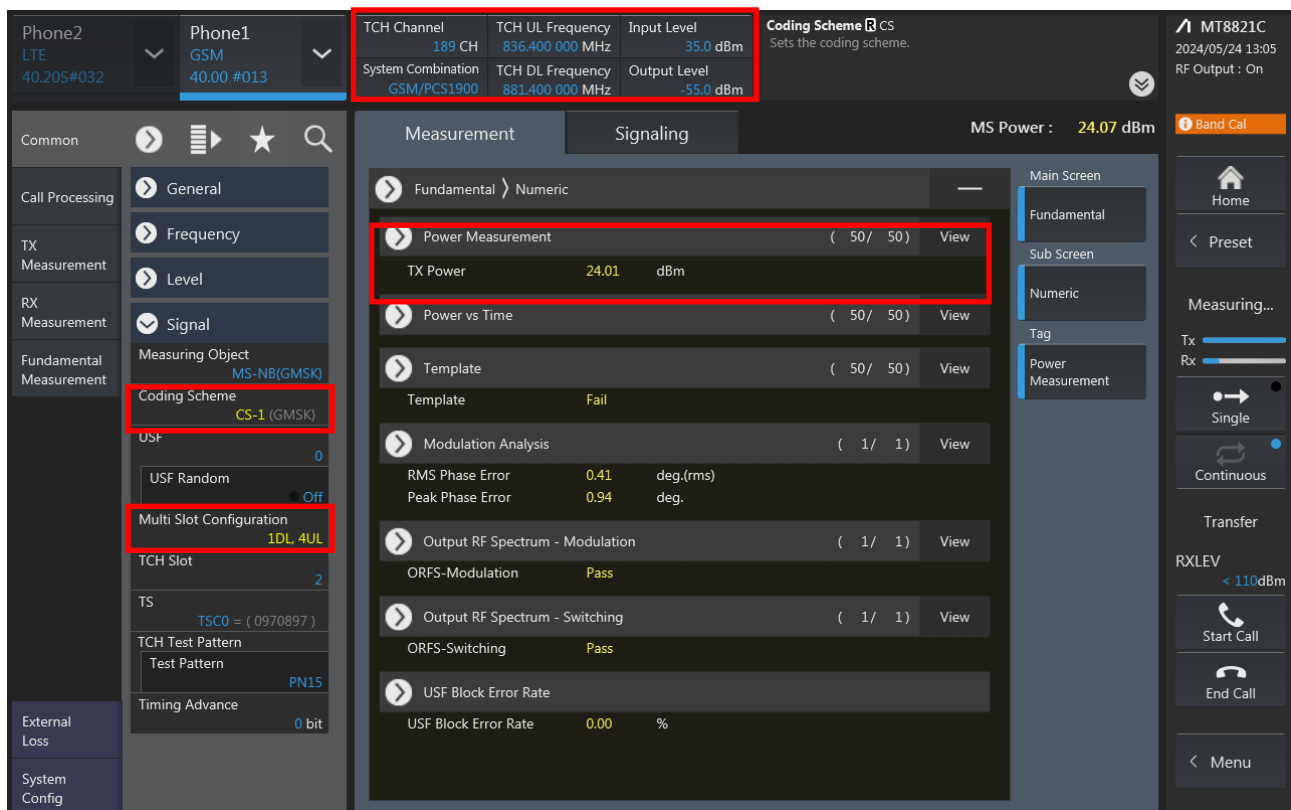


Appendix D-5. 2G/3G/LTE/5G FR1/UL CA connection diagram

General Note:

The power measurement for 2G/3G/LTE/5G FR1/UL CA is to establish a connection between device and call box, and via call box to configure Bands, channel, BWs, RB size, carrier aggregation of CA, frequency channels, SCS and maximum output power. Hereunder is screenshot call box connection information for 2G/3G/LTE/5G FR1/UL CA.

GSM



The screenshot displays the MT8821C test equipment interface for GSM configuration and measurement. The interface is divided into several sections:

- Top Bar:** Shows 'Phone2' (LTE 40.20S#032) and 'Phone1' (GSM 40.00 #013). It also displays 'TCH Channel' (189 CH), 'TCH UL Frequency' (836.400 000 MHz), 'Input Level' (35.0 dBm), 'System Combination' (GSM/PCS1900), 'TCH DL Frequency' (881.400 000 MHz), and 'Output Level' (-55.0 dBm). The 'Coding Scheme' is set to CS.
- Left Sidebar:** Contains navigation options for 'Call Processing', 'TX Measurement', 'RX Measurement', 'Fundamental Measurement', 'External Loss', and 'System Config'. The 'Fundamental Measurement' section is expanded, showing 'Measuring Object' (MS-NB(GMSK)), 'Coding Scheme' (CS-1 (GMSK)), 'USF' (0), 'USF Random' (Off), 'Multi Slot Configuration' (1DL 4UL), 'TCH Slot' (2), 'TS' (TSC0 = (0970897)), 'TCH Test Pattern' (Test Pattern), 'Timing Advance' (0 bit), and 'PN15'.
- Main Area:**
 - Measurement Tab:** Displays 'Power Measurement' (24.01 dBm), 'Power vs Time' (50/ 50), 'Template' (Fail), 'Modulation Analysis' (1/ 1), 'Output RF Spectrum - Modulation' (1/ 1), 'Output RF Spectrum - Switching' (1/ 1), and 'USF Block Error Rate' (0.00 %).
 - Signaling Tab:** Displays 'Modulation Analysis' (1/ 1), 'Output RF Spectrum - Modulation' (1/ 1), 'Output RF Spectrum - Switching' (1/ 1), and 'USF Block Error Rate' (0.00 %).
- Right Sidebar:** Shows 'Main Screen' and 'Sub Screen' options, along with 'Tx' and 'Rx' power levels. The 'Tx' power is 24.07 dBm, and the 'Rx' power is < 110 dBm.

WCDMA

Phone2
LTE
40.20S#032

Phone1
W-CDMA
40.00 #013

UL Channel
9400 CH

UL Frequency
1 880.000 000 MHz

Input Level
35.0 dBm

Average Count PWR_AVG
Sets the average count (measurement count) for power measurement.

DL Channel
9800 CH

DL Frequency
1 960.000 000 MHz

Output Level
-65.7 dBm

MT8821C
2024/05/24 12:58
RF Output : On

Common

Physical Channel

Call Processing

TX Measurement

RX Measurement

Fundamental Measurement

Meas Setup

External Loss

System Config

Authentication / Integrity

Integrity Protection

SIM Model Number

P0035

Authentication Algorithm

XOR

Authentication Key Ki

00112233 44556677
8899AABB CCDDDEFF

AMF

0000

H

Opc

00000000 00000000
00000000 00000000

Connection Setting

Measurement Report

Inner Loop Power Control

Power Control Algorithm

Algorithm 1

TPC StepSize

1dB

Power Control

All 1

User Command

10101 01010 10101
01010 10101 01010

Measurement

Signaling

UE Power : 22.6 dBm

Band Cal

Home

Preset

Measuring...

Tx

Rx

Single

Continuous

Loop Mode 1

Start Call

End Call

Menu

Fundamental

Numeric

Power Measurement

(50/ 50)

TX Power

23.28

dBm

Frequency Error

(1/ 1)

Carrier Frequency Error

-0.0002

kHz

Freq. Err

0.00

ppm

Occupied Bandwidth

(1/ 1)

View

OBW

4.163

MHz

Spectrum Emission Mask

(1/ 1)

View

SEM

Pass

Adjacent Channel Power

(1/ 1)

ACLR(-5MHz)

-40.24

dB

ACLR(+5MHz)

-42.79

dB

Modulation Analysis

(1/ 1)

View

EVM

5.15

%(rms)

Peak Code Domain Error

(1/ 1)

PCDE

-39.86

dB

LTE

Phone2
LTE
40.20S#032

Phone1
LTE
40.20S#032

UL Channel
18900 ch

TPC Pattern
All +3dB

Input Level
35.0 dBm

Power Measurement - Meas. Count PWR_AVG
This sets the measurement count of the power measurement.

Operation Band
2

Channel Bandwidth
20 MHz

Output Level
-54.2 dBm

MT8821C
2024/05/24 12:51
RF Output : On

PCC

SCC1

SCC2

SCC3

>>

Common

Physical Channel

Call Processing

TX Measurement

RX Measurement

Fundamental Measurement

Test Parameter

Band Definition

External Loss

System Config

General

Frequency

Level

Signal

UL RMC

UL Allocation Mode

Normal

RB Pos.

Min(#0)

Number of RB

1

Starting RB

0

Max UL Throughput

72 kbps

MCS Index

5 QPSK 5 72 8

256QAM

Disabled

DL RMC

Measurement

Signaling

UE Power : 25.4 dBm

Band Cal

Home

Preset

Measuring...

Tx

Rx

Single

Continuous

Connected

Start Call

End Call

Menu

Fundamental

Numeric

Power Measurement

(50/ 50)

TX Power

25.12

dBm

Modulation Analysis

(1/ 1)

View

Freq. Err

0.00

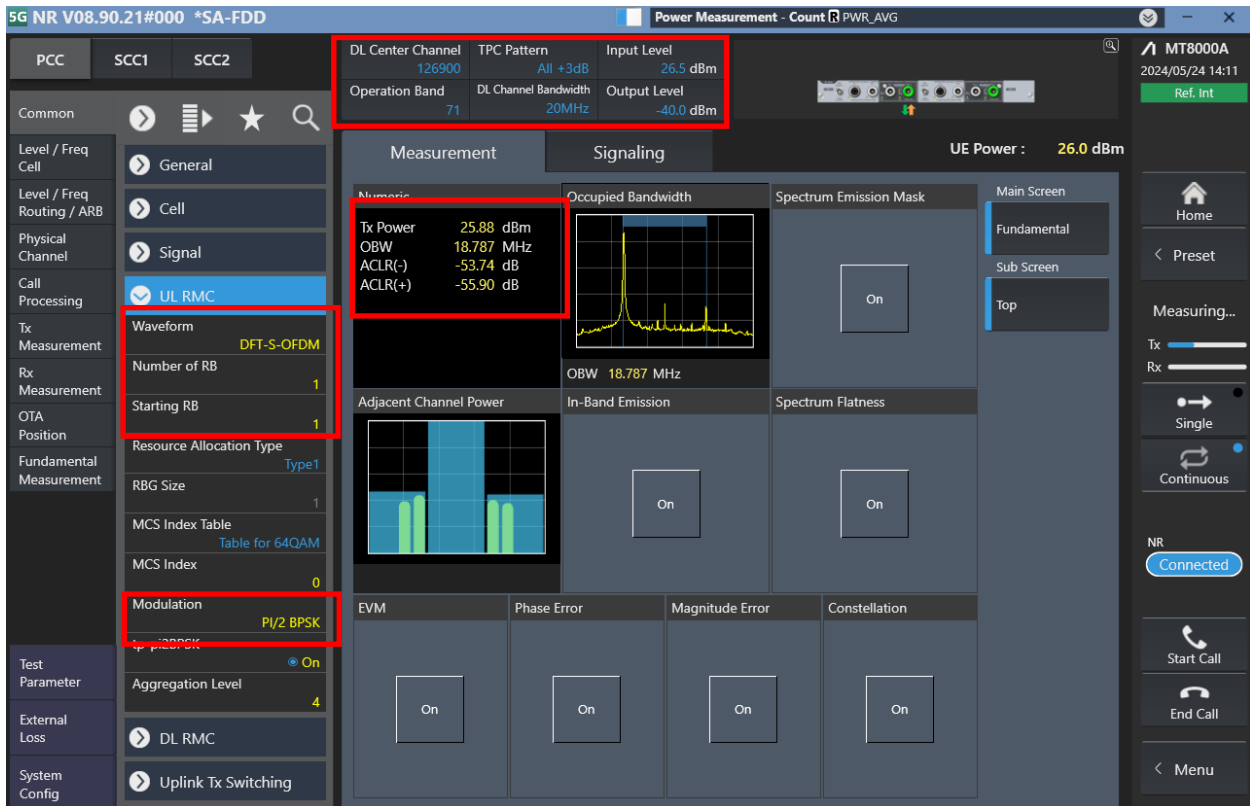
ppm

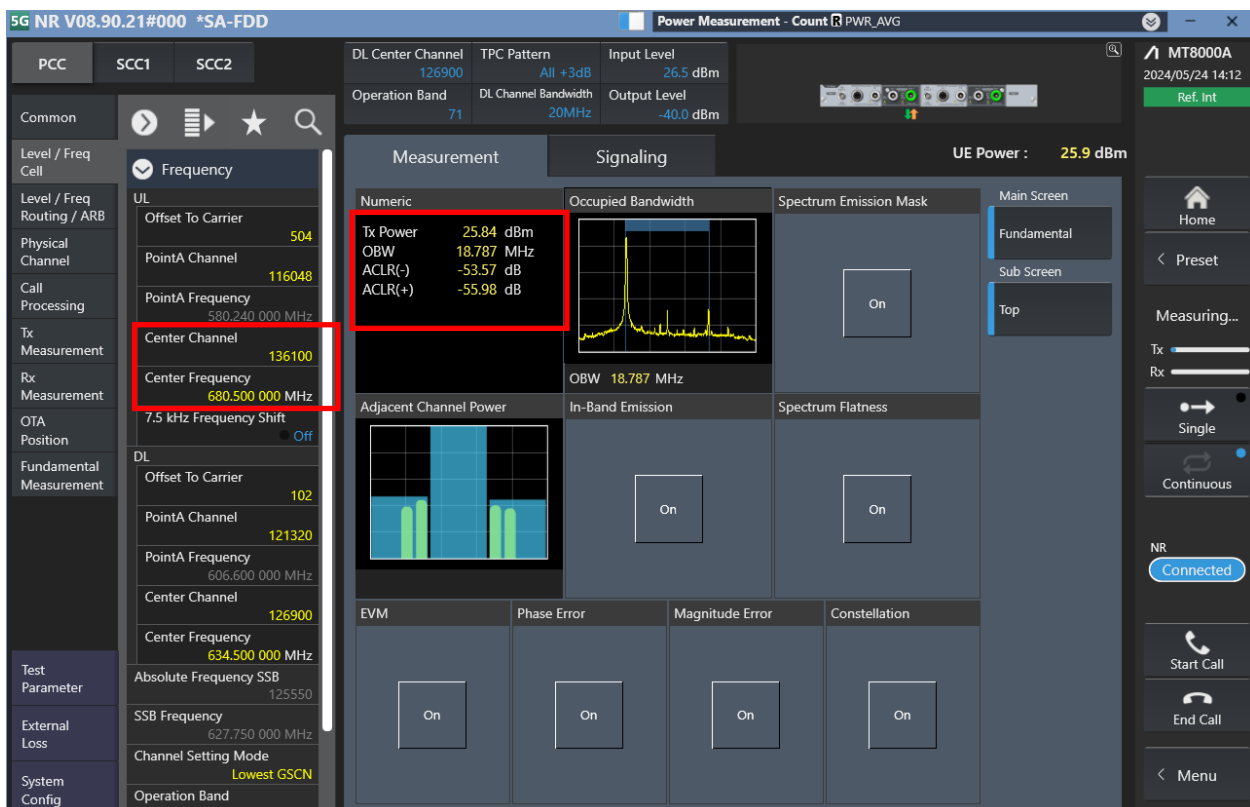
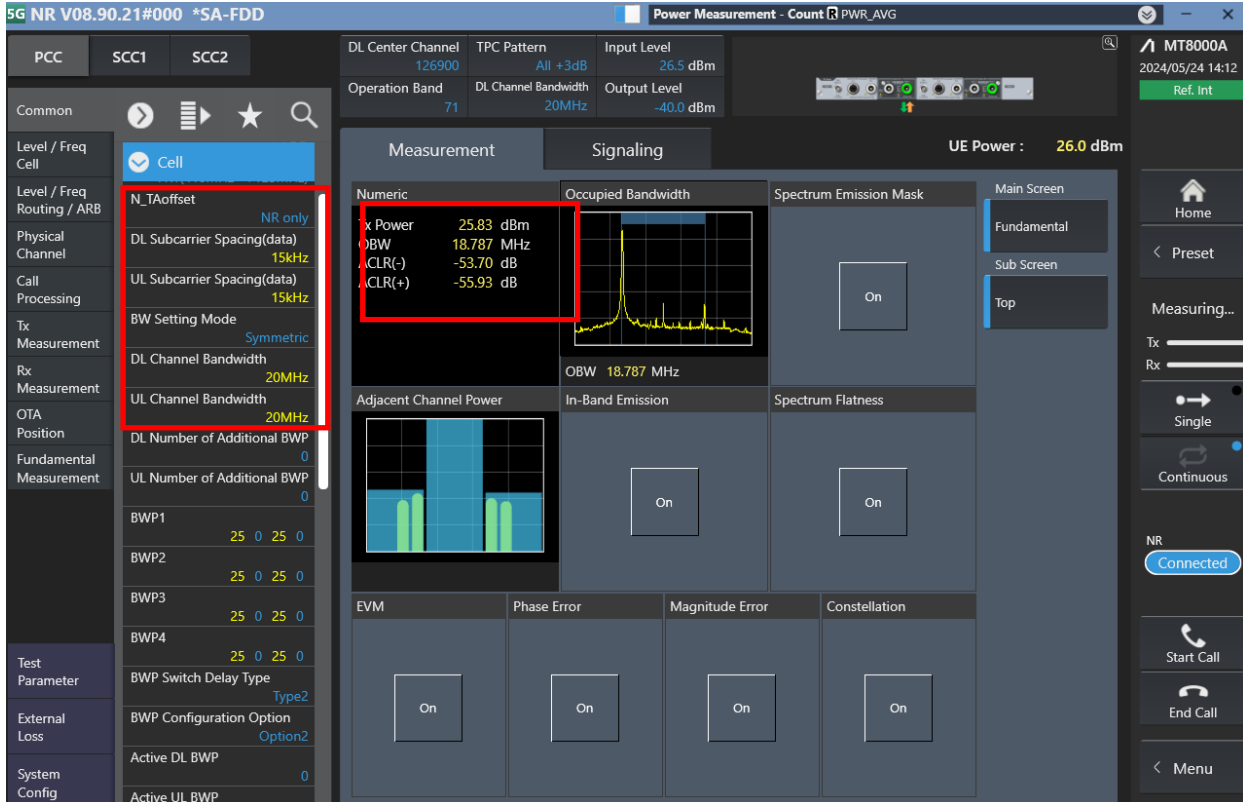
EVM

1.35

%(rms)

5G NR FR1



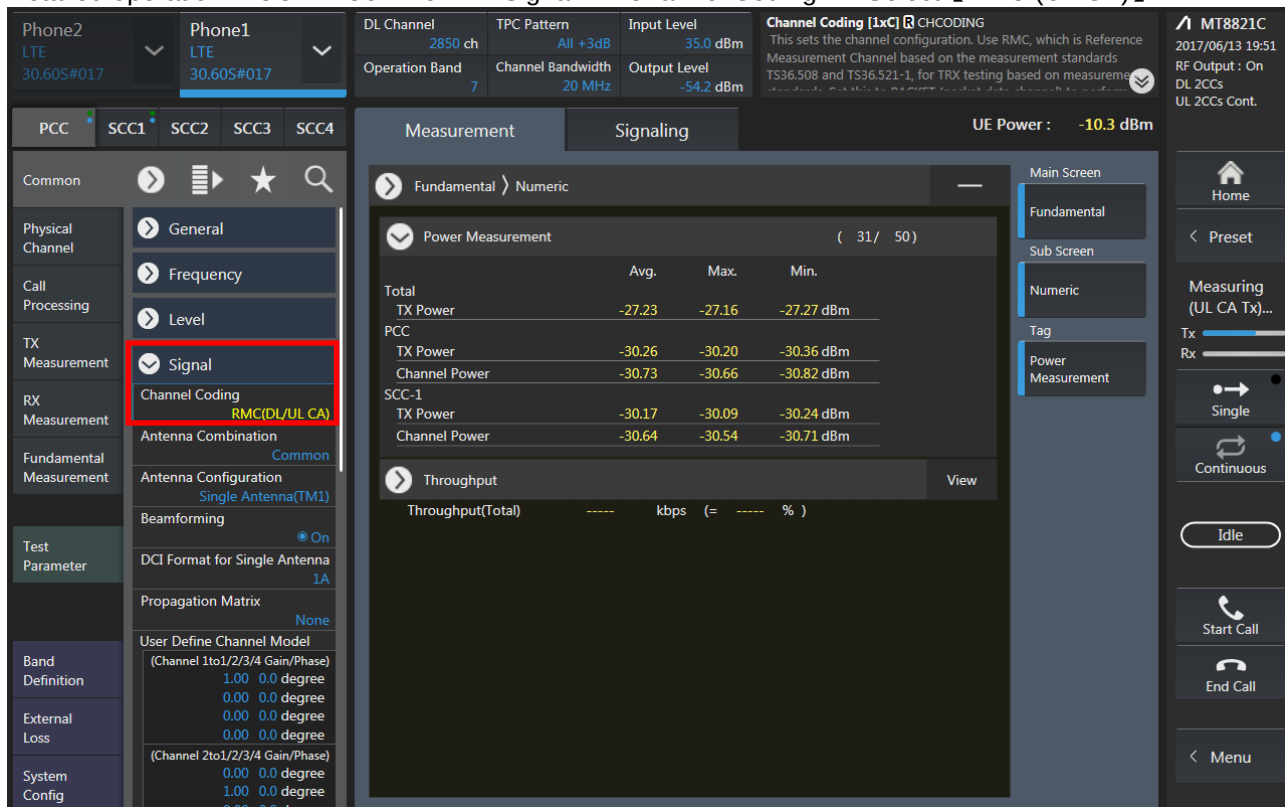


LTE Uplink Carrier Aggregation configurations:

Select "RMC (UL CA)" for Uplink Carrier Aggregation.

For example, Uplink Carrier Aggregation:

Detailed operation: PCC → Common → Signal → Channel Coding → Select **【RMC (UL CA)】**



Phone2 LTE 30.60S#017

Phone1 LTE 30.60S#017

DL Channel 2850 ch

TPC Pattern All +3dB

Input Level 35.0 dBm

Channel Coding [1xC] R CHCODING This sets the channel configuration. Use RMC, which is Reference Measurement Channel based on the measurement standards TS36.508 and TS36.521-1, for TRX testing based on measurement standards.

Operation Band 7

Channel Bandwidth 20 MHz

Output Level -54.2 dBm

UE Power : -10.3 dBm

Common

Physical Channel

Call Processing

TX Measurement

RX Measurement

Fundamental Measurement

Test Parameter

Band Definition

External Loss

System Config

Channel Coding RMC(DL/UL CA)

Antenna Combination Common

Antenna Configuration Single Antenna(TM1)

Beamforming On

DCI Format for Single Antenna 1A

Propagation Matrix None

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

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

Power Measurement (31 / 50)

	Avg.	Max.	Min.
Total TX Power	-27.23	-27.16	-27.27 dBm
PCC TX Power	-30.26	-30.20	-30.36 dBm
Channel Power	-30.73	-30.66	-30.82 dBm
SCC-1 TX Power	-30.17	-30.09	-30.24 dBm
Channel Power	-30.64	-30.54	-30.71 dBm

Throughput View

Throughput(Total) ----- kbps (= ----- %)

Main Screen

Fundamental

Sub Screen

Numeric

Tag

Power Measurement

Home

Preset

Measuring (UL CA Tx)...

Tx

Rx

Single

Continuous

Idle

Start Call

End Call

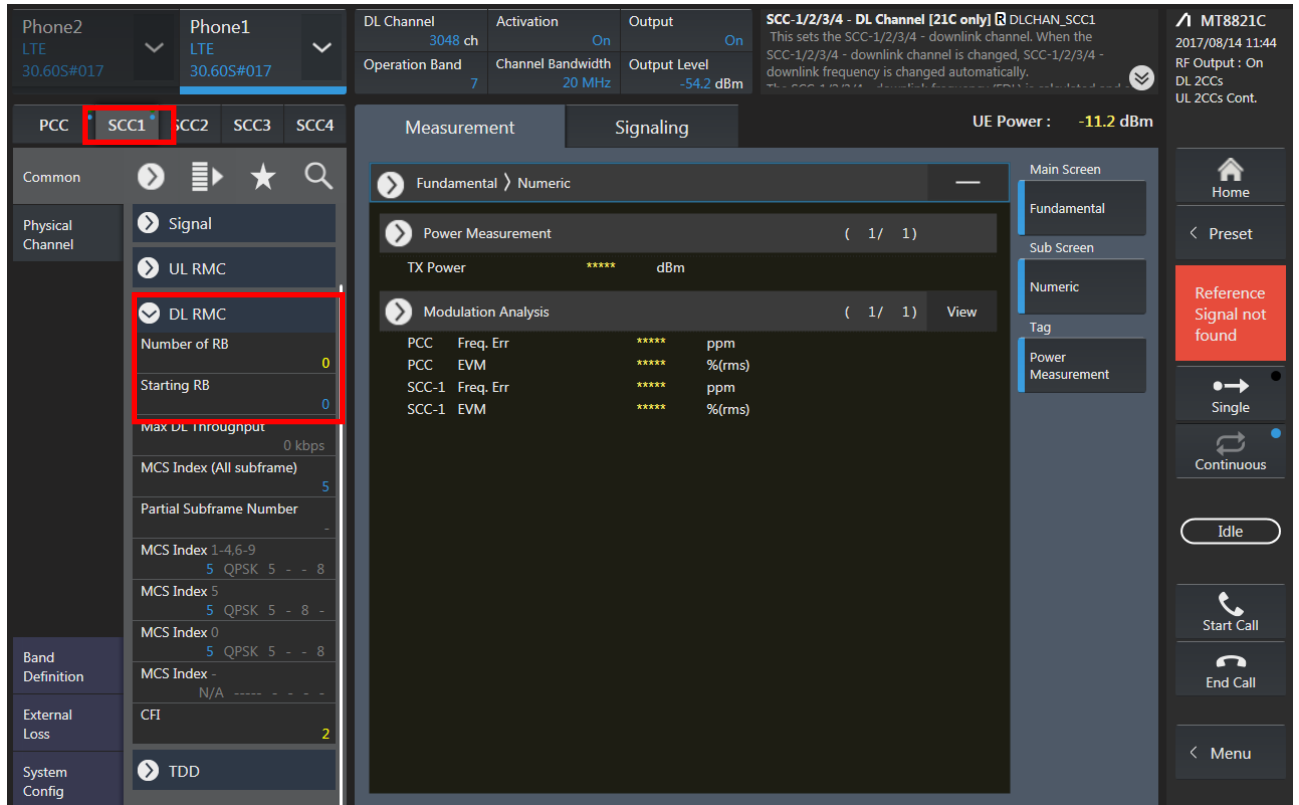
Menu



- The screenshot displays the MT8821C software interface, which is used for configuring and measuring the DL RMC (Downlink Resource Management Control) parameters. The interface is divided into several sections:

 - Top Bar:** Shows the device name "MT8821C" and the date/time "2017/08/14 11:42". It also indicates the RF Output status: "On", "DL 2CCs", and "UL 2CCs".
 - DL RMC - Number of RB [1x1] DLRMC_RB:** This section explains that the value sets the number of Resource Blocks (RBs) for Downlink signals. The current value is "15.8 dBm".
 - Measurement Section:** This section displays the current measurement results for the DL RMC. The "Fundamental" screen shows the "Power Measurement" results, including the "TX Power" (15.8 dBm) and the "Modulation Analysis" results (PCC, SCC-1, and SCC-2 EVM).
 - Configuration Section:** This section allows users to configure the DL RMC parameters. The "Allocation Mode" is set to "Normal". The "Number of RB" is set to "0". The "Starting RB" is set to "0". The "256QAM" mode is "Disabled". The "Max DL Throughput" is "0 kbps". The "MCS Index (All subframe)" is "5". The "MCS Index 1-4,6-9" is "5 QPSK 5 - - 8". The "MCS Index 5" is "5 QPSK 5 - 8 -". The "MCS Index 0" is "5 QPSK 5 - - 8". The "MCS Index -" is "N/A - - - -". The "CFI" is "2". The "TDD" mode is selected.

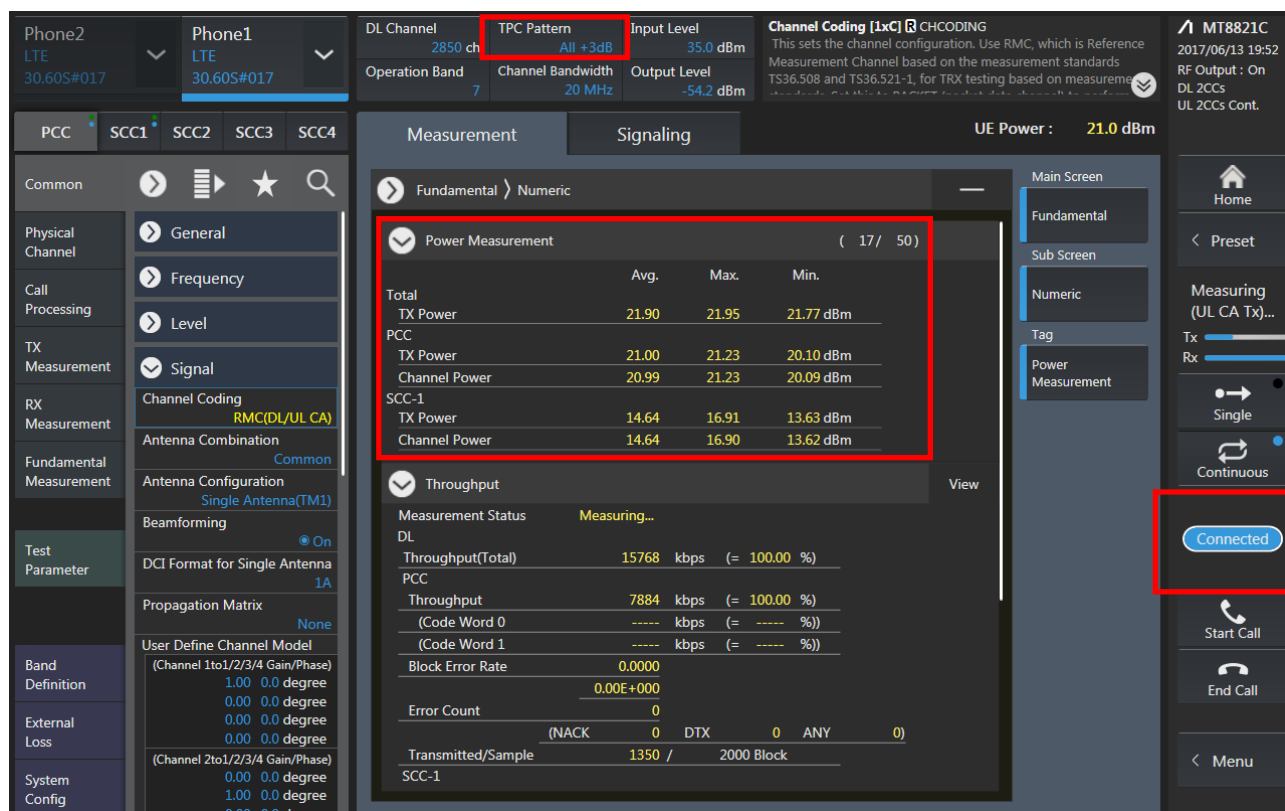
2. SCC parameter Settings: select the SCC tab and Set operating band, BW, channel and RB configurations for SCC.



The screenshot displays the SPORTON LAB. FCC SAR TEST REPORT interface. The top section shows the 'Phone1' configuration with 'LTE' and '30.60S#017'. The 'DL Channel' is set to '3048 ch', 'Operation Band' is '7', 'Channel Bandwidth' is '20 MHz', and 'Output Level' is '-54.2 dBm'. The 'Activation' and 'Output' status are both 'On'. The 'SCC-1/2/3/4 - DL Channel [21C only]' is selected, and the 'DLCHAN_SCC1' is set to 'DLCHAN_SCC1'. The 'UE Power' is '-11.2 dBm'. The 'Physical Channel' section is expanded, showing 'Signal', 'UL RMC', and 'DL RMC' (selected). The 'DL RMC' settings are: 'Number of RB' is '0', 'Starting RB' is '0', 'Max DL Throughput' is '0 kbps', 'MCS Index (All subframe)' is '5', 'Partial Subframe Number' is '-', 'MCS Index 1-4,6-9' is '5 QPSK 5 - - 8', 'MCS Index 5' is '5 QPSK 5 - - 8', 'MCS Index 0' is '5 QPSK 5 - - 8', 'MCS Index -' is 'N/A - - - - -', and 'CFI' is '2'. The 'System Config' section shows 'TDD'. The 'Measurement' section is expanded, showing 'Fundamental' and 'Modulation Analysis'. The 'Modulation Analysis' section shows 'PCC Freq. Err' as '***** ppm', 'PCC EVM' as '***** %(rms)', 'SCC-1 Freq. Err' as '***** ppm', and 'SCC-1 EVM' as '***** %(rms)'. The 'Main Screen' section shows 'Fundamental' and 'Sub Screen' (selected). The 'Tag' section shows 'Power Measurement'. The 'Reference Signal not found' message is displayed. The 'Home' button is visible at the bottom right.

3. Select the PCC tab, and select max power;

Click the “Connect” button at the Right of the screen.



The screenshot displays the FCC SAR Test Report software interface. The top bar shows the phone configuration: Phone2 (LTE, 30.60S#017) and Phone1 (LTE, 30.60S#017). The DL Channel is 2850 ch, and the TPC Pattern is All +3dB. The Input Level is 35.0 dBm, and the Output Level is -54.2 dBm. The Channel Coding is 1xC, and the CHCODING is CHCODING. The UE Power is 21.0 dBm.

The left sidebar contains various tabs: PCC, SCC1, SCC2, SCC3, and SCC4. The PCC tab is selected. The main area shows the Measurement and Signaling sections. The Measurement section is expanded, showing Power Measurement and Throughput. The Power Measurement section is highlighted with a red box, showing the following data:

	Avg.	Max.	Min.
Total TX Power	21.90	21.95	21.77 dBm
PCC TX Power	21.00	21.23	20.10 dBm
Channel Power	20.99	21.23	20.09 dBm
SCC-1 TX Power	14.64	16.91	13.63 dBm
Channel Power	14.64	16.90	13.62 dBm

The Throughput section shows the following data:

	Throughput	(= %)
DL Throughput(Total)	15768 kbps	(= 100.00 %)
PCC Throughput	7884 kbps	(= 100.00 %)
(Code Word 0)	----- kbps	(= ----- %)
(Code Word 1)	----- kbps	(= ----- %)
Block Error Rate	0.0000	
Error Count	0	
(NACK)	0	
DTX	0	
ANY	0	
Transmitted/Sample	1350 / 2000 Block	

The right sidebar contains a 'Connected' button, which is highlighted with a red box. Other buttons include Home, Preset, Measuring (UL CA Tx...), Single, Continuous, Start Call, End Call, and Menu.