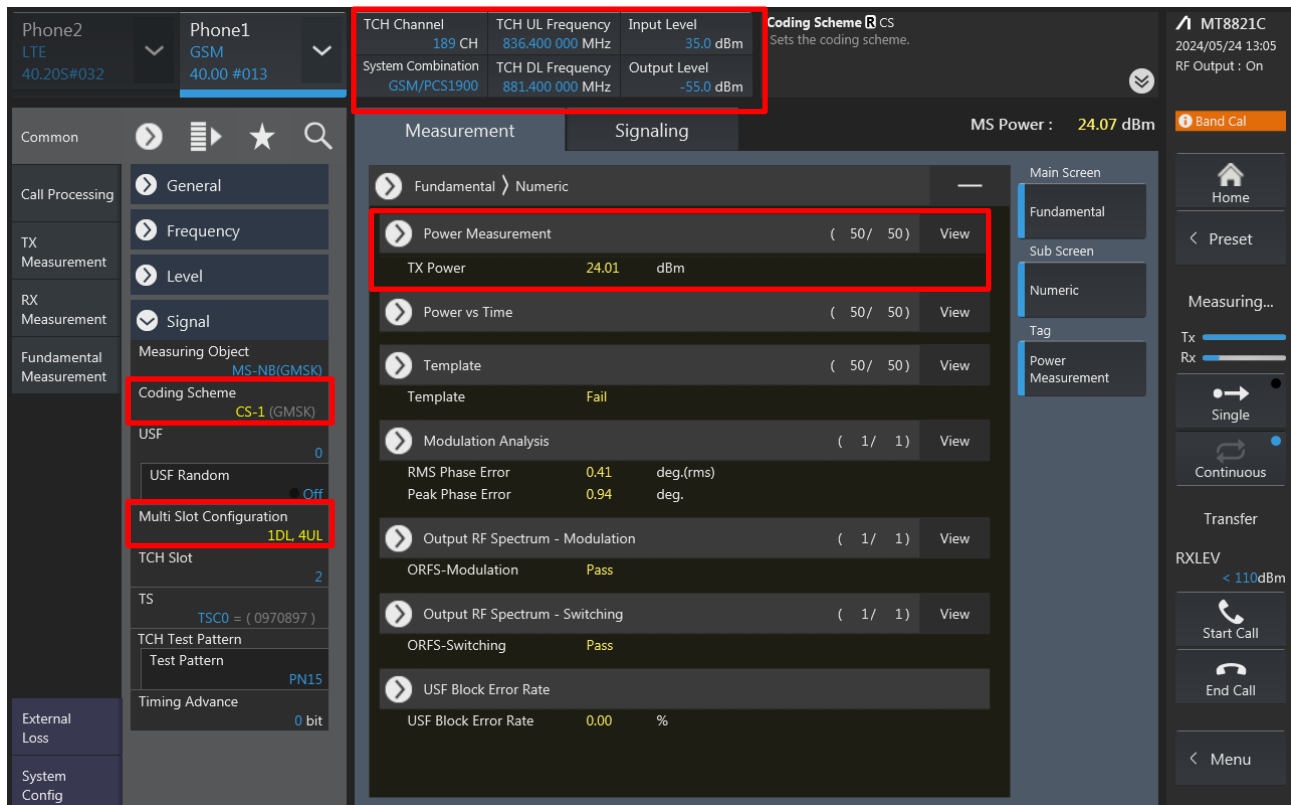


Power measurement connection diagram:

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.

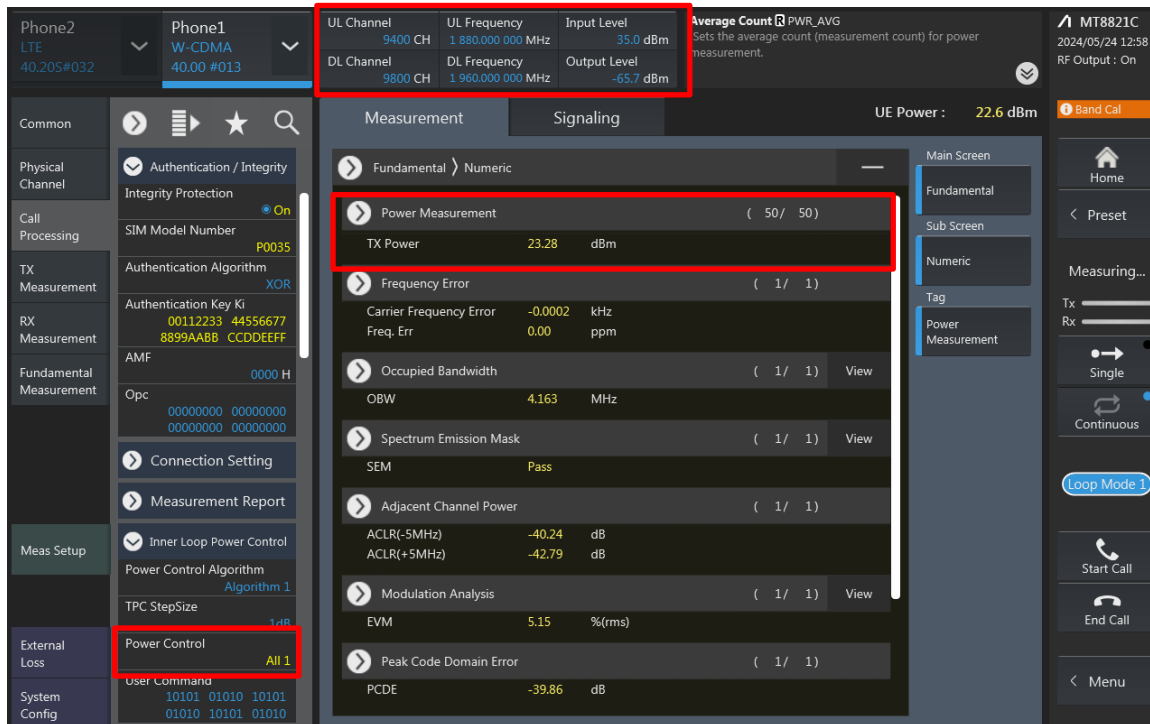
<GSM>



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

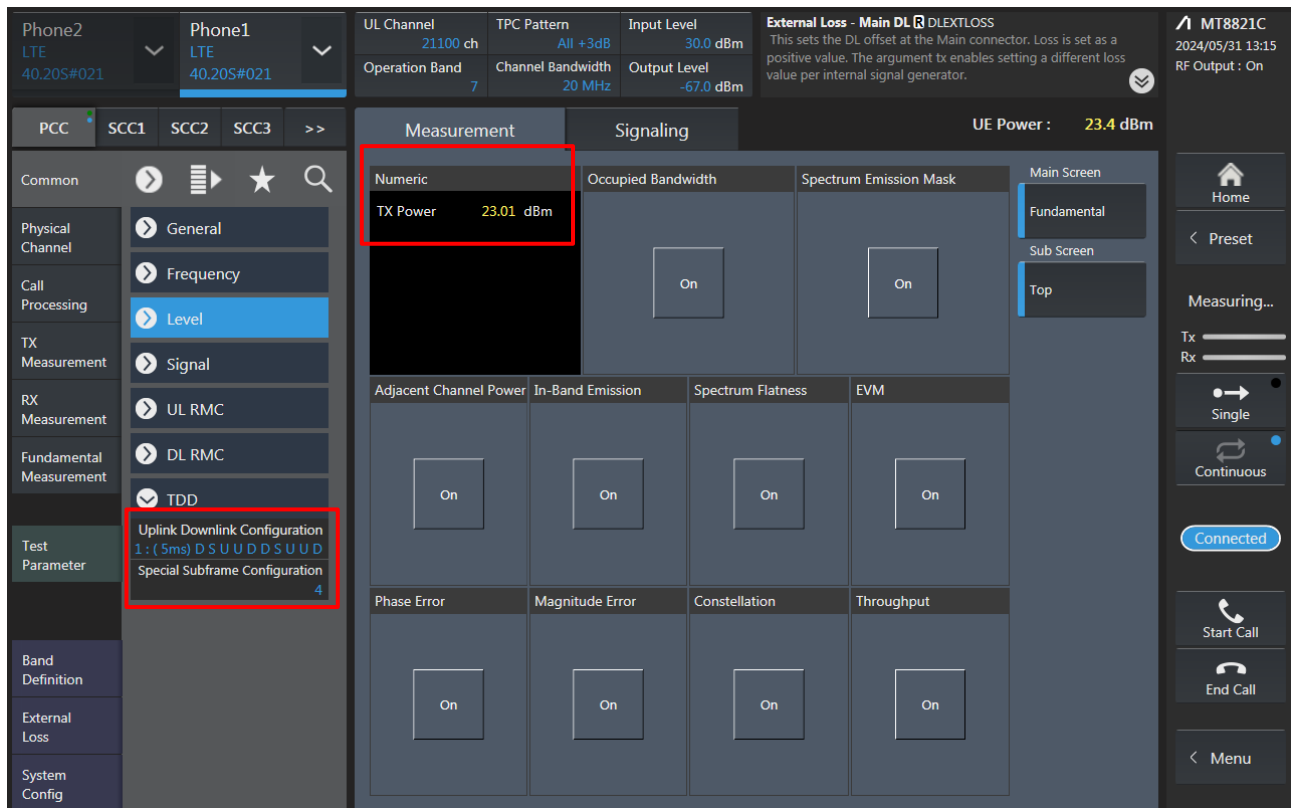
- Top Bar:** Shows Phone2 (LTE, 40.205#032) and Phone1 (GSM, 40.00 #013). It also displays TCH Channel (189 CH), TCH UL Frequency (836.400 000 MHz), Input Level (35.0 dBm), TCH DL Frequency (881.400 000 MHz), and Output Level (-55.0 dBm). The Coding Scheme is set to CS.
- Left Sidebar:** Contains navigation 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:** Shows 'MT8821C' with a timestamp of 2024/05/24 13:05 and 'RF Output : On'. It also includes a 'Band Cal' button and a 'Main Screen' section with 'Fundamental', 'Sub Screen', 'Numeric', and 'Tag' options.

<WCDMA>



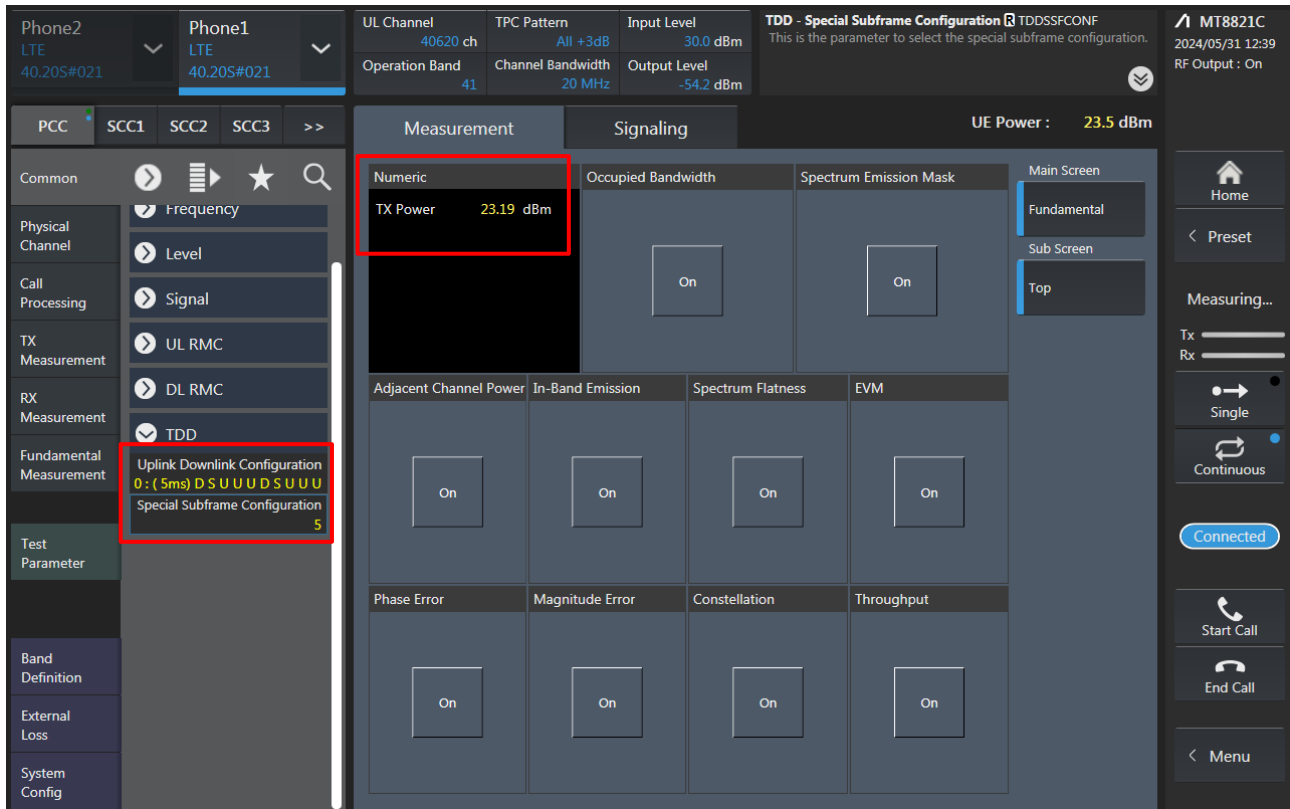
The screenshot shows the WCDMA measurement interface. The top bar displays 'Phone2 LTE 40.20S#032' and 'Phone1 W-CDMA 40.00 #013'. The 'Measurement' tab is active, showing 'Fundamental' and 'Numeric' views. The 'Power Measurement' section is highlighted with a red box, showing 'TX Power' at 23.28 dBm. 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' views. The 'Tag' shows 'Power Measurement'. The 'Loop Mode' is set to 'Loop Mode 1'. The 'Start Call' and 'End Call' buttons are visible on the right side.

<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 'TX Power' is 23.01 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 23.4 dBm. The 'Main Screen' shows 'Fundamental' and 'Sub Screen' views. The 'Tag' shows 'Power Measurement'. The 'Loop Mode' is set to 'Loop Mode 1'. The 'Start Call' and 'End Call' buttons are visible on the right side.

<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 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

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

Special Subframe Configuration 5

Test Parameter

Band Definition External Loss System Config

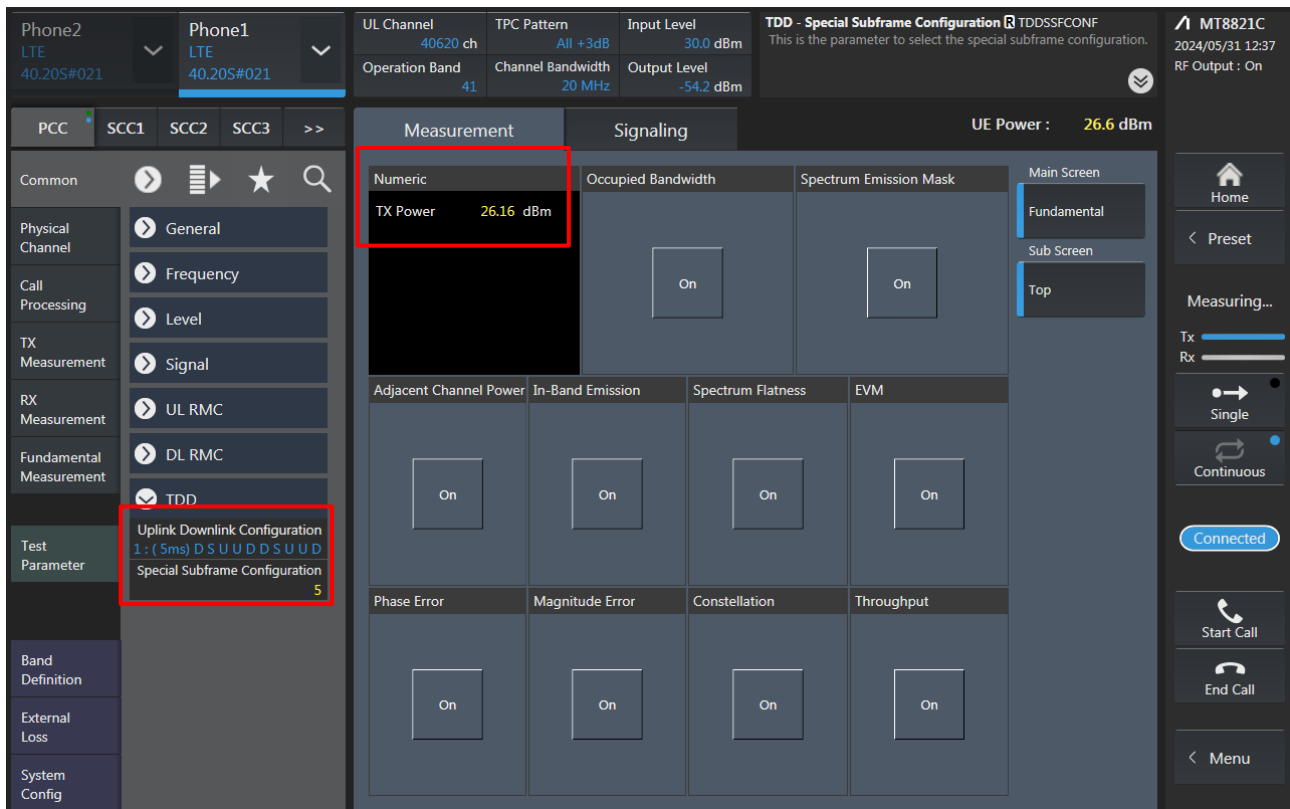
Common Physical Channel Call Processing TX Measurement RX Measurement Fundamental Measurement

Frequency Level Signal UL RMC DL RMC TDD

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

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 12:37 RF Output : On

UE Power : 26.6 dBm

Measurement Signaling

Numeric TX Power 26.16 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

Uplink Downlink Configuration 1: (5ms) D S U U D D S U U U

Special Subframe Configuration 5

Test Parameter

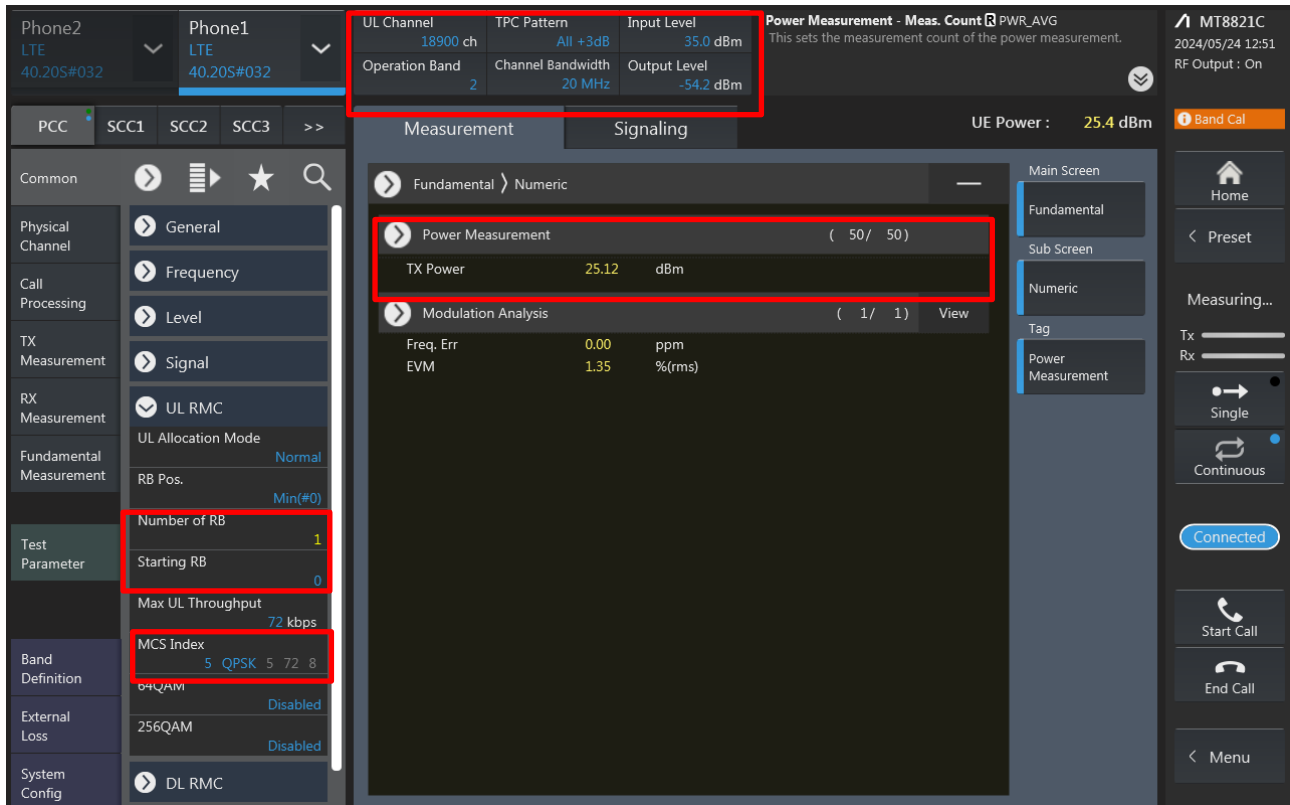
Band Definition External Loss System Config

Common Physical Channel Call Processing TX Measurement RX Measurement Fundamental Measurement

General Frequency Level Signal UL RMC DL RMC TDD

Main Screen Fundamental Sub Screen Top

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



Phone1 LTE 40.20S#032

Phone2 LTE 40.20S#032

UL Channel 18900 ch
Operation Band 2

TPC Pattern All +3dB
Channel Bandwidth 20 MHz

Input Level 35.0 dBm
Output Level -54.2 dBm

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

UE Power : 25.4 dBm

Measurement 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)

Test Parameter

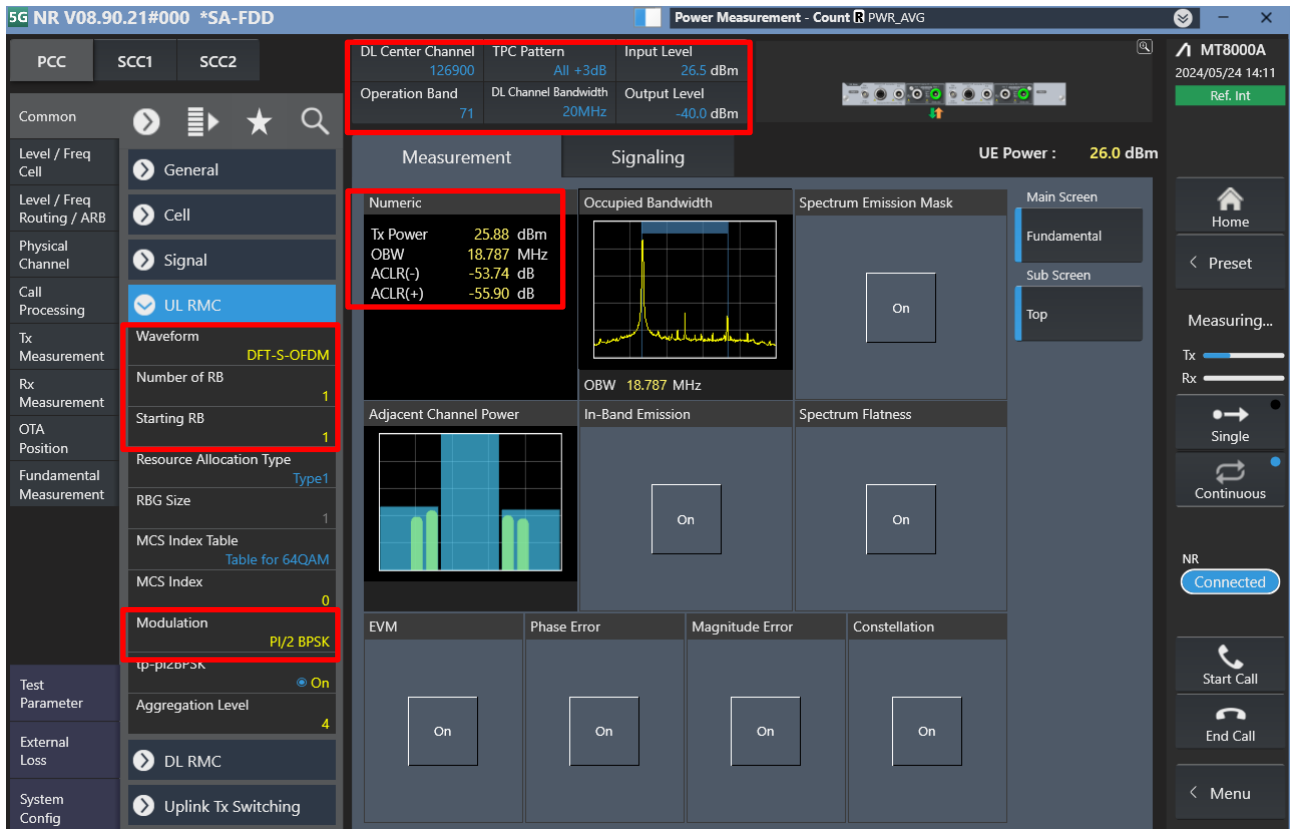
Number of RB 1
Starting RB 0
Max UL Throughput 72 kbps
MCS Index 5 QPSK 5 72 8

Band Definition 64QAM
External Loss 256QAM Disabled
System Config DL RMC

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

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

<5G NR FR1>



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

DL Center Channel 126900
Operation Band 71

TPC Pattern All +3dB
DL Channel Bandwidth 20MHz

Input Level 26.5 dBm
Output Level -40.0 dBm

Power Measurement - Count PWR_AVG

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 OBW 18.787 MHz

Spectrum Emission Mask On

Adjacent Channel Power On

In-Band Emission On

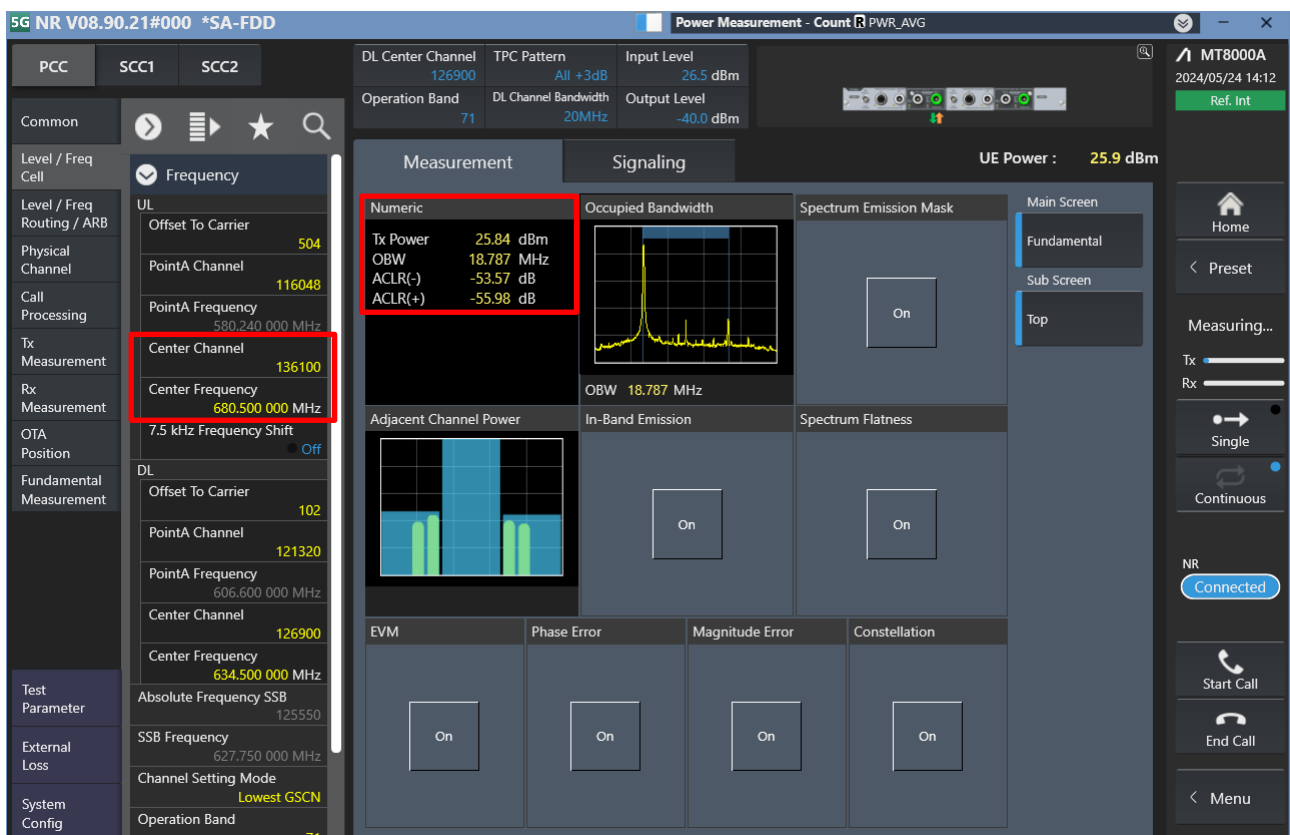
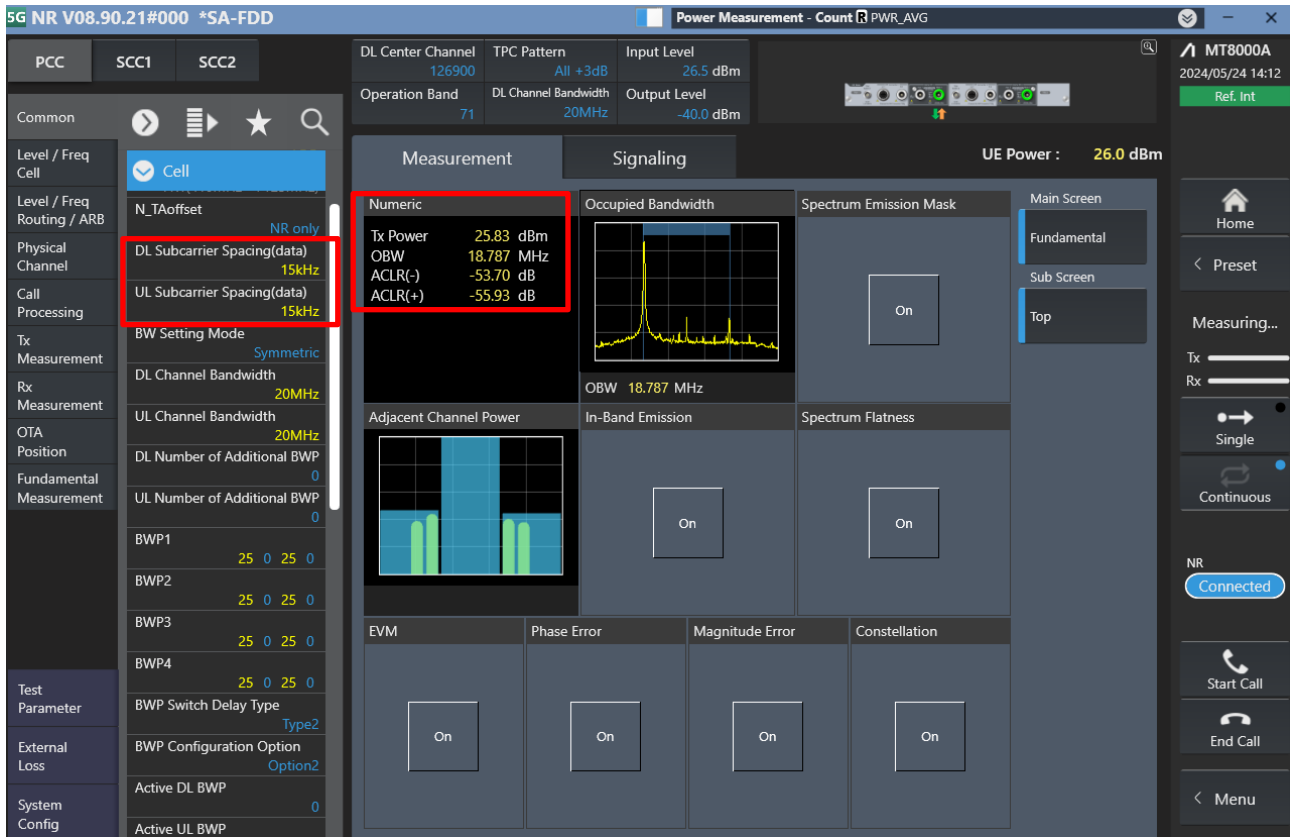
Spectrum Flatness On

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 PL/2 BPSK
Aggregation Level 4

Test Parameter DL RMC
System Config Uplink Tx Switching

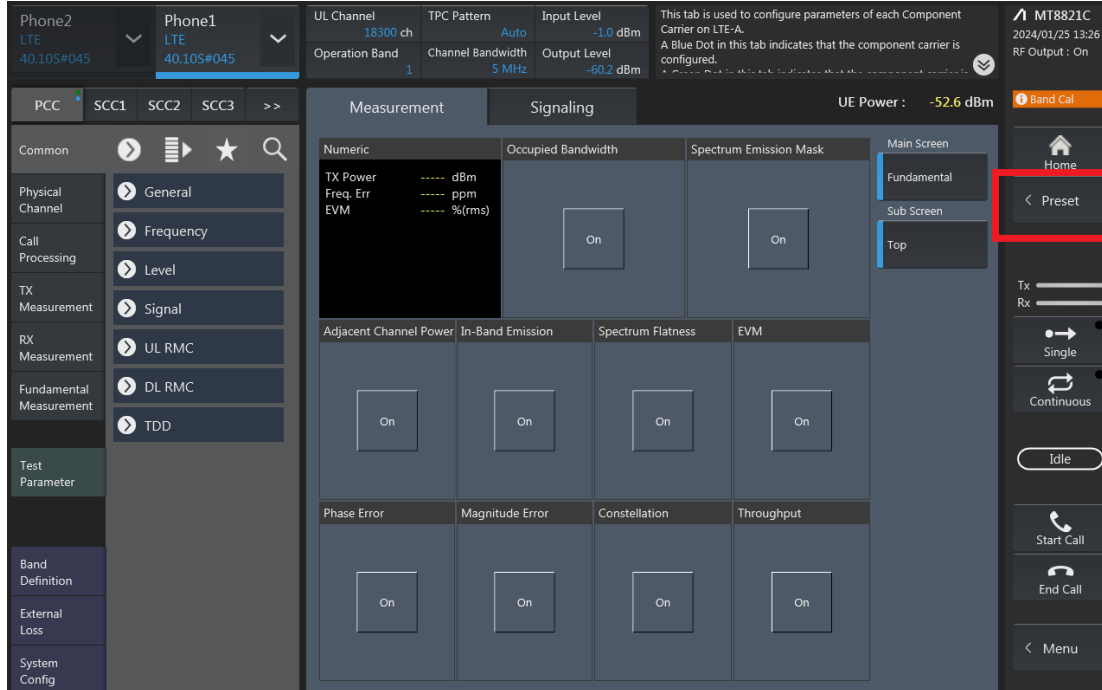
MT8000A
2024/05/24 14:11
Ref. Int

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



LTE Uplink and Downlink Carrier Aggregation configurations:

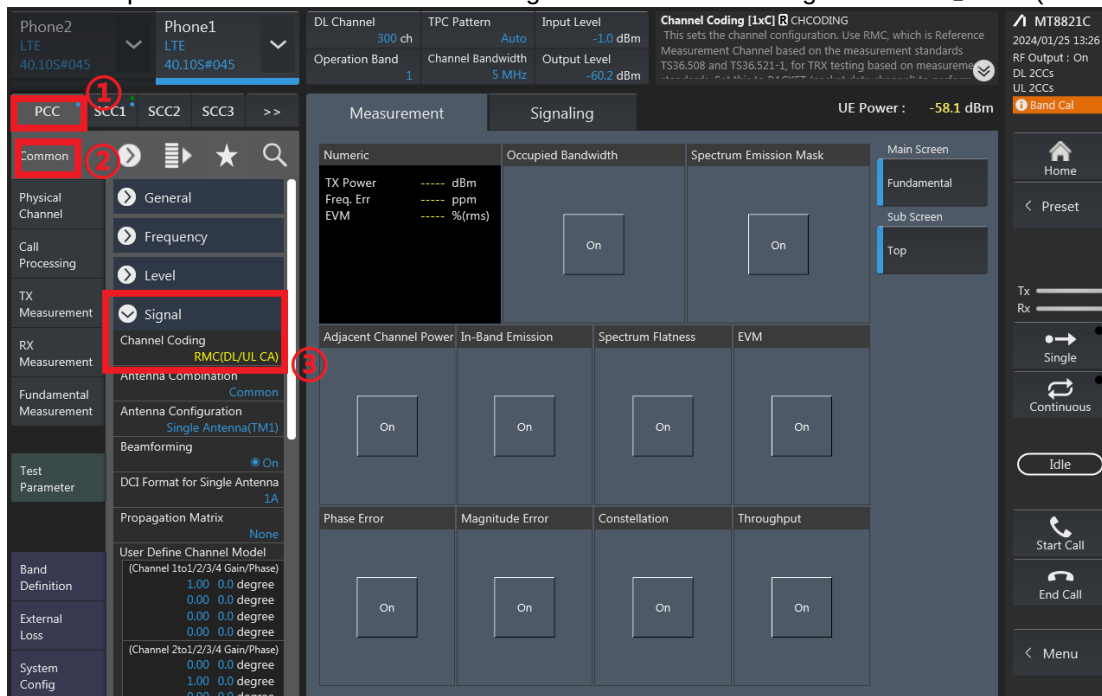
1. Change the Scenario in the Configuration of Phone1 LTE Signaling and Preset.



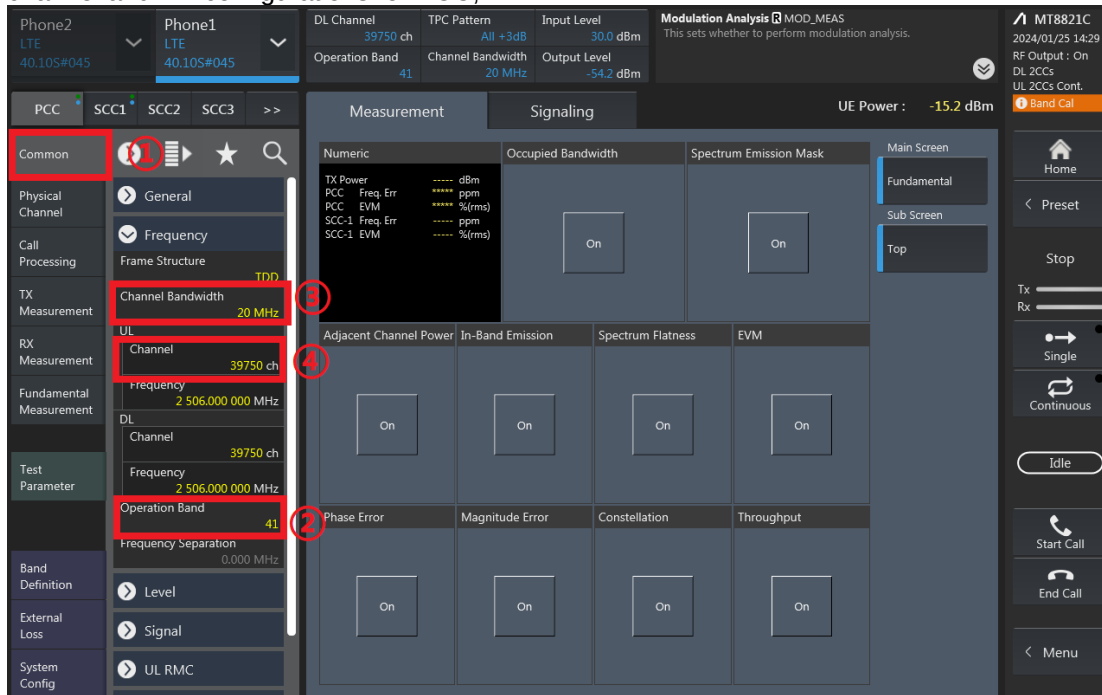
2. If Select "RMC (DL/UL CA)" for Uplink Carrier Aggregation;
If Select "RMC (DL CA)" for Downlink Carrier Aggregation.

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;



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 Occupied Bandwidth Spectrum Emission Mask

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

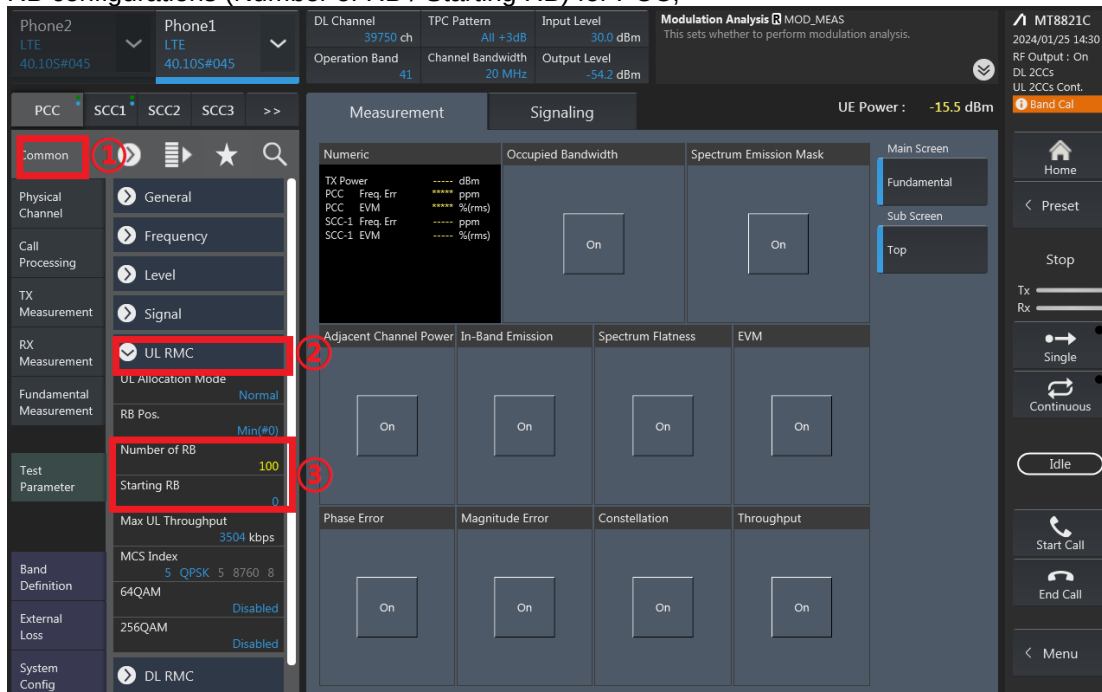
Adjacent Channel Power In-Band Emission Spectrum Flatness EVM

Phase Error Magnitude Error Constellation Throughput

Main Screen Fundamental Sub Screen Top

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

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 Occupied Bandwidth Spectrum Emission Mask

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

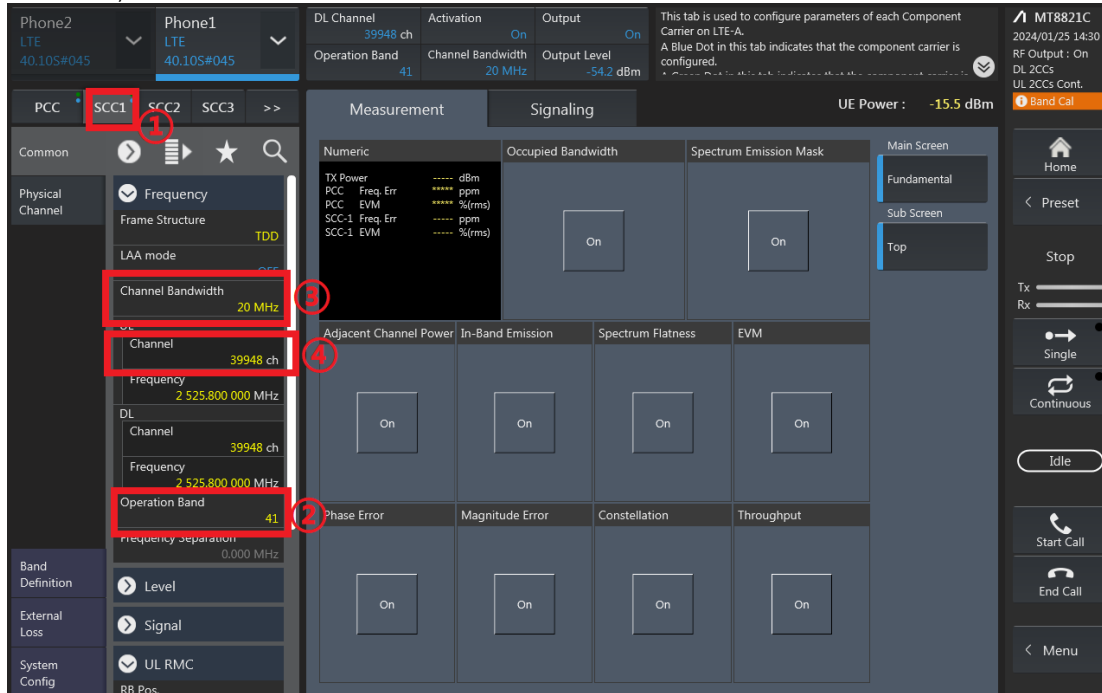
Adjacent Channel Power In-Band Emission Spectrum Flatness EVM

Phase Error Magnitude Error Constellation Throughput

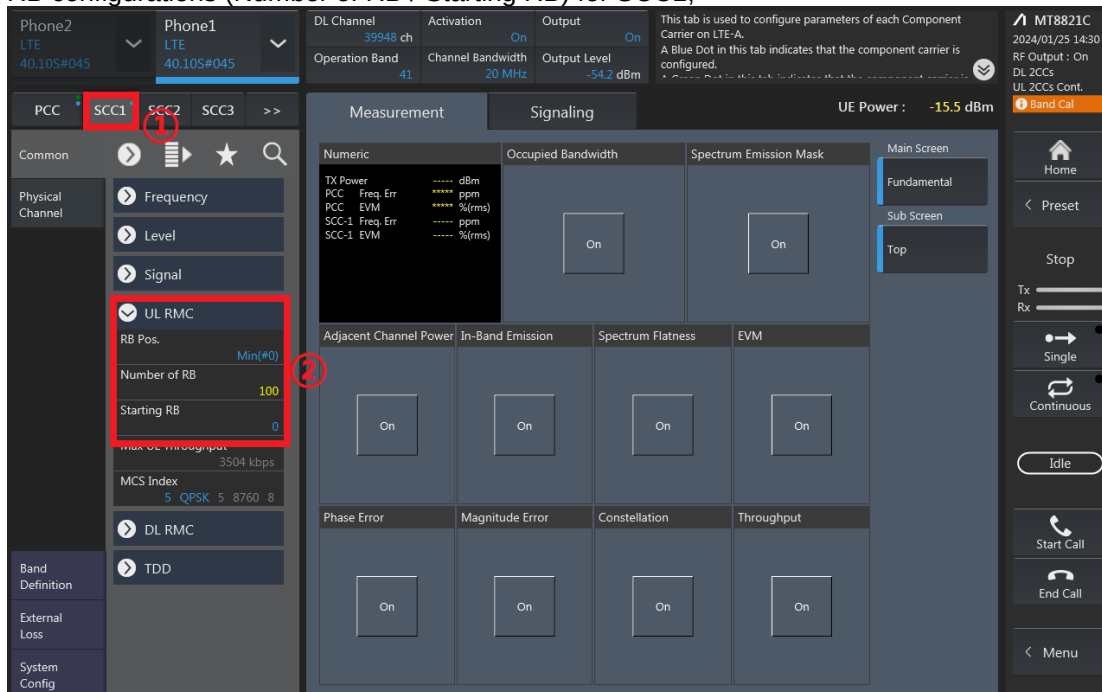
Main Screen Fundamental Sub Screen Top

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

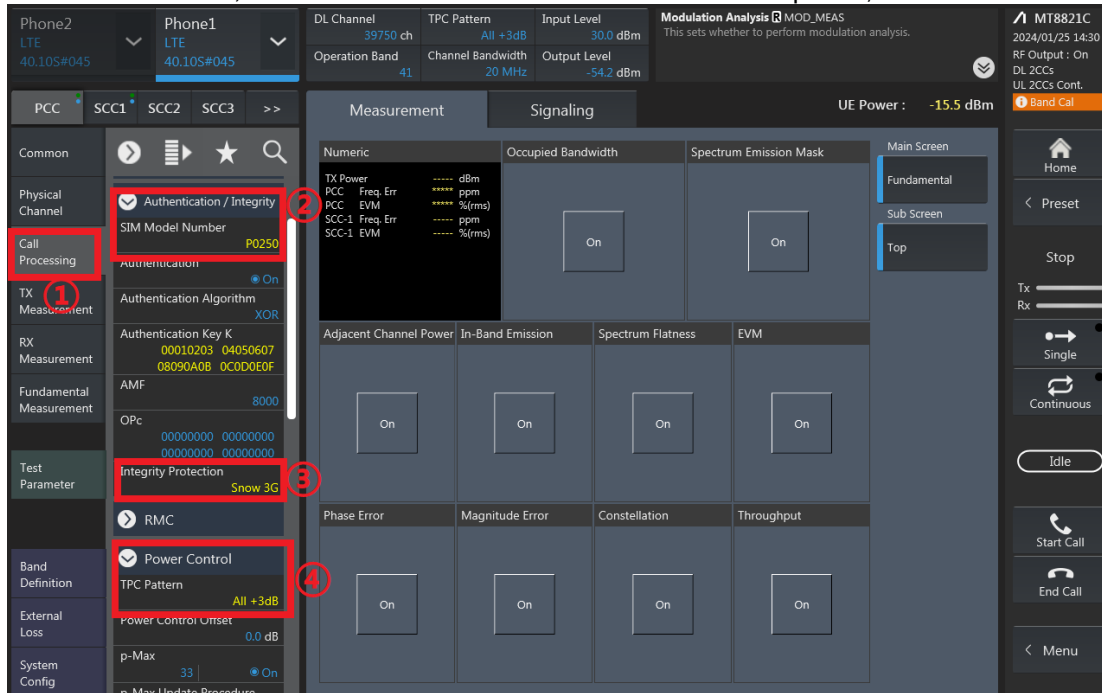
4. SCC parameter Settings: Select the SCC1 tab, Set operating band, BW, channel, and RB configurations for SCC1;



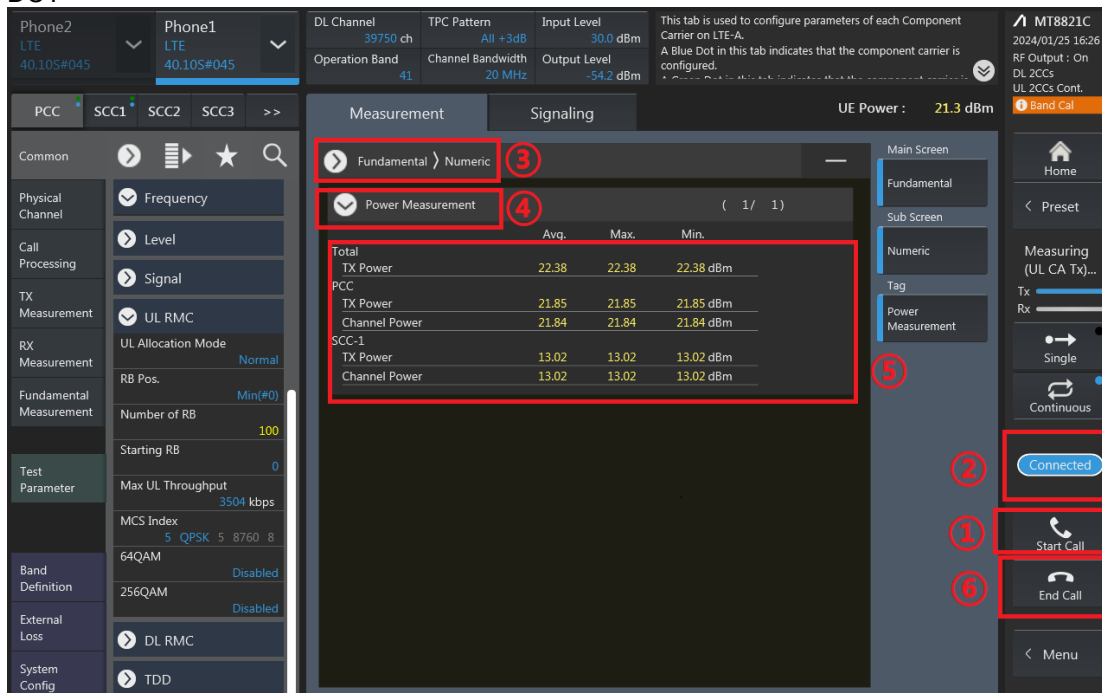
RB configurations (Number of RB / Starting RB) for SCC1;



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.

Uplink CA Power

Ant 1 Full Power								
CA_7C								
Combination 20MHz+20MHz (1RB+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	22.49	24.00
21100	21298	QPSK	1	99	1	0	22.64	24.00
21350	21152	QPSK	1	0	1	99	22.58	24.00

Ant 1 Full Power								
CA_38C								
Combination 20MHz+20MHz (1RB+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	22.78	24.00
37901	38099	QPSK	1	99	1	0	22.85	24.00
38150	37952	QPSK	1	0	1	99	22.63	24.00

Ant 1 Full Power								
CA_41C 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		
39750	39948	QPSK	1	99	1	0	22.55	24.00
40185	40383	QPSK	1	99	1	0	22.56	24.00
40620	40818	QPSK	1	99	1	0	22.79	24.00
41055	41253	QPSK	1	99	1	0	22.48	24.00
41490	41292	QPSK	1	0	1	99	22.43	24.00

Ant 1 Full Power								
CA_41C HPUE 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		
39750	39948	QPSK	1	99	1	0	25.70	27.00
40185	40383	QPSK	1	99	1	0	25.55	27.00
40620	40818	QPSK	1	99	1	0	25.73	27.00
41055	41253	QPSK	1	99	1	0	25.39	27.00
41490	41292	QPSK	1	0	1	99	25.39	27.00

Uplink CA Power

Ant 1 ECI2							
CA_7C							
Combination 20MHz+20MHz (1RB+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	22.49
21100	21298	QPSK	1	99	1	0	22.64
21350	21152	QPSK	1	0	1	99	22.58

Ant 1 ECI2							
CA_38C							
Combination 20MHz+20MHz (1RB+100RB)							
PCC Channel	SCC Channel	Modulation	PCC		SCC		Tune up Power (dBm)
			RB Size	RB offset	RB Size	RB offset	
37850	38048	QPSK	1	99	1	0	22.78
37901	38099	QPSK	1	99	1	0	22.85
38150	37952	QPSK	1	0	1	99	22.63

Ant 1 ECI2							
CA_41C Ant 2							
Combination 20MHz+20MHz (100RB+100RB)							
PCC Channel	SCC Channel	Modulation	PCC		SCC		Tune up Power (dBm)
			RB Size	RB offset	RB Size	RB offset	
39750	39948	QPSK	1	99	1	0	22.55
40185	40383	QPSK	1	99	1	0	22.56
40620	40818	QPSK	1	99	1	0	22.79
41055	41253	QPSK	1	99	1	0	22.48
41490	41292	QPSK	1	0	1	99	22.43

Ant 1 ECI2							
CA_41C HPUE Ant 2							
Combination 20MHz+20MHz (100RB+100RB)							
PCC Channel	SCC Channel	Modulation	PCC		SCC		Tune up Power (dBm)
			RB Size	RB offset	RB Size	RB offset	
39750	39948	QPSK	1	99	1	0	25.70
40185	40383	QPSK	1	99	1	0	25.55
40620	40818	QPSK	1	99	1	0	25.73
41055	41253	QPSK	1	99	1	0	25.39
41490	41292	QPSK	1	0	1	99	25.39

Uplink CA Power

Ant 1 ECI3								
CA_7C								
Combination 20MHz+20MHz (1RB+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	18.10	19.60
21100	21298	QPSK	1	99	1	0	18.33	19.60
21350	21152	QPSK	1	0	1	99	18.14	19.60

Ant 1 ECI3								
CA_38C								
Combination 20MHz+20MHz (1RB+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	22.78	24.00
37901	38099	QPSK	1	99	1	0	22.85	24.00
38150	37952	QPSK	1	0	1	99	22.63	24.00

Ant 1 ECI3								
CA_41C 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		
39750	39948	QPSK	1	99	1	0	22.55	24.00
40185	40383	QPSK	1	99	1	0	22.56	24.00
40620	40818	QPSK	1	99	1	0	22.79	24.00
41055	41253	QPSK	1	99	1	0	22.48	24.00
41490	41292	QPSK	1	0	1	99	22.43	24.00

Ant 1 ECI3								
CA_41C HPUE 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		
39750	39948	QPSK	1	99	1	0	25.70	27.00
40185	40383	QPSK	1	99	1	0	25.55	27.00
40620	40818	QPSK	1	99	1	0	25.73	27.00
41055	41253	QPSK	1	99	1	0	25.39	27.00
41490	41292	QPSK	1	0	1	99	25.39	27.00

Uplink CA Power

Ant 1 ECI6							
CA_7C							
Combination 20MHz+20MHz (1RB+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	20.22
21100	21298	QPSK	1	99	1	0	20.38
21350	21152	QPSK	1	0	1	99	20.08

Ant 1 ECI6							
CA_38C							
Combination 20MHz+20MHz (1RB+100RB)							
PCC Channel	SCC Channel	Modulation	PCC		SCC		Tune up Power (dBm)
			RB Size	RB offset	RB Size	RB offset	
37850	38048	QPSK	1	99	1	0	22.78
37901	38099	QPSK	1	99	1	0	22.85
38150	37952	QPSK	1	0	1	99	22.63

Ant 1 ECI6							
CA_41C Ant 2							
Combination 20MHz+20MHz (100RB+100RB)							
PCC Channel	SCC Channel	Modulation	PCC		SCC		Tune up Power (dBm)
			RB Size	RB offset	RB Size	RB offset	
39750	39948	QPSK	1	99	1	0	22.55
40185	40383	QPSK	1	99	1	0	22.56
40620	40818	QPSK	1	99	1	0	22.79
41055	41253	QPSK	1	99	1	0	22.48
41490	41292	QPSK	1	0	1	99	22.43

Ant 1 ECI6							
CA_41C HPUE Ant 2							
Combination 20MHz+20MHz (100RB+100RB)							
PCC Channel	SCC Channel	Modulation	PCC		SCC		Tune up Power (dBm)
			RB Size	RB offset	RB Size	RB offset	
39750	39948	QPSK	1	99	1	0	25.70
40185	40383	QPSK	1	99	1	0	25.55
40620	40818	QPSK	1	99	1	0	25.73
41055	41253	QPSK	1	99	1	0	25.39
41490	41292	QPSK	1	0	1	99	25.39

Uplink CA Power

Ant 1 ECI7								
CA_7C								
Combination 20MHz+20MHz (1RB+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	18.18	19.40
21100	21298	QPSK	1	99	1	0	18.42	19.40
21350	21152	QPSK	1	0	1	99	18.16	19.40

Ant 1 ECI7								
CA_38C								
Combination 20MHz+20MHz (1RB+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	20.89	22.90
37901	38099	QPSK	1	99	1	0	21.02	22.90
38150	37952	QPSK	1	0	1	99	20.90	22.90

Ant 1 ECI7								
CA_41C 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		
39750	39948	QPSK	1	99	1	0	20.95	22.20
40185	40383	QPSK	1	99	1	0	20.94	22.20
40620	40818	QPSK	1	99	1	0	21.17	22.20
41055	41253	QPSK	1	99	1	0	21.01	22.20
41490	41292	QPSK	1	0	1	99	20.91	22.20

Ant 1 ECI7								
CA_41C HPUE 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		
39750	39948	QPSK	1	99	1	0	22.62	23.80
40185	40383	QPSK	1	99	1	0	22.66	23.80
40620	40818	QPSK	1	99	1	0	22.73	23.80
41055	41253	QPSK	1	99	1	0	22.60	23.80
41490	41292	QPSK	1	0	1	99	22.64	23.80