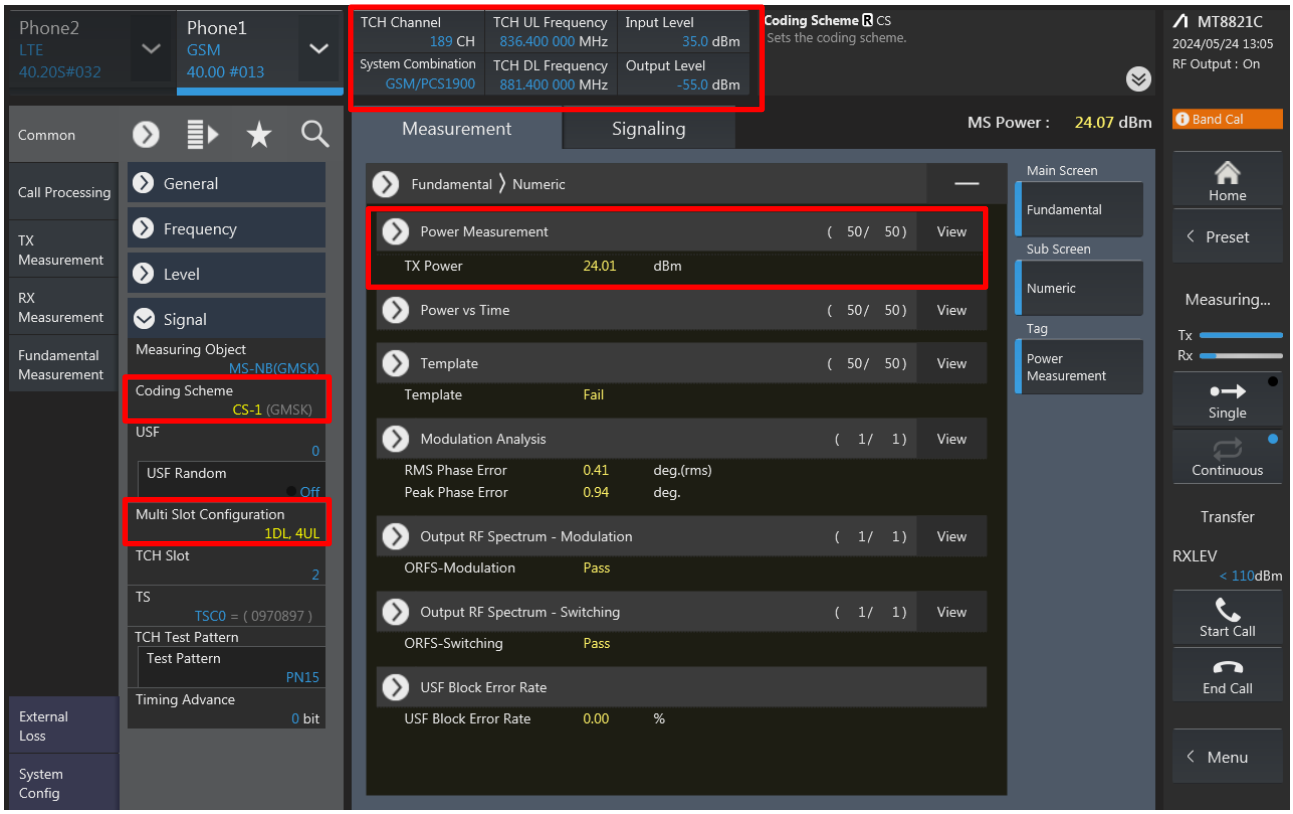
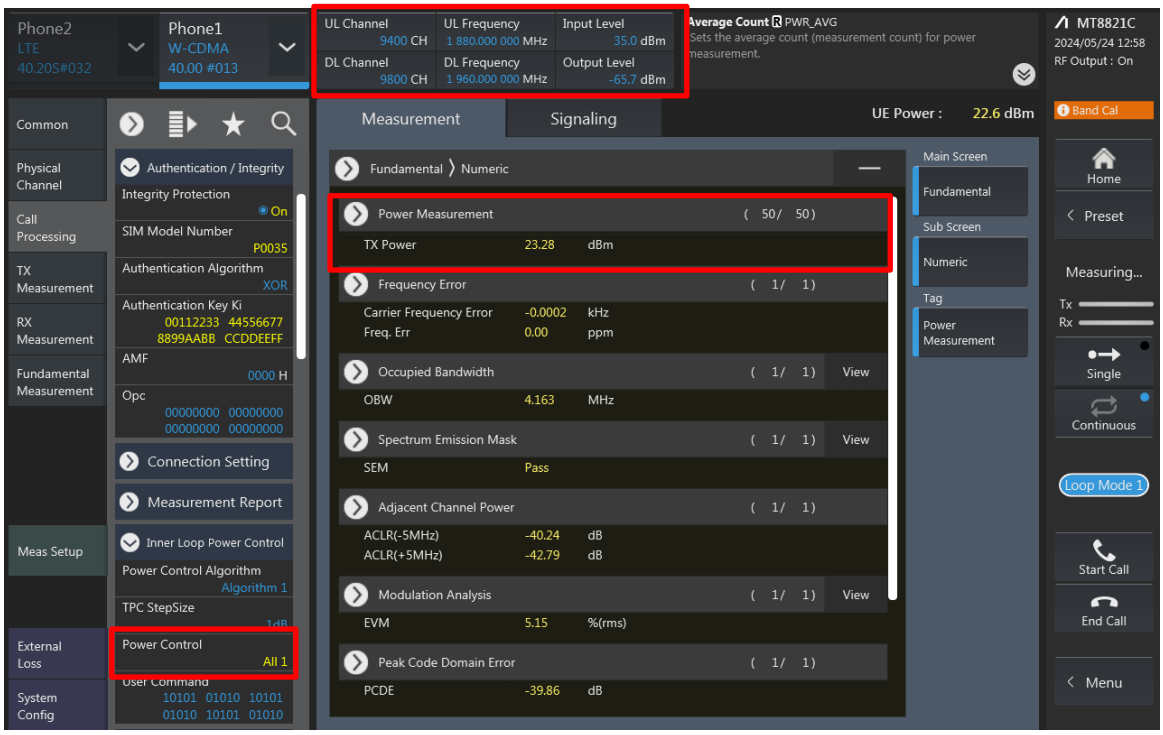
Power measurement connection diagram:

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.

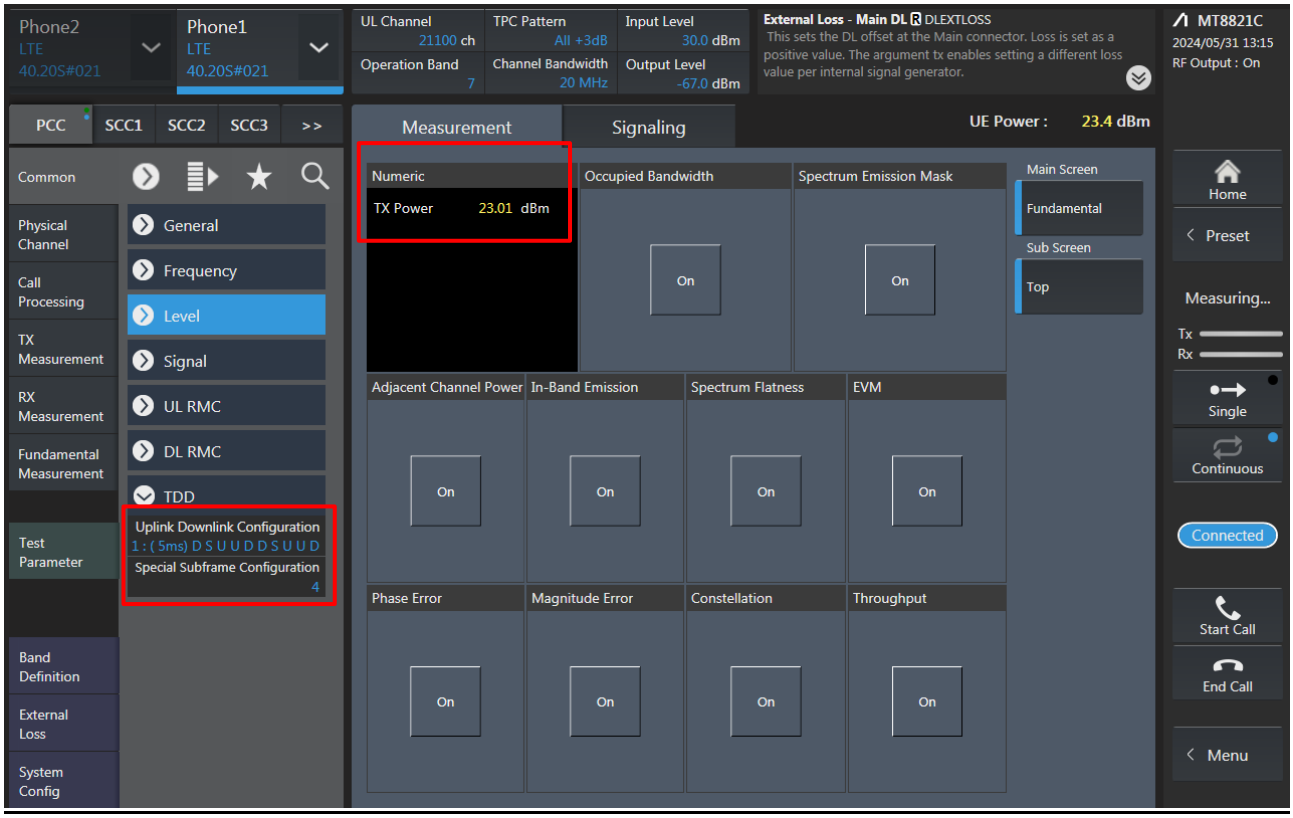
<GSM>



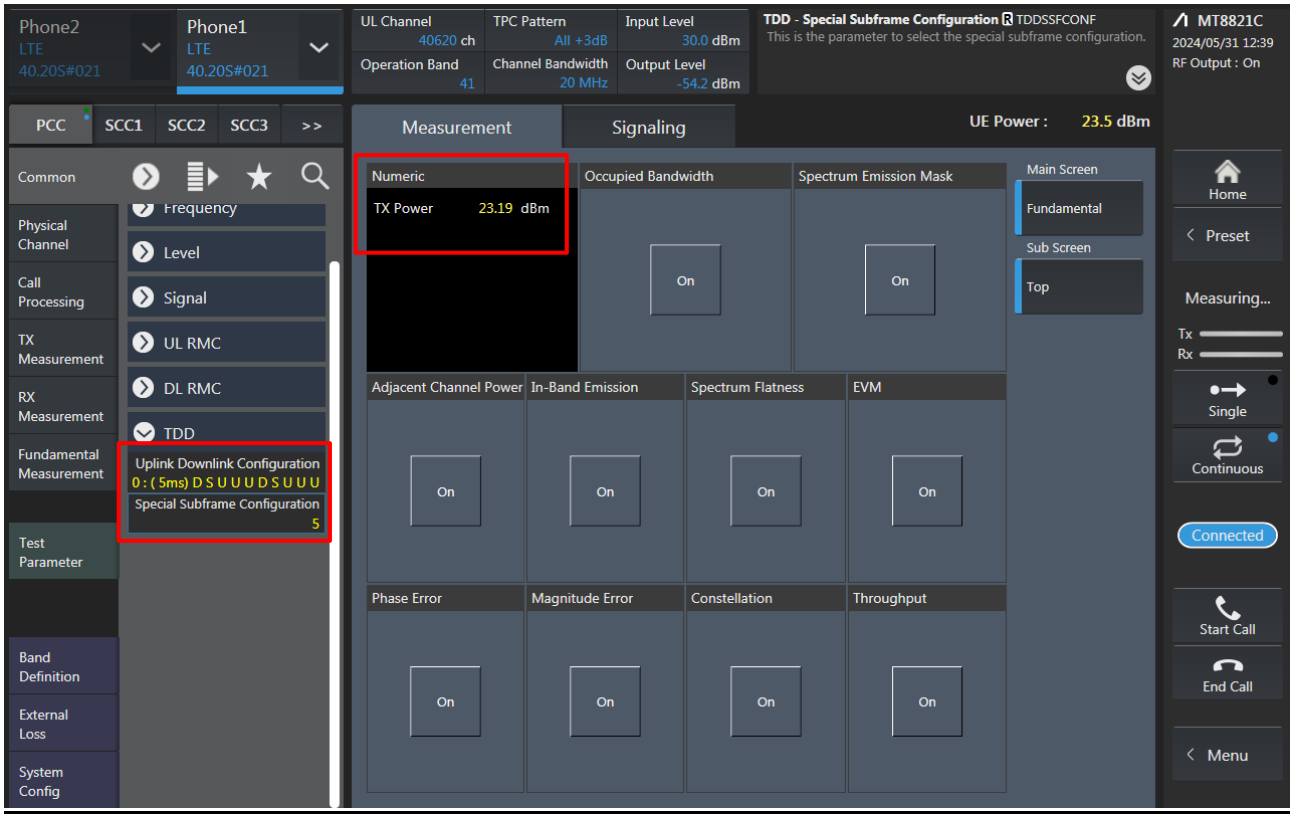
<WCDMA>


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
Measurement
Signaling
UE Power : 22.6 dBm
Band Cal
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

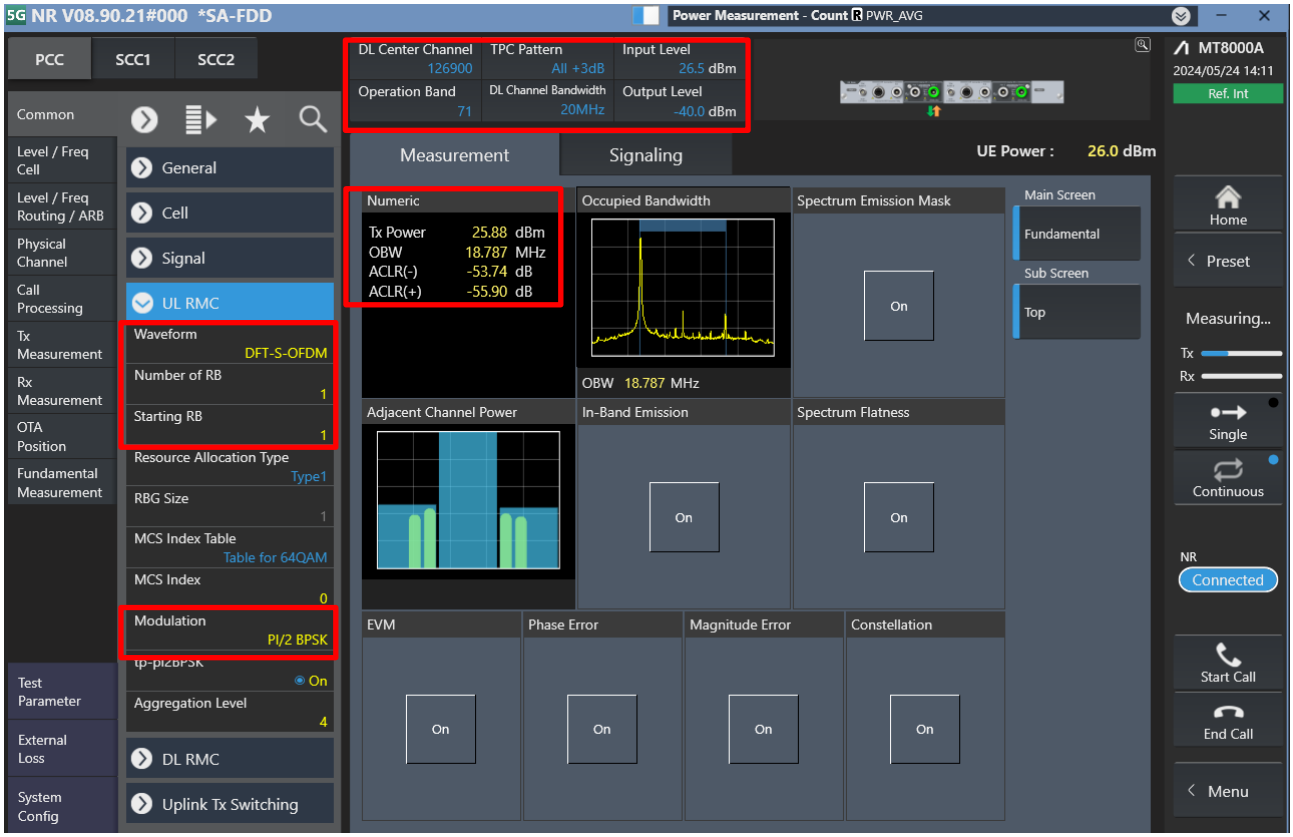
<LTE>

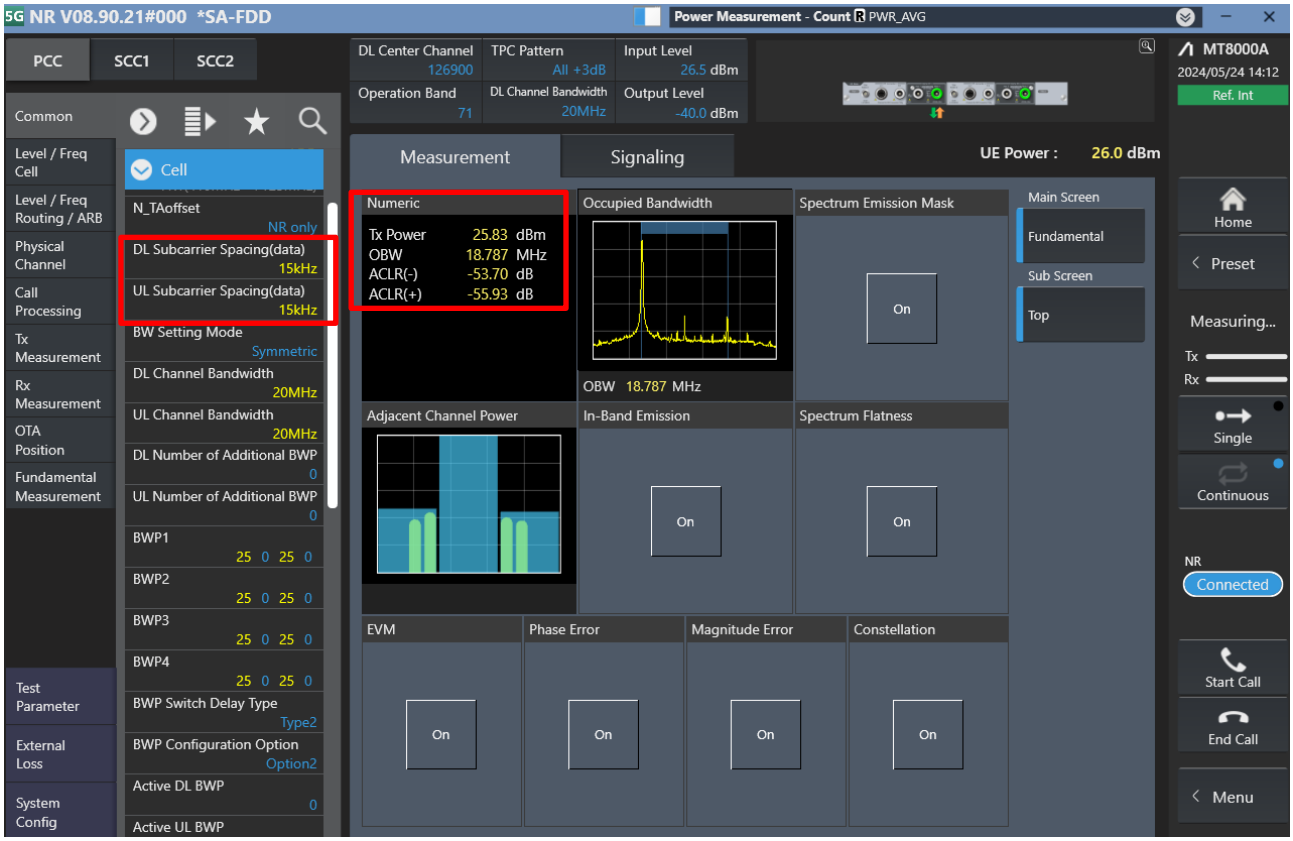

Phone2
LTE
40.20S#021
Phone1
LTE
40.20S#021
UL Channel 21100 ch
TPC Pattern All +3dB
Input Level 30.0 dBm
Operation Band 7
Channel Bandwidth 20 MHz
Output Level -67.0 dBm
External Loss - Main DL DLEXTLOSS
This sets the DL offset at the Main connector. Loss is set as a positive value. The argument tx 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
Spectrum Emission Mask
Adjacent Channel Power
In-Band Emission
Spectrum Flatness
EVM
Phase Error
Magnitude Error
Constellation
Throughput
On
Main Screen
Fundamental
Sub Screen
Top
Home
Preset
Measuring...
Tx
Rx
Single
Continuous
Connected
Start Call
End Call
Menu

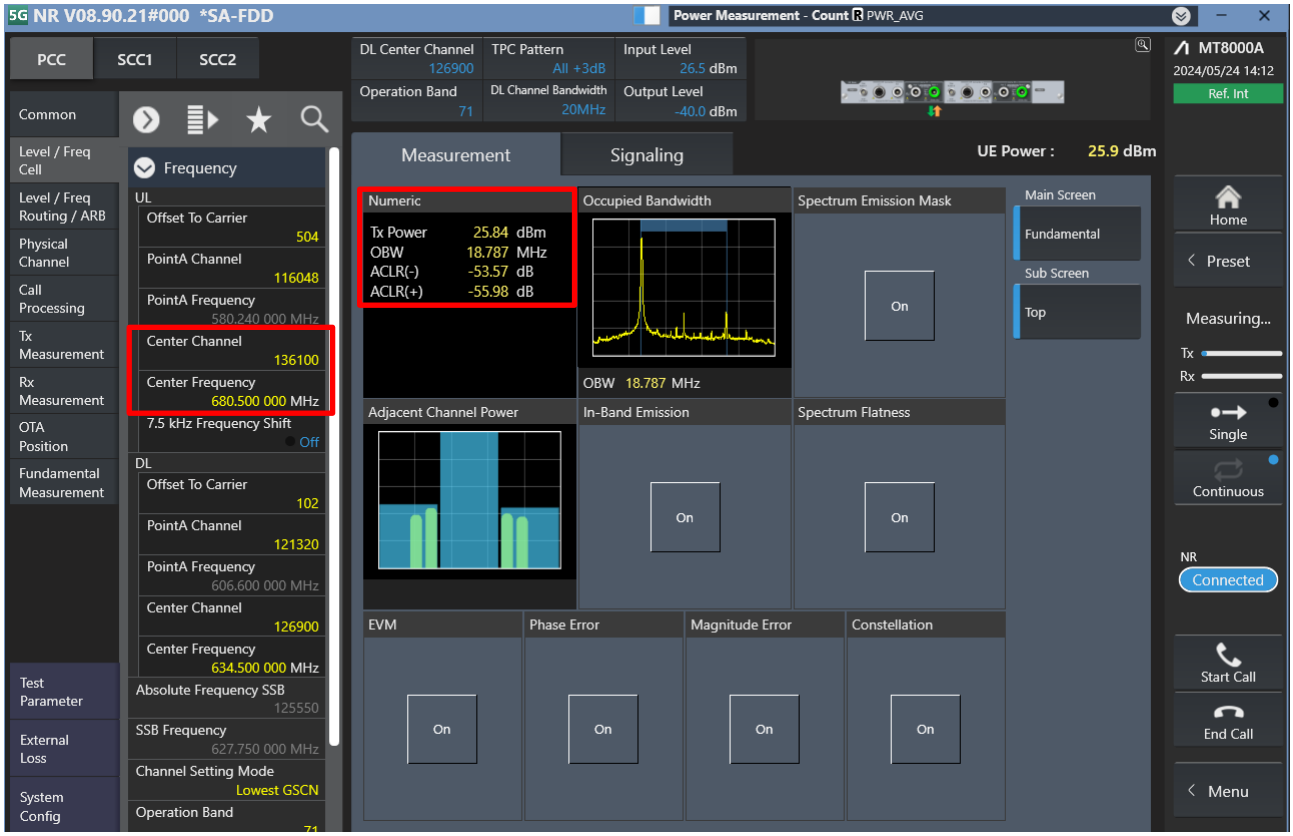
<LTE TDD Power class 3>



<5GNR FR1>

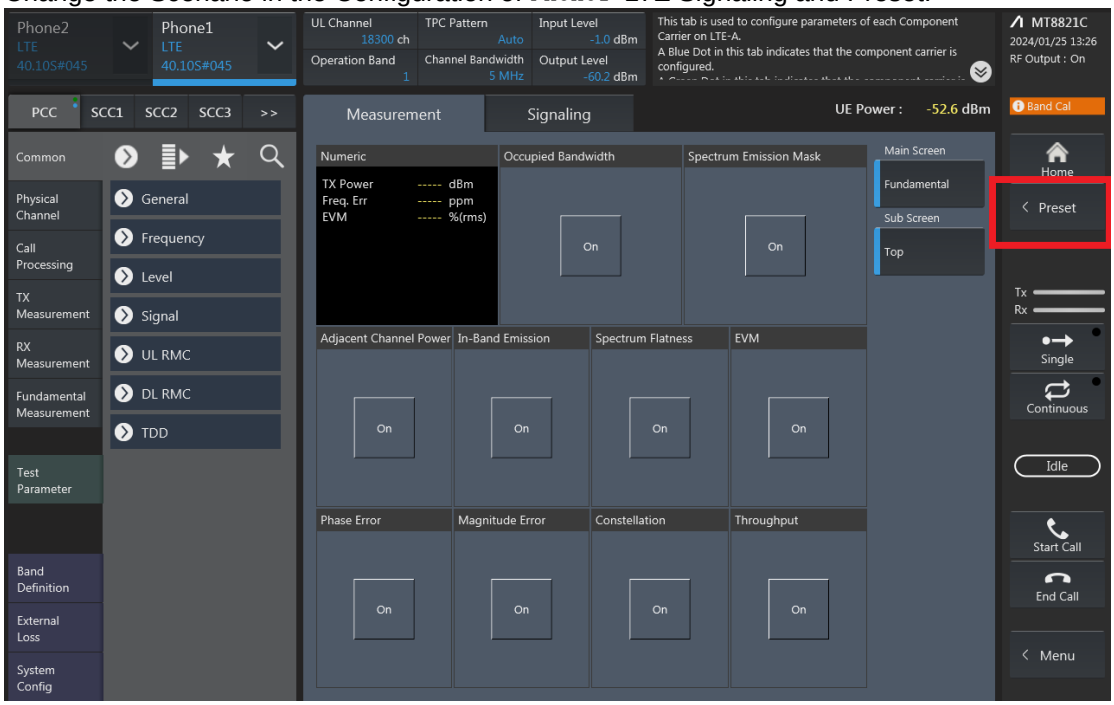

5G NR V08.90.21#000 *SA-FDD
Power Measurement - Count R PWR_AVG
PCC
SCC1
SCC2
DL Center Channel 126900
TPC Pattern All +3dB
Input Level 26.5 dBm
Operation Band 71
DL Channel Bandwidth 20MHz
Output Level -40.0 dBm
MT8000A
2024/05/24 14:11
Ref. Int
Common
Level / Freq Cell
Level / Freq Routing / ARB
Physical 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
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
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 R 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
Home
Preset
Measuring...
Tx
Rx
Single
Continuous
NR
Connected
Start Call
End Call
Menu

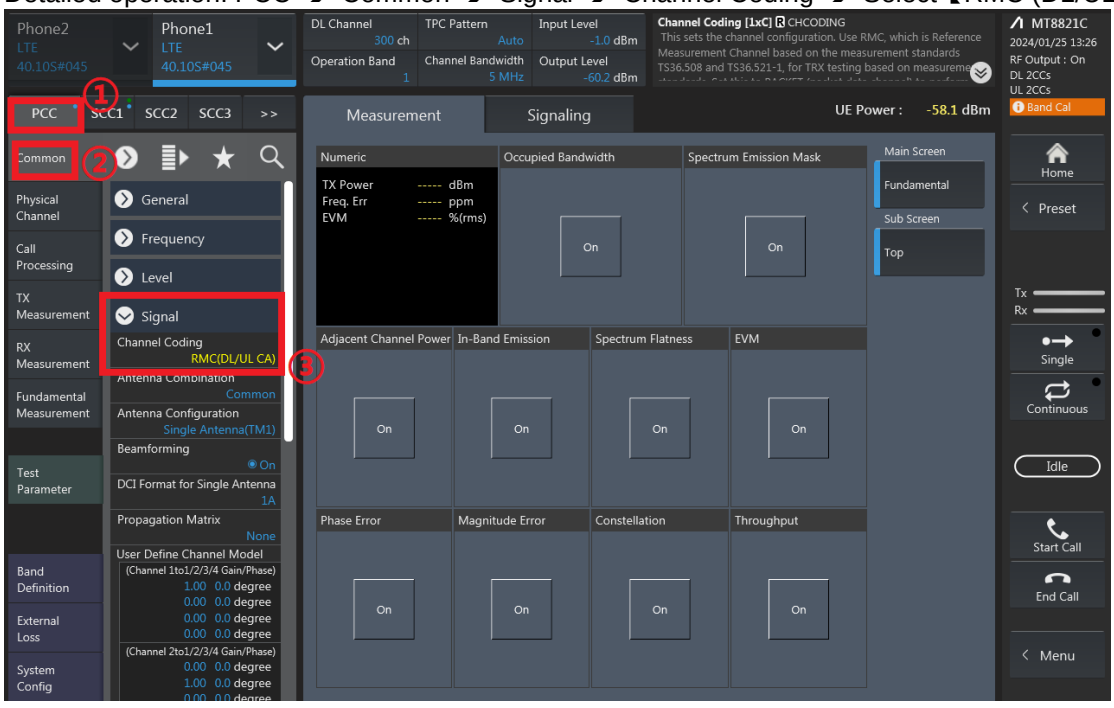

5G NR V08.90.21#000 *SA-FDD
Power Measurement - Count R PWR_AVG
PCC
SCC1
SCC2
DL Center Channel 126900
TPC Pattern All +3dB
Input Level 26.5 dBm
Operation Band 71
DL Channel Bandwidth 20MHz
Output Level -40.0 dBm
MT8000A
2024/05/24 14:12
Ref. Int
Common
Level / Freq Cell
Level / Freq Routing / ARB
Physical 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
On
Phase Error
On
Magnitude Error
On
Constellation
On
Home
Preset
Measuring...
Tx
Rx
Single
Continuous
NR
Connected
Start Call
End Call
Menu

LTE Uplink and Downlink Carrier Aggregation configurations:

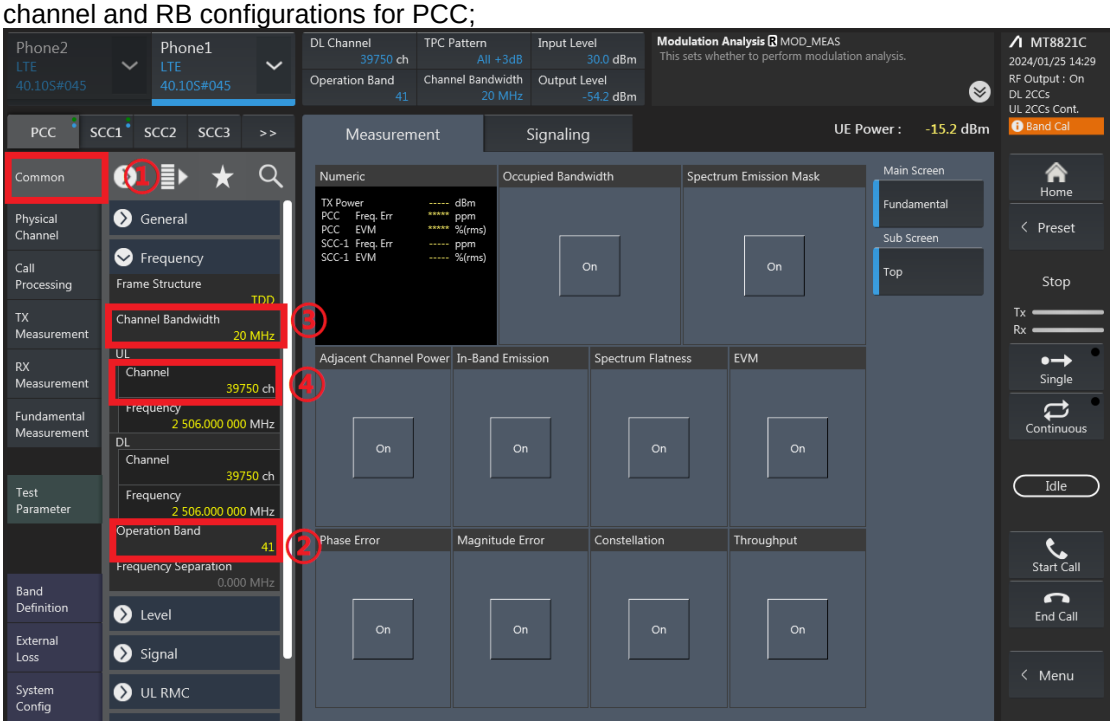
1. Change the Scenario in the Configuration of Phone1 LTE Signaling and Preset.



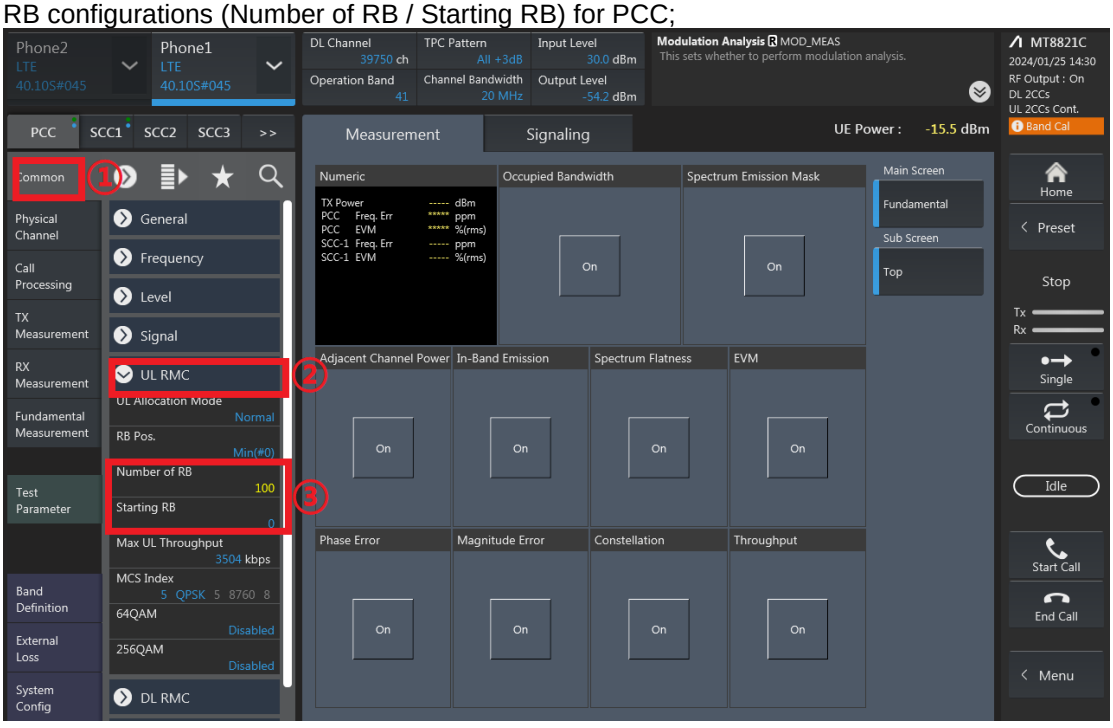
2. If Select “RMC (DL/UL CA)” for Uplink Carrier Aggregation;
   If Select “RMC (DL CA)” for Downlink Carrier Aggregation.
   For example, Uplink Carrier Aggregation:
   Detailed operation: PCC ➔ Common ➔ Signal ➔ Channel Coding ➔ Select【RMC (DL/UL CA)】



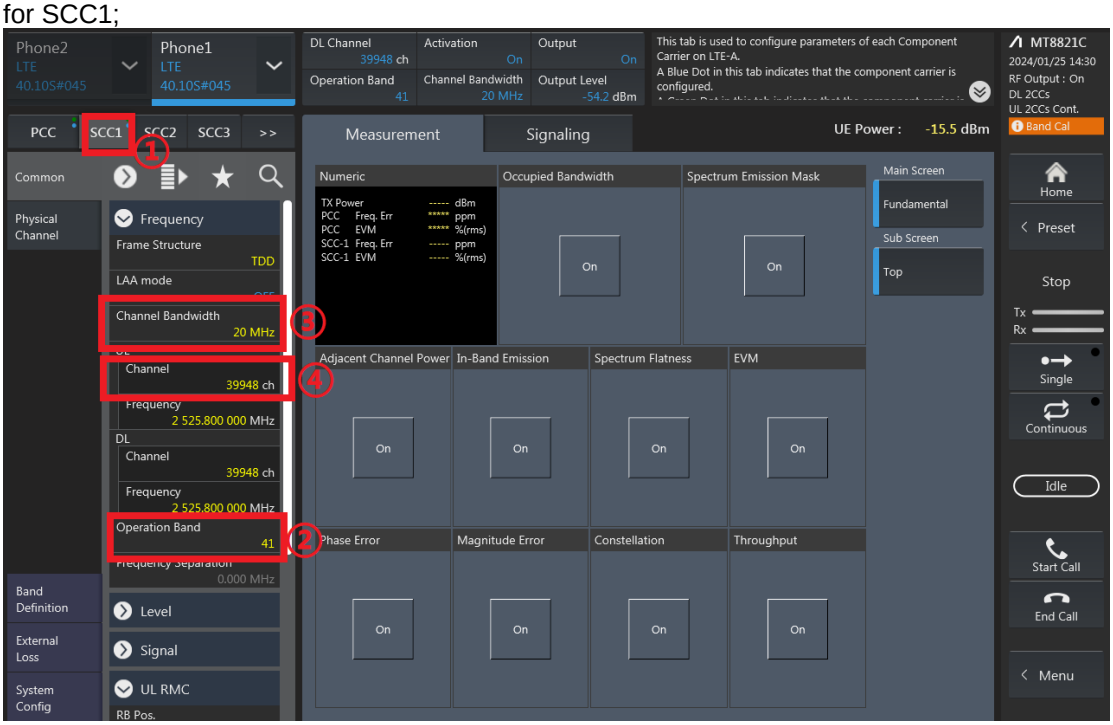
3. PCC parameter Settings: on the screen, and then select the PCC tab and Set operating band, BW, channel and RB configurations for PCC;



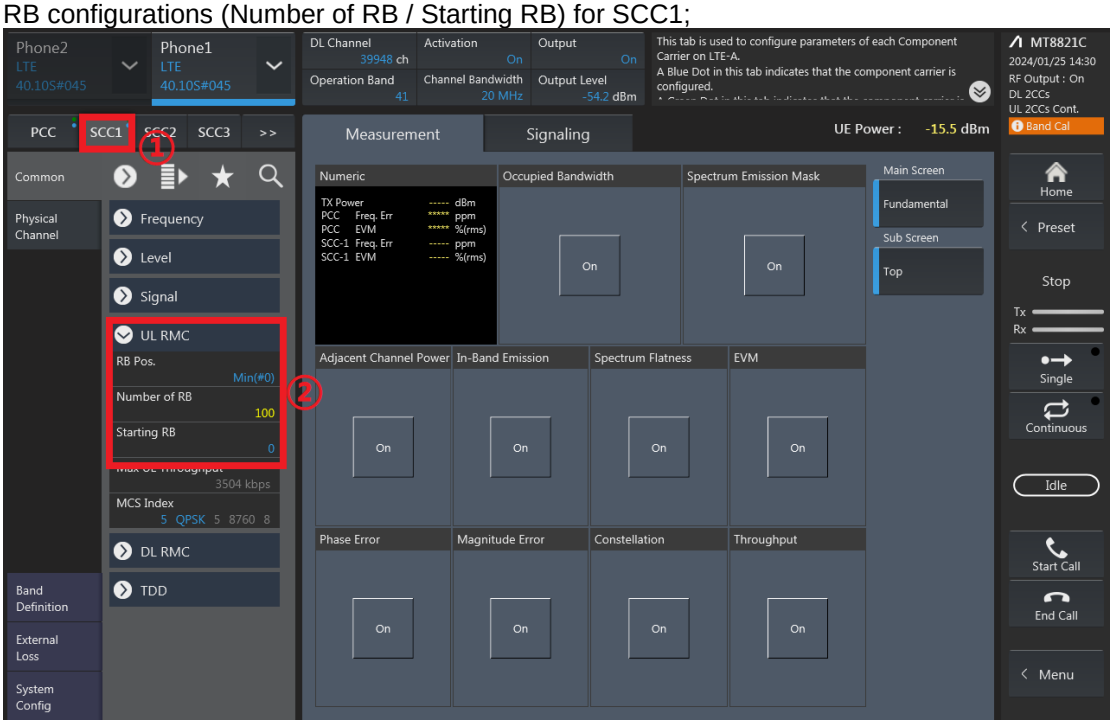
RB configurations (Number of RB / Starting RB) for PCC;



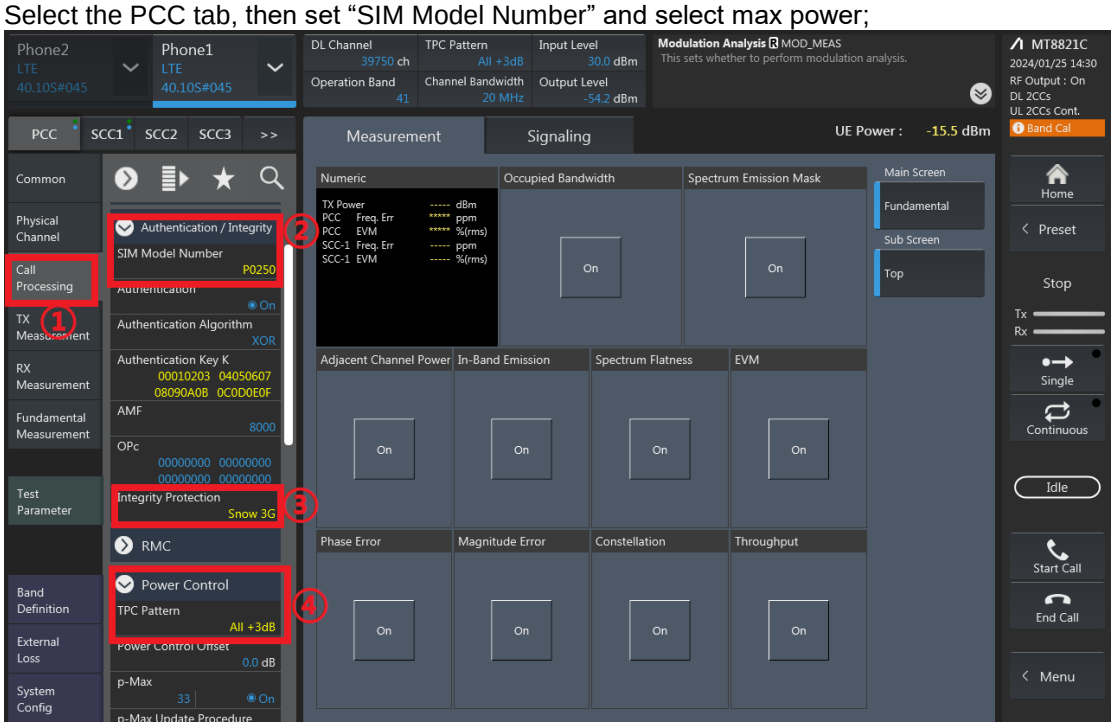
4. SCC parameter Settings: Select the SCC1 tab, Set operating band, BW, channel, and RB configurations for SCC1;



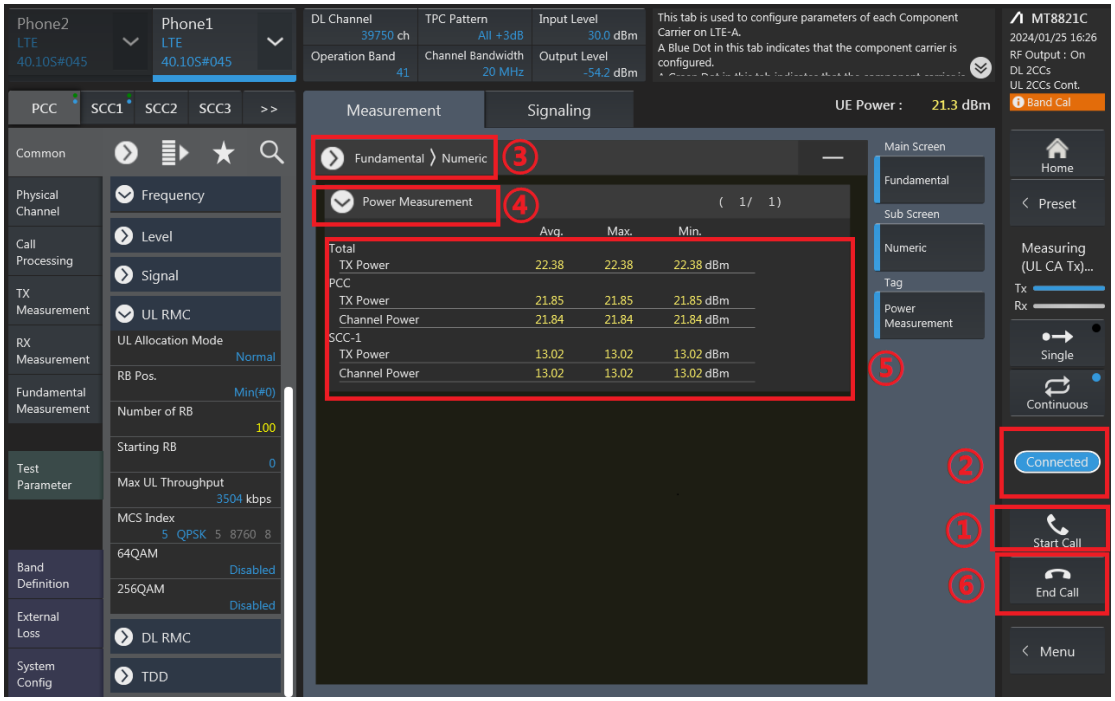
RB configurations (Number of RB / Starting RB) for SCC1;



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.

Downlink CA Power

Full Power

2CC

Configure		CA Configuration (BCS)	PCC							SCC				Power	
			LTE Band	BW (MHz)	UL Freq. (MHz)	UL Channel	Mod.	UL# RB	UL RB Offset	LTE Band	BW (MHz)	DL Freq. (MHz)	DL Channel	With CA Tx.Power (dBm)	W/O CA Tx.Power (dBm)
Inter-Band		CA_2A-5A	2	20	1880	18900	QPSK	1	0	5	10M	881.5	2525	24.05	24.15
		CA_2A-4A	2	20	1880	18900	QPSK	1	0	4	20M	2132.5	2175	23.77	24.15
		CA_2A-66A	2	20	1880	18900	QPSK	1	0	66	20M	2155	66886	23.94	24.15
		CA_2A-12A	2	20	1880	18900	QPSK	1	0	12	10M	737.5	5095	23.81	24.15
		CA_2A-71A	2	20	1880	18900	QPSK	1	0	71	20M	634.5	68786	23.83	24.15
		CA_2A-29A	2	20	1880	18900	QPSK	1	0	29	10M	722.5	9715	23.79	24.15
		CA_2A-30A	2	20	1880	18900	QPSK	1	0	30	10M	2355	9820	23.94	24.15
		CA_4A-5A	4	20M	1732.5	20175	QPSK	1	0	5	10M	881.5	2525	23.34	23.56
		CA_4A-12A	4	20M	1732.5	20175	QPSK	1	0	12	10M	737.5	5095	23.45	23.56
		CA_4A-13A	4	20M	1732.5	20175	QPSK	1	0	13	10M	751	5230	23.30	23.56
		CA_4A-71A	4	20M	1732.5	20175	QPSK	1	0	71	20M	634.5	68786	23.37	23.56
		CA_4A-29A	4	20M	1732.5	20175	QPSK	1	0	29	10M	722.5	9715	23.27	23.56
		CA_4A-30A	4	20M	1732.5	20175	QPSK	1	0	30	10M	2355	9820	23.29	23.56
		CA_5A-66A	5	10M	836.5	20525	QPSK	1	0	66	20M	2155	66886	23.69	24.03
		CA_5A-30A	5	10M	836.5	20525	QPSK	1	0	30	10M	2355	9820	23.71	24.03
		CA_12A-66A	12	10M	707.5	23095	QPSK	1	0	66	20M	2155	66886	23.70	23.83
		CA_12A-30A	12	10M	707.5	23095	QPSK	1	0	30	10M	2355	9820	23.60	23.83
		CA_13A-66A	13	10M	782	23230	QPSK	1	0	66	20M	2155	66886	23.90	24.05
		CA_13A-2A	13	10M	782	23230	QPSK	1	0	2	20M	1880	900	24.06	24.05
		CA_30A-29A	30	10M	2355	9820	QPSK	1	0	29	10M	722.5	9715	22.60	22.98
		CA_30A-66A	30	10M	2355	9820	QPSK	1	0	66	20M	2155	66886	22.77	22.98
		CA_66A-29A	66	20M	1745	132322	QPSK	1	0	29	10M	722.5	9715	23.57	23.62
		CA_66A-71A	66	20M	1745	132322	QPSK	1	0	71	20M	634.5	68786	23.31	23.62
Intra-Band	Non-Contiguous	CA_2A-2A	2	20M	1880	18900	QPSK	1	0	2	5M	1987.5	1175	23.91	24.15
		CA_4A-4A	4	20M	1732.5	20175	QPSK	1	0	4	5M	2152.5	2375	23.43	23.56
		CA_66A-66A	66	20M	1745	132322	QPSK	1	0	66	5M	2197.5	67311	23.43	23.62
	Contiguous	CA_2C	2	20M	1880	18900	QPSK	1	0	2	20M	1979.8	1098	24.02	24.15
		CA_66B	66	15	1717.5	132047	QPSK	1	0	66	5M	2126.80	66604	23.60	23.62
		CA_66C	66	20M	1745	132322	QPSK	1	0	66	20M	2174.80	67084	23.46	23.62