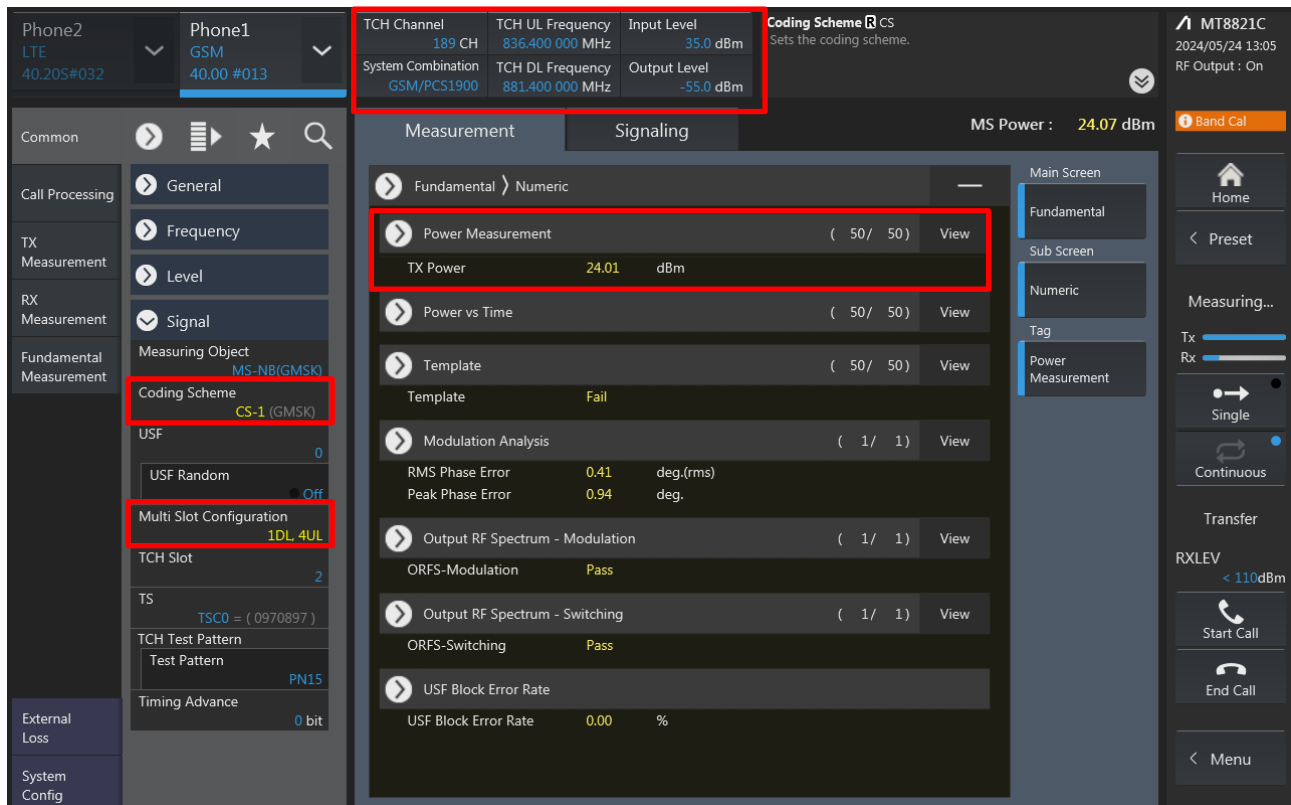


Power measurement connection diagram:

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.

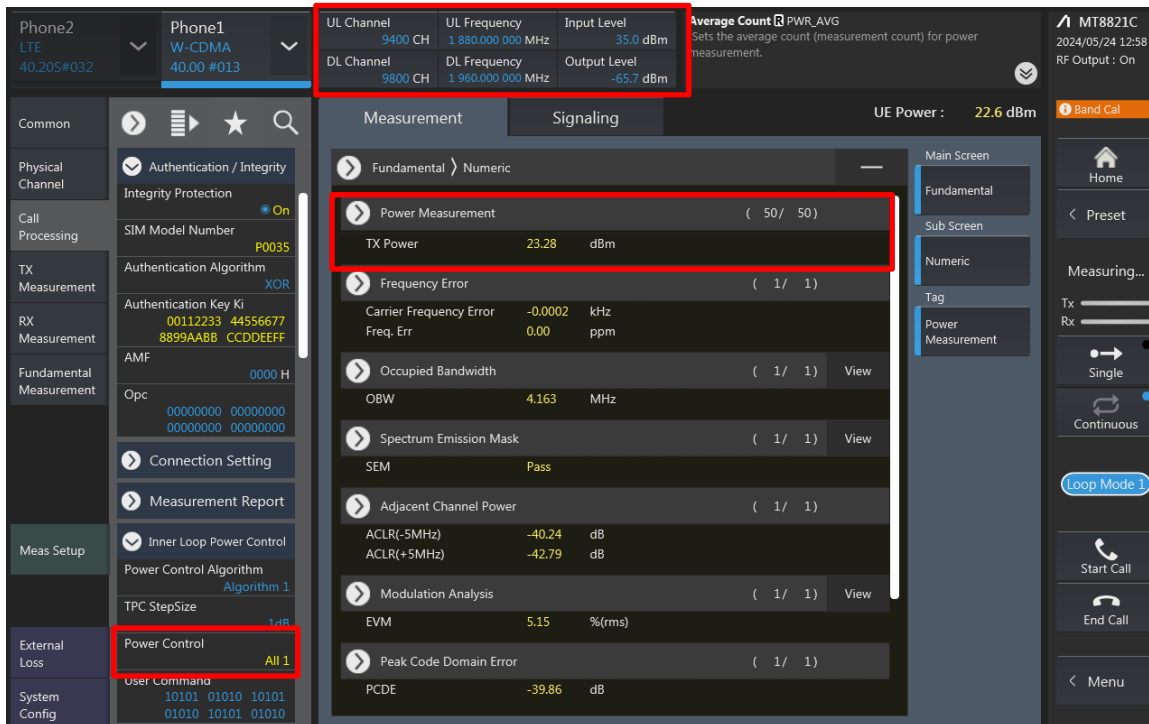
<GSM>



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). A table at the top right lists TCH Channel (189 CH), TCH UL Frequency (836.400 000 MHz), Input Level (35.0 dBm), 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 like Common, Call Processing, TX Measurement, RX Measurement, Fundamental Measurement, and External Loss. The 'Fundamental Measurement' section is expanded, showing 'Coding Scheme' (CS-1 (GMSK)) and 'Multi Slot Configuration' (1DL, 4UL).
- Main Area:** Displays 'Measurement' and 'Signaling' tabs. The 'Measurement' tab is active, showing 'Fundamental' and 'Numeric' views. The 'Power Measurement' section is highlighted, showing 'TX Power' (24.01 dBm). Other measurements include 'Power vs Time', 'Template', 'Modulation Analysis', 'Output RF Spectrum - Modulation', 'Output RF Spectrum - Switching', and 'USF Block Error Rate'.
- Right Sidebar:** Contains 'Main Screen' and 'Sub Screen' tabs. The 'Main Screen' tab is active, showing 'Fundamental' and 'Numeric' views. The 'Tag' section shows 'Power Measurement'.
- Bottom Bar:** Includes 'Home', 'Preset', 'Measuring...', 'Single', 'Continuous', 'Transfer', 'RXLEV' (110dBm), 'Start Call', 'End Call', and 'Menu' buttons.

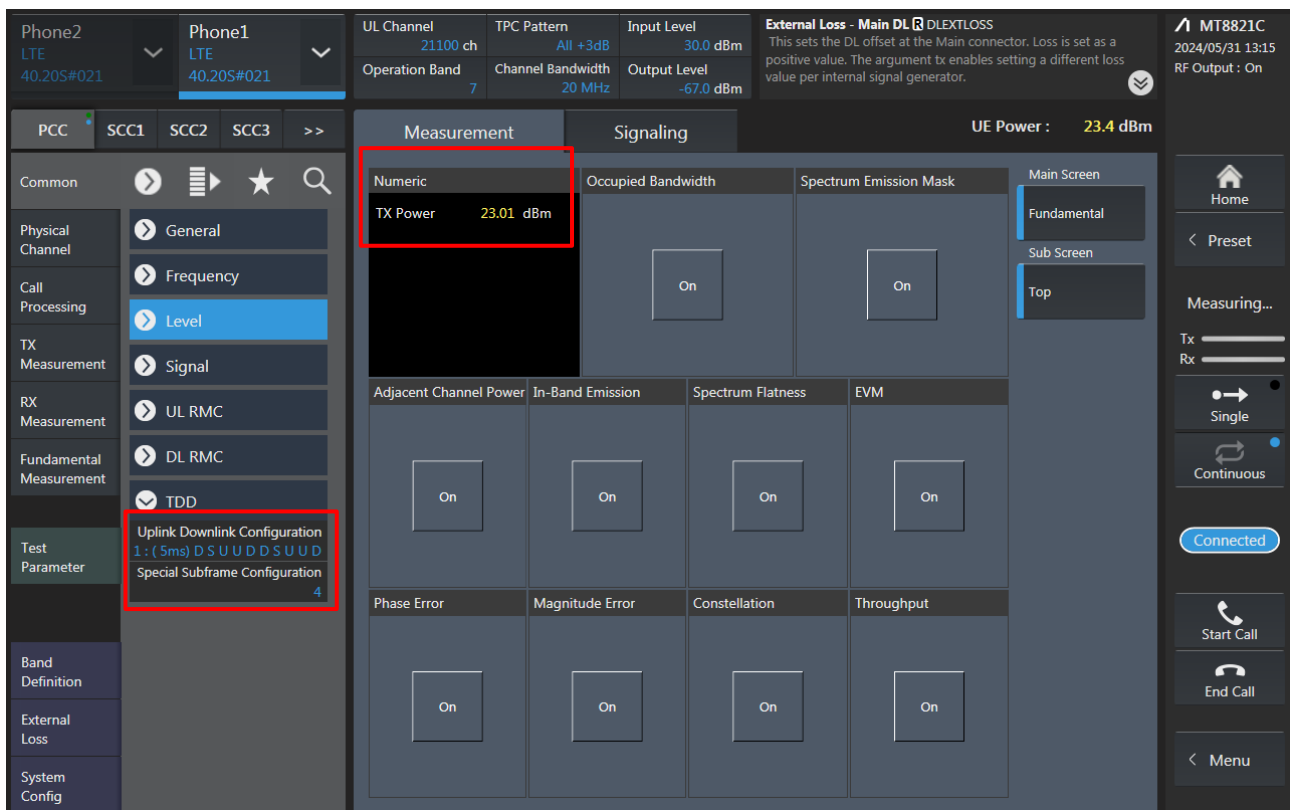
<WCDMA>



The WCDMA measurement interface displays various parameters and settings. Key elements include:

- Phone Information:** Phone2 (LTE, 40.20S#032) and Phone1 (W-CDMA, 40.00 #013).
- Measurement Section:**
 - 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
- Measurement Results:**
 - Power Measurement:** TX Power 23.28 dBm
 - Frequency Error:** Carrier Frequency Error -0.0002 kHz, Freq. Err 0.00 ppm
 - Occupied Bandwidth:** OBW 4.163 MHz
 - Spectrum Emission Mask:** SEM Pass
 - Adjacent Channel Power:** ACLR(-5MHz) -40.24 dB, ACLR(+5MHz) -42.79 dB
 - Modulation Analysis:** EVM 5.15 %(rms)
 - Peak Code Domain Error:** PCDE -39.86 dB
- Settings:**
 - Authentication / Integrity:** Integrity Protection On
 - Call Processing:** SIM Model Number P0035
 - TX Measurement:** Authentication Algorithm XOR
 - RX Measurement:** Authentication Key Ki 00112233 44556677 8899AABB CCDDDEFF
 - Fundamental Measurement:** AMF 0000 H, Opc 00000000 00000000 00000000 00000000
 - Connection Setting:** Measurement Report
 - Meas Setup:** Inner Loop Power Control, Power Control Algorithm Algorithm 1, TPC StepSize 1
 - External Loss:** Power Control All 1
 - System Config:** User Command 10101 01010 10101 01010 10101 01010
- UE Power:** 22.6 dBm
- MT8821C:** 2024/05/24 12:58, RF Output: On

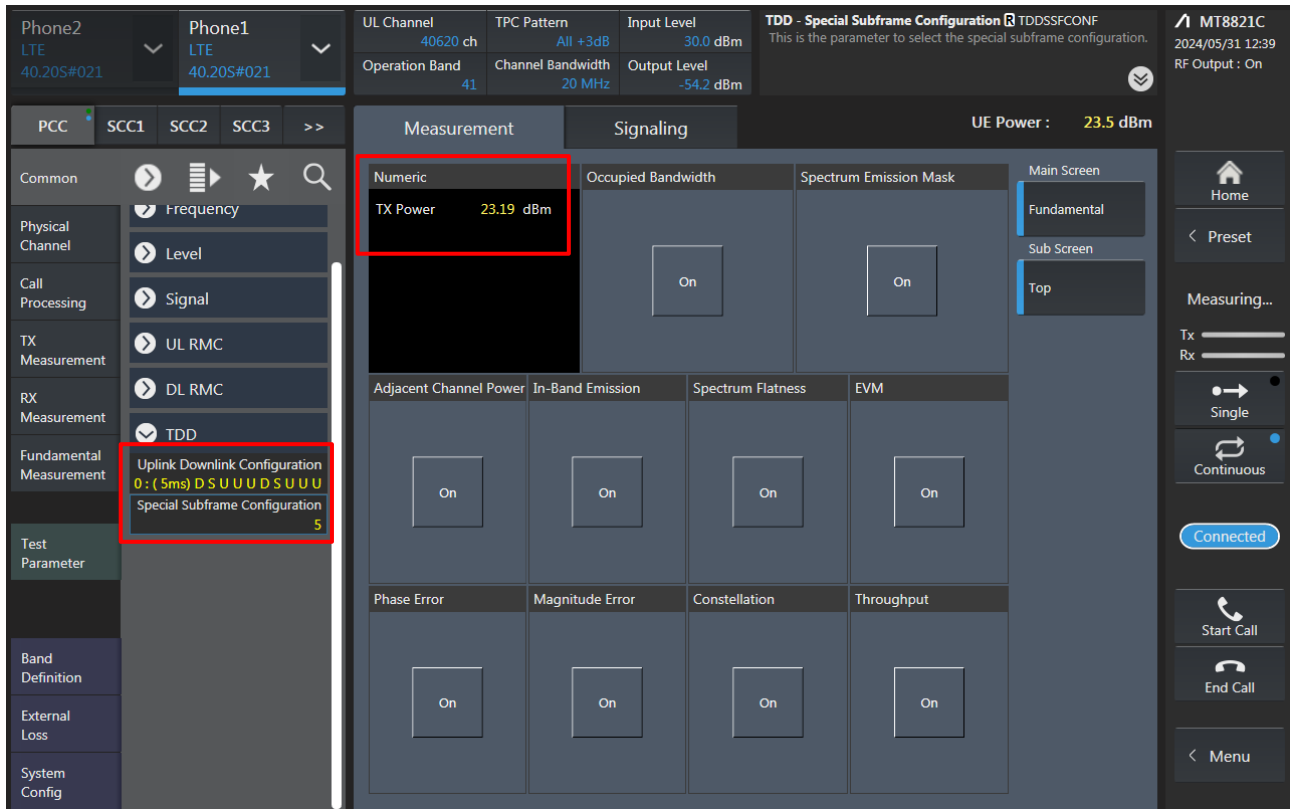
<LTE>



The LTE measurement interface displays various parameters and settings. Key elements include:

- Phone Information:** Phone2 (LTE, 40.20S#021) and Phone1 (LTE, 40.20S#021).
- Measurement Section:**
 - 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
- Measurement Results:**
 - Power Measurement:** 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
- Settings:**
 - General:** Frequency, Level, Signal
 - UL RMC:** On
 - DL RMC:** On
 - TDD:** On
 - Uplink Downlink Configuration:** 1: (5ms) D S U U D D S U U D
 - Special Subframe Configuration:** 4
- UE Power:** 23.4 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

<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 Signaling

Numeric Occupied Bandwidth Spectrum Emission Mask

TX Power 23.19 dBm

On On

Adjacent Channel Power In-Band Emission Spectrum Flatness EVM

On On On On

Phase Error Magnitude Error Constellation Throughput

On On On On

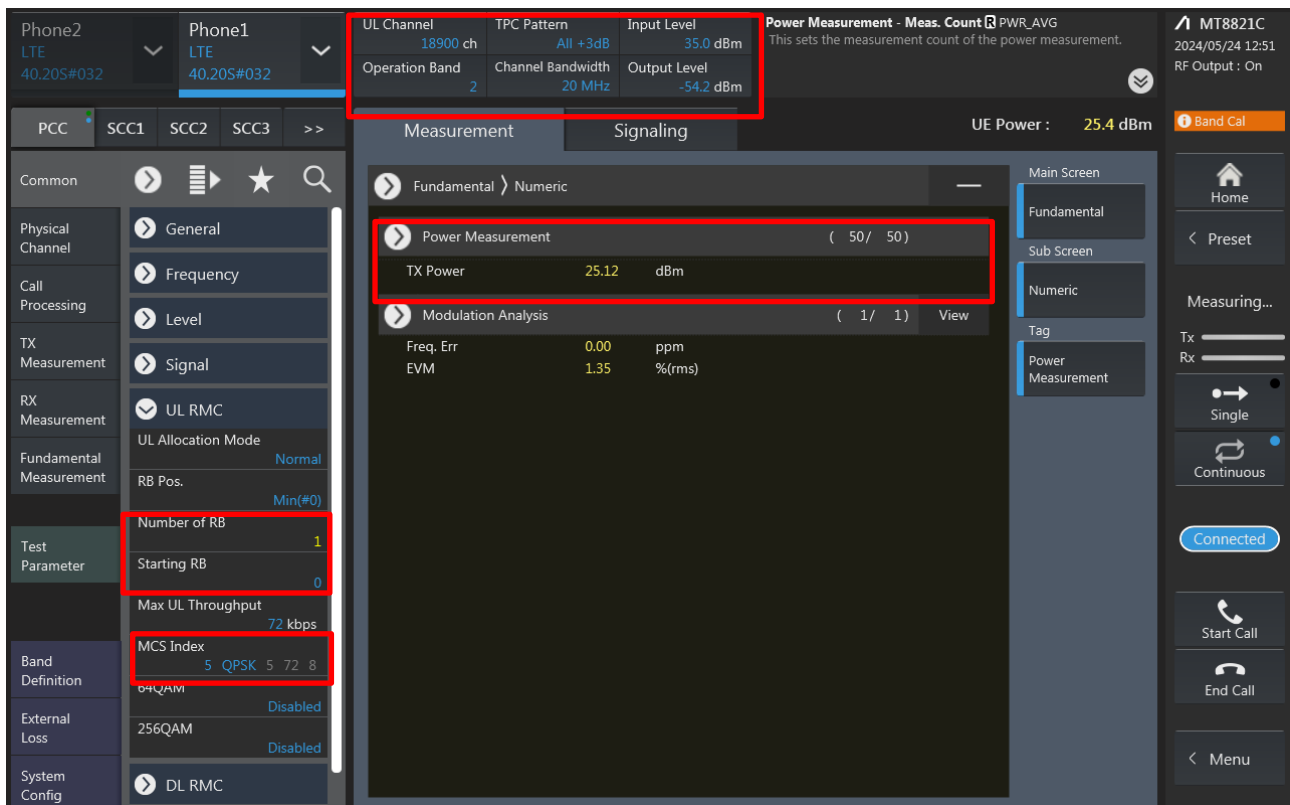
Common Frequency Level Signal UL RMC DL RMC TDD

Uplink Downlink Configuration 0: (5ms) D S U U U D S U U U

Special Subframe Configuration 5

Physical Channel Call Processing TX Measurement RX Measurement Fundamental Measurement Test Parameter Band Definition External Loss System Config

Home Preset Measuring... Tx Rx Single Continuous Connected Start Call End Call Menu



Phone2 LTE 40.20S#032 Phone1 LTE 40.20S#032

UL Channel 18900 ch TPC Pattern All +3dB Input Level 35.0 dBm

Operation Band 2 Channel Bandwidth 20 MHz Output Level -54.2 dBm

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

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

UE Power : 25.4 dBm

Measurement Signaling

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)

Number of RB 1

Starting RB 0

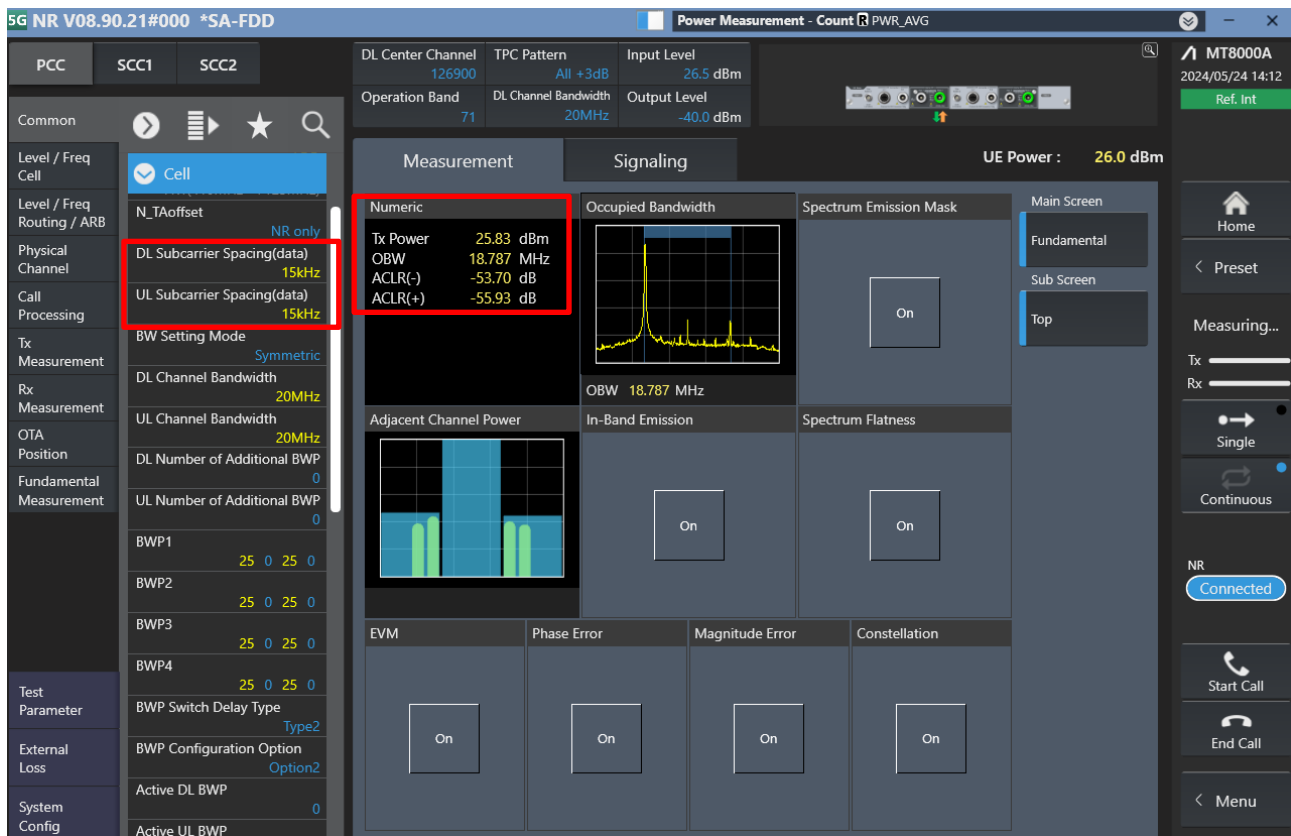
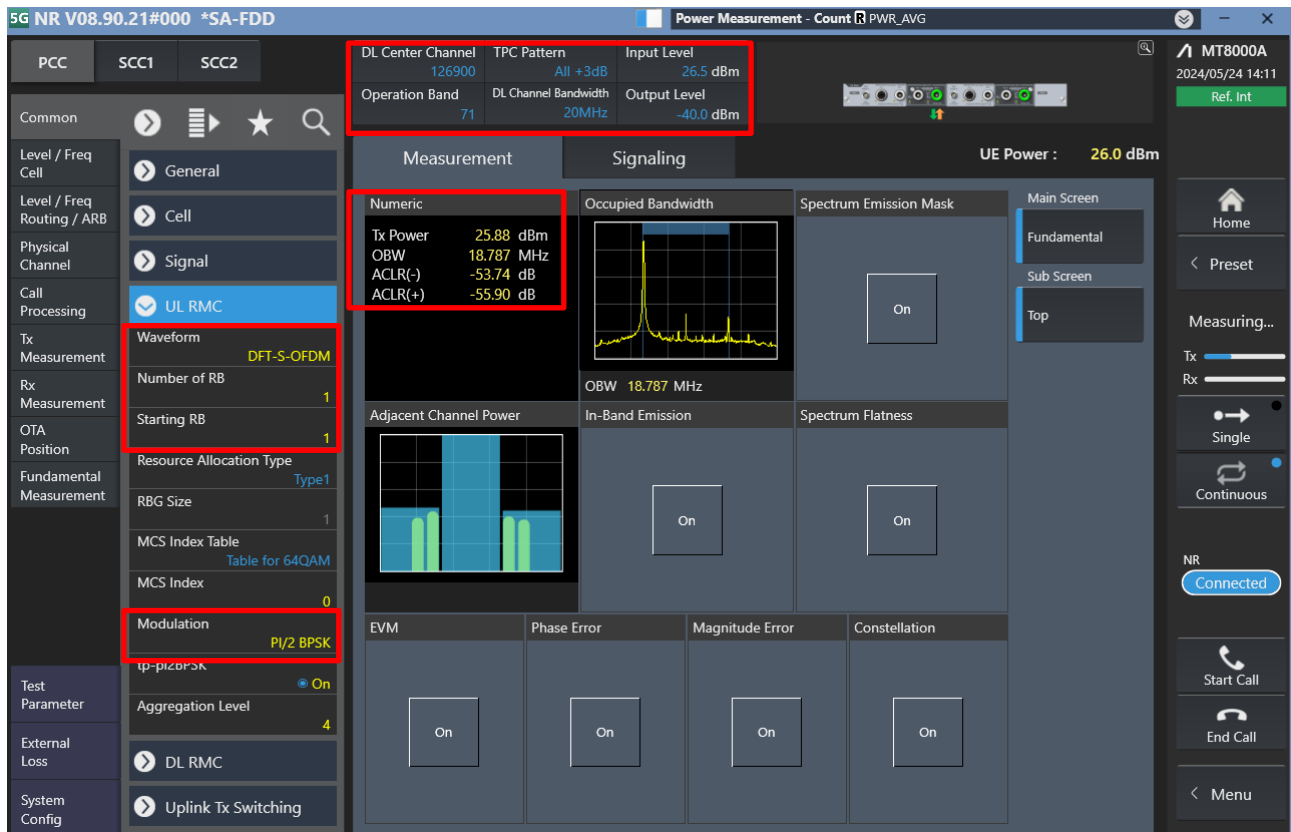
Max UL Throughput 72 kbps

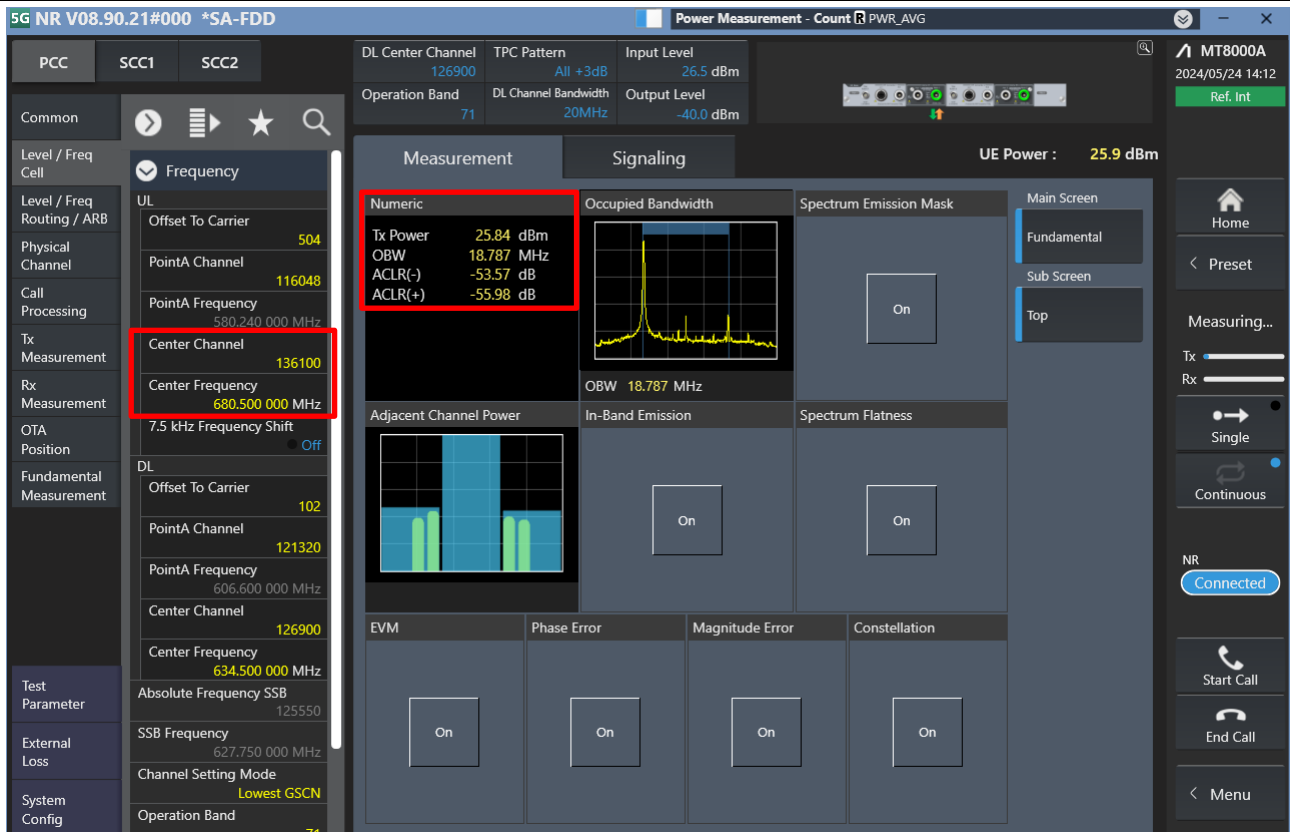
MCS Index 5 QPSK 5 72 8

Physical Channel Call Processing TX Measurement RX Measurement Fundamental Measurement Test Parameter Band Definition External Loss System Config

Home Preset Measuring... Tx Rx Single Continuous Connected Start Call End Call Menu

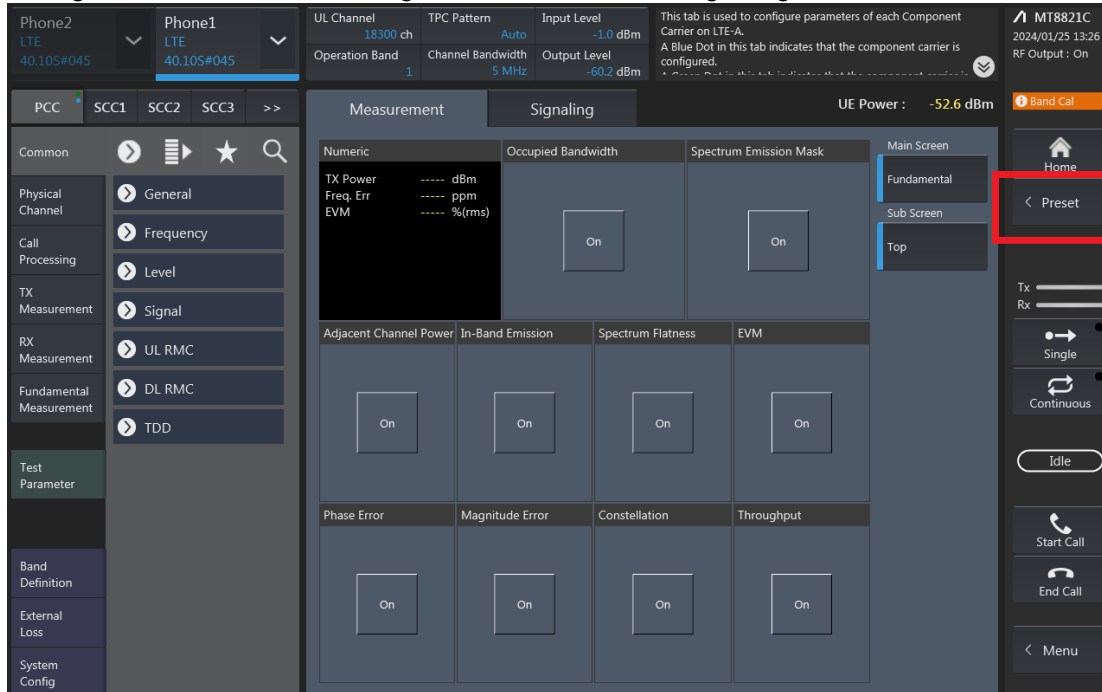
<5G NR FR1>





LTE Uplink and Downlink Carrier Aggregation configurations:

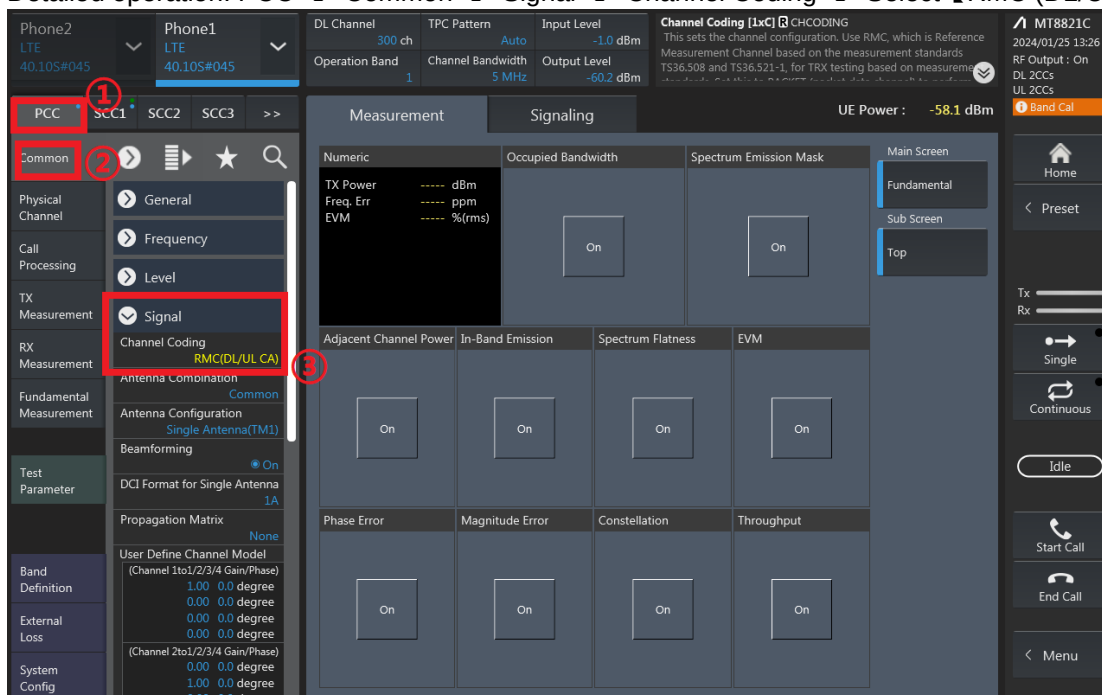
1. Change the Scenario in the Configuration of Phone1 LTE Signaling and Preset.



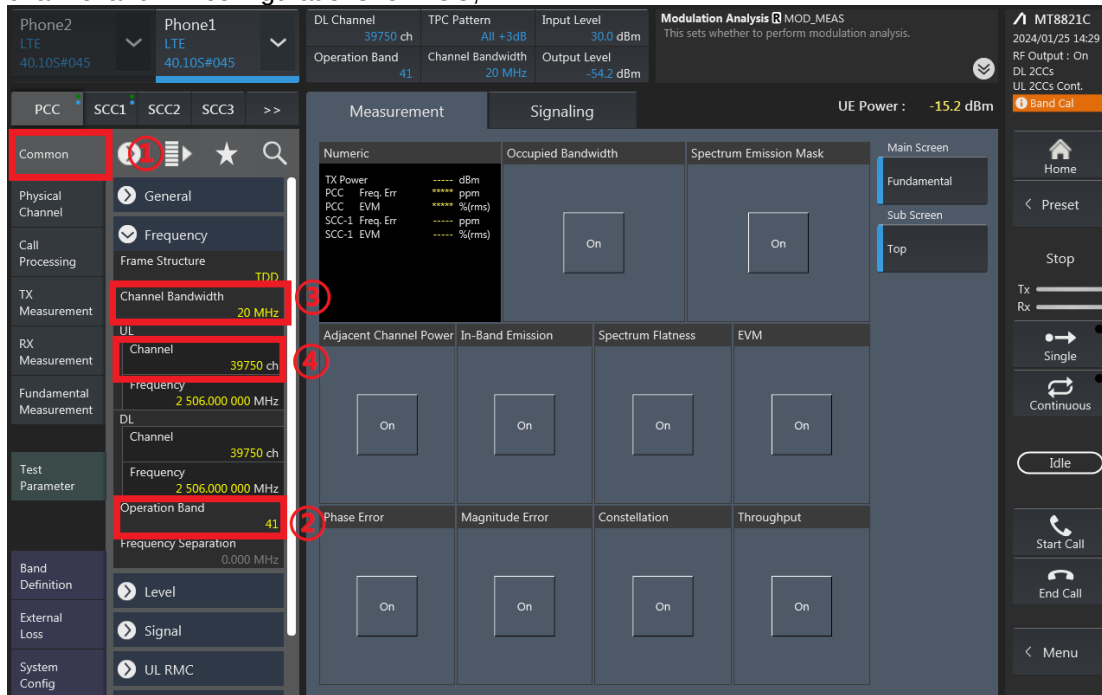
2. If Select "RMC (DL/UL CA)" for Uplink Carrier Aggregation;
If Select "RMC (DL CA)" for Downlink Carrier Aggregation.

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 PCC EVM ppm SCC-1 Freq. Err. ppm SCC-1 EVM ppm

Occupied Bandwidth

Spectrum Emission Mask

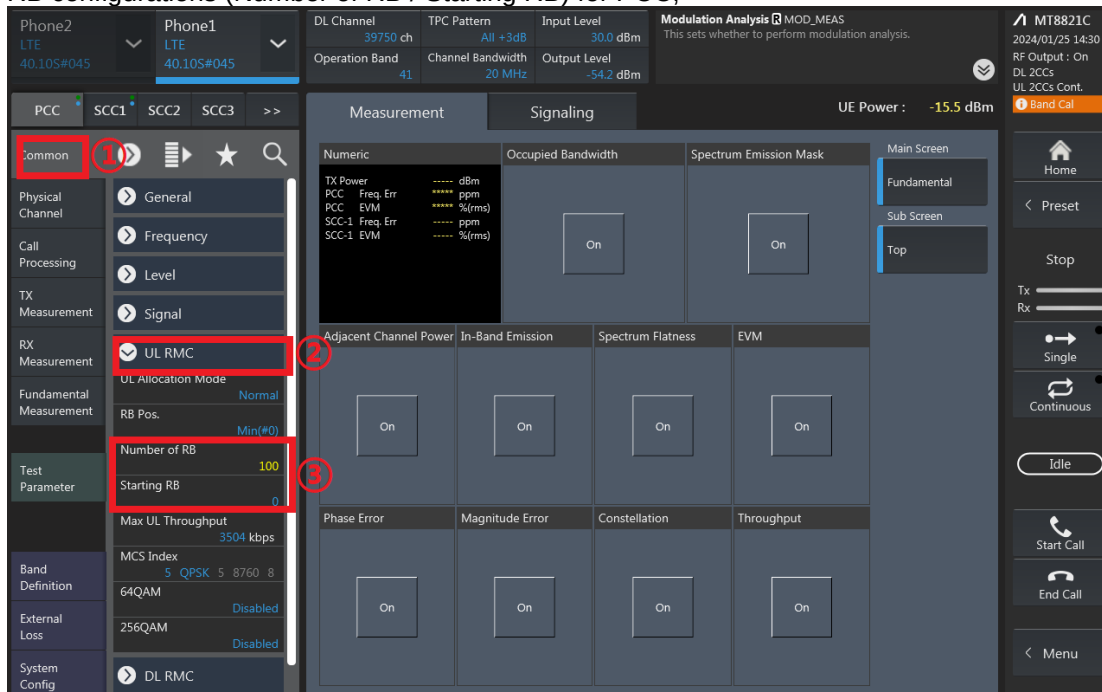
Main Screen Fundamental Sub Screen Top

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

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 Level

TX Measurement Signal

RX Measurement UL RMC

Fundamental Measurement UL Allocation Mode Normal RB Pos. Min(#0)

Test Parameter Number of RB 100 Starting RB 0 Max UL Throughput 3504 kbps

Band Definition MCS Index 5 QPSK 5 8760 8 64QAM

External Loss 256QAM Disabled

System Config DL RMC

Numeric

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

Occupied Bandwidth

Spectrum Emission Mask

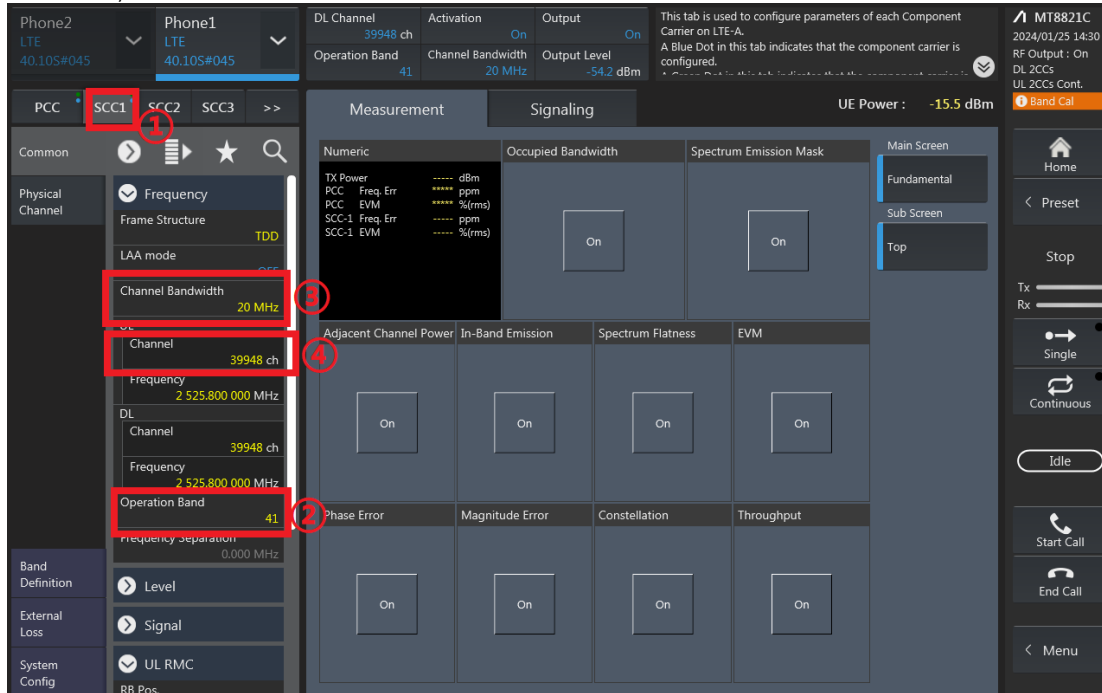
Main Screen Fundamental Sub Screen Top

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

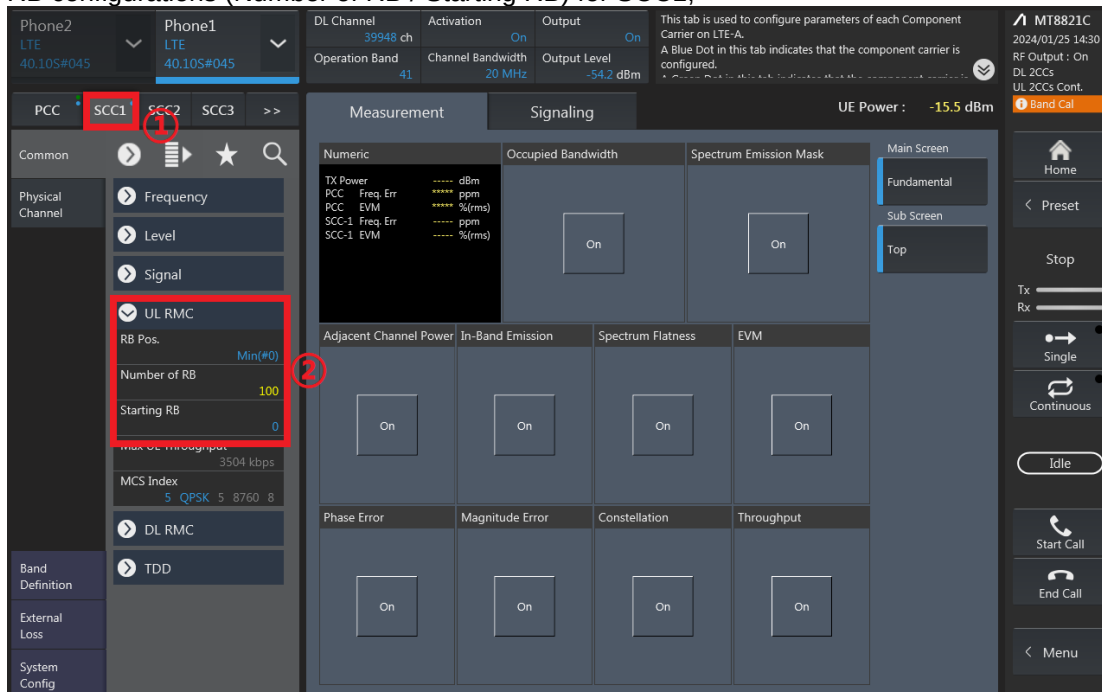
Adjacent Channel Power In-Band Emission Spectrum Flatness EVM

Phase Error Magnitude Error Constellation Throughput

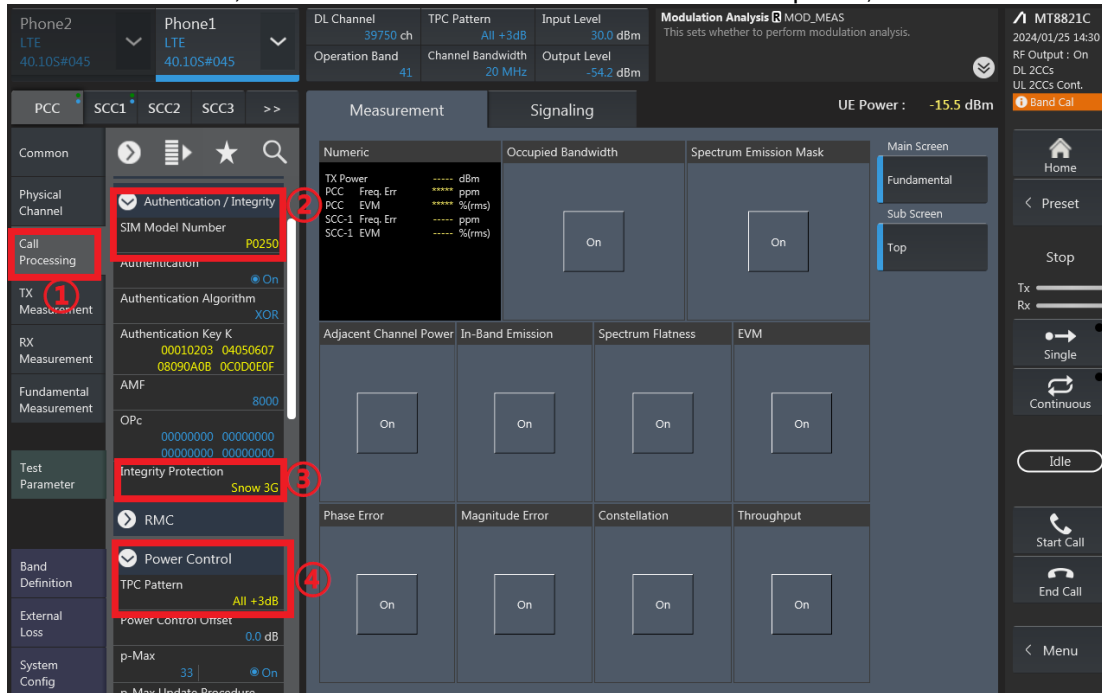
4. SCC parameter Settings: Select the SCC1 tab, Set operating band, BW, channel, and RB configurations for SCC1;



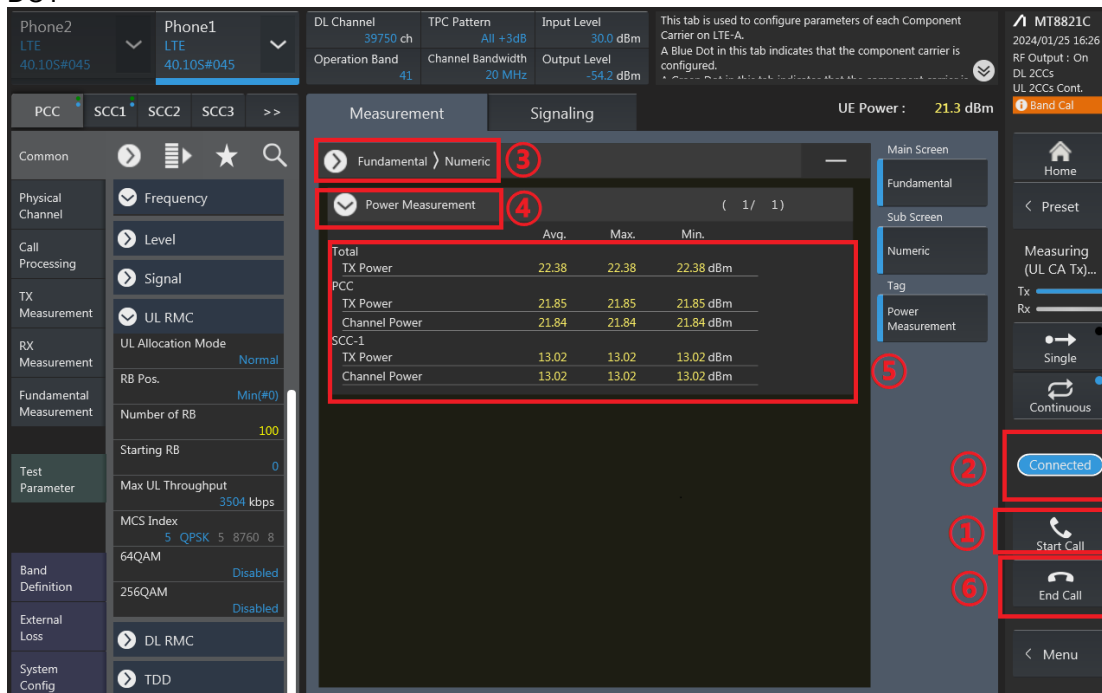
RB configurations (Number of RB / Starting RB) for SCC1;



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_2C_Ant 0_DSI 4】

CA_2C								
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		
18700	18898	QPSK	1	99	1	0	22.89	24.00
18900	19098	QPSK	1	99	1	0	22.81	24.00
19100	18902	QPSK	1	0	1	99	22.65	24.00

【CA_2C_Ant 0_DSI 2】

CA_2C								
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		
18700	18898	QPSK	1	0	0	0	22.89	24.00
18900	19098	QPSK	1	0	0	0	22.81	24.00
19100	18902	QPSK	1	0	0	0	22.65	24.00

【CA_2C_Ant 0_DSI 7】

CA_2C								
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		
18700	18898	QPSK	1	0	0	0	16.67	18.00
18900	19098	QPSK	1	0	0	0	16.61	18.00
19100	18902	QPSK	1	0	0	0	16.34	18.00

【CA_2C_Ant 0_DSI 3】

CA_2C								
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		
18700	18898	QPSK	1	0	0	0	19.08	20.50
18900	19098	QPSK	1	0	0	0	19.00	20.50
19100	18902	QPSK	1	0	0	0	18.86	20.50

【CA_2C_Ant 0_DSI 6】

CA_2C								
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		
18700	18898	QPSK	1	0	0	0	20.48	22.00
18900	19098	QPSK	1	0	0	0	20.36	22.00
19100	18902	QPSK	1	0	0	0	20.17	22.00

【CA_66C_Ant 0_DSI 4】

CA_66C								
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		
132072	132270	QPSK	1	0	0	0	23.07	24.00
132322	132124	QPSK	1	0	0	0	23.10	24.00
132572	132374	QPSK	1	0	0	0	23.01	24.00

【CA_66C_Ant 0_DSI 2】

CA_66C								
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		
132072	132270	QPSK	1	0	0	0	23.07	24.00
132322	132124	QPSK	1	0	0	0	23.10	24.00
132572	132374	QPSK	1	0	0	0	23.01	24.00

【CA_66C_Ant 0_DSI 7】

CA_66C								
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		
132072	132270	QPSK	1	0	0	0	17.84	18.50
132322	132124	QPSK	1	0	0	0	17.88	18.50
132572	132374	QPSK	1	0	0	0	17.75	18.50

【CA_66C_Ant 0_DSI 3】

CA_66C								
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		
132072	132270	QPSK	1	0	0	0	20.03	21.00
132322	132124	QPSK	1	0	0	0	20.06	21.00
132572	132374	QPSK	1	0	0	0	19.96	21.00

【CA_66C_Ant 0_DSI 6】

CA_66C								
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		
132072	132270	QPSK	1	0	0	0	21.29	22.00
132322	132124	QPSK	1	0	0	0	21.44	22.00
132572	132374	QPSK	1	0	0	0	21.43	22.00

【CA_7C_Ant 1_DSI 4】

CA_7C								
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		
20850	21048	QPSK	1	0	0	0	22.70	24.00
21100	21298	QPSK	1	0	0	0	22.72	24.00
21350	21152	QPSK	1	0	0	0	22.85	24.00

【CA_7C_Ant 1_DSI 2】

CA_7C								
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		
20850	21048	QPSK	1	0	0	0	22.70	24.00
21100	21298	QPSK	1	0	0	0	22.72	24.00
21350	21152	QPSK	1	0	0	0	22.85	24.00

【CA_7C_Ant 1_DSI 7】

CA_7C								
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		



20850	21048	QPSK	1	0	0	0	18.51	20.00
21100	21298	QPSK	1	0	0	0	18.53	20.00
21350	21152	QPSK	1	0	0	0	18.75	20.00

【CA_7C_Ant 1_DSI 3】

CA_7C								
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		
20850	21048	QPSK	1	0	0	0	18.51	20.00
21100	21298	QPSK	1	0	0	0	18.53	20.00
21350	21152	QPSK	1	0	0	0	18.75	20.00

【CA_7C_Ant 1_DSI 6】

CA_7C								
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		
20850	21048	QPSK	1	0	0	0	20.88	22.50
21100	21298	QPSK	1	0	0	0	21.03	22.50
21350	21152	QPSK	1	0	0	0	21.21	22.50

【CA_66C_Ant 4_DSI 4】

CA_66C								
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		
132072	132270	QPSK	1	0	0	0	22.18	24.00
132322	132124	QPSK	1	0	0	0	22.32	24.00
132572	132374	QPSK	1	0	0	0	22.25	24.00

【CA_66C_Ant 4_DSI 2】

CA_66C								
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		
132072	132270	QPSK	1	0	0	0	13.86	15.50
132322	132124	QPSK	1	0	0	0	13.92	15.50
132572	132374	QPSK	1	0	0	0	13.89	15.50

【CA_66C_Ant 4_DSI 7】

CA_66C								
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		
132072	132270	QPSK	1	0	0	0	12.36	14.00
132322	132124	QPSK	1	0	0	0	12.42	14.00
132572	132374	QPSK	1	0	0	0	12.39	14.00

【CA_66C_Ant 4_DSI 3】

CA_66C								
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		
132072	132270	QPSK	1	0	0	0	14.69	16.50
132322	132124	QPSK	1	0	0	0	14.73	16.50
132572	132374	QPSK	1	0	0	0	14.70	16.50

【CA_66C_Ant 4_DSI 6】

CA_66C								
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		
132072	132270	QPSK	1	0	0	0	17.61	19.50
132322	132124	QPSK	1	0	0	0	17.75	19.50
132572	132374	QPSK	1	0	0	0	17.71	19.50

【CA_42C_Ant 5_DSI 4】

CA_42C								
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		
42190	42388	QPSK	1	99	1	0	22.56	24.00
42590	42788	QPSK	1	99	1	0	22.63	24.00
42990	42792	QPSK	1	0	1	99	22.66	24.00

【CA_42C_Ant 5_DSI 2】

CA_42C								
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		
42190	42388	QPSK	1	0	0	0	16.49	18.00
42590	42788	QPSK	1	0	0	0	16.48	18.00
42990	42792	QPSK	1	0	0	0	16.55	18.00

【CA_42C_Ant 5_DSI 7】

CA_42C								
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		
42190	42388	QPSK	1	0	0	0	14.54	16.00
42590	42788	QPSK	1	0	0	0	14.55	16.00
42990	42792	QPSK	1	0	0	0	14.61	16.00

【CA_42C_Ant 5_DSI 3】

CA_42C								
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		
42190	42388	QPSK	1	0	0	0	16.03	17.50
42590	42788	QPSK	1	0	0	0	16.08	17.50
42990	42792	QPSK	1	0	0	0	16.09	17.50

【CA_42C_Ant 5_DSI 6】

CA_42C								
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		
42190	42388	QPSK	1	0	0	0	22.56	24.00
42590	42788	QPSK	1	0	0	0	22.63	24.00
42990	42792	QPSK	1	0	0	0	22.66	24.00