



# Radio Communication Analyzer MT8821C

# Radio Communication Analyzer MT8821C

**MT8821C** is an all-in-one tester designed for RF verification and functional tests of mobile phone incl. Smartphone. It supports all cellular technologies including LTE-Advanced and IoT in accordance with 3GPP RF relating test specifications: TS36.521-1 Chapter 6, 7. It also equips Call-processing mode which must remove the difficulty of chipset control and reduce development terms with simple operation.

## ✓ LTE/LTE- Advanced

- DL CA 8CCs 4x4MIMO \*\*\*
- DL CA 6CCs 4x4MIMO \*\*
- DL CA 4CCs 4x4MIMO \*
- DL CA 4CCs 2x2 MIMO
- UL CA 2CCs

## ✓ IoT systems

- LTE Cat-M1
- NB-IoT, Cat-NB2

## ✓ W-CDMA

- HSPA Evolution
- DB/DC-HSDPA
- 4C-HSDPA
- DC-HSUPA

## ✓ GSM

- GPRS
- EGPRS

## ✓ TD-SCDMA

- HSPA
- HSPA Evolution

✓ Enhanced GUI with large touch panel

✓ ParallelPhone measurement (e.g. Cat.M1 + NB-IoT)

✓ Built-in application/IMS server

✓ Compatibility with MT8820C



- ✓ Up to 8Tx RF/2 Rx RF
- ✓ Frequency range:
  - 30 MHz to 3.8 GHz
  - 3.8 GHz to 6.0 GHz (Option)
- ✓ Built-in front end

\* : Requires 2 boxes of MT8821C

\*\* : Requires 3 boxes of MT8821C

\*\*\* : Requires 4 boxes of MT8821C

# All-In One Tester for LTE-Advanced UE Development

The all-in-one MT8821C supports RF parametric tests through to UE functional and performance tests in one box. It is the perfect solution for development of RF chipsets and UE.



## ◆ RF Verification Tests

- UE TRX Tests
- UE Calibration
- RRM (Inter-RAT Measurements)

## ◆ Functional Tests

- OTA
- SAR
- IP Throughput
- Power Consumption
- VoLTE Voice/Video Echoback Tests

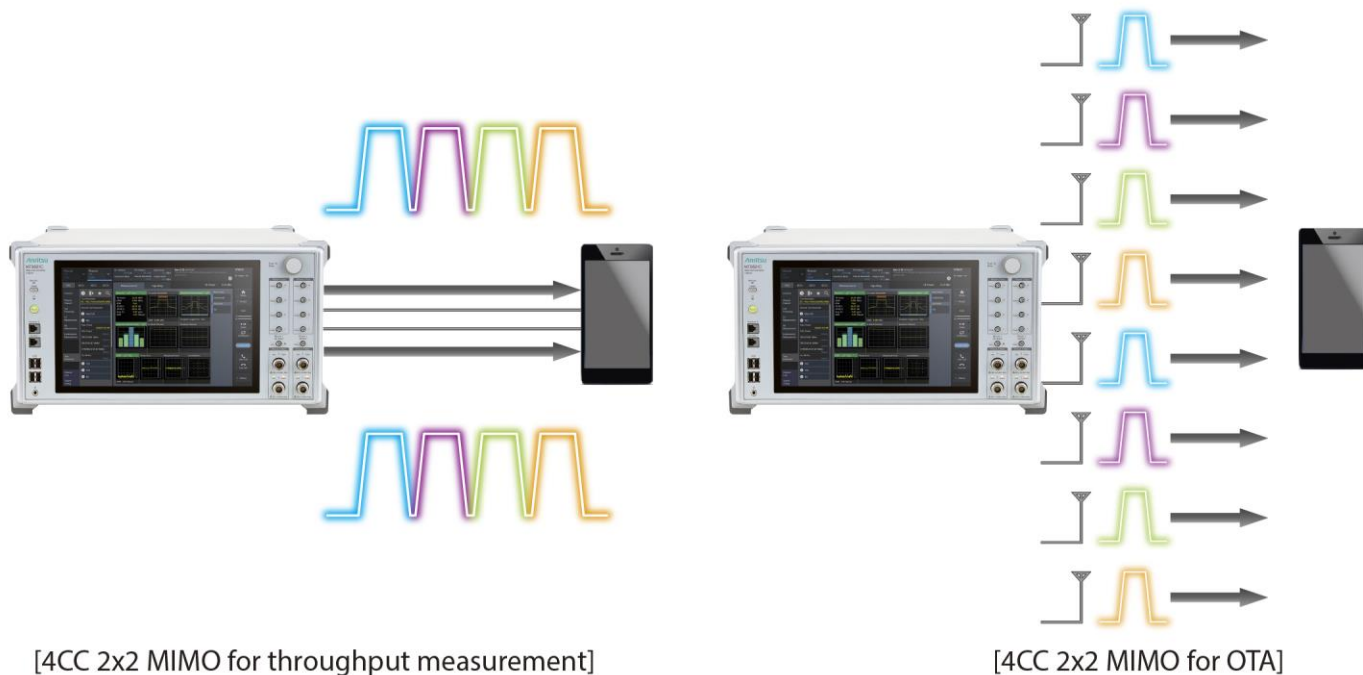
# Internal RF Frontend

The MT8821C supports up to 8 TX RF (when AUX ports used). It can also combine RF signals using the built-in RF frontend for LTE CA.

**This is the original feature of MT8821C** which enables users to simplify the test connection diagram because users do not need to prepare the external combiner.

## ◆Combining RF signals

The following combination can be selected according to the user's purpose.



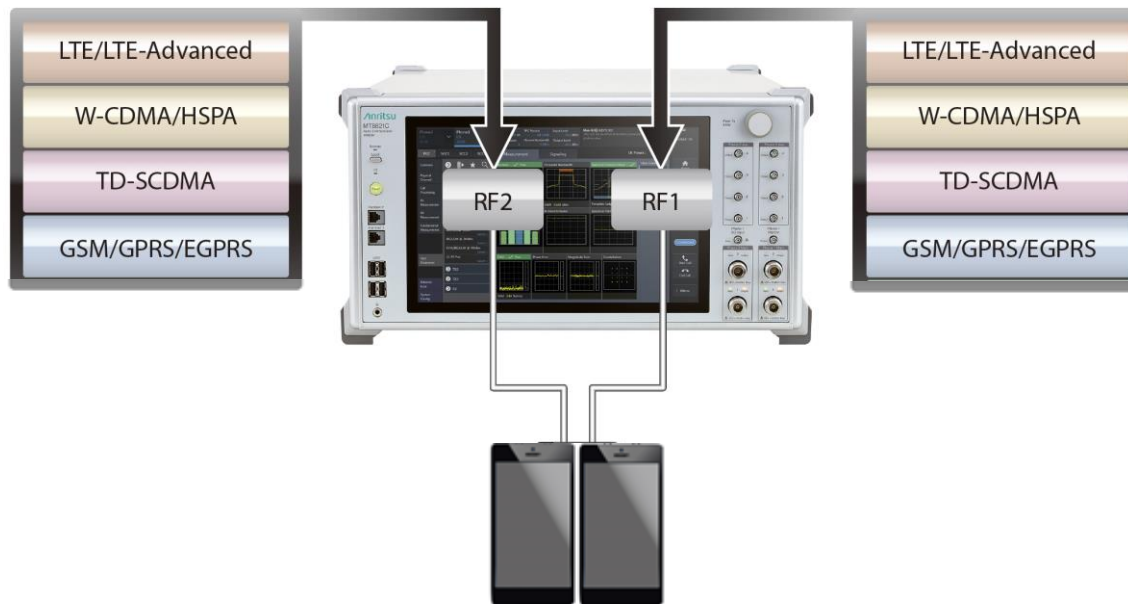
# Multi-RAT Measurement

One MT8821C can perform two measurements simultaneously. Anritsu calls this function Parallel-Phone Measurement or PPM.

It supports simultaneous and independent testing of two UEs.

The MT8821C contribute to reduce user's burden for test...

- SGLTE/SVLTE
- DSDA
- RRM (Inter-RAT measurement)
- Two UEs measurement (e.g. LTE Cat-M1 and NB-IoT)



# MT8821C LTE Support Status (Physical layer)

Legend	Throughput Support Status	Number of Units	FDD/TDD Joint CA	LAA
	White	: Max. throughput	<ul style="list-style-type: none"> <li><span style="display: inline-block; width: 10px; height: 10px; background-color: #2e8b57; margin-right: 5px;"></span> : Supported by 1 unit</li> <li><span style="display: inline-block; width: 10px; height: 10px; background-color: #00b0f0; margin-right: 5px;"></span> : Supported by 2 units</li> <li><span style="display: inline-block; width: 10px; height: 10px; background-color: #ffd700; margin-right: 5px;"></span> : Supported by 3 units</li> <li><span style="display: inline-block; width: 10px; height: 10px; background-color: #ff69b4; margin-right: 5px;"></span> : Supported by 4 units</li> </ul>	☆ : supported*1

\*1: When PCC is TDD with FDD/TDD joint CA, UL/DL Configuration 1 is supported.

\*2: PCC is FDD. SCC is FDD or TDD or LAA.

## DL CA Throughput (No limitation even with inter-band non-contiguous CA case)

CA	1	2	3	4	5	6 <sup>*4</sup>	7 <sup>*4</sup>	8 <sup>*4</sup>
4x4 MIMO (256QAM)	400 Mbps	800 Mbps	1200 Mbps	1600 Mbps	2000 Mbps	2400 Mbps	2800 Mbps	3200 Mbps
2x2 MIMO (256QAM)	200 Mbps	400 Mbps	600 Mbps	800 Mbps	1000 Mbps	1200 Mbps	1400 Mbps	1600 Mbps
SISO (256QAM)	100 Mbps	200 Mbps	300 Mbps	400 Mbps	500 Mbps	600 Mbps	700 Mbps	800 Mbps

\*3: Only supports PCC FDD frame structure among several CCs. Considering future support for TDD

\*4: CA with all-TDD band combination is not supported.

## UL CA Throughput

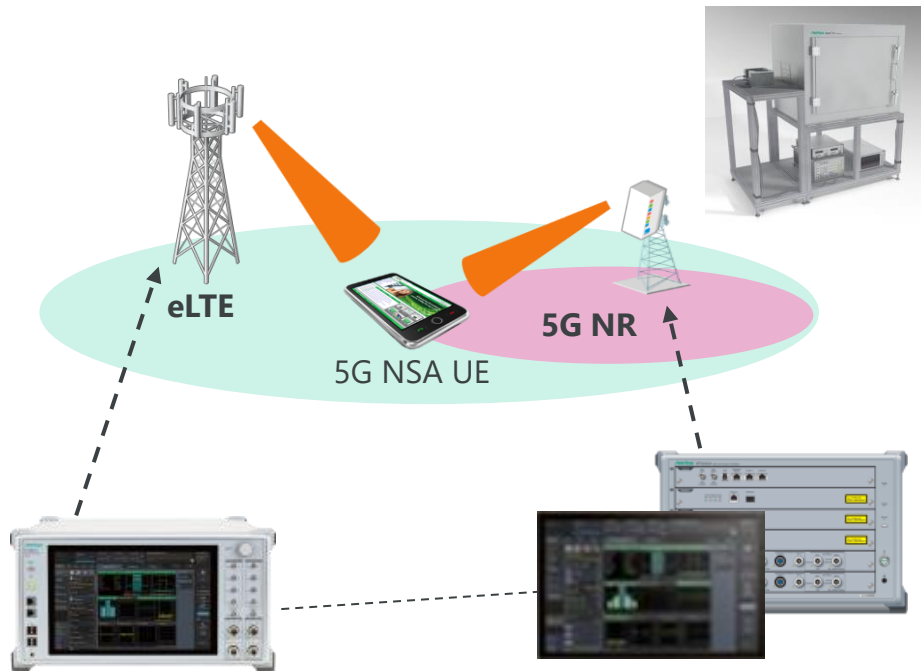
SISO (64QAM)	75 Mbps	150 Mbps
CA	1	2

# RF Test Configuration for 5G NSA (MT8000A + MT8821C NSA)

## ■ Outline of the option

- 4G Anchor function\*1 to realize RF measurement of 5G NSA UE by connecting with 5G tester
- 4G Anchor also supports MIMO and CA if required options are equipped. (required options are same as MT8821C LTE configuration)

\*1: LTE IP data transfer function during connected with 5G tester is not supported.



NSA-NR Network Configuration Image

## Required minimum unit

### <MT8821C FDD Configuration>

Product Num.	Product Name
MT8821C	Radio Communication Analyzer
MT8821C-008	LTE Measurement Hardware
MX882112C	LTE FDD Measurement Software
<b>MX882112C-010</b>	<b>LTE FDD 5G NSA Anchor</b>

### <MT8821C TDD Configuration >

Product Num.	Product Name
MT8821C	Radio Communication Analyzer
MT8821C-008	LTE Measurement Hardware
MX882113C	LTE TDD Measurement Software
<b>MX882113C-010</b>	<b>LTE TDD 5G NSA Anchor</b>

## ◆Product Overview

MT8821C will support RF Tx/Rx measurements for Cat M and NB-IoT to be specified in Chapter 6/7 of 3GPP TS 36.521-1.



## ◆Configuration

### Cat M

Model	Name
MT8821C	Radio Communication Analyzer
MT8821C-008	LTE Measurement Hardware
<b>MX882116C</b>	<b>LTE Category M1 Measurement Software</b>
<b>MX882116C-006</b>	<b>LTE Category M1 IP Data Transfer</b>

### NB-IoT

Model	Name
MT8821C	Radio Communication Analyzer
MT8821C-008	LTE Measurement Hardware
<b>MX882117C</b>	<b>NB-IoT Measurement Software</b>
<b>MX882117C-001</b>	<b>Category NB2 Measurement Software</b>
<b>MX882117C-002</b>	<b>NB-IoT Multi Carrier</b>
<b>MX882117C-006</b>	<b>NB-IoT IP Data Transfer</b>



## ◆ Available features

### RF TRX measurement

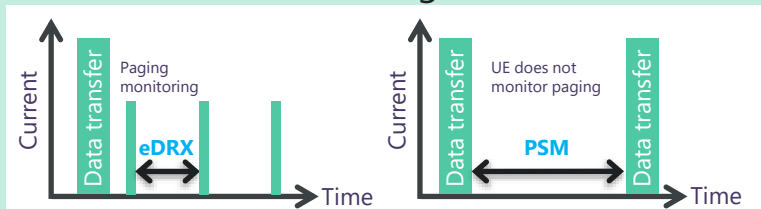
- 3GPP TS36.521-1 test case
- Maximum Throughput

### OTA

- Some OTA vendors have already supported Cat M of MT8821C.
- Some OTA vendors have already supported NB-IoT of MT8821C.

### Power consumption

- For Idle status
  - eDRX : Extended DRX
  - PSM : Power Saving Mode



- For Connected status
  - Maximum Throughput
  - IP data feature

### IP Function/Stress testing

- Maximum Throughput
- IP data feature
  - Internal Server/Iperf



# 3GPP Cat M test cases

## ■ TX Measurements

These items are based on 3GPP TS36.521-1 (2019-06).

Section	Item	Supporting status	Note
6.2.2EA	UE Maximum Output Power for UE category M1	Supported	
6.2.3EA	Maximum Power Reduction (MPR) for UE category M1	Supported	
6.2.4EA	Additional Maximum Power Reduction (A-MPR) for UE category M1	Supported	
6.2.5EA	Configured UE transmitted Power for UE category M1	Supported	
6.3.2EA	Minimum Output Power for UE category M1	Supported	
6.3.3EA	UE Transmit OFF power for UE category M1	Supported	
6.3.4EA1	General ON/OFF time mask for UE category M1	Supported	
6.3.4EA2.1	PRACH time mask for UE category M1	Supported	
6.3.4EA2.2	SRS time mask for UE category M1	Supported	
6.3.5EA1	Power Control Absolute power tolerance for UE category M1	Supported	
6.3.5EA2	Power Control Relative power tolerance for UE category M1	Supported	
6.3.5EA3	Aggregate power control tolerance for category M1	Supported	
6.5.1EA	Frequency Error for UE category M1	Supported	
6.5.2.1EA.1	Error Vector Magnitude (EVM) for UE category M1	Supported	
6.5.2.1EA.2	PUSCH-EVM with exclusion period for UE category M1	Supported	
6.5.2.2EA	Carrier leakage for UE category M1	Supported	
6.5.2.3EA	In-band emissions for non allocated RB for UE category M1	Supported	
6.5.2.4EA	EVM equalizer spectrum flatness for UE category M1	Supported	
6.6.1EA	Occupied bandwidth for UE category M1	Supported	
6.6.2.1EA	Spectrum Emission Mask for UE category M1	Supported	
6.6.2.2EA	Additional Spectrum Emission Mask for UE category M1	Supported	
6.6.2.3EA	Adjacent Channel Leakage power Ratio for UE category M1	Supported	
6.6.3EA	Spurious emission for UE category M1	Supported	External spectrum analyzer is required

## ■ RX Measurements

Section	Item	Supporting status	Note
7.3EA	Reference sensitivity level for UE category M1	Supported	
7.4EA	Maximum input level for UE category M1	Supported	
7.5EA	Adjacent Channel Selectivity (ACS) for UE category M1	Supported	External signal generator is required
7.6.1EA	In-band blocking for UE category M1	Supported	External signal generator is required
7.6.2EA	Out-of-band blocking for UE category M1	Supported	External signal generator is required
7.6.3EA	Narrow band blocking for UE Category M1	Supported	External signal generator is required
7.7EA	Spurious response for UE category M1	Supported	External signal generator is required
7.8.1EA	Wide band Intermodulation for UE category M1	Supported	External signal generator is required
7.9EA	Spurious emissions for UE category M1	Supported	External spectrum analyzer is required

Note. - Only FDD-LTE half-duplex is supported. FDD-LTE full- duplex and TDD-LTE is under consideration.

# 3GPP NB-IoT test cases

These items are based on 3GPP TS36.521-1 (2019-06).

Note. – MX882117C-001 Category NB2 Measurement Software is required for NB2 RF TRX tests

## TX Measurements

Section	Item	Support status	Note
6.2.2F	UE Maximum Output Power for category NB1 and NB2	Supported	
6.2.2FA	UE Maximum Output Power for category NB1 and NB2 / Power Class 6	Supported	
6.2.3F	Maximum Power Reduction (MPR) for category NB1 and NB2	Supported	
6.2.3FA	Maximum Power Reduction (MPR) for category NB1 and NB2 / Power Class 6	Supported	
6.2.5F	Configured UE transmitted Output Power for UE category NB1 and NB2	Supported	
6.2.5FA	Configured UE transmitted Output Power for UE category NB1 and NB2/Power Class 6	Supported	
6.3.2F	Minimum Output Power for category NB1 and NB2	Supported	
6.3.3F	Transmit OFF power for Category NB1 and NB2	Supported	This test is included in 6.3.4F.1
6.3.4F.1	General ON/OFF time mask for category NB1 and NB2	Supported	
6.3.4F.2	NPRACH time mask for category NB1 and NB2	Supported	
6.3.5F.1	Power Control Absolute power tolerance for category NB1 and NB2	Supported	
6.3.5F.2	Power Control Relative power tolerance for category NB1 and NB2	Supported	
6.3.5F.3	Aggregate power control tolerance for category NB1 and NB2	Supported	
6.3.5FA.1	Power Control Absolute power tolerance for category NB1 and NB2/Power Class 6	Supported	
6.3.5FA.2	Power Control Relative power tolerance for category NB1 and NB2/Power Class 6	Supported	
6.3.5FA.3	Aggregate power control tolerance for category NB1 and NB2/Power Class 6	Supported	
6.5.1F	Frequency Error for category NB1 and NB2	Supported	
6.5.2.1F.1	Error Vector Magnitude (EVM) for category NB1 and NB2	Supported	
6.5.2.1FA.1	Error Vector Magnitude (EVM) for category NB1 and NB2/Power Class 6	Planning	3GPP test spec has not finalized yet
6.5.2.2F	Carrier leakage for category NB1 and NB2	Supported	
6.5.2.2FA	Carrier leakage for category NB1 and NB2/Power class 6	Planning	3GPP test spec has not finalized yet
6.5.2.3F	In-band emissions for non allocated RB for category NB1 and NB2	Supported	
6.5.2.3FA	In-band emissions for non allocated RB for category NB1 and NB2/Power Class 6	Planning	3GPP test spec has not finalized yet
6.6.1F	Occupied bandwidth for category NB1 and NB2	Supported	
6.6.2.1F	Spectrum Emission Mask for category NB1 and NB2	Supported	
6.6.2.3F	Adjacent Channel Leakage power Ratio for category NB1 and NB2	Supported	
6.6.3F.1	Transmitter Spurious emissions for category NB1 and NB2	Supported	External spectrum analyzer is required
6.6.3F.2	Spurious emission band UE co-existence for category NB1 and NB2	Supported	External spectrum analyzer is required
6.7F	Transmit intermodulation for category NB1 and NB2	Supported	External signal generator is required

## RX Measurements

Section	Item	Support status	Note
7.3F.1	Reference sensitivity level without repetitions for category NB1 and NB2	Supported	
7.3F.2	Reference sensitivity level with repetitions for category NB1 and NB2	----	3GPP test spec was deleted
7.4F	Maximum input level for category NB1 and NB2	Supported	
7.5F	Adjacent Channel Selectivity (ACS) for category NB1 and NB2	Supported	External signal generator is required
7.6.1F	In-band blocking for category NB1 and NB2	Supported	External signal generator is required
7.6.2F	Out-of-band blocking for Category NB1 and NB2	Supported	External signal generator is required
7.7F	Spurious response for category NB1 and NB2	Supported	External signal generator is required
7.8.1F	Wide band Intermodulation for category NB1 and NB2	Supported	External signal generator is required
7.9F	Spurious emissions for Category NB1	Supported	External spectrum analyzer is required

# OTA Implementation status

Indicator	Meaning
✓	Supported
V	Supported(not verified)
D	Under development
C	Under consideration
-	Not supported

MT8821C continues to support leading edge features like LTE 4CA, 4x4 MIMO. OTA vendor and Anritsu provide OTA solution for leading edge features.

Reference : CTIA\_OTA\_Test\_Plan v3.8.2

CTIA Test Plan for 2x2MIMO Downlink MIMO v1.2

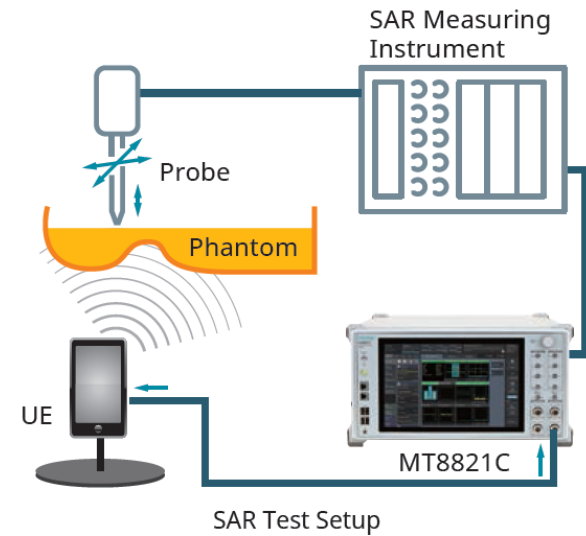
★ Mandated by CTIA Wireless Device OTA Performance  
 ★ Planned by CTIA Wireless Device OTA Performance

		Bluetest (Reverb)	ETS-Lindgren (Anechoic)	MVG (SATIMO) (Anechoic)	EMITE (Reverb)	
LTE	SISO/2x2 MIMO ★	✓	✓	✓	✓	
	4x4 MIMO	✓	✓	✓	✓	
LTE-A	DL 2CA	SISO/2x2 MIMO ★	✓	✓	✓	✓
		4x4 MIMO	✓	-	✓	✓
	DL 3CA	SISO/2x2 MIMO ★	✓	✓	✓	✓
		4x4 MIMO	✓	-	-	V
	DL 4CA	SISO/2x2 MIMO ★	✓	✓	✓	✓
		4x4 MIMO	✓	-	-	D
	DL 5CA	SISO/2x2 MIMO ★	✓	-	-	-
		4x4 MIMO	✓	-	-	-
UL 2CA	SISO	✓	-	-	-	
WCDMA	HSPA ★	✓	✓	✓	✓	
	DC-HSDPA	✓	-	-	✓	
GSM	GPRS/EGPRS ★	✓	✓	✓	✓	
TD-SCDMA	HSPA	✓	✓	✓ (HSDPA only)	✓ (HSDPA only)	
CDMA2K	1xEV-DO ★	✓*	✓*	✓*	✓*	
IoT	Cat-M ★	✓	✓	✓	✓	
	NB-IoT ★	✓	✓	✓	✓	

**SAR** (Specific absorption rate) is a measure of the rate at which energy is absorbed by the human body when exposed to a radio electromagnetic field. It is defined as the power absorbed per mass of tissue and has units of watts per kilogram (W/kg).

**SPEAG** in Switzerland is a biggest SAR system vendor.

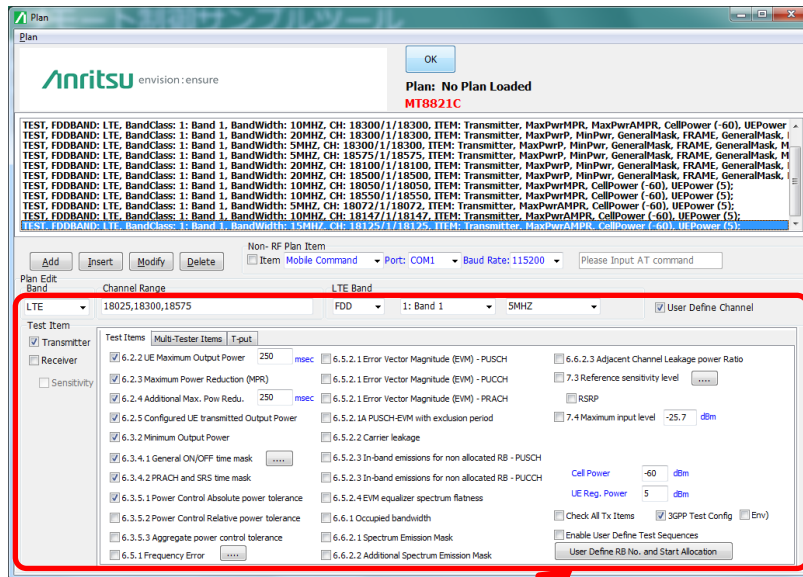
- MT8821C is supported as a subset for LTE/W/G by automated test s/w (V2.6 ~) of SPEAG system in DASY6 and cSA3D as of Mar. 2016.  
<http://www.speag.com/products/csar3d/csar3d-overview/>
- News release from SPEAG below.  
<http://www.speag.com/news-events/news/measurement/anritsu-mt8820c-integrates-with-dasy6-and-csar3d/>



# Automated 3GPP RF TRx Test Measurement System

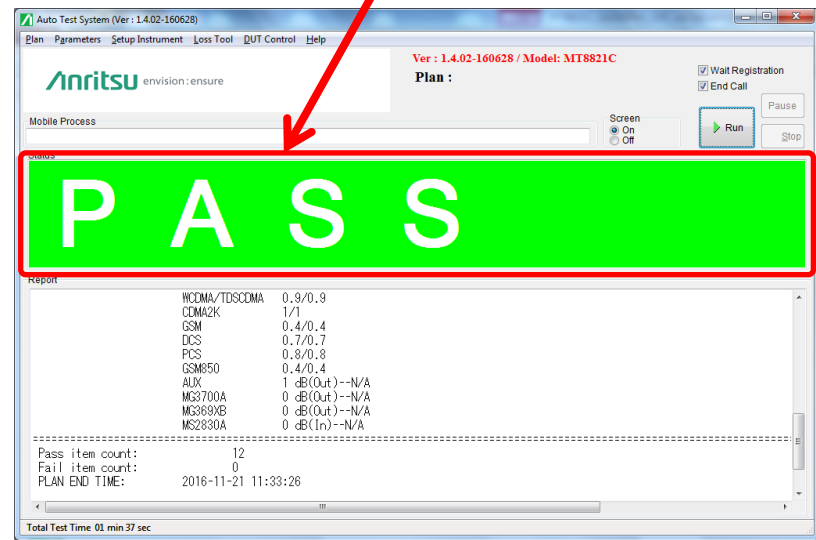
An automated measurement system is easily configured using the ATS tools (remote control sample tools) running on an external PC controller.

Measurement, Pass/Fail evaluation, and report creation are performed simply by selecting test cases from a list, supporting 3GPP RF TRx testing even by inexperienced operators.



Measurement Item Selection Window

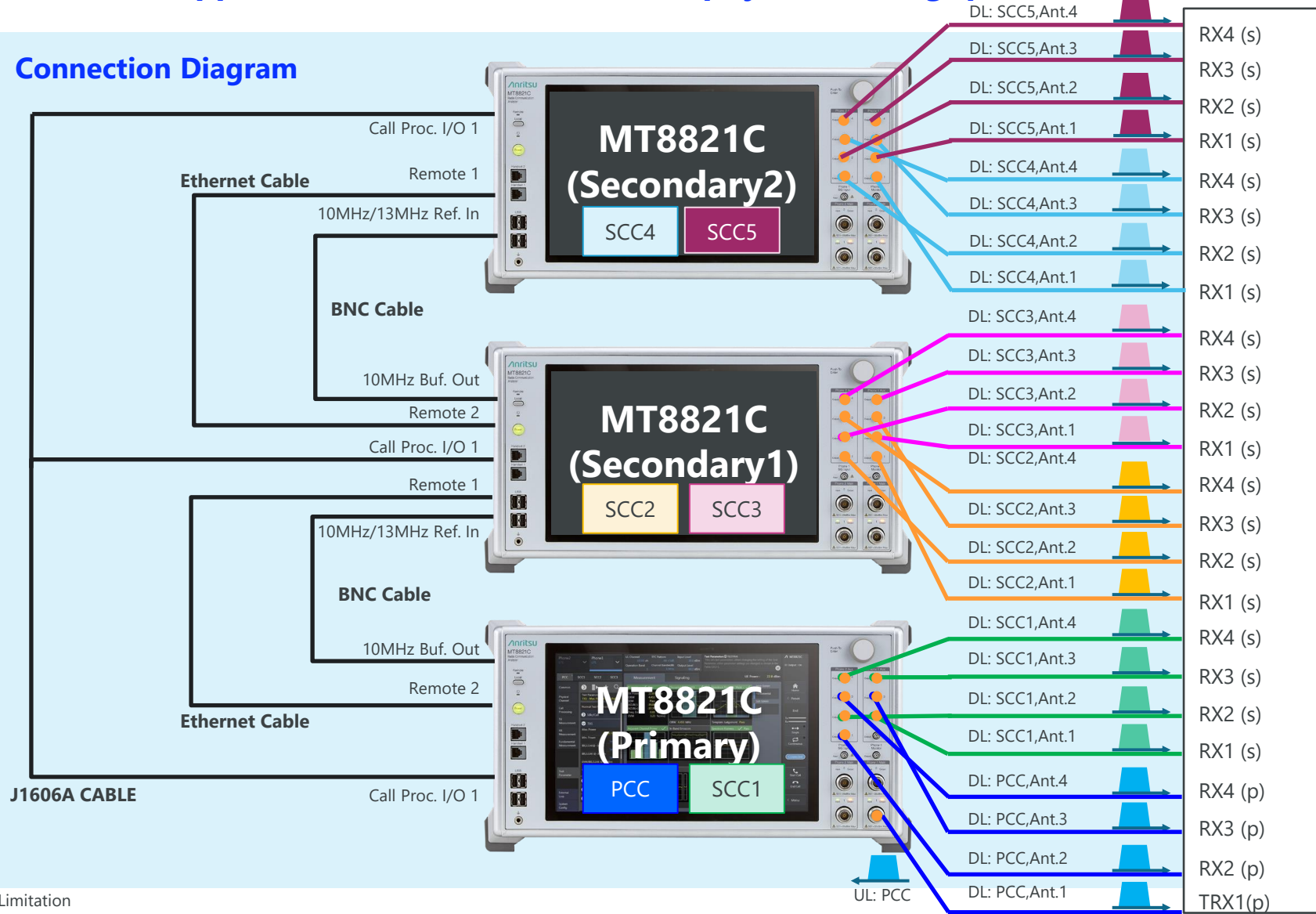
Measured Results Pass/Fail Evaluation



# APPENDIX

## ◆ MT8821C supports 6CA 4x4 MIMO 256QAM physical throughput testing.

### Connection Diagram



Limitation

- IP Throughput measurement is not supported
- HARQ re-transmission is not supported
- During FDD/TDD Joint 6CA measurement, only FDD can be set for PCC.



# DL 6CA 4x4 MIMO

No.	PCC	SCC1	SCC2	SCC3	SCC4	SCC5
1	FDD 4x4	FDD 4x4	FDD 4x4	FDD 4x4	FDD 4x4	FDD 4x4
2	FDD 4x4	TDD 4x4	TDD 4x4	TDD 4x4	TDD 4x4	TDD 4x4

\* LAA (band46) is supported  
 \* All TDD pattern is not verified

## ◆ Required options

If you want to test the CA/ MIMO combination shown in the right, following options are required.

### Primary

Measurement Instruments		No.1	No.2
MT8821C	Radio Communication Analyzer	1	1
Hardware Options		No.1	No.2
MT8821C-008	LTE Measurement Hardware	2	2
MT8821C-012	Parallel Phone Measurement Hardware	1	1
MT8821C-025	2nd RF for Phone1	1	1
MT8821C-026	3rd RF for Phone1	1	1
MT8821C-027	4th RF for Phone1	1	1
MT8821C-028	2nd RF for Phone2	1	1
MT8821C-029	3rd RF for Phone2	1	1
MT8821C-030	4th RF for Phone2	1	1
Software Options		No.1	No.2
MX882112C	LTE FDD Measurement Software	1	1
MX882112C-011	LTE FDD 2x2 MIMO DL	1	1
MX882112C-012	LTE FDD 4x4 MIMO DL	1	1
MX882112C-021	LTE-Advanced FDD DL CA Measurement Software	1	1
MX882112C-031	LTE-Advanced FDD DL 3CCs Measurement Software	1	1
MX882112C-041	LTE-Advanced FDD DL 4CCs Measurement Software	1	1
MX882112C-051	LTE-Advanced FDD DL 5CCs Measurement Software	1	1
MX882112C-061	LTE-Advanced FDD DL 6CCs Measurement Software	1	1
MX882113C	LTE TDD Measurement Software	-	1
MX882113C-011	LTE TDD 2x2 MIMO DL	-	1
MX882113C-012	LTE TDD 4x4 MIMO DL	-	1
MX882113C-021	LTE-Advanced TDD DL CA Measurement Software	-	1
MX882113C-031	LTE-Advanced TDD DL 3CCs Measurement Software	-	1
MX882113C-041	LTE-Advanced TDD DL 4CCs Measurement Software	-	1
MX882113C-051	LTE-Advanced TDD DL 5CCs Measurement Software	-	1
MX882113C-061	LTE-Advanced TDD DL 6CCs Measurement Software	-	1

### Secondary1

Measurement Instruments		No.1	No.2
MT8821C	Radio Communication Analyzer	1	1
Hardware Options		No.1	No.2
MT8821C-008	LTE Measurement Hardware	2	2
MT8821C-012	Parallel Phone Measurement Hardware	1	1
MT8821C-025	2nd RF for Phone1	1	1
MT8821C-026	3rd RF for Phone1	1	1
MT8821C-027	4th RF for Phone1	1	1
MT8821C-028	2nd RF for Phone2	1	1
MT8821C-029	3rd RF for Phone2	1	1
MT8821C-030	4th RF for Phone2	1	1
Software Options		No.1	No.2
MX882112C	LTE FDD Measurement Software	1	1
MX882113C	LTE TDD Measurement Software	-	1

### Secondary2

Measurement Instruments		No.1	No.2
MT8821C	Radio Communication Analyzer	1	1
Hardware Options		No.1	No.2
MT8821C-008	LTE Measurement Hardware	2	2
MT8821C-012	Parallel Phone Measurement Hardware	1	1
MT8821C-025	2nd RF for Phone1	1	1
MT8821C-026	3rd RF for Phone1	1	1
MT8821C-027	4th RF for Phone1	1	1
MT8821C-028	2nd RF for Phone2	1	1
MT8821C-029	3rd RF for Phone2	1	1
MT8821C-030	4th RF for Phone2	1	1
Software Options		No.1	No.2
MX882112C	LTE FDD Measurement Software	1	1
MX882113C	LTE TDD Measurement Software	-	1

### Others

Others		No.1/2/3
J1606A	Cable	1
-	BNC Cable	2
-	Ethernet Cable	2

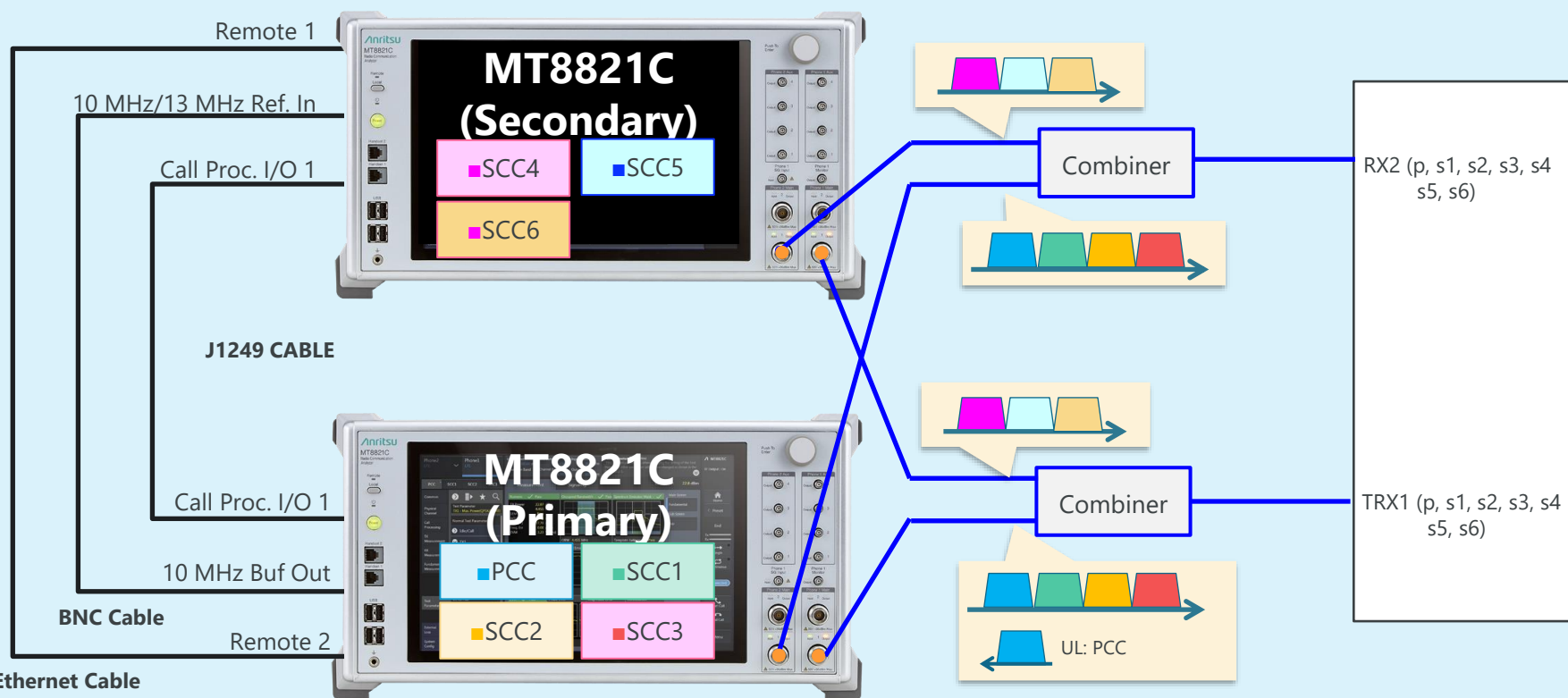
## ◆ MT8821C supports DL 7CA 2x2 MIMO 256QAM (1.4 Gbps)

### CA/MIMO Combination

No.	PCC	SCC1	SCC2	SCC3	SCC4	SCC5	SCC6
1	FDD 2x2	FDD 2x2	FDD 2x2	FDD 2x2	FDD 2x2	FDD 2x2	FDD 2x2
2	FDD 2x2	FDD 2x2	TDD 2x2	TDD 2x2	TDD 2x2	TDD 2x2	TDD 2x2

- Maximum Physical Throughput **1.4 Gbps**
- DL Modulation QPSK, 16QAM, 64QAM, **256QAM**
- Test by controlling only Primary MT8821C

### Setup



#### Note

- IP Throughput measurement is not supported
- HARQ re-transmission is not supported
- All TDD combination is not supported.
- During FDD/TDD Joint 7CA measurement, only FDD can be set for PCC.

## ◆ Required options

If you want to test the CA/ MIMO combination shown in the right, following options are required.

### Primary

Measurement Instruments		No.1	No.2
MT8821C	Radio Communication Analyzer	1	1
Hardware Options		No.1	No.2
MT8821C-008	LTE Measurement Hardware	2	2
MT8821C-012	Parallel Phone Measurement Hardware	1	1
MT8821C-025	2nd RF for Phone1	1	1
MT8821C-026	3rd RF for Phone1	1	1
MT8821C-027	4th RF for Phone1	1	1
MT8821C-028	2nd RF for Phone2	1	1
MT8821C-029	3rd RF for Phone2	1	1
MT8821C-030	4th RF for Phone2	1	1
Software Options		No.1	No.2
MX882112C	LTE FDD Measurement Software	1	1
MX882112C-011	LTE FDD 2x2 MIMO DL	1	1
MX882112C-021	LTE-Advanced FDD DL CA Measurement Software	1	1
MX882112C-031	LTE-Advanced FDD DL 3CCs Measurement Software	1	1
MX882112C-041	LTE-Advanced FDD DL 4CCs Measurement Software	1	1
MX882112C-051	LTE-Advanced FDD DL 5CCs Measurement Software	1	1
MX882112C-061	LTE-Advanced FDD DL 6CCs Measurement Software	1	1
MX882112C-071	LTE-Advanced FDD DL 7CCs Measurement Software	1	1
MX882113C	LTE TDD Measurement Software	-	1
MX882113C-011	LTE TDD 2x2 MIMO DL	-	1
MX882113C-021	LTE-Advanced TDD DL CA Measurement Software	-	1
MX882113C-031	LTE-Advanced TDD DL 3CCs Measurement Software	-	1
MX882113C-041	LTE-Advanced TDD DL 4CCs Measurement Software	-	1
MX882113C-051	LTE-Advanced TDD DL 5CCs Measurement Software	-	1
MX882113C-061	LTE-Advanced TDD DL 6CCs Measurement Software	-	1
MX882113C-071	LTE-Advanced TDD DL 7CCs Measurement Software	-	1

## 7CA 2x2 MIMO Combination example

No.	PCC	SCC1	SCC2	SCC3	SCC4	SCC5	SCC6
1	FDD 2x2	FDD 2x2	FDD 2x2	FDD 2x2	FDD 2x2	FDD 2x2	FDD 2x2
2	FDD 2x2	FDD 2x2	TDD 2x2	TDD 2x2	TDD 2x2	TDD 2x2	TDD 2x2

### Secondary

Measurement Instruments		No.1	No.2
MT8821C	Radio Communication Analyzer	1	1
Hardware Options		No.1	No.2
MT8821C-008	LTE Measurement Hardware	1	1
MT8821C-012	Parallel Phone Measurement Hardware	1	1
MT8821C-025	2nd RF for Phone1	1	1
MT8821C-026	3rd RF for Phone1	1	1
MT8821C-027	4th RF for Phone1	-	-
MT8821C-028	2nd RF for Phone2	1	1
MT8821C-029	3rd RF for Phone2	1	1
MT8821C-030	4th RF for Phone2	-	-
Software Options		No.1	No.2
MX882112C	LTE FDD Measurement Software	1	-
MX882113C	LTE TDD Measurement Software	-	1

Others		No.1	No.2
J1249	CDMA2000 Cable	1	1
-	BNC Cable	1	1
-	Ethernet Cable	1	1

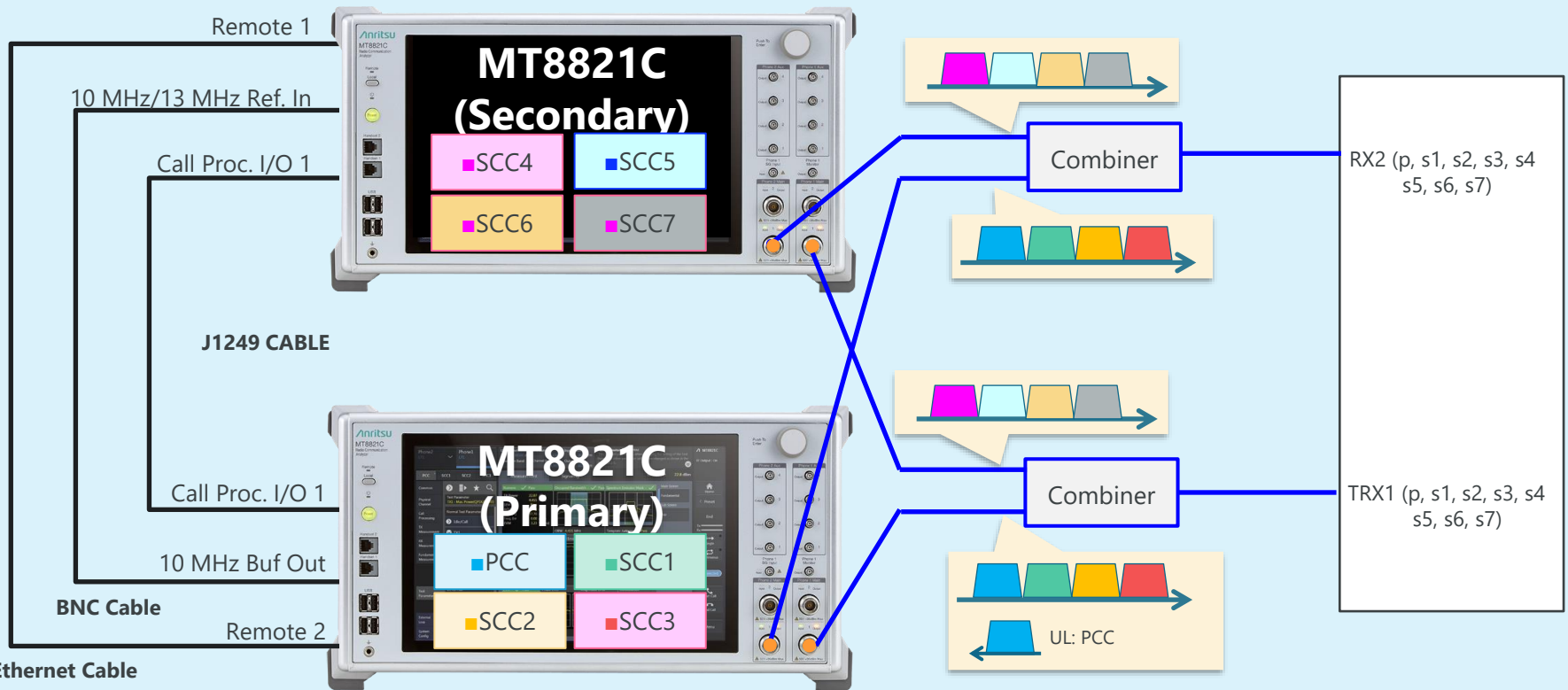
## ◆ MT8821C supports DL 8CA 2x2 MIMO 256QAM (1.6 Gbps)

### CA/MIMO Combination

No.	PCC	SCC1	SCC2	SCC3	SCC4	SCC5	SCC6	SCC7
1	FDD 2x2	FDD 2x2	FDD 2x2	FDD 2x2	FDD 2x2	FDD 2x2	FDD 2x2	FDD 2x2
2	FDD 2x2	FDD 2x2	TDD 2x2	TDD 2x2	TDD 2x2	TDD 2x2	TDD 2x2	TDD 2x2

- Maximum Physical Throughput **1.6 Gbps**
- DL Modulation QPSK, 16QAM, 64QAM, **256QAM**
- Test by controlling only Primary MT8821C

### Setup



#### Note

- IP Throughput measurement is not supported
- HARQ re-transmission is not supported
- All TDD combination is not supported.
- During FDD/TDD Joint 7CA measurement, only FDD can be set for PCC.

## ◆ Required options

If you want to test the CA/ MIMO combination shown in the right, following options are required.

### Primary

Measurement Instruments		No.1	No.2
MT8821C	Radio Communication Analyzer	1	1
Hardware Options		No.1	No.2
MT8821C-008	LTE Measurement Hardware	2	2
MT8821C-012	Parallel Phone Measurement Hardware	1	1
MT8821C-025	2nd RF for Phone1	1	1
MT8821C-026	3rd RF for Phone1	1	1
MT8821C-027	4th RF for Phone1	1	1
MT8821C-028	2nd RF for Phone2	1	1
MT8821C-029	3rd RF for Phone2	1	1
MT8821C-030	4th RF for Phone2	1	1
Software Options		No.1	No.2
MX882112C	LTE FDD Measurement Software	1	1
MX882112C-011	LTE FDD 2x2 MIMO DL	1	1
MX882112C-021	LTE-Advanced FDD DL CA Measurement Software	1	1
MX882112C-031	LTE-Advanced FDD DL 3CCs Measurement Software	1	1
MX882112C-041	LTE-Advanced FDD DL 4CCs Measurement Software	1	1
MX882112C-051	LTE-Advanced FDD DL 5CCs Measurement Software	1	1
MX882112C-061	LTE-Advanced FDD DL 6CCs Measurement Software	1	1
MX882112C-071	LTE-Advanced FDD DL 7CCs Measurement Software	1	1
MX882112C-081	LTE-Advanced FDD DL 8CCs Measurement Software	1	1
MX882113C	LTE TDD Measurement Software	-	1
MX882113C-011	LTE TDD 2x2 MIMO DL	-	1
MX882113C-021	LTE-Advanced TDD DL CA Measurement Software	-	1
MX882113C-031	LTE-Advanced TDD DL 3CCs Measurement Software	-	1
MX882113C-041	LTE-Advanced TDD DL 4CCs Measurement Software	-	1
MX882113C-051	LTE-Advanced TDD DL 5CCs Measurement Software	-	1
MX882113C-061	LTE-Advanced TDD DL 6CCs Measurement Software	-	1
MX882113C-071	LTE-Advanced TDD DL 7CCs Measurement Software	-	1
MX882113C-081	LTE-Advanced TDD DL 8CCs Measurement Software	-	1

## 8CA 2x2 MIMO Combination example

No.	PCC	SCC1	SCC2	SCC3	SCC4	SCC5	SCC6	SCC7
1	FDD 2x2	FDD 2x2	FDD 2x2	FDD 2x2	FDD 2x2	FDD 2x2	FDD 2x2	FDD 2x2
2	FDD 2x2	FDD 2x2	TDD 2x2	TDD 2x2	TDD 2x2	TDD 2x2	TDD 2x2	TDD 2x2

### Secondary

Measurement Instruments		No.1	No.2
MT8821C	Radio Communication Analyzer	1	1
Hardware Options		No.1	No.2
MT8821C-008	LTE Measurement Hardware	1	1
MT8821C-012	Parallel Phone Measurement Hardware	1	1
MT8821C-025	2nd RF for Phone1	1	1
MT8821C-026	3rd RF for Phone1	1	1
MT8821C-027	4th RF for Phone1	1	1
MT8821C-028	2nd RF for Phone2	1	1
MT8821C-029	3rd RF for Phone2	1	1
MT8821C-030	4th RF for Phone2	1	1
Software Options		No.1	No.2
MX882112C	LTE FDD Measurement Software	1	-
MX882113C	LTE TDD Measurement Software	-	1

Others		No.1	No.2
J1249	CDMA2000 Cable	1	1
-	BNC Cable	1	1
-	Ethernet Cable	1	1

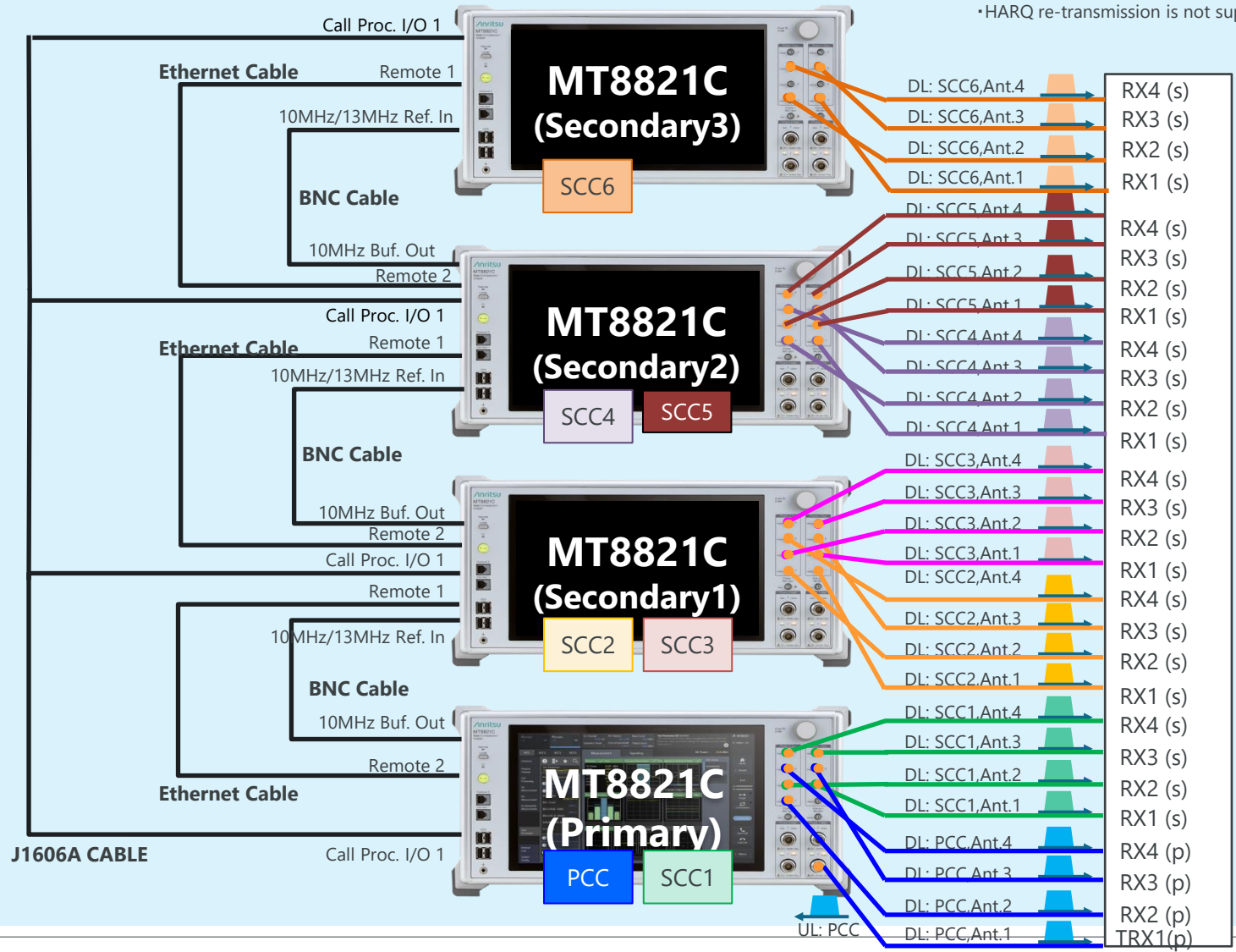
# DL 7CA 4x4 MIMO

## ◆ MT8821C supports 7CA 4x4 MIMO 256QAM physical throughput testing.

### Connection Diagram

Limitation ;

- During FDD/TDD Joint 7CA measurement, only FDD can be set for PCC.
- IP Throughput measurement is not supported
- HARQ re-transmission is not supported.



## ◆ Required options

### Primary Unit

Product Number	Product Name	Set
MT8821C	Radio Communication Analyzer	1
MT8821C-008	LTE Measurement Hardware	2
MT8821C-012	Parallel Phone Measurement Hardware	1
MT8821C-025	2nd RF for Phone1	1
MT8821C-026	3rd RF for Phone1	1
MT8821C-027	4th RF for Phone1	1
MT8821C-028	2nd RF for Phone2	1
MT8821C-029	3rd RF for Phone2	1
MT8821C-030	4th RF for Phone2	1
MX882112C	LTE FDD Measurement Software	1
MX882112C-011	LTE FDD 2x2MIMO DL	1
MX882112C-012	LTE FDD 4x4MIMO DL	1
MX882112C-021	LTE-Advanced FDD DL CA Measurement Software	1
MX882112C-031	LTE-Advanced FDD DL 3CCs Measurement Software	1
MX882112C-041	LTE-Advanced FDD DL 4CCs Measurement Software	1
MX882112C-051	LTE-Advanced FDD DL 5CCs Measurement Software	1
MX882112C-061	LTE-Advanced FDD DL 6CCs Measurement Software	1
MX882112C-071	LTE-Advanced FDD DL 7CCs Measurement Software	1
MX882113C	LTE TDD Measurement Software	1
MX882113C-011	LTE TDD 2x2MIMO DL	1
MX882113C-012	LTE TDD 4x4MIMO DL	1
MX882113C-021	LTE-Advanced TDD DL CA Measurement Software	1
MX882113C-031	LTE-Advanced TDD DL 3CCs Measurement Software	1
MX882113C-041	LTE-Advanced TDD DL 4CCs Measurement Software	1
MX882113C-051	LTE-Advanced TDD DL 5CCs Measurement Software	1
MX882113C-061	LTE-Advanced TDD DL 6CCs Measurement Software	1
MX882113C-071	LTE-Advanced TDD DL 7CCs Measurement Software	1

### Accessories

Product Number	Product Name	Set
J1606A	Cable	1
-	BNC Cable	3
-	Ethernet Cable	3

### Secondary Unit 1

Product Number	Product Name	Set
MT8821C	Radio Communication Analyzer	1
MT8821C-008	LTE Measurement Hardware	2
MT8821C-012	Parallel Phone Measurement Hardware	1
MT8821C-025	2nd RF for Phone1	1
MT8821C-026	3rd RF for Phone1	1
MT8821C-027	4th RF for Phone1	1
MT8821C-028	2nd RF for Phone2	1
MT8821C-029	3rd RF for Phone2	1
MT8821C-030	4th RF for Phone2	1
MX882112C	LTE FDD Measurement Software	1
MX882113C	LTE TDD Measurement Software	1

### Secondary Unit 2

Product Number	Product Name	Set
MT8821C	Radio Communication Analyzer	1
MT8821C-008	LTE Measurement Hardware	2
MT8821C-012	Parallel Phone Measurement Hardware	1
MT8821C-025	2nd RF for Phone1	1
MT8821C-026	3rd RF for Phone1	1
MT8821C-027	4th RF for Phone1	1
MT8821C-028	2nd RF for Phone2	1
MT8821C-029	3rd RF for Phone2	1
MT8821C-030	4th RF for Phone2	1
MX882112C	LTE FDD Measurement Software	1
MX882113C	LTE TDD Measurement Software	1

### Secondary Unit 3

Product Number	Product Name	Set
MT8821C	Radio Communication Analyzer	1
MT8821C-008	LTE Measurement Hardware	1
MT8821C-012	Parallel Phone Measurement Hardware	1
MT8821C-026	3rd RF for Phone1	1
MT8821C-029	3rd RF for Phone2	1
MX882112C	LTE FDD Measurement Software	1
MX882113C	LTE TDD Measurement Software	1

When LAA band (band46) is necessary for any SCCs, MT8821C-019 must be equipped with all of MT8821Cs.

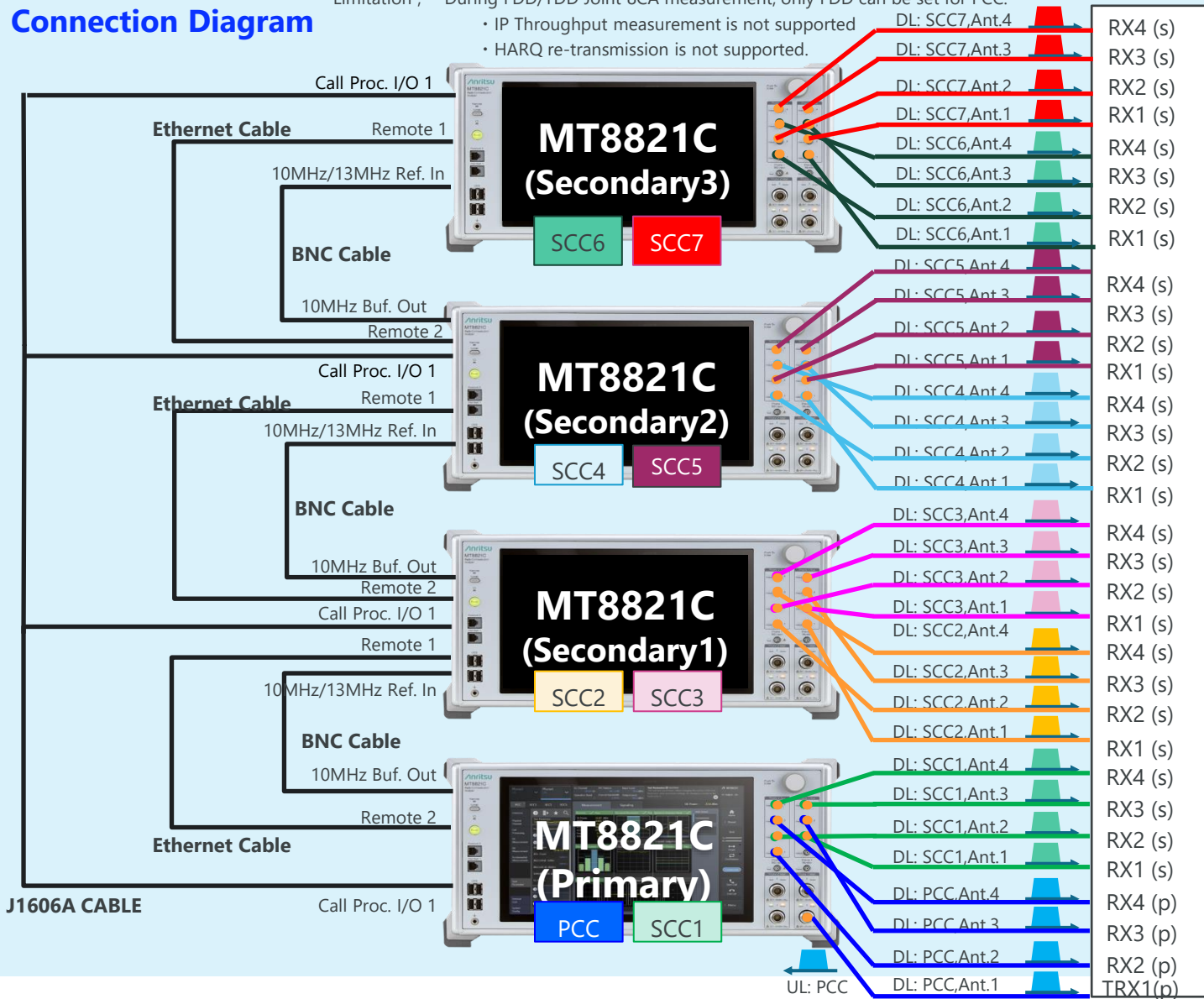
# DL 8CA 4x4 MIMO

## ◆ MT8821C supports 8CA 4x4 MIMO 256QAM physical throughput testing.

Limitation ; • During FDD/TDD Joint 8CA measurement, only FDD can be set for PCC.

- IP Throughput measurement is not supported
- HARQ re-transmission is not supported.

### Connection Diagram





## ◆ Required options

If you want to test the CA/ MIMO combination shown in the right, following options are required.

\* LAA (band46) is supported  
\* All TDD pattern is not verified

### Primary

Measurement Instruments		Q'ty
MT8821C	Radio Communication Analyzer	1
Hardware Options		Q'ty
MT8821C-008	LTE Measurement Hardware	2
MT8821C-012	Parallel Phone Measurement Hardware	1
MT8821C-025	2nd RF for Phone1	1
MT8821C-026	3rd RF for Phone1	1
MT8821C-027	4th RF for Phone1	1
MT8821C-028	2nd RF for Phone2	1
MT8821C-029	3rd RF for Phone2	1
MT8821C-030	4th RF for Phone2	1
Software Options		Q'ty
MX882112C	LTE FDD Measurement Software	1
MX882112C-011	LTE FDD 2x2 MIMO DL	1
MX882112C-012	LTE FDD 4x4 MIMO DL	1
MX882112C-021	LTE-Advanced FDD DL CA Measurement Software	1
MX882112C-031	LTE-Advanced FDD DL 3CCs Measurement Software	1
MX882112C-041	LTE-Advanced FDD DL 4CCs Measurement Software	1
MX882112C-051	LTE-Advanced FDD DL 5CCs Measurement Software	1
MX882112C-061	LTE-Advanced FDD DL 6CCs Measurement Software	1
MX882112C-071	LTE-Advanced FDD DL 7CCs Measurement Software	1
MX882112C-081	LTE-Advanced FDD DL 8CCs Measurement Software	1
MX882113C	LTE TDD Measurement Software	1
MX882113C-011	LTE TDD 2x2 MIMO DL	1
MX882113C-012	LTE TDD 4x4 MIMO DL	1
MX882113C-021	LTE-Advanced TDD DL CA Measurement Software	1
MX882113C-031	LTE-Advanced TDD DL 3CCs Measurement Software	1
MX882113C-041	LTE-Advanced TDD DL 4CCs Measurement Software	1
MX882113C-051	LTE-Advanced TDD DL 5CCs Measurement Software	1
MX882113C-061	LTE-Advanced TDD DL 6CCs Measurement Software	1
MX882113C-071	LTE-Advanced TDD DL 7CCs Measurement Software	1
MX882113C-081	LTE-Advanced TDD DL 8CCs Measurement Software	1

### Secondary1,2,3

Measurement Instruments		Q'ty
MT8821C	Radio Communication Analyzer	1
Hardware Options		Q'ty
MT8821C-008	LTE Measurement Hardware	2
MT8821C-012	Parallel Phone Measurement Hardware	1
MT8821C-025	2nd RF for Phone1	1
MT8821C-026	3rd RF for Phone1	1
MT8821C-027	4th RF for Phone1	1
MT8821C-028	2nd RF for Phone2	1
MT8821C-029	3rd RF for Phone2	1
MT8821C-030	4th RF for Phone2	1
Software Options		Q'ty
MX882112C	LTE FDD Measurement Software	1
MX882113C	LTE TDD Measurement Software	1

Others		Q'ty
J1606A	Cable	1
-	BNC Cable	3
-	Ethernet Cable	3



## ◆ MT8821C supports 3GPP LAA RF test case

RF RX test specifications with LAA (Band 46) are described in Chapter 7 of 3GPP TS 36.521-1 V14.2.0 (2017-03).

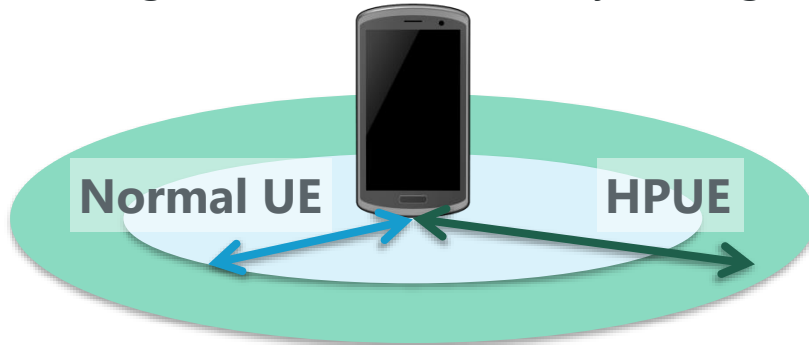
The MT8821C has already supported Physical layer Throughput measurement including the following 3GPP test conditions.

- Non-transition on subframe #1/#2
- Full RB allocation on subframe #5

Test Case		MT8821C	ATS	Remarks
Chapter	Title			
7.3A	Reference Sensitivity Level for CA	Supported	Planning	
7.4A	Maximum input level for CA	Supported	Planning	
7.5A	Adjacent Channel Selectivity (ACS) for CA	Supported	---	Requires external SG
7.6.1A	In-band Blocking for CA	Supported	---	Requires external SG
7.6.2A	Out-of-band Blocking for CA	Supported	---	Requires external SG
7.6.3A	Narrow Band Blocking for CA	Supported	---	Requires external SG
7.7A	Spurious response for CA	Supported	---	Requires external SG
7.8.1A	Wide Band Intermodulation for CA	Supported	---	Requires external SG

## ◆ MT8821C supports 3GPP HPUE RF test case

Coverage area is increased by strong HPUE Tx signal.



Power Class	Max. Output power [dBm]	Remarks
Class 1	31	HPUE (Band 14)
Class 2	26	HPUE (Band 41)
Class 3	23	Normal UE

MT8821C supports 3GPP TS 36.521-1 V14.1.0 (2016-12) HPUE test cases

Test Case				MT8821C	ATS
Chapter	Title	PC1	PC2		
6.2.2_1	UE Maximum Output Power for HPUE	√*1	√*2	√	√
6.2.3_1	Maximum Power Reduction (MPR) for HPUE	√*1	√*2	√	√
6.2.4_1	Additional Maximum Power Reduction (A-MPR) for HPUE	√	-	√	√
6.2.5_1	Configured UE Transmitted Output Power for HPUE	√	√	√	√
6.3.5_1.1	Power Control Absolute Power Tolerance for HPUE	√	√	√	√
6.3.5_1.2	Power Control Absolute Power Tolerance for HPUE	√	√	√	√
6.3.5_1.3	Aggregate Power Control Tolerance for HPUE	√	√	√	√
6.6.2.3_1	Adjacent Channel Leakage Power Ratio for HPUE	√	-	√	√

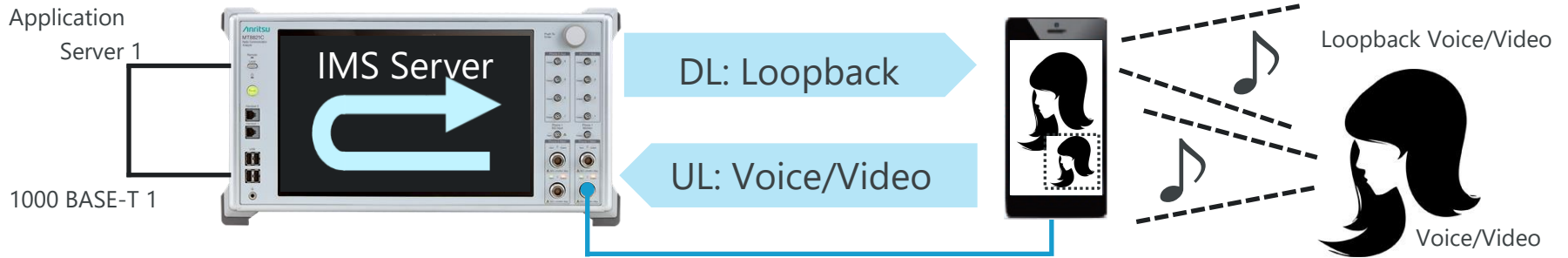
\*1: Band 14 defined for Power class 1 in this test case

\*2: Band 41 defined for Power class 2 in this test case

# VoLTE Echoback MX882164C

Built-in IMS Server

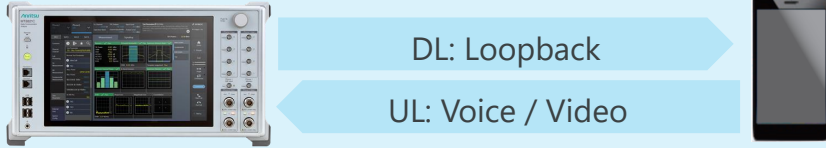
## ➔ Simple Voice and Video Echoback Test



### ◆ Functions

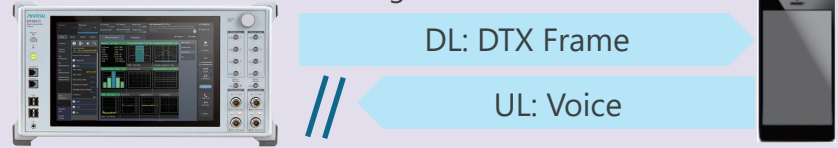
#### ■ Voice/Video Echoback

Voice and Video from UE returns to UE



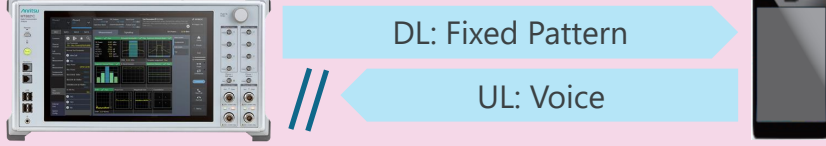
#### ■ DTX Frame

Sends DTX Frame to UE at regular interval



#### ■ Fixed Pattern

Sends fixed-pattern data to UE



#### ■ No Data

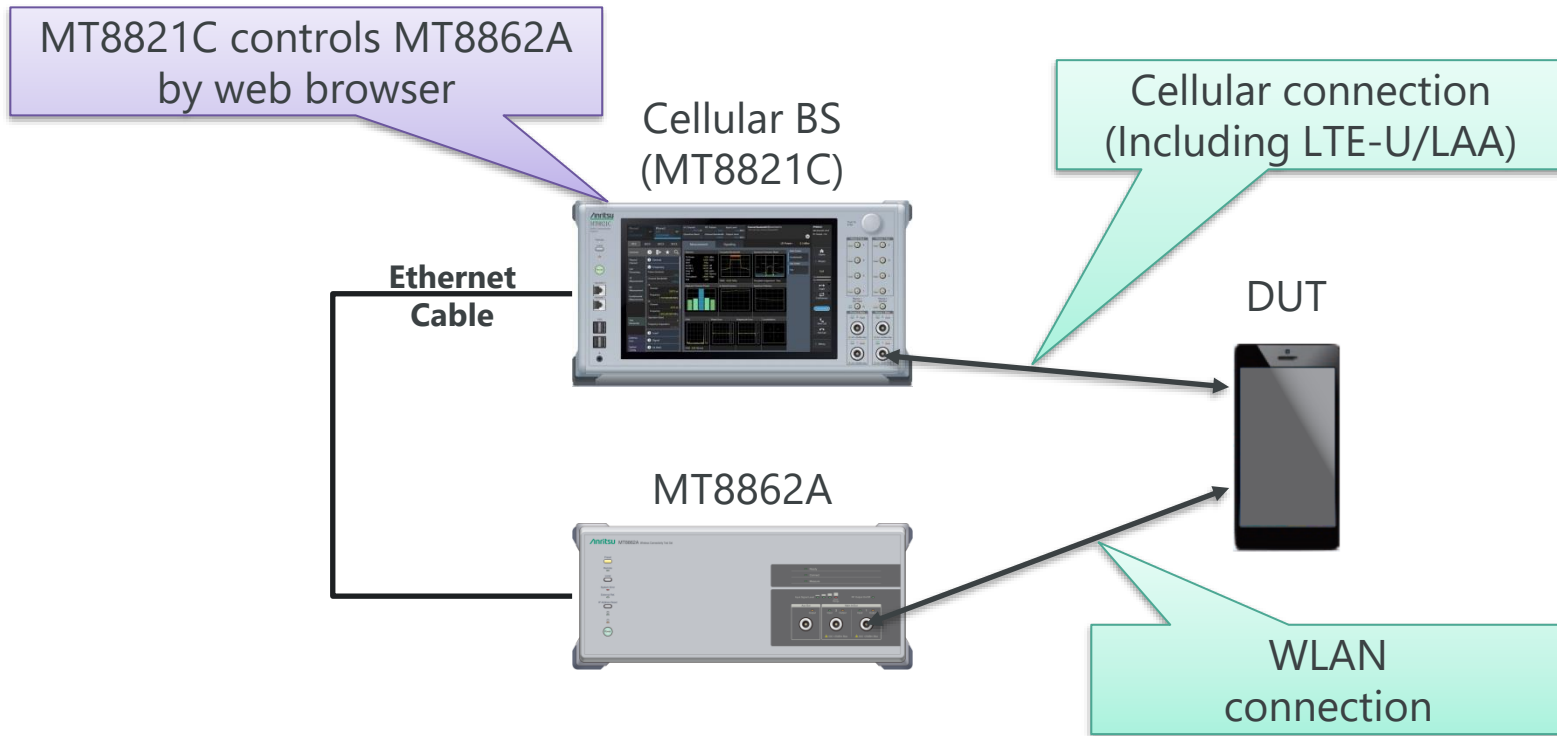
No data sent and just connected to UE



The following codec rates are supported.

Codec Type	Codec Rate
WB-AMR	6.60 kbps, 8.85 kbps, 12.65 kbps, 14.25 kbps, 15.85 kbps, 18.25 kbps, 19.85 kbps, 23.05 kbps, 23.85 kbps
NB-AMR	4.75 kbps, 5.15 kbps, 5.90 kbps, 6.70 kbps, 7.40 kbps, 7.95 kbps, 10.20 kbps, 12.20 kbps

# Cellular and WLAN co-existence



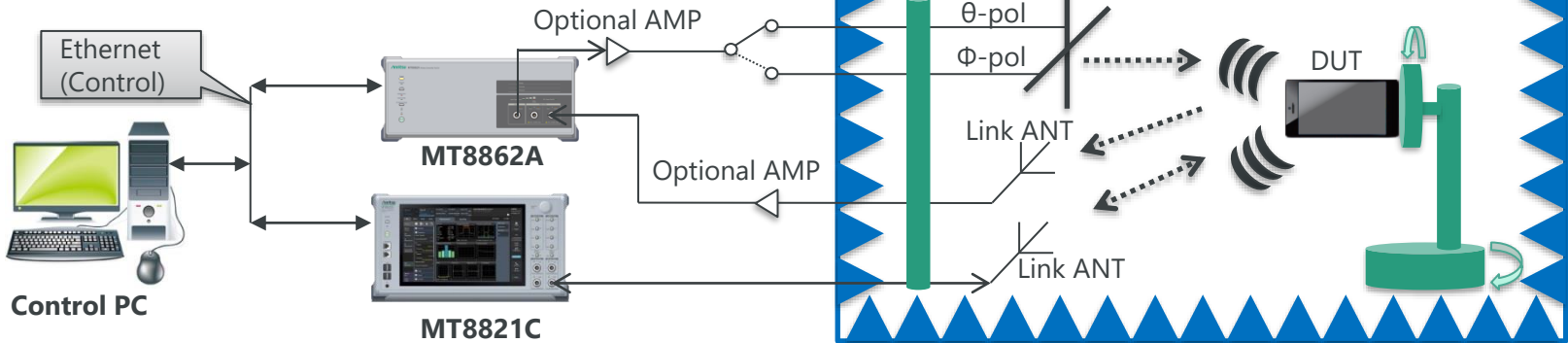
- MT8862A can be controlled by Web browser on MT8821C without external PC\*. Receiver sensitivity under concurrent connection with Cellular (including LTE-U/LAA) and WLAN can be tested.
- Co-existence test in the OTA is defined in CTIA/Wi-Fi Alliance Test Plan as Desense test.

\* : External control of MT8821C is done by OTA chamber system in OTA test

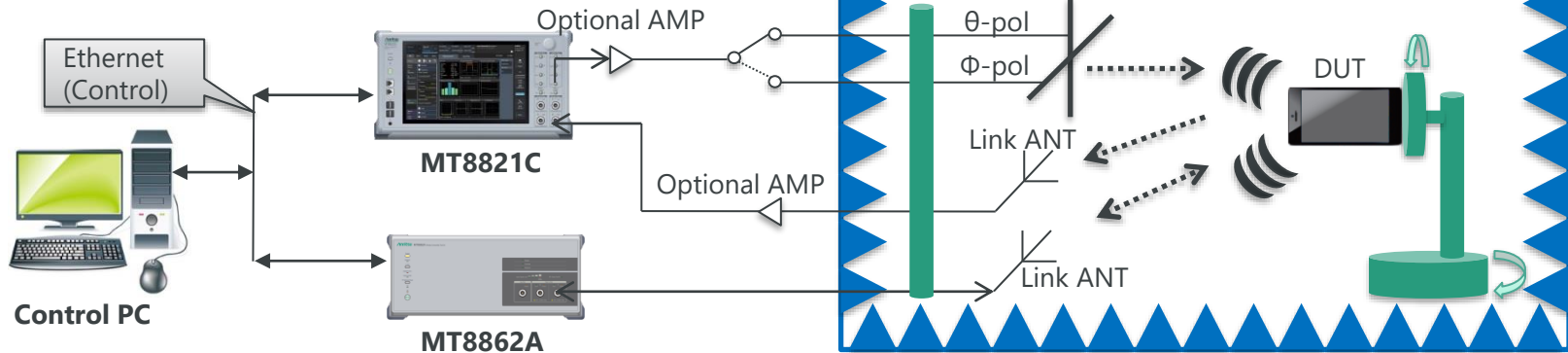
# Wi-Fi Desense Measurement

(CTIA/Wi-Fi Alliance Test Plan)

## For Wi-Fi Desense



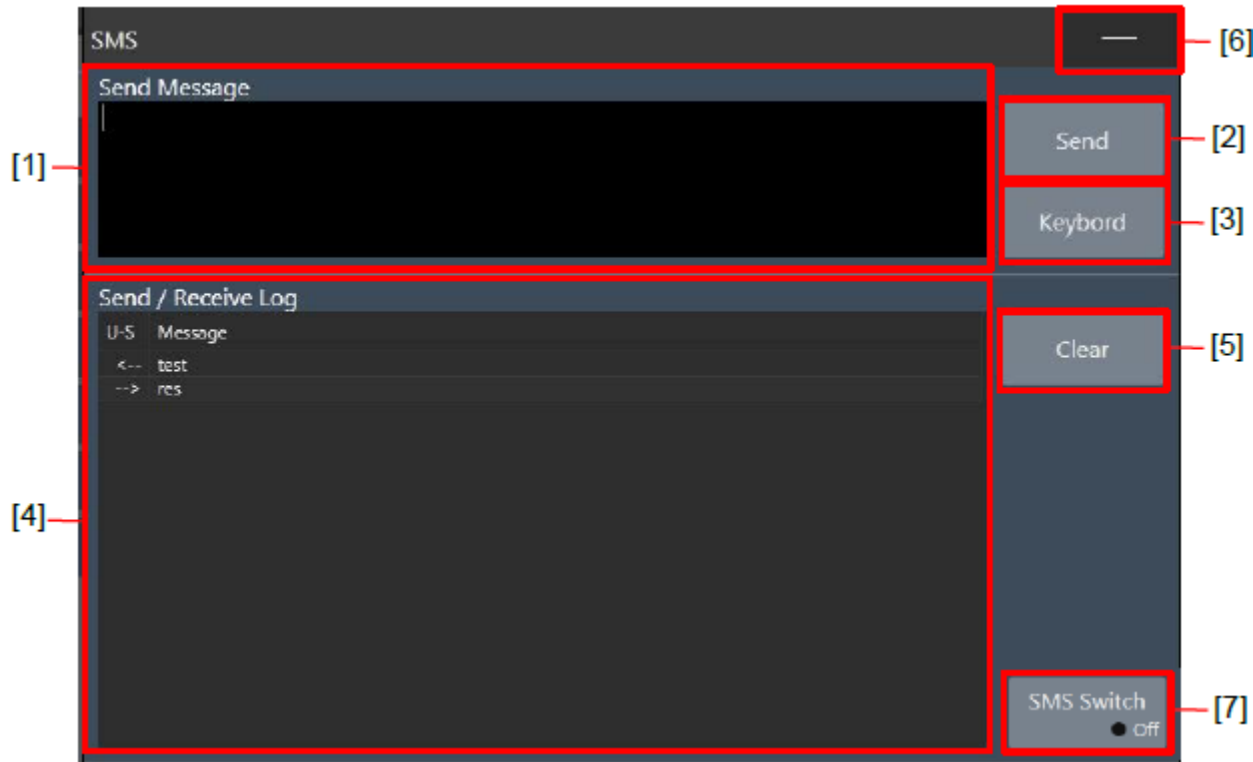
## For Cellular Desense



<Reference>

CTIA/Wi-Fi Alliance Test Plan for RF Performance Evaluation of Wi-Fi Mobile Converged Devices Ver. 2.0.3

## Send and receive SMS message with the simple operation



### Supported systems\*

W-CDMA  
GSM  
TD-SCDMA  
LTE  
Cat-M  
NB-IoT

\*Based on SMS over SGs

1	Send Message	Inputs a SMS message to send to the UE.
2	Send Button	Sends a SMS message to the UE.
3	Keyboard Button	Starts the screen key board.
4	Send/Receive Log	Displays SMS messages that were sent to and received from the UE.
5	Clear Button	Clears the contents and flag value from the received message.
6	Close Button	Closes the SMS screen.
7	SMS Switch Button	Sets the SMS reception function to On or Off. Displayed only for W-CDMA and TD-SCDMA.



# Enhanced GUI: Measurement (All Results)

## Overview

Fundamental > Numeric

- Power Measurement (1 / 1)
  - TX Power: -0.66 dBm
- Occupied Bandwidth (1 / 1) View
  - OBW: 4.455 MHz
- Spectrum Emission Mask (1 / 1) View
  - SEM: Pass
- Adjacent Channel Power (1 / 1) View
  - ACLR(-): -42.02 dB
  - ACLR(+): -41.82 dB
- Modulation Analysis (1 / 1) View
  - Freq. Err: 0.00 ppm
  - EVM: 2.76 %(rms)
- Throughput View
  - Throughput: 1994 kbps (= 100.00 %)

## Detail

Fundamental > Numeric

- Power Measurement (1 / 1)
 

	Avg.	Max.	Min.
TX Power	-0.66	-0.66	-0.66 dBm
Channel Power	-0.67	-0.67	-0.67 dBm
- Occupied Bandwidth (1 / 1) View
  - OBW: 4.455 MHz
  - Upper Frequency: 2.228 MHz
  - Lower Frequency: -2.228 MHz
  - Center(Upper+Lower)/2: 1950.000 MHz
- Spectrum Emission Mask (1 / 1) View
 

Frequency Range	Level	Mask Margin	Frequency
<b>Lower</b>			
0 to 1MHz	-52.74 dBm	-39.24 dB	-0.015 MHz
1 to 5MHz	-48.51 dBm	-40.01 dB	-1.500 MHz
5 to 6MHz	-62.59 dBm	-51.09 dB	-5.500 MHz
6 to 10MHz	-64.33 dBm	-40.83 dB	-6.500 MHz
<b>Upper</b>			
0 to 1MHz	-52.55 dBm	-39.05 dB	0.015 MHz
1 to 5MHz	-48.17 dBm	-39.67 dB	1.500 MHz
5 to 6MHz	-61.34 dBm	-49.84 dB	5.500 MHz
6 to 10MHz	-63.62 dBm	-40.12 dB	6.500 MHz

UL Channel: 18300 ch, TPC Pattern: Auto, Input Level: -1.0 dBm, Magnitude Error: MAGTDERR

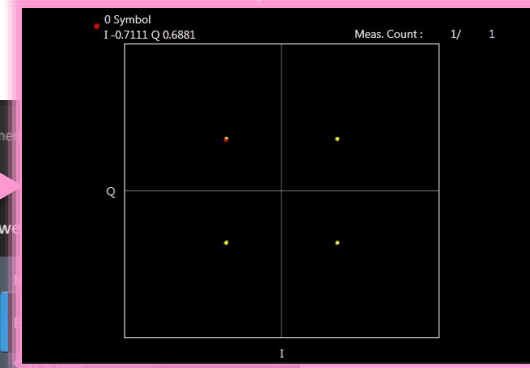
Operation Band: 7, Channel Bandwidth: 5 MHz, Output Level: -60.2 dBm

Measurement | Signaling | IP Data | UE Power

Measurement

- Occupied Bandwidth: 4.455 MHz
- Spectrum Emission Mask: Pass
- Adjacent Channel Power
- In-Band Emission
- Spectrum Flatness
- EVM: 2.76 %(rms)
- Phase Error
- Magnitude Error
- Constellation
- Throughput: 1994 kbps

## 1-Graph View

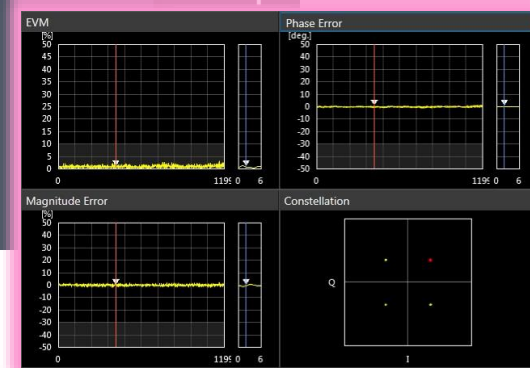


Top | End

Tx | Rx

Single | Continuous

## 4-Graph View



# Enhanced GUI: Automatic Help Display

Touching the test parameter/measurement results displays an explanation or remote commands in the Help window.

The screenshot shows the Anritsu test equipment GUI. On the left, a sidebar contains various test parameter categories. The 'Call Processing' parameter is highlighted with a pink box. A pink arrow points from this parameter to a help window in the top right corner. The help window displays the following text:

**Call Processing [CALLPROC]**  
This sets the call processing function on/off to switch the call connection mode.

The main screen displays various measurement graphs and numerical data. The 'Measurement' tab is active, showing the following data:

Parameter	Value
TX Power	-0.66 dBm
OBW	4.455 MHz
SEM	Pass
ACLR(-)	-42.02 dB
ACLR(+)	-41.82 dB
Freq. Err	0.0 ppm
EVM	2.76 %(rms)
Throughput	1994 kbps

The 'Occupied Bandwidth' graph shows a peak at 4.455 MHz. The 'Spectrum Emission Mask' graph shows a peak at 4.455 MHz. The 'Template Judgement' is 'Pass'. The 'EVM' is 2.76 %(rms). The 'Throughput' is 1994 kbps.

# Enhanced GUI: Parameter Search

Parameters can be searched by text and settings can be changed.

The screenshot displays the Anritsu test equipment GUI. At the top, it shows 'Phone2' and 'Phone1 LTE' with the number '30.34 #008'. Below this, there are tabs for 'PCC', 'SCC1', 'SCC2', 'SCC3', and 'SCC4'. The main area is divided into sections: 'Measurement', 'Signaling', and 'IP Data'. A 'Parameter Search' dialog is open, showing a search bar with 'CH' and a list of 35 items. A keyboard is overlaid on the search dialog. A pink box highlights the search area and the keyboard. A pink arrow points from the search bar to the 'Channel Coding' parameter in the list.

Parameter	Value
Channel Bandwidth	5 MHz
Channel	18300 ch
Channel	300 ch
Channel Coding	RMC
User Define Channel Model	
(Channel 1to1/2/3/4 Gain/Phase)	1.00 0.0 degree
	0.00 0.0 degree
	0.00 0.0 degree
(Channel 2to1/2/3/4 Gain/Phase)	0.00 0.0 degree
	0.00 0.0 degree
	0.00 0.0 degree
(Channel 3to1/2/3/4 Gain/Phase)	0.00 0.0 degree
	1.00 0.0 degree
	0.00 0.0 degree
(Channel 4to1/2/3/4 Gain/Phase)	0.00 0.0 degree
	0.00 0.0 degree
	1.00 0.0 degree
DTCH Data Pattern	MAC Padding Bits

# Enhanced GUI: External Loss separate setting for each of the CC/ PCC,SCC Link setting

- (1) Added function linking PCC and SCC parameter settings (only some parameters, such as Output Level)
- (2) Pressing list button at CA connection setting displays PCC and SCC settings simultaneously
- (3) Supports separate External Loss (Main UL/DL) setting for each CC

The screenshot displays the Anritsu test equipment GUI for CA connection settings. The interface is divided into several sections:

- Top Section:** Shows 'Phone2' and 'Phone1' settings. The 'Output Level (Total)' is set to -70.2 dBm, with a yellow box and arrow (1) pointing to the 'Output Level' field.
- Navigation Section:** A pink box (2) highlights a list button in the 'Common' section, with an arrow pointing to the 'PCC' tab.
- Measurement Section:** A pink box (2) highlights the 'PCC', 'SCC1', 'SCC2', and 'SCC3' tabs. Below these, the 'External Loss' settings are shown for each CC. A blue box (3) highlights the 'Main UL (Phone1)' and 'Main DL (Phone1)' fields for each CC, which are currently set to 0.0 dB.
- Right Side:** Contains various control buttons like 'Direct Entry', 'Close', 'Home', 'Preset', 'Stop', 'Tx/Rx' sliders, 'Single', 'Continuous', 'Connected', 'Start Call', 'End Call', and 'Menu'.

# Easy Parameter Setting

## ◆ Easier Downlink : Resource Block, MCS Index Settings

Freely settable parameters for each subframe support easy testing even at near-to-real test environment settings.

When Allocation mode = Detail

RB Allocation				Aggregation Level				
Subframe	Number of RB	Starting RB	MCS Index	Modulation	TBS Index	TBS	SI-RNTI	C-RNTI
0	80	20	28	64QAM	26	59256	-	8
1	100	0	28	64QAM	26	75376	-	8
2	2	98	25	64QAM	23	1128	-	8
3	2	98	8	QPSK	8	256	-	8
4	100	0	25	64QAM	23	57336	-	8
5	96	4	13	16QAM	12	22152	8	-
6	100	0	18	64QAM	16	32856	-	8
7	100	0	18	64QAM	16	32856	-	8
8	50	50	28	64QAM	26	36696	-	8
9	50	50	28	64QAM	26	36696	-	8

When Allocation mode = Normal

MCS Index		Aggregation Level				
Subframe	MCS Index	Modulation	TBS Index	TBS	SI-RNTI	C-RNTI
1-4,6-9	28	64QAM	26	18336	-	4
5	28	64QAM	26	15264	4	-
0	28	64QAM	26	18336	-	4
-	N/A	----	-	-	-	-

\*Easy legacy setting methods are also supported at measurement based on 3GPP TS 36.521-1.

# RF TRX Measurement (Test Parameters)

The MT8821C has a "Test Parameter" function for 3GPP RF tests.

It supports following features.

- One-button parameter setting for 3GPP RF TRX tests
- PASS/FAIL judgment

The screenshot displays the MT8821C RF measurement interface. The top section shows configuration parameters: UL Channel (18300 ch), TPC Pattern (All +3dB), Input Level (30.0 dBm), Operation Band (1), Channel Bandwidth (5 MHz), and Output Level (-60.2 dBm). The External Loss - Main DL R DLEXTLOSS is set to 0 dB. The UE Power is 22.0 dBm.

The central section is divided into Measurement, Signaling, and IP Data tabs. The Measurement tab is active, showing a grid of plots and numerical results. The Test Parameter menu is open, highlighting the 'Test Parameter' option. The results for the selected test parameter are as follows:

Parameter	Value	Status
Numeric	Pass	Pass
TX Power	22.01 dBm	
OBW	4.466 MHz	
SEM	Pass	
ACLR(-)	-37.48 dB	
ACLR(+)	-37.54 dB	
Freq. Err	0.00 ppm	
EVM	3.49 %(rms)	

The plots include Occupied Bandwidth (OBW) and Spectrum Emission Mask (SEM) plots, both showing 'Pass' status. Other plots include Adjacent Channel Power, In-Band Emission, Spectrum Flatness, EVM (3.49 %(rms)), Phase Error, Magnitude Error, Constellation, and Throughput (On).

# UE Capability Information Function \*

- Pressing the [UE Capability Information] button at the Signaling tab in the Result area displays a pop-up window listing the Band/Band Combination supported by the UE.

The UE CA Configuration can be captured and displayed for the specified Band for UE supporting Rel-11.

**UE Capability Information**

DL CA Config	UL CA Config
5A-1A	5A
1A-5A	1A
5A-1A	5A-1A
3A-1A	3A
1A-3A	1A
5A-3A	5A

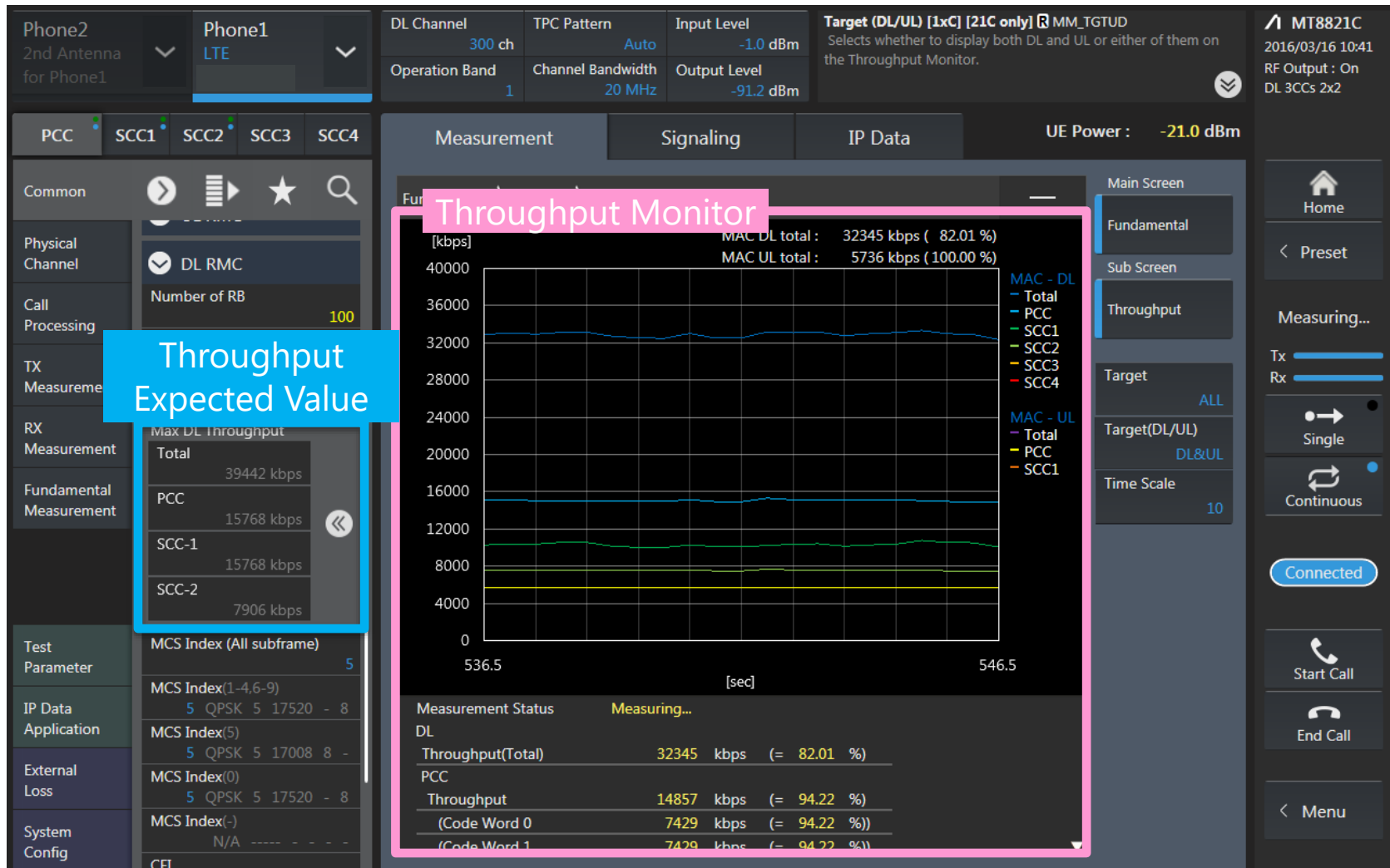
requested Frequency Bands Enabled  
Freq Band Indicator 1 3 5 0  
0 0 0 0  
0 0 0 0  
0 0 0 0

UE Capability Information

UE Capability Information

# Throughput Monitor/Display Expected Throughput

The MAC layer Throughput measurement results can be displayed as a graph. In addition, a function has been added for displaying expected Throughput values.





# IP Data Application

Data Application (PING/Iperf) operations can be performed from the MT8821C GUI using the Result – IP Data tab. Settings are made at the Parameter – IP Data Application tab.

The screenshot displays the MT8821C GUI interface. At the top, it shows 'Phone2' and 'Phone1' (LTE) settings. Below this, there are tabs for 'PCC', 'SCC1', 'SCC2', 'SCC3', and 'SCC4'. The main area is divided into 'Measurement', 'Signaling', and 'IP Data' tabs. The 'IP Data' tab is active, showing a list of servers and their respective test results. On the left, there is a 'Common' sidebar with various measurement and test parameter options. The 'IP Data Application' option is highlighted in blue. The 'IP Data' tab shows two servers: 'Server 1' and 'Server 2'. 'Server 1' has a PING test result showing 4 packets sent and received with 0% loss and an average round trip time of 13ms. 'Server 2' has an Iperf test result showing a bandwidth of 5.00 Mb/s. The right side of the screen shows a 'Connected' status and various control buttons like 'Home', 'Preset', 'Stop', 'Single', 'Continuous', 'Start Call', and 'End Call'.

DL Channel: 300 ch, TPC Pattern: Auto, Input Level: -1.0 dBm, Iperf Mode [1xC] [21C only] IPFMODE  
Operation Band: 1, Channel Bandwidth: 20 MHz, Output Level: -70.2 dBm  
This sets the packet transfer/receive direction of Client/Server of iperf.

MT8821C  
2016/03/16 12:50  
RF Output : On  
DL 3CCs 2x2

UE Power : -21.1 dBm

Common  
Physical Channel  
Call Processing  
TX Measurement  
RX Measurement  
Fundamental Measurement  
Test Parameter  
IP Data Application  
External Loss  
System Config

PING(Server1)  
Destination IPv4 Address: 192 168 20 11  
Destination IPv6 Address: 2001 0000 0000 0000 0000 0000 0000 0001  
IP Type: IPv4  
Interval: 1000  
Buffer Size: 32

Iperf(Server1)  
Iperf Mode: Client  
IP Type: IPv4  
IP Protocol: UDP  
Destination IPv4 Address: 192 168 20 11  
Destination IPv6 Address: 2001 0000 0000 0000 0000 0000 0000 0001  
Bandwidth: 5  
Bandwidth Unit

Server 1  
ping 192.168.20.11 -w 1000 -l 32 -S 192.168.20.10  
Pinging 192.168.20.11 from 192.168.20.10 with 32 bytes of data:  
Reply from 192.168.20.11: bytes=32 time=16ms TTL=64  
Reply from 192.168.20.11: bytes=32 time=12ms TTL=64  
Reply from 192.168.20.11: bytes=32 time=12ms TTL=64  
Reply from 192.168.20.11: bytes=32 time=13ms TTL=64  
Ping statistics for 192.168.20.11:  
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),  
Approximate round trip times in milli-seconds:  
Minimum = 12ms, Maximum = 16ms, Average = 13ms

Server 2  
-----  
Client connecting to 192.168.20.11, UDP port 5001  
Binding to local address 192.168.20.10  
Sending 1470 byte datagrams  
UDP buffer size: 1.00 MByte  
-----  
[ID] Interval Transfer Bandwidth  
0] 0.0- 1.0 sec 610 KBytes 5.00 Mb/s/sec  
0] 1.0- 2.0 sec 609 KBytes 4.99 Mb/s/sec  
0] 2.0- 3.0 sec 610 KBytes 5.00 Mb/s/sec  
0] 3.0- 4.0 sec 609 KBytes 4.99 Mb/s/sec  
0] 4.0- 5.0 sec 610 KBytes 5.00 Mb/s/sec  
0] 5.0- 6.0 sec 609 KBytes 4.99 Mb/s/sec  
0] 6.0- 7.0 sec 610 KBytes 5.00 Mb/s/sec  
0] 7.0- 8.0 sec 609 KBytes 4.99 Mb/s/sec

PING (Server1)  
Iperf (Server1)

PING (Server2)  
Iperf (Server2)

Home  
Preset  
Stop  
Tx  
Rx  
Single  
Continuous  
Connected  
Start Call  
End Call  
Menu

# Compatibility with MT8820C

The MT8821C is compatible with MT8820C functions, performance, remote commands, etc. Previously developed control software and test sequences can be used with the MT8821C.

- ◆ Reduces costs for test equipment and test environment configuration
- ◆ No risks rebuilding existing LTE and 3G/2G test environment

## Compatibility

- Functions and performance
- Remote commands

MT8820C



Control software and test environment can be reused.



MT8821C



# MT8820C to MT8821C Upgrade

The MT8821C is upgradeable from the MT8820C. The existing MT8820C hardware and all measurement software can be re-used to make the most efficient use of your investment.

MT8820C



**Upgrade kit**

MT8821C



	Hardware	Software
W-CDMA	MT8820C-001	MX882000C
TD-SCDMA	MT8820C-007	MX882007C
GSM	MT8820C-002	MX882001C
LTE	MT8820C-008	MX882012C/13C



	Hardware	Software
	MT8821C-001	MX882100C
	MT8821C-007	MX882107C
	MT8821C-002	MX882101C
	MT8821C-008	MX882112C/13C

# MT8821C vs. MT8820C

	MT8821C	MT8820C
Frequency Range	30 MHz to <b>6.0 GHz</b> ( <b>3.8 GHz to 6.0 GHz</b> Option)	30 MHz to 2.7 GHz, 3.4 GHz to 3.8 GHz (3.4 GHz to 3.8 GHz Option)
Interface	Main: RF In/Out ( <b>Max. 4 ports</b> ) Aux: RF Out ( <b>Max. 8 ports</b> )	Main: RF In/Out (Max. 2 ports) Aux: RF Out (Max. 2 ports)
Output Level	-140 to <b>-10 dBm</b> (Main) -125 to <b>+5 dBm</b> (Aux)	-140 to - 10 dBm (Main) -130 to 0 dBm (Aux)
Bandwidth	Generator bandwidth: <b>160 MHz</b> Analyzer bandwidth: <b>160 MHz</b>	Generator bandwidth: 25 MHz Analyzer bandwidth: 25 MHz
System	<ul style="list-style-type: none"> <li>- LTE FDD/TDD</li> <li>  LTE CA (DL CA 4CCs (with SISO)/   DL CA 8CCs (with 4x4 MIMO)***/   DL CA 6CCs (with 4x4 MIMO)**/   DL CA 4CCs (with 4x4 MIMO)*/   DL CA 8CCs (with 2x2 MIMO)*/   UL CA 2CCs/   LTE in unlicensed spectrum : 5 GHz )</li> <li>- WCDMA/HSPA/HSPA Evolution/   (DB-)DC-HSDPA/4C-HSDPA/DC-HSUPA</li> <li>- GSM/GPRS/EGPRS</li> <li>- TD-SCDMA/HSPA/HSDPA Evolution</li> <li>- LTE Cat-M, NB-IoT(Cat-NB1,2)</li> <li>- 5G NSA Anchor</li> </ul>	<ul style="list-style-type: none"> <li>- LTE FDD/TDD (up to 2x2 MIMO)</li> <li>- LTE CA (DL 3CC + 2x2 MIMO by 3units/   UL 2CC)</li> <li>- WCDMA/HSPA/HSPA Evolution/   (DB-)DC-HSDPA/4C-HSDPA/DC-HSUPA</li> <li>- GSM/GPRS/EGPRS</li> <li>- TD-SCDMA/HSPA/HSDPA Evolution</li> </ul>
GUI	<b>Windows 7 OS, touch panel, USB interface</b>	Unix OS, key panel, CF interface
Dimensions	426 (W) × 221.5 (H) × 578 (D) mm (excluding protrusions)	426 (W) × 221.5 (H) × <b>498</b> (D) mm (excluding protrusions)

# MT8821C Options

Hardware No.	Hardware Name
MT8821C	Radio Communication Analyzer
MT8821C-001	W-CDMA Measurement Hardware
MT8821C-002	TDMA Measurement Hardware
MT8821C-007	TD-SCDMA Measurement Hardware
MT8821C-008	LTE Measurement Hardware
MT8821C-012	Parallel Phone Measurement Hardware
MT8821C-019	Extended RF 3.8GHz - 6GHz
MT8821C-025	2nd RF for Phone1
MT8821C-026	3rd RF for Phone1
MT8821C-027	4th RF for Phone1
MT8821C-028	2nd RF for Phone2
MT8821C-029	3rd RF for Phone2
MT8821C-030	4th RF for Phone2
Software No.	Software Name
MX882100C	W-CDMA Measurement Software
MX882100C-002	W-CDMA External Packet Data
MX882100C-003	W-CDMA Video Phone Test
MX882100C-005	W-CDMA A-GPS
MX882100C-019	WCDMA HSPA Measurement Software
MX882100C-032	DC-HSDPA Measurement Software
MX882100C-033	DC-HSUPA Measurement Software
MX882100C-034	4C-HSDPA Measurement Software
MX882170C	W-CDMA Ciphering Software
MX882101C	GSM Measurement Software
MX882101C-002	GSM External Packet Data
MX882101C-005	GSM A-GPS
MX882101C-011	EGPRS Measurement Software
MX882107C	TD-SCDMA Measurement Software
MX882107C-002	TD-SCDMA External Packet Data
MX882107C-003	TD-SCDMA Video Phone Test
MX882107C-011	TD-SCDMA HSDPA Measurement Software
MX882107C-012	TD-SCDMA HSDPA Evolution Measurement Software
MX882107C-021	TD-SCDMA HSUPA Measurement Software
MX882112C	LTE FDD Measurement Software
MX882112C-006	LTE FDD IP Data Transfer
MX882112C-010	LTE FDD Anchor For 5G NSA
MX882112C-011	LTE FDD 2x2 MIMO DL
MX882112C-012	LTE FDD 4x4 MIMO DL
MX882112C-016	LTE FDD CS Fallback to W-CDMA/GSM
MX882112C-021	LTE-Advanced FDD DL CA Measurement Software
MX882112C-022	LTE-Advanced FDD UL CA Measurement Software
MX882112C-026	LTE-Advanced FDD DL CA IP Data Transfer
MX882112C-031	LTE-Advanced FDD DL CA 3CCs Measurement Software
MX882112C-036	LTE-Advanced FDD DL CA 3CCs IP Data Transfer
MX882112C-041	LTE-Advanced FDD DL CA 4CCs Measurement Software
MX882112C-046	LTE-Advanced FDD DL CA 4CCs IP Data Transfer
MX882112C-051	LTE-Advanced FDD DL CA 5CCs Measurement Software
MX882112C-061	LTE-Advanced FDD DL CA 6CCs Measurement Software
MX882112C-071	LTE Advanced FDD DL CA 7CCs Measurement Software
MX882112C-081	LTE Advanced FDD DL CA 8CCs Measurement Software

Software No.	Software Name
MX882113C	LTE TDD Measurement Software
MX882113C-006	LTE TDD IP Data Transfer
MX882113C-010	LTE TDD Anchor For 5G NSA
MX882113C-011	LTE TDD 2x2 MIMO DL
MX882113C-012	LTE TDD 4x4 MIMO DL
MX882113C-016	LTE TDD CS Fallback to W-CDMA/GSM
MX882113C-018	LTE TDD CS Fallback to TD-SCDMA/GSM
MX882113C-021	LTE-Advanced TDD DL CA Measurement Software
MX882113C-022	LTE-Advanced TDD UL CA Measurement Software
MX882113C-026	LTE-Advanced TDD DL CA IP Data Transfer
MX882113C-031	LTE-Advanced TDD DL CA 3CCs Measurement Software
MX882113C-036	LTE-Advanced TDD DL CA 3CCs IP Data Transfer
MX882113C-041	LTE-Advanced TDD DL CA 4CCs Measurement Software
MX882113C-046	LTE-Advanced TDD DL CA 4CCs IP Data Transfer
MX882113C-051	LTE-Advanced TDD DL CA 5CCs Measurement Software
MX882113C-061	LTE-Advanced TDD DL CA 6CCs Measurement Software
MX882113C-071	LTE Advanced TDD DL CA 7CCs Measurement Software
MX882113C-081	LTE Advanced TDD DL CA 8CCs Measurement Software
MX882115C	W-CDMA HSPA IP Data Transfer
MX882115C-001	W-CDMA DC-HSPA IP Data Transfer
MX882116C	LTE Category M1 Measurement Software
MX882116C-006	LTE Category M1 IP Data Transfer
MX882117C	NB-IoT Measurement Software
MX882117C-001	NB-IoT Category NB-2 Measurement Software
MX882117C-002	NB-IoT Multi Carrier
MX882117C-006	NB-IoT IP Data Transfer
MX882120C	SEQ Measurement Software
MX882120C-001	W-CDMA Measurement Software
MX882120C-002	GSM Measurement Software
MX882120C-004	LTE Measurement Software
MX882120C-005	TD-SCDMA Measurement Software
MX882132C	CDMA2000 Measurement Software Lite
MX882136C	1xEV-DO Measurement Software Lite
MX882142C	LTE FDD Measurement Software Lite
MX882143C	LTE TDD Measurement Software Lite
MX882164C	LTE VoLTE Echoback

