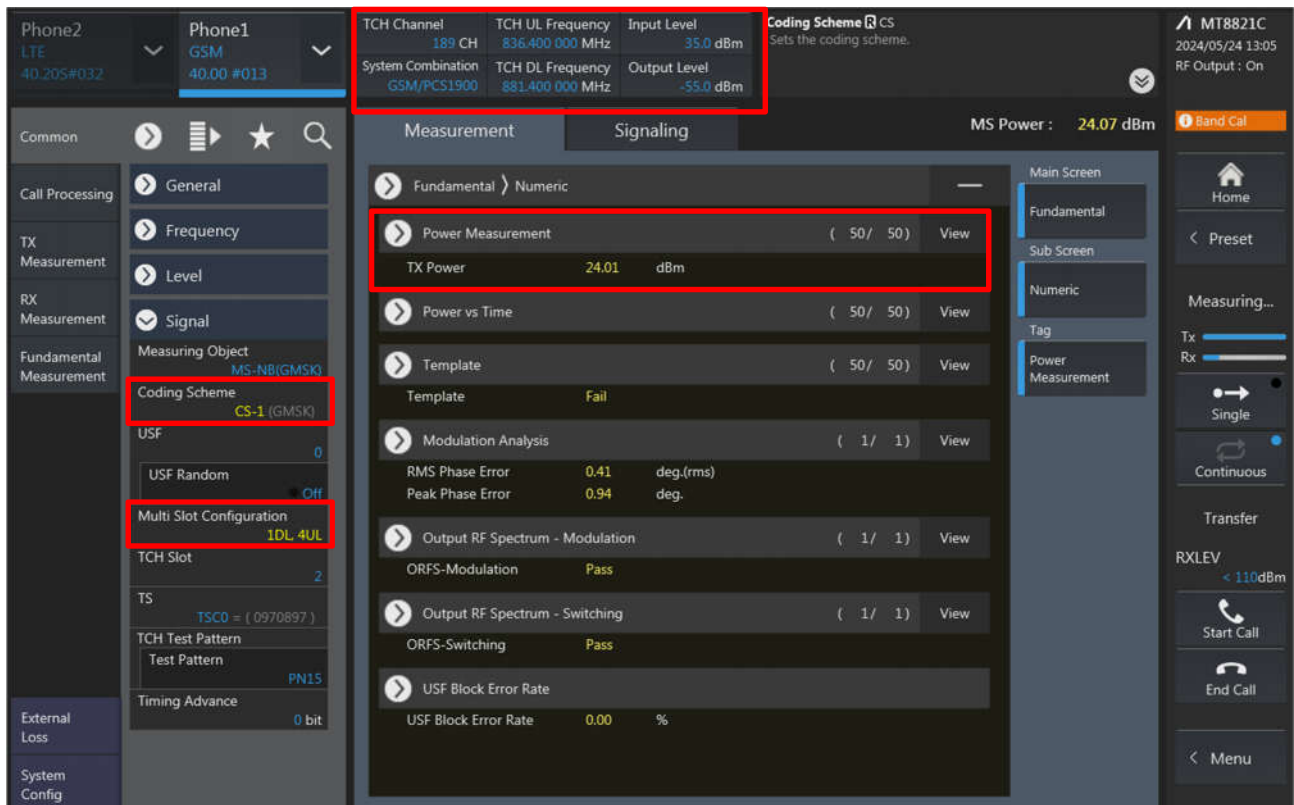


Power measurement connection diagram:

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>



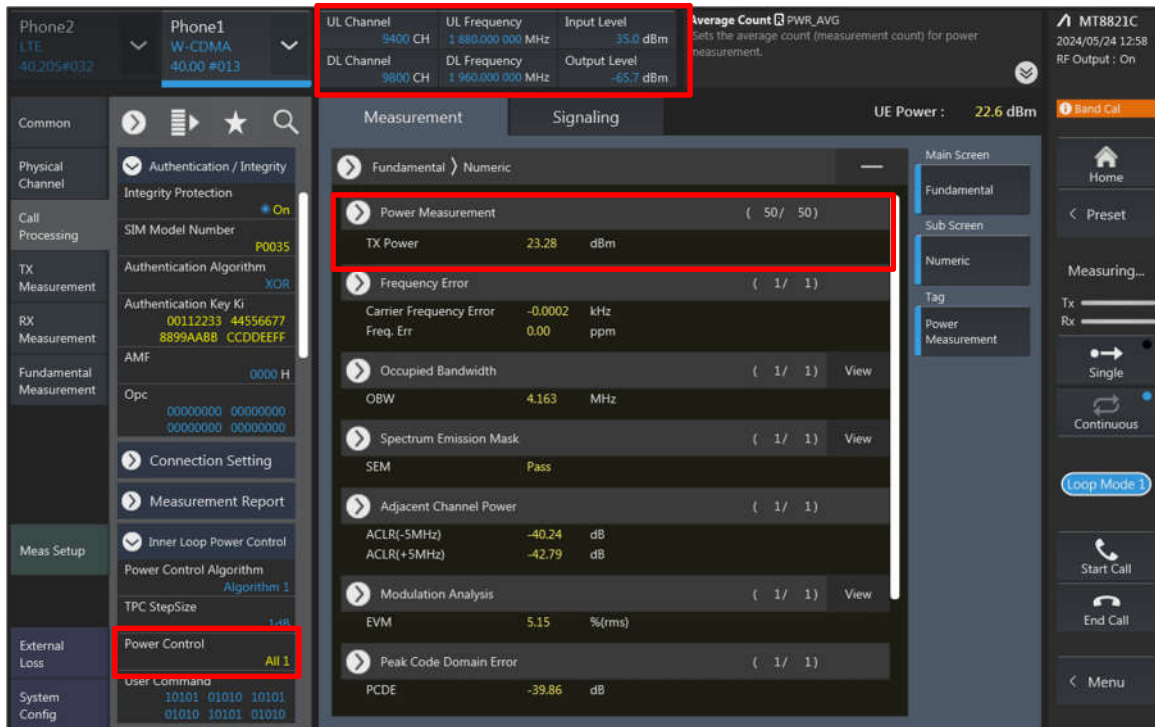
The screenshot displays the SPORTON LAB. software interface for GSM power measurement. The interface is divided into several sections:

- 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 Coding Scheme is CS. The TCH DL Frequency is 881.400 000 MHz, and Output Level is -55.0 dBm.
- Left Sidebar:** Contains navigation options like Call Processing, TX Measurement, RX Measurement, Fundamental Measurement, and External Loss.
- Main Panel:**
 - Measurement Section:** Displays TX Power as 24.01 dBm.
 - Signaling Section:** Shows various measurement results including Power vs Time, Template, Modulation Analysis, Output RF Spectrum - Modulation, Output RF Spectrum - Switching, and USF Block Error Rate.
- Right Sidebar:** Includes a 'Band Cal' button and a 'Main Screen' section with options for Fundamental, Sub Screen, Numeric, and Tag.

Key settings and results highlighted in red boxes:

- Coding Scheme:** CS (GMSK)
- Multi Slot Configuration:** 1DL, 4UL
- TX Power:** 24.01 dBm

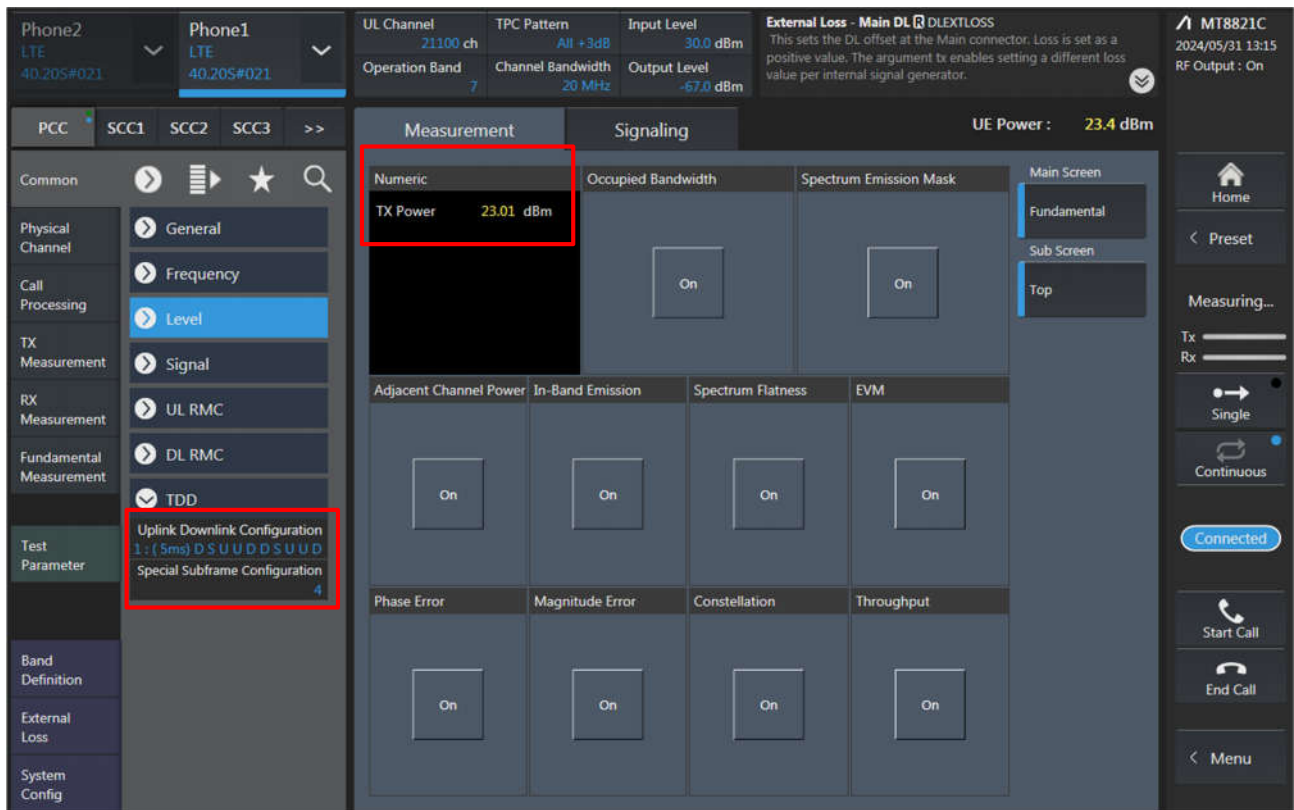
<WCDMA>



The WCDMA interface shows two phones connected. Phone1 is in W-CDMA mode. The Measurement tab is active, displaying various metrics. A red box highlights the 'Power Measurement' section, showing TX Power at 23.28 dBm. Another red box highlights the 'Power Control' section, showing 'All 1'.

Measurement	Value	Unit
TX Power	23.28	dBm
Carrier Frequency Error	-0.0002	kHz
Frequency Error	0.00	ppm
Occupied Bandwidth	4.163	MHz
Spectrum Emission Mask	Pass	
Adjacent Channel Power	-40.24	dB
Modulation Analysis	5.15	%(rms)
Peak Code Domain Error	-39.86	dB

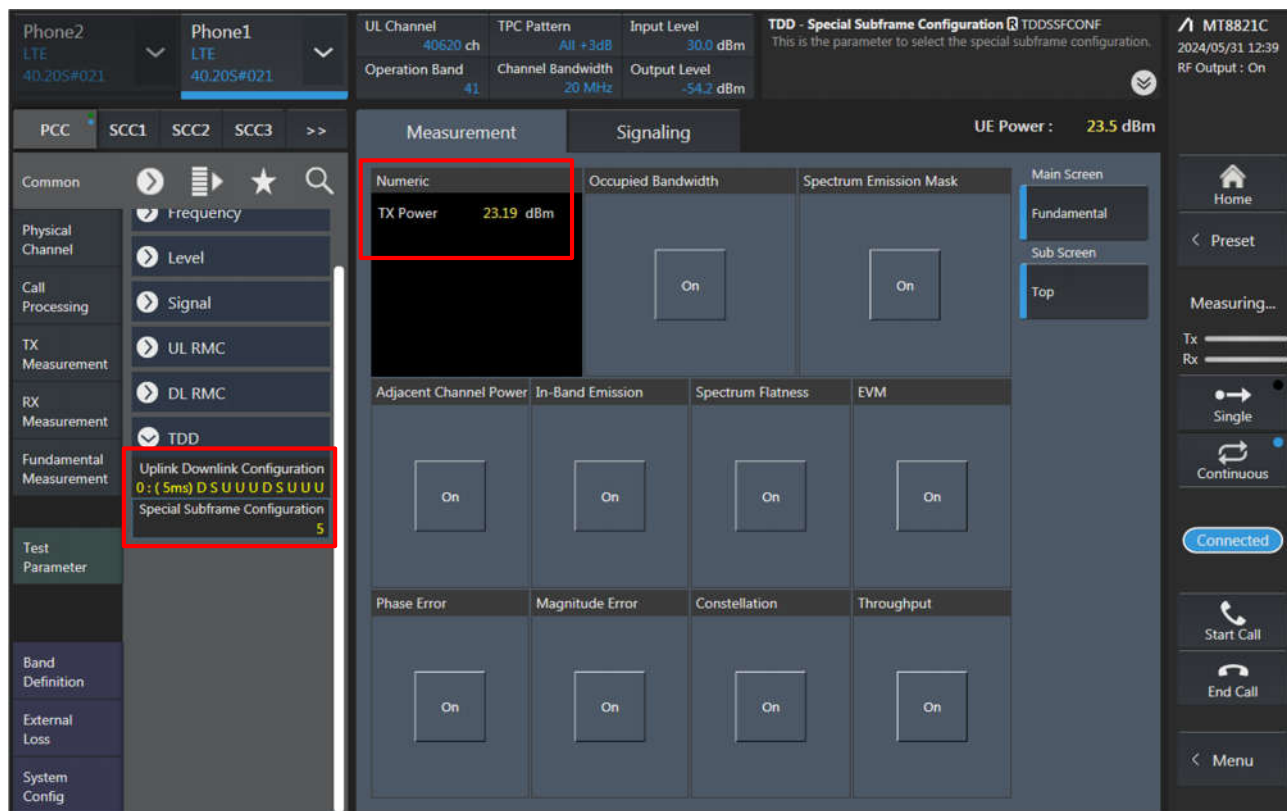
<LTE>



The LTE interface shows two phones connected. Phone1 is in LTE mode. The Measurement tab is active, displaying various metrics. A red box highlights the 'Power Measurement' section, showing TX Power at 23.01 dBm. Another red box highlights the 'Uplink Downlink Configuration' section, showing '1: (5ms) DSUUDDDSUU'.

Measurement	Value	Unit
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	

<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 TDD - Special Subframe Configuration TDDSSFCO NF This is the parameter to select the special subframe configuration. MT8821C 2024/05/31 12:39 RF Output : On

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

UE Power : 23.5 dBm

Measurement Signaling

Numeric TX Power 23.19 dBm

Occupied Bandwidth Spectrum Emission Mask

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

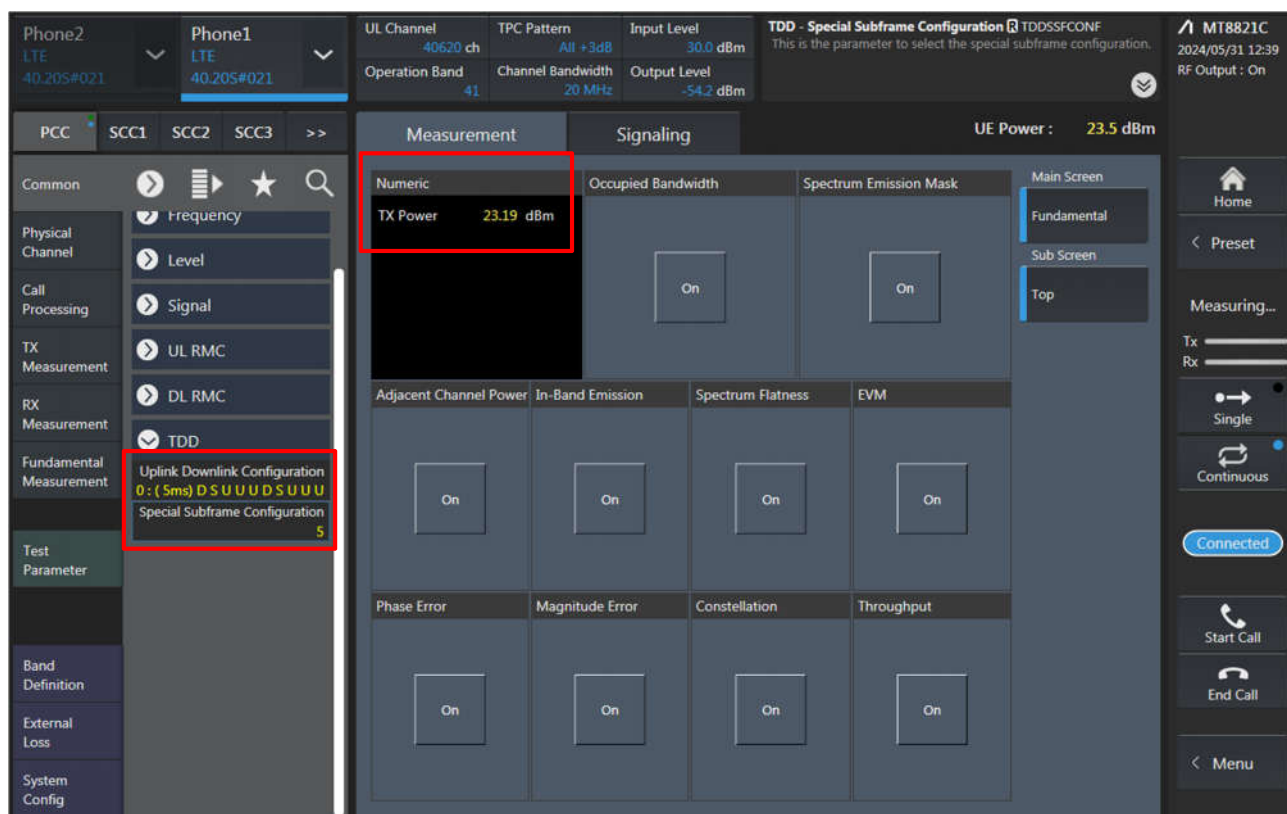
Common Frequency Level Signal UL RMC DL RMC TDD Uplink Downlink Configuration 0 : (5ms) D S U U U D S U U U Special Subframe Configuration 5

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

Main Screen Fundamental Sub Screen Top

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

<LTE TDD Power class 2>



Phone2 LTE 40.20S#021 Phone1 LTE 40.20S#021

UL Channel 40620 ch TPC Pattern All +3dB Input Level 30.0 dBm TDD - Special Subframe Configuration TDDSSFCO NF This is the parameter to select the special subframe configuration. MT8821C 2024/05/31 12:39 RF Output : On

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

UE Power : 23.5 dBm

Measurement Signaling

Numeric TX Power 23.19 dBm

Occupied Bandwidth Spectrum Emission Mask

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

Main Screen Fundamental Sub Screen Top

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

PCC SCC1 SCC2 SCC3 >>

Common > > > > >

Physical Channel > General

Call Processing > Frequency

TX Measurement > Level

RX Measurement > Signal

Fundamental Measurement > 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

Band Definition 256QAM Disabled

External Loss Disabled

System Config > DL RMC

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)

UE Power : 25.4 dBm

Band Cal

Home

Preset

Measuring...

Tx Rx

Single

Continuous

Connected

Start Call

End Call

Menu

<5GNR FR1>

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

Power Measurement - Count PWR_AVG

MT8000A 2024/05/24 14:11 Ref. Int

PCC SCC1 SCC2

Common > > > > >

Level / Freq Cell > General

Level / Freq Routing / ARB > Cell

Physical Channel > Signal

Call Processing > UL RMC

Tx Measurement > Waveform DFT-S-OFDM

Rx Measurement > Number of RB 1

OTA Position > Starting RB 1

Fundamental Measurement > Resource Allocation Type Type1

RBG Size 1

MCS Index Table Table for 64QAM

MCS Index 0

Modulation PI/2 BPSK

Aggregation Level 4

DL RMC

Uplink Tx Switching

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

Measurement Signaling

Numeric

Tx Power 25.88 dBm

OBW 18.787 MHz

ACL(-) -53.74 dB

ACL(+) -55.90 dB

Occupied Bandwidth

Spectrum Emission Mask On

Adjacent Channel Power

In-Band Emission On

Spectrum Flatness On

EVM On

Phase Error On

Magnitude Error On

Constellation On

UE Power : 26.0 dBm

Home

Preset

Measuring...

Tx Rx

Single

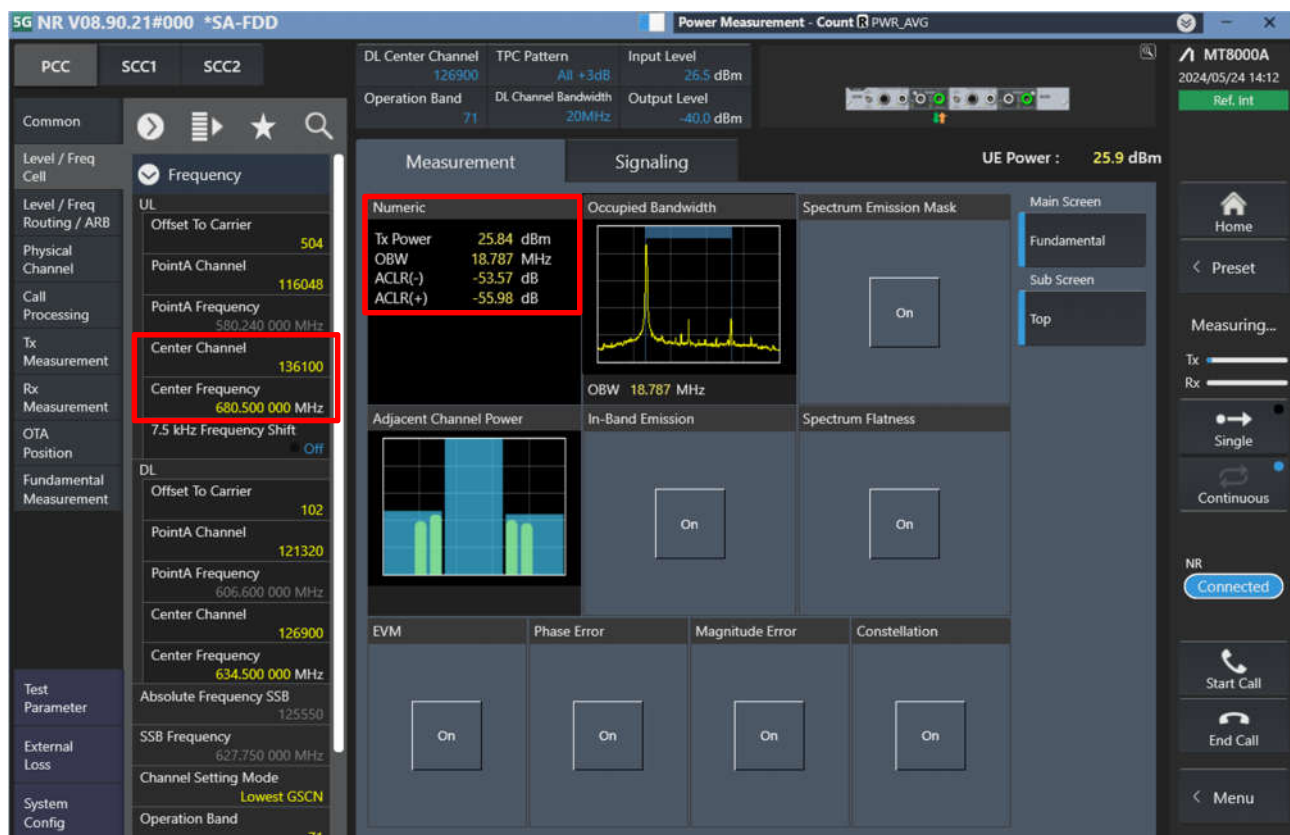
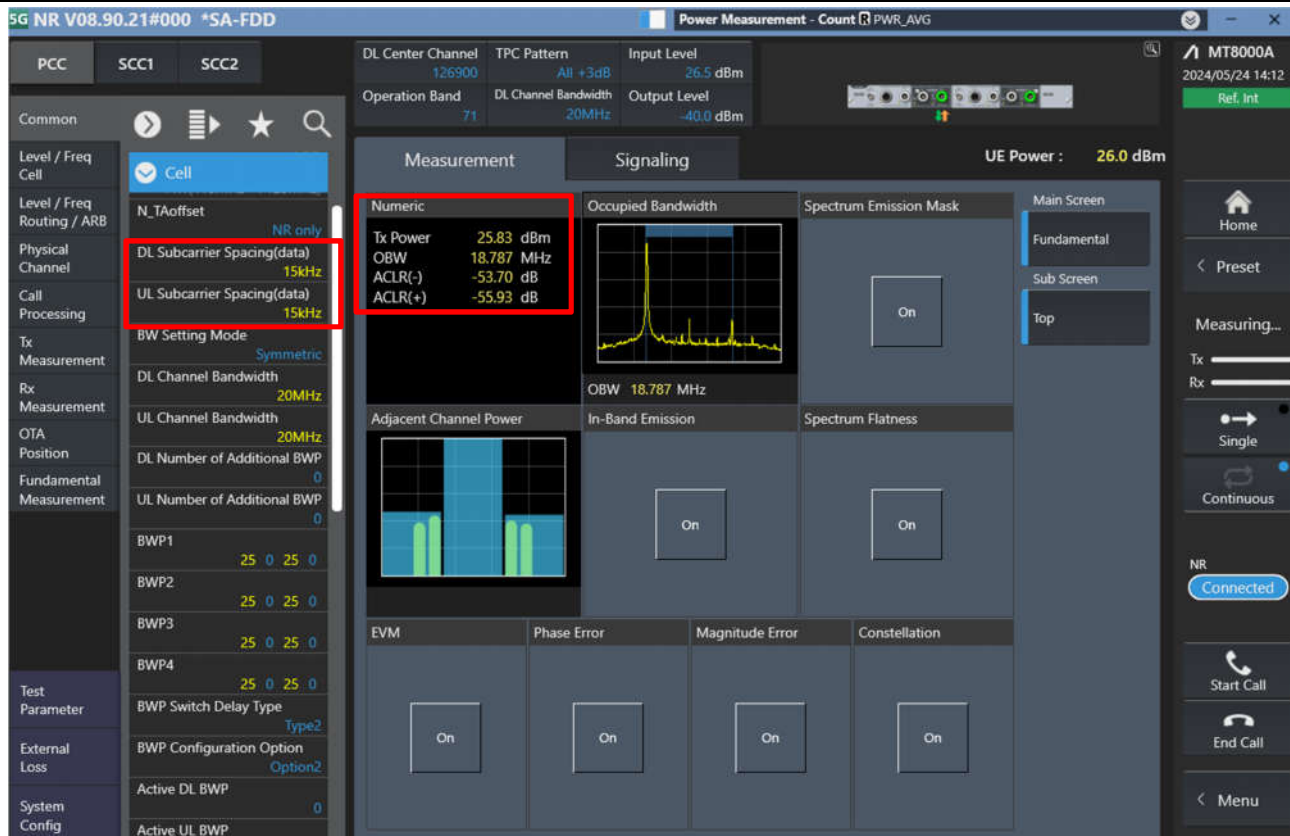
Continuous

NR Connected

Start Call

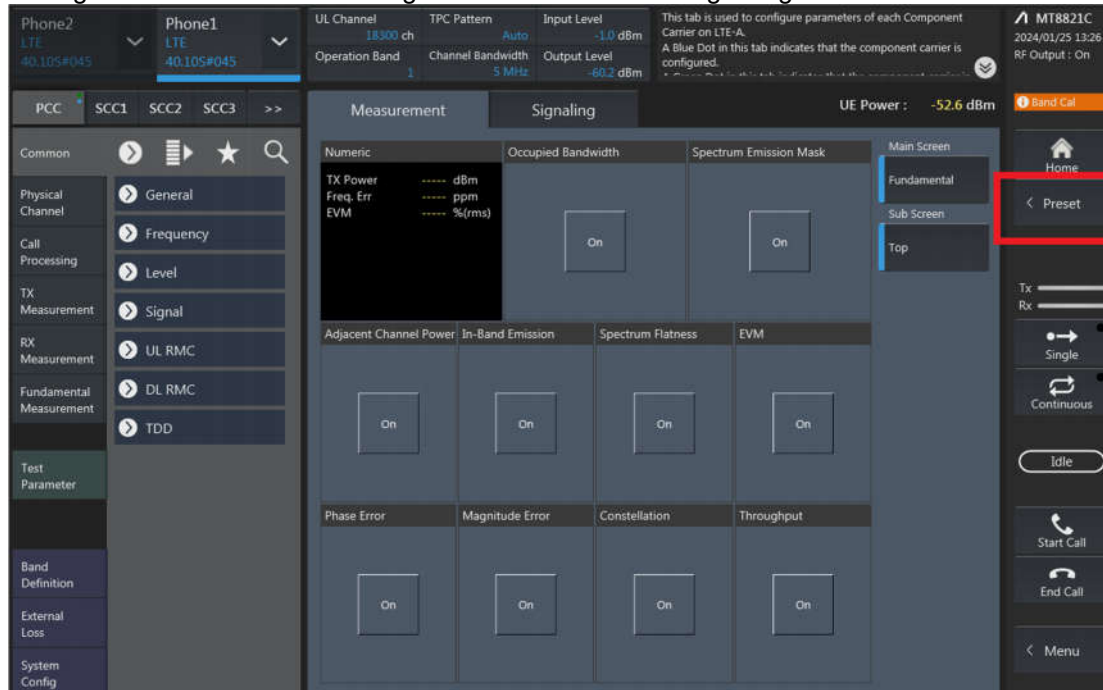
End Call

Menu



LTE Uplink and Downlink Carrier Aggregation configurations:

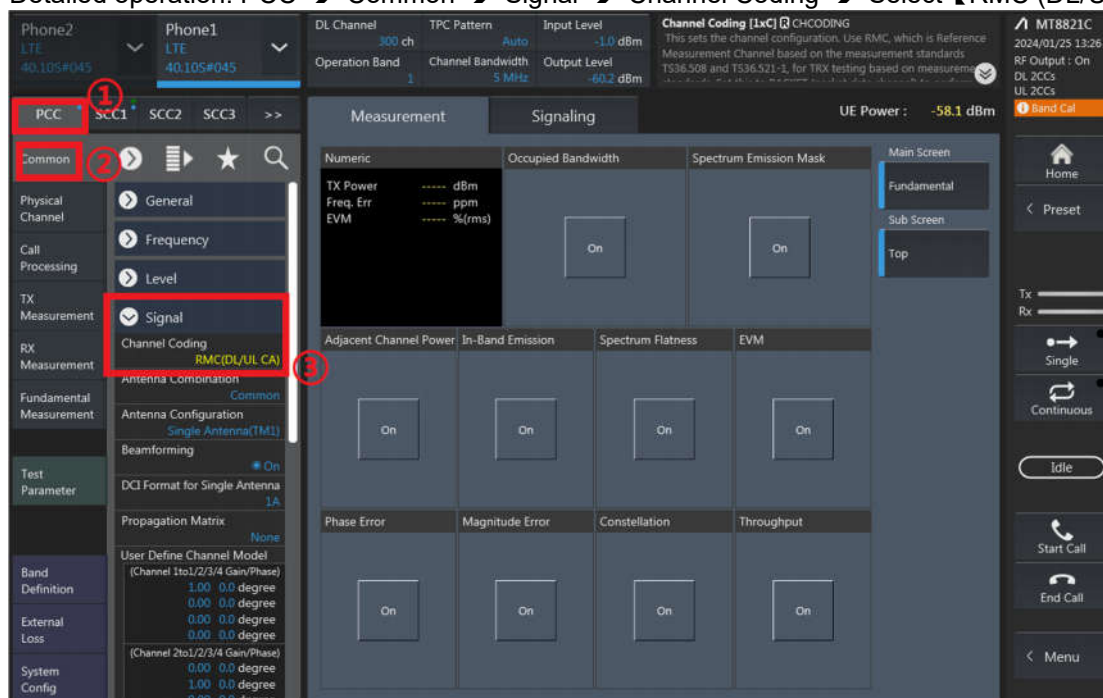
1. Change the Scenario in the Configuration of Phone1 LTE Signaling and Preset.



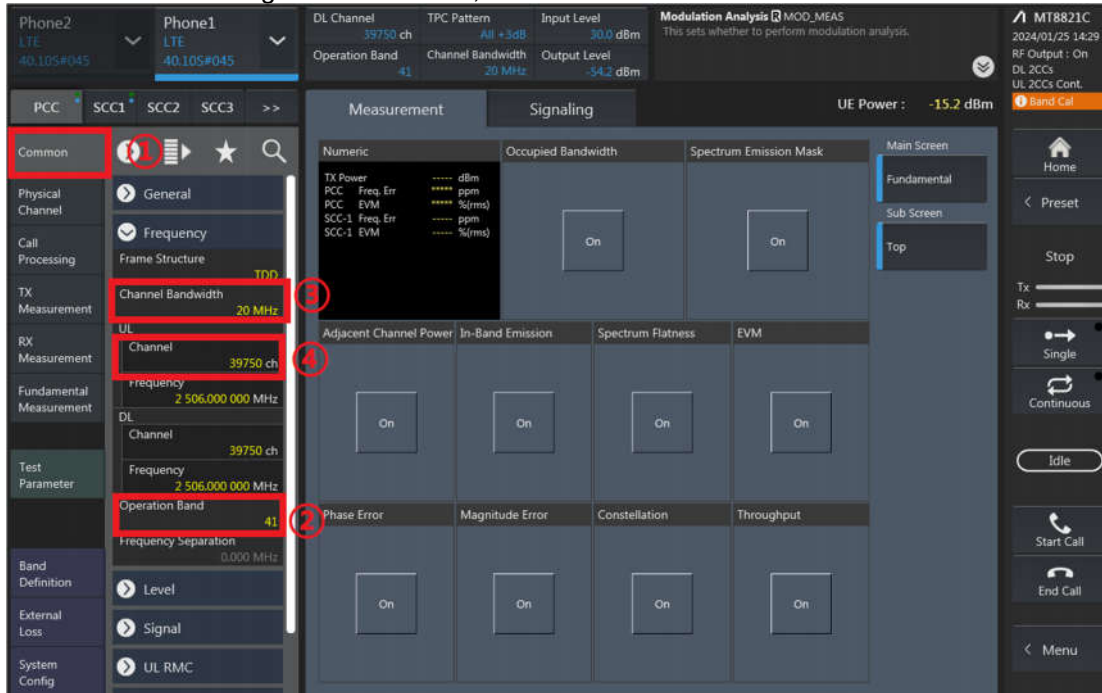
2. If Select "RMC (DL/UL CA)" for Uplink Carrier Aggregation;
If Select "RMC (DL CA)" for Downlink Carrier Aggregation.

For example, Uplink Carrier Aggregation:

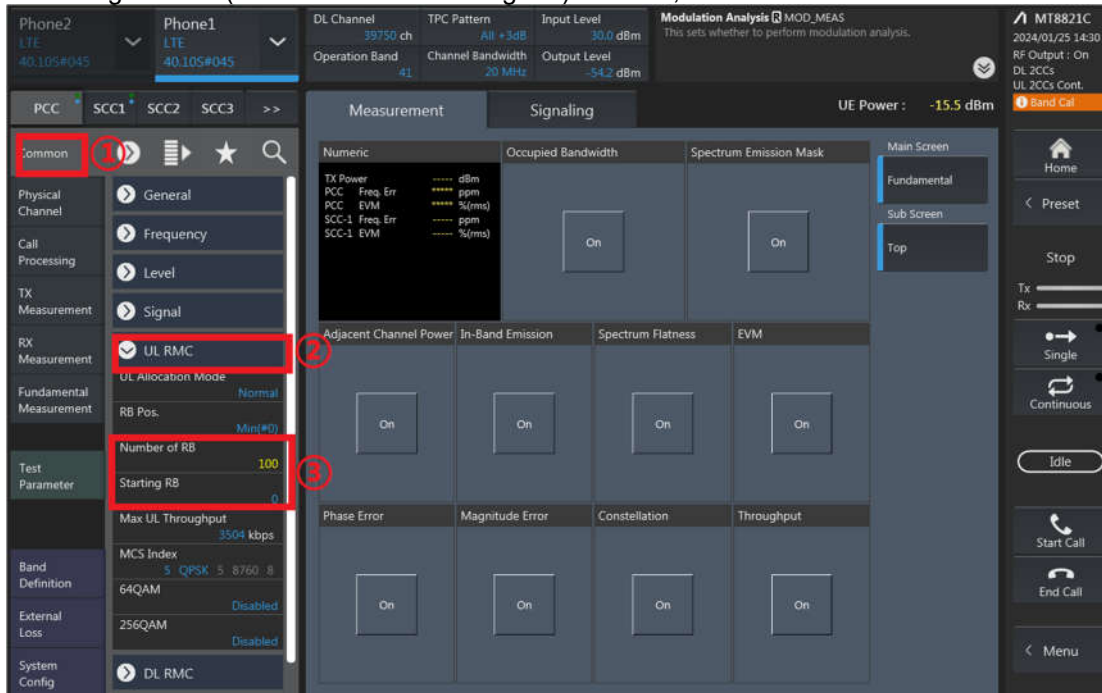
Detailed operation: PCC → Common → Signal → Channel Coding → Select 【RMC (DL/UL CA)】



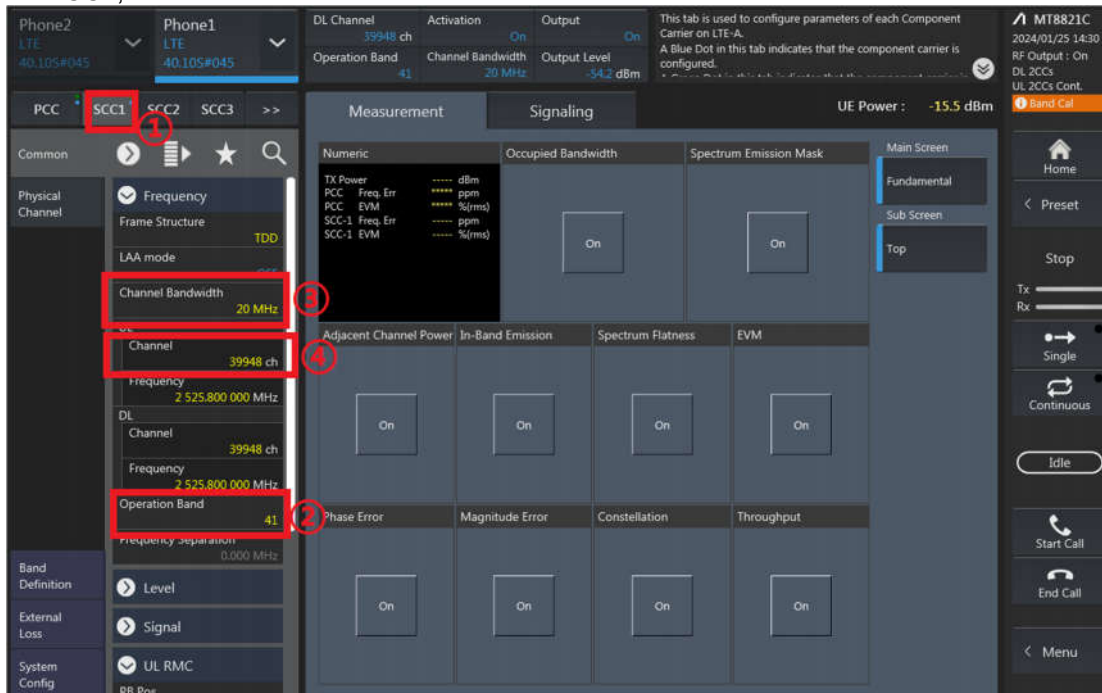
3. PCC parameter Settings: on the screen, and then select the PCC tab and Set operating band, BW, channel and RB configurations for PCC;



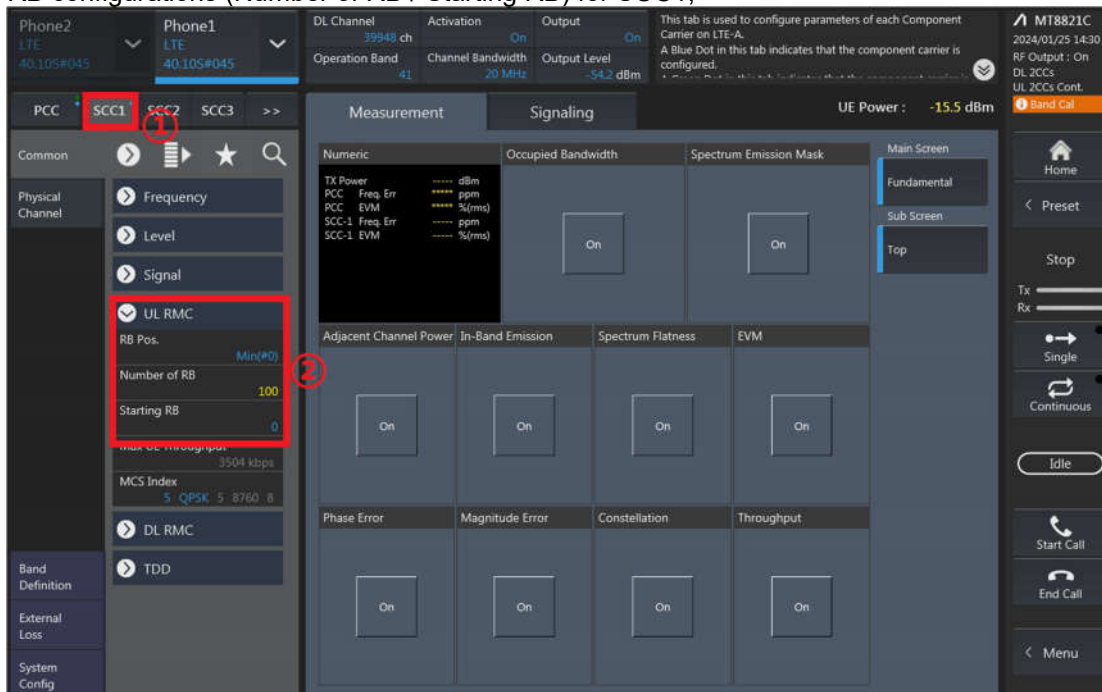
RB configurations (Number of RB / Starting RB) for PCC;



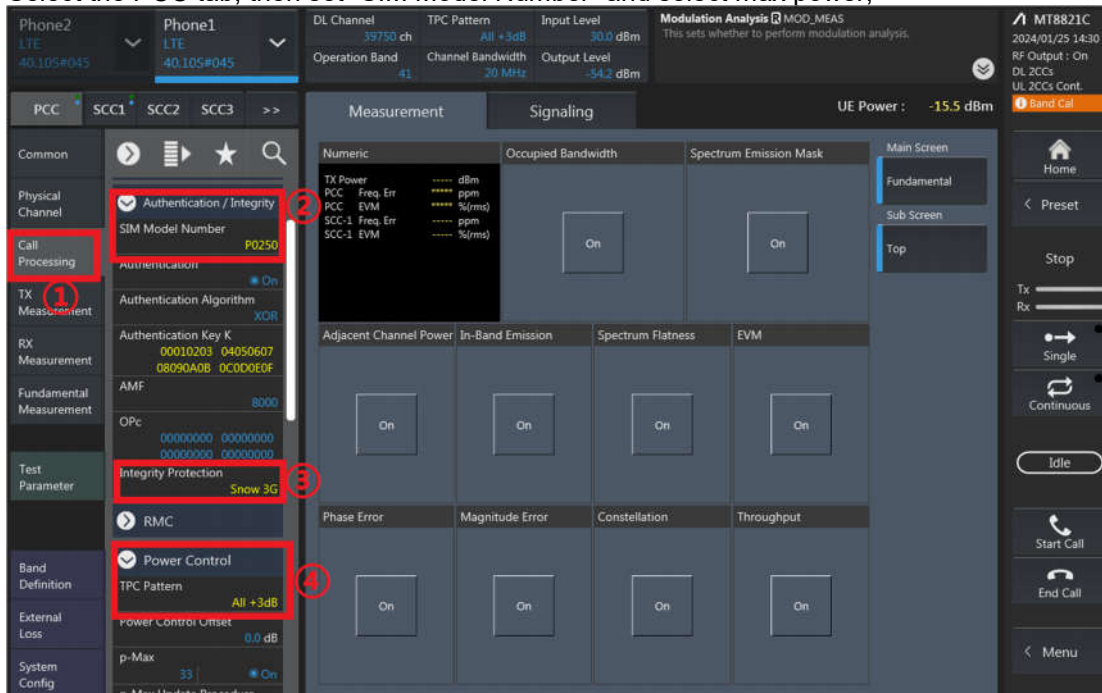
4. SCC parameter Settings: Select the SCC1 tab, Set operating band, BW, channel, and RB configurations for SCC1;



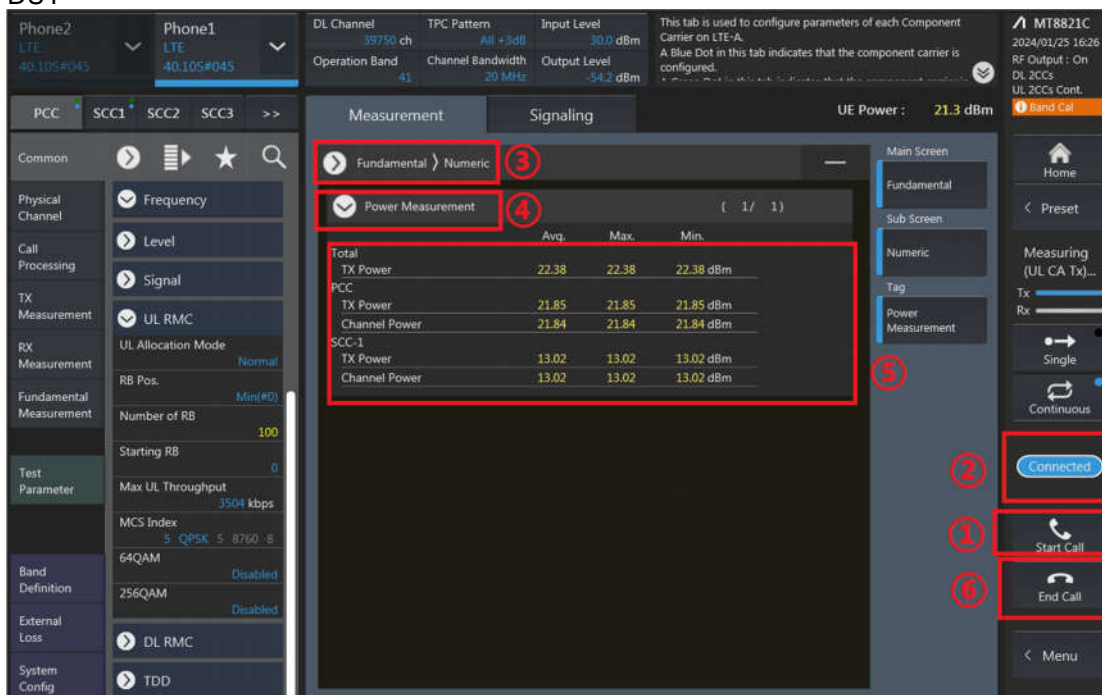
RB configurations (Number of RB / Starting RB) for SCC1;



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

Uplink CA Power

CA_7C Ant1 Default&ECI2								
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	99	1	0	22.71	24.00
21100	21298	QPSK	1	99	1	0	22.76	24.00
21350	21152	QPSK	1	0	1	99	22.55	24.00

CA_66C Ant0 Default&ECI2								
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	99	1	0	22.51	24.00
132322	132520	QPSK	1	99	1	0	22.65	24.00
132572	132374	QPSK	1	0	1	99	22.46	24.00

CA_66B Ant0 Default&ECI2								
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		
132047	132140	QPSK	1	74	1	0	22.45	24.00
132322	132415	QPSK	1	74	1	0	22.55	24.00
132597	132504	QPSK	1	0	1	24	22.42	24.00

CA_38C Ant4 Default								
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		
37850	38048	QPSK	1	99	1	0	22.44	24.00
37901	38099	QPSK	1	99	1	0	22.59	24.00
38150	37952	QPSK	1	0	1	99	22.51	24.00

Uplink CA Power

CA_7C Ant1 ECi3								
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	99	1	0	17.82	19.00
21100	21298	QPSK	1	99	1	0	17.99	19.00
21350	21152	QPSK	1	0	1	99	17.72	19.00

CA_66C Ant0 ECi3								
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	99	1	0	17.05	18.50
132322	132520	QPSK	1	99	1	0	17.12	18.50
132572	132374	QPSK	1	0	1	99	17.06	18.50

CA_66B Ant0 ECi3								
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		
132047	132140	QPSK	1	74	1	0	17.01	18.50
132322	132415	QPSK	1	74	1	0	17.09	18.50
132597	132504	QPSK	1	0	1	24	16.99	18.50

CA_38C Ant4 ECi2								
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		
37850	38048	QPSK	1	99	1	0	14.72	16.00
37901	38099	QPSK	1	99	1	0	14.86	16.00
38150	37952	QPSK	1	0	1	99	14.65	16.00

CA_7C Ant1 ECi6								
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	99	1	0	18.55	20.00
21100	21298	QPSK	1	99	1	0	18.74	20.00
21350	21152	QPSK	1	0	1	99	18.65	20.00

CA_66C Ant0 ECi6								
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	99	1	0	20.05	21.50
132322	132520	QPSK	1	99	1	0	20.08	21.50
132572	132374	QPSK	1	0	1	99	20.02	21.50

CA_66B Ant0 ECi6								
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		
132047	132140	QPSK	1	74	1	0	20.01	21.50
132322	132415	QPSK	1	74	1	0	20.06	21.50
132597	132504	QPSK	1	0	1	24	19.95	21.50

CA_38C Ant4 ECi3								
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		
37850	38048	QPSK	1	99	1	0	15.55	17.00
37901	38099	QPSK	1	99	1	0	15.71	17.00
38150	37952	QPSK	1	0	1	99	15.52	17.00

CA_7C Ant1 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		
20850	21048	QPSK	1	99	1	0	17.82	19.00
21100	21298	QPSK	1	99	1	0	17.89	19.00
21350	21152	QPSK	1	0	1	99	17.72	19.00

CA_66C Ant0 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		
132072	132270	QPSK	1	99	1	0	16.08	17.50
132322	132520	QPSK	1	99	1	0	16.18	17.50
132572	132374	QPSK	1	0	1	99	16.12	17.50

CA_66B Ant0 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		
132047	132140	QPSK	1	74	1	0	16.05	17.50
132322	132415	QPSK	1	74	1	0	16.14	17.50
132597	132504	QPSK	1	0	1	24	16.07	17.50

CA_38C Ant4 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		
37850	38048	QPSK	1	99	1	0	20.31	21.50
37901	38099	QPSK	1	99	1	0	20.35	21.50
38150	37952	QPSK	1	0	1	99	20.25	21.50

CA_38C Ant4 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		
37850	38048	QPSK	1	99	1	0	11.58	13.00
37901	38099	QPSK	1	99	1	0	11.73	13.00
38150	37952	QPSK	1	0	1	99	11.52	13.00

Conducted Power for DL CA

2CA DL

CA List	PCC										SCC					Power	
	LTE	BW	BW	UL	UL	Mod.	UL#	UL	DL Antenna Configuratio	LTE	BW	DL	DL	DL Antenna Configuratio	With CA	Without CA	
	Band	Ant	(MHz)	Freq. (MHz)	Channel		RB	RB	Offset	Band	(MHz)	Freq. (MHz)	Channel	Tx. Power (dBm)	Tx. Power (dBm)		
CA_5A-7A	Band 5	Ant0	10M	836.5	20525	QPSK	1	0		Band 7	20M	2655	3100	4X4MIMO	22.82	22.86	
	Band 7	Ant1	20M	2535	21100	QPSK	1		4X4MIMO	Band 5	10M	861.5	2525		22.95	23.02	
CA_7A-7A	Band 7	Ant1	20M	2535	21100	QPSK	1	0	4X4MIMO	Band 7	5M	2687.5	3425	4X4MIMO	22.91	23.02	
CA_7B	Band 7	Ant1	15M	2535	21100	QPSK	1	0	4X4MIMO	Band 7	5M	2544.3	3193	4X4MIMO	22.92	23.02	
CA_7C	Band 7	Ant1	20M	2535	21100	QPSK	1	0	4X4MIMO	Band 7	20M	2554.8	3298	4X4MIMO	22.97	23.02	
CA_38C	Band 38	Ant4	20M	2580	37850	QPSK	1	0	4X4MIMO	Band 38	20M	2599.8	38048	4X4MIMO	22.71	22.79	
CA_66A-66A	Band 66	Ant0	20M	1745	132322	QPSK	1	0		Band 66	5M	2197.5	67311		22.66	22.74	
	Band 66	Ant4	20M	1745	132322	QPSK	1	0		Band 66	5M	2197.5	67311		20.45	20.50	
CA_66B	Band 66	Ant0	15M	1745	132322	QPSK	1	0		Band 66	5M	2164.3	66979		22.61	22.74	
	Band 66	Ant4	15M	1745	132322	QPSK	1	0		Band 66	5M	2164.3	66979		20.42	20.50	
CA_66C	Band 66	Ant0	20M	1745	132322	QPSK	1	0		Band 66	20M	2164.8	66984		22.65	22.74	
	Band 66	Ant4	20M	1745	132322	QPSK	1	0		Band 66	20M	2164.8	66984		20.47	20.50	

3CA DL

3CA List	PCC									SCC1					SCC2				DL Antenna Configuration	Power	
	LTE	BW	BW	UL	UL	Mod.	UL#	UL	DL Antenna Configuration	LTE	BW	DL	DL	DL Antenna Configuration	LTE	BW	DL	DL		With CA	Without CA
	Band	Ant	(MHz)	Freq. (MHz)	Channel		RB	RB Offset		Band	(MHz)	Freq. (MHz)	Channel		Band	(MHz)	Freq. (MHz)	Channel		Tx. Power (dBm)	Tx. Power (dBm)
CA_41A-41A-41A	Band 41	Ant4	20M	2553	40620	QPSK	1	0	4X4MIMO	Band 41	5M	2887.5	41565	4X4MIMO	Band 41	20M	2506	39750	4X4MIMO	22.95	23.11
CA_41A-41C	Band 41	Ant4	20M	2675.8	39750	QPSK	1	0	4X4MIMO	Band 41	20M	2660.2	41292	4X4MIMO	Band 41	20M	2680	41490	4X4MIMO	22.99	23.11
CA_41D	Band 41	Ant4	20M	2553	40620	QPSK	1	0	4X4MIMO	Band 41	20M	2612.6	40818	4X4MIMO	Band 41	20M	2632.6	41016	4X4MIMO	22.94	23.11