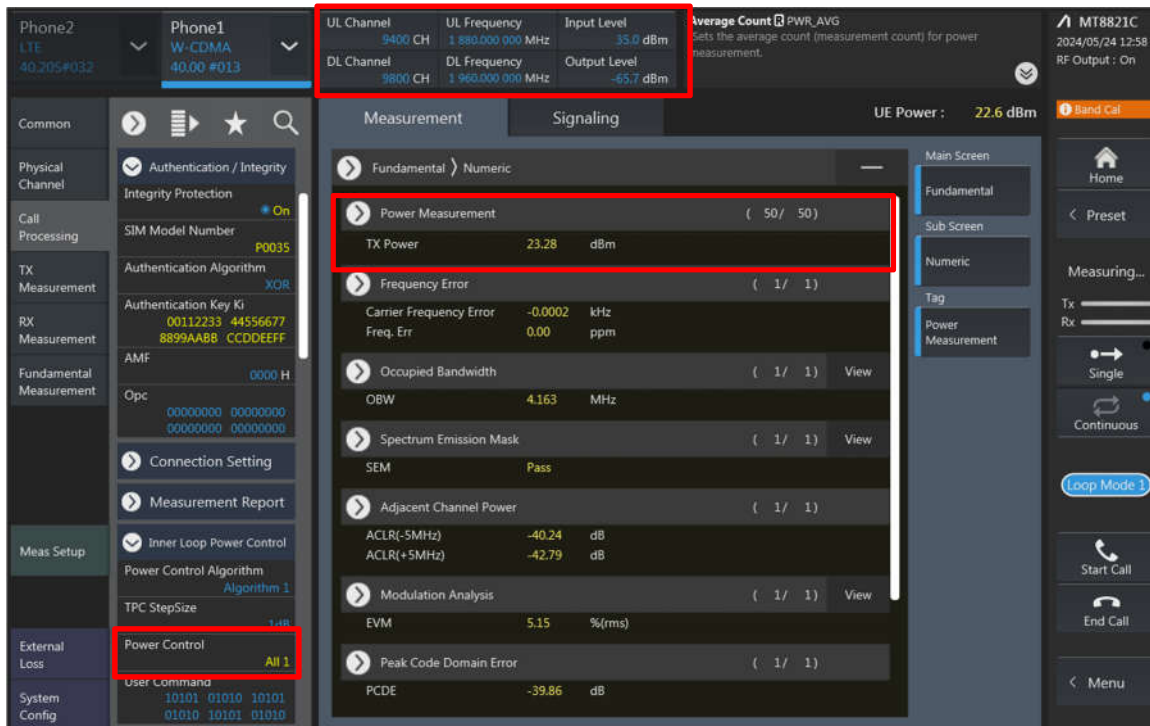


Power measurement connection diagram:

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.

<WCDMA>



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

- Top Bar:** Shows Phone2 (LTE, 40.205#032) and Phone1 (W-CDMA, 40.00 #013). The UL Channel is 8400 CH and the DL Channel is 9800 CH. The UL Frequency is 1 880.000 000 MHz and the DL Frequency is 1 960.000 000 MHz. The Input Level is 35.0 dBm and the Output Level is -65.7 dBm. The Average Count is 3 and PWR_AVG is 22.6 dBm.
- Left Panel:** Contains various measurement and setup options, including Authentication / Integrity, SIM Model Number, Authentication Algorithm, Authentication Key Ki, AMF, Opc, Connection Setting, Measurement Report, Inner Loop Power Control, Power Control Algorithm, TPC StepSize, Power Control, and User Command.
- Measurement Section:** Displays various measurement results, including TX Power (23.28 dBm), Frequency Error (Carrier Frequency Error: -0.0002 kHz, Freq. Err: 0.00 ppm), Occupied Bandwidth (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)), and Peak Code Domain Error (PCDE: -39.86 dB).
- Right Panel:** Contains navigation buttons (Home, Preset, Measuring..., Single, Continuous, Loop Mode 1, Start Call, End Call, Menu) and a status bar showing MT8821C, 2024/05/24 12:58, and RF Output: On.

<LTE>

Phone2
LTE
40.20S#021

Phone1
LTE
40.20S#021

UL Channel
21100 ch
Operation Band
7

TPC Pattern
All +3dB
Channel Bandwidth
20 MHz

Input Level
30.0 dBm
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 >>

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

Measurement Signaling

UE Power : 23.4 dBm

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

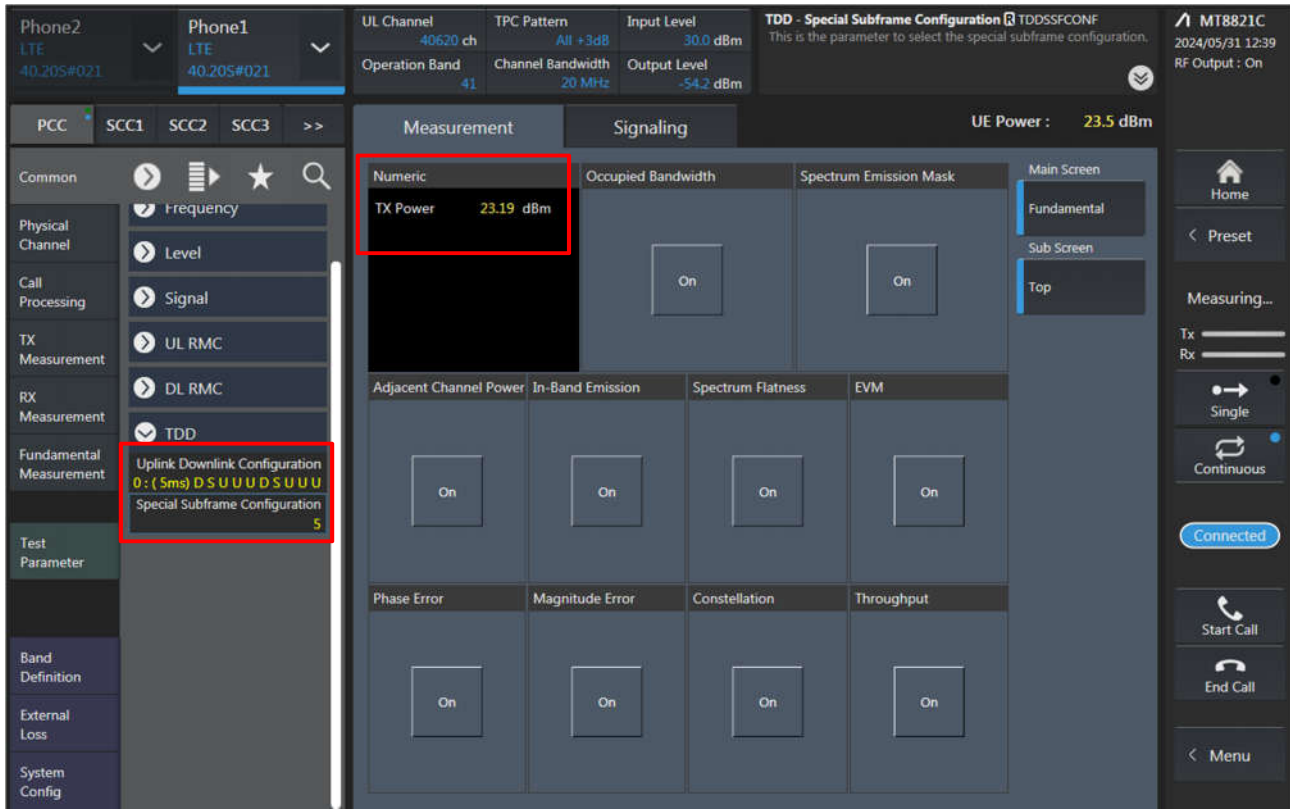
Constellation
On

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>



Phone2
LTE
40.20S#021

Phone1
LTE
40.20S#021

UL Channel: 40620 ch
Operation Band: 41
TPC Pattern: All +3dB
Channel Bandwidth: 20 MHz
Input Level: 30.0 dBm
Output Level: -54.2 dBm

TDD - Special Subframe Configuration
TDDSSFCONE
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
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

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

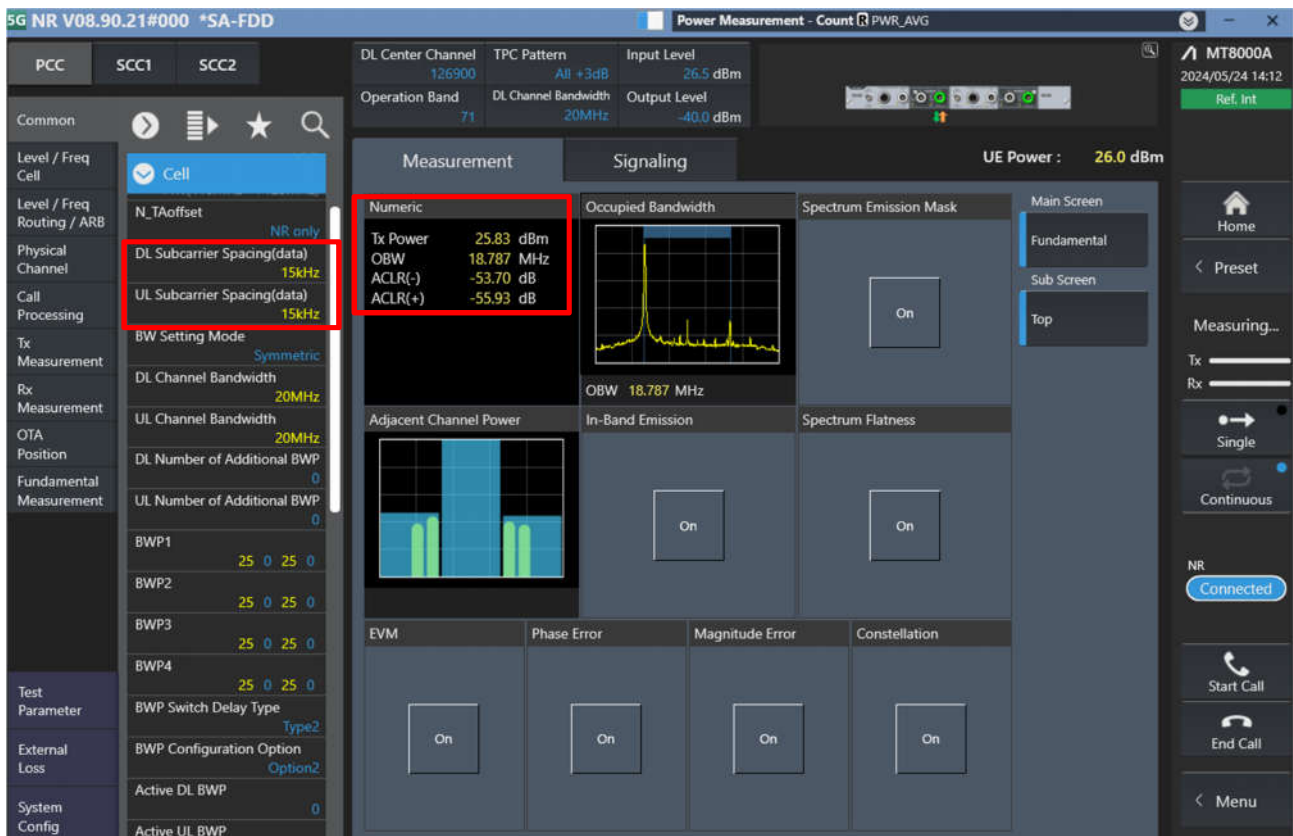
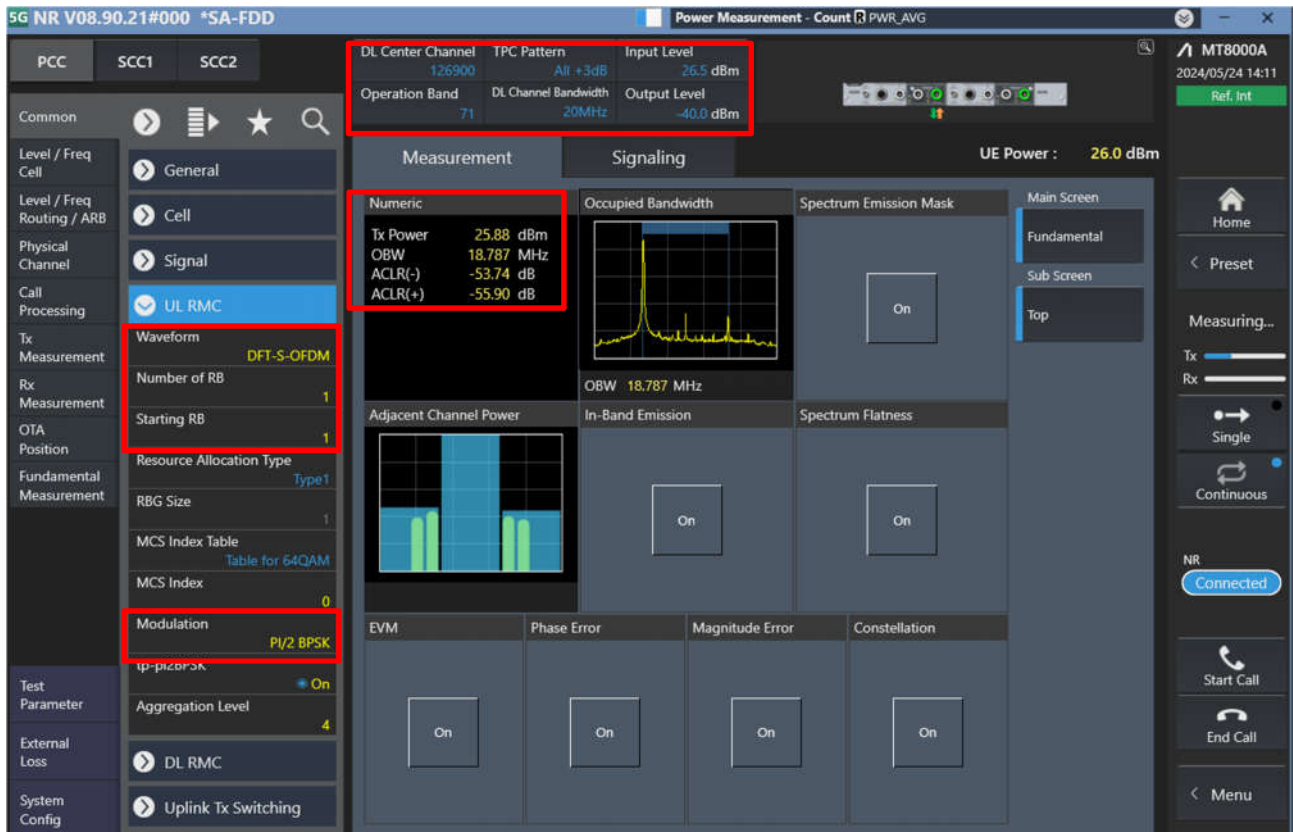
Main Screen
Fundamental
Sub Screen
Top

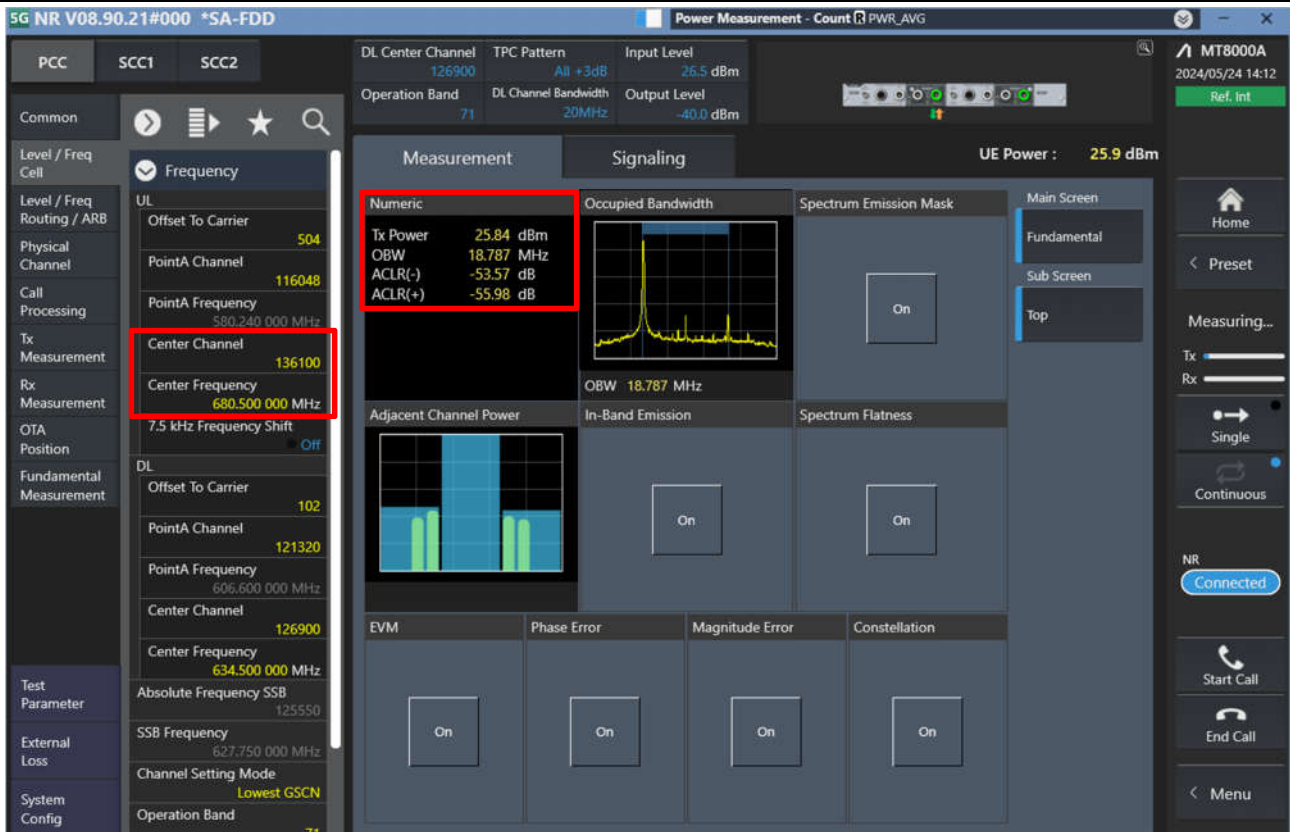
Test Parameter
Band Definition
External Loss
System Config

Connected

Start Call
End Call
Menu

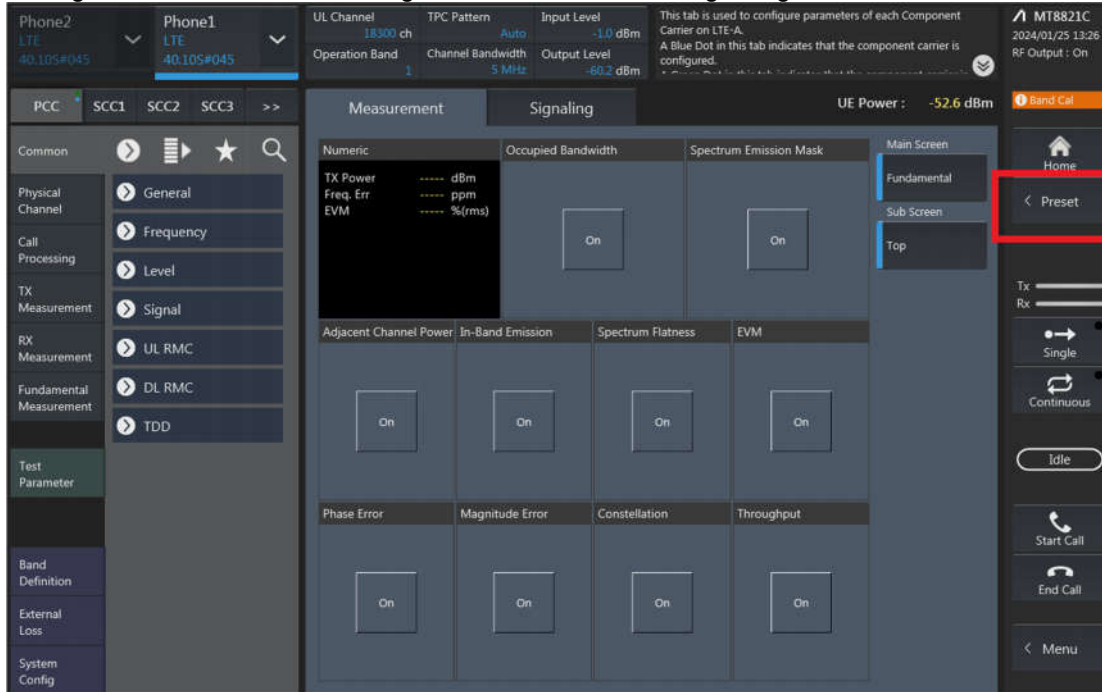
<5G NR FR1>





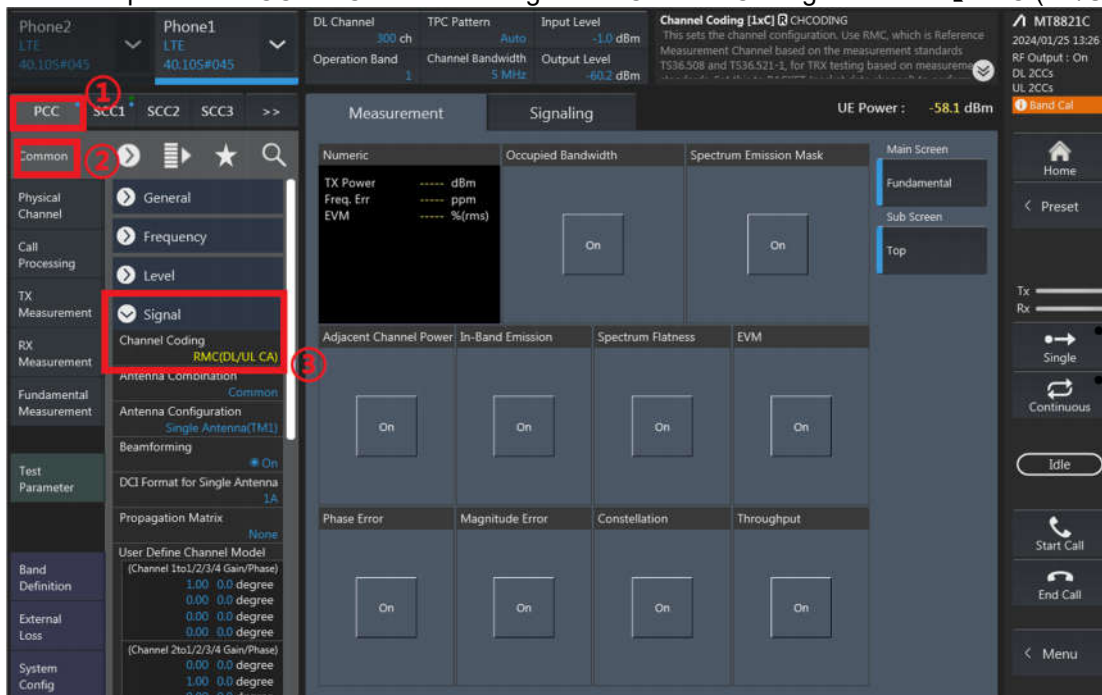
LTE Uplink and Downlink Carrier Aggregation configurations:

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

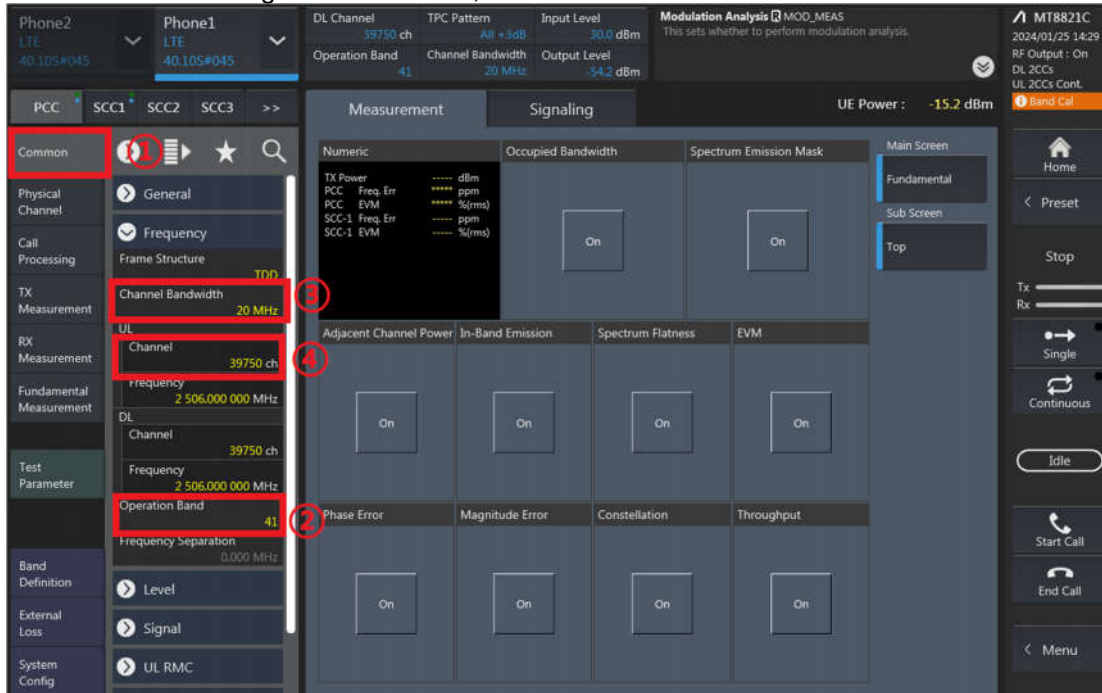


2. If Select "RMC (DL/UL CA)" for Uplink Carrier Aggregation;
If Select "RMC (DL CA)" for Downlink Carrier Aggregation.
For example, Uplink Carrier Aggregation:

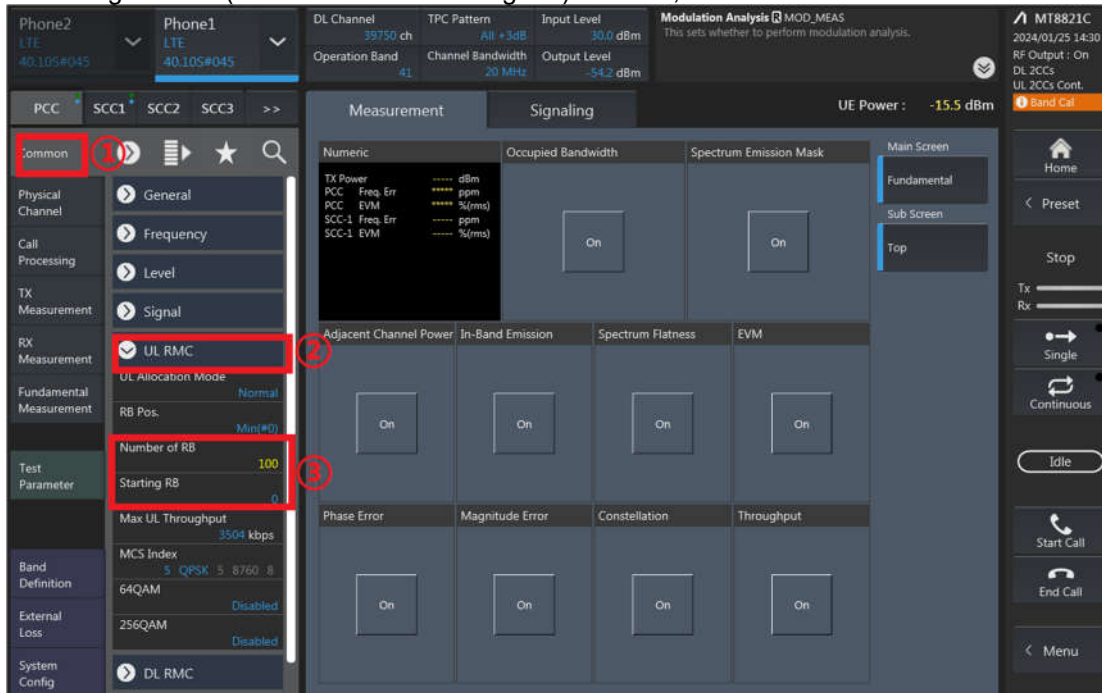
Detailed operation: PCC → Common → Signal → Channel Coding → Select 【RMC (DL/UL CA)】



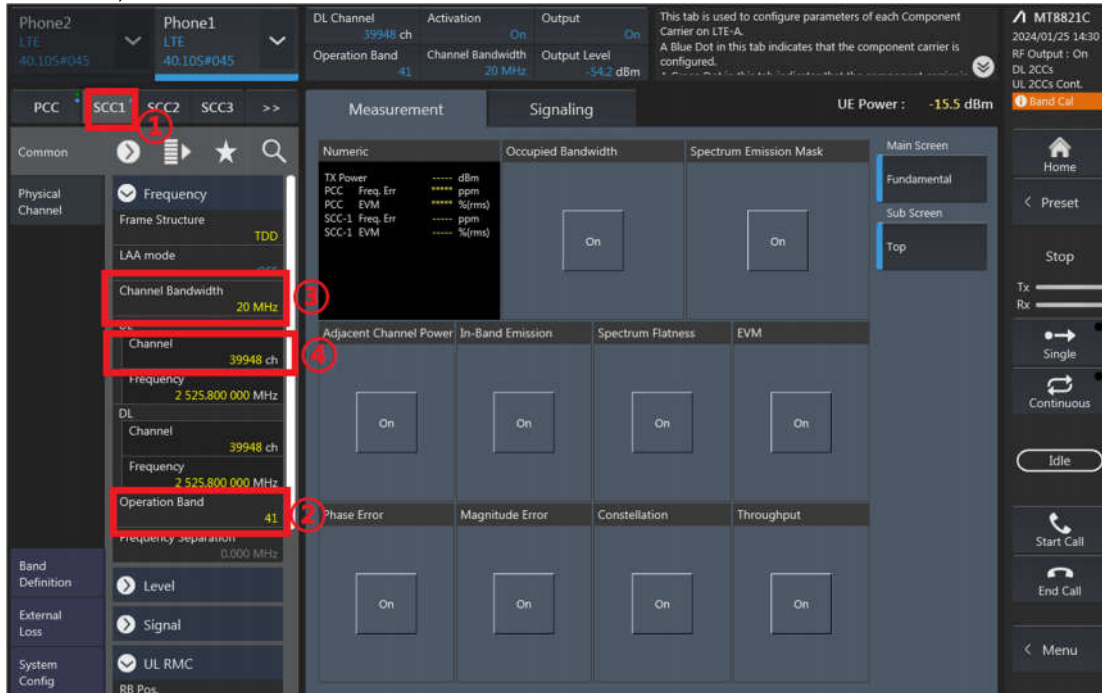
3. PCC parameter Settings: on the screen, and then select the PCC tab and Set operating band, BW, channel and RB configurations for PCC;



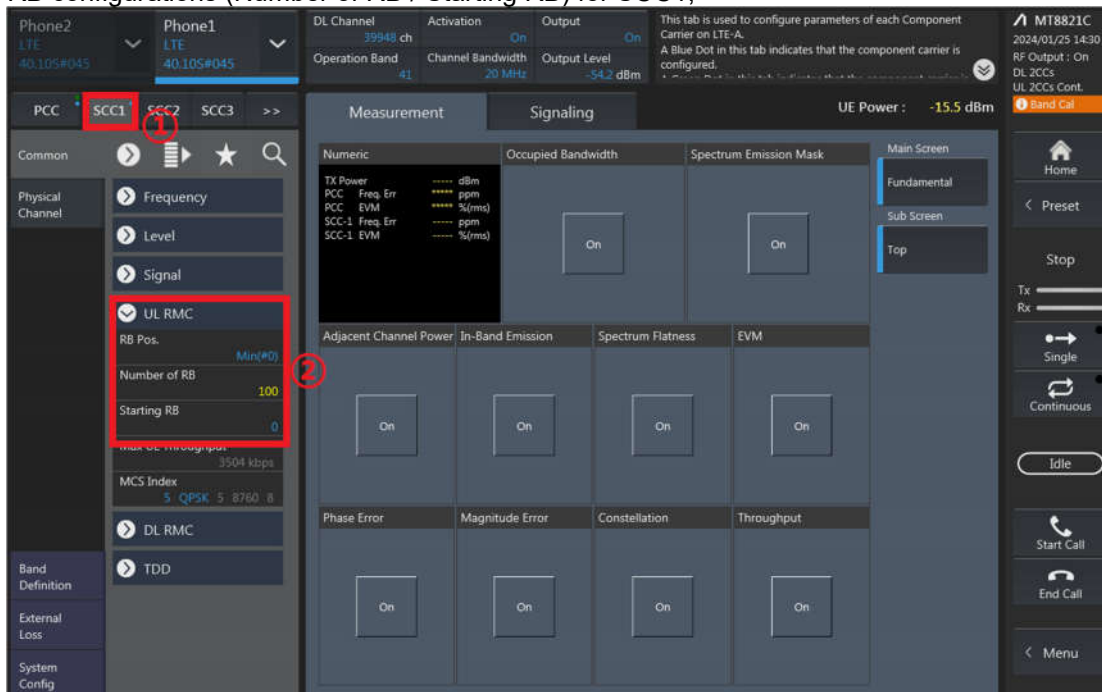
RB configurations (Number of RB / Starting RB) for PCC;



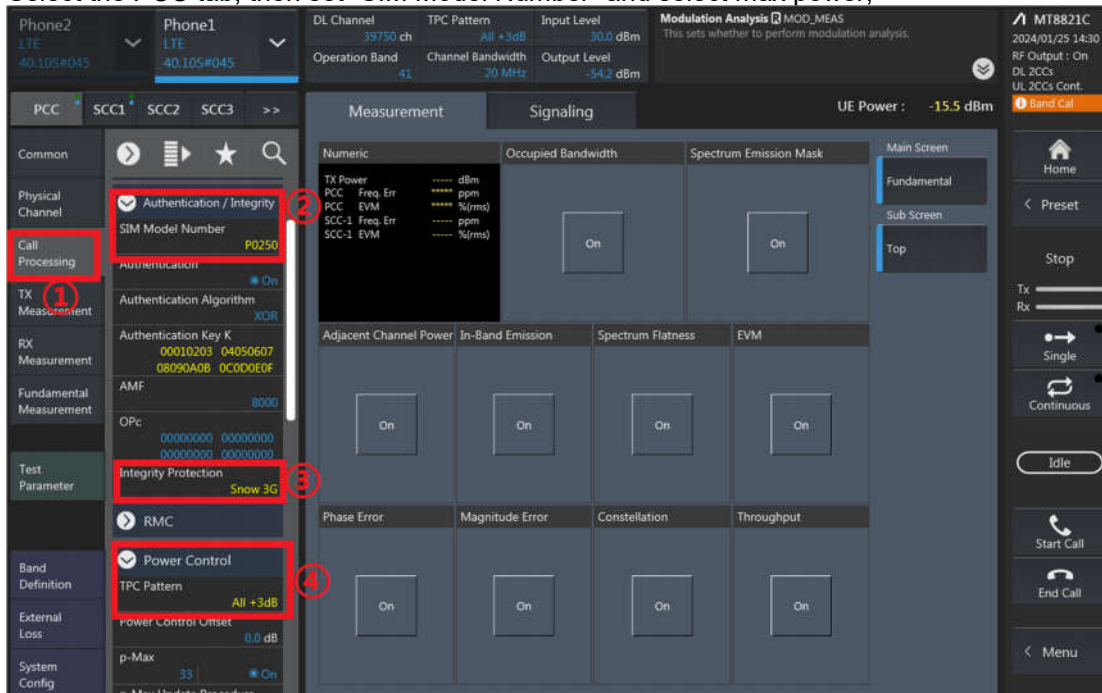
4. SCC parameter Settings: Select the SCC1 tab, Set operating band, BW, channel, and RB configurations for SCC1;



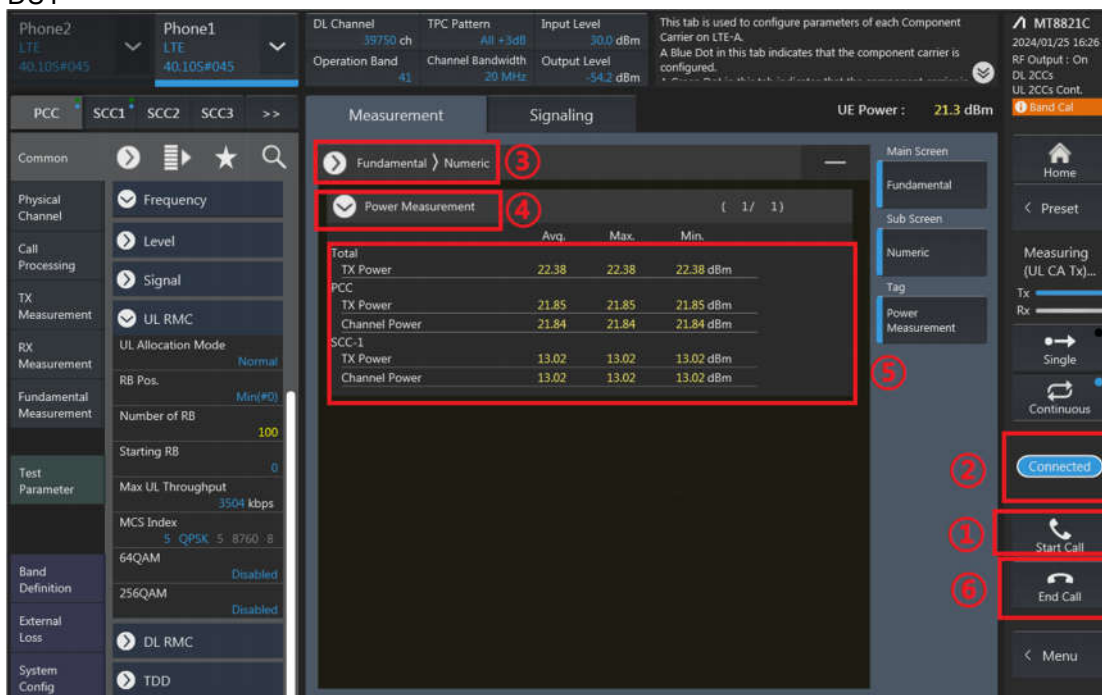
RB configurations (Number of RB / Starting RB) for SCC1;



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.

UL CA Modem A

CA_5B Ant 0								
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	23.01	24.50
20475	20574	QPSK	1	49	1	0	23.12	24.50
20600	20501	QPSK	1	0	1	49	23.07	24.50

CA_6B Ant 0								
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	18.62	20.50
132322	132229	QPSK	1	74	1	0	18.71	20.50
132597	132504	QPSK	1	0	1	74	18.70	20.50

CA_2C Ant 0								
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	21.66	23.50
18900	19098	QPSK	1	99	1	0	21.69	23.50
19100	18902	QPSK	1	0	1	99	21.48	23.50

UL CA Modem B

CA_5B Ant 0								
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	23.61	24.50
20475	20574	QPSK	1	49	1	0	23.70	24.50
20600	20501	QPSK	1	0	1	49	23.63	24.50

CA_6B Ant 0								
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	18.74	20.50
132322	132229	QPSK	1	74	1	0	18.88	20.50
132597	132504	QPSK	1	0	1	74	18.73	20.50

CA_2C Ant 0								
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	21.51	23.50
18900	19098	QPSK	1	99	1	0	21.64	23.50
19100	18902	QPSK	1	0	1	99	21.51	23.50

UL CA Modem C

CA_5B Ant 0								
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	23.01	24.50
20475	20574	QPSK	1	49	1	0	23.15	24.50
20600	20501	QPSK	1	0	1	49	23.02	24.50

CA_6B Ant 0								
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	18.63	20.50
132322	132229	QPSK	1	74	1	0	18.79	20.50
132597	132504	QPSK	1	0	1	74	18.76	20.50

CA_2C Ant 0								
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	21.47	23.50
18900	19098	QPSK	1	99	1	0	21.61	23.50
19100	18902	QPSK	1	0	1	99	21.60	23.50

UL CA Modem D

CA_5B Ant 0								
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	23.42	24.50
20475	20574	QPSK	1	49	1	0	23.42	24.50
20600	20501	QPSK	1	0	1	49	23.39	24.50

CA_6B Ant 0								
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	18.65	20.50
132322	132229	QPSK	1	74	1	0	18.79	20.50
132597	132504	QPSK	1	0	1	74	18.42	20.50

CA_2C Ant 0								
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	21.53	23.50
18900	19098	QPSK	1	99	1	0	21.66	23.50
19100	18902	QPSK	1	0	1	99	21.56	23.50

CA_7C Ant 0							
Combination 20MHz+20MHz (100RB+100RB)							
PCC Channel	SCC Channel	Modulation	PCC		SCC		Tune up Power (dBm)
			RB Size	RB offset	RB Size	RB offset	
20850	21048	QPSK	1	99	1	0	18.96
21100	21298	QPSK	1	99	1	0	19.00
21350	21152	QPSK	1	0	1	99	18.92

CA_66C Ant 0							
Combination 20MHz+20MHz (100RB+100RB)							
PCC Channel	SCC Channel	Modulation	PCC		SCC		Tune up Power (dBm)
			RB Size	RB offset	RB Size	RB offset	
132072	132270	QPSK	1	99	1	0	18.67
132322	132520	QPSK	1	99	1	0	18.76
132572	132374	QPSK	1	0	1	99	18.62

CA_7C Ant 0							
Combination 20MHz+20MHz (100RB+100RB)							
PCC Channel	SCC Channel	Modulation	PCC		SCC		Tune up Power (dBm)
			RB Size	RB offset	RB Size	RB offset	
20850	21048	QPSK	1	99	1	0	18.72
21100	21298	QPSK	1	99	1	0	18.99
21350	21152	QPSK	1	0	1	99	18.76

CA_66C Ant 0							
Combination 20MHz+20MHz (100RB+100RB)							
PCC Channel	SCC Channel	Modulation	PCC		SCC		Tune up Power (dBm)
			RB Size	RB offset	RB Size	RB offset	
132072	132270	QPSK	1	99	1	0	18.81
132322	132520	QPSK	1	99	1	0	18.84
132572	132374	QPSK	1	0	1	99	18.70

CA_7C Ant 0							
Combination 20MHz+20MHz (100RB+100RB)							
PCC Channel	SCC Channel	Modulation	PCC		SCC		Tune up Power (dBm)
			RB Size	RB offset	RB Size	RB offset	
20850	21048	QPSK	1	99	1	0	18.81
21100	21298	QPSK	1	99	1	0	19.09
21350	21152	QPSK	1	0	1	99	18.84

CA_66C Ant 0							
Combination 20MHz+20MHz (100RB+100RB)							
PCC Channel	SCC Channel	Modulation	PCC		SCC		Tune up Power (dBm)
			RB Size	RB offset	RB Size	RB offset	
132072	132270	QPSK	1	99	1	0	18.59
132322	132520	QPSK	1	99	1	0	18.73
132572	132374	QPSK	1	0	1	99	18.65

CA_7C Ant 0							
Combination 20MHz+20MHz (100RB+100RB)							
PCC Channel	SCC Channel	Modulation	PCC		SCC		Tune up Power (dBm)
			RB Size	RB offset	RB Size	RB offset	
20850	21048	QPSK	1	99	1	0	18.90
21100	21298	QPSK	1	99	1	0	18.95
21350	21152	QPSK	1	0	1	99	18.89

CA_66C Ant 0							
Combination 20MHz+20MHz (100RB+100RB)							
PCC Channel	SCC Channel	Modulation	PCC		SCC		Tune up Power (dBm)
			RB Size	RB offset	RB Size	RB offset	
132072	132270	QPSK	1	99	1	0	18.64
132322	132520	QPSK	1	99	1	0	18.76
132572	132374	QPSK	1	0	1	99	18.43

CA_38C Ant 0								
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	21.58	23.50
37901	38099	QPSK	1	99	1	0	21.66	23.50
38150	37952	QPSK	1	0	1	99	21.59	23.50

CA_41C Ant 0								
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		
39750	39948	QPSK	1	99	1	0	21.60	23.50
40185	40383	QPSK	1	99	1	0	21.62	23.50
40620	40818	QPSK	1	99	1	0	21.77	23.50
41055	41253	QPSK	1	99	1	0	21.59	23.50
41490	41292	QPSK	1	0	1	99	21.50	23.50

CA_42C Ant 2								
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	21.79	23.50
42590	42788	QPSK	1	99	1	0	21.78	23.50
42990	42792	QPSK	1	0	1	99	21.50	23.50

CA_38C Ant 0								
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	22.03	23.50
37901	38099	QPSK	1	99	1	0	22.14	23.50
38150	37952	QPSK	1	0	1	99	22.06	23.50

CA_41C Ant 0								
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		
39750	39948	QPSK	1	99	1	0	21.91	23.50
40185	40383	QPSK	1	99	1	0	21.99	23.50
40620	40818	QPSK	1	99	1	0	22.21	23.50
41055	41253	QPSK	1	99	1	0	21.97	23.50
41490	41292	QPSK	1	0	1	99	22.01	23.50

CA_42C Ant 2								
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	21.74	23.50
42590	42788	QPSK	1	99	1	0	21.71	23.50
42990	42792	QPSK	1	0	1	99	21.65	23.50

CA_38C Ant 0								
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	21.54	23.50
37901	38099	QPSK	1	99	1	0	21.76	23.50
38150	37952	QPSK	1	0	1	99	21.48	23.50

CA_41C Ant 0								
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		
39750	39948	QPSK	1	99	1	0	21.36	23.50
40185	40383	QPSK	1	99	1	0	21.42	23.50
40620	40818	QPSK	1	99	1	0	21.78	23.50
41055	41253	QPSK	1	99	1	0	21.37	23.50
41490	41292	QPSK	1	0	1	99	21.36	23.50

CA_42C Ant 2								
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	22.12	23.50
42590	42788	QPSK	1	99	1	0	22.09	23.50
42990	42792	QPSK	1	0	1	99	21.96	23.50

CA_38C Ant 0								
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	21.60	23.50
37901	38099	QPSK	1	99	1	0	21.71	23.50
38150	37952	QPSK	1	0	1	99	21.56	23.50

CA_41C Ant 0								
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		
39750	39948	QPSK	1	99	1	0	21.49	23.50
40185	40383	QPSK	1	99	1	0	21.56	23.50
40620	40818	QPSK	1	99	1	0	21.62	23.50
41055	41253	QPSK	1	99	1	0	21.46	23.50
41490	41292	QPSK	1	0	1	99	21.47	23.50

CA_42C Ant 2								
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	21.78	23.50
42590	42788	QPSK	1	99	1	0	21.76	23.50
42990	42792	QPSK	1	0	1	99	21.74	23.50

CA_48C Ant 2								
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	1	99	1	0	14.71	16.50
55830	56028	QPSK	1	99	1	0	14.85	16.50
56150	56348	QPSK	1	99	1	0	14.67	16.50
56640	56442	QPSK	1	99	1	0	14.83	16.50

CA_48C Ant 2								
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	1	99	1	0	14.78	16.50
55830	56028	QPSK	1	99	1	0	14.81	16.50
56150	56348	QPSK	1	99	1	0	14.68	16.50
56640	56442	QPSK	1	99	1	0	14.73	16.50

CA_48C Ant 2								
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	1	99	1	0	14.89	16.50
55830	56028	QPSK	1	99	1	0	14.91	16.50
56150	56348	QPSK	1	99	1	0	14.72	16.50
56640	56442	QPSK	1	99	1	0	14.38	16.50

CA_48C Ant 2								
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	1	99	1	0	14.79	16.50
55830	56028	QPSK	1	99	1	0	14.81	16.50
56150	56348	QPSK	1	99	1	0	14.65	16.50
56640	56442	QPSK	1	99	1	0	14.63	16.50