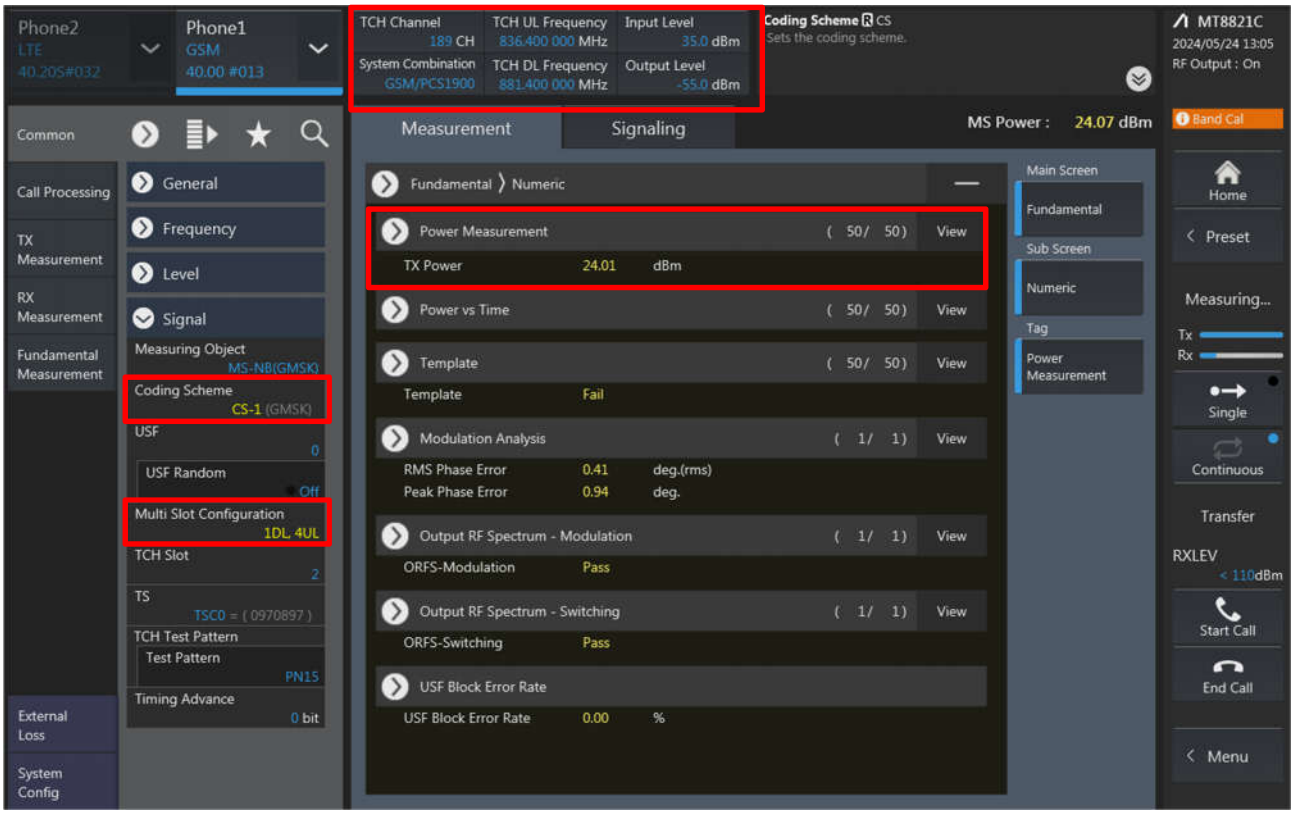
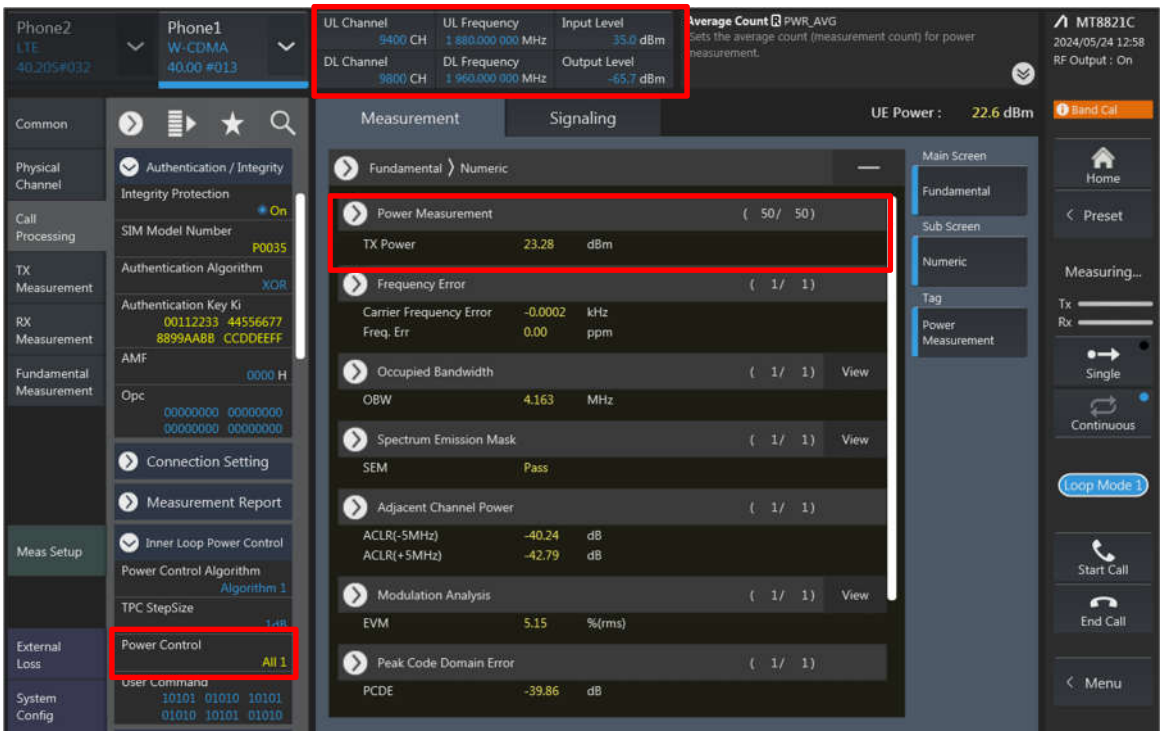
Power measurement connection diagram:

The power measurement for 2G/3G/LTE/5G FR1/UL and DL 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 and DL CA.

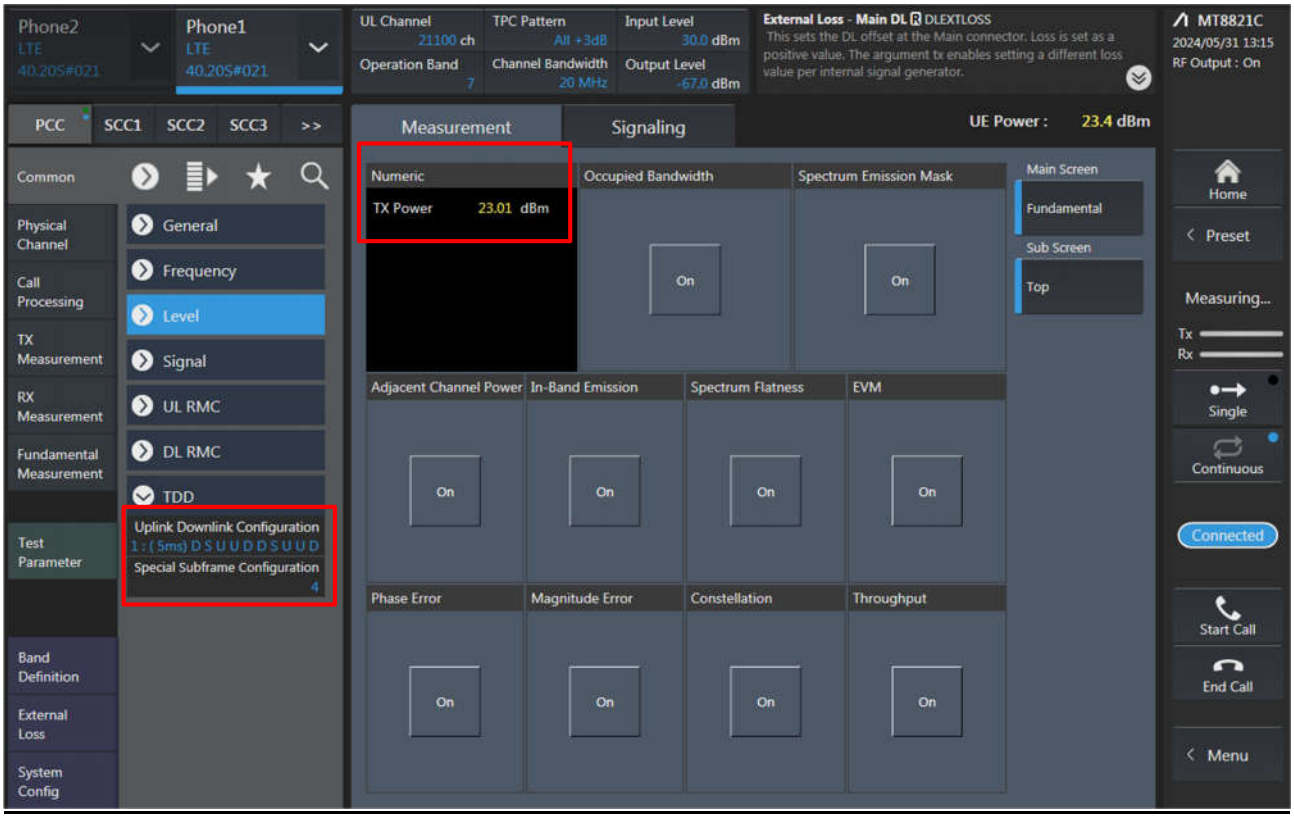
<GSM>



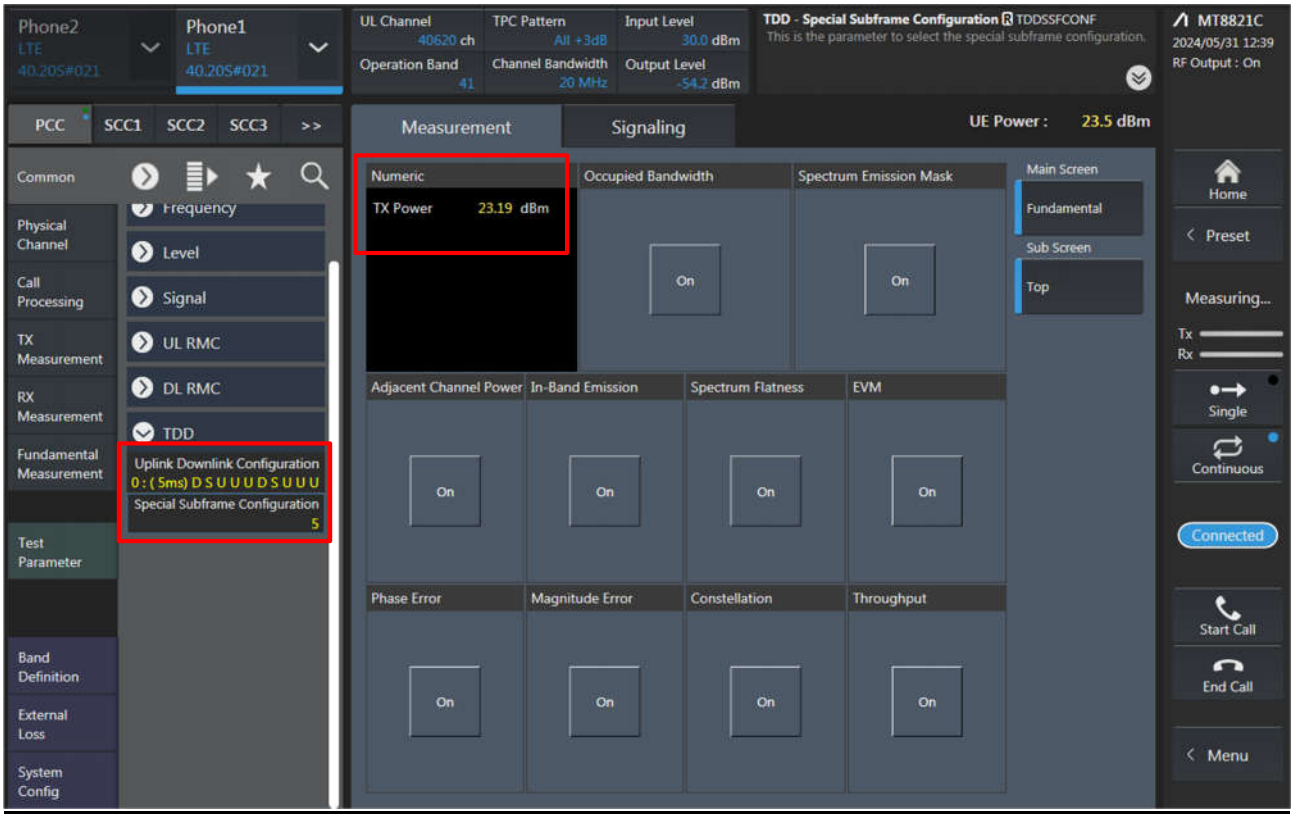
<WCDMA>


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
DL Channel
9800 CH
DL Frequency
1 960.000 000 MHz
Output Level
-65.7 dBm
Average Count PWR_AVG
Sets the average count (measurement count) for power measurement.
MT8821C
2024/05/24 12:58
RF Output : On
Band Cal
Measurement
Signaling
UE Power : 22.6 dBm
Common
Physical Channel
Call Processing
TX Measurement
RX Measurement
Fundamental Measurement
Meas Setup
External Loss
System Config
Authentication / Integrity
Integrity Protection
On
SIM Model Number
P0035
Authentication Algorithm
XOR
Authentication Key Ki
00112233 44556677
8899AABB CCDDEEFF
AMF
0000 H
Opc
Connection Setting
Measurement Report
Inner Loop Power Control
Power Control Algorithm
Algorithm 1
TPC StepSize
Power Control
All 1
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
Main Screen
Fundamental
Sub Screen
Numeric
Tag
Power Measurement
Home
Preset
Measuring...
Tx
Rx
Single
Continuous
Loop Mode 1
Start Call
End Call
Menu

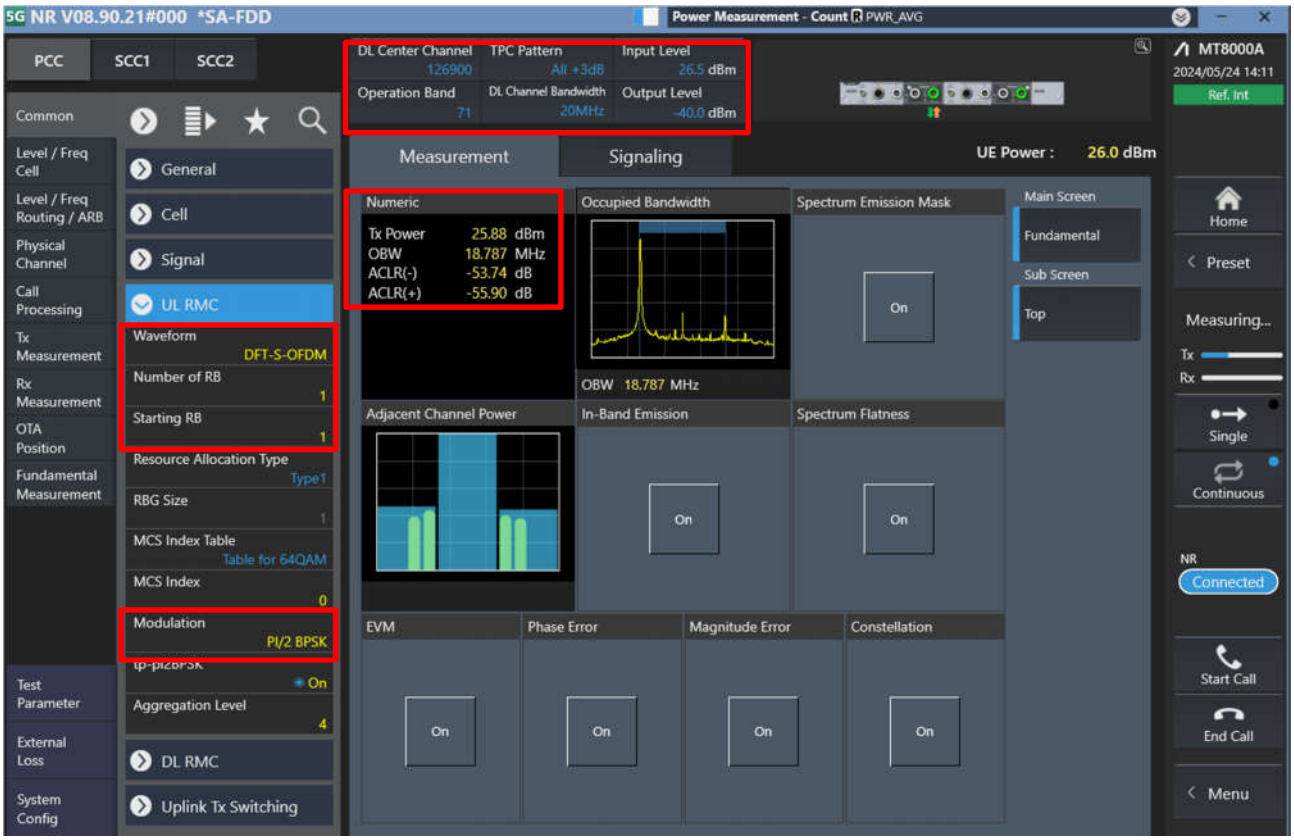
<LTE>

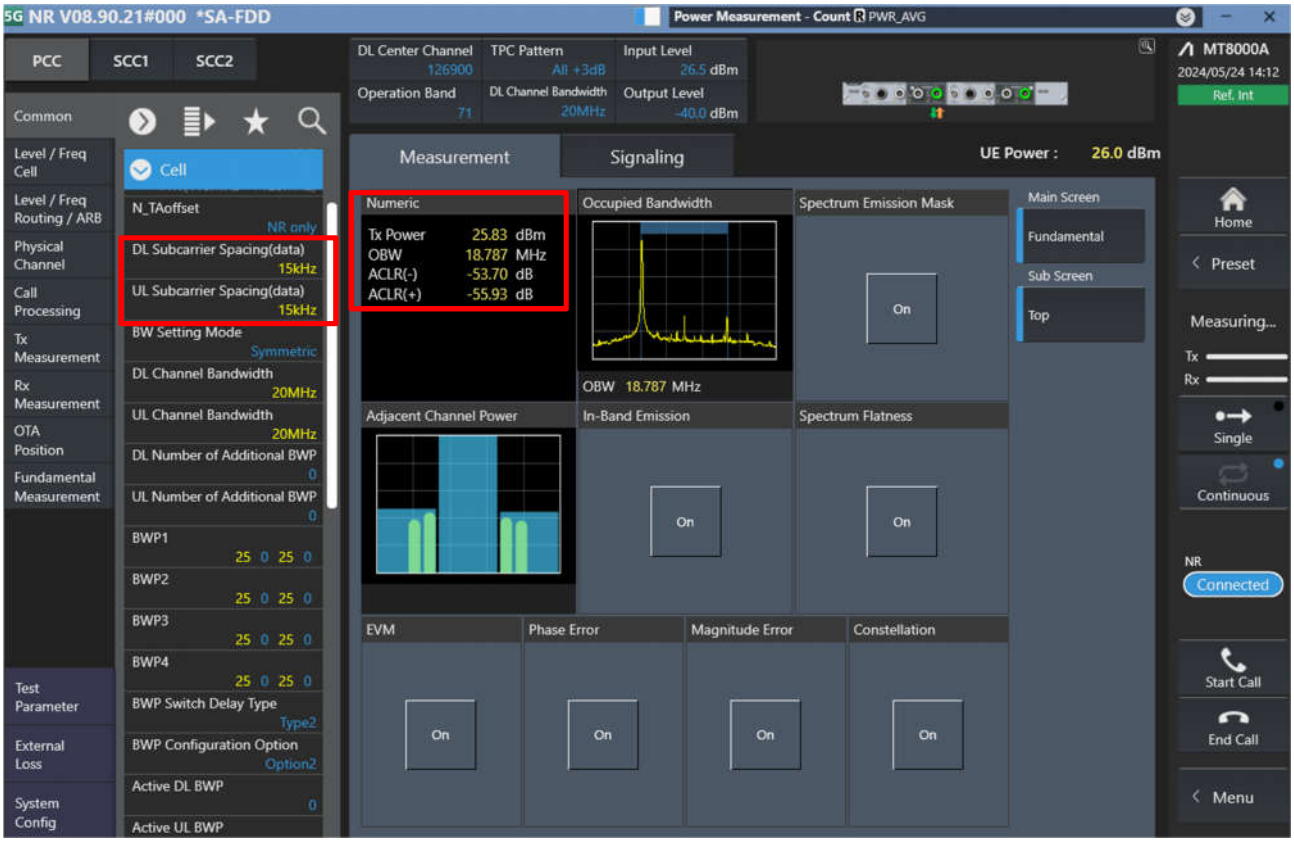

Phone2
LTE
40.20S#021
Phone1
LTE
40.20S#021
UL Channel
21100 ch
TPC Pattern
All +3dB
Input Level
30.0 dBm
Operation Band
7
Channel Bandwidth
20 MHz
Output Level
-67.0 dBm
External Loss - Main DL DLEXTLOSS
This sets the DL offset at the Main connector. Loss is set as a positive value. The argument tx enables setting a different loss value per internal signal generator.
MT8821C
2024/05/31 13:15
RF Output : On
PCC
SCC1
SCC2
SCC3
>>
Measurement
Signaling
UE Power : 23.4 dBm
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
DL RMC
TDD
Uplink Downlink Configuration
1 : (5ms) D S U U D D S U U D
Special Subframe Configuration
4
Numeric
TX Power 23.01 dBm
Occupied Bandwidth
On
Spectrum Emission Mask
On
Adjacent Channel Power
On
In-Band Emission
On
Spectrum Flatness
On
EVM
On
Phase Error
On
Magnitude Error
On
Constellation
On
Throughput
On
Main Screen
Fundamental
Sub Screen
Top
Home
Preset
Measuring...
Tx
Rx
Single
Continuous
Connected
Start Call
End Call
Menu

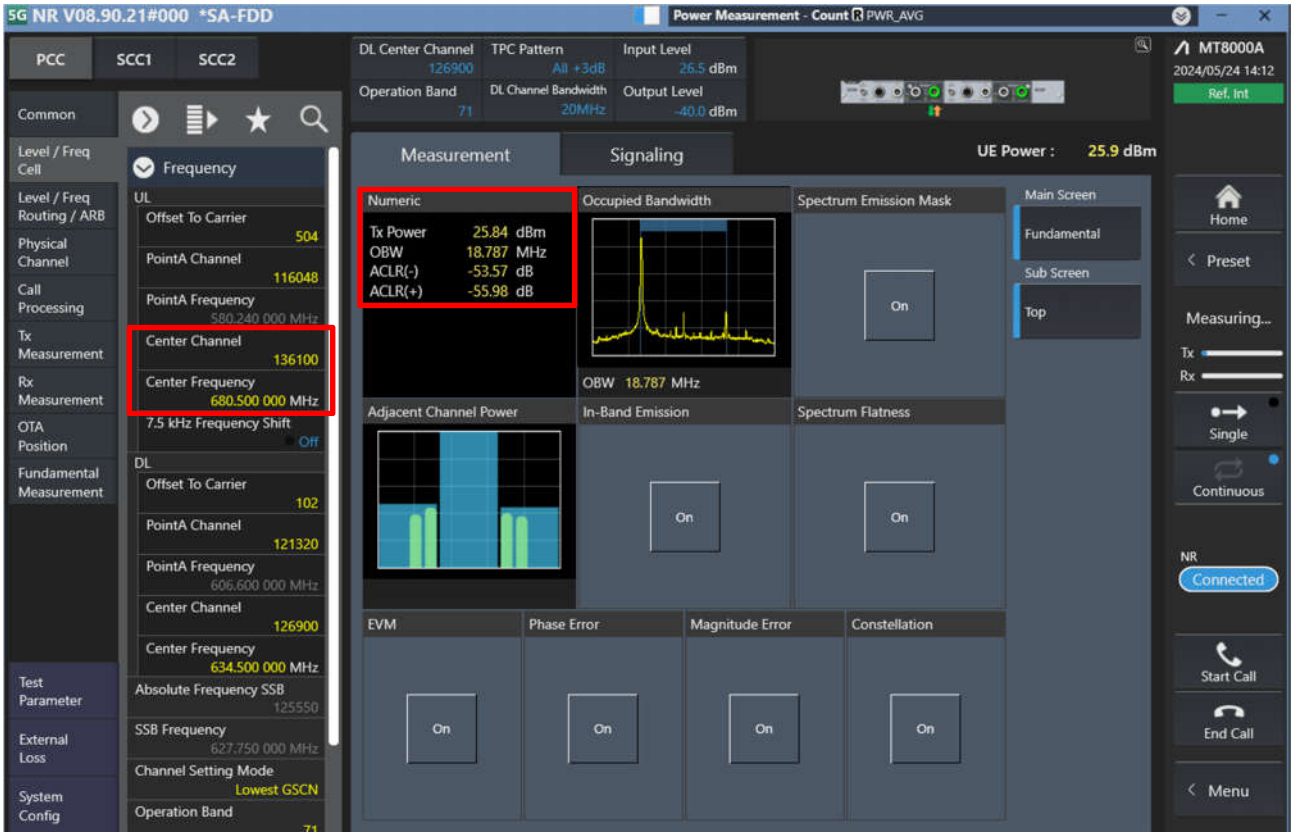
<LTE TDD Power class 3>



<5GNR FR1>

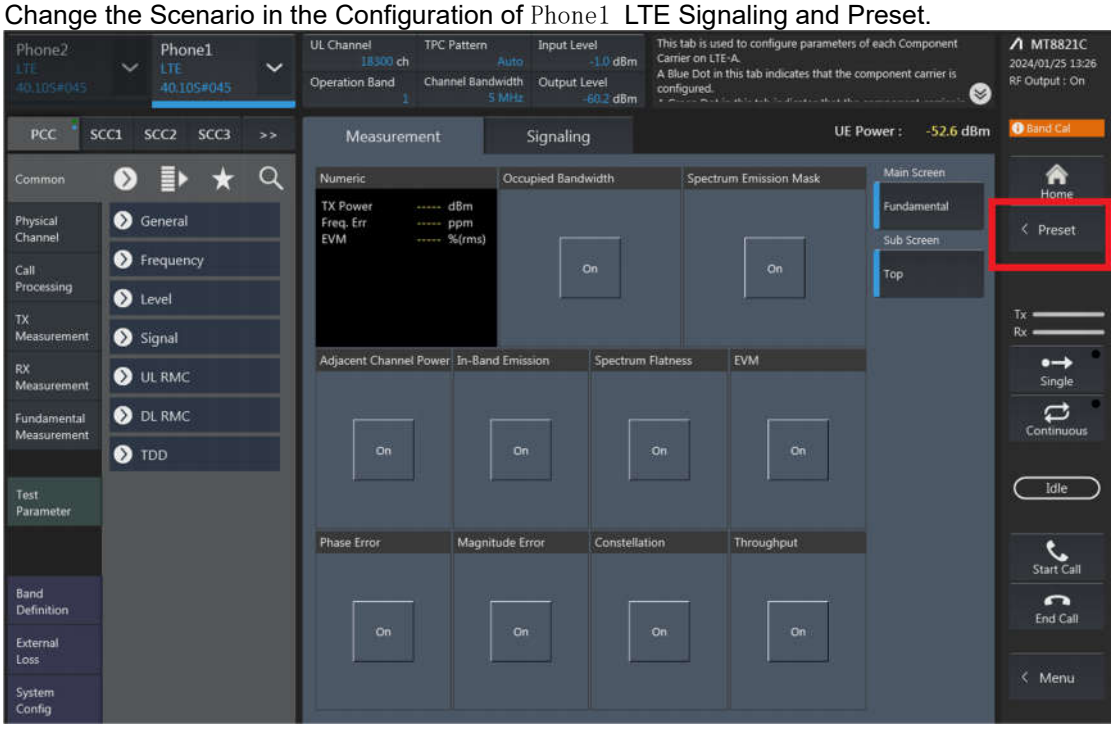

5G NR V08.90.21#000 *SA-FDD
Power Measurement - Count PWR_AVG
PCC
SCC1
SCC2
DL Center Channel 126900
TPC Pattern All +3dB
Input Level 26.5 dBm
Operation Band 71
DL Channel Bandwidth 20MHz
Output Level -40.0 dBm
MT8000A
2024/05/24 14:11
Ref. Int
Common
Level / Freq Cell
Level / Freq Routing / ARB
Physical Channel
Call Processing
Tx Measurement
Rx Measurement
OTA Position
Fundamental Measurement
Test Parameter
External Loss
System Config
General
Cell
Signal
UL RMC
Waveform DFT-S-OFDM
Number of RB 1
Starting RB 1
Resource Allocation Type Type1
RBG Size 1
MCS Index Table Table for 64QAM
MCS Index 0
Modulation PI/2 BPSK
tp-pi2bpsk On
Aggregation Level 4
DL RMC
Uplink Tx Switching
Measurement
Signaling
UE Power : 26.0 dBm
Numeric
Tx Power 25.88 dBm
OBW 18.787 MHz
ACLR(-) -53.74 dB
ACLR(+) -55.90 dB
Occupied Bandwidth
OBW 18.787 MHz
Spectrum Emission Mask
Main Screen
Fundamental
Sub Screen
Top
Adjacent Channel Power
In-Band Emission
Spectrum Flatness
EVM
Phase Error
Magnitude Error
Constellation
On
Home
Preset
Measuring...
Tx
Rx
Single
Continuous
NR
Connected
Start Call
End Call
Menu


5G NR V08.90.21#000 *SA-FDD
Power Measurement - Count PWR_AVG
PCC
SCC1
SCC2
DL Center Channel 126900
TPC Pattern All +3dB
Input Level 26.5 dBm
Operation Band 71
DL Channel Bandwidth 20MHz
Output Level -40.0 dBm
MT8000A
2024/05/24 14:12
Ref. Int
Common
Level / Freq Cell
Level / Freq Routing / ARB
Physical Channel
Call Processing
Tx Measurement
Rx Measurement
OTA Position
Fundamental Measurement
Test Parameter
External Loss
System Config
Cell
N_TAoffset NR only
DL Subcarrier Spacing(data) 15kHz
UL Subcarrier Spacing(data) 15kHz
BW Setting Mode Symmetric
DL Channel Bandwidth 20MHz
UL Channel Bandwidth 20MHz
DL Number of Additional BWP 0
UL Number of Additional BWP 0
BWP1 25 0 25 0
BWP2 25 0 25 0
BWP3 25 0 25 0
BWP4 25 0 25 0
BWP Switch Delay Type Type2
BWP Configuration Option Option2
Active DL BWP 0
Active UL BWP
Measurement
Signaling
UE Power : 26.0 dBm
Numeric
Tx Power 25.83 dBm
OBW 18.787 MHz
ACLR(-) -53.70 dB
ACLR(+) -55.93 dB
Occupied Bandwidth
OBW 18.787 MHz
Spectrum Emission Mask
Main Screen
Fundamental
Sub Screen
Top
Adjacent Channel Power
In-Band Emission
Spectrum Flatness
EVM
Phase Error
Magnitude Error
Constellation
On
Home
Preset
Measuring...
Tx
Rx
Single
Continuous
NR
Connected
Start Call
End Call
Menu

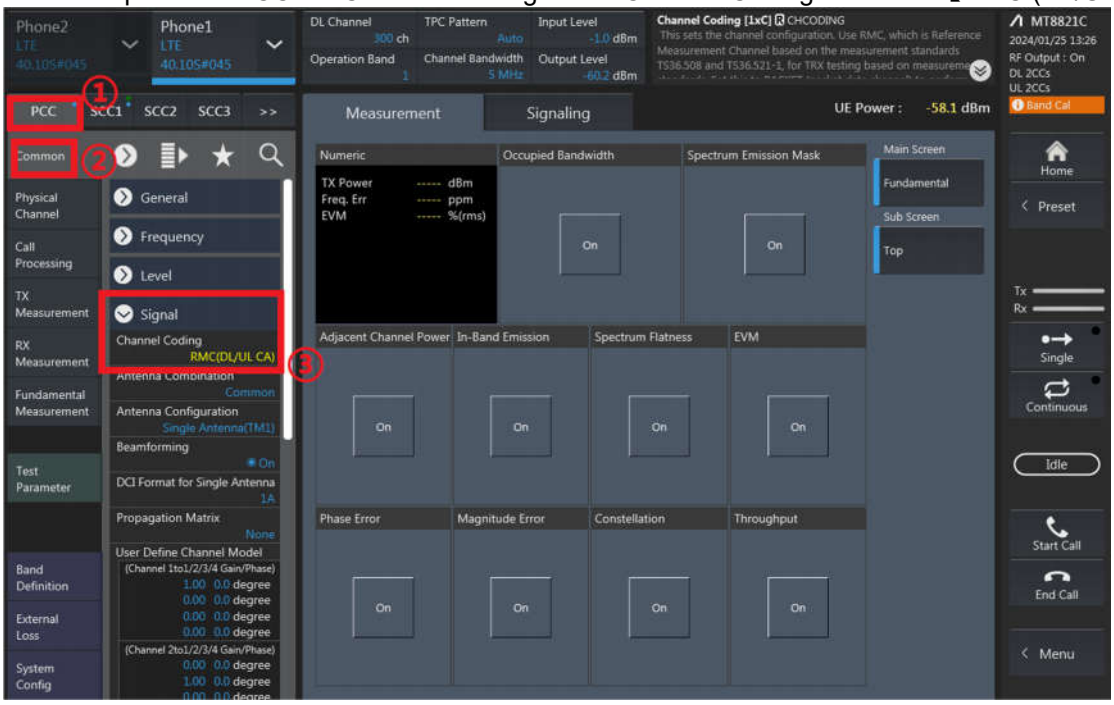

5G NR V08.90.21#000 *SA-FDD
Power Measurement - Count PWR_AVG
PCC
SCC1
SCC2
DL Center Channel
126900
TPC Pattern
All +3dB
Input Level
26.5 dBm
Operation Band
71
DL Channel Bandwidth
20MHz
Output Level
-40.0 dBm
MT8000A
2024/05/24 14:12
Ref. Int
Common
Level / Freq Cell
Level / Freq Routing / ARB
Physical Channel
Call Processing
Tx Measurement
Rx Measurement
OTA Position
Fundamental Measurement
Test Parameter
External Loss
System Config
Frequency
UL
Offset To Carrier
504
PointA Channel
116048
PointA Frequency
580.240 000 MHz
Center Channel
136100
Center Frequency
680.500 000 MHz
7.5 kHz Frequency Shift
Off
DL
Offset To Carrier
102
PointA Channel
121320
PointA Frequency
606.600 000 MHz
Center Channel
126900
Center Frequency
634.500 000 MHz
Absolute Frequency SSB
125550
SSB Frequency
627.750 000 MHz
Channel Setting Mode
Lowest GSCN
Operation Band
71
Measurement
Signaling
UE Power : 25.9 dBm
Numeric
Tx Power 25.84 dBm
OBW 18.787 MHz
ACLR(-) -53.57 dB
ACLR(+) -55.98 dB
Occupied Bandwidth
OBW 18.787 MHz
Spectrum Emission Mask
On
Main Screen
Fundamental
Sub Screen
Top
Adjacent Channel Power
In-Band Emission
On
Spectrum Flatness
On
EVM
Phase Error
Magnitude Error
Constellation
On
On
On
On
Home
Preset
Measuring...
Tx
Rx
Single
Continuous
NR
Connected
Start Call
End Call
Menu

LTE Uplink and Downlink Carrier Aggregation configurations:

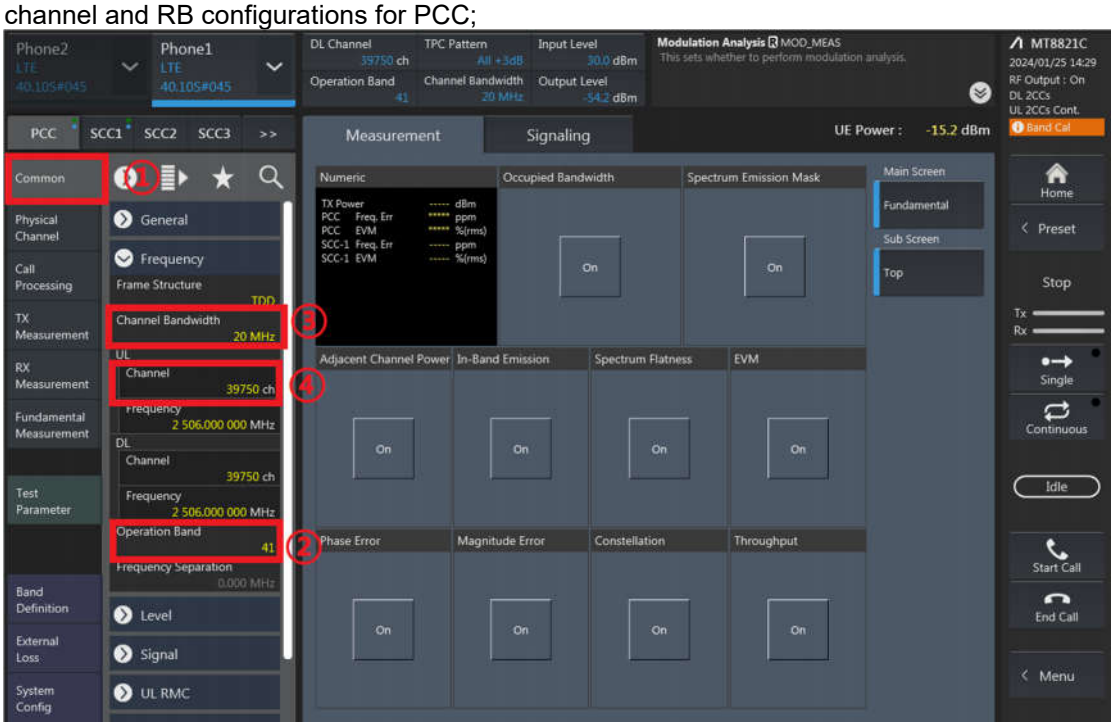
1. Change the Scenario in the Configuration of Phone1 LTE Signaling and Preset.



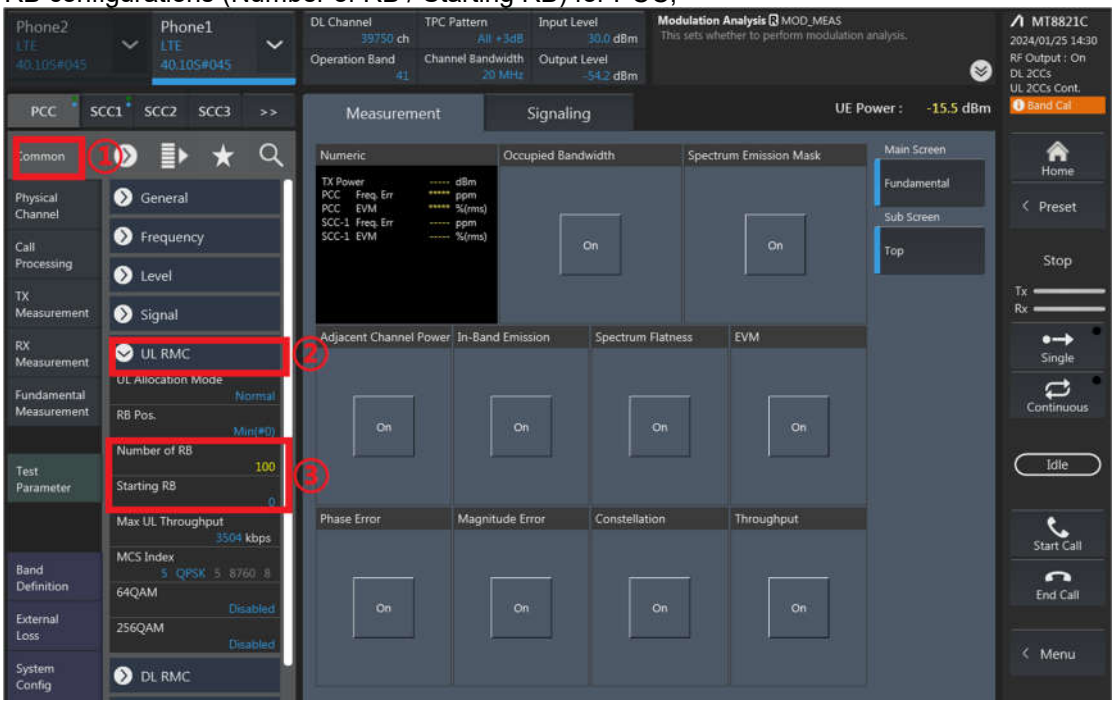
2. If Select “RMC (DL/UL CA)” for Uplink Carrier Aggregation;
If Select “RMC (DL CA)” for Downlink Carrier Aggregation.
For example, Uplink Carrier Aggregation:
Detailed operation: PCC ➔ Common ➔ Signal ➔ Channel Coding ➔ Select【RMC (DL/UL CA)】



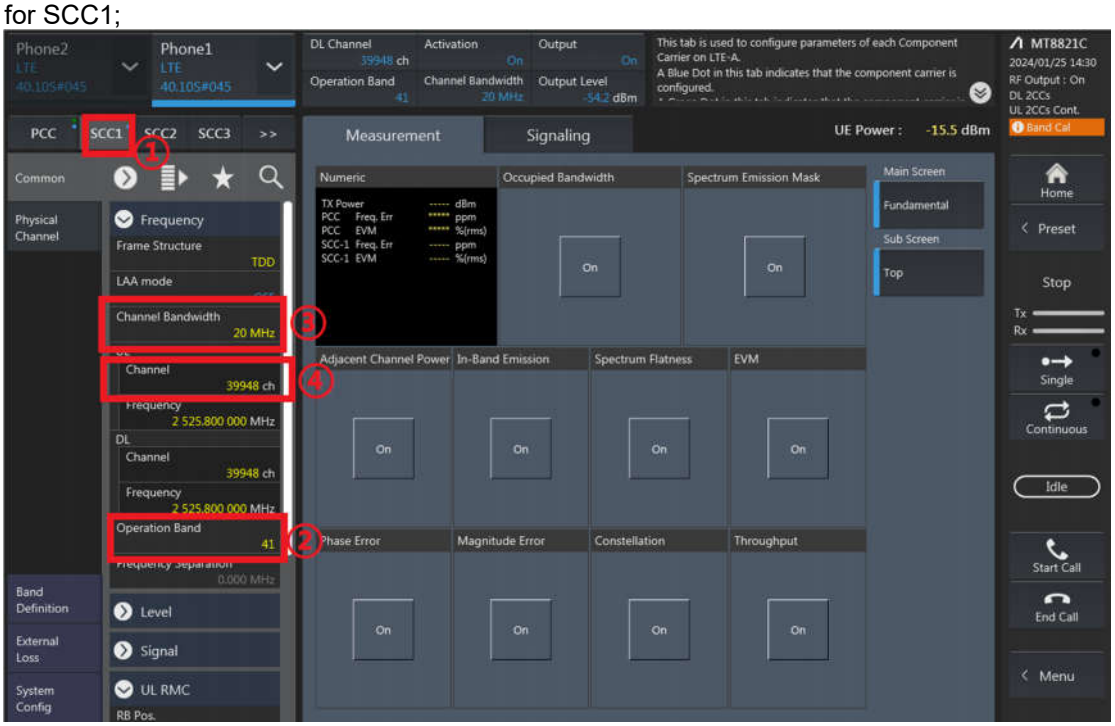
3. PCC parameter Settings: on the screen, and then select the PCC tab and Set operating band, BW, channel and RB configurations for PCC;



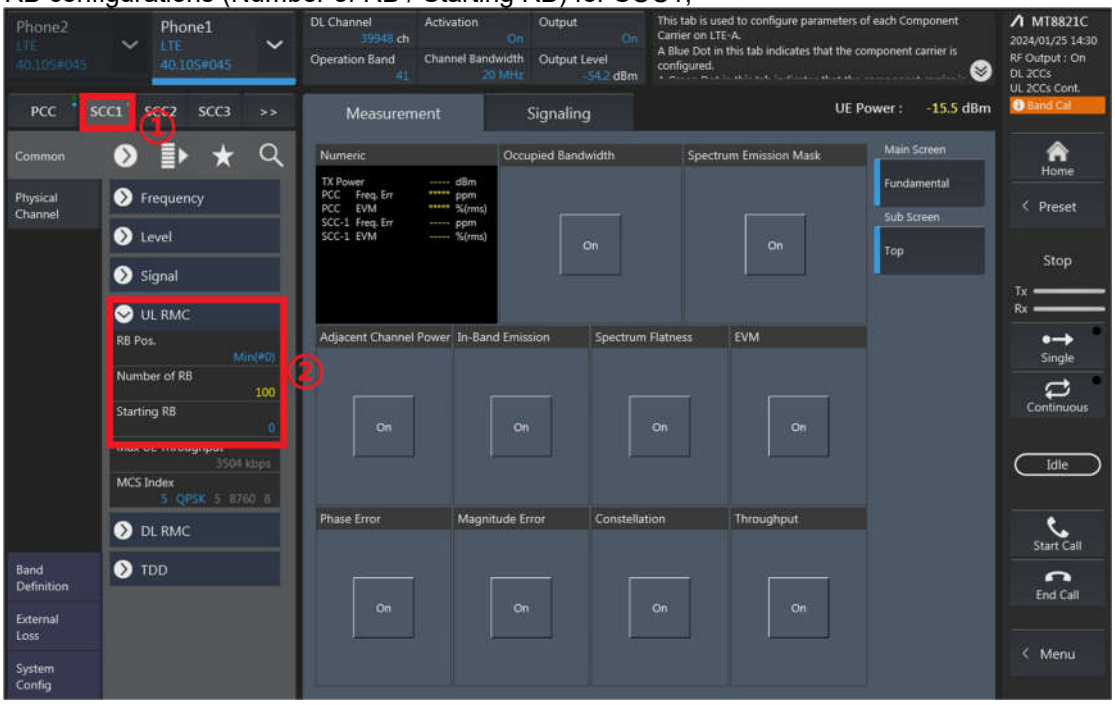
RB configurations (Number of RB / Starting RB) for PCC;



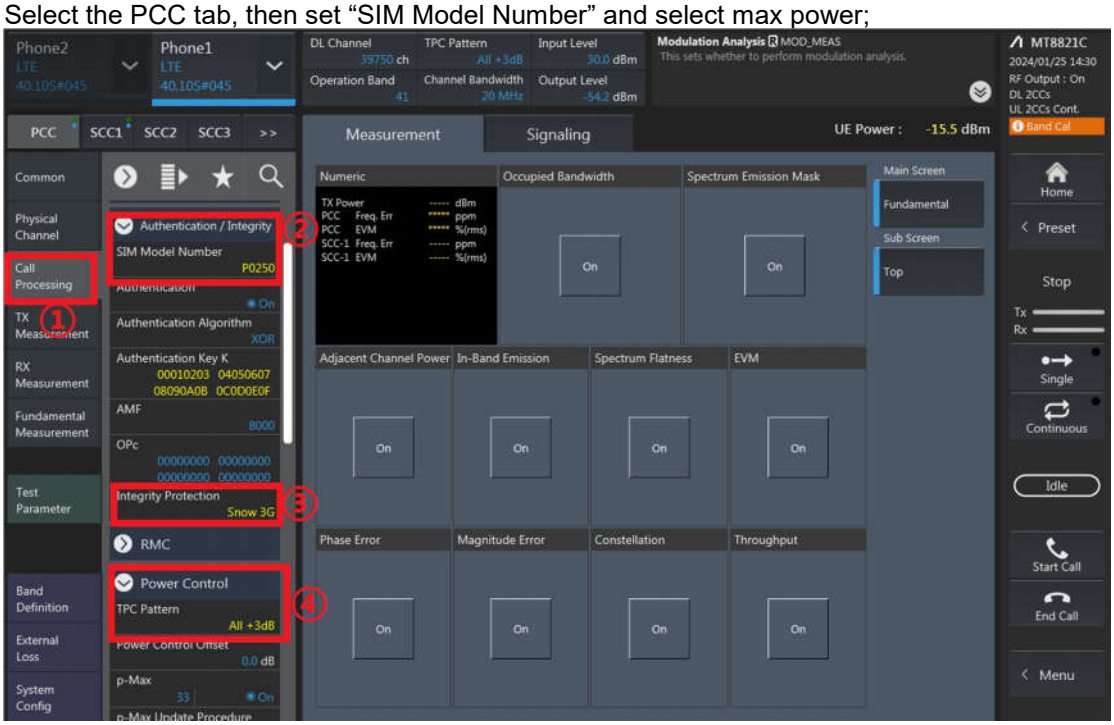
4. SCC parameter Settings: Select the SCC1 tab, Set operating band, BW, channel, and RB configurations for SCC1;



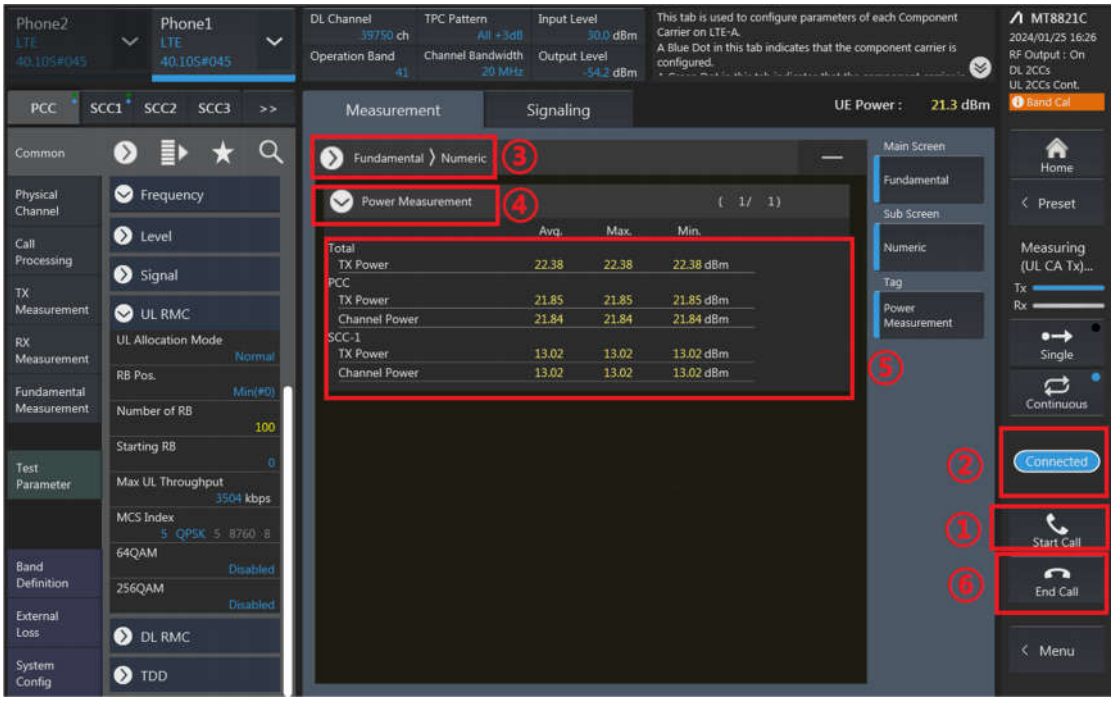
RB configurations (Number of RB / Starting RB) for SCC1;



5. Select the PCC tab, then set “SIM Model Number” and select max power;



6. Click the “Connect” button at the Right of the screen, if necessary, turn the Airplane mode on/off in the DUT



7. The inter-band ULCA test method is similar to intra-band ULCA, and DLCA test method is similar to intra-band ULCA too.

Uplink CA Power

CA_41C_Ant 1 Combination 20MHz+20MHz (100RB+100RB)											
PCC Channel	SCC Channel	Modulation	PCC		SCC		Total RB Size	Target MPR Level (dB)	Power Reduction	Measured Power (dBm)	Tune up Power (dBm)
			RB Size	RB offset	RB Size	RB offset					
39750	39948	QPSK	1	0	0	0	1	0	Full	22.60	24.00
40185	39987	QPSK	1	0	0	0	1	0	Full	22.64	24.00
40620	40422	QPSK	1	0	0	0	1	0	Full	22.47	24.00
41055	40857	QPSK	1	0	0	0	1	0	Full	22.52	24.00
41490	41292	QPSK	1	0	0	0	1	0	Full	22.37	24.00
39750	39948	QPSK	1	0	0	0	1	0	Receiver on	22.60	24.00
40185	39987	QPSK	1	0	0	0	1	0	Receiver on	22.64	24.00
40620	40422	QPSK	1	0	0	0	1	0	Receiver on	22.47	24.00
41055	40857	QPSK	1	0	0	0	1	0	Receiver on	22.52	24.00
41490	41292	QPSK	1	0	0	0	1	0	Receiver on	22.37	24.00
39750	39948	QPSK	1	0	0	0	1	0	Sensor on	21.02	22.50
40185	39987	QPSK	1	0	0	0	1	0	Sensor on	21.16	22.50
40620	40422	QPSK	1	0	0	0	1	0	Sensor on	20.94	22.50
41055	40857	QPSK	1	0	0	0	1	0	Sensor on	20.93	22.50
41490	41292	QPSK	1	0	0	0	1	0	Sensor on	20.95	22.50
39750	39948	QPSK	1	0	0	0	1	0	Receiver off	22.60	24.00
40185	39987	QPSK	1	0	0	0	1	0	Receiver off	22.64	24.00
40620	40422	QPSK	1	0	0	0	1	0	Receiver off	22.47	24.00
41055	40857	QPSK	1	0	0	0	1	0	Receiver off	22.52	24.00
41490	41292	QPSK	1	0	0	0	1	0	Receiver off	22.37	24.00
39750	39948	QPSK	1	0	0	0	1	0	Handheld	21.53	23.00
40185	39987	QPSK	1	0	0	0	1	0	Handheld	21.75	23.00
40620	40422	QPSK	1	0	0	0	1	0	Handheld	21.71	23.00
41055	40857	QPSK	1	0	0	0	1	0	Handheld	21.52	23.00
41490	41292	QPSK	1	0	0	0	1	0	Handheld	21.69	23.00
39750	39948	QPSK	1	0	0	0	1	0	Hotspot on	21.02	22.50
40185	39987	QPSK	1	0	0	0	1	0	Hotspot on	21.16	22.50
40620	40422	QPSK	1	0	0	0	1	0	Hotspot on	20.94	22.50
41055	40857	QPSK	1	0	0	0	1	0	Hotspot on	20.93	22.50
41490	41292	QPSK	1	0	0	0	1	0	Hotspot on	20.95	22.50

CA_42C for FCC(3450~3550MHz)_Ant 5										
Combination 20MHz+20MHz (100RB+100RB)										
PCC Channel	SCC Channel	Modulation	PCC		SCC		Total RB Size	Target MPR Level (dB)	Power Reduction	Measured Power (dBm)	Tune up Power (dBm)
			RB Size	RB offset	RB Size	RB offset					
42190	42388	QPSK	1	0	0	0	1	0	Full	22.42	24.00
42590	42788	QPSK	1	0	0	0	1	0	Full	22.44	24.00
42990	42792	QPSK	1	0	0	0	1	0	Full	22.90	24.00
42190	42388	QPSK	1	0	0	0	1	0	Receiver on	14.34	16.00
42590	42788	QPSK	1	0	0	0	1	0	Receiver on	14.43	16.00
42990	42792	QPSK	1	0	0	0	1	0	Receiver on	14.84	16.00
42190	42388	QPSK	1	0	0	0	1	0	Sensor on	12.88	14.50
42590	42788	QPSK	1	0	0	0	1	0	Sensor on	12.95	14.50
42990	42792	QPSK	1	0	0	0	1	0	Sensor on	13.36	14.50
42190	42388	QPSK	1	0	0	0	1	0	Receiver off	22.42	24.00
42590	42788	QPSK	1	0	0	0	1	0	Receiver off	22.44	24.00
42990	42792	QPSK	1	0	0	0	1	0	Receiver off	22.90	24.00
42190	42388	QPSK	1	0	0	0	1	0	Handheld	19.83	21.50
42590	42788	QPSK	1	0	0	0	1	0	Handheld	19.88	21.50
42990	42792	QPSK	1	0	0	0	1	0	Handheld	20.31	21.50
42190	42388	QPSK	1	0	0	0	1	0	Hotspot on	11.86	13.50
42590	42788	QPSK	1	0	0	0	1	0	Hotspot on	11.82	13.50
42990	42792	QPSK	1	0	0	0	1	0	Hotspot on	12.31	13.50