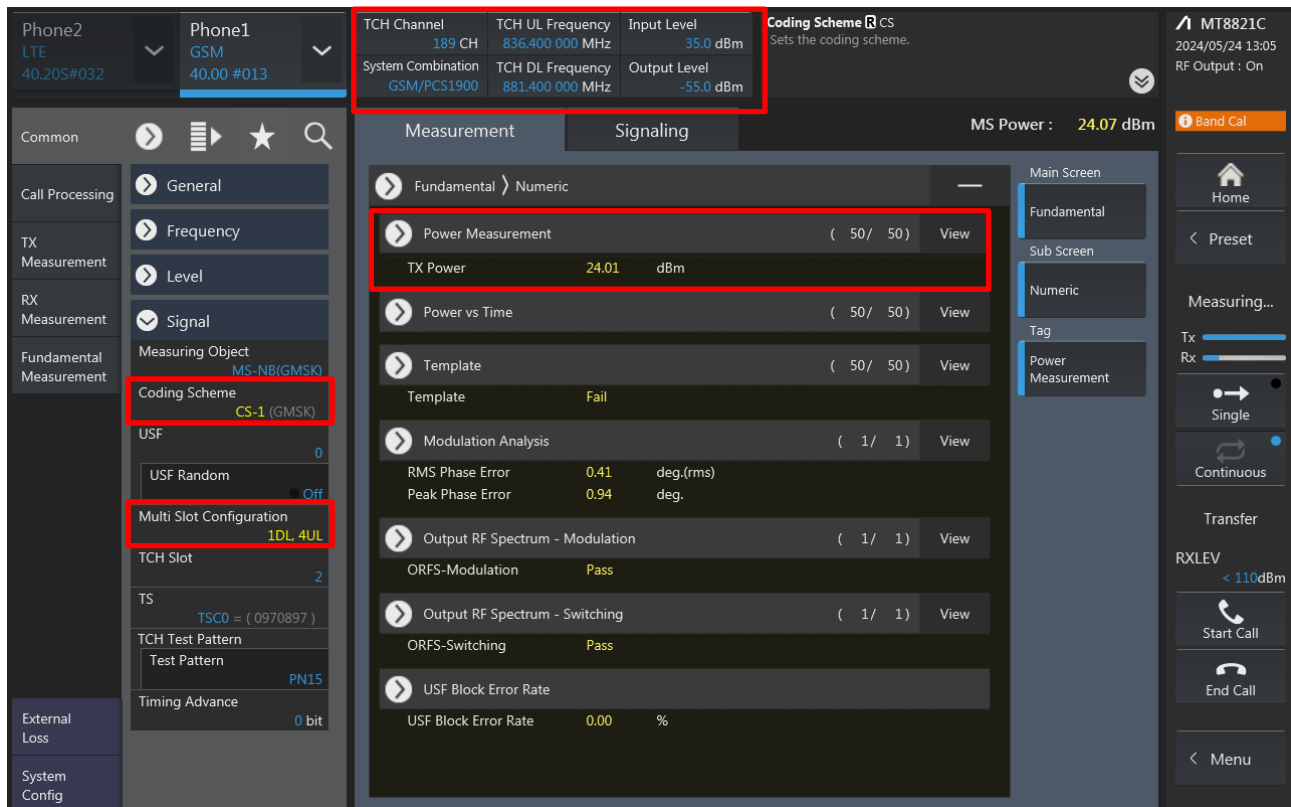


Power measurement connection diagram:

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.

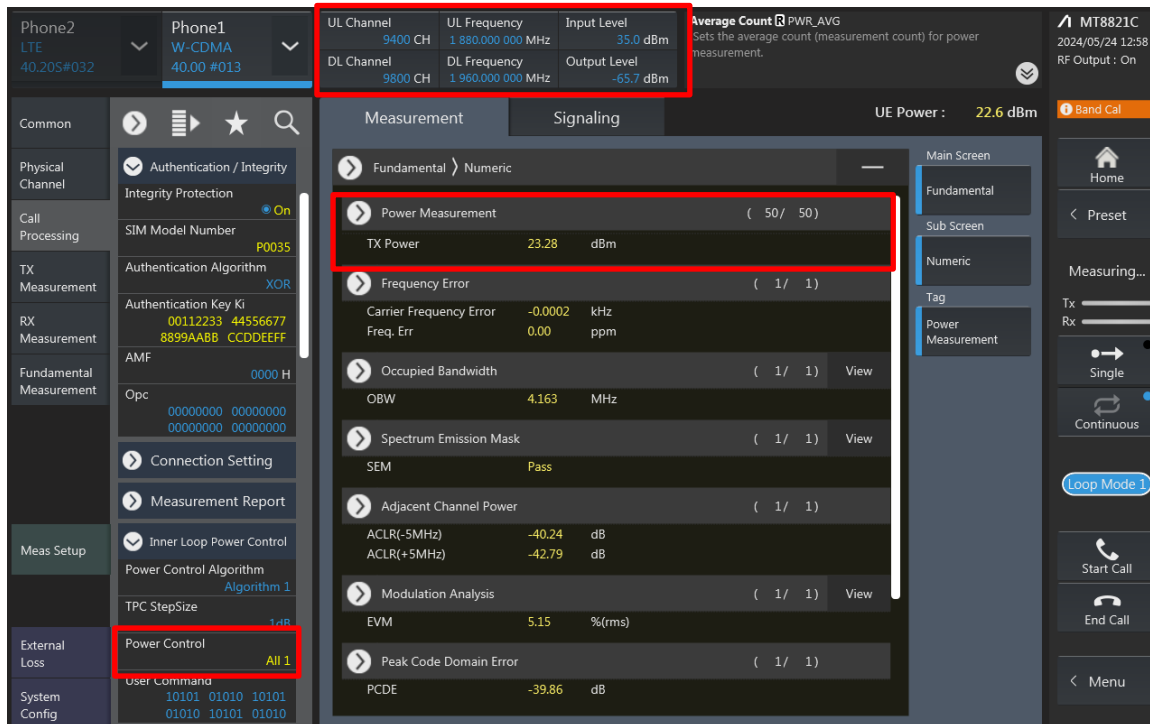
<GSM>



The screenshot displays the SPORTON LAB. software interface for GSM power measurement. The interface is divided into several sections:

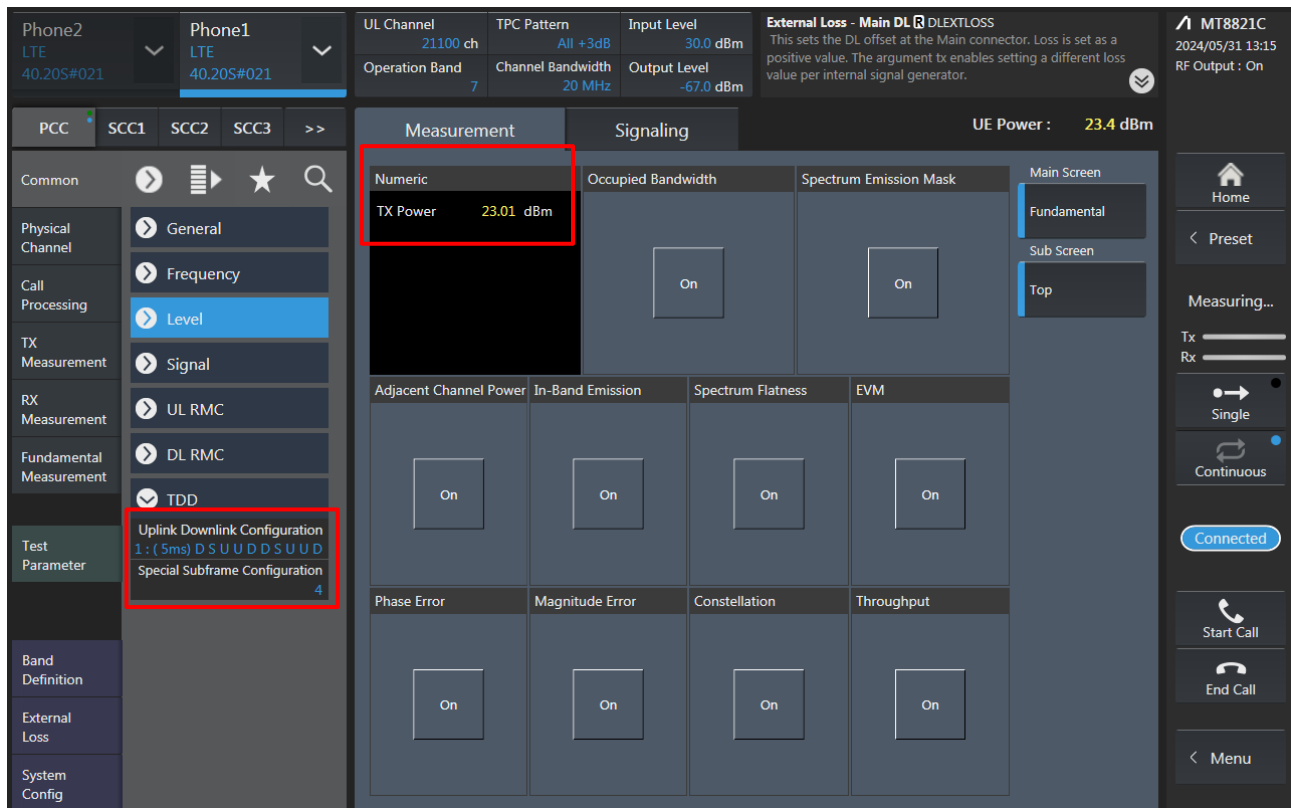
- Top Bar:** Shows Phone2 (LTE, 40.205#032) and Phone1 (GSM, 40.00 #013). The TCH Channel is 189 CH, TCH UL Frequency is 836.400 000 MHz, Input Level is 35.0 dBm, and TCH DL Frequency is 881.400 000 MHz. The Coding Scheme is CS.
- Left Sidebar:** Contains navigation options like Call Processing, TX Measurement, RX Measurement, Fundamental Measurement, and External Loss.
- Main Area:**
 - Measurement Tab:** Displays various measurement results. The 'Power Measurement' section shows TX Power as 24.01 dBm. Other sections include Power vs Time, Template, Modulation Analysis, Output RF Spectrum - Modulation, Output RF Spectrum - Switching, and USF Block Error Rate.
 - Signaling Tab:** Shows signaling information.
- Right Sidebar:** Includes a 'Main Screen' section with 'Fundamental' and 'Sub Screen' options, and a 'Tag' section with 'Power Measurement'.

<WCDMA>



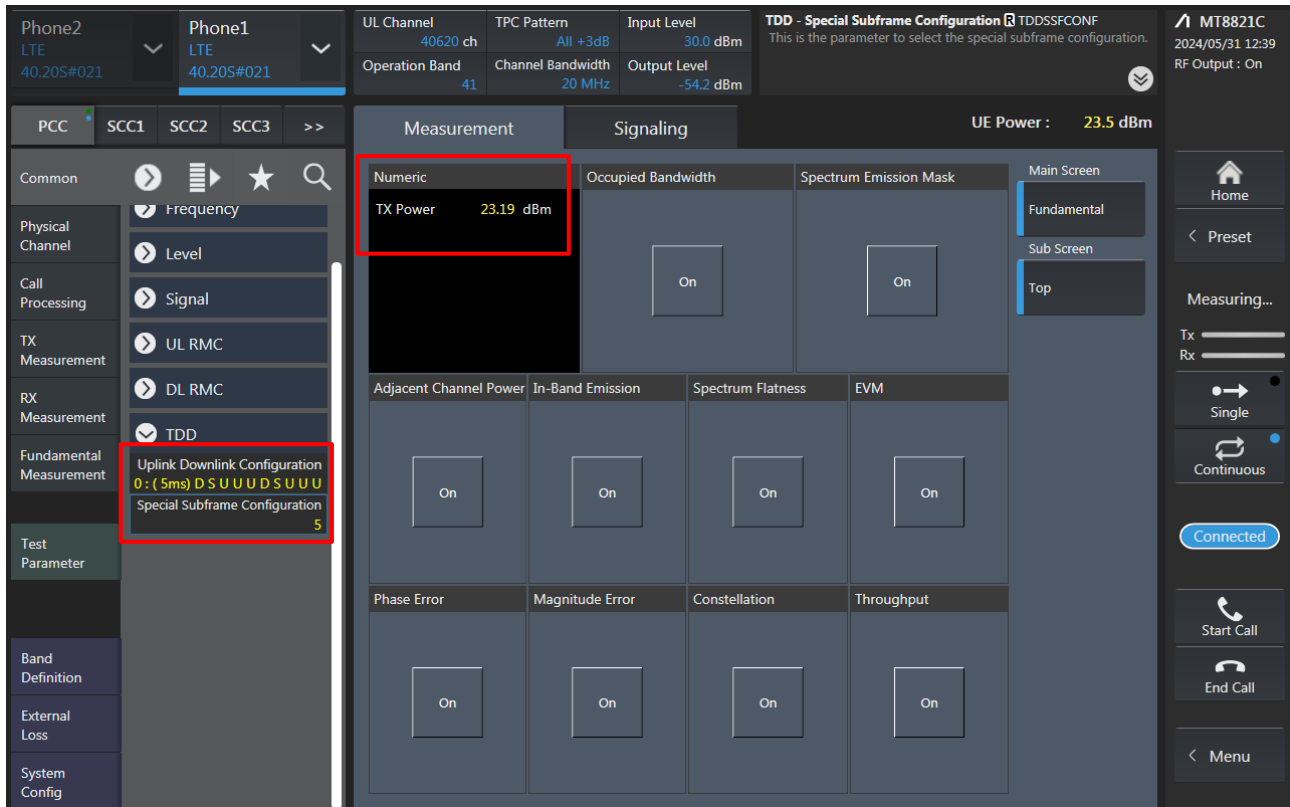
The screenshot shows the WCDMA measurement interface. The top bar displays 'Phone2 LTE 40.20S#032' and 'Phone1 W-CDMA 40.00 #013'. The 'Measurement' tab is active, showing 'Fundamental' and 'Numeric' views. The 'Power Measurement' section is highlighted with a red box, showing 'TX Power' at 23.28 dBm. The 'Occupied Bandwidth' section shows 'OBW' at 4.163 MHz. The 'Adjacent Channel Power' section shows 'ACLR(-5MHz)' at -40.24 dB and 'ACLR(+5MHz)' at -42.79 dB. The 'Modulation Analysis' section shows 'EVM' at 5.15 % (rms). The 'Peak Code Domain Error' section shows 'PCDE' at -39.86 dB. The 'UE Power' is 22.6 dBm. The 'Main Screen' shows 'Fundamental' and 'Sub Screen' options. The 'Tag' shows 'Power Measurement'. The 'Meas Setup' section shows 'Authentication / Integrity' and 'Integrity Protection' settings. The 'External Loss' section shows 'Power Control' and 'User Command' settings.

<LTE>



The screenshot shows the LTE measurement interface. The top bar displays 'Phone2 LTE 40.20S#021' and 'Phone1 LTE 40.20S#021'. The 'Measurement' tab is active, showing 'Numeric' and 'Occupied Bandwidth' views. The 'Power Measurement' section is highlighted with a red box, showing 'TX Power' at 23.01 dBm. The 'Occupied Bandwidth' section shows 'OBW' at 20 MHz. The 'Spectrum Emission Mask' section shows 'SEM' at Pass. The 'Adjacent Channel Power' section shows 'ACLR(-5MHz)' at -40.24 dB and 'ACLR(+5MHz)' at -42.79 dB. The 'Modulation Analysis' section shows 'EVM' at 5.15 % (rms). The 'Peak Code Domain Error' section shows 'PCDE' at -39.86 dB. The 'UE Power' is 23.4 dBm. The 'Main Screen' shows 'Fundamental' and 'Sub Screen' options. The 'Tag' shows 'Power Measurement'. The 'Meas Setup' section shows 'General' and 'Frequency' settings. The 'Test Parameter' section shows 'Uplink Downlink Configuration 1: (5ms) D S U U D D S U U D' and 'Special Subframe Configuration 4'. The 'Band Definition' section shows 'Band 1' and 'Band 2' settings. The 'External Loss' section shows 'External Loss - Main DL' and 'DLEXTLOSS' settings.

<LTE TDD Power class 3>



Phone2 LTE 40.20S#021

Phone1 LTE 40.20S#021

UL Channel 40620 ch

TPC Pattern All +3dB

Input Level 30.0 dBm

Operation Band 41

Channel Bandwidth 20 MHz

Output Level -54.2 dBm

TDD - Special Subframe Configuration TDDSSFCNF

This is the parameter to select the special subframe configuration.

MT8821C

2024/05/31 12:39

RF Output : On

UE Power : 23.5 dBm

Measurement

Numeric

TX Power 23.19 dBm

Occupied Bandwidth

Spectrum Emission Mask

Main Screen

Fundamental

Sub Screen

Top

Adjacent Channel Power

In-Band Emission

Spectrum Flatness

EVM

Phase Error

Magnitude Error

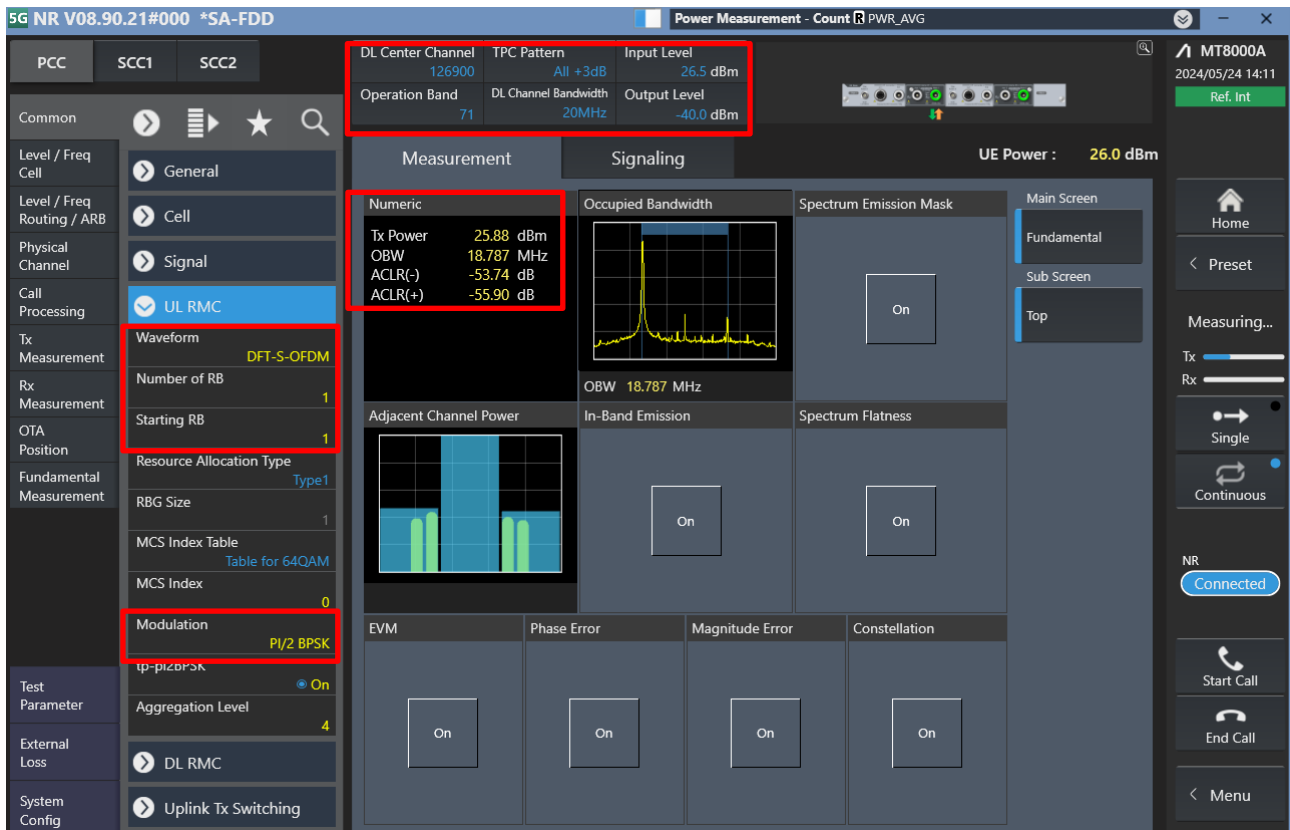
Constellation

Throughput

Uplink Downlink Configuration 0:(5ms)DSUUUSUUU

Special Subframe Configuration 5

<5G NR FR1>



5G NR V08.90.21#000 *SA-FDD

Power Measurement - Count PWR_AVG

MT88000A

2024/05/24 14:11

Ref. Int

UE Power : 26.0 dBm

Measurement

Numeric

Tx Power 25.88 dBm

OBW 18.787 MHz

ACLR(-) -53.74 dB

ACLR(+) -55.90 dB

Occupied Bandwidth

Spectrum Emission Mask

Main Screen

Fundamental

Sub Screen

Top

Adjacent Channel Power

In-Band Emission

Spectrum Flatness

EVM

Phase Error

Magnitude Error

Constellation

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

Waveform DFT-S-OFDM

Number of RB 1

Starting RB 1

Resource Allocation Type Type1

RBG Size 1

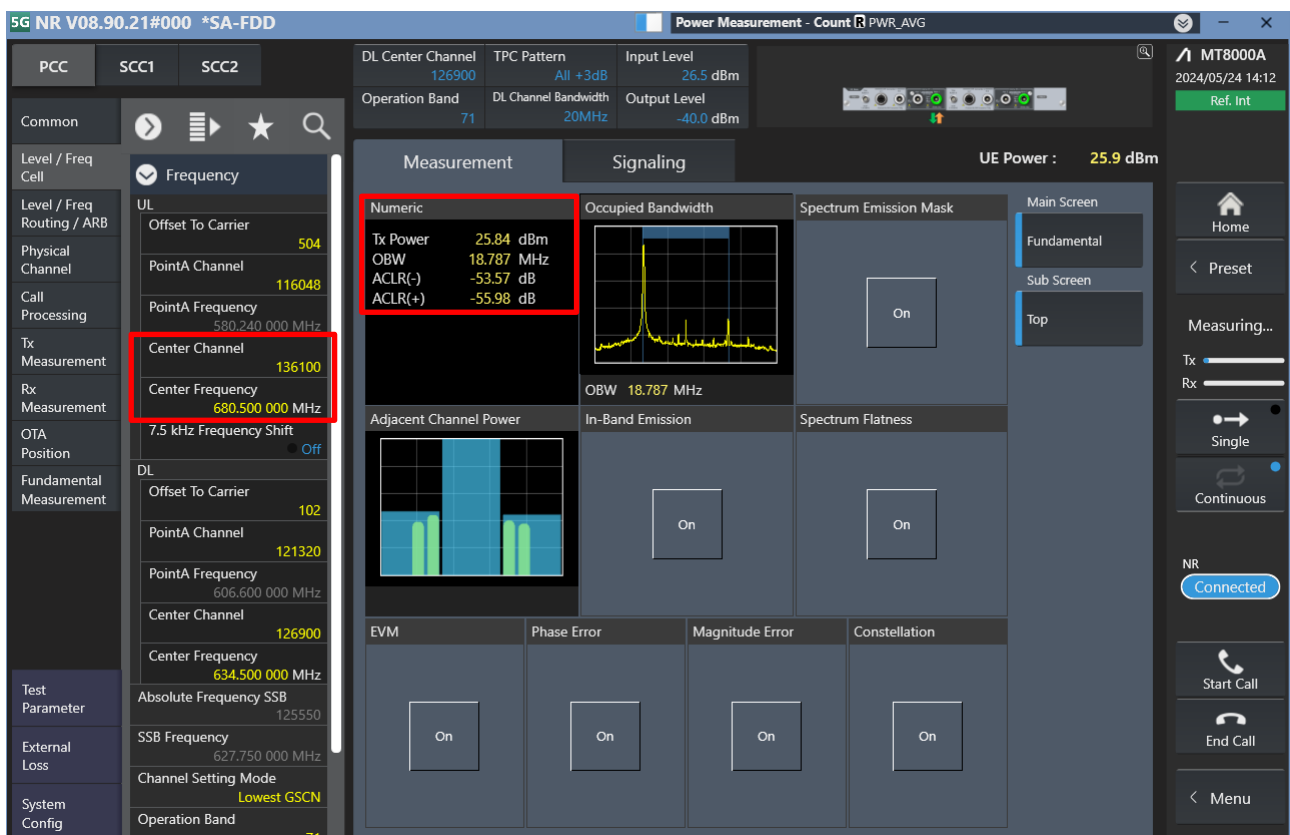
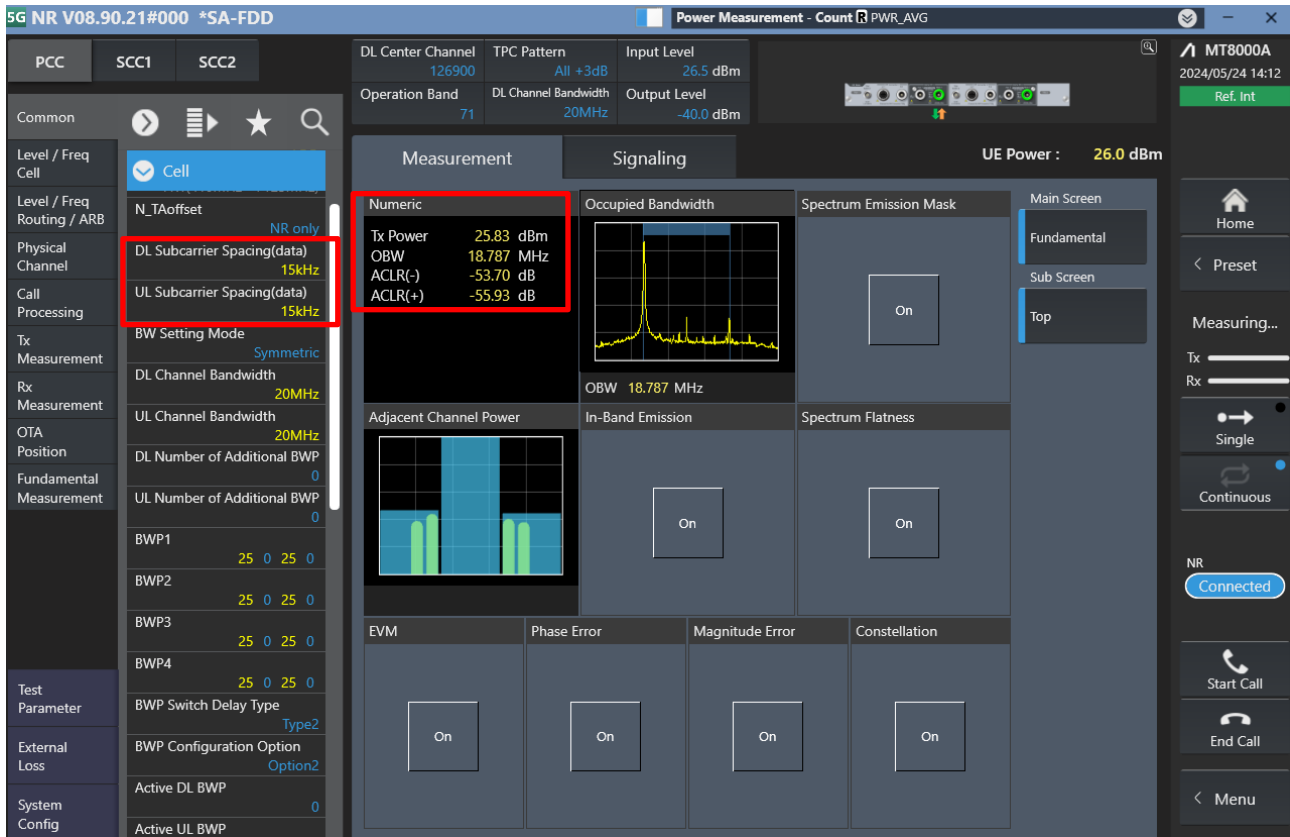
MCS Index Table Table for 64QAM

MCS Index 0

Modulation PI/2 BPSK

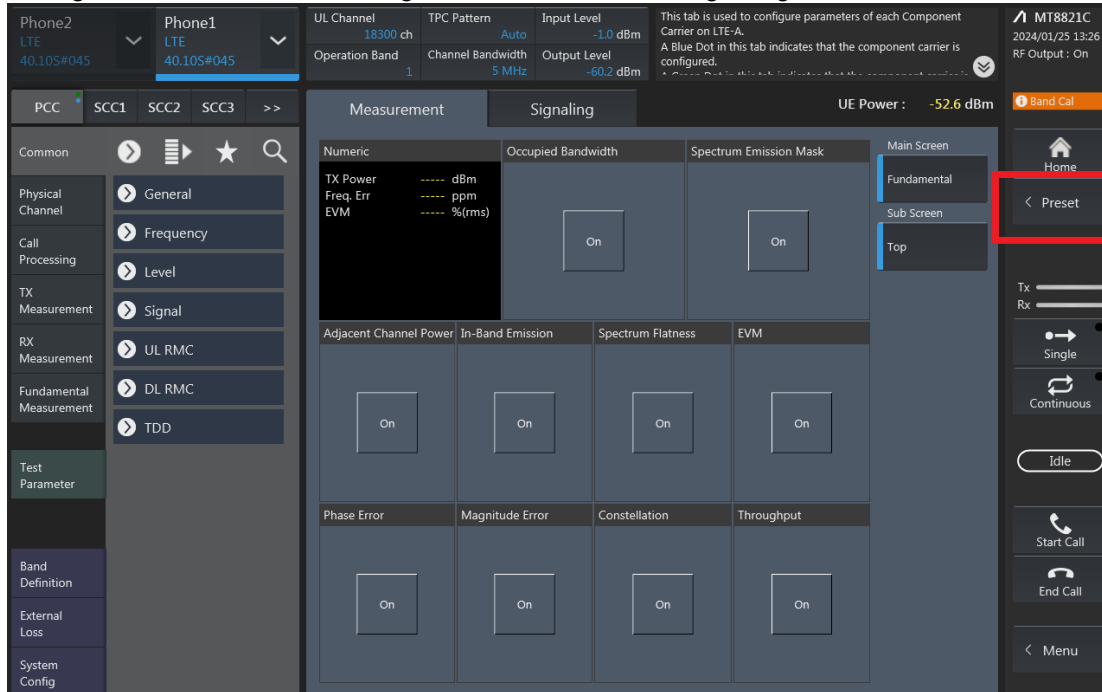
Aggregation Level 4

Uplink Tx Switching



LTE Uplink and Downlink Carrier Aggregation configurations:

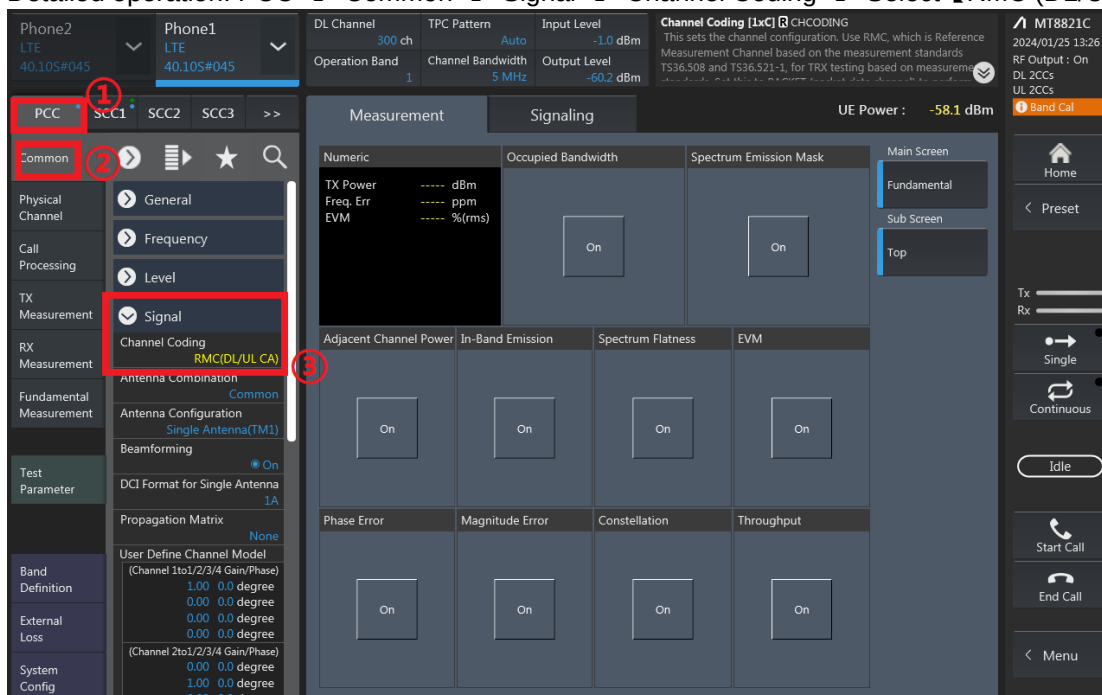
1. Change the Scenario in the Configuration of Phone1 LTE Signaling and Preset.



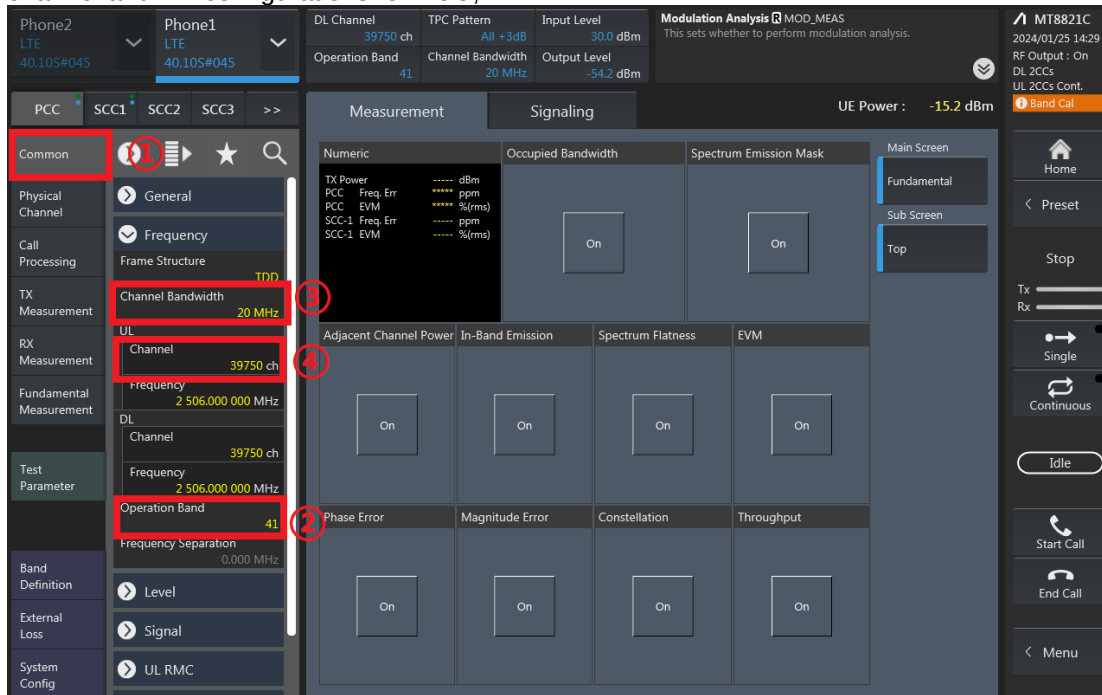
2. If Select "RMC (DL/UL CA)" for Uplink Carrier Aggregation;
If Select "RMC (DL CA)" for Downlink Carrier Aggregation.

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;



Phone2 LTE 40.10S#045 Phone1 LTE 40.10S#045

DL Channel 39750 ch TPC Pattern All +3dB Input Level 30.0 dBm Modulation Analysis MOD_MEAS This sets whether to perform modulation analysis.

Operation Band 41 Channel Bandwidth 20 MHz Output Level -54.2 dBm

MT8821C 2024/01/25 14:29 RF Output : On DL 2CCs UL 2CCs Cont.

UE Power : -15.2 dBm

Measurement Signaling

Common

Physical Channel General

Call Processing Frequency

TX Measurement Channel Bandwidth 20 MHz

RX Measurement Channel 39750 ch

Fundamental Measurement Frequency 2 506.000 000 MHz

Test Parameter Channel 39750 ch Frequency 2 506.000 000 MHz Operation Band 41 Frequency Separation 0.000 MHz

Band Definition Level

External Loss Signal

System Config UL RMC

Numeric

TX Power PCC Freq. Err. dBm PPM PCC EVM dBm PPM SCC-1 Freq. Err. dBm PPM SCC-1 EVM dBm PPM

Occupied Bandwidth

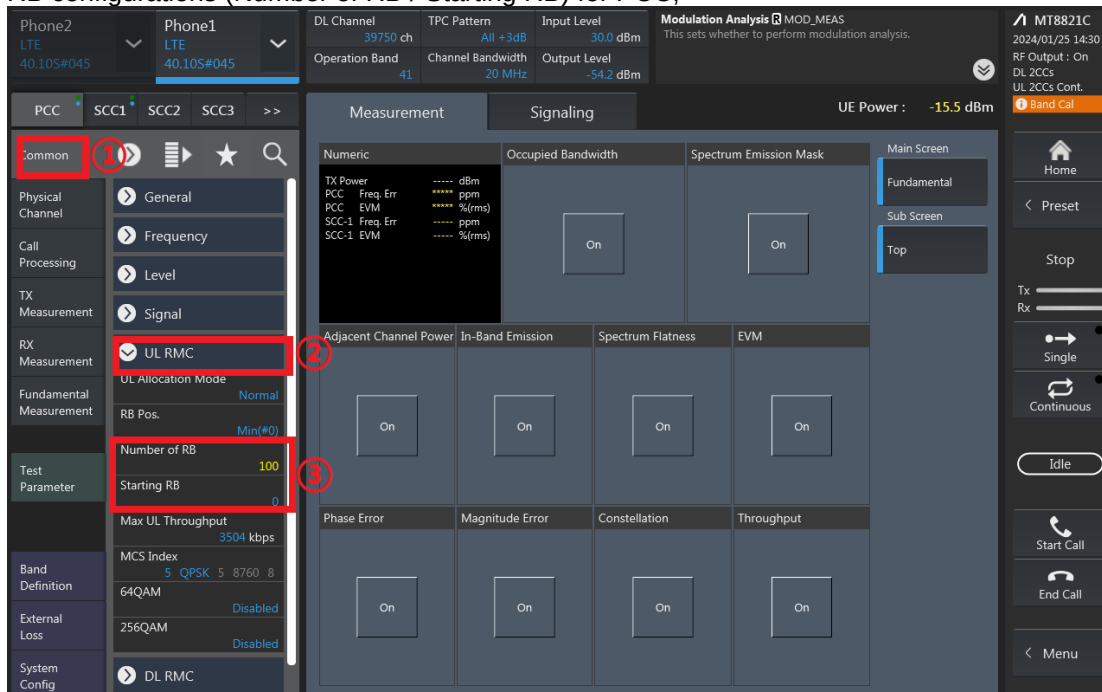
Spectrum Emission Mask

Main Screen Fundamental Sub Screen Top

Adjacent Channel Power In-Band Emission Spectrum Flatness EVM

Phase Error Magnitude Error Constellation Throughput

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



Phone2 LTE 40.10S#045 Phone1 LTE 40.10S#045

DL Channel 39750 ch TPC Pattern All +3dB Input Level 30.0 dBm Modulation Analysis MOD_MEAS This sets whether to perform modulation analysis.

Operation Band 41 Channel Bandwidth 20 MHz Output Level -54.2 dBm

MT8821C 2024/01/25 14:30 RF Output : On DL 2CCs UL 2CCs Cont.

UE Power : -15.5 dBm

Measurement Signaling

Common

Physical Channel General

Call Processing Frequency

TX Measurement Level

RX Measurement Signal

Fundamental Measurement UL RMC

Test Parameter UL Allocation Mode Normal RB Pos. Min(#0) Number of RB 100 Starting RB 0 Max UL Throughput 3504 kbps MCS Index 5 QPSK 5 8760 8 64QAM 256QAM Disabled Disabled

Band Definition DL RMC

Numeric

TX Power PCC Freq. Err. dBm PPM PCC EVM dBm PPM SCC-1 Freq. Err. dBm PPM SCC-1 EVM dBm PPM

Occupied Bandwidth

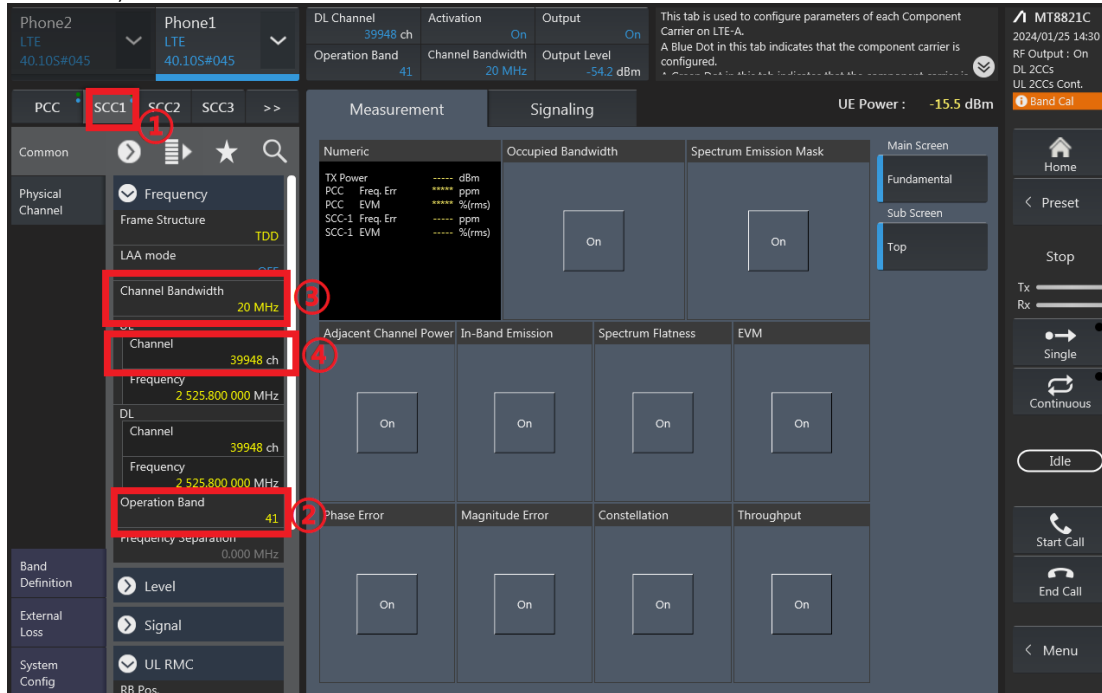
Spectrum Emission Mask

Main Screen Fundamental Sub Screen Top

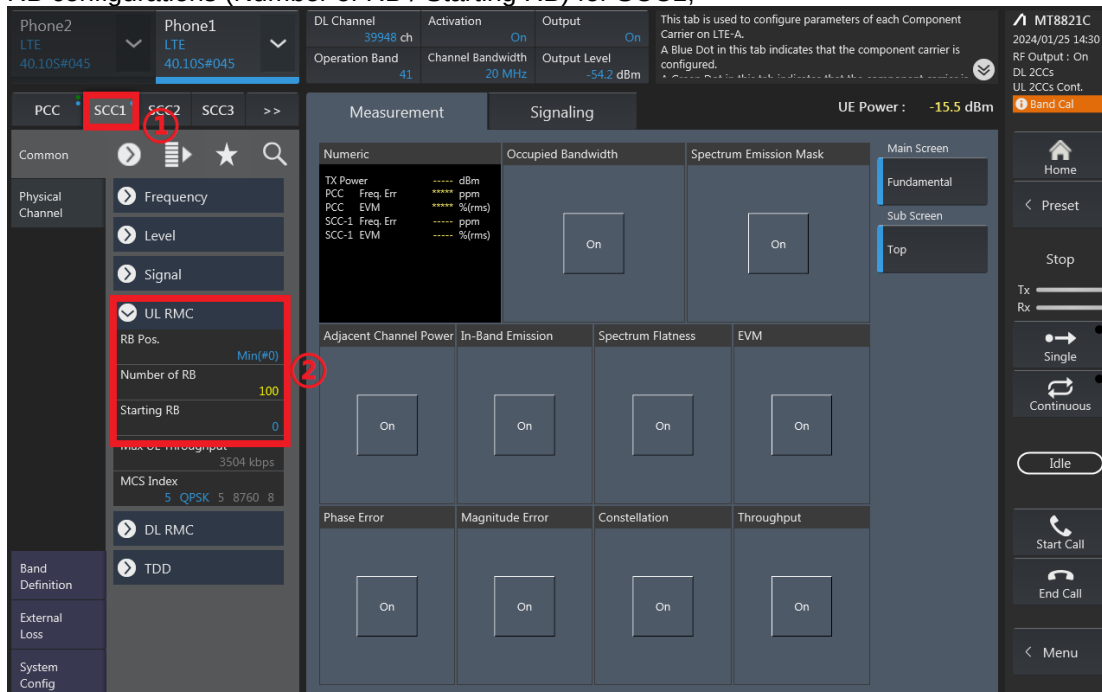
Adjacent Channel Power In-Band Emission Spectrum Flatness EVM

Phase Error Magnitude Error Constellation Throughput

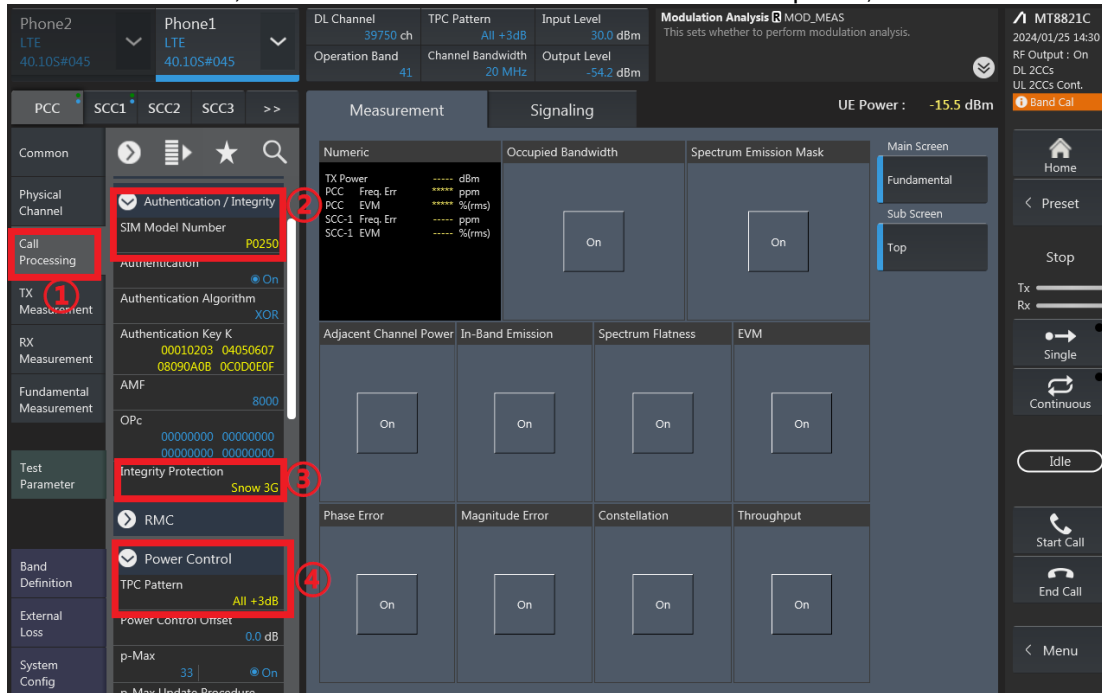
4. SCC parameter Settings: Select the SCC1 tab, Set operating band, BW, channel, and RB configurations for SCC1;



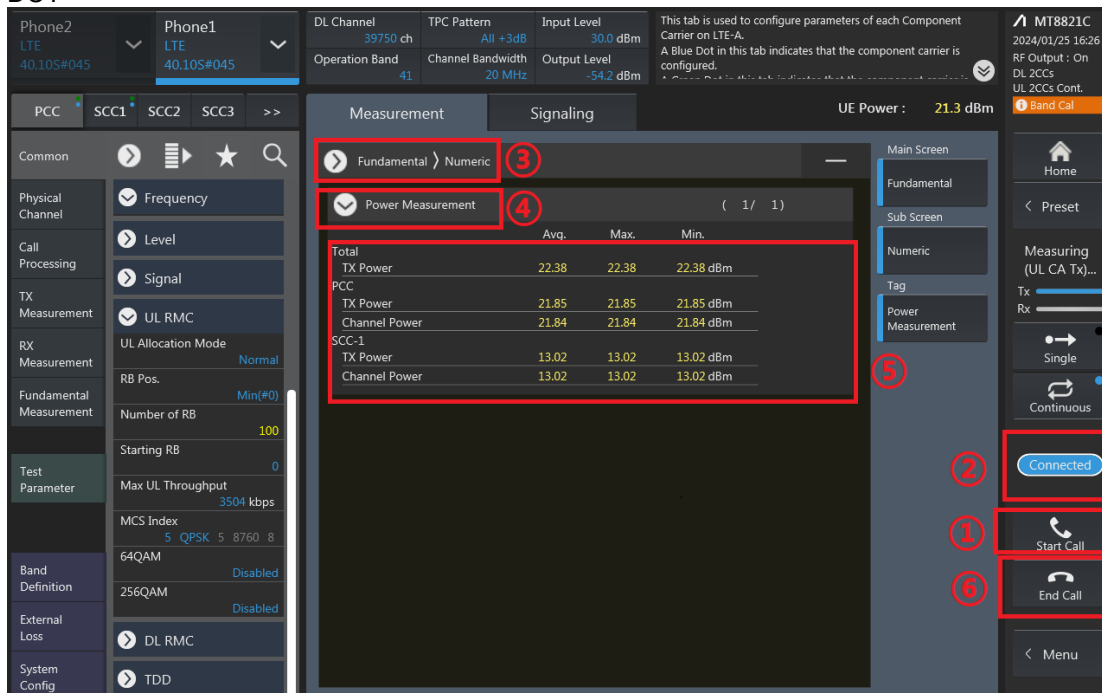
RB configurations (Number of RB / Starting RB) for SCC1;



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.

CA_5B Ant0 Default								
Combination 10MHz+10MHz (50RB+50RB)								
PCC Channel	SCC Channel	Modulation	PCC		SCC		Measured Power (dBm)	Tune up Power (dBm)
			RB Size	RB offset	RB Size	RB offset		
20450	20549	QPSK	1	49	1	0	21.94	24.00
20476	20575	QPSK	1	49	1	0	22.24	24.00
20600	20501	QPSK	1	0	1	49	22.01	24.00

CA_5B Ant0 EC12								
Combination 10MHz+10MHz (50RB+50RB)								
PCC Channel	SCC Channel	Modulation	PCC		SCC		Measured Power (dBm)	Tune up Power (dBm)
			RB Size	RB offset	RB Size	RB offset		
20450	20549	QPSK	1	49	1	0	21.94	24.00
20476	20575	QPSK	1	49	1	0	22.24	24.00
20600	20501	QPSK	1	0	1	49	22.01	24.00

CA_5B Ant0 EC14								
Combination 10MHz+10MHz (50RB+50RB)								
PCC Channel	SCC Channel	Modulation	PCC		SCC		Measured Power (dBm)	Tune up Power (dBm)
			RB Size	RB offset	RB Size	RB offset		
20450	20549	QPSK	1	49	1	0	21.94	24.00
20476	20575	QPSK	1	49	1	0	22.24	24.00
20600	20501	QPSK	1	0	1	49	22.01	24.00

CA_5B Ant0 EC16								
Combination 10MHz+10MHz (50RB+50RB)								
PCC Channel	SCC Channel	Modulation	PCC		SCC		Measured Power (dBm)	Tune up Power (dBm)
			RB Size	RB offset	RB Size	RB offset		
20450	20549	QPSK	1	49	1	0	21.94	24.00
20476	20575	QPSK	1	49	1	0	22.24	24.00
20600	20501	QPSK	1	0	1	49	22.01	24.00

CA_48C Ant5 Default								
Combination 20MHz+20MHz (100RB+100RB)								
	SCC Channel	Modulation	PCC		SCC		Measured Power (dBm)	Tune up Power (dBm)
			RB Size	RB offset	RB Size	RB offset		
55340	55538	QPSK	100	0	100	0	19.03	20.00
55830	56028	QPSK	100	0	100	0	19.35	20.00
56150	56348	QPSK	100	0	100	0	18.97	20.00
56640	56442	QPSK	100	0	100	0	18.84	20.00

CA_48C Ant5 EC12								
Combination 20MHz+20MHz (100RB+100RB)								
PCC Channel	SCC Channel	Modulation	PCC		SCC		Measured Power (dBm)	Tune up Power (dBm)
			RB Size	RB offset	RB Size	RB offset		
55340	55538	QPSK	100	0	100	0	17.58	19.50
55830	56028	QPSK	100	0	100	0	17.65	19.50
56150	56348	QPSK	100	0	100	0	17.58	19.50
56640	56442	QPSK	100	0	100	0	17.55	19.50

CA_48B Ant5 Default								
Combination 15MHz+5MHz (75RB+25RB)								
PCC Channel	SCC Channel	Modulation	PCC		SCC		Measured Power (dBm)	Tune up Power (dBm)
			RB Size	RB offset	RB Size	RB offset		
55315	55408	QPSK	75	0	25	0	19.17	20.00
55820	55913	QPSK	75	0	25	0	19.23	20.00
56160	56253	QPSK	75	0	25	0	19.07	20.00
56665	56572	QPSK	75	0	25	0	18.93	20.00

CA_48B Ant5 EC12								
Combination 15MHz+5MHz (75RB+25RB)								
PCC Channel	SCC Channel	Modulation	PCC		SCC		Measured Power (dBm)	Tune up Power (dBm)
			RB Size	RB offset	RB Size	RB offset		
55315	55408	QPSK	75	0	25	0	17.55	19.50
55820	55913	QPSK	75	0	25	0	17.64	19.50
56160	56253	QPSK	75	0	25	0	17.61	19.50
56665	56572	QPSK	75	0	25	0	17.54	19.50

CA_48C Ant5 Ant5 EC14								
Combination 20MHz+20MHz (100RB+100RB)								
PCC Channel	SCC Channel	Modulation	PCC		SCC		Measured Power (dBm)	Tune up Power (dBm)
			RB Size	RB offset	RB Size	RB offset		
55340	55538	QPSK	100	0	100	0	19.03	20.00
55830	56028	QPSK	100	0	100	0	19.35	20.00
56150	56348	QPSK	100	0	100	0	18.97	20.00
56640	56442	QPSK	100	0	100	0	18.84	20.00

CA_48C Ant5 EC16								
Combination 20MHz+20MHz (100RB+100RB)								
PCC Channel	SCC Channel	Modulation	PCC		SCC		Measured Power (dBm)	Tune up Power (dBm)
			RB Size	RB offset	RB Size	RB offset		
55340	55538	QPSK	100	0	100	0	19.03	20.00
55830	56028	QPSK	100	0	100	0	19.35	20.00
56150	56348	QPSK	100	0	100	0	18.97	20.00
56640	56442	QPSK	100	0	100	0	18.84	20.00

CA_48B Ant5 EC14								
Combination 15MHz+5MHz (75RB+25RB)								
PCC Channel	SCC Channel	Modulation	PCC		SCC		Measured Power (dBm)	Tune up Power (dBm)
			RB Size	RB offset	RB Size	RB offset		
55315	55408	QPSK	75	0	25	0	19.17	20.00
55820	55913	QPSK	75	0	25	0	19.23	20.00
56160	56253	QPSK	75	0	25	0	19.07	20.00
56665	56572	QPSK	75	0	25	0	18.93	20.00

CA_48B Ant5 EC16								
Combination 15MHz+5MHz (75RB+25RB)								
PCC Channel	SCC Channel	Modulation	PCC		SCC		Measured Power (dBm)	Tune up Power (dBm)
			RB Size	RB offset	RB Size	RB offset		
55315	55408	QPSK	75	0	25	0	19.17	20.00
55820	55913	QPSK	75	0	25	0	19.23	20.00
56160	56253	QPSK	75	0	25	0	19.07	20.00
56665	56572	QPSK	75	0	25	0	18.93	20.00

CA_5B Ant0 EC13								
Combination 10MHz+10MHz (50RB+50RB)								
PCC Channel	SCC Channel	Modulation	PCC		SCC		Measured Power (dBm)	Tune up Power (dBm)
			RB Size	RB offset	RB Size	RB offset		
20450	20549	QPSK	1	49	1	0	21.94	23.10
20476	20575	QPSK	1	49	1	0	22.04	23.10
20600	20501	QPSK	1	0	1	49	22.01	23.10
20450	20549	QPSK	25	25	25	0	21.11	23.00
20476	20575	QPSK	25	25	25	0	21.18	23.00
20600	20501	QPSK	25	0	25	25	21.07	23.00

CA_5B Ant0 EC17								
Combination 10MHz+10MHz (50RB+50RB)								
PCC Channel	SCC Channel	Modulation	PCC		SCC		Measured Power (dBm)	Tune up Power (dBm)
			RB Size	RB offset	RB Size	RB offset		
20450	20549	QPSK	1	49	1	0	21.94	23.10
20476	20575	QPSK	1	49	1	0	22.24	23.10
20600	20501	QPSK	1	0	1	49	22.01	23.10

CA_48C Ant5 EC13								
Combination 20MHz+20MHz (100RB+100RB)								
PCC Channel	SCC Channel	Modulation	PCC		SCC		Measured Power (dBm)	Tune up Power (dBm)
			RB Size	RB offset	RB Size	RB offset		
55340	55538	QPSK	100	0	100	0	17.94	19.60
55830	56028	QPSK	100	0	100	0	18.16	19.60
56150	56348	QPSK	100	0	100	0	17.92	19.60
56640	56442	QPSK	100	0	100	0	18.01	19.60

CA_48B Ant5 EC17								
Combination 15MHz+5MHz (75RB+25RB)								
PCC Channel	SCC Channel	Modulation	PCC		SCC		Measured Power (dBm)	Tune up Power (dBm)
			RB Size	RB offset	RB Size	RB offset		
55315	55408	QPSK	75	0	25	0	17.92	19.60
55820	55913	QPSK	75	0	25	0	18.15	19.60
56160	56253	QPSK	75	0	25	0	17.91	19.60
56665	56572	QPSK	75	0	25	0	18.01	19.60

CA_48C Ant5 EC17								
Combination 20MHz+20MHz (100RB+100RB)								
PCC Channel	SCC Channel	Modulation	PCC		SCC		Measured Power (dBm)	Tune up Power (dBm)
			RB Size	RB offset	RB Size	RB offset		
55340	55538	QPSK	100	0	100	0	16.11	18.00
55830	56028	QPSK	100	0	100	0	16.21	18.00
56150	56348	QPSK	100	0	100	0	16.11	18.00
56640	56442	QPSK	100	0	100	0	16.15	18.00

CA_48B Ant5 EC17								
Combination 15MHz+5MHz (75RB+25RB)								
PCC Channel	SCC Channel	Modulation	PCC		SCC		Measured Power (dBm)	Tune up Power (dBm)
			RB Size	RB offset	RB Size	RB offset		
55315	55408	QPSK	75	0	25	0	16.14	18.00
55820	55913	QPSK	75	0	25	0	16.17	18.00
56160	56253	QPSK	75	0	25	0	16.07	18.00
56665	56572	QPSK	75	0	25	0	16.14	18.00