

**Anritsu** envision : ensure

# Universal Wireless Test Set

## MT8870A/MT8872A



# Two Anritsu Solutions

4 Slot

MT8870A



5G NR

LTE/  
LTE-Advanced

WLAN  
802.11ax

LTE-V2X

Bluetooth5



# for High-Density Production Lines

2 slot

MT8872A



## For Production Lines of Smartphones and Wireless Modules

With the recent rollout of commercial 5G service, wireless communications are expanding from smartphones into new markets, such as automotive and IoT-based communications devices. Additionally, use of wider frequency bands and more efficient transmission methods is in planning with progressive development of newer versions of communications standards, including 5G, IEEE 802.11ax, Bluetooth®, etc., all for simultaneous deployment in one wireless communications device.

Against this background, testing of wireless communications products is becoming more complex, and there is increasing demand for test equipment enabling both efficient mass-production and, simultaneously, flexible support for diverse communications standards.

Anritsu's MT8870A and MT8872A solutions support a customized choice of shared MU887000A/01A/02A TRX test modules matching the measurement objective.

The MT8870A accommodates up to four TRX test modules in one main chassis for efficient calibration/verification and high productivity on busy production lines.

The space-saving MT8872A is fully compatible with the MT8870A but has been designed for use in tighter spaces than the standard 19-inch rackmount. It shares the same MU887002A TRX test modules and has 24 RF test ports for help in configuring high-density production lines.



# High Performance Coupled with Flexibility and Expandability



## MU887000A/01A/02A



TRX Test Module  
MU887000A



TRX Test Module  
MU887000A  
with MU887000A-002 (Audio)



TRX Test Module  
MU887001A



TRX Test Module  
MU887001A  
with MU887001A-002 (Audio)



TRX Test Module  
MU887002A

### Future-proof Production Lines

Mobile terminal manufacturers require not only production line efficiency but also the flexibility to adapt to changes in wireless standards. The MT8870A is the ideal instrument to meet these needs.



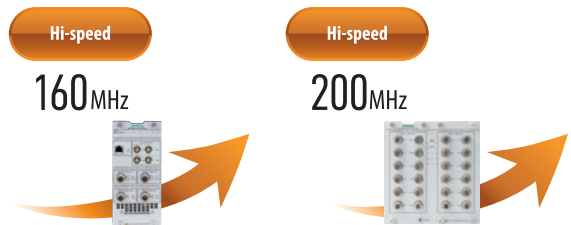
# 1 Built-in Signal Generator and Signal Analyzer in Each Test Module

The TRX Test Module MU887000A/01A/02A (MU88700xA) has been developed for communication terminal device production lines. Each installed test module has an independent high-performance signal generator and signal analyzer.



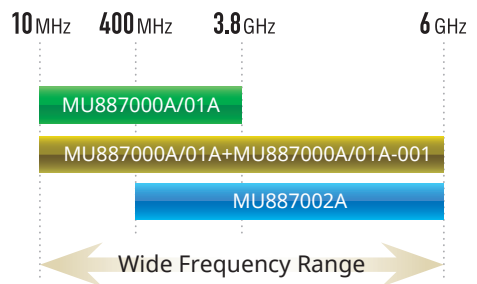
# 2 Wide Bandwidth

To support the NR Sub-6 GHz and WLAN 802.11ax wireless communications standards requiring bandwidths of more than 100 MHz, the analysis bandwidth of the signal analyzer (SA) and modulation bandwidth of the signal generator (SG) in the MU887000A/01A is 160 MHz as standard, while that in the MU887002A is 200 MHz.



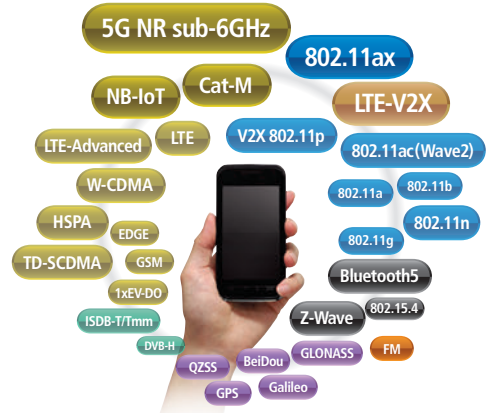
# 3 Wide Frequency Range up to 6 GHz

The signal generator and signal analyzer in the MU887000A/01A have an upper frequency limit of 3.8 GHz as standard, but this can be extended to 6 GHz as an option. The signal generator and signal analyzer in the MU887002A have an upper frequency limit of 6 GHz as standard. They flexibly support new wireless communication standards that cannot be supported by dedicated instruments for specific frequencies.



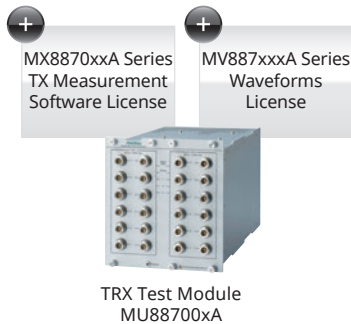
# 4 Each Test Module Supports Multiple Wireless Standards

One MU88700xA supports multiple wireless communication standards.



Each standard is supported easily using a cost-effective licensing scheme

Licenses are obtained by adding TX measurement software packages and waveform files.



Wireless Standards	Specifications
5G NR sub-6 GHz	3GPP TS 38.101-1V15.0.0
W-CDMA/HSDPA	3GPP TS 34.121-1 3GPP TS 25.141
GSM/EDGE	3GPP TS 51.010-1
LTE/LTE-Advanced/ LTE-V2X/NB-IoT/Cat-M	3GPP TS 36.521-1 3GPP TS 36.141
CDMA2000	3GPP2 TSG-C.S0011-C
1xEV-DO	3GPP2 TSG-C.S0033-B
TD-SCDMA	3GPP TS 34.122
WLAN	IEEE 802.11a/b/g/n/p/ac (Wave 2)/ax
Bluetooth®	Basic Rate/EDR/Bluetooth low energy (Bluetooth v5.0)
ZigBee	IEEE 802.15.4
Z-Wave	ITU-T G.9959
FM*	RDS (IEC 62106 Edition 2.0)
GPS	GPS standard Positioning Service Signal
Galileo	European GNSS (Galileo) Open Service Signal In Space Interface Control Document
GLONASS	GLONASS ICD Navigational radiosignal In bands L1, L2
BeiDou	BeiDou Navigation Satellite System Signal In Space Interface Control Document Open Service Signal (Version 2.0)
QZSS	Quasi-Zenith Satellite System Interface Specification
DVB-H	ETSI EN300 744
ISDB-T/Tmm*	ARIB STD-B31/B46

\*: MU887000A/MU887001A only

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## 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 Connection

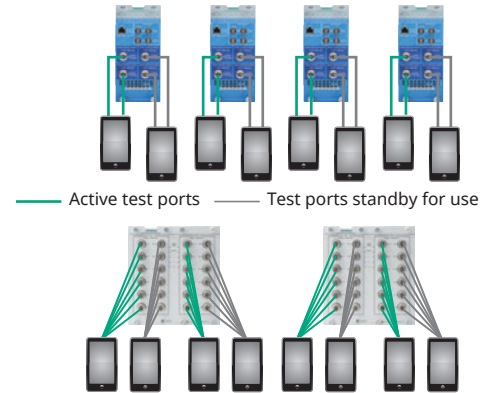
### Ping-Pong Measurement of Eight Simultaneously Connected UE Units:

Production line efficiency can be improved using a Ping-Pong measurement method which measures by connecting two UE units alternately to the MU88700xA.

Installing up to four test units in the MT8870A supports alternate connection and testing of four test units.

With four RF test ports per module, the MU887000A/01A supports connection of up to 8 dual-antenna UE.

With two TRX test functions per MU887002A unit and 12 RF test ports per TRX test function, the MU887002A supports connection of up to 8 six-antenna UE.

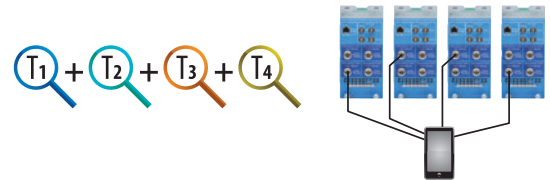


Up to  
**4**  
Measurement Types

### Four Simultaneous Measurements:

Recent smartphones support various wireless interfaces, such as Bluetooth® and WLAN, in addition to cellular.

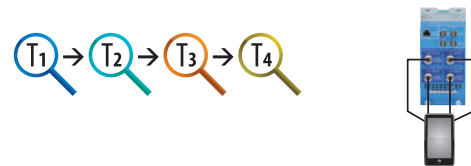
Test times are cut by testing multiple wireless standards simultaneously.



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.

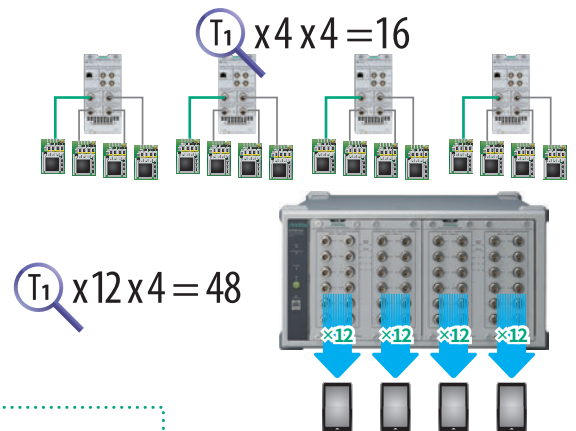


Up to  
**48**  
Test Devices

### 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.

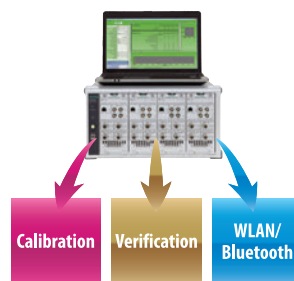
This versatility eliminates the need for external combiners and also reduces test fixture calibration.



## POINT

### Supports Flexible Line Changes

Generally, wireless device production lines are divided into different processing stages such as calibration, verification, and function testing. Using different test 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.



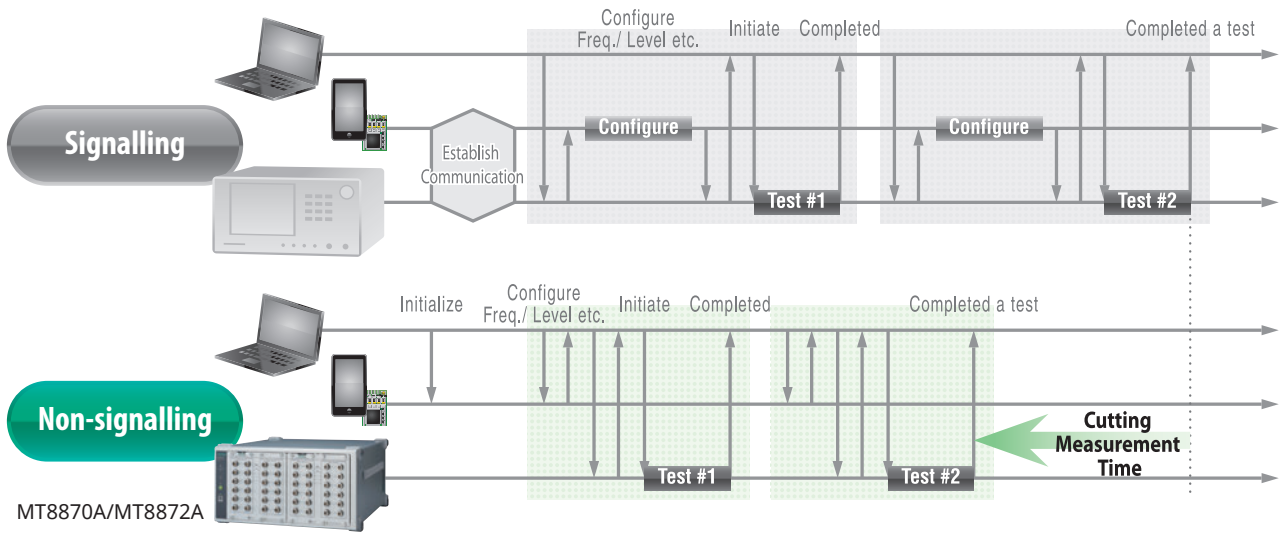
# TRX Test Module MU887000A/01A/02A Features

## Integration with Leading-edge High-speed Measurement Methods MU887000A/01A/02A

Times for manufacturing and testing mobile terminals have been slashed using leading-edge hardware architecture and parallel measurement technology. Additionally, multiple items for batch measurement processing can be freely selected for any number of repeat measurements. Batch measurement of selected items greatly simplifies and speeds up key tests.

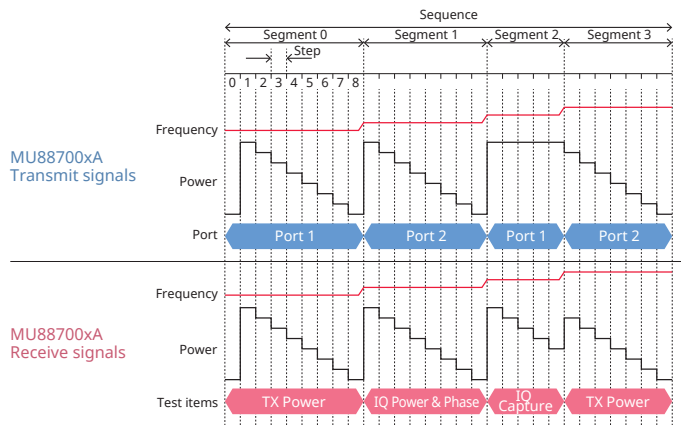
## Non-signalling Measurement Support MU887000A/01A/02A

The MT8870A/MT8872A performs measurements in a non-signalling environment. As shown in the figure below, alleviating the need to establish direct communication with the DUT brings considerable savings in both time and manufacturing costs.



## Sequence Measurement (Mobile Communication Terminals) MU887000A/01A/02A

- For mobile terminals supporting sequence measurements (list mode), TRX tests are performed in accordance with a sequence table (list) where measurement conditions are recorded while changing the test conditions.
- Since each measurement is executed at high speed in accordance with a predetermined sequence without using remote control commands, line tact times are greatly reduced, increasing line throughput and efficiency.



## Ease of Configuration MU887000A/01A/02A

Line capacity can change from week to week or month to month, depending on customers' needs and the specifications of the device under test. The number of test modules installed\*1 in the chassis can be tailored to meet changes in line test stations and items, keeping the line efficiency high without needing major configuration changes to the line and stations.

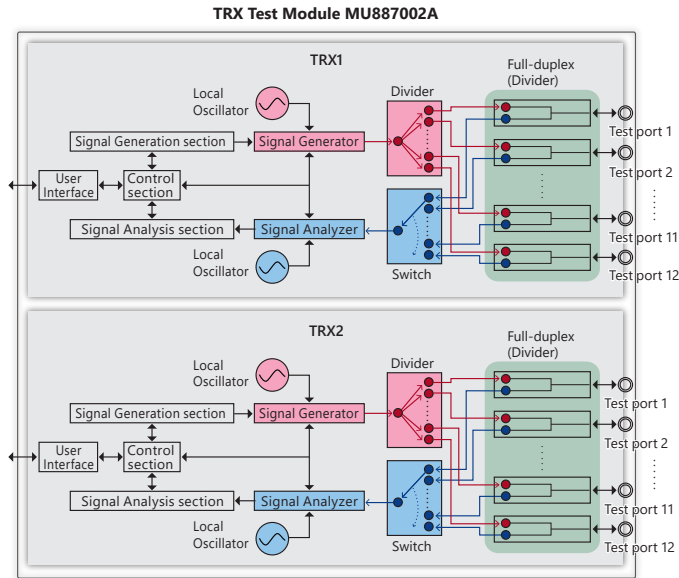


\*1: Test modules cannot be hot-swapped with the power on.

# TRX Test Module MU887002A Features

## 12 RF Test Ports MU887002A

The MU887002A has two TRX functions in one module and each TRX function has 12 built-in RF test ports.



The 12 test ports in the MU887002A perform leveling to assure high level accuracy over a wide range from 400 MHz to 6 GHz. A built-in divider at the output side supporting simultaneous signal output from all 12 ports facilitates shorter test times by receiving the signal simultaneously at multiple antennas without requiring an external divider (Broadcast function).

Measurement is performed by switching the 12 test ports using the internal switch at the input side.

## Test Port and Wireless Technology MU887002A

MU887002A

	TRX1 Test Ports 1 to 12	TRX2 Test Ports 1 to 12
Name	High power port	
Connector	N (female)	
Type (Configuration)	Duplex (divider)	
Outline	Can use both VSA and VSG required for mobile wireless standard measurements simultaneously Signal output from all port simultaneously	
Wireless Standards*	Supported standards: 5G NR sub-6 GHz, LTE/LTE-Advanced, W-CDMA/HSPA, TD-SCDMA, GSM/EDGE, CDMA2000/1xEV-DO, WLAN 802.11a/b/g/n/ac/ax, Bluetooth, GPS, Galileo, GLONASS, BeiDou, DVB-H	

\*: See "Measurement Software/Waveforms Ordering Information" for details of support for future expected standards.



# TRX Test Module MU887002A Features

## 200-MHz Bandwidth as Standard MU887002A

Supporting the new 5G NR Sub-6 GHz and 802.11ax wireless standards generally requires additional costs for changing instruments and purchasing options to extend the instrument bandwidth, but the standard 200-MHz bandwidth of the MU887002A eliminates the need to change hardware to support future NR 5G Sub-6 GHz 2CC tests.

## High Output Overcoming Measurement System Power Loss MU887002A

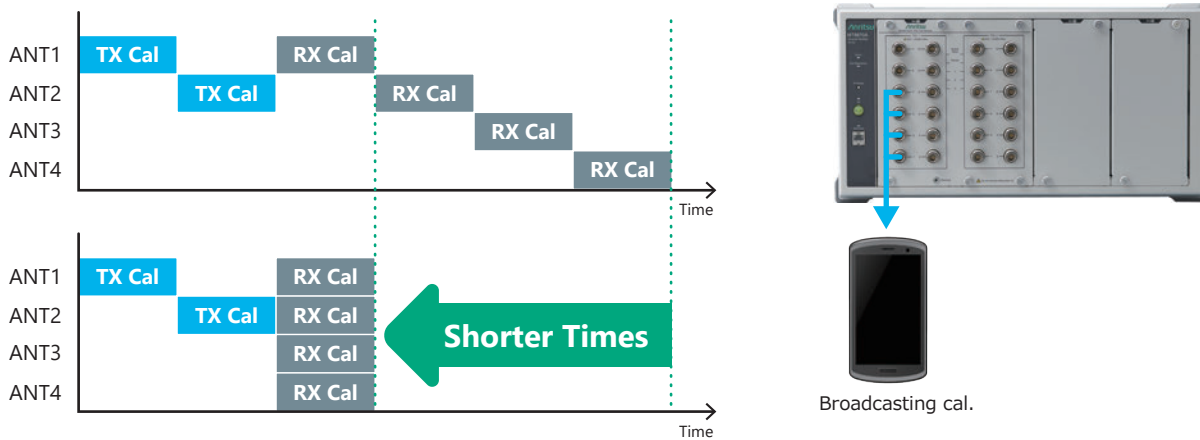
Generally, TRX tests must take power losses due to external devices such as RF cables, switches, dividers, and spacers between them into consideration. Since the tester output level can be inadequate in overcoming these power losses, sometimes the input level to the UE under test is insufficient. Consequently, it may be necessary to add an amplifier to the test system.

With a total of 24 RF ports each capable of outputting a -5 dBm modulated signal simultaneously, the MU887002A can perform tests, such as Max Input Level measurements (Rx test), without requiring an external amplifier.

Additionally, the MU887002A is the only measurement module supporting simultaneous over the air (OTA) Rx tests of multiple UE units.

## Shorter Rx Test Times using Broadcast Function at Calibration MU887002A

The increasing number of bands supported by mobile terminals resulting in increasing numbers of internal antennas causes longer production times. Using the MU887002A Broadcast function to receive signals at multiple antennas simultaneously helps cut calibration times.

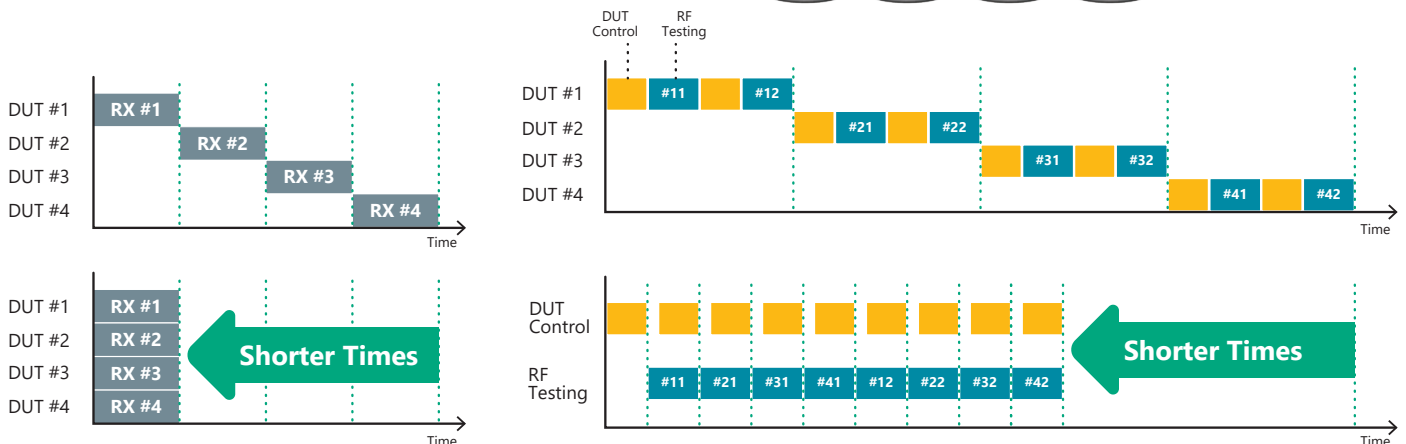
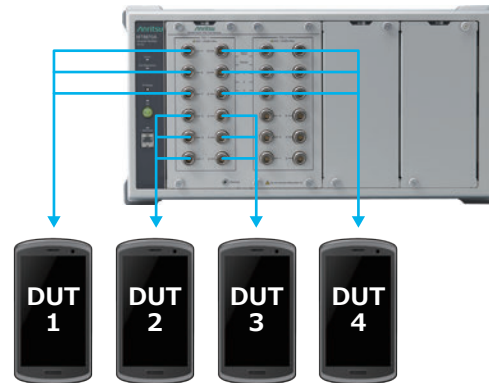


## Efficient Rx Verification Tests using Broadcast Function MU887002A

Connecting multiple UE units to one tester for sequential verification is becoming a common verification method. Since the MU887002A can output the same signal at up to 12 ports, the Rx test can be executed simultaneously at multiple UE to cut Rx test times.

## Efficient Tx Verification Tests using Multi-DUT Measurement Scheduler Function MU887002A

The MU887002A has a function for operating as multiple virtual testers by managing the software and hardware resources using a built-in dedicated controller, which optimizes the tester operation and cuts the test time for each UE.



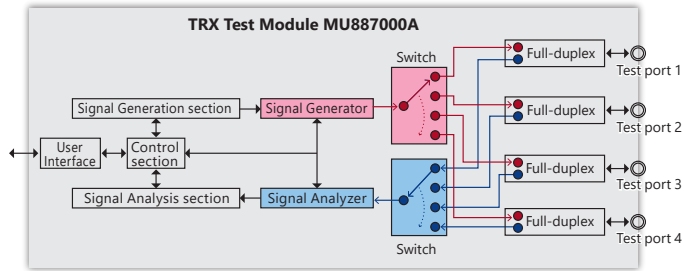
Shorter Rx Tests by Simultaneous Receiving at Multiple DUTs using Simultaneous Output Function

Shorter Multiple DUT Tx Test Times using Multi-DUT Measurement Scheduler Function

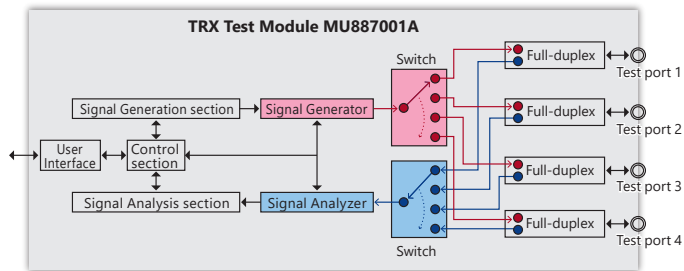
# TRX Test Module MU887000A/01A Features

## Four Test Ports per Module MU887000A/01A

Each MU887000A has two duplex and two half-duplex RF connectors. The duplex ports (Test port 1 and 2) incorporate dividers at the front end to support simultaneous tests in both TX and RX directions when testing typical wireless standards. The half-duplex ports (Test port 3 and 4) incorporate switches at the front end to switch between each test port when used either for TX or RX tests. These half-duplex ports have higher sensitivity than the full-duplex ports and are ideal for low-level wireless signals.



The MU887001A has four duplex RF connectors. Each MU887001A has four duplex RF connectors so that the test module can connect four mobile terminals at once to test them by high speed switching with the internal RF switches. Also the isolation performance between each test port is better than MU887000A.



The four test ports can be used for level calibration because they have high level accuracy over a wide frequency range from 10 MHz to 6 GHz (option). Internal switches can switch the TRX ports between input and output. Normally, simultaneous coupling measurements of multiple antennas require troublesome calibration corrections when using the required external dividers and external switches. With four test ports each incorporating the internal switch level deviation, the MU887000A/01A supports high level accuracy measurements over a wide frequency range.

## Test Port and Wireless Technology MU887000A/01A

MU887000A

	Test port 1 and 2	Test port 3 and 4
Name	High power port	Low power port
Connector	N (female)	N (female)
Type (Configuration)	Duplex (divider)	Half-duplex (switch)
Outline	Support simultaneous use of VSG and VSA required for measuring mobile terminal standards	Do not support simultaneous use of VSA and VSG each of which must be used separately High accuracy supports measurement of low-level signals
Wireless Standards and Recommended Port	5G NR/ENDC FDD/TDD sub-6 GHz, LTE/LTE-Advanced FDD/TDD, LTE-V2X, W-CDMA, GSM/EDGE, CDMA2000/1xEV-DO, TD-SCDMA, NB-IoT, Category M, WLAN 802.11a/b/g/n/p/ac/ax, Z-Wave, FM/RDS, GPS, Galileo, GLONASS, BeiDou, QZSS, DVB-T, ISDB-T/Tmm	Cellular Diversity, WLAN 802.11a/b/g/n/p/ac/ax, Bluetooth, IEEE 802.15.4, Z-Wave, FM/RDS, GPS, Galileo, GLONASS, BeiDou, QZSS, DVB-T, ISDB-T/Tmm

MU887001A

	Test port 1 to 4
Name	High power port
Connector	N (female)
Type (Configuration)	Duplex (divider)
Outline	Support simultaneous use of VSG and VSA required for measuring mobile terminal standards
Wireless Standards and Recommended Port	5G NR/ENDC FDD/TDD sub-6 GHz, LTE/LTE-Advanced FDD/TDD, LTE-V2X, W-CDMA, GSM/EDGE, CDMA2000/1xEV-DO, TD-SCDMA, NB-IoT, Category M, WLAN 802.11a/b/g/n/p/ac/ax, Bluetooth, IEEE 802.15.4, Z-Wave, FM/RDS, GPS, Galileo, GLONASS, BeiDou, QZSS, DVB-T, ISDB-T/Tmm

\*: Since test ports 1 and 2 have higher input levels than ports 3 and 4, use ports 3 and 4 when the MU88700xA input level is low.

# TRX Test Module MU887000A/01A Features

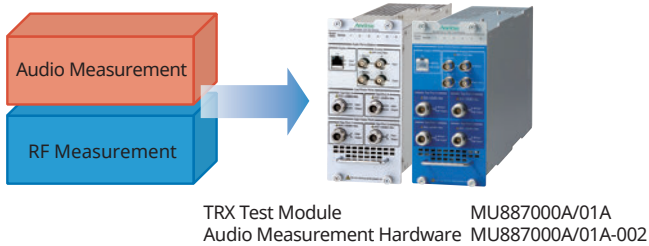
## Built-in Audio Analyzer/Audio Generator MU887000A/01A

Installing the Audio Measurement Hardware MU887000A/01A-002 in the MU887000A/01A supports a built-in audio analyzer and audio generator.

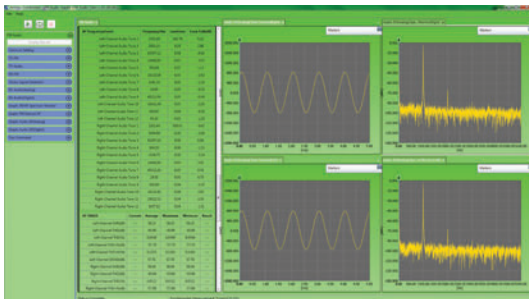
The MU887000A/01A-002 supports both analog and digital audio. The stereo and monaural analog audio inputs and outputs of a communications device can be measured using the four BNC connectors (input and output for both left and right channels). Additionally, digital audio communications modules without analog audio inputs and outputs are supported without needing an AD/DC converter using the RJ-45 connector on the MU887000A/01A to measure digital audio signals using the standard inter-IC Sound (I2S) format.



The MU887000A/01A-002 solution saves spaces and cuts costs by combining RF and audio measurements into one unit, eliminating the need for separate production lines for RF measurements and audio measurements.

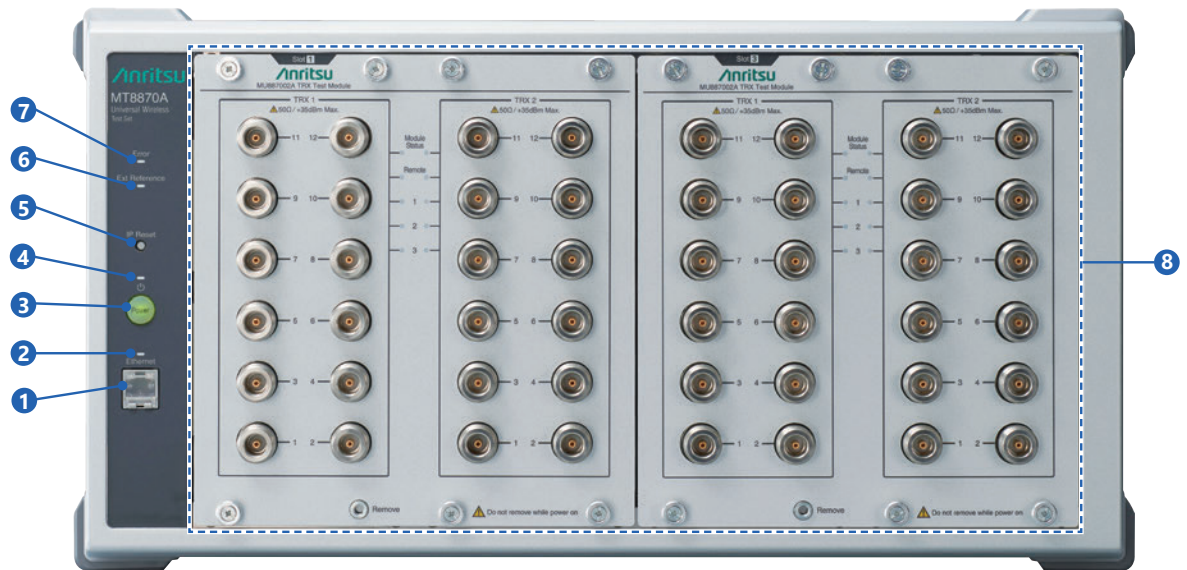


\*: The audio analyzer and audio generator functions cannot be used simultaneously.

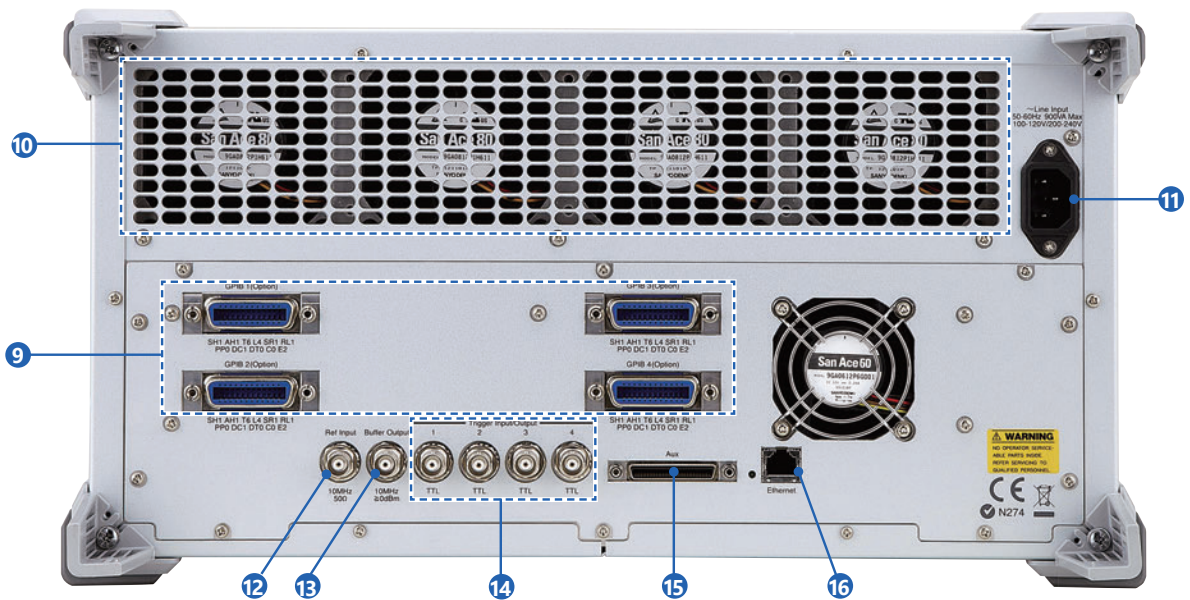


CombiView Audio Measurement Screen

# Universal Wireless Test Set MT8870A Panel Layout



Front panel

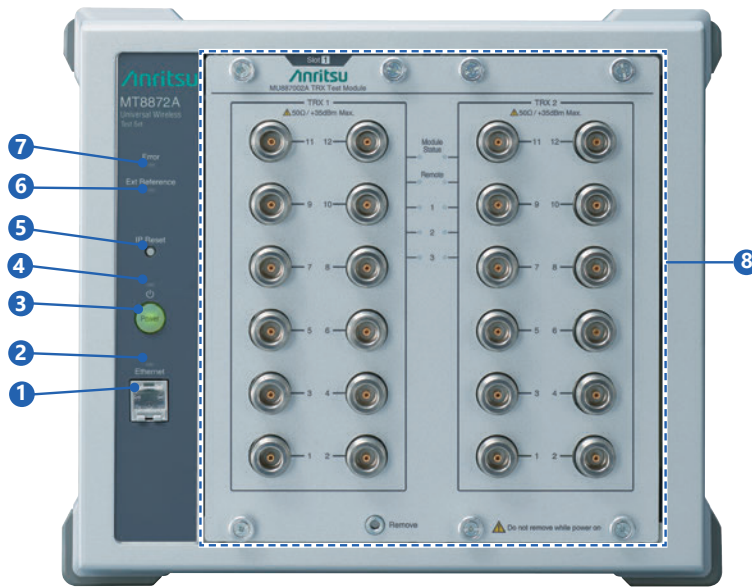


Rear panel

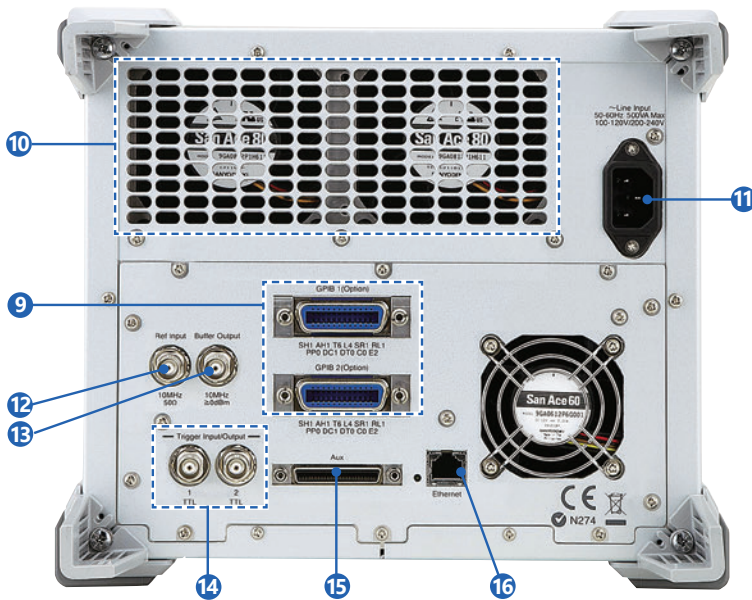
- |   |  |
|---|--|
| <ul style="list-style-type: none"> <li>1 Ethernet Connector</li> <li>2 Access Lamp</li> <li>3 Power Switch</li> <li>4 Standby Lamp</li> <li>5 IP Address Reset Button (IP reset)</li> <li>6 External Reference Signal Lamp (ext. reference)</li> <li>7 Error Lamp</li> <li>8 Slot 1 to 4</li> </ul> | <ul style="list-style-type: none"> <li>9 GPIB Connector (option)</li> <li>10 Cooling Fan</li> <li>11 Power Cord Connector</li> <li>12 External Reference Signal Input (ref input)</li> <li>13 Reference Signal Output (buffer output)</li> <li>14 Trigger Input/Output Connector</li> <li>15 AUX Connector</li> <li>16 Ethernet Connector</li> </ul> |
|---|--|



# Universal Wireless Test Set MT8872A Panel Layout



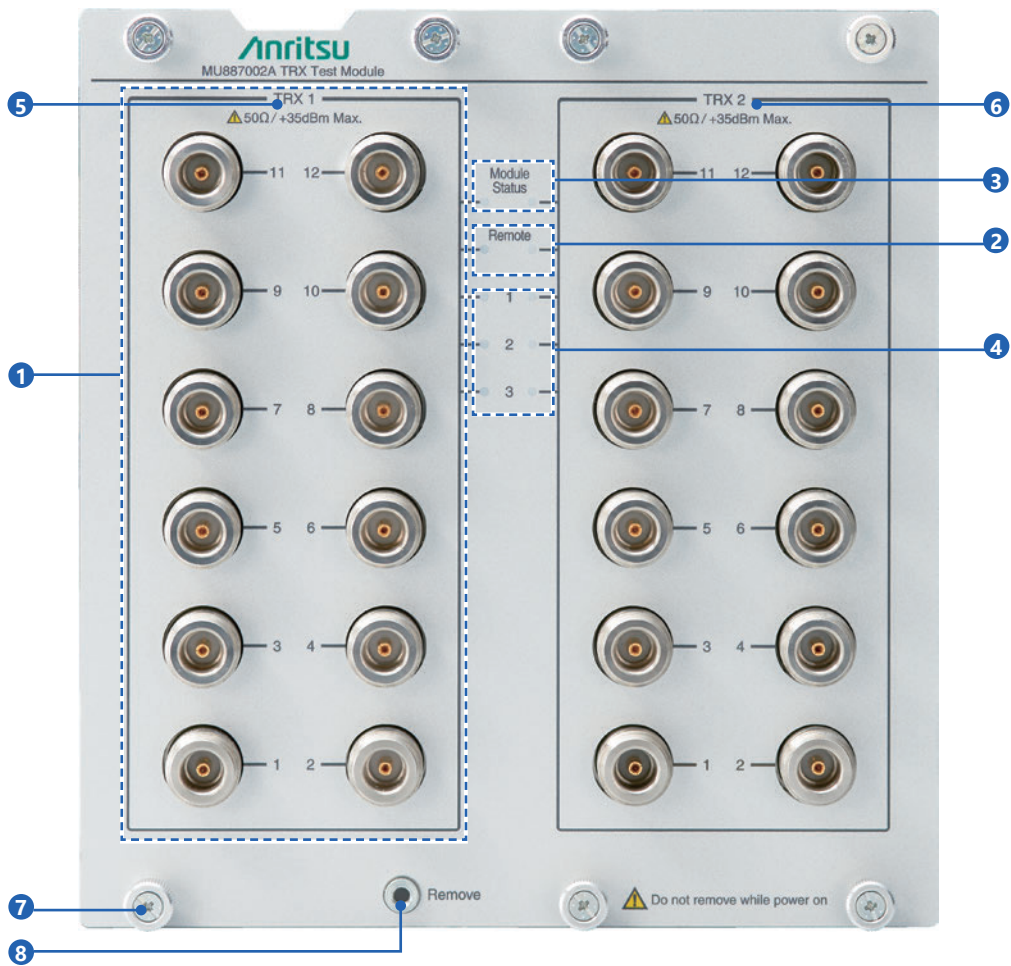
Front Panel



Rear Panel

- |   |  |
|---|--|
| 1 Ethernet Connector                              | 9 GPIB Connector (option)                      |
| 2 Access Lamp                                     | 10 Cooling Fan                                 |
| 3 Power Switch                                    | 11 Power Cord Connector                        |
| 4 Standby Lamp                                    | 12 External Reference Signal Input (Ref Input) |
| 5 IP Address Reset Button (IP Reset)              | 13 Reference Signal Output (Buffer Output)     |
| 6 External Reference Signal Lamp (Ext. Reference) | 14 Trigger Input/Output Connector              |
| 7 Error Lamp                                      | 15 AUX Connector                               |
| 8 Slot 1 to 2                                     | 16 Ethernet Connector                          |

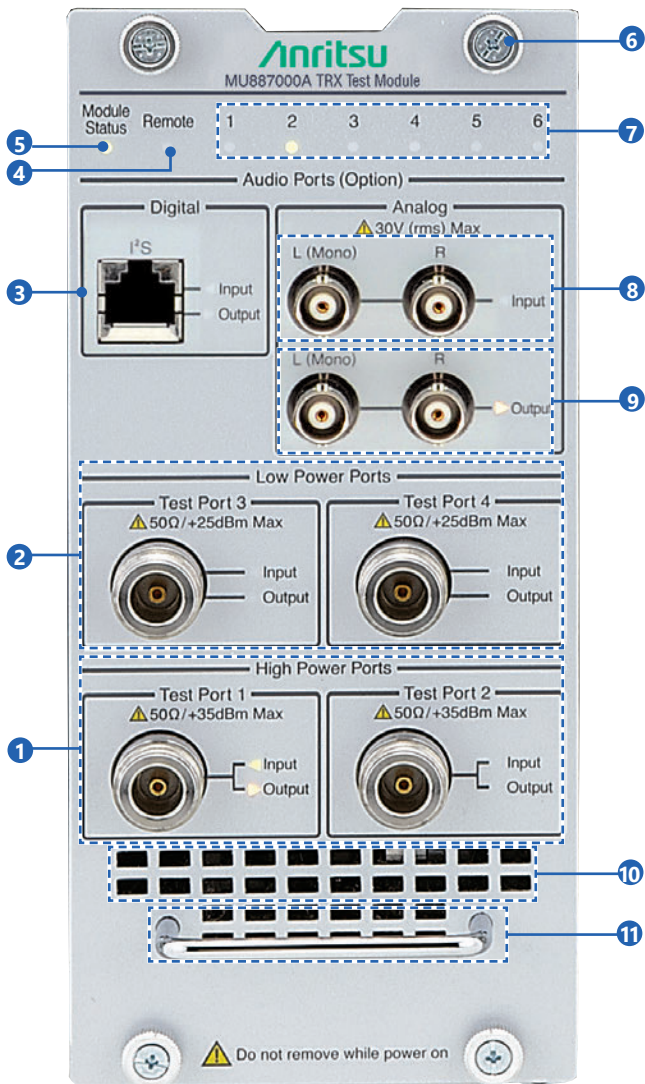
## TRX Test Module MU887002A Panel



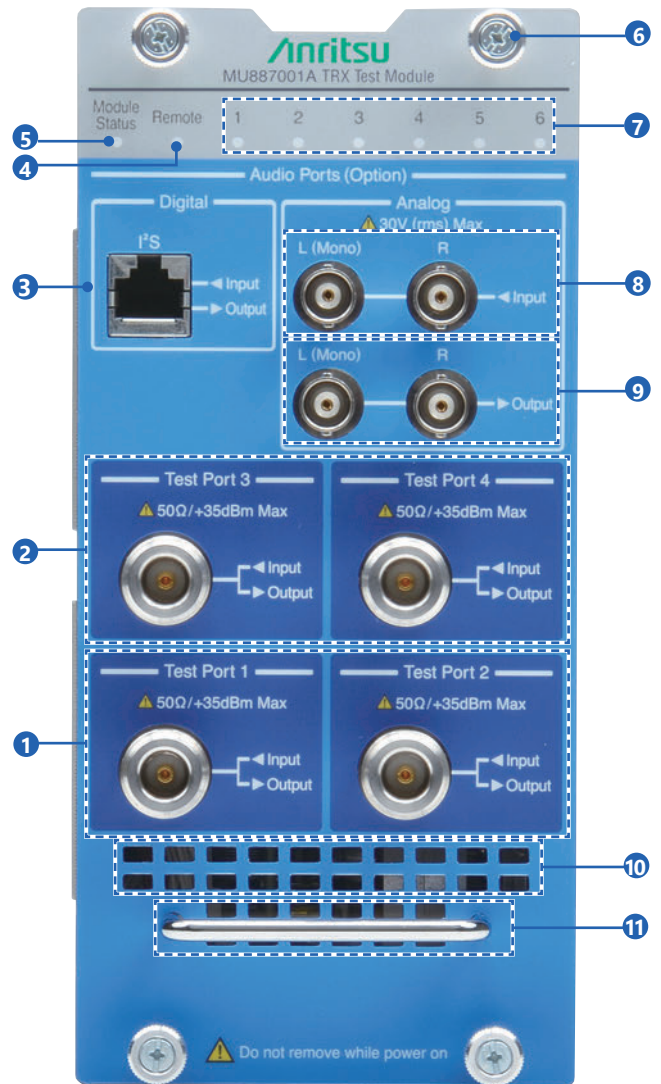
MU887001A

- ① Test Ports 1 to 12
- ② Remote Lamps (Remote)
- ③ Status Lamps (Module Status)
- ④ Status Lamps
- ⑤ TRX 1
- ⑥ TRX 2
- ⑦ Mounting Screws (7)
- ⑧ Hole for Unmounting Tool (one location)

## TRX Test Module MU887000A/01A Panel Layout



MU887000A



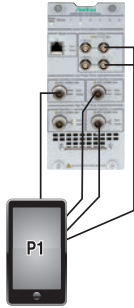
MU887001A

- ① Test Port 1, 2
- ② Test Port 3, 4
- ③ Digital Audio Input/Output (option)
- ④ Remote Lamp (remote)
- ⑤ Status Lamp (module status)
- ⑥ Mounting screws
- ⑦ Status Lamp (1 to 6)
- ⑧ Analog Audio Input (option)
- ⑨ Analog Audio Output (option)
- ⑩ Vent
- ⑪ Handle

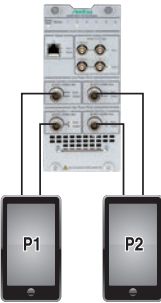
# Universal Wireless Test Set MT8870A/MT8872A Applications

## Smartphones/Automotive

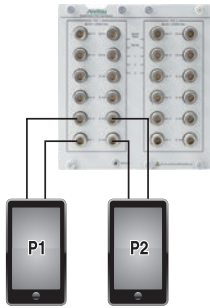
### Smartphone/Automotive Measurement (Simultaneous Measurement of Multiple Wireless Technologies)



P1 Load 5G NR sub6 LTE Diversity WLAN/BT FM GPS/GLONASS Unload



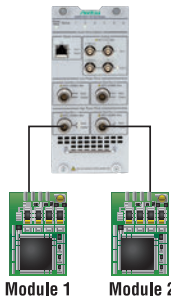
P1 Load 5G NR sub6 LTE Diversity Unload  
P2 Setup Load 5G NR sub6 LTE Diversity Unload



P1 Load 5G NR sub6 LTE Diversity 1 Diversity 2 Unload  
P2 Load Diversity 1 Diversity 2 5G NR sub6 LTE Unload

## Cellular LPWA Devices

### NB-IoT Module Measurement



Module 1 Load Category M/NB-IoT Unload  
Module 2 Load Category M/NB-IoT Unload

Two TRX Test Modules can be used to measure multiple wireless technologies in one wireless device or module.

The multiple antennas for the various wireless technologies in the wireless device or module are connected all at one time to execute measurements in parallel, greatly reducing the problems of moving smartphones between test stations and re-booting time for smartphone.

### Recommended Configuration

Model	Description	Qty.
MT8870A/MT8872A	Universal Wireless Test Set	1
MU88700xA	TRX Test Module	1
MU88700xA-001*	6 GHz Frequency Extension	1
MU88700xA-002*	Audio Measurement Hardware	1
MX887010A	Cellular Standards Sequence Measurement	1
MX887013A	LTE FDD Uplink TX Measurement	1
MX887013A-001	LTE-Advanced FDD Uplink CA TX Measurement	1
MX887018A	NR FDD sub-6 GHz Uplink Measurement	1
MX887018A-001	NR FDD Contiguous ENDC TX Measurement	1
MX887019A	NR TDD sub-6 GHz Uplink Measurement	1
MX887019A-001	NR TDD Contiguous ENDC TX Measurement	1
MX887030A	WLAN 802.11b/g/a/n TX Measurement	1
MX887031A	WLAN 802.11ac TX Measurement	1
MX887033A	WLAN 802.11ax TX Measurement	1
MX887040A	Bluetooth TX Measurement	1
MX887040A-001	DLE TX Measurement	1
MX887040A-002	2LE TX Measurement	1
MX887040A-003	BLR TX Measurement	1
MX887068A	LTE-V2X TX Measurement	1
MX887070A*	FM/Audio TRX Measurement	1
MX887090A	Multi-DUT Measurement scheduler	1
MV887013A	LTE FDD Downlink Waveforms	1
MV887018A	NR FDD sub-6 GHz Downlink Waveforms	1
MV887019A	NR TDD sub-6 GHz Downlink Waveforms	1
MV887030A	WLAN 802.11b/g/a/n Waveforms	1
MV887031A	WLAN 802.11ac Waveforms	1
MV887033A	WLAN 802.11ax Waveforms	1
MV887040A	Bluetooth Waveforms	1
MV887040A-001	DLE Waveforms	1
MV887040A-002	2LE Waveforms	1
MV887040A-003	BLR Waveforms	1
MV887068A	LTE-V2X Waveforms	1
MV887070A*	FM RDS Waveforms	1
MV887100A	GPS Waveforms	1
MV887100A-002	GPS L5 Waveforms	1
MV887101A	Galileo Waveforms	1
MV887102A	GLONASS Waveforms	1
MV887103A	BeiDou Waveforms	1
MV887104A	QZSS Waveforms	1

\*: Can only install MU887000A/01A

Refer to table of Measurement Software/Waveforms Ordering Information for details of support status.

### Recommended Configuration

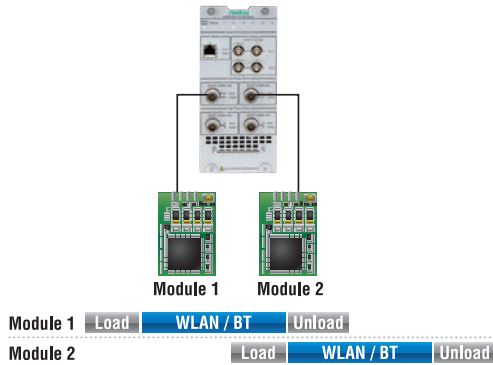
Model	Description	Qty.
MT8870A/MT8872A	Universal Wireless Test Set	1
MU88700xA	TRX Test Module	1
MX887010A	Cellular Standards Sequence Measurement	1
MX887065A	Category M FDD Uplink TX Measurement	1
MX887067A	NB-IoT Uplink TX Measurement	1
MX887090A	Multi-DUT Measurement scheduler	1
MV887065A	Category M FDD Downlink Waveforms	1
MV887067A	NB-IoT Downlink Waveforms	1



# Universal Wireless Test Set MT8870A/MT8872A Applications

## Connectivity Devices

### Combo Module Measurement



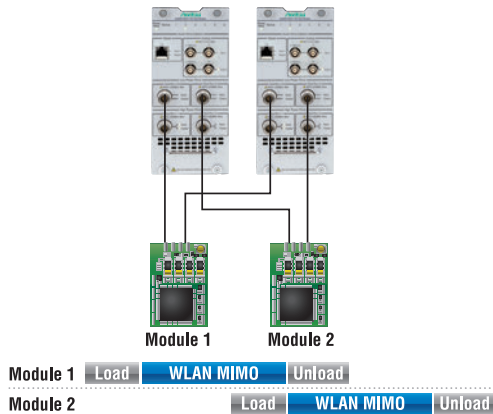
One TRX Test Module can be used to measure WLAN 802.11b/g/a/n/p/ac, 11ac (Wave 2), 11ax and Bluetooth v5 modules.

Recommended Configuration

Model	Description	Qty.
MT8870A/MT8872A	Universal Wireless Test Set	1
MU88700xA	TRX Test Module	1
MU88700xA-001*	6 GHz Frequency Extension	1
MX887030A	WLAN 802.11b/g/a/n TX Measurement	1
MX887031A	WLAN 802.11ac TX Measurement	1
MX887032A	WLAN 802.11p TX Measurement	1
MX887033A	WLAN 802.11ax TX Measurement	1
MX887040A	Bluetooth TX Measurement	1
MX887040A-001	DLE TX Measurement	1
MX887040A-002	2LE TX Measurement	1
MX887040A-003	BLR TX Measurement	1
MX887090A	Multi-DUT Measurement scheduler	1
MV887030A	WLAN 802.11b/g/a/n Waveforms	1
MV887031A	WLAN 802.11ac Waveforms	1
MV887032A	WLAN 802.11p Waveforms	1
MV887033A	WLAN 802.11ax Waveforms	1
MV887040A	Bluetooth Waveforms	1
MV887040A-001	DLE Waveforms	1
MV887040A-002	2LE Waveforms	1
MV887040A-003	BLR Waveforms	1

\*: Can only install MU887000A/01A

### WLAN 2x2 MIMO Module Measurement (True MIMO)



Using two TRX Test Modules supports True MIMO measurement of WLAN 802.11n and 11ac 2x2 MIMO modules.

Recommended Configuration

Model	Description	Qty.
MT8870A/MT8872A	Universal Wireless Test Set	1
MU88700xA	TRX Test Module	2
MU88700xA-001*	6 GHz Frequency Extension	2
MX887030A	WLAN 802.11b/g/a/n TX Measurement	1
MX887031A	WLAN 802.11ac TX Measurement	1
MX887090A	Multi-DUT Measurement scheduler	1
MV887030A	WLAN 802.11b/g/a/n Waveforms	1
MV887031A	WLAN 802.11ac Waveforms	1

\*: Can only install MU887000A/01A

# Universal Wireless Test Set MT8870A/MT8872A PC Applications

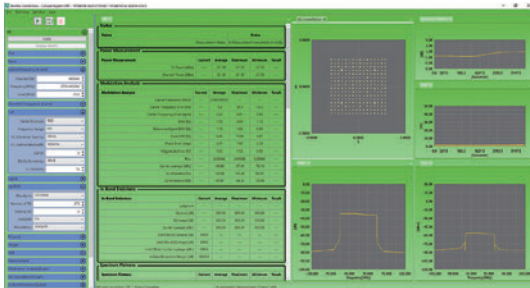
## CombiView

CombiView is a PC application used to control the MT8870A/MT8872A and display graphical and numerical test results. It has the following functions:

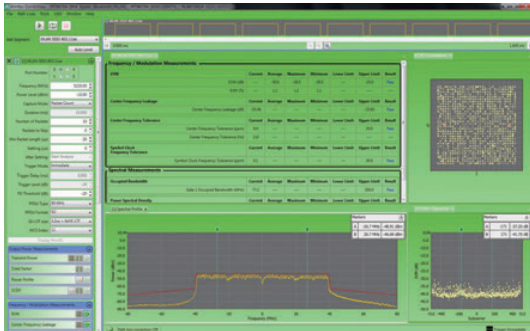
### Key Features

- Windows interface displays graphs of Tx measurement results, and controls signal generator for Rx test
- Remote control of MT8870A/MT8872A (MU88700xA) via Ethernet and GPIB (option)\*
- Setting of MT8870A/MT8872A (MU88700xA)

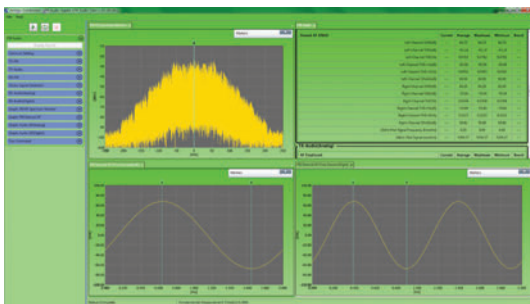
\*: MU887002A supports Ethernet I/F only



NR FDD sub-6 GHz Uplink TX Measurement with Cellular Application Applet



WLAN 802.11ax TX Measurement with SRW Application Applet



Audio Measurement with FM/Audio Application Applet

## Utility Tool

The utility tool is a PC application used to detect the network and perform firmware updates.

### Key Features

- Displays details of MT8870A/MT8872A and MU88700xA TRX Test Module(s) detected on network
- TRX Test Module MU88700xA firmware upgrade
- Waveform file transfer
- License registration



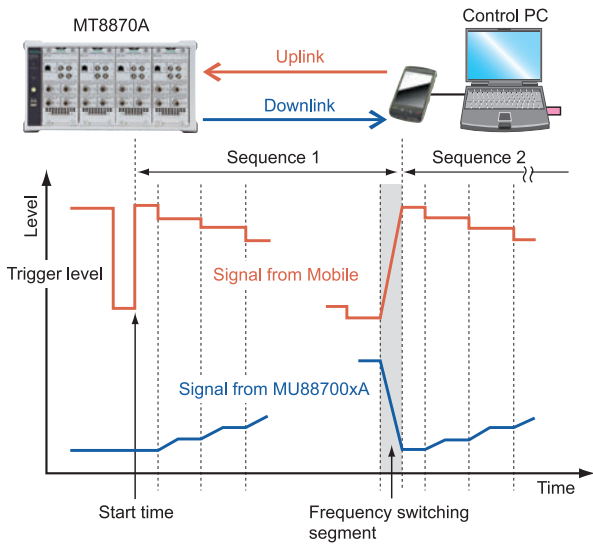
## Cellular Measurement Solution

### Cellular Standards Sequence Measurement **MX887010A** MU887000A/01A/02A

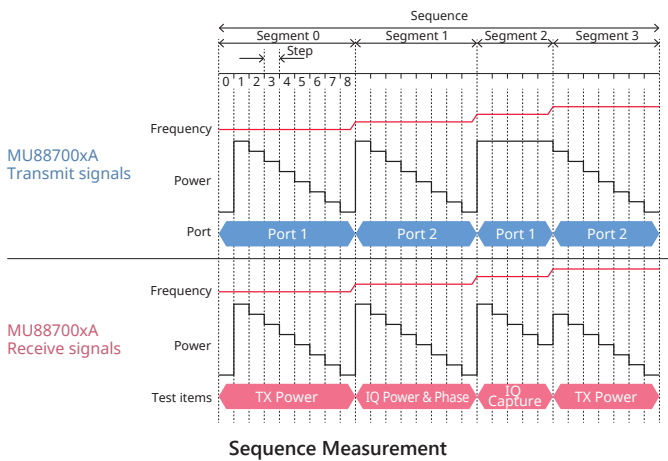
Installing the Cellular Standards Sequence Measurement software MX887010A package in the MT8870A/MT8872A can be operated with preconfigured frequency and level in a sequence list to the signal generator and signal analyzer.

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



### TRX vs. Frequency Measurement



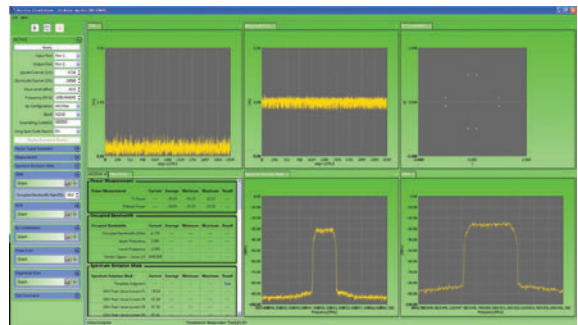
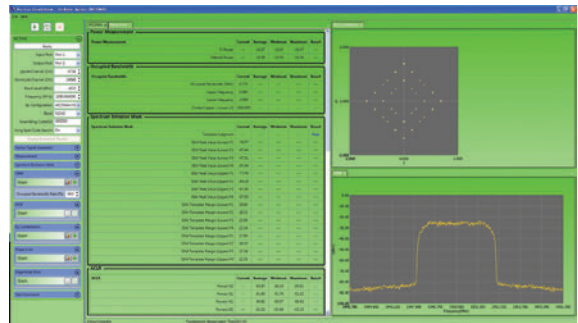
### W-CDMA/HSPA Uplink TX Measurement **MX887011A** MU887000A/01A/02A

### W-CDMA/HSPA Downlink Waveforms **MV887011A** MU887000A/01A/02A

Installing the W-CDMA/HSPA Uplink TX Measurement software MX887011A in the MT8870A/MT8872A 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

**MX887012A**

MU887000A/01A/02A

### GSM/EDGE Downlink Waveforms

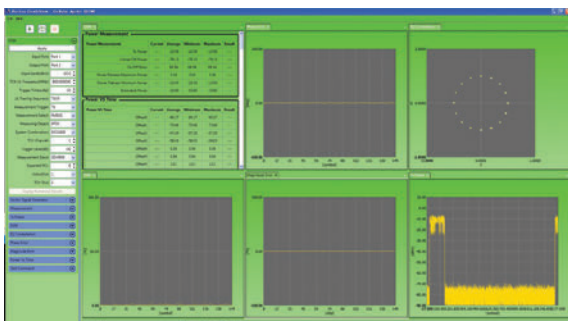
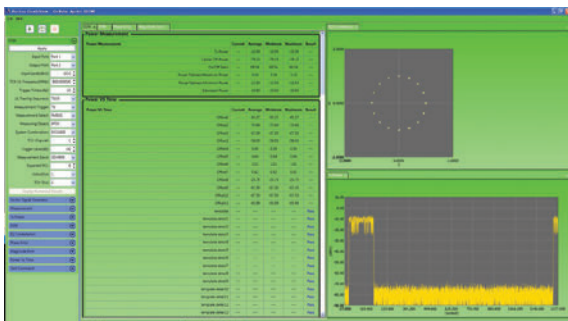
**MV887012A**

MU887000A/01A/02A

Installing the GSM/EDGE Uplink TX Measurement software MX887012A in the MT8870A/MT8872A 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

### LTE FDD Uplink TX Measurement

**MX887013A**

MU887000A/01A/02A

### LTE-Advanced FDD Uplink CA TX Measurement

**MX887013A-001**

MU887000A/01A/02A

### LTE FDD Downlink Waveforms

**MV887013A**

MU887000A/01A/02A

Installing the LTE FDD Uplink TX Measurement software MX887013A in the MT8870A/MT8872A 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

Installing the LTE-Advanced FDD Uplink CA TX Measurement software MX887013A-001, extend LTE-Advanced Uplink CA (Carrier Aggregation) measurement on existing LTE FDD TX measurement software. 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 TDD Uplink TX Measurement

**MX887014A**

MU887000A/01A/02A

### LTE-Advanced TDD Uplink CA TX Measurement

**MX887014A-001**

MU887000A/01A/02A

### LTE TDD Downlink Waveforms

**MV887014A**

MU887000A/01A/02A

Installing the LTE TDD Uplink TX Measurement software MX887014A in the MT8870A/MT8872A 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

Installing the LTE-Advanced TDD Uplink CA TX Measurement software MX887014A-001, extend LTE Uplink CA (Carrier Aggregation) measurement on existing LTE TDD TX measurement software. 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.

### CDMA2000 Reverse Link TX Measurement

**MX887015A**

MU887000A/01A/02A

### CDMA2000 Forward Link Waveforms

**MV887015A**

MU887000A/01A/02A

Installing the CDMA2000 Reverse Link TX Measurement software MX887015A in the MT8870A/MT8872A 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.



# Measurement Software MX8870xxA Series/Waveforms MV887xxxA Series

## Cellular Measurement Solution (continued)

### 1xEV-DO Reverse Link TX Measurement

**MX887016A**

MU887000A/01A/02A

### 1xEV-DO Forward Link Waveforms

**MV887016A**

MU887000A/01A/02A

Installing the 1xEV-DO Reverse Link TX Measurement software MX887016A in the MT8870A/MT8872A 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.

### TD-SCDMA Uplink TX Measurement

**MX887017A**

MU887000A/01A/02A

### TD-SCDMA Downlink Waveforms

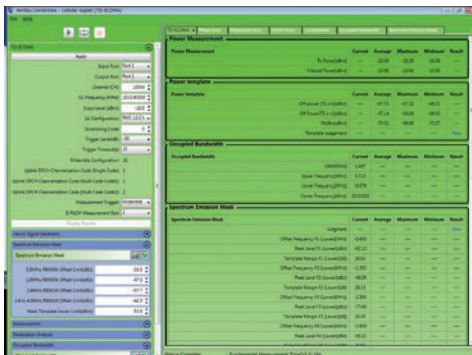
**MV887017A**

MU887000A/01A/02A

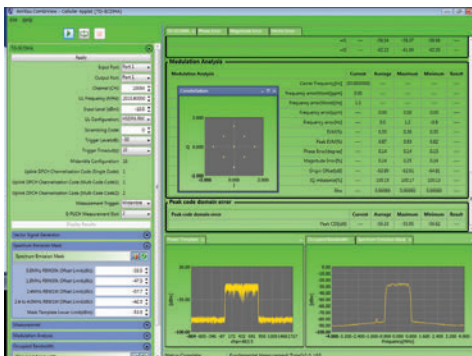
Installing the TD-SCDMA Uplink TX Measurement software MX887017A in the MT8870A/MT8872A provides support for the following 3GPP TD-SCDMA (1.28 Mcps TDD) related TX characteristics measurements.

- 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



### NR FDD sub-6 GHz Uplink TX Measurement

**MX887018A**

MU887000A/01A/02A

### NR FDD Contiguous ENDC TX Measurement

**MX887018A-001**

MU887000A/01A/02A

### NR FDD sub-6 GHz Downlink Waveforms

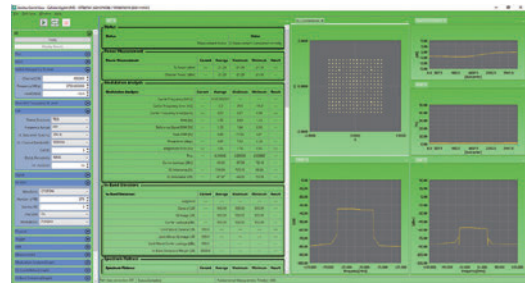
**MV887018A**

MU887000A/01A/02A

Installing the NR FDD sub-6 GHz Uplink Measurement MX887018A in the MT8870A/MT8872A provides support for the following 3GPP 5G NR FDD sub-6 GHz related TX characteristics measurements.

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

Additionally, the package of NR FDD sub-6 GHz Downlink Waveforms MV887018A contains downlink signals required for non-signaling measurements, sending the downlink signal for production is as easy as selecting the waveform file.



NR FDD sub-6 GHz Uplink TX Measurement using CombiView

### NR TDD sub-6 GHz Uplink TX Measurement

**MX887019A**

MU887000A/01A/02A

### NR TDD Contiguous ENDC TX Measurement

**MX887019A-001**

MU887000A/01A/02A

### NR TDD sub-6 GHz Downlink Waveforms

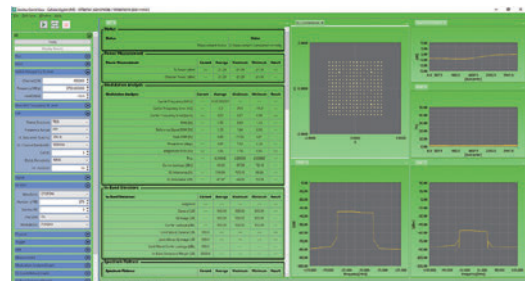
**MV887019A**

MU887000A/01A/02A

Installing the NR TDD sub-6 GHz Uplink Measurement MX887019A in the MT8870A/MT8872A provides support for the following 3GPP 5G NR TDD sub-6 GHz related TX characteristics measurements.

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

Additionally, the package of NR TDD sub-6 GHz Downlink Waveforms MV887019A contains downlink signals required for non-signaling measurements, sending the downlink signal for production is as easy as selecting the waveform file.



NR TDD sub-6 GHz Uplink TX Measurement using CombiView

# Measurement Software MX8870xxA Series/Waveforms MV887xxxA Series

## Cellular Measurement Solution (continued)

**W-CDMA/HSPA Downlink TX Measurement**      **MX887021A**  
**MU887000A/01A**

**W-CDMA/HSPA Uplink Waveforms**            **MV887021A**  
**MU887000A/01A**

Installing the W-CDMA/HSPA Downlink TX Measurement software MX887021A in the MT8870A/MT8872A 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

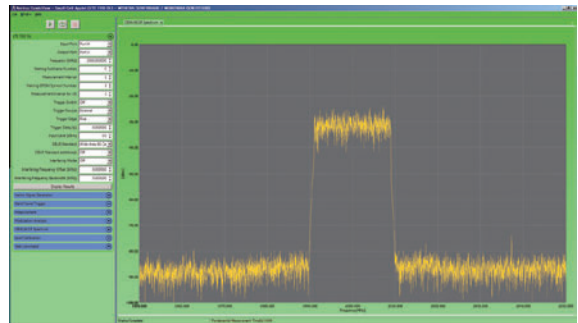
**LTE FDD Downlink TX Measurement**            **MX887023A**  
**MU887000A/01A**

**LTE FDD Uplink Waveforms**                    **MV887023A**  
**MU887000A/01A**

Installing the LTE FDD Downlink TX Measurement software MX887023A in the MT8870A/MT8872A 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

## Cellular-IoT Measurement Solution (Cellular-LPWA Solution)

### Category M FDD Uplink TX Measurement

**MX887065A**

**MU887000A/01A**

### Category M FDD Downlink Waveforms

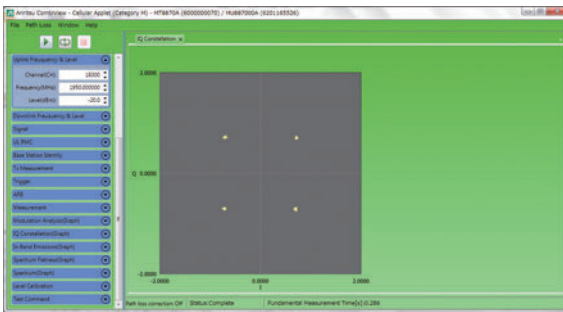
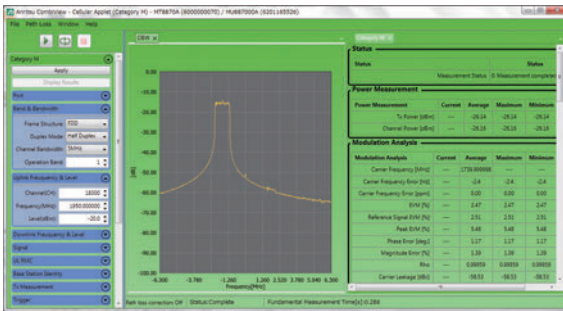
**MV887065A**

**MU887000A/01A**

Installing the Category M FDD Uplink TX Measurement software MX887065A in the MT8870A/MT8872A provides support for the following 3GPP LTE Category M related TX characteristics measurements.

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

Additionally, the package of Category M FDD Downlink Waveforms MV887065A contains downlink signals required for non-signaling measurements; sending the downlink signal for production is as easy as selecting the waveform file.



Category M FDD Uplink TX Measurement using CombiView

### NB-IoT Uplink TX Measurement

**MX887067A**

**MU887000A/01A**

### NB-IoT Downlink Waveforms

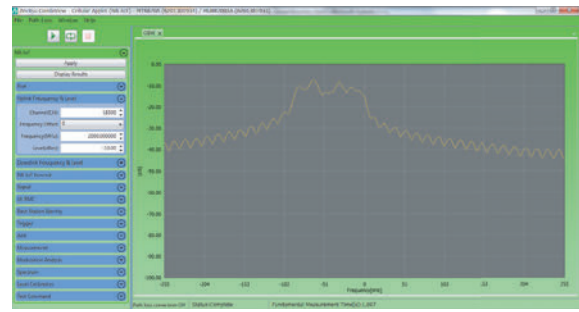
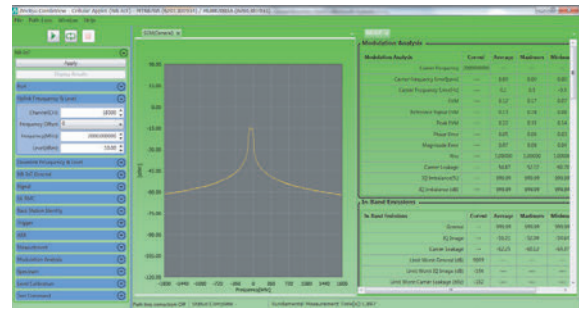
**MV887067A**

**MU887000A/01A**

Installing the NB-IoT Uplink TX Measurement software MX887067A in the MT8870A/MT8872A provides support for the following 3GPP LTE NB-IoT related TX characteristics measurements.

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

Additionally, the package of NB-IoT Downlink Waveforms MV887067A contains downlink signals required for non-signaling measurements; sending the downlink signal for production is as easy as selecting the waveform file.



NB-IoT Uplink TX Measurement using CombiView

## WLAN Measurement Solution

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

**MX887030A** MU887000A/01A/02A

### WLAN 802.11b/g/a/n Waveforms

**MV887030A** MU887000A/01A/02A

The MT8870A/MT8872A/MU88700xA supports non-signalling transmitter and receiver tests for all WLAN 802.11b/g/a/n-compliant devices. Requires installation of 6 GHz Frequency Expansion MU887000A/01-001 option (sold separately) when measuring 5-GHz band IEEE 802.11a/n using MU887000A/01A.

### Transmitter Test

Installing the MX887030A in the MT8870A/MT8872A provides support for measurement of key IEEE 802.11 - March 2012 : 802.11b TX Test using all installed TRX test modules.

#### 802.11b TX Measurement

IEEE 802.11 TX characteristics

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

#### 802.11g/a/n TX Measurement

IEEE 802.11a/g/n TX Test

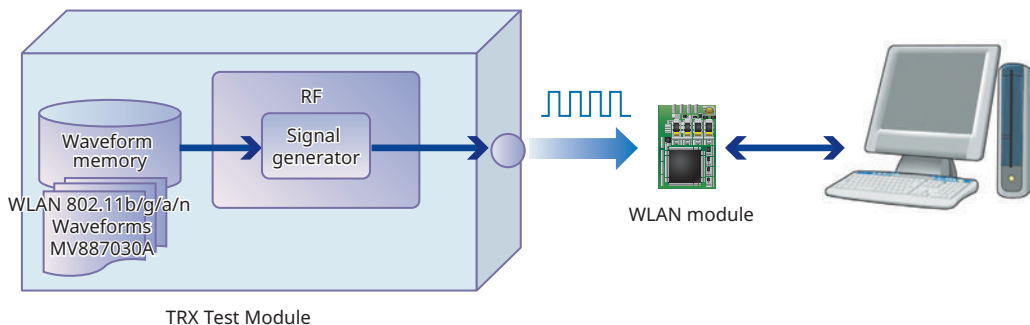
802.11a	802.11g	802.11n	Test Items
18.3.9.2	19.4.8.2	20.3.20.3	Transmit Power Levels
18.3.9.3	19.5.5	20.3.20.1	Transmit Spectrum Mask
18.3.9.5	19.4.8.3	20.3.20.4	Transmit center frequency tolerance
18.3.9.6	19.4.8.4	20.3.20.6	Symbol Clock frequency tolerance
18.3.9.7.2	19.4.8 (18.3.9.7.2)	20.3.20.7.2	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 802.11g/a/n Measurements

Test Items
Power crest factor
CCDF
Occupied bandwidth
Power spectral density

### Receiver Test

The MV887030A application provides support for transmission of WLAN 802.11b/g/a/n signals from the vector signal generator to the device under test (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 802.11b RX Test

802.11b	Test Items
17.4.8.2	Receiver minimum input level sensitivity
17.4.8.3	Receiver maximum input level

#### 802.11g/a/n RX Measurement

IEEE 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
18.3.10.5	19.5.4	20.3.21.4	Receiver maximum input level



## WLAN Measurement Solution

### WLAN 802.11ac TX Measurement

**MX887031A** MU887000A/01A/02A

### WLAN 802.11ac Waveforms

**MV887031A** MU887000A/01A/02A

The MT8870A/MT8872A/MU88700xA supports non-signalling transmitter and receiver tests for all WLAN 802.11ac-compliant devices. The 6 GHz Frequency Extension option MU887000A/01A-001 is required.

### Transmitter Test

Installing the WLAN 802.11ac TX Measurement software MX887031A in the MT8870A/MT8872A supports in-band wireless measurements defined by the IEEE 802.11ac on all installed TRX test modules.

#### 802.11ac TX Measurement

IEEE 802.11ac TX Test

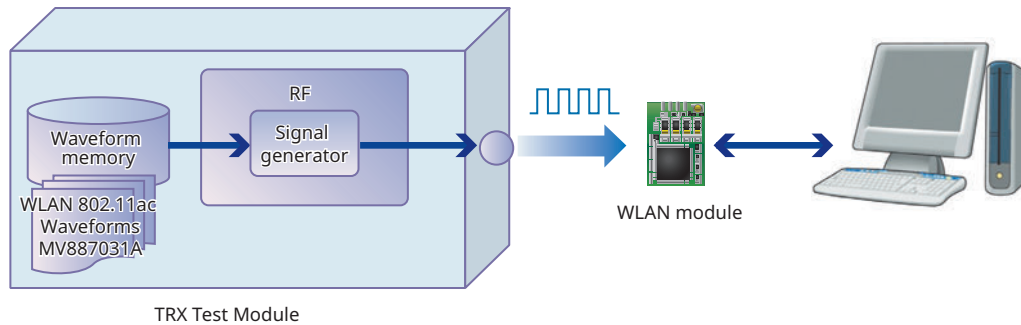
802.11ac	Test Items
22.3.18.1	Transmit spectrum mask
22.3.18.2	Spectral flatness
22.3.18.3	Transmit center frequency tolerance
22.3.18.3	Symbol Clock frequency tolerance
22.3.18.4	Modulation accuracy
22.3.18.4.2	Transmitter center frequency leakage
22.3.18.4.3	Transmitter constellation error
22.3.18.4.4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

Additional 802.11ac Measurements

Test Items
Power crest factor
CCDF
Occupied bandwidth
Power spectral density

### 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 802.11ac RX Test

802.11ac	Test Items
22.3.19.1	Receiver minimum input level sensitivity
22.3.19.4	Receiver maximum input level

# Measurement Software MX8870xxA Series/Waveforms MV887xxxA Series

## V2X Measurement Solution

### WLAN 802.11p TX Measurement

**MX887032A** **MU887000A/01A**

### WLAN 802.11p Waveforms

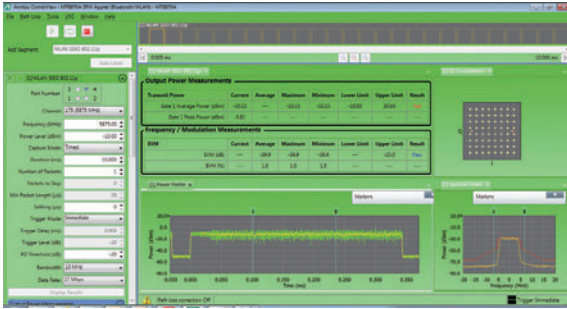
**MX887032A** **MU887000A/01A**

The MT8870A/MT8872A/MU88700xA supports non-signalling TRX tests for all WLAN 802.11p-compliant communications devices. The 6 GHz Frequency Extension option MU887000A/01A-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/MT8872A 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 802.11p TX Test

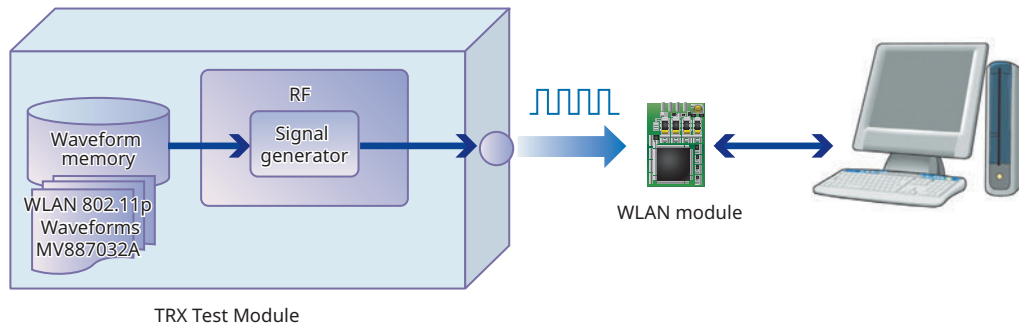
802.11p	Test Items
18.3.9.2	Transmit power levels
18.3.9.3	Transmit spectrum mask
18.3.9.5	Transmit center frequency tolerance
18.3.9.6	Symbol clock frequency tolerance
18.3.9.7.2	Transmitter center frequency leakage
18.3.9.7.3	Transmitter spectral flatness
18.3.9.7.4	Transmitter constellation error

Additional 802.11p Measurements

Test Items
Power crest factor
CCDF
Occupied bandwidth
Power spectral density

### 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 MU88700xA installed in the vector signal generator. Reading the number of packets received by the DUT requires the chipset vendor's control software.



TRX Test Module

### 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 802.11p RX Test

802.11p	Test Items
18.3.10.2	Receiver minimum input sensitivity
18.3.10.5	Receiver maximum input level

## V2X Measurement Solution

LTE-V2X Tx Measurement

MX887068A

MU887000A/01A

LTE-V2X Waveforms

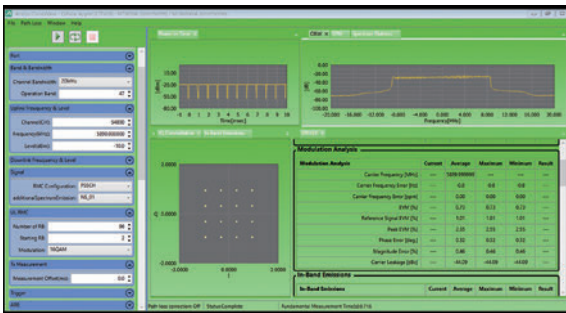
MV887068A

MU887000A/01A

LTE-V2X Tx characteristics specified by 3GPP can be measured by installing the LTE-V2X Tx Measurement MX887068A software.

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

In addition, the bundled LTE-V2X Waveforms MV887068A package includes general RF test signal waveform files required for non-signaling manufacturing for easy output of RF test signals at manufacturing simply by selecting the waveform file.



LTE-V2X Tx Measurement using CombiView

## WLAN MIMO Measurement Solution

### WLAN 802.11n/11ac MIMO Measurement Function MU887000A/01A

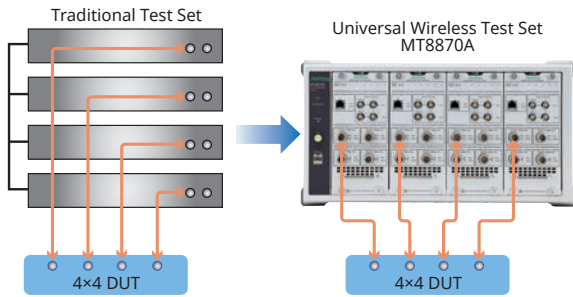
Installing the MU88700xA\*1 in the MT8870A/MT8872A with the installed WLAN TRX Measurement software supports easy set-up and measurement of up to 4x4 WLAN MIMO devices.

\*1: Requires 6 GHz Frequency Extension option MU887000A/01A-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/MT8872A 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.



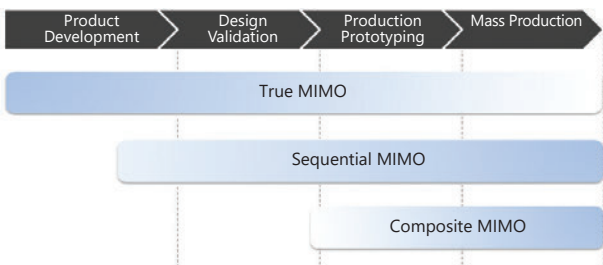
The MX887030A and MV887030A are required for WLAN 802.11n MIMO measurements.

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/MT8872A is the ideal MIMO measurement solution for WLAN MIMO devices at every stage from R&D to production.



### True MIMO MU887000A/01A

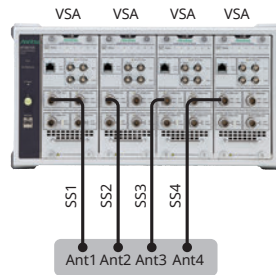
#### Features

The MT8870A/MT8872A 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.



#### Test sequence:

- Antenna 1
- Antenna 2
- Antenna 3
- Antenna 4

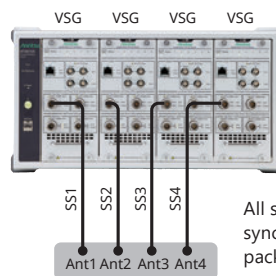
#### Test results:

- Antenna 1: EVM\_1, Power\_1, Spectral mask\_1 ...
- Antenna 2: EVM\_2, Power\_2, Spectral mask\_2 ...
- Antenna 3: EVM\_3, Power\_3, Spectral mask\_3 ...
- Antenna 4: EVM\_4, Power\_4, Spectral mask\_4 ...

#### Receiver Test

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

Note: RF local frequency sync. not supported



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



## WLAN MIMO Measurement Solution (continued)

### Sequential MIMO MU887000A/01A

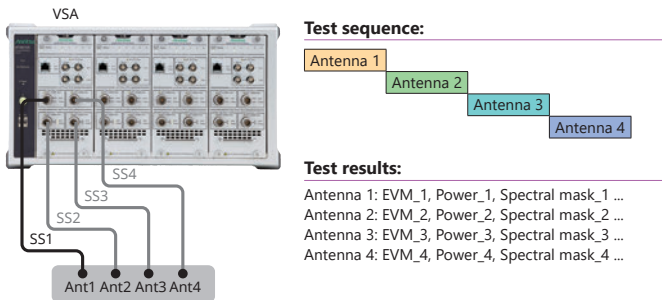
#### Features

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

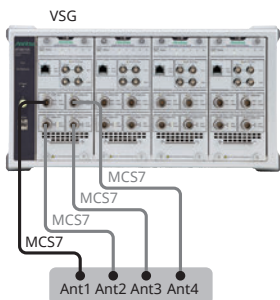
- DUT transmits four MIMO signals simultaneously
- MT8870A/MT8872A switches connected test port and performs TRX test at each antenna (stream)
- Test results
  - Each TX power (Cross power\*<sup>3</sup>), EVM, Spectral mask, etc.

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



#### Receiver Test

- MT8870A/MT8872A 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 MU887000A/01A

#### Features

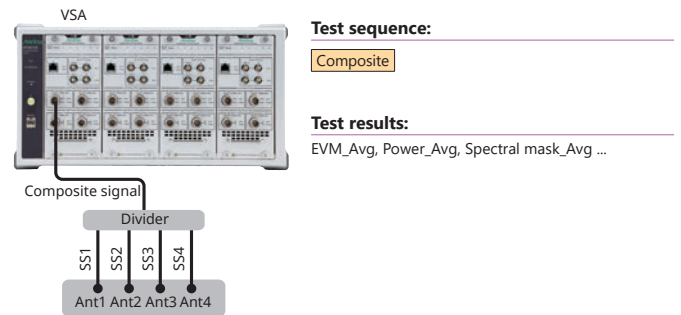
Production-line operators urgently need ways to cut production costs by shortening tact times through reduced measurement times. MIMO device measurement methods currently focus on measuring each antenna one-by-one but viewed from the perspective of reduced tact time and lower costs, production lines 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/MT8872A 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)

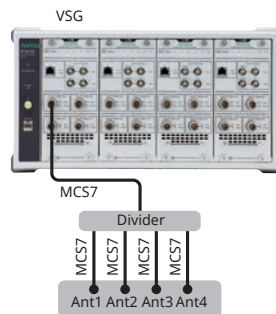
#### Transmitter Test

- DUT transmits three MIMO signals simultaneously
- MT8870A/MT8872A receives composite test signal via divider (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/MT8872A 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)



## WLAN Measurement Solution

### WLAN 802.11ax TX Measurement

**MX887033A** MU887000A/01A/02A

### WLAN 802.11ax Waveforms

**MV887033A** MU887000A/01A/02A

Non-signaling Tx and Rx tests of WLAN 802.11ax communications devices are supported. The MU887000A/01A requires installation of the 6-GHz Frequency Expansion MU887000A/01-001 option.

### Transmitter Test

Installing the WLAN 802.11ax TX Measurement software MX887033A in the MT8870A/MT8872A supports in-band wireless measurements defined by the latest IEEE 802.11ax/D5.0 standard on all installed TRX test modules.

The 802.11ax 20/40/80 MHz bandwidths and 1024QAM (MCS10/11) modulation method are supported.

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



WLAN 11ax TX Measurement using CombiView

### 802.11 ax TX Measurement

IEEE P802.11ax/D1.3 802.11ax

Chapter	Measurement Item
28.3.18.1	Transmit spectral mask
28.3.18.2	Spectral flatness
28.3.18.3	Transmit center frequency and symbol clock frequency tolerance
28.3.18.4.2	Transmit center frequency leakage
28.3.18.4.3	Transmitter constellation error
28.3.18.4.4	Transmitter modulation accuracy (EVM) test

### Receiver Test

The MV887031A application provides support for transmission of WLAN 802.11ax 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
802.11ax	MCS 0 to 11	20, 40, 80 MHz	4096 bytes	Nss: 1, Guard interval: 800 ns

### 802.11 ax RX Measurement

IEEE P802.11ax/D1.3 802.11ax

Chapter	Measurement Item
28.3.17.2	Receiver minimum input sensitivity
28.3.17.5	Receiver maximum input level

## Bluetooth Measurement Solution

### Bluetooth TX Measurement

#### DLE TX Measurement

#### 2LE TX Measurement

#### BLR TX Measurement

#### Bluetooth Waveforms

#### DLE Waveforms

#### 2LE Waveforms

#### BLR Waveforms

### MX887040A

#### MX887040A-001

#### MX887040A-002

#### MX887040A-003

### MV887040A

#### MV887040A-001

#### MV887040A-002

#### MV887040A-003

MU887000A/01A/02A

MU887000A/01A/02A

MU887000A/01A/02A

MU887000A/01A/02A

MU887000A/01A/02A

MU887000A/01A/02A

MU887000A/01A/02A

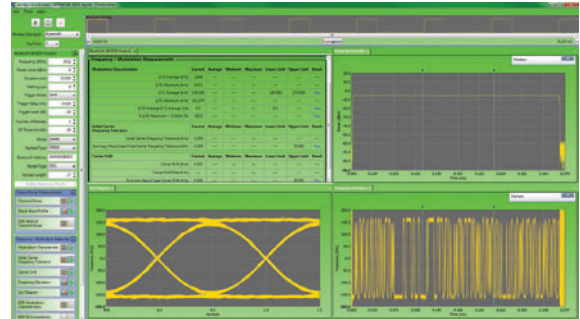
MU887000A/01A/02A

The MT8870A/MT8872A/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

Basic Rate and Enhanced Data Rate (EDR)

Basic Rate measurements and Enhanced Data Rate measurements made in compliance with Bluetooth RF Test Specification RF.TS.P30

Specification	Measurement Item
RF/TRM/CA/BV-01-C	[Output Power]
RF/TRM/CA/BV-03-C	[Power Control]
RF/TRM/CA/BV-05-C	[TX Output Spectrum – 20 dB Bandwidth]
RF/TRM/CA/BV-06-C	[TX Output Spectrum – Adjacent Channel Power]
RF/TRM/CA/BV-07-C	[Modulation Characteristics]
RF/TRM/CA/BV-08-C	[Initial Carrier Frequency Tolerance]
RF/TRM/CA/BV-09-C	[Carrier Frequency Drift]
RF/TRM/CA/BV-10-C	[EDR Relative Transmit Power]
RF/TRM/CA/BV-11-C	[EDR Carrier Frequency Stability and Modulation Accuracy]
RF/TRM/CA/BV-12-C	[EDR Differential Phase Encoding]
RF/TRM/CA/BV-13-C	[EDR In-band Spurious Emissions]*1
RF/TRM/CA/BV-14-C	[Enhanced Power Control]
RF/TRM/CA/BV-15-C	[EDR Guard Time]

\*1: Can measure up to  $\pm 5$  channels

Bluetooth Low Energy

Bluetooth low energy measurements made in compliance with Bluetooth RF Test Specification RF-PHY.TS.P15

Specification	Measurement Item	Required Option		
		MX887040A-001	MX887040A-002	MX887040A-003
RF-PHY/TRM/BV-01-C	[Output power]	✓*3		
RF-PHY/TRM/BV-03-C	[In-band emissions, uncoded data at 1 Ms/s]*2	✓*3		
RF-PHY/TRM/BV-05-C	[Modulation Characteristics, uncoded data at 1 Ms/s]	✓*3		
RF-PHY/TRM/BV-06-C	[Carrier frequency offset and drift, uncoded data at 1 Ms/s]	✓*3		
RF-PHY/TRM/BV-08-C	[In-band emissions at 2 Ms/s]*2	✓	✓	
RF-PHY/TRM/BV-09-C	[Stable Modulation Characteristics, uncoded data at 1 Ms/s]	✓*3		
RF-PHY/TRM/BV-10-C	[Modulation Characteristics at 2 Ms/s]	✓	✓	
RF-PHY/TRM/BV-11-C	[Stable Modulation Characteristics at 2 Ms/s]	✓	✓	
RF-PHY/TRM/BV-12-C	[Carrier frequency offset and drift at 2 Ms/s]	✓	✓	
RF-PHY/TRM/BV-13-C	[Modulation Characteristics, LE Coded (S = 8)]	✓		✓
RF-PHY/TRM/BV-14-C	[Carrier frequency offset and drift, LE Coded (S = 8)]	✓		✓

\*2: Can measure BLE:  $\pm 5$  channels, and 2LE:  $\pm 8$  channels

\*3: Required when measuring signal with PSDU Length > 37 bytes

### Graphical Displays (BR/BLE)

Graphs
Power Burst profile
Frequency deviation
Eye diagram
Spectral profile

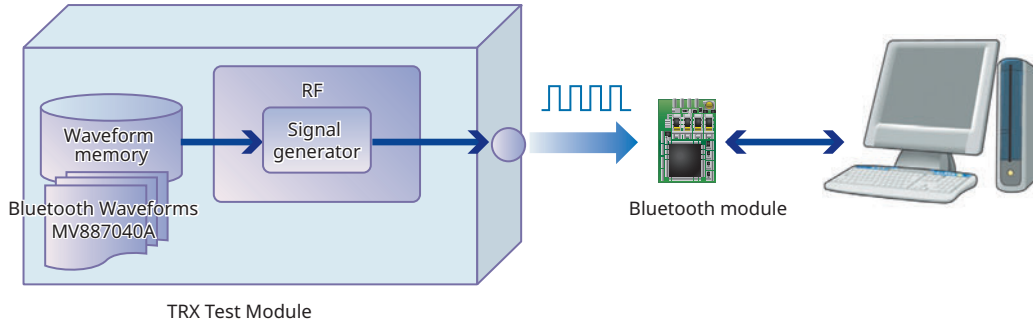
### Graphical Displays (EDR)

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

## 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

Basic Rate and Enhanced Data Rate (EDR)

Basic Rate measurements and Enhanced Data Rate measurements made in compliance with Bluetooth RF Test Specification RF.TS.P30

Specification	Measurement Item
RF/RCV/CA/BV-01-C	[Sensitivity – single slot packets]
RF/RCV/CA/BV-02-C	[Sensitivity - multi-slot packets]
RF/RCV/CA/BV-06-C	[Maximum Input Level]
RF/RCV/CA/BV-07-C	[EDR Sensitivity]
RF/RCV/CA/BV-08-C	[EDR BER Floor Performance]
RF/RCV/CA/BV-10-C	[EDR Maximum Input Level]

Bluetooth Low Energy

Bluetooth low energy measurements made in compliance with Bluetooth RF Test Specification RF-PHY.TS.P15

Specification	Measurement Item	Required Option		
		MV887040A-001	MV887040A-002	MV887040A-003
RF-PHY/RCV/BV-01-C	[Receiver sensitivity, uncoded data at 1 Ms/s]	✓*		
RF-PHY/RCV/BV-06-C	[Maximum input signal level, uncoded data at 1 Ms/s]	✓*		
RF-PHY/RCV/BV-07-C	[PER Report Integrity, uncoded data at 1 Ms/s]	✓*		
RF-PHY/RCV/BV-08-C	[Receiver sensitivity at 2 Ms/s]	✓	✓	
RF-PHY/RCV/BV-12-C	[Maximum input signal level at 2 Ms/s]	✓	✓	
RF-PHY/RCV/BV-13-C	[PER Report Integrity at 2 Ms/s]	✓	✓	
RF-PHY/RCV/BV-14-C	[Receiver Sensitivity, uncoded data at 1 Ms/s, Stable Modulation Index]	✓*		
RF-PHY/RCV/BV-18-C	[Maximum input signal level, uncoded data at 1 Ms/s, Stable Modulation Index]	✓*		
RF-PHY/RCV/BV-19-C	[PER Report Integrity, uncoded data at 1 Ms/s, Stable Modulation Index]	✓*		
RF-PHY/RCV/BV-20-C	[Receiver sensitivity at 2 Ms/s, Stable Modulation Index]	✓	✓	
RF-PHY/RCV/BV-24-C	[Maximum input signal level at 2 Ms/s, Stable Modulation Index]	✓	✓	
RF-PHY/RCV/BV-25-C	[PER Report Integrity at 2 Ms/s, Stable Modulation Index]	✓	✓	
RF-PHY/RCV/BV-26-C	[Receiver sensitivity, LE Coded (S = 2)]	✓		✓
RF-PHY/RCV/BV-27-C	[Receiver sensitivity, LE Coded (S = 8)]	✓		✓
RF-PHY/RCV/BV-30-C	[PER Report Integrity, LE Coded (S = 2)]	✓		✓
RF-PHY/RCV/BV-31-C	[PER Report Integrity, LE Coded (S = 8)]	✓		✓
RF-PHY/RCV/BV-32-C	[Receiver sensitivity, LE Coded (S = 2), Stable Modulation Index]	✓		✓
RF-PHY/RCV/BV-33-C	[Receiver sensitivity, LE Coded (S = 8), Stable Modulation Index]	✓		✓
RF-PHY/RCV/BV-36-C	[PER Report Integrity, LE Coded (S = 2), Stable Modulation Index]	✓		✓
RF-PHY/RCV/BV-37-C	[PER Report Integrity, LE Coded (S = 8), Stable Modulation Index]	✓		✓

\*: Required when measuring signal with PSDU Length >37 bytes



## Simple Test Solution

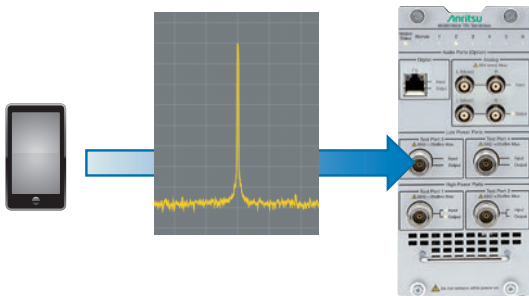
### Short Range Wireless Average Power and Frequency Measurement MX887050A MU887000A/01A/02A

Installing the Short Range Wireless Average Power and Frequency Measurement software MX887050A in the MT8870A/MT8872A 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.

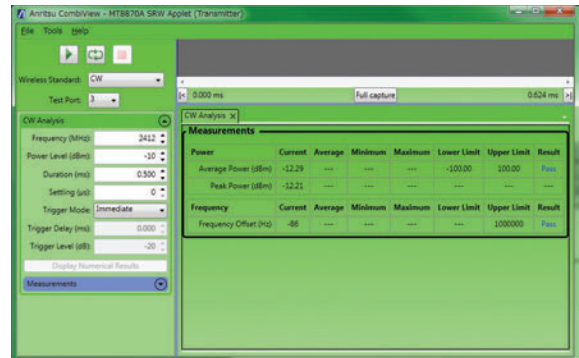
MX887050A is also utilized for the RF calibration test of connectivity devices using unmodulated signals.

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** **MU887000A/01A**

### IEEE 802.15.4 Waveforms

**MV887060A** **MU887000A/01A**

The MT8870A/MT8872A/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/MT8872A supports measurement of the key TX characteristics recommended by the IEEE 802.15.4 standard released in 2011.

### 802.15.4 TX Measurement

IEEE 802.15.4 - 2011: 802.15.4 TX Measurements

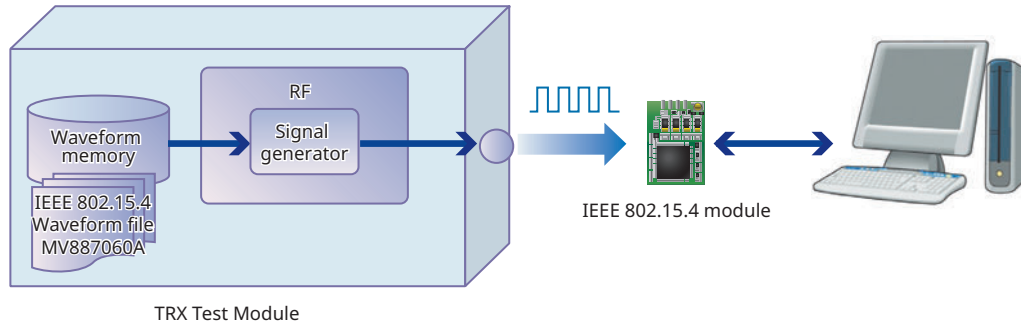
802.15.4	Test Items
10.3.2	Transmit power spectral density (PSD) mask
10.3.3	Symbol rate
10.3.7	RX-to-TX turnaround time
10.3.8	Error vector magnitude (EVM)
10.3.9	Transmit center frequency tolerance
10.3.10	Transmit power

### Graphical Displays

Spectral mask
Constellation diagram
Power vs. Time

### 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
10.3.11	Receiver maximum input level of required signal

## Z-Wave Measurement Solution

### Z-Wave TX Measurements

**MX887061A** MU887000A/01A

### Z-Wave Waveforms

**MV887061A** MU887000A/01A

The MT8870A/MT8872A/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/MT8872A supports the key TX measurements defined by ITU-T G.9959 - 2012.

### ITU-T G.9959 TX Measurement

ITU-T G.9959 2012 TX Measurements

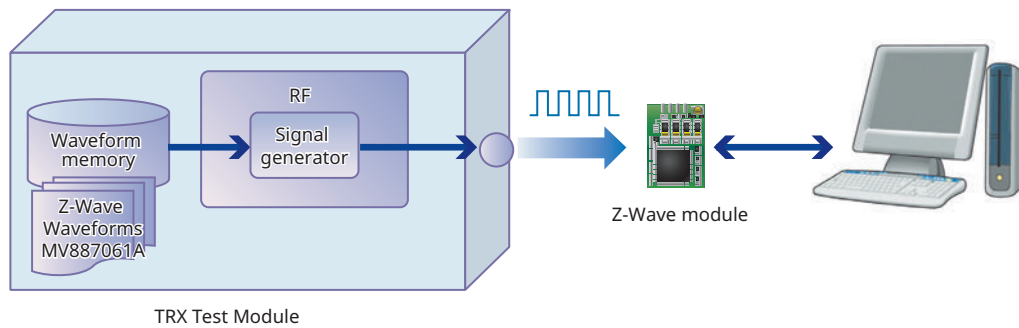
ITU-T G.9959	Test Items
7.1.2.2	Data rates
7.1.2.5.1	Transmit frequency error
7.1.2.5.2	Transmit power adjustments (conducted)

### Graphical Displays

Data table
Power vs. Time
Frequency vs. Time

### Receiver Test

The MV887061A supports RX tests of Z-Wave devices under test (DUT) by sending Z-Wave test signals from the MU88700xA 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 kbaud	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 kbaud	Gaussian (BT=1.0)	35 bytes (280 bits)	20 bytes	1 byte	14 bytes (incl. MPSU 4 bytes)
MV887061A_ZW_R3_0001	2FSK	R3	100 kbps	100 kbaud	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 kbaud	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 kbaud	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 kbaud	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

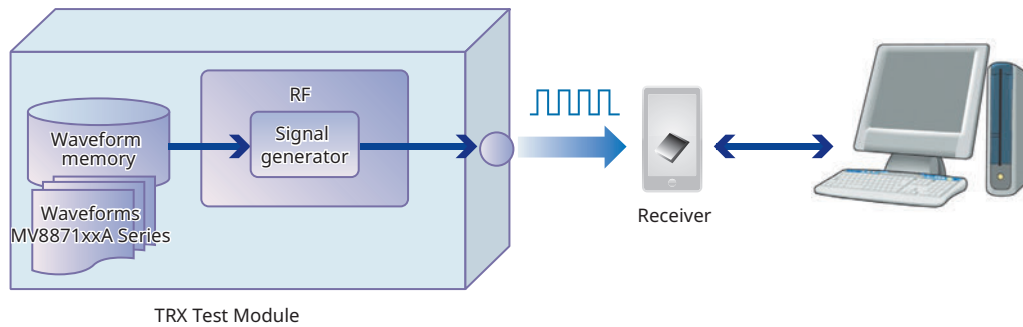
The MT8870A/MT8872A/MU88700xA supports RX tests of receivers using the various common communications technologies in widespread use today.

### 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 MU887000A/01A/02A

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	

### GPS L5 Waveforms MV887100A-002 MU887000A/01A

Waveform File Name	MV887100A_GPS_0040
Application	Sensitivity test
Transmitted Data Modulation Method	BPSK
Satellite ID Number	1
Reference Standard	GLOBAL POSITIONING SYSTEM STANDARD POSITIONING SERVICE SIGNAL SPECIFICATION

\*: MV887100A GPS waveforms license is required.

### Galileo Waveforms MV887101A MU887000A/01A/02A

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 MU887000A/01A/02A

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 MU887000A/01A/02A

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)

### QZSS Waveforms MV887104A MU887000A/01A

Waveform File Name	MV887104A_QZSS_0001
Application	Parity detection/Sensitivity test/BER measurement
Transmitted Data Modulation Method	BPSK
Satellite ID Number	193
Reference Standard	Quasi-Zenith Satellite System Interface Specification

### DVB-H Waveforms MV887110A MU887000A/01A/02A

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.

# Measurement Software MX8870xxA Series/Waveforms MV887xxxA Series

## Main Specifications of MV8871xxA Series Waveforms

### ISDB-T Waveforms MV887111A MU887000A/01A/02A

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]	40 [Frame]	4 [Frame]
Transmitted Data	PN23fix*4			
Transmitted Data Modulation Method	Layer A: 64QAM and Layer A: QPSK Layer B: 64QAM	Layer A: QPSK Layer B: 64QAM		Layer A: QPSK or 16QAM Layer B: 64QAM
Guard Interval	1/8			
Encoding Rate	No Encoding	Layer A: 2/3 Layer B: 7/8	Layer A: 2/3 Layer B: 3/4	Layer A: 2/3 or 1/2 Layer B: 3/4 or 7/8
Mode	3			
Reference Standard	ARIB STD-B31			

\*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 MU887000A/01A

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.

## FM/RDS Measurement Solution

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

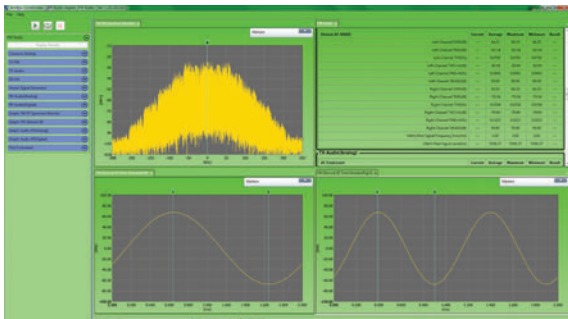
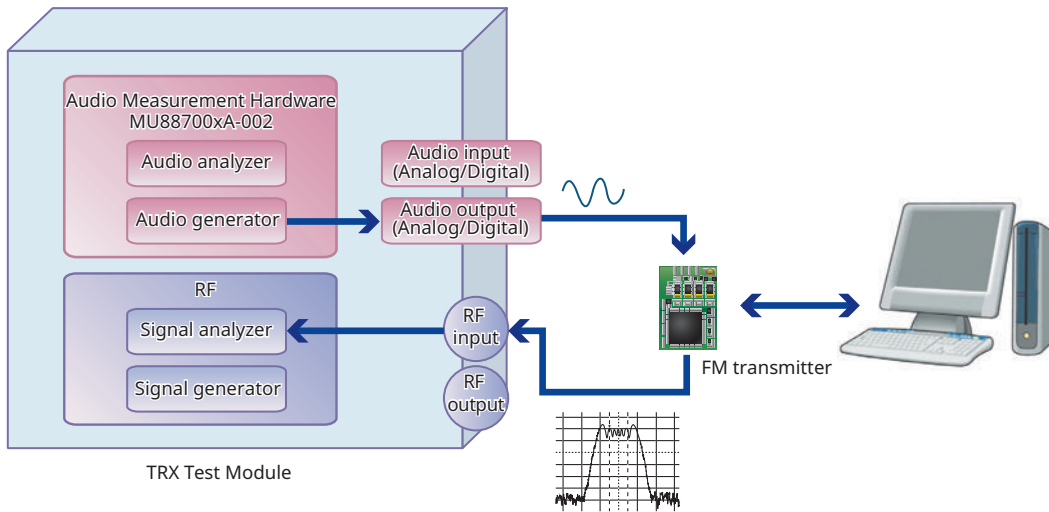
**MX887070A** MU887000A/01A  
**MV887070A** MU887000A/01A

The MT8870A/MT8872A/MU88700xA supports TRX tests of FM transceivers and adding an option also supports audio tests.

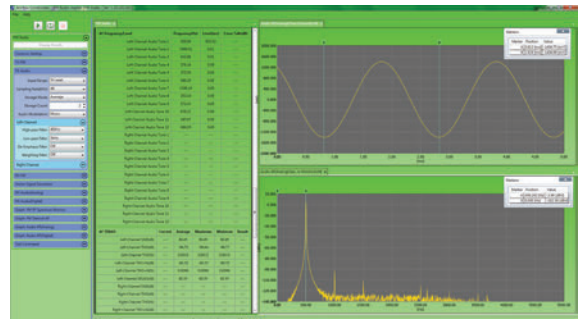
### FM Transmitter Test

Installing the Audio Measurement Hardware MU887000A/01A-002 in the MU887000A/01A 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 MU887000A/01A 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



FM Receiver Test using CombiView  
(device audio output measurement)



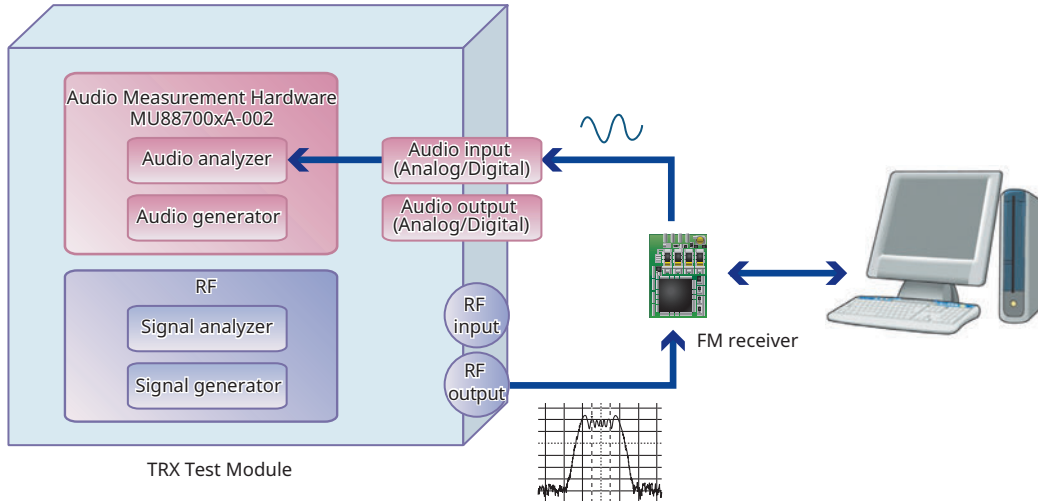
RDS Measurement Results using CombiView

## FM/RDS Measurement Solution (continued)

### FM Receiver Test

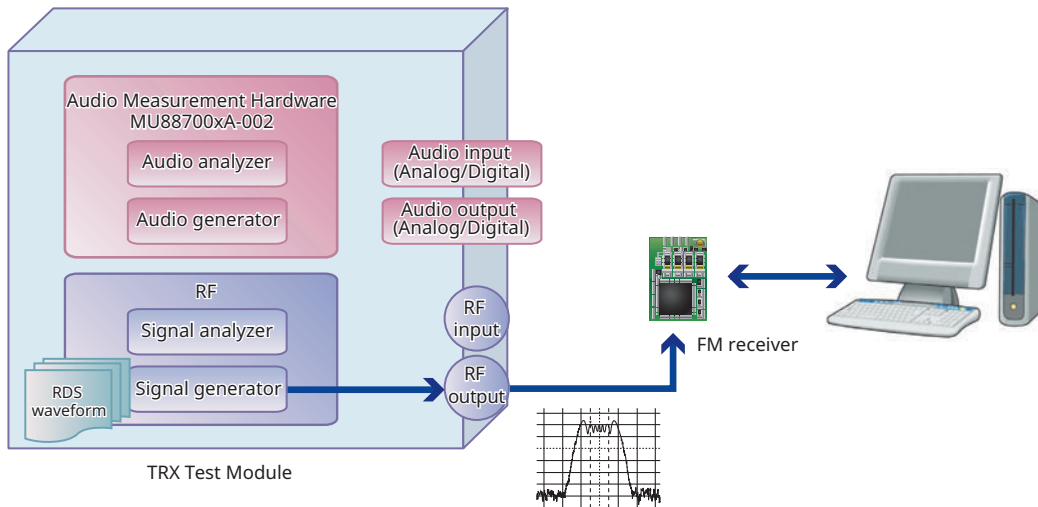
To test FM receivers using the FM/Audio TRX Measurement software MX887070A, the specified test audio signal is frequency modulated and a signal is output from the vector signal generator.

Installing the Audio Measurement Hardware MU887000A/01A-002 in the MU887000A/01A inputs either analog or digital format audio signals output from the FM receiver to the built-in audio analyzer of the MU887000A/01A to perform audio tests including AF signal frequency and level (up to 12 multi-tones), distortion rate, stereo crosstalk, etc.



### 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			DUT RX test
AF Left Channel	Tone Count	1		
	Tone Frequency	1 kHz		
	Tone Deviation	75 kHz × 0.9		
AF Right Channel	Tone Count	1		
	Tone Frequency	2 kHz		
	Tone Deviation	75 kHz × 0.9		
Pilot Deviation	75 kHz × 0.1			
RDS Deviation	75 kHz × 0.05			
Reference Standard	IEC 62106 Edition 2.0			

Consult Anritsu for details about the FM RDS waveform file.



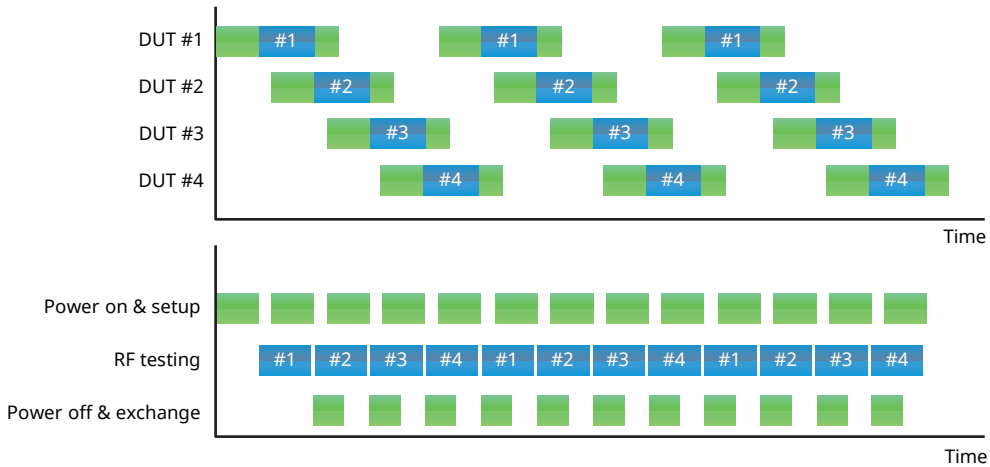
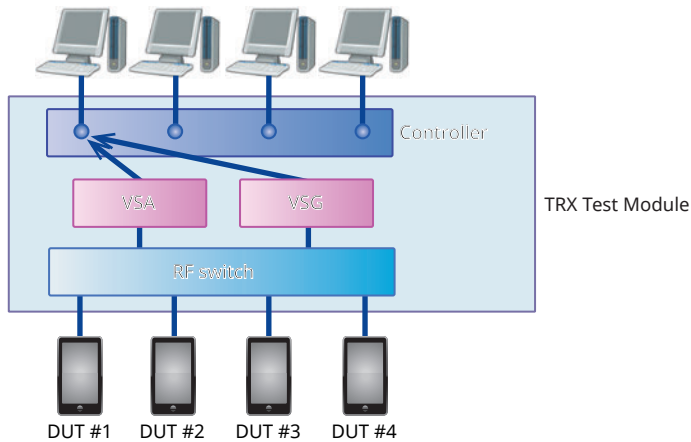
## High Speed Measurement Solution

### Multi-DUT Measurement Scheduler

**MX887090A** MU887000A/01A/02A

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, FM/Audio TRX Measurement MX887070A.



# Universal Wireless Test Set MT8870A Specifications

## Electrical Characteristics

Number of Slots	4
Internal Reference Oscillator	<p>Starting characteristics                      25°C, Referenced to frequency at 24-hour after power-on  <math>\pm 5 \times 10^{-7}</math> (2 minutes after power-on)  <math>\pm 5 \times 10^{-8}</math> (5 minutes after power-on)</p> <p>Aging rate: <math>\pm 1 \times 10^{-7}</math>/year</p> <p>Temperature characteristics: <math>\pm 2 \times 10^{-8}</math> (+5°C to +45°C)</p> <p>Initial calibration accuracy                      +20°C to +30°C, 1 hour after power-on  <math>\pm 2.2 \times 10^{-8}</math></p>
Connector	<p>External reference input                      Connector: BNC-J (rear panel), 50Ω (nom.)                      Frequency: 10 MHz                      Operating range: <math>\pm 1</math> ppm                      Input level: -15 to +20 dBm, 50Ω (AC coupling)</p> <p>Reference signal output                      Connector: BNC-J (rear panel), 50Ω (nom.)                      Frequency: 10 MHz                      Output level: <math>\geq 0</math> dBm (AC coupling)</p> <p>Trigger                      Input/Output switching: Trigger input/output selectable                      Connector: BNC-J (rear panel, 4 ports)                      Input/Output level: TTL level</p> <p>Ethernet controller                      Control from external controller (excluding power-on/off)                      Ethernet (1000BASE-T)                      Connector: RJ-45 (front panel, rear panel)                      GPIB (with MT8870A-001)                      Connector: IEEE488 bus connector (rear panel, 4 ports)</p> <p>AUX                      Connector: 50-pin (correspond to DX10BM-50S, rear panel)</p>

## General

Dimensions and Mass	<p>426 (W) × 221.5 (H) × 498 (D) mm (excluding projections)</p> <p>≤11.5 kg (excluding all options and test modules)</p> <p>≤30.0 kg (including options and test modules)</p>	
Power Supply	<p>Power voltage: 100 VAC to 120 VAC/200 VAC to 240 VAC</p> <p>Frequency: 50 Hz/60 Hz</p> <p>Power consumption: ≤900 VA (including all options and test modules)</p>	
Temperature Range	+5°C to +45°C (operating), -20°C to +60°C (storage)	
CE	EMC	2014/30/EU, EN61326-1, EN61000-3-2
	LVD	2014/35/EU, EN61010-1
	RoHS	2011/65/EU, EN50581

# Universal Wireless Test Set MT8872A Specifications

## Electrical Characteristics

Number of Slots	2
Internal Reference Oscillator	<p>Starting characteristics                      25°C, Referenced to frequency at 24-hour after power-on  <math>\pm 5 \times 10^{-7}</math> (2 minutes after power-on)  <math>\pm 5 \times 10^{-8}</math> (5 minutes after power-on)                      Aging rate: <math>\pm 1 \times 10^{-7}</math>/year                      Temperature characteristics: <math>\pm 2 \times 10^{-8}</math> (5°C to 45°C)</p>
Connector	<p>External Reference Input                      Connector: BNC-J (Rear panel), 50Ω (nominal)                      Frequency: 10 MHz                      Operating range: <math>\pm 1</math> ppm                      Input level: -15 to +20 dBm, 50Ω (AC coupling)</p>
	<p>Reference Signal Output                      Connector: BNC-J (Rear panel), 50Ω (nominal)                      Frequency: 10 MHz                      Output level: <math>\geq 0</math> dBm (AC coupling)</p>
	<p>Trigger                      Input/Output switching: Trigger Input/Output selectable                      Connector: BNC-J (Rear panel: 2 ports)                      Input/Output level: TTL level</p>
	<p>Ethernet Controller                      Control from external controller (Excluding power-On/Off)                      Ethernet (1000BASE-T)                      Connector: RJ-45 (Front panel, Rear panel)                      GPIB (With MT8872A-001)                      Connector: IEEE488 bus connector (Rear panel: 2 ports)                      Aux                      Connector: 50-pin (Correspond to DX10BM-50S, Rear panel)</p>

## General

Dimensions and Mass	<p>250 (W) × 221.5 (H) × 498 (D) mm (Exclusive of surface projections)  <math>\leq 9.5</math> kg (Excluding all options and modules)  <math>&lt; 18.0</math> kg (Including options and modules)</p>
Power Supply	<p>Power voltage: 100 VAC to 120 VAC/200 VAC to 240 VAC                      Frequency: 50 Hz/60 Hz                      Power consumption: <math>\leq 500</math> VA (Including all options and modules)</p>
Temperature Range	+5°C to +45°C (Operating), -20°C to +60°C (Storage)
EMC	EN61326-1, EN61000-3-2

# TRX Test Module MU887000A Specifications

## Input/Output Connector

RF Test Ports	<p>Number of ports 4</p> <p>Connector N (female)</p> <p>Impedance 50Ω (nom.)</p> <p>VSWR</p> <p>Test port 1 and 2</p> <ul style="list-style-type: none"> <li>&lt;1.5 (10 MHz ≤ f &lt; 400 MHz)</li> <li>&lt;1.2 (400 MHz ≤ f ≤ 2.7 GHz)</li> <li>&lt;1.3 (2.7 GHz &lt; f ≤ 3.8 GHz)</li> <li>&lt;1.5 (3.8 GHz &lt; f ≤ 6.0 GHz)</li> </ul> <p>Test port 3 and 4</p> <ul style="list-style-type: none"> <li>&lt;1.8 (10 MHz ≤ f &lt; 30 MHz)</li> <li>&lt;1.5 (30 MHz ≤ f ≤ 3.8 GHz)</li> <li>&lt;1.6 (3.8 GHz &lt; f ≤ 6.0 GHz)</li> </ul> <p>Maximum input level</p> <ul style="list-style-type: none"> <li>+35 dBm (Test port 1 and 2)</li> <li>+25 dBm (Test port 3 and 4)</li> </ul>
AF Test Ports	<p>Ports Analog port, Digital port</p> <p>Connector Analog port: BNC (female) Digital port: RJ-45</p>

## Signal Generator

Frequency	<p>Setting range</p> <ul style="list-style-type: none"> <li>10 MHz to 3.8 GHz</li> <li>10 MHz to 6.0 GHz (with MU887000A-001)</li> </ul> <p>Setting Resolution 1 Hz</p> <p>Accuracy Depends on MT8870A reference oscillator accuracy</p>
Amplitude	<p>Setting range</p> <p>Test port 1 and 2</p> <ul style="list-style-type: none"> <li>-130 to -10 dBm (≤3.8 GHz)</li> <li>-130 to -18 dBm (&gt;3.8 GHz)</li> </ul> <p>Test port 3 and 4</p> <ul style="list-style-type: none"> <li>-120 to 0 dBm (≤3.8 GHz)</li> <li>-120 to -8 dBm (&gt;3.8 GHz)</li> </ul> <p>Setting Resolution 0.1 dB</p> <p>Accuracy CW, After CAL, 10°C to 40°C</p> <p>Test port 1 and 2</p> <p>Output level: ≥-120 dBm (≤3.8 GHz), ≥-100 dBm (&gt;3.8 GHz)</p> <ul style="list-style-type: none"> <li>±1.3 dB (10 MHz ≤ f &lt; 400 MHz) (Signal Analyzer input level: +15 dBm)</li> <li>±1.0 dB, ±0.7 dB (typ.) (400 MHz ≤ f ≤ 3.8 GHz)</li> <li>±1.3 dB, ±1.0 dB (typ.) (3.8 GHz &lt; f ≤ 6.0 GHz)</li> </ul> <p>Test port 3 and 4</p> <p>Output level: ≥ -110 dBm</p> <ul style="list-style-type: none"> <li>±1.3 dB (10 MHz ≤ f &lt; 400 MHz)</li> <li>±1.0 dB, ±0.7 dB (typ.) (400 MHz ≤ f ≤ 3.8 GHz)</li> <li>±1.3 dB, ±0.7 dB (typ.) (3.8 GHz &lt; f ≤ 6.0 GHz)</li> </ul>
Spurious Response	<p>Harmonic distortion &lt;-25 dBc</p>
Vector Modulation	<p>Bandwidth 160 MHz (max.)</p>

## Signal Analyzer

Frequency	<p>Setting range</p> <ul style="list-style-type: none"> <li>10 MHz to 3.8 GHz</li> <li>10 MHz to 6.0 GHz (with MU887000A-001)</li> </ul> <p>Resolution 1 Hz</p>
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# TRX Test Module MU887000A Specifications

Amplitude	<p>Setting range            CW            Test port 1 and 2            -65 to +15 dBm (10 MHz ≤ f &lt; 350 MHz)            -65 to +35 dBm (350 MHz ≤ f ≤ 6.0 GHz)            Test port 3 and 4            -65 to +15 dBm (10 MHz ≤ f &lt; 350 MHz)            -65 to +25 dBm (350 MHz ≤ f ≤ 6.0 GHz)</p> <p>Resolution            0.1 dB</p> <p>Accuracy            CW, After CAL, Measurement bandwidth: 300 kHz, RBW: 100 kHz            Test port 1 and 2            10 MHz ≤ f &lt; 400 MHz, Signal Generator: Off, +10°C to +40°C            ±0.7 dB (-30 dBm ≤ p ≤ +15 dBm)            ±0.9 dB (-55 dBm ≤ p &lt; -30 dBm)            ±1.1 dB (-65 dBm ≤ p &lt; -55 dBm)            400 MHz ≤ f ≤ 3.8 GHz, +10°C to +40°C            ±0.5 dB, ±0.3 dB (typ.) (-30 dBm ≤ p ≤ +35 dBm)            ±0.7 dB (-55 dBm ≤ p &lt; -30 dBm)            ±0.9 dB (-65 dBm ≤ p &lt; -55 dBm)            3.8 GHz &lt; f ≤ 6.0 GHz, +20°C to +30°C            ±0.7 dB (-30 dBm ≤ p ≤ +35 dBm)            ±0.9 dB (-55 dBm ≤ p &lt; -30 dBm)            ±1.1 dB (-65 dBm ≤ p &lt; -55 dBm)</p> <p>Test port 3 and 4            10 MHz ≤ f &lt; 400 MHz, +10°C to +40°C            ±0.7 dB (-30 dBm ≤ p ≤ +15 dBm)            ±0.9 dB (-55 dBm ≤ p &lt; -30 dBm)            ±1.1 dB (-65 dBm ≤ p &lt; -55 dBm)            400 MHz ≤ f ≤ 3.8 GHz, +10°C to +40°C            ±0.7 dB (-30 dBm ≤ p ≤ +25 dBm)            ±0.9 dB (-55 dBm ≤ p &lt; -30 dBm)            ±1.1 dB (-65 dBm ≤ p &lt; -55 dBm)            3.8 GHz &lt; f ≤ 6.0 GHz, +20°C to +30°C            ±0.7 dB (-30 dBm ≤ p ≤ +25 dBm)            ±0.9 dB (-55 dBm ≤ p &lt; -30 dBm)            ±1.1 dB (-65 dBm ≤ p &lt; -55 dBm)</p> <p>Linearity            CW, Measurement bandwidth: 300 kHz, RBW: 100 kHz            ±0.2 dB (0 to -40 dB, ≥ -55 dBm)            ±0.4 dB (0 to -40 dB, ≥ -65 dBm)</p>
Modulation Analysis	<p>Maximum bandwidth            25 MHz (10 MHz ≤ f &lt; 500 MHz)            80 MHz (500 MHz ≤ f &lt; 1.9 GHz)            160 MHz (1.9 GHz ≤ f ≤ 6.0 GHz)</p>

## General

Interface	<p>Trigger            Trigger signals input/output at trigger connectors (rear panel)</p> <p>Remote control            Ethernet: via MT8870A interface            GPIB: with MT8870A GPIB option (MT8870A-001)            Interface function: SH1, AH1, T6, L4, SR1, RL1, PP0, DC1, DT0, C0, E2</p>						
Dimensions and Mass	<p>90 (W) × 193.6 (H) × 325 (D) mm (excluding projections)            ≤5 kg (including options)</p>						
CE	<table border="1"> <tr> <td data-bbox="242 1528 395 1547">EMC</td> <td data-bbox="402 1528 1501 1547">2014/30/EU, EN61326-1, EN61000-3-2</td> </tr> <tr> <td data-bbox="242 1549 395 1568">LVD</td> <td data-bbox="402 1549 1501 1568">2014/35/EU, EN61010-1</td> </tr> <tr> <td data-bbox="242 1570 395 1596">RoHS</td> <td data-bbox="402 1570 1501 1596">2011/65/EU, EN50581</td> </tr> </table>	EMC	2014/30/EU, EN61326-1, EN61000-3-2	LVD	2014/35/EU, EN61010-1	RoHS	2011/65/EU, EN50581
EMC	2014/30/EU, EN61326-1, EN61000-3-2						
LVD	2014/35/EU, EN61010-1						
RoHS	2011/65/EU, EN50581						

## Audio Measurement Hardware MU887000A-002

Analog Audio	<p>Audio generator            Frequency range: 20 Hz to 20 kHz            Output level range: 0 (off), 1 mV to 5 V<sub>peak</sub> (100 kΩ termination)            Impedance: 1Ω (AC coupling) (nom.)</p> <p>Audio analyzer            Frequency range: 20 Hz to 20 kHz            Input level range: 1 mV<sub>peak</sub> to 5 V<sub>peak</sub> (30 V rms max.)            Impedance: 100 kΩ (AC coupling)</p>
Digital Audio	<p>Audio generator            Frequency range: 20 Hz to 20 kHz (Sampling rate: 44.1 kHz, 48 kHz)                              20 Hz to 14 kHz (Sampling rate: 32 kHz)                              20 Hz to 7 kHz (Sampling rate: 16 kHz)</p> <p>Bit resolution: 16 bits/24 bits</p> <p>Audio analyzer            Sampling rate: 16, 32, 44.1, 48 kHz            Bit resolution: 16 bits/24 bits</p>



# TRX Test Module MU887001A Specifications

## Input/Output Connector

RF Test Ports	<p>Number of ports 4</p> <p>Connector N (female)</p> <p>Impedance 50Ω (nom.)</p> <p>VSWR &lt;1.5 (10 MHz ≤ f &lt; 400 MHz) &lt;1.2 (400 MHz ≤ f ≤ 2.7 GHz) &lt;1.3 (2.7 GHz &lt; f ≤ 3.8 GHz) &lt;1.5 (3.8 GHz &lt; f ≤ 6.0 GHz)</p> <p>Maximum input level +35 dBm</p>
AF Test Ports	<p>Ports Analog port, Digital port</p> <p>Connector Analog port: BNC (female) Digital port: RJ-45</p>

## Signal Generator

Frequency	<p>Setting range 10 MHz to 3.8 GHz 10 MHz to 6.0 GHz (with MU887001A-001)</p> <p>Setting Resolution 1 Hz</p> <p>Accuracy Depends on MT8870A reference oscillator accuracy</p>
Amplitude	<p>Setting range -130 to -10 dBm (≤3.8 GHz) -130 to -18 dBm (&gt;3.8 GHz)</p> <p>Setting Resolution 0.1 dB</p> <p>Accuracy CW, After CAL, 10°C to 40°C Output level: ≥-120 dBm (≤3.8 GHz), ≥-100 dBm (&gt;3.8 GHz) ±1.3 dB (10 MHz ≤ f &lt; 400 MHz) (Signal Analyzer input level: +15 dBm) ±1.0 dB, ±0.7 dB (typ.) (400 MHz ≤ f ≤ 3.8 GHz) ±1.3 dB, ±1.0 dB (typ.) (3.8 GHz &lt; f ≤ 6.0 GHz)</p>
Spurious Response	<p>Harmonic distortion &lt;-25 dBc</p>
Vector Modulation	<p>Bandwidth 160 MHz (max.)</p>

# TRX Test Module MU887001A Specifications

## Signal Analyzer

Frequency	<p>Setting range</p> <p>10 MHz to 3.8 GHz</p> <p>10 MHz to 6.0 GHz (with MU887001A-001)</p> <p>Resolution</p> <p>1 kHz</p>
Amplitude	<p>Setting range</p> <p>CW</p> <p>-65 to +15 dBm (10 MHz ≤ f &lt; 350 MHz)</p> <p>-65 to +35 dBm (350 MHz ≤ f ≤ 6.0 GHz)</p> <p>Resolution</p> <p>0.1 dB</p> <p>Accuracy</p> <p>CW, After CAL, Measurement bandwidth: 300 kHz, RBW: 100 kHz</p> <p>10 MHz ≤ f &lt; 400 MHz, Signal Generator: Off, +10°C to +40°C</p> <p>±0.7 dB (-30 dBm ≤ p ≤ +15 dBm)</p> <p>±0.9 dB (-55 dBm ≤ p &lt; -30 dBm)</p> <p>±1.1 dB (-65 dBm ≤ p &lt; -55 dBm)</p> <p>400 MHz ≤ f ≤ 3.8 GHz, +10°C to +40°C</p> <p>±0.5 dB, ±0.3 dB (typ.) (-30 dBm ≤ p ≤ +35 dBm)</p> <p>±0.7 dB (-55 dBm ≤ p &lt; -30 dBm)</p> <p>±0.9 dB (-65 dBm ≤ p &lt; -55 dBm)</p> <p>3.8 GHz &lt; f ≤ 6.0 GHz, +20°C to +30°C</p> <p>±0.7 dB (-30 dBm ≤ p ≤ +35 dBm)</p> <p>±0.9 dB (-55 dBm ≤ p &lt; -30 dBm)</p> <p>±1.1 dB (-65 dBm ≤ p &lt; -55 dBm)</p> <p>Linearity</p> <p>CW, Measurement bandwidth: 300 kHz, RBW: 100 kHz</p> <p>±0.2 dB (0 to -40 dB, ≥ -55 dBm)</p> <p>±0.4 dB (0 to -40 dB, ≥ -65 dBm)</p>
Modulation Analysis	<p>Maximum bandwidth</p> <p>25 MHz (10 MHz ≤ f &lt; 500 MHz)</p> <p>80 MHz (500 MHz ≤ f &lt; 1.9 GHz)</p> <p>160 MHz (1.9 GHz ≤ f ≤ 6.0 GHz)</p>

## General

Interface	<p>Trigger</p> <p>Trigger signals input/output at trigger connectors (rear panel)</p> <p>Remote control</p> <p>Ethernet: via MT8870A interface</p> <p> GPIB: with MT8870A GPIB option (MT8870A-001)</p> <p>Interface function: SH1, AH1, T6, L4, SR1, RL1, PP0, DC1, DT0, C0, E2</p>	
Dimensions and Mass	<p>90 (W) × 193.6 (H) × 325 (D) mm (excluding projections)</p> <p>≤5 kg (including options)</p>	
CE	EMC	2014/30/EU, EN61326-1, EN61000-3-2
	LVD	2014/35/EU, EN61010-1
	RoHS	2011/65/EU, EN50581

## Audio Measurement Hardware MU887001A-002

Analog Audio	<p>Audio generator</p> <p>Frequency range: 20 Hz to 20 kHz</p> <p>Output level range: 0 (off), 1 mV to 5 V<sub>peak</sub> (100 kΩ termination)</p> <p>Impedance: 1Ω (AC coupling) (nom.)</p> <p>Audio analyzer</p> <p>Frequency range: 20 Hz to 20 kHz</p> <p>Input level range: 1 mV<sub>peak</sub> to 5 V<sub>peak</sub> (30 V rms max.)</p> <p>Impedance: 100 kΩ (AC coupling)</p>
Digital Audio	<p>Audio generator</p> <p>Frequency range: 20 Hz to 20 kHz (Sampling rate: 44.1 kHz, 48 kHz)</p> <p>20 Hz to 14 kHz (Sampling rate: 32 kHz)</p> <p>20 Hz to 7 kHz (Sampling rate: 16 kHz)</p> <p>Bit resolution: 16 bits/24 bits</p> <p>Audio analyzer</p> <p>Sampling rate: 16, 32, 44.1, 48 kHz</p> <p>Bit resolution: 16 bits/24 bits</p>

# TRX Test Module MU887002A Specifications

## I/O Connectors

RF Test Ports	<p>Number of ports            TRX1: 12            TRX2: 12</p> <p>Connectors            N (female)</p> <p>Impedance            50 <math>\Omega</math> (nom.)</p> <p>VSWR            20°C to 30°C            &lt;1.4 (400 MHz <math>\leq</math> f &lt; 450 MHz)            &lt;1.3 (450 MHz <math>\leq</math> f <math>\leq</math> 2.7 GHz)            &lt;1.4 (2.7 GHz &lt; f <math>\leq</math> 3.8 GHz)            &lt;1.4 (3.8 GHz &lt; f <math>\leq</math> 6.0 GHz)</p> <p>Max. input level            +35 dBm</p>
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## Signal Generator

Frequency	<p>Setting range            400 MHz to 6.0 GHz</p> <p>Resolution            1 Hz</p> <p>Accuracy            Depends on MT8870A reference oscillator accuracy</p>
Amplitude	<p>Setting range            -130 to 0 dBm</p> <p>Assured upper range            -5 dBm (<math>\leq</math>3.8 GHz)            -8 dBm (<math>&gt;</math>3.8 GHz)</p> <p>* RMS value at modulation wave</p> <p>Resolution            0.1 dB</p> <p>Accuracy            CW, after CAL, 20°C to 30°C            Output level: <math>\geq</math>-120 dBm (<math>\leq</math>3.8 GHz), <math>\geq</math>-100 dBm (<math>&gt;</math>3.8 GHz)  <math>\pm</math>1.0 dBm <math>\pm</math>0.7 dB (typ.) (400 MHz <math>\leq</math> f <math>\leq</math> 3.8 GHz)  <math>\pm</math>1.3 dB, <math>\pm</math>1.0 dB (typ.) 3.8 GHz &lt; f <math>\leq</math> 6.0 GHz)</p>
Level Linearity at Cable Loss Setting	<p>At Broadcast with different cable loss value at each test port            Referenced to 0 dB cable loss  <math>\pm</math>0.2 dB (typ.)            However, difference of <math>\leq</math>8 dB in cable loss between test ports</p>
Output Level Deviation	<p>Broadcast  <math>\leq</math>0.6 dB (nom.)</p>
Spurious	<p>Harmonic distortion            CW, 800 MHz <math>\leq</math> Harmonic Frequency <math>\leq</math> 6.0 GHz, -120 dBm <math>\leq</math> p <math>\leq</math> -5dBm, 20°C to 30°C  <math>&lt;</math>-25 dBc</p>
Vector Modulation	<p>Bandwidth            200 MHz (max.)</p>

# TRX Test Module MU887002A Specifications

## Signal Analyzer

Frequency	Setting range 400 MHz to 6.0 GHz Resolution 1 Hz
Amplitude	Setting range CW -65 to +35 dBm Resolution 0.1 dB Accuracy CW, Measurement bandwidth: 300 kHz, RBW: 100 kHz, after CAL, 20°C to 30°C 400 MHz $\leq f \leq$ 3.8 GHz $\pm 0.5$ dB, $\pm 0.3$ dB (typ.) ( $-30$ dBm $\leq p \leq$ +35 dBm) $\pm 0.7$ dB ( $-55$ dBm $\leq p <$ -30 dBm) $\pm 0.9$ dB ( $-65$ dBm $\leq p <$ -55 dBm) 3.8 GHz $< f \leq$ 6.0 GHz $\pm 0.7$ dB ( $-30$ dBm $\leq p \leq$ +35 dBm) $\pm 0.9$ dB ( $-55$ dBm $\leq p <$ -30 dBm) $\pm 1.1$ dB ( $-65$ dBm $\leq p <$ -55 dBm) Linearity CW, Measurement bandwidth: 300 kHz, RBW: 100 kHz, after CAL, 20°C to 30°C $\pm 0.2$ dB (0 to -40 dB, $\geq$ -55 dBm) $\pm 0.4$ dB (0 to -40 dB, $\geq$ -65 dBm)
Modulation Analysis	Bandwidth 200 MHz (max.)

## General

Interface	Trigger Trigger I/O connector (back panel) Remote control Ethernet: Via MT8870A interface
Dimensions and Mass	181 (W) $\times$ 193.6 (H) $\times$ 325 (D) mm (excluding projections) $\leq 12.5$ kg
Operating Temperature Range	+5°C to +40°C
Storage Temperature Range	-20°C to +60°C

## Cellular Standards Sequence Measurement MX887010A

Common Item	<p>Measuring object LTE-Advanced/NR sub-6 GHz</p> <p>Frequency range 400 MHz to 6.0 GHz</p>																				
Spectrum Monitor	<p>Analysis time 1 ms, 10 ms</p> <p>Span 1, 2.5, 5, 10, 25, 50, 100, 160, 200* 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> <tr> <td>160 MHz</td> <td>30 kHz, 100 kHz, 300 kHz, 1 MHz</td> </tr> <tr> <td>200 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	160 MHz	30 kHz, 100 kHz, 300 kHz, 1 MHz	200 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																				
160 MHz	30 kHz, 100 kHz, 300 kHz, 1 MHz																				
200 MHz*	30 kHz, 100 kHz, 300 kHz, 1 MHz																				
Multiple Power Measurement	<p>Number of steps 10 to 100 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 1600</p> <p>Number of sequence 1 to 400</p>																				
Narrowband Power vs. Time	<p>Segment duration Range: 200 <math>\mu</math>s to 20000 <math>\mu</math>s, Resolution: 1 <math>\mu</math>s</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 <math>\mu</math>s to 10000 <math>\mu</math>s, Resolution : 1 <math>\mu</math>s</p> <p>Measurement bandwidth Low-pass filter: 100, 300, 500 kHz, 1, 3, 5, 20 MHz Gaussian filter: 1 MHz</p>																				

\*: MU887002A only



## W-CDMA/HSPA Uplink TX Measurement MX887011A

Common Item	<p>Measuring object W-CDMA uplink</p> <p>Frequency range 400 MHz to 2.7 GHz (MU887000A/01A) 400 MHz to 2.7 GHz (MU887002A includes measured target signal band described in frequency range at left)</p>
RF Power	<p>Input level range -65 to +35 dBm (MU887000A test port 1 and 2, MU887001A all test port, MU887002A (TRX1/2) all test port) -65 to +25 dBm (MU887000A test port 3 and 4)</p> <p>Measurement accuracy After CAL, 10°C to 40°C MU887000A test port 1 and 2, MU887001A all test port, MU887002A(TRX1/2) all test port ±0.3 dB (typ.) (-20 to +35 dBm, 20°C to 30°C) ±0.5 dB (-20 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, MU887002A (TRX1/2) 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, MU887002A (TRX1/2) 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, MU887002A (TRX1/2) 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 (MU887000A/01A) 400 MHz to 2.0 GHz (MU887002A includes measured target signal band described in frequency range at left)</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, MU887002A (TRX1/2) all test port) -30 to +25 dBm (MU887000A test port 3 and 4)</p> <p>Measurement accuracy After CAL, 10°C to 40°C (MU887000A/01A), 20°C to 30°C (MU887002A) MU887000A test port 1 and 2, MU887001A all test port ±0.3 dB (typ.) (-20 to +35 dBm, 20°C to 30°C) ±0.5 dB (-20 to +35 dBm) 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, MU887002A (TRX1/2) 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) ≤0.5°rms (f ≥500 MHz), ≤0.7°rms (f &lt;500 MHz) ≤2° peak Residual EVM (8PSK) ≤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, MU887002A (TRX1/2) 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>

## 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 (MU887000A/01A) 600 MHz to 2.7 GHz, 3.4 GHz to 4.2 GHz (with MU887000A/01A-001/101 option) 600 MHz to 2.7 GHz, 3.4 GHz to 4.2 GHz (MU887002A)</p>
RF Power	<p>Input level range -65 to +35 dBm (MU887000A test port 1 and 2, MU887001A all test port, MU887002A (TRX1/2) all test port) -65 to +25 dBm (MU887000A test port 3 and 4)</p> <p>Measurement accuracy 600 MHz to 2.7 GHz, 3.4 GHz to 3.8 GHz, After CAL, 10°C to 40°C (MU887000A/01A), 20°C to 30°C (MU887002A) MU887000A test port 1 and 2, MU887001A all test ports, MU887002A (TRX1/2) all test port ±0.3 dB (typ.) (-20 to +35 dBm, 20°C to 30°C) ±0.5 dB (-20 to +35 dBm) ±0.7 dB (-50 to -20 dBm) ±0.9 dB (-60 to -50 dBm) 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) 3.8 GHz to 4.2 GHz, After CAL, 20°C to 30°C MU887000A all test ports and MU887001A all test ports, MU887002A (TRX1/2) all test port ±0.7 dB (-20 to +35 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, MU887002A (TRX1/2) 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, MU887002A (TRX1/2) 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) -10 to +35 dBm (MU887002A (TRX1/2) all test port, 600 MHz ≤ f ≤ 2700 MHz) -14 to +35 dBm (MU887002A (TRX1/2) all test port, 3400 MHz ≤ f ≤ 4200 MHz)</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, MU887002A (TRX1/2) all test port) -10 to +25 dBm (MU887000A test port 3 and 4)</p>

## LTE-Advanced FDD Uplink CA TX Measurement MX887013A-001

## LTE-Advanced TDD Uplink CA TX Measurement MX887014A-001

Common Item	<p>Measuring object PUSCH</p> <p>Frequency range 698 MHz to 2.7 GHz, 3.4 GHz to 3.8 GHz 698 MHz to 2.7 GHz, 3.4 GHz to 4.2 GHz (with MU88700xA-001/101 option) 698 MHz to 2.7 GHz, 3.4 GHz to 4.2 GHz (with MU887002A)</p>
RF Power	<p>Input level range -65 to +35 dBm (MU887000A test port 1 and 2, MU887001A all test ports, MU887002A (TRX1/2) all test port) -65 to +25 dBm (MU887000A test port 3 and 4)</p> <p>Measurement accuracy MU887000A test port 1 and 2, MU887001A all test ports, MU887002A (TRX1/2) all test port Excluding when measuring Inband Contiguous CA SCC and PCC + SCC 698 MHz to 2.7 GHz, 3.4 GHz to 3.8 GHz, After CAL, 10°C to 40°C (MU887000A/01A), 20°C to 30°C (MU887002A) ±0.3 dB (typ.) (-20 to +35 dBm, 20°C to 30°C) ±0.5 dB (-20 to +35 dBm) ±0.7 dB (-50 to -20 dBm) ±0.9 dB (-60 to -50 dBm) 3.8 GHz to 4.2 GHz, After CAL, 10°C to 40°C ±0.7 dB (-20 to +35 dBm) ±0.9 dB (-50 to -20 dBm) ±1.1 dB (-60 to -50 dBm) MU887000A test port 1 and 2, MU887001A all test ports, MU887002A (TRX1/2) all test port When measuring Inband Contiguous CA SCC and PCC + SCC 698 MHz to 2.7 GHz, After CAL, 10°C to 40°C (MU887000A/01A), 20°C to 30°C (MU887002A) ±0.5 dB (typ.) (-20 to +35 dBm, 20°C to 30°C) ±0.7 dB (-50 to +35 dBm) ±0.9 dB (-60 to -50 dBm) 3.4 GHz to 3.8 GHz, After CAL, 10°C to 40°C 3.8 GHz to 4.2 GHz, After CAL, 20°C to 30°C ±1.0 dB (-50 to +35 dBm) ±1.3 dB (-60 to -50 dBm) MU887000A test port 3 and 4 Excluding when measuring Inband Contiguous CA SCC and PCC + SCC 698 MHz to 2.7 GHz, 3.4 GHz to 3.8 GHz, After CAL, 10°C to 40°C 3.8 GHz to 4.2 GHz, After CAL, 20°C to 30°C ±0.7 dB (-20 to +25 dBm) ±0.9 dB (-50 to -20 dBm) ±1.1 dB (-60 to -50 dBm) MU887000A test port 3 and 4 When measuring Inband Contiguous CA SCC and PCC + SCC 698 MHz to 2.7 GHz, After CAL, 10°C to 40°C ±0.7 dB (-20 to +25 dBm) ±0.9 dB (-50 to -20 dBm) ±1.1 dB (-60 to -50 dBm) 3.4 GHz to 3.8 GHz, After CAL, 10°C to 40°C 3.8 GHz to 4.2 GHz, After CAL, 20°C to 30°C ±1.0 dB (-50 to +25 dBm) ±1.3 dB (-60 to -50 dBm)</p> <p>Linearity 0 to 30 dB, 20 to 30°C ±0.2 dB (≥-50 dBm) ±0.4 dB (≥-60 dBm)</p>
Frequency/Modulation Measurement	<p>Input level range -40 to +35 dBm (MU887000A test port 1 and 2, MU887001A all test ports, MU887002A (TRX1/2) 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 ports, MU887002A (TRX1/2) 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) -10 to +35 dBm (MU887002A (TRX1/2) all test port, 698 MHz ≤ f ≤ 2700 MHz) -14 to +35 dBm (MU887002A (TRX1/2) all test port, 3400 MHz ≤ f ≤ 4200 MHz)</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 ports, MU887002A (TRX1/2) 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 (MU887000A/01A) 400 MHz to 2.7 GHz (MU887002A includes measured target signal band described in frequency range at left)</p>
RF Power	<p>Input level range -65 to +35 dBm (MU887000A test port 1 and 2, MU887001A all test port, MU887002A (TRX1/2) all test port) -65 to +25 dBm (MU887000A test port 3 and 4)</p> <p>Measurement accuracy After CAL, 10°C to 40°C (MU887000A/01A), 20°C to 30°C (MU887002A) MU887000A test port 1 and 2, MU887001A all test port, MU887002A (TRX1/2) all test port ±0.3 dB (typ.) (-20 to +35 dBm, 20°C to 30°C) ±0.5 dB (-20 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, MU887002A (TRX1/2) 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 &gt;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, MU887002A (TRX1/2) 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, MU887002A (TRX1/2) all test port) -10 to +25 dBm (MU887000A test port 3 and 4)</p> <p>OBW ratio 80.0 to 99.9%</p>



## 1xEV-DO Reverse Link TX Measurement MX887016A

Common Item	Measuring object Reverse link Rev. 0/Rev. A Frequency range 400 MHz to 2.7 GHz (MU887000A/01A) 400 MHz to 2.7 GHz (MU887002A includes measured target signal band described in frequency range at left)
RF Power	Input level range -65 to +35 dBm (MU887000A test port 1 and 2, MU887001A all test port, MU887002A (TRX1/2) all test port) -65 to +25 dBm (MU887000A test port 3 and 4) Measurement accuracy After CAL, 10°C to 40°C (MU887000A/01A), 20°C to 30°C (MU887002A) MU887000A test port 1 and 2, MU887001A all test port, MU887002A (TRX1/2) all test port ±0.3 dB (typ.) (-20 to +35 dBm, 20°C to 30°C) ±0.5 dB (-20 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) Linearity 0 to 40 dB ±0.2 dB (≥-55 dBm) ±0.4 dB (≥-65 dBm)
Frequency/Modulation Measurement	Input level range -30 to +35 dBm (MU887000A test port 1 and 2, MU887001A all test port, MU887002A (TRX1/2) all test port) -30 to +25 dBm (MU887000A test port 3 and 4) Carrier frequency accuracy ± (Setting frequency × Reference oscillator accuracy + 10 Hz) Waveform quality >0.999
Code Domain Power Measurement	Input level range -30 to +35 dBm (MU887000A test port 1 and 2, MU887001A all test port, MU887002A (TRX1/2) all test port) -30 to +25 dBm (MU887000A test port 3 and 4) Measurement accuracy ±0.2 dB (Code power: ≥-15 dBc), ±0.4 dB (Code power: ≥-23 dBc)
Occupied Bandwidth	Input level range -10 to +35 dBm (MU887000A test port 1 and 2, MU887001A all test port, MU887002A (TRX1/2) all test port) -10 to +25 dBm (MU887000A test port 3 and 4) OBW ratio 80.0 to 99.9%

## TD-SCDMA Uplink TX Measurement MX887017A

Common Item	<p>Measuring object TD-SCDMA uplink</p> <p>Frequency range 400 MHz to 2.7 GHz (MU887000A/01A) 400 MHz to 2.7 GHz (MU887002A includes measured target signal band described in frequency range at left)</p>
RF Power	<p>Input level range -65 to +35 dBm (MU887000A test port 1 and 2, MU887001A all test port, MU887002A (TRX1/2) all test port) -65 to +25 dBm (MU887000A test port 3 and 4)</p> <p>Measurement accuracy After CAL, 10°C to 40°C (MU887000A/01A), 20°C to 30°C (MU887002A) MU887000A test port 1 and 2, MU887001A all test port, MU887002A (TRX1/2) all test port ±0.3 dB (typ.) (-20 to +35 dBm, 20°C to 30°C) ±0.5 dB (-20 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, MU887002A (TRX1/2) 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, MU887002A (TRX1/2) 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, MU887002A (TRX1/2) 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>

## NR FDD sub-6 GHz Uplink TX Measurement MX887018A

## NR TDD sub-6 GHz Uplink TX Measurement MX887019A

Common Item	Measuring object PUSCH Channel Bandwidth (MHz) 5, 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 Modulation $\pi$ /2BPSK, QPSK, 16QAM, 64QAM																						
RF Power	Input level range -65 to +35 dBm (MU887000A test port 1 and 2, MU887001A all test port, MU887002A (TRX1/2) all test port) -65 to +25 dBm (MU887000A test port 3 and 4) Measurement accuracy MU887000A test port 1 and 2, MU887001A all test port, MU887002A (TRX1/2) all test port 600 MHz to 2.7 GHz, After CAL, 10°C to 40°C (MU887000A/01A), 20°C to 30°C (MU887002A) ±0.5 dB (typ.) (-20 to +35 dBm, 20°C to 30°C) ±0.7 dB (-20 to +35 dBm) ±0.7 dB (-50 to -20 dBm) ±0.9 dB (-60 to -50 dBm) 3.3 GHz to 3.8 GHz, After CAL, 10°C to 40°C (MU887000A/01A), 20°C to 30°C (MU887002A) ±1.0 dB (-50 to +35 dBm) ±1.3 dB (-60 to -50 dBm) 3.8 GHz to 5.0 GHz, After CAL, 20°C to 30°C ±1.0 dB (-50 to +35 dBm) ±1.3 dB (-60 to -50 dBm) MU887000A test port 3 and 4 600 MHz to 2.7 GHz, After CAL, 10°C to 40°C ±0.7 dB (-20 to +25 dBm) ±0.9 dB (-50 to -20 dBm) ±1.1 dB (-60 to -50 dBm) 3.3 GHz to 3.8 GHz, After CAL, 10°C to 40°C ±1.0 dB (-50 to +25 dBm) ±1.3 dB (-60 to -50 dBm) 3.8 GHz to 5.0 GHz, After CAL, 20°C to 30°C ±1.0 dB (-50 to +25 dBm) ±1.3 dB (-60 to -50 dBm)																						
Frequency/Modulation Measurement	Input level range Minimum output power* to +35 dBm (MU887000A test port 1 and 2, MU887001A all test port, MU887002A (TRX1/2) all test port) Minimum output power* to +25 dBm (MU887000A test port 3 and 4) *: Minimum output power <table border="1" data-bbox="418 1312 979 1631"> <thead> <tr> <th>Channel Bandwidth (MHz)</th> <th>Minimum output power (dBm)</th> </tr> </thead> <tbody> <tr> <td>5, 10, 15, 20</td> <td>-40</td> </tr> <tr> <td>25</td> <td>-39</td> </tr> <tr> <td>30</td> <td>-38.2</td> </tr> <tr> <td>40</td> <td>-37</td> </tr> <tr> <td>50</td> <td>-36</td> </tr> <tr> <td>60</td> <td>-35.2</td> </tr> <tr> <td>70</td> <td>-34.6</td> </tr> <tr> <td>80</td> <td>-34</td> </tr> <tr> <td>90</td> <td>-33.5</td> </tr> <tr> <td>100</td> <td>-33</td> </tr> </tbody> </table> Carrier frequency accuracy 600 MHz to 2.7 GHz $\pm$ (Setting frequency $\times$ Reference oscillator accuracy) + 15 Hz 3.3 GHz to 5.0 GHz $\pm$ (Setting frequency $\times$ Reference oscillator accuracy) + 36 Hz Modulation accuracy Residual EVM (average of 20 measurements) -25 dBm < Input Level Range $\leq 2.5\%$ Minimum output power $\leq$ Input Level Range $\leq$ -25 dBm $\leq 3.0\%$ (600 MHz $\leq$ Frequency $\leq$ 2.7 GHz, 3.3 GHz $\leq$ Frequency $\leq$ 4.2 GHz) $\leq 3.0\%$ (4.2 GHz < Frequency $\leq$ 5.0 GHz, 20°C to 30°C)	Channel Bandwidth (MHz)	Minimum output power (dBm)	5, 10, 15, 20	-40	25	-39	30	-38.2	40	-37	50	-36	60	-35.2	70	-34.6	80	-34	90	-33.5	100	-33
Channel Bandwidth (MHz)	Minimum output power (dBm)																						
5, 10, 15, 20	-40																						
25	-39																						
30	-38.2																						
40	-37																						
50	-36																						
60	-35.2																						
70	-34.6																						
80	-34																						
90	-33.5																						
100	-33																						

# Measurement Software MX8870xxA Series/Waveforms MV887xxxA Series Specifications

Occupied Bandwidth	<p>Frequency range</p> <p>Channel Bandwidth <math>\leq</math> 60 MHz</p> <p>600 MHz to 2.7 GHz, 3.3 GHz to 3.8 GHz (MU887000A/01A)</p> <p>600 MHz to 2.7 GHz, 3.3 GHz to 5.0 GHz (MU887000A/01A-001/101 option)</p> <p>600 MHz to 2.7 GHz, 3.3 GHz to 5.0 GHz (MU887002A)</p> <p>60 MHz &lt; Channel Bandwidth</p> <p>2.0 GHz to 2.7 GHz, 3.3 GHz to 3.8 GHz (MU887000A/01A)</p> <p>2.0 GHz to 2.7 GHz, 3.3 GHz to 5.0 GHz (MU887000A/01A-001/101 option)</p> <p>2.0 GHz to 2.7 GHz, 3.3 GHz to 5.0 GHz (MU887002A)</p> <p>Input level range</p> <p>-10 to +35 dBm (MU887000A test port 1 and 2, MU887001A all test port, MU887002A (TRX1/2) all test port)</p> <p>-10 to +25 dBm (MU887000A test port 3 and 4)</p>
Adjacent Channel Leakage Power Ratio	<p>Frequency range</p> <p>Channel Bandwidth <math>\leq</math> 60 MHz</p> <p>600 MHz to 2.7 GHz, 3.3 GHz to 3.8 GHz (MU887000A/01A)</p> <p>600 MHz to 2.7 GHz, 3.3 GHz to 5.0 GHz (MU887000A/01A-001/101 option)</p> <p>600 MHz to 2.7 GHz, 3.3 GHz to 5.0 GHz (MU887002A)</p> <p>60 MHz &lt; Channel Bandwidth</p> <p>2.0 GHz to 2.7 GHz, 3.3 GHz to 3.8 GHz (MU887000A/01A)</p> <p>2.0 GHz to 2.7 GHz, 3.3 GHz to 5.0 GHz (MU887000A/01A-001/101 option)</p> <p>2.0 GHz to 2.7 GHz, 3.3 GHz to 5.0 GHz (MU887002A)</p> <p>Input level range</p> <p>-10 to +35 dBm (MU887000A test port 1 and 2, MU887001A all test port)</p> <p>-10 to +25 dBm (MU887000A test port 3 and 4)</p> <p>-10 to +35 dBm (MU887002A (TRX1/2) all test port, 600 MHz <math>\leq</math> f <math>\leq</math> 2700 MHz)</p> <p>-14 to +35 dBm (MU887002A (TRX1/2) all test port, 3300 MHz <math>\leq</math> f <math>\leq</math> 5000 MHz)</p> <p>Measurement range</p> <p><math>\geq</math>42 dB (NR ACLR), <math>\geq</math>45 dB (UTRA ACLR1), <math>\geq</math>48 dB (UTRA ACLR2)</p>
Spectrum Emission Mask	<p>Frequency range</p> <p>Channel Bandwidth <math>\leq</math> 60 MHz</p> <p>600 MHz to 2.7 GHz, 3.3 GHz to 3.8 GHz (MU887000A/01A)</p> <p>600 MHz to 2.7 GHz, 3.3 GHz to 5.0 GHz (MU887000A/01A-001/101 option)</p> <p>600 MHz to 2.7 GHz, 3.3 GHz to 5.0 GHz (MU887002A)</p> <p>60 MHz &lt; Channel Bandwidth</p> <p>2.0 GHz to 2.7 GHz, 3.3 GHz to 3.8 GHz (MU887000A/01A)</p> <p>2.0 GHz to 2.7 GHz, 3.3 GHz to 5.0 GHz (MU887000A/01A-001/101 option)</p> <p>2.0 GHz to 2.7 GHz, 3.3 GHz to 5.0 GHz (MU887002A)</p> <p>Input level range</p> <p>-10 to +35 dBm (MU887000A test port 1 and 2, MU887001A all test port, MU887002A (TRX1/2) all test port)</p> <p>-10 to +25 dBm (MU887000A test port 3 and 4)</p>

**NR FDD Contiguous ENDC TX Measurement MX887018A-001**  
**NR TDD Contiguous ENDC TX Measurement MX887019A-001**

Common Item	Measuring object PUSCH Channel Bandwidth (MHz) 5, 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 Modulation $\pi/2$ BPSK, QPSK, 16QAM, 64QAM																						
RF Power	Input level range -65 to +35 dBm (MU887000A test port 1 and 2, MU887001A all test port, MU887002A (TRX1/2) all test port) -65 to +25 dBm (MU887000A test port 3 and 4) Measurement accuracy MU887000A test port 1 and 2, MU887001A all test port, MU887002A (TRX1/2) all test port 600 MHz to 2.7 GHz, After CAL, 10°C to 40°C (MU887000A/01A), 20°C to 30°C (MU887002A) ±0.7 dB (-50 to +35 dBm) ±0.9 dB (-60 to -50 dBm) 3.3 GHz to 3.8 GHz, After CAL, 10°C to 40°C (MU887000A/01A), 20°C to 30°C (MU887002A) ±1.0 dB (-50 to +35 dBm) ±1.3 dB (-60 to -50 dBm) 3.8 GHz to 5.0 GHz, After CAL, 20°C to 30°C ±1.0 dB (-50 to +35 dBm) ±1.3 dB (-60 to -50 dBm) MU887000A test port 3 and 4 600 MHz to 2.7 GHz, After CAL, 10°C to 40°C ±0.7 dB (-20 to +25 dBm) ±0.9 dB (-50 to -20 dBm) ±1.1 dB (-60 to -50 dBm) 3.3 GHz to 3.8 GHz, After CAL, 10°C to 40°C ±1.0 dB (-50 to +25 dBm) ±1.3 dB (-60 to -50 dBm) 3.8 GHz to 5.0 GHz, After CAL, 20°C to 30°C ±1.0 dB (-50 to +25 dBm) ±1.3 dB (-60 to -50 dBm)																						
Frequency/Modulation Measurement	Input level range Input level range (E-UTRA non-allocated) Minimum output power* to +35 dBm (MU887000A test port 1 and 2, MU887001A all test port, MU887002A (TRX1/2) all test port) Minimum output power* to +25 dBm (MU887000A test port 3 and 4) *: Minimum output power <table border="1" data-bbox="419 1285 979 1606"> <thead> <tr> <th>Channel Bandwidth (MHz)</th> <th>Minimum output power (dBm)</th> </tr> </thead> <tbody> <tr><td>5, 10, 15, 20</td><td>-40</td></tr> <tr><td>25</td><td>-39</td></tr> <tr><td>30</td><td>-38.2</td></tr> <tr><td>40</td><td>-37</td></tr> <tr><td>50</td><td>-36</td></tr> <tr><td>60</td><td>-35.2</td></tr> <tr><td>70</td><td>-34.6</td></tr> <tr><td>80</td><td>-34</td></tr> <tr><td>90</td><td>-33.5</td></tr> <tr><td>100</td><td>-33</td></tr> </tbody> </table>	Channel Bandwidth (MHz)	Minimum output power (dBm)	5, 10, 15, 20	-40	25	-39	30	-38.2	40	-37	50	-36	60	-35.2	70	-34.6	80	-34	90	-33.5	100	-33
Channel Bandwidth (MHz)	Minimum output power (dBm)																						
5, 10, 15, 20	-40																						
25	-39																						
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40	-37																						
50	-36																						
60	-35.2																						
70	-34.6																						
80	-34																						
90	-33.5																						
100	-33																						
Occupied Bandwidth	Frequency range Channel Bandwidth ≤ 60 MHz 600 MHz to 2.7 GHz, 3.3 GHz to 3.8 GHz (MU887000A/01A) 600 MHz to 2.7 GHz, 3.3 GHz to 5.0 GHz (MU887000A/01A-001/101 option) 600 MHz to 2.7 GHz, 3.3 GHz to 5.0 GHz (MU887002A) 60 MHz < Channel Bandwidth 2.0 GHz to 2.7 GHz, 3.3 GHz to 3.8 GHz (MU887000A/01A) 2.0 GHz to 2.7 GHz, 3.3 GHz to 5.0 GHz (MU887000A/01A-001/101 option) 2.0 GHz to 2.7 GHz, 3.3 GHz to 5.0 GHz (MU887002A) Input level range -10 to +35 dBm (MU887000A test port 1 and 2, MU887001A all test port, MU887002A (TRX1/2) all test port) -10 to +25 dBm (MU887000A test port 3 and 4)																						



# Measurement Software MX8870xxA Series/Waveforms MV887xxxA Series Specifications

Adjacent Channel Leakage Power Ratio	<p>Frequency range</p> <p>Channel Bandwidth <math>\leq</math> 60 MHz</p> <p>600 MHz to 2.7 GHz, 3.3 GHz to 3.8 GHz (MU887000A/01A)</p> <p>600 MHz to 2.7 GHz, 3.3 GHz to 5.0 GHz (MU887000A/01A-001/101 option)</p> <p>600 MHz to 2.7 GHz, 3.3 GHz to 5.0 GHz (MU887002A)</p> <p>60 MHz &lt; Channel Bandwidth</p> <p>2.0 GHz to 2.7 GHz, 3.3 GHz to 3.8 GHz (MU887000A/01A)</p> <p>2.0 GHz to 2.7 GHz, 3.3 GHz to 5.0 GHz (MU887000A/01A-001/101 option)</p> <p>2.0 GHz to 2.7 GHz, 3.3 GHz to 5.0 GHz (MU887002A)</p> <p>Input level range</p> <p>-10 to +35 dBm (MU887000A test port 1 and 2, MU887001A all test port)</p> <p>-10 to +25 dBm (MU887000A test port 3 and 4)</p> <p>-10 to +35 dBm (MU887002A (TRX1/2) all test port, 600 MHz <math>\leq</math> f <math>\leq</math> 2700 MHz)</p> <p>-14 to +35 dBm (MU887002A (TRX1/2) all test port, 3300 MHz <math>\leq</math> f <math>\leq</math> 5000 MHz)</p> <p>Measurement range</p> <p><math>\geq</math>42 dB</p>
Spectrum Emission Mask	<p>Frequency range</p> <p>Channel Bandwidth <math>\leq</math> 60 MHz</p> <p>600 MHz to 2.7 GHz, 3.3 GHz to 3.8 GHz (MU887000A/01A)</p> <p>600 MHz to 2.7 GHz, 3.3 GHz to 5.0 GHz (MU887000A/01A-001/101 option)</p> <p>600 MHz to 2.7 GHz, 3.3 GHz to 5.0 GHz (MU887002A)</p> <p>60 MHz &lt; Channel Bandwidth</p> <p>2.0 GHz to 2.7 GHz, 3.3 GHz to 3.8 GHz (MU887000A/01A)</p> <p>2.0 GHz to 2.7 GHz, 3.3 GHz to 5.0 GHz (MU887000A/01A-001/101 option)</p> <p>2.0 GHz to 2.7 GHz, 3.3 GHz to 5.0 GHz (MU887002A)</p> <p>Input level range</p> <p>-10 to +35 dBm (MU887000A test port 1 and 2, MU887001A all test port, MU887002A (TRX1/2) all test port)</p> <p>-10 to +25 dBm (MU887000A test port 3 and 4)</p>

## W-CDMA/HSPA Downlink TX Measurement MX887021A

Common Item	Measuring object W-CDMA/HSPA downlink Frequency range 600 MHz to 2.7 GHz
RF Power	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) Measurement accuracy After CAL, 10°C to 40°C MU887000A test port 1 and 2, MU887001A all test port ±0.3 dB (typ.) (-20 to +35 dBm, 20°C to 30°C) ±0.5 dB (-20 to +35 dBm) MU887000A test port 3 and 4 ±0.7 dB (-15 to +25 dBm)
Frequency/Modulation Measurement	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) Carrier frequency accuracy Average of 10 measurements, test model 4 signals ± (Setting frequency × Reference oscillator accuracy + 10 Hz) Modulation accuracy Average of 10 measurements, test model 4 signals ≤1%
Adjacent Channel Leakage Power Ratio	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) Measurement points ±5 MHz, ±10 MHz Measurement range ≥55 dB (UTRA Adj./Alt.)

## LTE FDD Downlink TX Measurement MX887023A

Common Item	Measuring object LTE FDD downlink signal Frequency range 600 MHz to 2.7 GHz, 3.4 GHz to 3.8 GHz
RF Power	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) Measurement accuracy After CAL, 10°C to 40°C MU887000A test port 1 and 2, MU887001A all test port ±0.3 dB (typ.) (-20 to +35 dBm, 20°C to 30°C) ±0.5 dB (-20 to +35 dBm) MU887000A test port 3 and 4 ±0.7 dB (-15 to +25 dBm)
Frequency/Modulation Measurement	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) Carrier frequency accuracy Measurement interval: 10, test model 3.1 signals ± (Setting frequency × Reference oscillator accuracy + 10 Hz) Modulation accuracy Residual EVM Measurement interval: 10, Test model 3.1 signals, Channel bandwidth: 3, 5, 10, 15, 20 MHz ≤1%
Adjacent Channel Leakage Power Ratio	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) 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.)

# 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) With the MU887002A, the output signal band must be within the above-described frequency range.
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## GSM/EDGE Downlink Waveforms MV887012A

Phase Error	$\leq 1^\circ$ rms (400 MHz $\leq f \leq 2.7$ GHz, GMSK) With the MU887002A, the output signal band must be within the above-described frequency range.
EVM	$\leq 1.8\%$ rms (400 MHz $\leq f \leq 2.7$ GHz, 8PSK) With the MU887002A, the output signal band must be within the above-described frequency range.

## 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) MU887002A (TRX1/2) all test port -7 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), $\leq 4\%$ rms (3.8 GHz $< f \leq 6.0$ GHz) With the MU887002A, the output signal band must be within the above-described frequency range.

## 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) MU887002A (TRX1/2) all test port -7 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), $\leq 4\%$ rms (3.8 GHz $< f \leq 6.0$ GHz) With the MU887002A, the output signal band must be within the above-described frequency range.

## CDMA2000 Forward Link Waveforms MV887015A

Waveform Quality	$> 0.99$ (400 MHz $\leq f \leq 2.7$ GHz) With the MU887002A, the output signal band must be within the above-described frequency range.
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## 1xEV-DO Forward Link Waveforms MV887016A

Waveform Quality	$> 0.99$ (400 MHz $\leq f \leq 2.7$ GHz, Pilot channel) With the MU887002A, the output signal band must be within the above-described frequency range.
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## TD-SCDMA Downlink Waveforms MV887017A

EVM	$\leq 3\%$ rms (400 MHz $\leq f \leq 2.7$ GHz) With the MU887002A, the output signal band must be within the above-described frequency range.
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## NR FDD sub-6 GHz Downlink Waveforms MV887018A

## NR TDD sub-6 GHz Downlink Waveforms MV887019A

Max. Output Level	MU887000A test port 1 and 2, MU887001A all test port -10 dBm ( $f \leq 3.8$ GHz), -18 dBm ( $f > 3.8$ GHz) MU887000A test port 3 and 4 0 dBm ( $f \leq 3.8$ GHz), -8 dBm ( $f > 3.8$ GHz) MU887002A (TRX1/2) all test port -5 dBm ( $f \leq 3.8$ GHz), -8 dBm ( $f > 3.8$ GHz)
EVM	$\leq 2\%$ rms (600 MHz $\leq f \leq 2.7$ GHz), $\leq 3\%$ rms (3.3 GHz $\leq f \leq 3.8$ GHz), $\leq 4\%$ rms (3.8 GHz $< f \leq 5.0$ GHz) With the MU887002A, the output signal band must be within the above-described frequency range.

# 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 (For MU887000A/01A, required MU887000A/01A-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, MU887002A (TRX1/2) all test port)</p> <p>Accuracy After CAL, 20°C to 30°C ±0.7 dB (-30 dBm ≤ p ≤ +25 dBm), ±1.0 dB (-50 dBm ≤ p &lt; -30 dBm) (MU887000A) ±0.7 dB (-20 dBm ≤ p ≤ +35 dBm), ±1.0 dB (-40 dBm ≤ p &lt; -20 dBm) (MU887001A, MU887002A)</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 (802.11a/b/g)</p> <p>Capture time 50 μs</p> <p>Measurement range (RBW: 100 kHz) -27 to +25 dBm (MU887000A) -17 to +35 dBm (MU887001A, MU887002A)</p> <p>Linearity CW, RBW: 100 kHz, Same as level linearity (MU887000A test port 3 and 4, MU887001A all test port, MU887002A (TRX1/2) 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, MU887002A)</p> <p>Residual EVM Signal level: &gt;-20 dBm (MU887000A), &gt;-10 dBm (MU887001A, MU887002A) all test port, Averaged over 20 packets &lt;-28 dB (DSSS) &lt;-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 &gt;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 &lt; ±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.          User specified measurement range          16 symbols (min.), 1000 symbols (max.)          OFDM pilot tracking          "Phase tracking only" or "Phase and Amplitude tracking".          Peak and Average EVM on all sub-carriers, dB or percentage          Peak and Average on each sub-carrier – frequency domain % vs. sub-carrier          EVM vs. Symbol – time domain % vs. Symbol number, 1 to max</p>
DSSS Additional Measurement	<p>Transmit center frequency tolerance          Definition: Average frequency of the DSSS carrier signal          Accuracy: <math>\pm</math> (Setting frequency <math>\times</math> Reference oscillator accuracy + 1 kHz)          Resolution: Hz to no decimal places, ppm to one decimal place          Chip clock frequency tolerance          Definition: Frequency error relative to the 11 MHz chip clock.          Measurement averaged over a fully coded DSSS packet with minimum payload length 3300 chips, 300 <math>\mu</math>s          Display format: Hz, ppm          Range: <math>\pm</math>50 ppm          Resolution: Hz to no decimal places, ppm to one decimal place          Data analysis width: 20 <math>\mu</math>s (220 chips) (min.)          User specified measurement range: 3300 to 30250 chips          Transmit power-on and power down ramp          Definition: Time for burst to transit from 10 to 90% or 90 to 10% of linear power.          Data outputs: 10%, 90%, Delta values          Resolution: 5 ns          RF carrier suppression          Method: IEEE Std 802.11-2007 (18.4.7.7), IQ offset method          IEEE method: Relative level of the carrier to the highest sideband for a 10101010 test pattern with scrambler disabled, data rate 2 Mbps.          IQ offset method: Calculated from the relative values of the peak frequency response and the channel center frequency with the data rate processing gain.</p>
OFDM Additional Measurement	<p>Transmit center frequency tolerance          Definition: Average frequency of the OFDM carrier signal          Data output format: Hz, ppm          Accuracy: <math>\pm</math> (Setting frequency <math>\times</math> Reference oscillator accuracy + 1 kHz) (&gt;1 ms packet)          Resolution: Hz to no decimal places, ppm to one decimal place          Symbol clock frequency tolerance          Definition: Frequency error relative to the 250 kHz symbol clock as per 19.4.7.3/17.3.9.5          Measurement averaged over a fully coded OFDM packet with a minimum payload length of 16 symbols (64 <math>\mu</math>s)          Data output format: Hz, ppm          Range: <math>\pm</math>40 ppm          Resolution: ppm to one decimal place          User specified measurement range: 16- (define numbers)          Transmitter center frequency leakage          Definition: Measurement of the leakage of the center carrier          Data output format: dB          Resolution: dB to two decimal places          Transmitter spectral flatness          Definition: Measurement of RF sub-carrier power level          Unit of measurement: dB</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          Occupied bandwidth          Measures the frequency range within which the specified percentage power is contained          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 (For MU887000A/01A, required MU887000A/01A-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, MU887002A (TRX1/2) all test port)</p> <p>Accuracy After CAL, 20°C to 30°C ±0.7 dB (-30 dBm ≤ p ≤ +25 dBm), ±1.0 dB (-50 dBm ≤ p &lt; -30 dBm) (MU887000A) ±0.7 dB (-20 dBm ≤ p ≤ +35 dBm), ±1.0 dB (-40 dBm ≤ p &lt; -20 dBm) (MU887001A, MU887002A)</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, MU887002A)</p> <p>Linearity CW, RBW: 100 kHz, Same as level linearity (MU887000A test port 3 and 4, MU887001A all test port, MU887002A (TRX1/2) 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, MU887002A)</p> <p>Residual EVM (Bandwidth: ≤80 MHz) Signal level: &gt;-10 dBm (MU887000A), 0 dBm (MU887001A, MU887002A), Averaged over 20 packets, Channel estimation: FULLPACKET &lt;-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 &gt;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>



# Measurement Software MX8870xxA Series/Waveforms MV887xxxA Series Specifications

OFDM Additional Measurement	<p>Transmit center frequency tolerance            Definition: Average frequency of the OFDM carrier signal            Data output format: Hz, ppm            Accuracy: <math>\pm</math> (Setting frequency <math>\times</math> Reference oscillator accuracy + 1 kHz) (&gt; 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 <math>\mu</math>s)            Data output format: Hz, ppm            Range: <math>\pm</math>40 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 (Automotive Connectivity V2X)

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 (For MU887000A/01A, required MU887000A/01A-001)</p>
RF Power	<p>Input level range            -65 to +25 dBm (MU887000A test port 3 and 4)            -55 to +35 dBm (MU887001A, MU887002A (TRX1/2) all test port)</p> <p>Measurement accuracy            After CAL, 20 to 30°C  <math>\pm</math>0.7 dB (-30 dBm <math>\leq</math> p <math>\leq</math> +25 dBm), <math>\pm</math>1.0 dB (-50 dBm <math>\leq</math> p &lt; -30 dBm) (MU887000A)  <math>\pm</math>0.7 dB (-20 dBm <math>\leq</math> p <math>\leq</math> +35 dBm), <math>\pm</math>1.0 dB (-40 dBm <math>\leq</math> p &lt; -20 dBm) (MU887001A, MU887002A)</p> <p>Bandwidth            5, 10, 20 MHz</p>
EVM (Modulation Accuracy)	<p>Measurement range            -20 to +25 dBm (MU887000A)            -10 to +35 dBm (MU887001A, MU887002A)</p> <p>Residual EVM (OFDM)            Signal level: &gt;-20 dBm (MU887000A), &gt;-10 dBm (MU887001A, MU887002A), Averaged over 20 packets,            Channel estimation: FULLPACKET            &lt;-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            Peak and average EVM on all sub-carriers, dB or percentage            Peak and average on each sub-carrier – frequency domain % vs. sub-carrier            EVM vs. Symbol – time domain % vs. Symbol number, 1 to max</p>
OFDM Additional Measurement	<p>Transmit center frequency tolerance            Definition: Average frequency of the OFDM carrier signal            Data output format: Hz and ppm            Measurement accuracy: <math>\pm</math> (Setting frequency <math>\times</math> Reference oscillator accuracy + 1 kHz) (packet: &gt;1 ms)            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            Data output format: dB            Resolution: dB to two decimal places</p> <p>Transmitter spectral flatness            Definition: Measurement of RF sub-carrier power level            Data output format: dB</p>

# Measurement Software MX8870xxA Series/Waveforms MV887xxxA Series Specifications

## WLAN 802.11ax TX Measurement MX887033A

Common Item	<p>Measuring object WLAN signal packet</p> <p>Frequency range 5 GHz Band: (For MU887000A/01A, required MU887000A/01A-001) 80 MHz BW: 4920 MHz to 5775 MHz 40 MHz BW: 4920 MHz to 5795 MHz 20 MHz BW: 4920 MHz to 5825 MHz</p> <p>2.4 GHz Band: 40 MHz BW: 2412 MHz to 2472 MHz 20 MHz BW: 2412 MHz to 2484 MHz</p>
RF Power	<p>Input level range -65 to +25 dBm (MU887000A test port 3 and 4) -55 to +35 dBm (MU887001A, MU887002A all test port)</p> <p>Accuracy After CAL, 20°C to 30°C ±0.7 dB (-30 dBm ≤ p ≤ +25 dBm), ±1.0 dB (-50 dBm ≤ p &lt; -30 dBm) (MU887000A) ±0.7 dB (-20 dBm ≤ p ≤ +35 dBm), ±1.0 dB (-40 dBm ≤ p &lt; -20 dBm) (MU887001A, MU887002A)</p> <p>Bandwidth 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, MU887002A)</p> <p>Linearity CW, RBW: 100 kHz, Same as level linearity (MU887000A test port 3 and 4, MU887001A, MU887002A 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) 20°C to 30°C Signal level: &gt;-10 dBm (MU887000A), 0 dBm (MU887001A, MU887002A), averaged over 20 packets, where each packet is no less than 16 data OFDM symbols long. And for each subcarrier except Pilots, all data OFDM symbol should have same data field pattern. Channel estimation: FULLPACKET, Measured at 5210 MHz &lt;-45 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>

# 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>
OFDM Additional Measurement	<p>Transmit center frequency tolerance Definition: Average frequency of the OFDM carrier signal Data output format: Hz, ppm Accuracy: <math>\pm</math> (Setting frequency <math>\times</math> Reference oscillator accuracy + 1 kHz) (&gt;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 symbol clock depends on Signal's Guard interval. If GI is 0.8 us, Symbol Clock is <math>(1 / (12.8 \text{ us} + 0.8 \text{ us})) = 73.529 \text{ kHz}</math> approx. If GI is 1.6 us, Symbol Clock is <math>(1 / (12.8 \text{ us} + 1.6 \text{ us})) = 69.444 \text{ kHz}</math> approx. If GI is 3.2 us, Symbol Clock is <math>(1 / (12.8 \text{ us} + 3.2 \text{ us})) = 62.500 \text{ kHz}</math> approx. Measurement averaged over a fully coded OFDM packet with a minimum payload length of 16 symbols. Data output format: Hz, ppm Range: <math>\pm 40</math> 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>

## 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 Bluetooth SIG RF test specification.</p>
RF Power	<p>Input level range -65 to +25 dBm (MU887000A test port 3 and 4) -55 to +35 dBm (MU887001A, MU887002A (TRX1/2) all test port)</p> <p>Measurement accuracy After CAL, 20°C to 30°C <math>\pm 0.7 \text{ dB}</math> (<math>-30 \text{ dBm} \leq p \leq +25 \text{ dBm}</math>), <math>\pm 1.0 \text{ dB}</math> (<math>-50 \text{ dBm} \leq p &lt; -30 \text{ dBm}</math>) (MU887000A) <math>\pm 0.7 \text{ dB}</math> (<math>-20 \text{ dBm} \leq p \leq +35 \text{ dBm}</math>), <math>\pm 1.0 \text{ dB}</math> (<math>-40 \text{ dBm} \leq p \leq -20 \text{ dBm}</math>) (MU887001A, MU887002A)</p>
EDR Relative Transmit Power	<p>Input level range -35 to +25 dBm (MU887000A) -25 to +35 dBm (MU887001A, MU887002A)</p> <p>Measurement Value Maximum, Minimum, Average differential power</p> <p>Relative power measurement range Relative power measurement range between the GFSK and <math>\pi/4</math>-DQPSK, 8-DSPK sections of the packet.</p> <p>Bandwidth 1.3 MHz (IF filter response 'flat' fc <math>\pm 550 \text{ kHz}</math>)</p> <p>Resolution (time domain) 0.01 dB</p>

# Measurement Software MX8870xxA Series/Waveforms MV887xxxA Series Specifications

Bluetooth Modulation	<p>GFSK, <math>\pi/4</math>-DQPSK, 8-DSPK</p> <p>Input level range          -20 to +25 dBm (MU887000A)          -10 to +35 dBm (MU887001A, MU887002A)</p> <p>Residual DEVM          Signal level: &gt;-20 dBm (MU887000A), &gt;-10 dBm (MU887001A, MU887002A), Averaged over 10 packets          &lt;5%</p> <p>Resolution          0.1%</p> <p>GFSK          Deviation measurement range: 0 to 350 kHz          Accuracy: Modulation index: 0.32, Signal level: &gt;-20 dBm (MU887000A), &gt;-10 dBm (MU887001A, MU887002A),          Averaged over 10 packets          1% (<math>\pm 0.01 \times</math> expected deviation [Hz]) (nom.)</p> <p>Initial carrier frequency tolerance          Input level range: -35 to +25 dBm (MU887000A)          -25 to +35 dBm (MU887001A, MU887002A)</p> <p>Initial frequency range: 0 to <math>\pm 150</math> kHz          Resolution: 1 kHz</p> <p>Carrier-frequency drift          Input signal range: -35 to +25 dBm (MU887000A)          -25 to +35 dBm (MU887001A, MU887002A)</p> <p>Frequency drift range: 0 to <math>\pm 200</math> kHz          Time settings: 50 <math>\mu</math>s, &gt;2000 <math>\mu</math>s</p>
EDR Carrier Frequency Stability	<p>Measurement range  <math>\pm 100</math> kHz</p> <p>Resolution          1 kHz</p> <p>Accuracy          Signal level: &gt;-20 dBm (MU887000A), &gt;-10 dBm (MU887001A, MU887002A), Averaged over 10 packets  <math>\pm</math> (Setting frequency <math>\times</math> Reference oscillator accuracy + 500 Hz)</p> <p>Displayed results          Initial frequency error <math>\omega_i</math>, Frequency error <math>\omega_o</math>, Frequency error <math>\omega_i + \omega_o</math></p>
EDR Modulation Accuracy	<p>RMS DEVM range          0 to 30% (<math>\pi/4</math>-DQPSK), 0 to 20% (8-DSPK)</p> <p>Peak DEVM range          0 to 50% (<math>\pi/4</math>-DQPSK), 0 to 30% (8-DSPK)</p>
BLE Modulation Characteristics	<p>GFSK</p> <p>Input level range          -35 to +25 dBm (MU887000A)          -25 to +35 dBm (MU887001A, MU887002A)</p> <p>Frequency deviation range          0 to <math>\pm 500</math> kHz peak</p> <p>Resolution          1 kHz</p> <p>Accuracy          Modulation index: 0.5, Signal level: &gt;-20 dBm (MU887000A), &gt;-10 dBm (MU887001A, MU887002A), Averaged over 10 packets          1% (<math>\pm 0.01 \times</math> 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, MU887002A)</p> <p>Frequency range          0 to <math>\pm 500</math> kHz</p> <p>Accuracy          Signal level: &gt;-20 dBm (MU887000A), &gt;-10 dBm (MU887001A, MU887002A), Averaged over 10 packets  <math>\pm</math> (Setting frequency <math>\times</math> Reference oscillator accuracy + 500 Hz)</p> <p>Displayed results          Carrier frequency error, Frequency drift, Drift rate</p>

## Short Range Wireless Average Power and Frequency Measurement MX887050A

<p>RF Power (CW and Continuously Modulated)</p>	<p>Frequency range 2.4 GHz band: 2402 MHz to 2484 MHz 5 GHz band: 4920 MHz to 5825 MHz (For MU887000A/01A, required MU887000A/01A-001)</p> <p>Input level range -65 to +25 dBm (MU887000A test port 3 and 4) -55 to +35 dBm (MU887001A, MU887002A)</p> <p>Accuracy After CAL 400 MHz ≤ f &lt; 3.8 GHz, 10°C to 40°C ±0.7 dB (-30 ≤ p ≤ +25 dBm) ±0.9 dB (-55 ≤ p &lt; -30 dBm) ±1.1 dB (-65 ≤ p &lt; -55 dBm) 3.8 GHz ≤ f ≤ 6 GHz, 20°C to 30°C ±0.7 dB (-30 ≤ p ≤ +25 dBm) ±0.9 dB (-55 ≤ p &lt; -30 dBm) ±1.1 dB (-65 ≤ p &lt; -55 dBm)</p> <p>Linearity CW, RBW: 100 kHz ±0.2 dB (≥ -55 dBm, -40 to 0 dB)</p>
<p>Frequency (CW)</p>	<p>Input level range -35 to +25 dBm (MU887000A) -25 to +35 dBm (MU887001A, MU887002A)</p> <p>Frequency range 0 to ±500 kHz</p> <p>Accuracy ± (Setting frequency × Reference oscillator accuracy + 500 Hz)</p>

## IEEE 802.15.4 TX Measurement MX887060A

<p>Common Item</p>	<p>Frequency range 440 MHz to 2500 MHz</p>
<p>RF Power</p>	<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°C 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>Modulation Analysis</p>	<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 ≤ 1.5%</p> <p>Carrier frequency accuracy ± (Setting frequency × Reference oscillator accuracy + 20 Hz)</p>

## Z-Wave TX Measurement MX887061A

Common Item	Frequency range 440 MHz to 1000 MHz
RF Power	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) Accuracy After CAL, 10°C 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)
Modulation Analysis	Input level range Analysis length: 200 bits –30 to +35 dBm (MU887000A test port 1 and 2, MU887001A all test port) –30 to +25 dBm (MU887000A test port 3 and 4) Carrier frequency accuracy ± (Setting frequency × Reference oscillator accuracy + 20 Hz)

## Category M FDD Uplink TX Measurement MX887065A

Common Item	Measuring Object PUSCH, PUCCH Frequency Range 600 MHz to 2.7 GHz, 3.4 GHz to 3.8 GHz 600 MHz to 2.7 GHz, 3.4 GHz to 4.2 GHz (For MU887000A/01A, required MU887000A/01A-001)
RF Power	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) Measurement Accuracy 600 MHz to 2.7 GHz, 3.4 GHz to 3.8 GHz, After CAL, 10°C to 40°C MU887000A test port 1 and 2, MU887001A all test port ±0.3 dB (typ.) (–20 to +35 dBm, 20°C to 30°C) ±0.5 dB (–20 to +35 dBm) ±0.7 dB (–50 to –20 dBm) ±0.9 dB (–60 to –50 dBm) 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) 3.8 GHz to 4.2 GHz, After CAL, 20°C to 30°C MU887000A test port 1 and 2, MU887001A all test port ±0.7 dB (–20 to +35 dBm) ±0.9 dB (–50 to –20 dBm) ±1.1 dB (–60 to –50 dBm) 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)
Frequency/Modulation Measurement	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) Carrier Frequency Accuracy ± (Setting frequency × Reference oscillator accuracy + 15 Hz) Modulation Analysis Residual EVM: Average of 20 measurements ≤2.5% In-Band Emission In signal condition with Input Level ≥–10 dBm ≤–40 dBc



# Measurement Software MX8870xxA Series/Waveforms MV887xxxA Series Specifications

Occupied bandwidth	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)
Adjacent channel leakage power ratio	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) Measurement Range ≥45 dB (E-UTRA ACLR1) ≥50 dB (UTRA ACLR1) ≥55 dB (UTRA ACLR2)
Spectrum Emission Mask	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)

## NB-IoT Uplink TX Measurement MX887067A

Common Item	Measuring object NPUSCH Frequency range 600 MHz to 2.7 GHz, 3.4 GHz to 3.8 GHz 600 MHz to 2.7 GHz, 3.4 GHz to 4.2 GHz (For MU887000A/01A, required MU887000A/01A-001)
RF Power	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) Measurement accuracy 600 MHz to 2.7 GHz, 3.4 GHz to 3.8 GHz, After CAL, 10°C to 40°C MU887000A test port 1 and 2, MU887001A all test port ±0.3 dB (typ.) (-20 to +35 dBm, 20°C to 30°C) ±0.5 dB (-20 to +35 dBm) ±0.7 dB (-50 to -20 dBm) ±0.9 dB (-60 to -50 dBm) 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) 3.8 GHz to 4.2 GHz, After CAL, 20°C to 30°C MU887000A test port 1 and 2, MU887001A all test port ±0.7 dB (-20 to +35 dBm) ±0.9 dB (-50 to -20 dBm) ±1.1 dB (-60 to -50 dBm) 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)
Frequency/Modulation Measurement	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) Carrier frequency accuracy ± (Setting frequency × Reference oscillator accuracy + 15 Hz) Modulation analysis Residual EVM: Average of 20 measurements ≤1% In-band emission In signal condition with Input Level ≥-10 dBm ≤-40 dBc
Occupied Bandwidth	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)
Adjacent Channel Leakage Power Ratio	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) Measurement range ≥47 dB (GSM ACLR) ≥50 dB (UTRA ACLR)
Spectrum Emission Mask	Input level range -10 to +35dBm (MU887000A test port 1 and 2, MU887001A all test port) -10 to +25dBm (MU887000A test port 3 and 4)

## LTE-V2X Tx Measurement MX887068A

Common Item	Measuring object PSSCH Frequency range 5855 MHz to 5925 MHz (For MU887000A/01A, required MU887000A/01A-001)
RF Power	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) Measurement accuracy After CAL, 20°C to 30°C MU887000A test port 1 and 2, MU887001A all test port ±0.7 dB (-20 to +35 dBm) ±1.1 dB (-50 to -20 dBm) MU887000A test ports 3, 4 ±0.7 dB (-30 to +25 dBm) ±1.1 dB (-50 to -30 dBm)
Frequency/Modulation Measurement	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) Carrier frequency accuracy 20°C to 30°C ± (Setting Frequency × Reference Oscillator Accuracy + 36 Hz) Modulation analysis Residual EVM: Average of 20 measurements 20°C to 30°C ≤2.5% In-band emission In signal condition with Input Level ≥-10 dBm, Allocated RB ≤18 20°C to 30°C ≤-40 dBc
Occupied Bandwidth	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)
Adjacent Channel Leakage Power Ratio	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) Measurement range 20°C to 30°C ≥42 dB (E-UTRA ACLR1)
Spectrum Emission Mask	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)

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

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

## 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, π/4-DQPSK, 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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## Category M FDD Downlink Waveforms MV887065A

Max. Output Level	MU887000A test port 1 and 2, MU887001A all test port -12 dBm (f ≤ 3.8 GHz), -20 dBm (f > 3.8 GHz) MU887000A test port 3 and 4 -2 dBm (f ≤ 3.8 GHz), -10 dBm (f > 3.8 GHz)
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## NB-IoT Downlink Waveforms MV887067A

Max. Output Level	MU887000A test port 1 and 2, MU887001A all test port -12 dBm (f ≤ 3.8 GHz), -20 dBm (f > 3.8 GHz) MU887000A test port 3 and 4 -2 dBm (f ≤ 3.8 GHz), -10 dBm (f > 3.8 GHz)
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## LTE-V2X Waveform Files MV887068A

Max. Output Level	MU887000A test port 1 and 2, MU887001A all test port -12 dBm (f ≤ 3.8 GHz), -20 dBm (f > 3.8 GHz) MU887000A test port 3 and 4 -2 dBm (f ≤ 3.8 GHz), -10 dBm (f > 3.8 GHz)
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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</p> <p>Frequency range                      65 MHz to 110 MHz</p>
TX Measurements	<p>Measurement functions</p> <ul style="list-style-type: none"> <li>Amplitude</li> <li>Carrier frequency</li> <li>Frequency deviation</li> <li>Occupied bandwidth</li> <li>Pilot frequency deviation</li> <li>Audio frequency deviation</li> <li>Audio frequency</li> <li>Pilot frequency</li> <li>THD</li> <li>THD+N/SINAD</li> <li>SNR</li> </ul> <p>Audio filter</p> <ul style="list-style-type: none"> <li>Low-pass: Off, 3 kHz, 15 kHz, 20 kHz, 30 kHz</li> <li>High-pass: Off, 20 Hz, 100 Hz, 400 Hz</li> <li>De-emphasis: Off, 50 <math>\mu</math>s, 75 <math>\mu</math>s</li> <li>Bandpass (Weighting filter): Off, A-Weighting (IEC 61672: 2003), C-Message, CCITT (ITU-T O.41)</li> </ul> <p>Input level range                      -30 to +15 dBm</p> <p>Level accuracy                      10°C to 40°C, Measurement bandwidth: 1.2 MHz, <math>-30 \text{ dBm} \leq p \leq +15 \text{ dBm}</math>  <math>\pm 0.7 \text{ dB}</math></p> <p>Carrier frequency accuracy                      FM monaural modulation, Tone: 1 kHz, Deviation: 75 kHz  <math>\pm (\text{Setting frequency} \times \text{Reference oscillator accuracy} + 1 \text{ Hz})</math></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 <math>\mu</math>s)                      &gt;55 dB</p> <p>Demodulation signal analysis</p> <ul style="list-style-type: none"> <li>No. of FFT points: 65536</li> <li>Sampling rate: 152 kHz</li> <li>FFT window function: Hanning window</li> </ul>
RX Measurements	<p>Measurement functions</p> <ul style="list-style-type: none"> <li>FM waveform output</li> </ul> <p>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                      &gt;50 dB (SINAD)</p> <p>Resolution: 0.1 Hz</p> <p>Internal modulation signal</p> <ul style="list-style-type: none"> <li>AF tone                             <ul style="list-style-type: none"> <li>L channel (Mono): 1 to 8 tones</li> <li>R channel: 1 to 8 tones</li> </ul> </li> </ul> <p>Frequency range                      20 Hz to 20 kHz, Resolution: 0.1 Hz</p>

# Measurement Software MX8870xxA Series/Waveforms MV887xxxA Series Specifications

## Audio Signal Measurements

With MU887000A/01A-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"> <li>Amplitude</li> <li>Frequency</li> <li>Distortion ratio measurement</li> <li>Crosstalk</li> <li>THD</li> <li>THD+N/SINAD</li> <li>SNR</li> </ul> <p>Analog measurements</p> <ul style="list-style-type: none"> <li>All single-tone measurement standard values</li> <li>Impedance: 100 k<math>\Omega</math> (AC coupling)</li> <li>Frequency <ul style="list-style-type: none"> <li>Frequency range: 20 Hz to 20 kHz</li> </ul> </li> <li>Input level <ul style="list-style-type: none"> <li>Level range: 1 mV<sub>peak</sub> to 5 V<sub>peak</sub> (30 V rms, max.)</li> <li>Setting range: 50 mV<sub>peak</sub>, 500 mV<sub>peak</sub>, 5 V<sub>peak</sub></li> <li>Level accuracy: <math>\pm 0.4</math> dB (20°C to 30°C)</li> </ul> </li> <li>THD+N (total harmonic distortion + noise) <ul style="list-style-type: none"> <li>&lt;-60 dB (at 1 kHz, 2 V<sub>peak</sub>, 20 Hz to 20 kHz bandwidth, 5 V<sub>peak</sub> range, 20°C to 30°C)</li> </ul> </li> <li>Crosstalk <ul style="list-style-type: none"> <li>L/R: &gt; 60 dB</li> </ul> </li> <li>AF signal analysis <ul style="list-style-type: none"> <li>Sampling rate: 192 kHz</li> <li>No. of FFT points: 65536</li> <li>FFT window function: Hanning window</li> </ul> </li> </ul> <p>Digital measurement</p> <ul style="list-style-type: none"> <li>All single-tone measurement standard values</li> <li>Bit resolution: 16 bits/24 bits</li> <li>Sampling rate <ul style="list-style-type: none"> <li>Frequency: 16, 32, 44.1, 48 kHz</li> </ul> </li> <li>AF signal analysis <ul style="list-style-type: none"> <li>No. of FFT points: 16384 (sampling rates of 48 kHz, 44.1 kHz)</li> <li>8192 (sampling rate of 32 kHz)</li> <li>4096 (sampling rate of 16 kHz)</li> <li>FFT window function: Hanning window</li> </ul> </li> </ul>
RX Measurement	<p>Analog measurements</p> <ul style="list-style-type: none"> <li>All single-tone measurement standard values</li> <li>Impedance: 1 <math>\Omega</math> (AC coupling) (nom.)</li> <li>Output waveform: Single tone, Multi-tone</li> <li>Frequency <ul style="list-style-type: none"> <li>Frequency range: 20 Hz to 20 kHz</li> <li>Frequency resolution: 0.01 Hz</li> </ul> </li> <li>Output level <ul style="list-style-type: none"> <li>Level range: 0 (off), 1 mV to 5 V<sub>peak</sub> (100 k<math>\Omega</math> termination)</li> <li>Resolution: 1 mV (<math>\leq 5</math> V<sub>peak</sub>)</li> <li>100 <math>\mu</math>V (<math>\leq 500</math> mV<sub>peak</sub>)</li> <li>10 <math>\mu</math>V (<math>\leq 50</math> mV<sub>peak</sub>)</li> <li>Accuracy: <math>\pm 0.3</math> dB (at 1 kHz, 100 k<math>\Omega</math> termination, 20°C to 30°C)</li> <li>Maximum output current <ul style="list-style-type: none"> <li>100 mA (nom.) (Do not do short circuit)</li> </ul> </li> <li>THD+N (Total harmonic distortion + noise) <ul style="list-style-type: none"> <li>&lt;-60 dB (at 1 kHz, 1 V<sub>peak</sub>, 20 Hz to 20 kHz bandwidth, 100 k<math>\Omega</math> termination, 20°C to 30°C)</li> </ul> </li> </ul> <p>Digital measurement</p> <ul style="list-style-type: none"> <li>All single-tone measurement standard values</li> <li>Output waveform: Single tone, Multi-tone</li> <li>Frequency <ul style="list-style-type: none"> <li>Frequency range: 20 Hz to 20 kHz (44.1 kHz, 48 kHz sampling)</li> <li>20 Hz to 14 kHz (32 kHz sampling)</li> <li>20 Hz to 7 kHz (16 kHz sampling)</li> </ul> </li> <li>Resolution: 0.01 Hz</li> <li>Output level <ul style="list-style-type: none"> <li>Level range: Full scale to (Full scale - 40 dB)</li> <li>Resolution: 0.1 dB</li> </ul> </li> <li>Bit resolution: 16 bits/24 bits</li> <li>Sampling rate <ul style="list-style-type: none"> <li>Frequency: 16, 32, 44.1, 48 kHz</li> </ul> </li> </ul> </li></ul>

# Universal Wireless Test Set MT8870A Ordering Information

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

Model/Order No.	Name
MT8870A	<b>Main frame</b> Universal Wireless Test Set
	<b>Standard Accessories</b>
B0666B	Power Cord: 1 pc Blank Panel: 0 to 4 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)
	<b>Options</b>
MT8870A-001	GPIB Control
MT8870A-101/201	GPIB Control Retrofit
	<b>Warranty</b>
MT8870A-ES210	2 Years Extended Warranty Service
MT8870A-ES310	3 Years Extended Warranty Service
MT8870A-ES510	5 Years Extended Warranty Service
	<b>Application Parts</b>
B0666B	Blank Panel
B0664A	Rack Mount Kit (MT8870A)
B0665A	Carrying Case (MT8870A)
B0775A	Carrying Case (MU88700xA)
B0669A*2	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)
J1941A	2way Low Amplitude Error Divider
J1942A	4way Low Amplitude Error Divider

\*1: Installed in empty slots

\*2: Cannot be shipped to EU because not RoHS10 compliant

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

Model/Order No.	Name
	<b>Test Module</b>
MU887000A	TRX Test Module
MU887001A	TRX Test Module
MU887002A	TRX Test Module
	<b>Standard Accessories</b>
	DVD-R: 1 pc
W3606AE	MU887000A Operation Manual (DVD-R)
W3720AE	MU887001A TRX Test Module Operation Manual
W4048AE	MU887002A TRX Test Module Operation Manual
KUWM-32-M4-16-OR	Plastic Wing Knob
	<b>Options</b>
MU887000A-001	6 GHz Frequency Extension
MU887000A-101/201	6 GHz Frequency Extension Retrofit
MU887000A-002	Audio Measurement Hardware
MU887000A-102/202	Audio Measurement Hardware Retrofit
MU887001A-001	6 GHz Frequency Extension
MU887001A-101/201	6 GHz Frequency Extension Retrofit
MU887001A-002	Audio Measurement Hardware
MU887001A-102/202	Audio Measurement Hardware Retrofit
	<b>Warranty</b>
MU887000A-ES210	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
MU887002A-ES210	2 Years Extended Warranty Service
MU887002A-ES310	3 Years Extended Warranty Service
MU887002A-ES510	5 Years Extended Warranty Service

## Universal Wireless Test Set MT8872A Ordering Information

Model/Order No.	Name
MT8872A	<b>Main Frame</b> Universal Wireless Test Set
	<b>Standard Accessories</b>
B0666A	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	MT8872A Operation Manual (DVD-R)
W3606AE	MU887000A Operation Manual (DVD-R)
	<b>Options</b>
MT8872A-001	GPIB Control
MT8872A-101	GPIB Control Retrofit
	<b>Warranty</b>
MT8872A-ES210	2 Years Extended Warranty Service
MT8872A-ES310	3 Years Extended Warranty Service
MT8872A-ES510	5 Years Extended Warranty Service
	<b>Application Parts</b>
B0666A	Blank Panel
B0774A	Carrying Case (MT8872A)
B0775A	Carrying Case (MU88700xA)
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
	<b>Test Module</b>
MU887000A	TRX Test Module
MU887001A	TRX Test Module
MU887002A	TRX Test Module
	<b>Standard Accessories</b>
	DVD-R: 1 pc
W3606AE	MU887000A Operation Manual (DVD-R)
W3720AE	MU887001A TRX Test Module Operation Manual
W4048AE	MU887002A TRX Test Module Operation Manual
KUWM-32-M4-16-OR	Plastic Wing Knob
	<b>Options</b>
MU887000A-001	6 GHz Frequency Extension
MU887000A-101/201	6 GHz Frequency Extension Retrofit
MU887000A-002	Audio Measurement Hardware
MU887000A-102/202	Audio Measurement Hardware Retrofit
MU887001A-001	6 GHz Frequency Extension
MU887001A-101/201	6 GHz Frequency Extension Retrofit
MU887001A-002	Audio Measurement Hardware
MU887001A-102/202	Audio Measurement Hardware Retrofit
	<b>Warranty</b>
MU887000A-ES210	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
MU887002A-ES210	2 Years Extended Warranty Service
MU887002A-ES310	3 Years Extended Warranty Service
MU887002A-ES510	5 Years Extended Warranty Service



## Measurement Software/Waveforms Ordering Information

Measurement Software		MU887002A Support Status*1
MX887010A	Cellular Standards Sequence Measurement	○
MX887011A	W-CDMA/HSPA Uplink TX Measurement	○
MX887012A	GSM/EDGE Uplink TX Measurement	○
MX887013A	LTE FDD Uplink TX Measurement	○
MX887013A-001	LTE-Advanced FDD Uplink CA TX Measurement	○
MX887014A	LTE TDD Uplink TX Measurement	○
MX887014A-001	LTE-Advanced TDD Uplink CA TX Measurement	○
MX887015A	CDMA2000 Reverse Link TX Measurement	○
MX887016A	1xEV-DO Reverse Link TX Measurement	○
MX887017A	TD-SCDMA Uplink TX Measurement	○
MX887018A	NR FDD sub-6 GHz Uplink TX Measurement	○
MX887018A-001	NR FDD Contiguous ENDC TX Measurement	○
MX887019A	NR TDD sub-6 GHz Uplink TX Measurement	○
MX887019A-001	NR TDD Contiguous ENDC 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	△
MX887033A	WLAN 802.11ax TX Measurement*2	○
MX887040A	Bluetooth TX Measurement	○
MX887040A-001	DLE TX Measurement*3	○
MX887040A-002	2LE TX Measurement*3, *4	○
MX887040A-003	BLR TX Measurement*3, *4	○
MX887050A	Short Range Wireless Average Power and Frequency Measurement	○
MX887060A	IEEE 802.15.4 TX Measurement	△
MX887061A	Z-Wave TX Measurement	△
MX887065A	Category M FDD Uplink TX Measurement	△
MX887067A	NB-IoT Uplink TX Measurement	△
MX887068A	LTE-V2X Tx Measurement*5	△
MX887070A	FM/Audio TRX Measurement*6	—
MX887090A	Multi-DUT Measurement Scheduler	○

\*1: ○: Supported, △: To be Supported, —: Not Supported

\*2: Requires MU887000A/01A-001 for 5 GHz (802.11a/n/p/ac) frequency measurements

\*3: Requires MX887040A

\*4: Requires MX887040A-001

\*5: Requires MU887000A/01A-001

\*6: Requires MU887000A/01A-002 for audio signal measurements

\*7: Requires MV887040A

\*8: Requires MV887040A-001

\*9: Requires MV887100A

Waveforms		MU887002A Support Status*1
MV887011A	W-CDMA/HSPA Downlink Waveforms	○
MV887012A	GSM/EDGE Downlink Waveforms	○
MV887013A	LTE FDD Downlink Waveforms	○
MV887014A	LTE TDD Downlink Waveforms	○
MV887015A	CDMA2000 Forward Link Waveforms	○
MV887016A	1xEV-DO Forward Link Waveforms	○
MV887017A	TD-SCDMA Downlink Waveforms	○
MV887018A	NR FDD sub-6 GHz Downlink Waveforms	○
MV887019A	NR TDD sub-6 GHz 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*2	△
MV887033A	WLAN 802.11ax Waveforms*2	○
MV887040A	Bluetooth Waveforms	○
MV887040A-001	DLE Waveforms*7	○
MV887040A-002	2LE Waveforms*7, *8	○
MV887040A-003	BLR Waveforms*7, *8	○
MV887060A	IEEE 802.15.4 Waveforms	△
MV887061A	Z-Wave Waveforms	△
MV887065A	Category M FDD Downlink Waveforms	△
MV887067A	NB-IoT Downlink Waveforms	△
MV887068A	LTE-V2X Waveforms*5	△
MV887070A	FM RDS Waveforms	—
MV887100A	GPS Waveforms	○
MV887100A-002	GPS L5 Waveforms*9	△
MV887101A	Galileo Waveforms	○
MV887102A	GLONASS Waveforms	○
MV887103A	BeiDou Waveforms	○
MV887104A	QZSS Waveforms	△
MV887110A	DVB-H Waveforms	○
MV887111A	ISDB-T Waveforms	○
MV887112A	ISDB-Tmm Waveforms	—

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