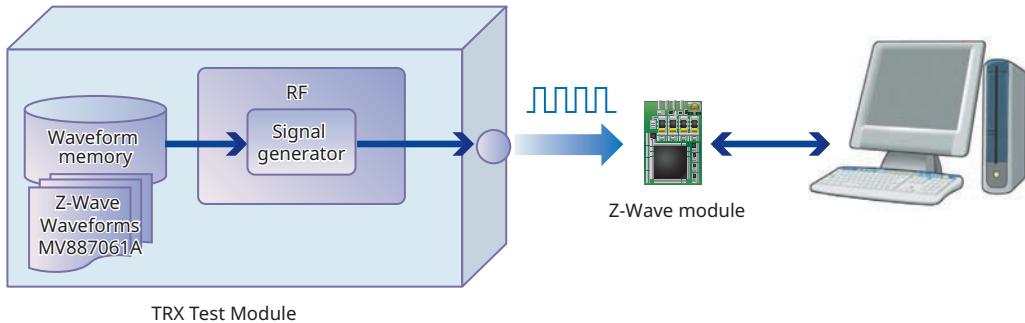
Graphical Displays

Data table
Power vs. Time
Frequency vs. Time

Z-Wave Measurement Solution (continued)

Receiver Test

The MV887061A supports RX tests of Z-Wave devices under test (DUT) by sending Z-Wave test signals from the MU887000A installed in the vector signal generator. Reading the number of packets received by the DUT requires the chipset vendor's control software.



Waveform Parameter

Waveform Name	Modulation	Data Rate	Bit Rate	Symbol Rate	Filter	PPDU	Preamble Sequence	SFD	PSDU
MV887061A_ZW_R1_0001	2FSK	R1	9.6 kbps	19.2 baud	Gaussian (BT=1.0)	26 bytes (208 bits)	10 bytes	1 byte	14 bytes (incl. MPSU 4 bytes)
MV887061A_ZW_R2_0001	2FSK	R2	40 kbps	40 baud	Gaussian (BT=1.0)	35 bytes (280 bits)	20 bytes	1 byte	14b ytes (incl. MPSU 4 bytes)
MV887061A_ZW_R3_0001	2FSK	R3	100 kbps	100 baud	Gaussian (BT=0.6)	40 bytes (320 bits)	24 bytes	1 byte	15 bytes (incl. MPSU 4 bytes)
MV887061A_ZW_R1_0002	2FSK	R1	9.6 kbps	19.2 baud	Gaussian (BT=1.0)	76 bytes (608 bits)	10 bytes	1 byte	64 bytes (incl. MPSU 54 bytes)
MV887061A_ZW_R2_0002	2FSK	R2	40 kbps	40 baud	Gaussian (BT=1.0)	85 bytes (680 bits)	20 bytes	1 byte	64 bytes (incl. MPSU 54 bytes)
MV887061A_ZW_R3_0002	2FSK	R3	100 kbps	100 baud	Gaussian (BT=0.6)	211 bytes (1688 bits)	40 bytes	1 byte	170 bytes (incl. MPSU 159 bytes)

ITU-T G.9959 RX Measurement

ITU-T G.9959 2012 RX Measurement

802.15.4	Test Items
ITU-T G.9959	Test Items
7.1.2.5.3	Receiver sensitivity

Receiver Measurement Solution

MV8871xxA Series Waveforms

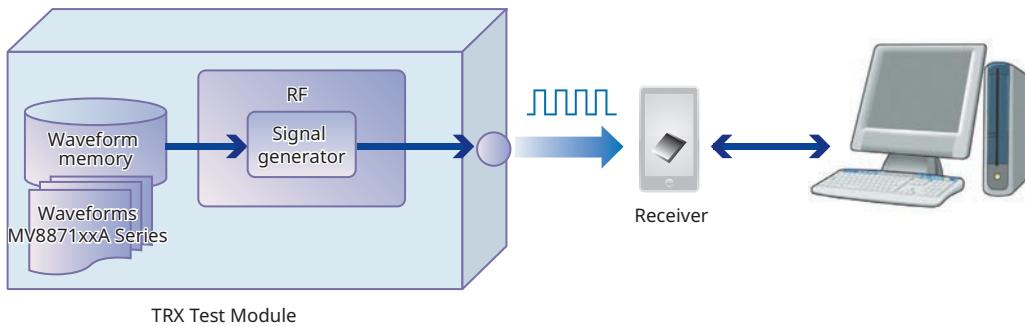
The MT8870A/MU88700xA supports RX tests of receivers using the various common communications technologies in widespread use today.

RX Test Using Waveforms

The Waveforms MV8871xxA series 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 MU88700xA makes it easy to output a signal for any waveform pattern from the built-in vector signal generator.

Waveform file generated from the MU88700xA 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.



Measurement Software MX8870xxA Series/Waveforms MV887xxxA Series

Main Specifications of MV8871xxA Series Waveforms

GPS Waveforms MV887100A

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	

Galileo Waveforms MV887101A

Waveform File Name	MV887101A_GALILEO_0001
Application	Parity detection/Sensitivity test
Transmitted Data Modulation Method	QPSK or CBOC (depending on selecting waveforms)
Satellite ID Number	1
Reference Standard	European GNSS (Galileo) Open Service Signal In Space Interface Control Document

GLONASS Waveforms MV887102A

Waveform File Name	MV887102A_GLONASS_0001	MV887102A_GLONASS_010x MV887102A_GLONASS_011x
Application	Sensitivity test/BER measurement	Simultaneous GPS and GLONASS measurements ^{*1} , 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	

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

BeiDou Waveform MV887103A

Waveform File Name	MV887103A_BEIDOU_0002
Application	Parity detection/Sensitivity test
Transmitted Data Modulation Method	QPSK (Only I phase)
Satellite ID Number	1, 6 (depending on selected waveforms)
Reference Standard	BeiDou Navigation Satellite System Signal In Space Interface Control Document Open Service Signal (Version 2.0)

DVB-H Waveforms MV887110A

Waveform File Name	MV887110A_DVBH_0001
Application	Simple BER measurement
Transmitted Data	PN9fix ^{*2}
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)

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

ISDB-T Waveforms MV887111A

Waveform File Name	MV887111A_ISDBT_0001	MV887111A_ISDBT_0002	MV887111A_ISDBT_0003	MV887111A_ISDBT_0004
Application	Device evaluation	Video and audio evaluation ^{*3}		Simple BER measurement
Waveform Cycle/Group	2 [Frame]	40 [Frame]		4 [Frame]
Transmitted Data	PN23fix ^{*4}			
Transmitted Data Modulation Method	Layer A: 64QAM 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			

*3: RX not guaranteed for all receivers

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

ISDB-Tmm Waveforms MV887112A

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 ^{*5}
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

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

* Consult Anritsu for details about each waveforms.

Measurement Software MX8870xxA Series/Waveforms MV887xxxA Series

FM/RDS Measurement Solution

FM/Audio TRX Measurement
FM RDS Waveforms
(RDS: Radio Data System)

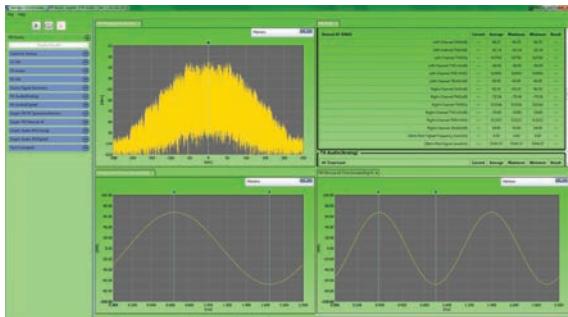
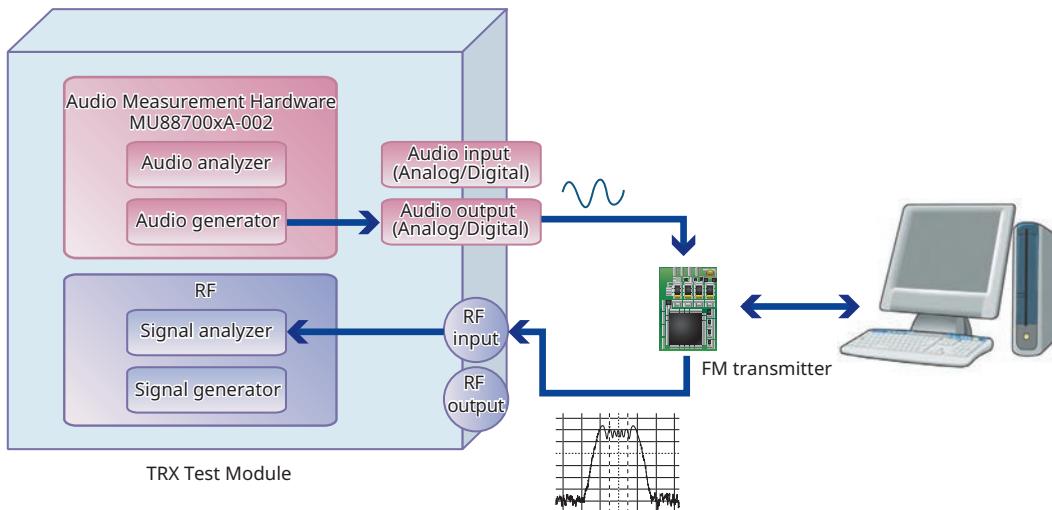
MX887070A
MV887070A

The MT8870A/MU88700xA supports TRX tests of FM transceivers and adding an option also supports audio tests.

FM Transmitter Test

Installing the Audio Measurement Hardware MU88700xA-002 in the MU88700xA 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 FM/Audio TRX Measurement software MX887070A is used with the built-in signal analyzer of the MU88700xA 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.



FM Transmitter Test using CombiView

RDS	Detail
RDS Total Data Size(Byte/blocks)	143 byte, 44 blocks
RDS Error Rate(%)	0
RDS RT(HEX)	5466520717569535a2052726f776e20666f7820a756d7073206f76657220746885206c617a79206469872e***

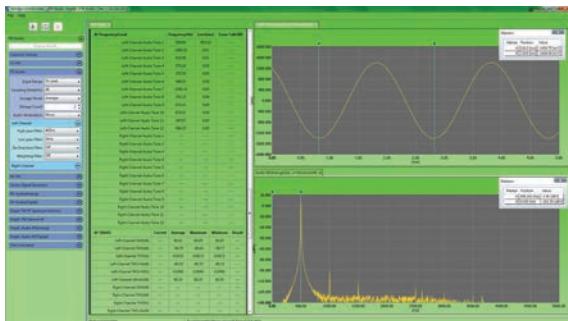
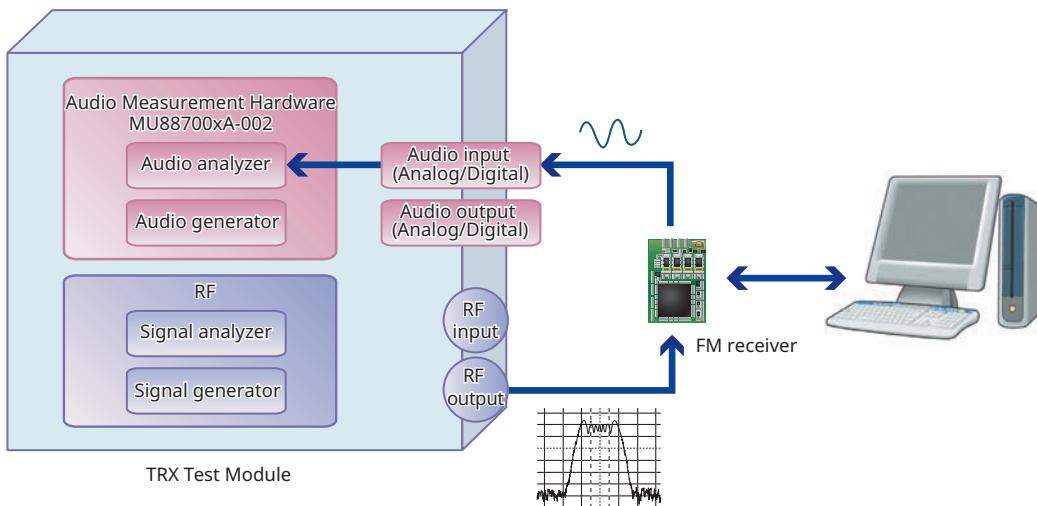
RDS Measurement Results using CombiView

FM/RDS Measurement Solution (continued)

FM Receiver Test

To test FM receivers using the FM/Audio TRX Measurement software MX887070A, the specified test audio signal is frequency modulated and a signal is output from the vector signal generator.

Installing the Audio Measurement Hardware MU88700xA-002 in the MU88700xA inputs either analog or digital format audio signals output from the FM receiver to the built-in audio analyzer of the MU88700xA to perform audio tests including AF signal frequency and level (up to 12 multi-tones), distortion rate, stereo crosstalk, etc.



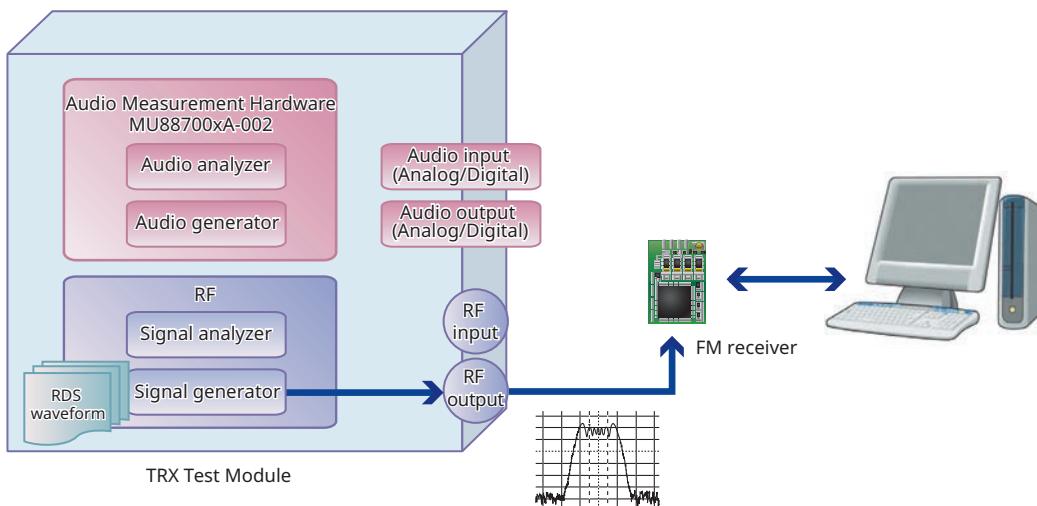
FM Receiver Test using CombiView
(device audio output measurement)

Measurement Software MX8870xxA Series/Waveforms MV887xxxA Series

FM/RDS Measurement Solution (continued)

FM Receiver Test RDS (Radio Data System)

Loading the FM RDS Waveforms MV887070A 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			
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			

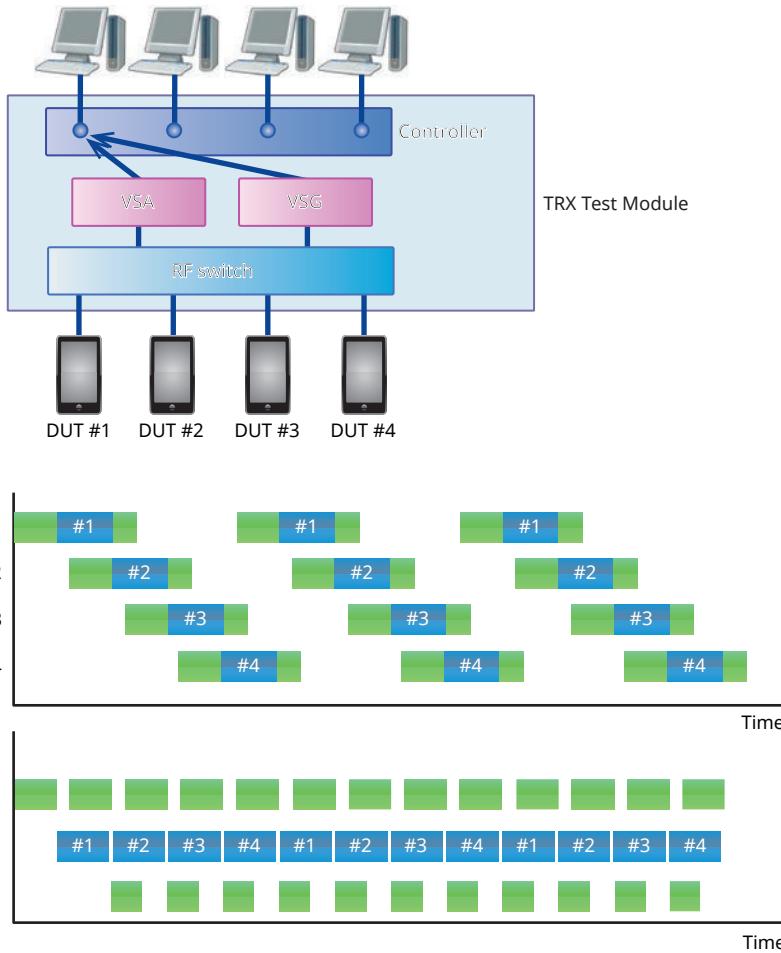
* Consult Anritsu for details about the FM RDS waveform file.

High Speed Measurement Solution

Multi-DUT Measurement Scheduler

Installing the Multi-DUT Measurement Scheduler software MX887090A in one MU88700xA with built-in dedicated control offers functions for operating multiple measurement systems virtually by managing software and hardware. Optimizing measuring instrument operations like this helps cut DUT production costs.

*: Multi-DUT Measurement Scheduler software does not support for W-CDMA/HSPA Downlink TX Measurement MX887021A, LTE FDD Downlink TX Measurement MX887023A, IEEE 802.15.4 TX Measurement MX887060A, Z-Wave TX Measurement MX887061A, FM/Audio TRX Measurement MX887070A.



Cellular Standards Sequence Measurement MX887010A

Common Item	<p>Measuring object W-CDMA/GSM/LTE uplink, CDMA2000/1xEV-DO reverse link</p> <p>Frequency range 400 MHz to 3.8 GHz</p>																
Spectrum Monitor	<p>Analysis time 1 ms, 10 ms</p> <p>Span 1, 2.5, 5, 10, 25, 50, 100 MHz</p> <p>RBW</p> <table border="1"> <thead> <tr> <th>Span</th> <th>RBW</th> </tr> </thead> <tbody> <tr> <td>1 MHz</td> <td>100 Hz, 300 Hz, 1 kHz, 3 kHz, 10 kHz</td> </tr> <tr> <td>2.5 MHz</td> <td>1 kHz, 3 kHz, 10 kHz, 30 kHz</td> </tr> <tr> <td>5 MHz</td> <td>3 kHz, 10 kHz, 30 kHz, 100 kHz</td> </tr> <tr> <td>10 MHz</td> <td>3 kHz, 10 kHz, 30 kHz, 100 kHz</td> </tr> <tr> <td>25 MHz</td> <td>10 kHz, 30 kHz, 100 kHz, 300 kHz</td> </tr> <tr> <td>50 MHz</td> <td>30 kHz, 100 kHz, 300 kHz, 1 MHz</td> </tr> <tr> <td>100 MHz</td> <td>30 kHz, 100 kHz, 300 kHz, 1 MHz</td> </tr> </tbody> </table> <p>Detection mode Average, Peak</p> <p>Power measurement bandwidth Range: 0.001 MHz to (setting span) MHz, Resolution: 0.001 MHz</p>	Span	RBW	1 MHz	100 Hz, 300 Hz, 1 kHz, 3 kHz, 10 kHz	2.5 MHz	1 kHz, 3 kHz, 10 kHz, 30 kHz	5 MHz	3 kHz, 10 kHz, 30 kHz, 100 kHz	10 MHz	3 kHz, 10 kHz, 30 kHz, 100 kHz	25 MHz	10 kHz, 30 kHz, 100 kHz, 300 kHz	50 MHz	30 kHz, 100 kHz, 300 kHz, 1 MHz	100 MHz	30 kHz, 100 kHz, 300 kHz, 1 MHz
Span	RBW																
1 MHz	100 Hz, 300 Hz, 1 kHz, 3 kHz, 10 kHz																
2.5 MHz	1 kHz, 3 kHz, 10 kHz, 30 kHz																
5 MHz	3 kHz, 10 kHz, 30 kHz, 100 kHz																
10 MHz	3 kHz, 10 kHz, 30 kHz, 100 kHz																
25 MHz	10 kHz, 30 kHz, 100 kHz, 300 kHz																
50 MHz	30 kHz, 100 kHz, 300 kHz, 1 MHz																
100 MHz	30 kHz, 100 kHz, 300 kHz, 1 MHz																
Multiple Power Measurement	<p>Number of steps 10 to 30 steps</p> <p>Power step time 0.5, 1, 2, 4, 5, 10, 20, 30, 40, 50, 60, 70, 80 ms</p> <p>Filter type Low-pass filter: 1.23, 1.4, 3, 5, 10, 15, 20 MHz RRC filter: 3.84 MHz</p> <p>Measurement window Range: 1 to 90%, Resolution 1%</p> <p>Trigger level -40 to 0 dB (based on the input level)</p>																
TX/RX vs. Frequency	<p>Segment duration Range: 1 to 80 ms, Resolution: 1 ms</p> <p>Measurement filter Low-pass filter: 1.23, 1.4, 3, 5, 10, 15, 20 MHz RRC filter: 3.84 MHz</p> <p>Measurement window Range: 1 to 90%, Resolution: 1%</p> <p>Number of segment 1 to 72</p> <p>Number of sequence 1 to 40</p>																
Narrowband Power vs. Time	<p>Segment duration Range: 200 μs to 20000 μs, Resolution: 1 μs</p> <p>Measurement bandwidth 15 kHz</p> <p>Measurement window Range: 1 to 90%, Resolution: 1%</p> <p>Number of segment 1 to 1000</p>																
IQ Capturing	<p>Time span Range: 1000 μs to 10000 μs, Resolution : 1 μs</p> <p>Measurement bandwidth Low-pass filter: 100, 300, 500 kHz, 1, 3, 5, 20 MHz Gaussian filter: 1 MHz</p>																

Measurement Software MX8870xxA Series/Waveforms MV887xxxA Series Specifications

W-CDMA/HSPA Uplink TX Measurement MX887011A

Common Item	<p>Measuring object W-CDMA uplink Frequency range 400 MHz to 2.7 GHz</p>
RF Power	<p>Input level range -65 to +35 dBm (MU887000A test port 1 and 2, MU887001A all test port) -65 to +25 dBm (MU887000A test port 3 and 4)</p> <p>Measurement accuracy After CAL, 10° to 40°C MU887000A test port 1 and 2, MU887001A all test port ±0.3 dB (typ.), ±0.5 dB (-25 to +35 dBm) ±0.7 dB (-55 to -25 dBm) ±0.9 dB (-65 to -55 dBm) MU887000A test port 3 and 4 ±0.7 dB (-25 to +25 dBm) ±0.9 dB (-55 to -25 dBm) ±1.1 dB (-65 to -55 dBm)</p> <p>Linearity 0 to 40 dB ±0.2 dB (≥-55 dBm) ±0.4 dB (≥-65 dBm)</p> <p>Relative level accuracy At the power level difference within 2 dB, ≥-55 dBm, 0 to 40 dB ±0.1 dB (typ.)</p>
Frequency/ Modulation Analysis	<p>Input level range -30 to +35 dBm (MU887000A test port 1 and 2, MU887001A all test port) -30 to +25 dBm (MU887000A test port 3 and 4)</p> <p>Carrier frequency accuracy ± (Setting frequency × Reference oscillator accuracy + 10 Hz)</p> <p>Modulation accuracy Residual EVM: at input of single DPCCH and single DPDCH ≤2.5%</p>
Occupied Bandwidth	<p>Input level range -10 to +35 dBm (MU887000A test port 1 and 2, MU887001A all test port) -10 to +25 dBm (MU887000A test port 3 and 4)</p> <p>OBW ratio 80.0 to 99.9%</p>
Adjacent Channel Leakage Power Ratio	<p>Input level range -10 to +35 dBm (MU887000A test port 1 and 2, MU887001A all test port) -10 to +25 dBm (MU887000A test port 3 and 4)</p> <p>Measurement points ±5 MHz, ±10 MHz</p> <p>Measurement range ≥50 dB (±5 MHz), ≥55 dB (±10 MHz)</p>

GSM/EDGE Uplink TX Measurement MX887012A

Common Item	<p>Measuring object Normal burst (GMSK, 8PSK)</p> <p>Frequency range 400 MHz to 2.0 GHz</p>
RF Power	<p>Input level range Average power of burst signal -30 to +35 dBm (MU887000A test port 1 and 2, MU887001A all test port) -30 to +25 dBm (MU887000A test port 3 and 4)</p> <p>Measurement accuracy After CAL, 10° to 40°C MU887000A test port 1 and 2, MU887001A all test port ±0.3 dB (typ.), ±0.5 dB (-30 to +35 dBm)</p> <p>MU887000A test port 3 and 4 ±0.7 dB (-30 to +25 dBm)</p> <p>Linearity ±0.2 dB (≥-30 dBm, 0 to 40 dB)</p> <p>Carrier off power ≥65 dB (≥-10 dBm), ≥45 dB (-30 to -10 dBm)</p>
Frequency/Modulation Measurement	<p>Input level range Average power of burst signal -30 to +35 dBm (MU887000A test port 1 and 2, MU887001A all test port) -30 to +25 dBm (MU887000A test port 3 and 4)</p> <p>Carrier frequency accuracy ± (Setting frequency × Reference oscillator accuracy + 10 Hz)</p> <p>Modulation accuracy Residual phase error (GMSK modulation) ≤0.5°rms (f ≥ 500 MHz), ≤0.7°rms (f < 500 MHz) ≤2° peak</p> <p>Residual EVM (8PSK modulation) ≤1.5% rms</p>
Output RF Spectrum Measurement	<p>Input level range Average power of burst signal -10 to +35 dBm (MU887000A test port 1 and 2, MU887001A all test port) -10 to +25 dBm (MU887000A test port 3 and 4)</p> <p>Measurement point ±100 kHz, ±200 kHz, ±250 kHz, ±400 kHz, ±600 kHz, ±800 kHz, ±1000 kHz, ±1200 kHz, ±1600 kHz, ±1800 kHz, ±2000 kHz</p> <p>Measurement range of due to modulation Average of 10 measurements ≤-55 dB (200 kHz, 250 kHz offset), ≤-66 dB (≥400 kHz offset)</p> <p>Measurement range of switching transient ≤-57 dB (≥400 kHz offset)</p>

Measurement Software MX8870xxA Series/Waveforms MV887xxxA Series Specifications

LTE FDD Uplink TX Measurement MX887013A

LTE TDD Uplink TX Measurement MX887014A

Common Item	<p>Measuring object PUSCH, PUCCH</p> <p>Frequency range 600 MHz to 2.7 GHz, 3.4 GHz to 3.8 GHz</p>
RF Power	<p>Input level range -65 to +35 dBm (MU887000A test port 1 and 2, MU887001A all test port) -65 to +25 dBm (MU887000A test port 3 and 4)</p> <p>Measurement accuracy After CAL, 10° to 40°C</p> <p>MU887000A test port 1 and 2, MU887001A all test port ±0.3 dB (typ.), ±0.5 dB (-20 to +35 dBm) ±0.7 dB (-50 to -20 dBm) ±0.9 dB (-60 to -50 dBm)</p> <p>MU887000A test port 3 and 4 ±0.7 dB (-20 to +25 dBm) ±0.9 dB (-50 to -20 dBm) ±1.1 dB (-60 to -50 dBm)</p> <p>Linearity 0 to 40 dB ±0.2 dB (≥-50 dBm) ±0.4 dB (≥-60 dBm)</p> <p>Relative level accuracy At the power level difference within 2 dB ±0.1 dB (typ.)</p>
Frequency/Modulation Measurement	<p>Input level range -40 to +35 dBm (MU887000A test port 1 and 2, MU887001A all test port) -40 to +25 dBm (MU887000A test port 3 and 4)</p> <p>Carrier frequency accuracy ± (Setting frequency × Reference oscillator accuracy + 15 Hz)</p> <p>Modulation accuracy Residual EVM (average of 20 measurements) ≤2.5%</p> <p>In-band emission Input level: ≥-10 dBm, Allocated RB: ≤18 ≤-40 dBc</p>
Occupied Bandwidth	<p>Input level range -10 to +35 dBm (MU887000A test port 1 and 2, MU887001A all test port) -10 to +25 dBm (MU887000A test port 3 and 4)</p> <p>OBW ratio 80.0 to 99.9%</p>
Adjacent Channel Leakage Power Ratio	<p>Input level range -10 to +35 dBm (MU887000A test port 1 and 2, MU887001A all test port) -10 to +25 dBm (MU887000A test port 3 and 4)</p> <p>Measurement range ≥45 dB (E-UTRA ACLR1), ≥50 dB (UTRA ACLR1), ≥55 dB (UTRA ACLR2)</p>
Spectrum Emission Mask	<p>Input level range -10 to +35 dBm (MU887000A test port 1 and 2, MU887001A all test port) -10 to +25 dBm (MU887000A test port 3 and 4)</p>

CDMA2000 Reverse Link TX Measurement MX887015A

Common Item	<p>Measuring object Reverse RC-1/2/3/4</p> <p>Frequency range 400 MHz to 2.7 GHz</p>
RF Power	<p>Input level range -65 to +35 dBm (MU887000A test port 1 and 2, MU887001A all test port) -65 to +25 dBm (MU887000A test port 3 and 4)</p> <p>Measurement accuracy After CAL, 10° to 40°C</p> <p>MU887000A test port 1 and 2, MU887001A all test port ±0.3 dB (typ.), ±0.5 dB (-25 to +35 dBm) ±0.7 dB (-55 to -25 dBm) ±0.9 dB (-65 to -55 dBm)</p> <p>MU887000A test port 3 and 4 ±0.7 dB (-25 to +25 dBm) ±0.9 dB (-55 to -25 dBm) ±1.1 dB (-65 to -55 dBm)</p> <p>Linearity 0 to 40 dB ±0.2 dB (≥-55 dBm) ±0.4 dB (≥-65 dBm)</p>
Frequency/Modulation Measurement	<p>Input level range -30 to +35 dBm (MU887000A test port 1 and 2, MU887001A all test port) -30 to +25 dBm (MU887000A test port 3 and 4)</p> <p>Carrier frequency accuracy ± (Setting frequency × Reference oscillator accuracy + 10 Hz)</p> <p>Waveform quality >0.999</p>
Code Domain Power Measurement	<p>Reverse RC3 or RC4</p> <p>Input level range -30 to +35 dBm (MU887000A test port 1 and 2, MU887001A all test port) -30 to +25 dBm (MU887000A test port 3 and 4)</p> <p>Measurement accuracy ±0.2 dB (Code power: ≥-15 dBc), ±0.4 dB (Code power: ≥-23 dBc)</p>
Occupied Bandwidth	<p>Input level range -10 to +35 dBm (MU887000A test port 1 and 2, MU887001A all test port) -10 to +25 dBm (MU887000A test port 3 and 4)</p> <p>OBW ratio 80.0 to 99.9%</p>

Measurement Software MX8870xxA Series/Waveforms MV887xxxA Series Specifications

1xEV-DO Reverse Link TX Measurement MX887016A

Common Item	<p>Measuring object Reverse link Rev. 0/Rev. A</p> <p>Frequency range 400 MHz to 2.7 GHz</p>
RF Power	<p>Input level range -65 to +35 dBm (MU887000A test port 1 and 2, MU887001A all test port) -65 to +25 dBm (MU887000A test port 3 and 4)</p> <p>Measurement accuracy After CAL, 10° to 40°C</p> <p>MU887000A test port 1 and 2, MU887001A all test port ±0.3 dB (typ.), ±0.5 dB (-25 to +35 dBm) ±0.7 dB (-55 to -25 dBm) ±0.9 dB (-65 to -55 dBm)</p> <p>MU887000A test port 3 and 4 ±0.7 dB (-25 to +25 dBm) ±0.9 dB (-55 to -25 dBm) ±1.1 dB (-65 to -55 dBm)</p> <p>Linearity 0 to 40 dB ±0.2 dB (≥-55 dBm) ±0.4 dB (≥-65 dBm)</p>
Frequency/Modulation Measurement	<p>Input level range -30 to +35 dBm (MU887000A test port 1 and 2, MU887001A all test port) -30 to +25 dBm (MU887000A test port 3 and 4)</p> <p>Carrier frequency accuracy ± (Setting frequency × Reference oscillator accuracy + 10 Hz)</p> <p>Waveform quality >0.999</p>
Code Domain Power Measurement	<p>Input level range -30 to +35 dBm (MU887000A test port 1 and 2, MU887001A all test port) -30 to +25 dBm (MU887000A test port 3 and 4)</p> <p>Measurement accuracy ±0.2 dB (Code power: ≥-15 dBc), ±0.4 dB (Code power: ≥-23 dBc)</p>
Occupied Bandwidth	<p>Input level range -10 to +35 dBm (MU887000A test port 1 and 2, MU887001A all test port) -10 to +25 dBm (MU887000A test port 3 and 4)</p> <p>OBW ratio 80.0 to 99.9%</p>

TD-SCDMA Uplink TX Measurement MX887017A

Common Item	<p>Measuring object TD-SCDMA uplink Frequency range 400 MHz to 2.7 GHz</p>
RF Power	<p>Input level range -65 to +35 dBm (MU887000A test port 1 and 2, MU887001A all test port) -65 to +25 dBm (MU887000A test port 3 and 4)</p> <p>Measurement accuracy After CAL, 10° to 40°C MU887000A test port 1 and 2, MU887001A all test port ±0.3 dB (typ.), ±0.5 dB (-25 to +35 dBm) ±0.7 dB (-55 to -25 dBm) ±0.9 dB (-65 to -55 dBm) MU887000A test port 3 and 4 ±0.7 dB (-25 to +25 dBm) ±0.9 dB (-55 to -25 dBm) ±1.1 dB (-65 to -55 dBm)</p> <p>Linearity 0 to 40 dB ±0.2 dB (≥-55 dBm) ±0.4 dB (≥-65 dBm)</p>
Frequency/Modulation Measurement	<p>Input level range -30 to +35 dBm (MU887000A test port 1 and 2, MU887001A all test port) -30 to +25 dBm (MU887000A test port 3 and 4)</p> <p>Carrier frequency accuracy ± (Setting frequency × Reference oscillator accuracy + 10 Hz)</p> <p>Modulation accuracy Residual EVM (at input of single code) ≤2.5%</p>
Occupied Bandwidth	<p>Input level range -10 to +35 dBm (MU887000A test port 1 and 2, MU887001A all test port) -10 to +25 dBm (MU887000A test port 3 and 4)</p> <p>OBW ratio 99.0%</p>
Adjacent Channel Leakage Power Ratio	<p>Input level range -10 to +35 dBm (MU887000A test port 1 and 2, MU887001A all test port) -10 to +25 dBm (MU887000A test port 3 and 4)</p> <p>Measurement points ±1.6 MHz, ±3.2 MHz</p> <p>Measurement range ≥50 dB (±1.6 MHz), ≥55 dB (±3.2 MHz)</p>

Measurement Software MX8870xxA Series/Waveforms MV887xxxA Series Specifications

W-CDMA/HSPA Downlink TX Measurement MX887021A

Common Item	<p>Measuring object W-CDMA/HSPA downlink</p> <p>Frequency range 600 MHz to 2.7 GHz</p>
RF Power	<p>Input level range -65 to +35 dBm (MU887000A test port 1 and 2, MU887001A all test port) -65 to +25 dBm (MU887000A test port 3 and 4)</p> <p>Measurement accuracy After CAL, 10° to 40°C MU887000A test port 1 and 2, MU887001A all test port ±0.3 dB (typ.), ±0.5 dB (-15 to +35 dBm) MU887000A test port 3 and 4 ±0.7 dB (-15 to +25 dBm)</p>
Frequency/Modulation Measurement	<p>Input level range -30 to +35 dBm (MU887000A test port 1 and 2, MU887001A all test port) -30 to +25 dBm (MU887000A test port 3 and 4)</p> <p>Carrier frequency accuracy Average of 10 measurements, test model 4 signals ± (Setting frequency × Reference oscillator accuracy + 10 Hz)</p> <p>Modulation accuracy Average of 10 measurements, test model 4 signals ≤1%</p>
Adjacent Channel Leakage Power Ratio	<p>Input level range -10 to +35 dBm (MU887000A test port 1 and 2, MU887001A all test port) -10 to +25 dBm (MU887000A test port 3 and 4)</p> <p>Measurement points ±5 MHz, ±10 MHz</p> <p>Measurement range ≥55 dB (UTRA Adj./Alt.)</p>

LTE FDD Downlink TX Measurement MX887023A

Common Item	<p>Measuring object LTE FDD downlink signal</p> <p>Frequency range 600 MHz to 2.7 GHz, 3.4 GHz to 3.8 GHz</p>
RF Power	<p>Input level range -65 to +35 dBm (MU887000A test port 1 and 2, MU887001A all test port) -65 to +25 dBm (MU887000A test port 3 and 4)</p> <p>Measurement accuracy After CAL, 10° to 40°C MU887000A test port 1 and 2, MU887001A all test port ±0.3 dB (typ.), ±0.5 dB (-15 to +35 dBm) MU887000A test port 3 and 4 ±0.7 dB (-15 to +25 dBm)</p>
Frequency/Modulation Measurement	<p>Input level range -15 to +35 dBm (MU887000A test port 1 and 2, MU887001A all test port) -15 to +25 dBm (MU887000A test port 3 and 4)</p> <p>Carrier frequency accuracy Measurement interval: 10, test model 3.1 signals ± (Setting frequency × Reference oscillator accuracy + 10 Hz)</p> <p>Modulation accuracy Residual EVM Measurement interval: 10, Test model 3.1 signals, Channel bandwidth: 3, 5, 10, 15, 20 MHz ≤1%</p>
Adjacent Channel Leakage Power Ratio	<p>Input level range -10 to +35 dBm (MU887000A test port 1 and 2, MU887001A all test port) -10 to +25 dBm (MU887000A test port 3 and 4)</p> <p>Measurement range Channel bandwidth: 1.4, 3, 5 MHz ≥54 dB (E-UTRA Adj.), ≥57 dB (E-UTRA Alt.) Channel bandwidth: 10, 15, 20 MHz ≥50 dB (E-UTRA Adj./Alt.) Full channel bandwidth ≥54 dB (UTRA Adj./Alt.)</p>

Measurement Software MX8870xxA Series/Waveforms MV887xxxA Series Specifications

W-CDMA/HSPA Downlink Waveforms MV887011A

EVM	$\leq 3\%$ rms (400 MHz $\leq f \leq 2.7$ GHz)
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GSM/EDGE Downlink Waveforms MV887012A

Phase Error	$\leq 1^\circ$ rms (400 MHz $\leq f \leq 2.7$ GHz, GMSK modulation)
EVM	$\leq 1.8\%$ rms (400 MHz $\leq f \leq 2.7$ GHz, 8PSK modulation)

LTE FDD Downlink Waveforms MV887013A

Max. Output Level	MU887000A test port 1 and 2, MU887001A all test port -12 dBm ($f \leq 3.8$ GHz), -20 dBm ($f > 3.8$ GHz) MU887000A test port 3 and 4 -2 dBm ($f \leq 3.8$ GHz), -10 dBm ($f > 3.8$ GHz)
EVM	$\leq 2\%$ rms (400 MHz $\leq f \leq 2.7$ GHz), $\leq 3\%$ rms (3.4 GHz $\leq f \leq 3.8$ GHz)

LTE TDD Downlink Waveforms MV887014A

Max. Output Level	MU887000A test port 1 and 2, MU887001A all test port -12 dBm ($f \leq 3.8$ GHz), -20 dBm ($f > 3.8$ GHz) MU887000A test port 3 and 4 -2 dBm ($f \leq 3.8$ GHz), -10 dBm ($f > 3.8$ GHz)
EVM	$\leq 2\%$ rms (400 MHz $\leq f \leq 2.7$ GHz), $\leq 3\%$ rms (3.4 GHz $\leq f \leq 3.8$ GHz)

CDMA2000 Forward Link Waveforms MV887015A

Waveform Quality	> 0.99 (400 MHz $\leq f \leq 2.7$ GHz)
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1xEV-DO Forward Link Waveforms MV887016A

Waveform Quality	> 0.99 (400 MHz $\leq f \leq 2.7$ GHz, Pilot channel)
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TD-SCDMA Downlink Waveforms MV887017A

EVM	$\leq 3\%$ rms (400 MHz $\leq f \leq 2.7$ GHz)
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Measurement Software MX8870xxA Series/Waveforms MV887xxxA Series Specifications

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

Common Item	<p>Measuring object WLAN signal packet</p> <p>Frequency range 2.4 GHz band: 2412 MHz to 2484 MHz 5 GHz band: 4920 MHz to 5825 MHz (required MU88700xA-001)</p>
RF Power	<p>Input level range -65 to +25 dBm (MU887000A test port 3 and 4) -55 to +35 dBm (MU887001A all test port)</p> <p>Accuracy After CAL, 20° to 30°C ±0.7 dB (-30 dBm ≤ p ≤ +25 dBm), ±1.0 dB (-50 dBm ≤ p < -30 dBm) (MU887000A) ±0.7 dB (-20 dBm ≤ p ≤ +35 dBm), ±1.0 dB (-40 dBm ≤ p < -20 dBm) (MU887001A)</p> <p>Bandwidth 40 MHz, 20 MHz (802.11n) 20 MHz (802.11a/b/g)</p> <p>Capture time 1.34 s</p> <p>Pre-trigger 1.33 s</p> <p>Resolution (time domain profile) 5 ns/sample</p> <p>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.</p> <p>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.</p>
Spectral Profile Measurement	<p>Span ±65 MHz (802.11n) ±35 MHz (802.11b/g/a)</p> <p>Capture time 50 µs</p> <p>Measurement range (RBW: 100 kHz) -27 to +25 dBm (MU887000A) -17 to +35 dBm (MU887001A)</p> <p>Linearity CW, RBW: 100 kHz, Same as level linearity (MU887000A test port 3 and 4, MU887001A all test port) ±0.2 dB (≥ -55 dBm, -40 to 0 dB)</p> <p>Resolution 0.1 dB</p> <p>Bandwidth 100 kHz</p>
EVM (Modulation accuracy)	<p>Measurement range -20 to +25 dBm (MU887000A) -10 to +35 dBm (MU887001A)</p> <p>Residual EVM Signal level: >-20 dBm (MU887000A), >-10 dBm (MU887001A), Averaged over 20 packets <-28 dB (DSSS) <-40 dB (OFDM, Channel estimation: FULLPACKET)</p> <p>EVM data format dB, %</p> <p>Resolution 0.1% or 0.1 dB, All limit checking in dB to 0.1 dB resolution</p> <p>Speed >20 readings/second</p>
DSSS EVM Measurement Setting	<p>RX filter type None, Gaussian, Root raised cosine</p> <p>Gaussian filter setting BT BT 0.3 to 1.0, Resolution: 0.1</p> <p>Root raised cosine filter setting α 0.30 to 1.00, Resolution: 0.01</p> <p>Measurement start It shall be possible to measure EVM from the first data chip of the packet</p> <p>Measurement method Header or payload. Header measures the EVM of the first 1000 chips of the PLCP preamble and header.</p> <p>User specified measurement range 220 to 11000 chips</p> <p>Measurement functional range Measurement only possible if channel frequency error <±150 kHz (±60 ppm)</p> <p>Carrier lock Phase tracking automatically applied as per carrier lock 802.11-2007 18.4.7.8</p>

Measurement Software MX8870xxA Series/Waveforms MV887xxxA Series Specifications

OFDM EVM Measurement Setting	<p>Channel estimation User selection of Long training sequence or Full packet.</p> <p>User specified measurement range 16 symbols (min.), 1000 symbols (max.)</p> <p>OFDM pilot tracking "Phase tracking only" or "Phase and Amplitude tracking".</p> <p>Peak and Average EVM on all sub-carriers, dB or percentage</p> <p>Peak and Average on each sub-carrier – frequency domain % vs. sub-carrier</p> <p>EVM vs. Symbol – time domain % vs. Symbol number, 1 to max</p>
DSSS Additional Measurement	<p>Transmit center frequency tolerance Definition: Average frequency of the DSSS carrier signal Accuracy: \pm (Setting frequency \times Reference oscillator accuracy + 1 kHz) Resolution: Hz to no decimal places, ppm to one decimal place</p> <p>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: \pm50 ppm Resolution: Hz to no decimal places, ppm to one decimal place</p> <p>Data analysis width: 20 μs (220 chips) (min.)</p> <p>User specified measurement range: 3300 to 30250 chips</p> <p>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</p> <p>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.</p>
OFDM Additional Measurement	<p>Transmit center frequency tolerance Definition: Average frequency of the OFDM carrier signal Data output format: Hz, ppm Accuracy: \pm (Setting frequency \times Reference oscillator accuracy + 1 kHz) (>1 ms packet) Resolution: Hz to no decimal places, ppm to one decimal place</p> <p>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: \pm40 ppm Resolution: ppm to one decimal place</p> <p>User specified measurement range: 16- (define numbers)</p> <p>Transmitter center frequency leakage Definition: Measurement of the leakage of the center carrier Data output format: dB Resolution: dB to two decimal places</p> <p>Transmitter spectral flatness Definition: Measurement of RF sub-carrier power level Unit of measurement: dB</p>
Additional Measurement (DSSS and OFDM)	<p>Power spectral density The maximum power measured in a 1 MHz bandwidth within the occupied bandwidth of the signal</p> <p>Occupied bandwidth Measures the frequency range within which the specified percentage power is contained</p> <p>Occupied bandwidth percentage range 1 to 99%</p>

Measurement Software MX8870xxA Series/Waveforms MV887xxxA Series Specifications

WLAN 802.11ac TX Measurement MX887031A

Common Item	<p>Measuring object WLAN signal packet</p> <p>Frequency range 5 GHz band: 4920 MHz to 5825 MHz (required MU88700xA-001)</p>
RF Power	<p>Input level range -65 to +25 dBm (MU887000A test port 3 and 4) -55 to +35 dBm (MU887001A all test port)</p> <p>Accuracy After CAL, 20° to 30°C ±0.7 dB (-30 dBm ≤ p ≤ +25 dBm), ±1.0 dB (-50 dBm ≤ p < -30 dBm) (MU887000A) ±0.7 dB (-20 dBm ≤ p ≤ +35 dBm), ±1.0 dB (-40 dBm ≤ p < -20 dBm) (MU887001A)</p> <p>Bandwidth 160, 80, 40, 20 MHz</p> <p>Capture time 1.34 s</p> <p>Pre-trigger 1.33 s</p> <p>Resolution (time domain profile) 5 ns/sample</p> <p>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.</p> <p>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.</p>
Spectral Profile Measurement	<p>Spectral profile measurement span ±80 MHz</p> <p>Capture time 50 µs</p> <p>Measurement range (RBW: 100 kHz) -27 to +25 dBm (MU887000A) -17 to +35 dBm (MU887001A)</p> <p>Linearity CW, RBW: 100 kHz, Same as level linearity (MU887000A test port 3 and 4, MU887001A all test port) ±0.2 dB (≥ -55 dBm, -40 to 0 dB)</p> <p>Resolution 0.1 dB</p> <p>Bandwidth 100 kHz</p>
EVM (Modulation Accuracy)	<p>EVM measurement range -20 to +25 dBm (MU887000A) -10 to +35 dBm (MU887001A)</p> <p>Residual EVM (Bandwidth: ≤80 MHz) Signal level: >-10 dBm (MU887000A), 0 dBm (MU887001A), Averaged over 20 packets, Channel estimation: FULLPACKET <-38 dB</p> <p>EVM data format dB, %</p> <p>Resolution 0.1% or 0.1 dB, All limit checking in dB to 0.1 dB resolution</p> <p>Speed >20 readings/second</p>
OFDM EVM Measurement Setting	<p>Channel estimation User selection of long training sequence or full packet.</p> <p>User specified measurement range 16 symbols (min.), 1000 symbols (max.)</p> <p>OFDM pilot tracking "Phase tracking only" or "Phase and Amplitude tracking".</p> <p>Peak and Average EVM on all sub-carriers, dB or percentage</p> <p>Peak and Average on each sub-carrier – frequency domain % vs. sub-carrier</p> <p>EVM vs. Symbol – time domain % vs. Symbol number, 1 to max.</p>

OFDM Additional Measurement	<p>Transmit center frequency tolerance Definition: Average frequency of the OFDM carrier signal Data output format: Hz, ppm Accuracy: \pm (Setting frequency \times Reference oscillator accuracy + 1 kHz) (>1 ms packet) Resolution: Hz to no decimal places, ppm to one decimal places</p> <p>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: \pm40 ppm Resolution: ppm to one decimal places User specified measurement range: 16- (Define numbers)</p> <p>Transmitter center frequency leakage Definition: Measurement of the leakage of the center carrier Data output format: dB Resolution: dB to two decimal places</p> <p>Transmitter spectral flatness Definition: Measurement of RF sub-carrier power level Unit of measurement: dB</p>
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WLAN 802.11p TX Measurement MX887032A

Common Item	<p>Measuring object WLAN single packet</p> <p>Frequency range 715 MHz to 765 MHz 902 MHz to 928 MHz 5725 MHz to 5925 MHz (required MU88700xA-001 option)</p>
RF Power	<p>Input level range -65 to +25 dBm (MU887000A test port 3 and 4) -55 to +35 dBm (MU887001A all test port)</p> <p>Measurement accuracy After CAL, 20 to 30°C ±0.7 dB (-30 dBm ≤ p ≤ +25 dBm), ±1.0 dB (-50 dBm ≤ p < -30 dBm) (MU887000A) ±0.7 dB (-20 dBm ≤ p ≤ +35 dBm), ±1.0 dB (-40 dBm ≤ p < -20 dBm) (MU887001A)</p> <p>Bandwidth 5, 10, 20 MHz</p>
EVM (Modulation Accuracy)	<p>Measurement range -20 to +25 dBm (MU887000A) -10 to +35 dBm (MU887001A)</p> <p>Residual EVM (OFDM) Signal level: >-20 dBm (MU887000A), >-10 dBm (MU887001A), Averaged over 20 packets, Channel estimation: FULLPACKET <-40 dB</p> <p>EVM data format dB or %</p> <p>Measurement resolution 0.1% or 0.1 dB, All limit checking in dB to 0.1 dB resolution</p>
OFDM EVM Measurement Setting	<p>Channel estimation User selection of Long training sequence or Full packet</p> <p>User specified measurement range 16 symbols (min.), 1000 symbols (max.)</p> <p>OFDM pilot tracking "Phase tracking only" or "Phase and amplitude tracking", default: Phase tracking only</p> <p>Peak and average EVM on all sub-carriers, dB or percentage</p> <p>Peak and average on each sub-carrier – frequency domain % vs. sub-carrier</p> <p>EVM vs. Symbol – time domain % vs. Symbol number, 1 to max</p>
OFDM Additional Measurement	<p>Transmit center frequency tolerance Definition: Average frequency of the OFDM carrier signal</p> <p>Data output format: Hz and ppm</p> <p>Measurement accuracy: ± (Setting frequency × Reference oscillator accuracy + 1 kHz) (packet: >1 ms)</p> <p>Resolution: Hz to no decimal places, ppm to 1 decimal place</p> <p>Transmit center frequency leakage Definition: Measurement of the leakage of the center carrier</p> <p>Data output format: dB</p> <p>Resolution: dB to two decimal places</p> <p>Transmitter spectral flatness Definition: Measurement of RF sub-carrier power level</p> <p>Data output format: dB</p>

Bluetooth TX Measurement MX887040A

Common Item	<p>Measuring object Bluetooth signal packet (DH-1, 3, 5 2-DH-1, 3, 5 3-DH-1, 3, 5 LE)</p> <p>Frequency range 2402 MHz to 2480 MHz</p> <p>Measurement mode 'SIG Standard' Supports RF measurements on selected packet types as per the <i>Bluetooth SIG RF test specification</i>.</p>
RF Power	<p>Input level range -65 to +25 dBm (MU887000A test port 3 and 4) -55 to +35 dBm (MU887001A all test port)</p> <p>Measurement accuracy After CAL, 20° to 30°C ±0.7 dB (-30 dBm ≤ p ≤ +25 dBm), ±1.0 dB (-50 dBm ≤ p < -30 dBm) (MU887000A) ±0.7 dB (-20 dBm ≤ p ≤ +35 dBm), ±1.0 dB (-40 dBm ≤ p ≤ -20 dBm) (MU887001A)</p>
EDR Relative Transmit Power	<p>Input level range -35 to +25 dBm (MU887000A) -25 to +35 dBm (MU887001A)</p> <p>Measurement Value Maximum, Minimum, Average differential power</p> <p>Relative power measurement range Relative power measurement range between the GFSK and π/4DQPSK or 8DPSK sections of the packet.</p> <p>Bandwidth 1.3 MHz (IF filter response 'flat' fc ±550 kHz)</p> <p>Resolution (time domain) 0.01 dB</p>
Bluetooth Modulation	<p>GFSK, π/4DQPSK, 8DPSK</p> <p>Input level range -20 to +25 dBm (MU887000A) -10 to +35 dBm (MU887001A)</p> <p>Residual DEVM Signal level: >-20 dBm (MU887000A), >-10 dBm (MU887001A), Averaged over 10 packets <5%</p> <p>Resolution 0.1%</p> <p>GFSK modulation Deviation measurement range: 0 to 350 kHz</p> <p>Accuracy: Modulation index: 0.32, Signal level: >-20 dBm (MU887000A), >-10 dBm (MU887001A), Averaged over 10 packets 1% (±0.01 × expected deviation [Hz]) (nom.)</p> <p>Initial carrier frequency tolerance Input level range: -35 to +25 dBm (MU887000A) -25 to +35 dBm (MU887001A)</p> <p>Initial frequency range: 0 to ±150 kHz</p> <p>Resolution: 1 kHz</p> <p>Carrier-frequency drift Input signal range: -35 to +25 dBm (MU887000A) -25 to +35 dBm (MU887001A)</p> <p>Frequency drift range: 0 to ±200 kHz</p> <p>Time settings: 50 µs, >2000 µs</p>
EDR Carrier Frequency Stability	<p>Measurement range ±100 kHz</p> <p>Resolution 1 kHz</p> <p>Accuracy Signal level: >-20 dBm (MU887000A), >-10 dBm (MU887001A), Averaged over 10 packets ± (Setting frequency × Reference oscillator accuracy + 500 Hz)</p> <p>Displayed results Initial frequency error ω_i, Frequency error ω_o, Frequency error $\omega_i + \omega_o$</p>
EDR Modulation Accuracy	<p>RMS DEVM range 0 to 30% (π/4DQPSK), 0 to 20% (8DPSK)</p> <p>Peak DEVM range 0 to 50% (π/4DQPSK), 0 to 30% (8DPSK)</p>

Measurement Software MX8870xxA Series/Waveforms MV887xxxA Series Specifications

BLE Modulation Characteristics	<p>GFSK</p> <p>Input level range -35 to +25 dBm (MU887000A) -25 to +35 dBm (MU887001A)</p> <p>Frequency deviation range 0 to ± 500 kHz peak</p> <p>Resolution 1 kHz</p> <p>Accuracy Modulation index: 0.5, Signal level: >-20 dBm (MU887000A), >-10 dBm (MU887001A), Averaged over 10 packets 1% ($\pm 0.01 \times$ expected deviation [Hz]) (nom.)</p>
BLE Carrier Frequency Offset and Drift	<p>Input level range -35 to +25 dBm (MU887000A) -25 to +35 dBm (MU887001A)</p> <p>Frequency range 0 to ± 500 kHz</p> <p>Accuracy Signal level: >-20 dBm (MU887000A), >-10 dBm (MU887001A), Averaged over 10 packets \pm (Setting frequency \times Reference oscillator accuracy + 500 Hz)</p> <p>Displayed results Carrier frequency error, Frequency drift, Drift rate</p>

Measurement Software MX8870xxA Series/Waveforms MV887xxxA Series Specifications

Short Range Wireless Average Power and Frequency Measurement MX887050A

RF Power (CW and Continuously Modulated)	<p>Frequency range 2.4 GHz band: 2402 MHz to 2484 MHz 5 GHz band: 4920 MHz to 5825 MHz (require MU88700xA-001)</p> <p>Input level range -65 to +25 dBm (MU887000A test port 3 and 4) -55 to +35 dBm (MU887001A all test port)</p> <p>Accuracy After CAL, MU887000A test port 400 MHz $\leq f < 3.8$ GHz, 10° to 40°C ± 0.7 dB ($-30 \leq p \leq +25$ dBm) ± 0.9 dB ($-55 \leq p < -30$ dBm) ± 1.1 dB ($-65 \leq p < -55$ dBm) 3.8 GHz $\leq f \leq 6$ GHz, 20° to 30°C ± 0.7 dB ($-30 \leq p \leq +25$ dBm) ± 0.9 dB ($-55 \leq p < -30$ dBm) ± 1.1 dB ($-65 \leq p < -55$ dBm)</p> <p>Linearity CW, RBW: 100 kHz, MU887000A test port ± 0.2 dB (≥ -55 dBm, -40 to 0 dB)</p>
Frequency (CW)	<p>Input level range -35 to +25 dBm (MU887000A) -25 to +35 dBm (MU887001A)</p> <p>Frequency range 0 to ± 500 kHz</p> <p>Accuracy \pm (Setting frequency \times Reference oscillator accuracy + 500 Hz)</p>

IEEE 802.15.4 TX Measurement MX887060A

Common Item	<p>Frequency range 440 MHz to 2500 MHz</p>
RF Power	<p>Input level range -65 to +35 dBm (MU887000A test port 1 and 2, MU887001A all test port) -65 to +25 dBm (MU887000A test port 3 and 4)</p> <p>Accuracy After CAL, 10° to 40°C MU887000A test port 1 and 2, MU887001A all test port ± 0.3 dB (typ.), ± 0.5 dB (-25 to +35 dBm) ± 0.7 dB (-55 to -25 dBm) ± 0.9 dB (-65 to -55 dBm) MU887000A test port 3 and 4 ± 0.7 dB (-25 to +25 dBm) ± 0.9 dB (-55 to -25 dBm) ± 1.1 dB (-65 to -55 dBm)</p>
Modulation Analysis	<p>Input level range Analysis length: 1000 chips or more -30 to +35 dBm (MU887000A test port 1 and 2, MU887001A all test port) -30 to +25 dBm (MU887000A test port 3 and 4)</p> <p>Modulation accuracy Residual EVM $\leq 1.5\%$</p> <p>Carrier frequency accuracy \pm (Setting frequency \times Reference oscillator accuracy + 20 Hz)</p>

Measurement Software MX8870xxA Series/Waveforms MV887xxxA Series Specifications

Z-Wave TX Measurement MX887061A

Common Item	Frequency range 440 MHz to 1000 MHz
RF Power	<p>Input level range -65 to +35 dBm (MU887000A test port 1 and 2, MU887001A all test port) -65 to +25 dBm (MU887000A test port 3 and 4)</p> <p>Accuracy After CAL, 10° to 40°C</p> <p>MU887000A test port 1 and 2, MU887001A all test port ±0.3 dB (typ.), ±0.5 dB (-25 to +35 dBm) ±0.7 dB (-55 to -25 dBm) ±0.9 dB (-65 to -55 dBm)</p> <p>MU887000A test port 3 and 4 ±0.7 dB (-25 to +25 dBm) ±0.9 dB (-55 to -25 dBm) ±1.1 dB (-65 to -55 dBm)</p>
Modulation Analysis	<p>Input level range Analysis length: 200 bits</p> <p>-30 to +35 dBm (MU887000A test port 1 and 2, MU887001A all test port) -30 to +25 dBm (MU887000A test port 3 and 4)</p> <p>Carrier frequency accuracy ± (Setting frequency × Reference oscillator accuracy + 20 Hz)</p>

WLAN 802.11b/g/a/n Waveforms MV887030A

EVM	<p>802.11b Packet length: 1024 byte, Gaussian filter: BT 0.5 ≤-38 dB rms (2402 MHz to 2484 MHz)</p> <p>802.11g Packet length: 1000 byte, 20° to 30°C ≤-40 dB rms (2402 MHz to 2484 MHz)</p> <p>802.11a Packet length: 1000 byte, 20° to 30°C ≤-38 dB rms (4920 MHz to 5825 MHz)</p> <p>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)</p>
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Bluetooth Waveforms MV887040A

Deviation	Frequency: 2402 MHz to 2480 MHz, GFSK modulation 1% (±0.01 × deviation Hz) (nom.)
DEVM	Frequency: 2402 MHz to 2480 MHz, $\pi/4$ -DQPSK or 8-DPSK modulation <5% rms

IEEE 802.15.4 Waveforms MV887060A

EVM	440 MHz ≤ f ≤ 2500 MHz ≤3.0%
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Z-Wave Waveforms MV887061A

EVM	440 MHz ≤ f ≤ 2500 MHz ≤3.0%
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ISDB-Tmm Waveforms MV887112A

MER	Frequency: 214.714285 MHz ≥37 dB (total)
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FM/Audio TRX Measurement MX887070A

FM Signal Measurements

Common Item	<p>Target signals FM/FM stereo/RDS (Radio Data System) signals Frequency range 65 MHz to 110 MHz</p>
TX Measurements	<p>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 Bandpass (Weighting filter): Off, A-Weighting (IEC 61672: 2003), C-Message, CCITT (ITU-T O.41)</p> <p>Input level range -30 to +15 dBm</p> <p>Level accuracy 10° to 40°C, Measurement bandwidth: 1.2 MHz, -30 dBm ≤ p ≤ +15 dBm ±0.7 dB</p> <p>Carrier frequency accuracy FM monaural modulation, Tone: 1 kHz, Deviation: 75 kHz ± (Setting frequency × Reference oscillator accuracy + 1 Hz)</p> <p>FM deviation range 1 kHz to 100 kHz</p> <p>Residual FM Monaural modulation, Tone: 1 kHz, Deviation: 75 kHz, Demodulation bandwidth: 20 Hz to 15 kHz, using De-emphasis filter (50 µs) ≥55 dB</p> <p>Demodulation signal analysis No. of FFT points: 65536 Sampling rate: 152 kHz FFT window function: Hanning window</p>
RX Measurements	<p>Measurement functions FM waveform output Modulation method FM Monaural, FM stereo</p> <p>Frequency deviation Setting range: 20 kHz to 100 kHz</p> <p>Distortion 65 MHz to 110 MHz, (SINAD, 20 Hz to 15 kHz, Emphasis on, Monaural), Tone: 1 kHz, Deviation: 75 kHz ≥50 dB (SINAD)</p> <p>Resolution: 0.1 Hz</p> <p>Internal modulation signal AF tone L channel (Mono): 1 to 8 tones R channel: 1 to 8 tones</p> <p>Frequency range 20 Hz to 20 kHz, Resolution: 0.1 Hz</p>

Audio Signal Measurements

With MU88700xA-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	<p>Measurement functions</p> <ul style="list-style-type: none"> Amplitude Frequency Distortion ratio measurement Crosstalk THD THD+N/SINAD SNR <p>Analog measurements</p> <ul style="list-style-type: none"> All single-tone measurement standard values Impedance: 100 kΩ (AC coupling) Frequency Frequency range: 20 Hz to 20 kHz Input level Level range: 1 mVpeak to 5 Vpeak (30 Vrms, max.) Setting range: 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 <p>Digital measurement</p> <ul style="list-style-type: none"> All single-tone measurement standard values Bit resolution: 16 bits/24 bits Sampling rate Frequency: 16, 32, 44.1, 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	<p>Analog measurements</p> <ul style="list-style-type: none"> All single-tone measurement standard values Impedance: 1 Ω (AC coupling) (nom.) 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) Resolution: 1 mV (≤5 Vpeak) 100 μV (≤500 mVpeak) 10 μV (≤50 mVpeak) Accuracy: ±0.3 dB (at 1 kHz, 100 kΩ termination, 20° to 30°C) Maximum output current 100 mA (nom.) (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) <p>Digital measurement</p> <ul style="list-style-type: none"> 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) Resolution: 0.01 Hz Output level Level range: Full scale to (Full scale - 40 dB) Resolution: 0.1 dB Bit resolution: 16 bits/24 bits Sampling rate Frequency: 16, 32, 44.1, 48 kHz

Ordering Information

Measurement Software MX8870xxA Series/Waveforms MV887xxxA Series

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
MT8870A	Main frame Universal Wireless Test Set
B0666A	Standard accessories Power Cord: 1 pc 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)
MX880055A	Small Cell Application Applet (DVD-R)
MX880056A	IEEE 802.15.4 Application Applet (DVD-R)
MX887900A	MT8870A Utility Tool (DVD-R)
W3605AE	MT8870A Operation Manual (DVD-R)
W3606AE	MU887000A Operation Manual (DVD-R)
MT8870A-001	Options
MT8870A-101	GPIB Control GPIB Control Retrofit
MT8870A-ES210	Warranty 2 Years Extended Warranty Service
MT8870A-ES310	3 Years Extended Warranty Service
MT8870A-ES510	5 Years Extended Warranty Service
B0666A	Application parts 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
MU887000A	Test module TRX Test Module
MU887001A	TRX Test Module
W3606AE	Standard accessories DVD-R: 1 pc MU887000A Operation Manual (DVD-R)
MU887000A-001	Options 6 GHz Frequency Extension
MU887000A-101	6 GHz Frequency Extension Retrofit
MU887000A-002	Audio Measurement Hardware
MU887000A-102	Audio Measurement Hardware Retrofit
MU887001A-001	6 GHz Frequency Extension
MU887001A-101	6 GHz Frequency Extension Retrofit
MU887001A-002	Audio Measurement Hardware
MU887001A-102	Audio Measurement Hardware Retrofit
MU887000A-ES210	Warranty 2 Years Extended Warranty Service
MU887000A-ES310	3 Years Extended Warranty Service
MU887000A-ES510	5 Years Extended Warranty Service
MU887001A-ES210	2 Years Extended Warranty Service
MU887001A-ES310	3 Years Extended Warranty Service
MU887001A-ES510	5 Years Extended Warranty Service

Model/Order No.	Name
MX887010A	Measurement Software 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
MX887021A	W-CDMA/HSPA Downlink TX Measurement
MX887023A	LTE FDD Downlink TX Measurement
MX887030A	WLAN 802.11b/g/a/n TX Measurement ^{*2}
MX887031A	WLAN 802.11ac TX Measurement ^{*2}
MX887032A	WLAN 802.11p TX Measurement ^{*2}
MX887040A	Bluetooth TX Measurement
MX887040A-001	DLE TX Measurement
MX887050A	Short Range Wireless Average Power and Frequency Measurement
MX887060A	IEEE 802.15.4 TX Measurement
MX887061A	Z-Wave TX Measurement
MX887070A	FM/Audio TRX Measurement ^{*3}
MX887090A	Multi-DUT Measurement Scheduler

Model/Order No.	Name
MN8116A	Application instruments Multi-Port Switch (16 ports)
MN8116A-001	16 Port Expansion Bank
MN8116A-101	16 Port Expansion Bank Retrofit
MN8116A-ES210	Warranty 2 Years Extended Warranty Service
MN8116A-ES310	3 Years Extended Warranty Service
MN8116A-ES510	5 Years Extended Warranty Service

Ordering Information

Measurement Software MX8870xxA Series/Waveforms MV887xxxA Series

Model/Order No.	Name
MV887011A	Waveforms
MV887012A	W-CDMA/HSPA Downlink Waveforms
MV887013A	GSM/EDGE Downlink Waveforms
MV887014A	LTE FDD Downlink Waveforms
MV887015A	LTE TDD Downlink Waveforms
MV887016A	CDMA2000 Forward Link Waveforms
MV887017A	1xEV-DO Forward Link Waveforms
MV887018A	TD-SCDMA Downlink Waveforms
MV887021A	W-CDMA/HSPA Uplink Waveforms
MV887023A	LTE FDD Uplink Waveforms
MV887030A	WLAN 802.11b/g/a/n Waveforms* ²
MV887031A	WLAN 802.11ac Waveforms* ²
MV887032A	WLAN 802.11p Waveforms
MV887040A	Bluetooth Waveforms
MV887040A-001	DLE Waveforms
MV887060A	IEEE 802.15.4 Waveforms
MV887061A	Z-Wave Waveforms
MV887070A	FM RDS Waveforms
MV887100A	GPS Waveforms
MV887101A	Galileo Waveforms
MV887102A	GLONASS Waveforms
MV887103A	BeiDou Waveforms
MV887110A	DVB-H Waveforms
MV887111A	ISDB-T Waveforms
MV887112A	ISDB-Tmm Waveforms

*²: Requires MU88700xA-001 for 5 GHz (802.11a/n/p/ac) frequency measurements

*³: Requires MU88700xA-002 for audio signal measurements



Specifications are subject to change without notice.

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