



Power measurement connection diagram:

The power measurement for 3G/LTE/5G FR1 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 3G/LTE/5G FR1 and DL CA.

<WCDMA>

The screenshot displays a mobile measurement tool interface for WCDMA. At the top, it shows two phone configurations: Phone2 (LTE, 40.205#032) and Phone1 (W-CDMA, 40.00 #013). A table of channel and frequency information is visible:

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

Below this, the 'Measurement' section is active, showing 'Fundamental' and 'Numeric' views. The 'Power Measurement' section is highlighted with a red box, displaying:

- TX Power: 23.28 dBm

Other measurement metrics include 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)), and Peak Code Domain Error (PCDE: -39.86 dB).

On the left sidebar, the 'Power Control' setting is highlighted with a red box, showing 'All 1'.

<LTE>

The screenshot shows the LTE test equipment interface. At the top, it displays 'Phone2' and 'Phone1' both set to LTE 40.205#021. The 'Measurement' tab is active, showing 'TX Power' at 23.01 dBm. The 'Signaling' tab shows 'Occupied Bandwidth' and 'Spectrum Emission Mask' both set to 'On'. The 'TDD' configuration is highlighted in the left sidebar, showing 'Uplink Downlink Configuration 1: (5ms) D S U U D D S U U D' and 'Special Subframe Configuration 4'. The 'UE Power' is 23.4 dBm. The interface also includes a 'Main Screen' section with 'Fundamental', 'Sub Screen', and 'Top' options, and a 'Connected' status indicator.

<LTE TDD Power class 3>

The screenshot shows the LTE TDD Power class 3 test equipment interface. At the top, it displays 'Phone2' and 'Phone1' both set to LTE 40.205#021. The 'Measurement' tab is active, showing 'TX Power' at 23.19 dBm. The 'Signaling' tab shows 'Occupied Bandwidth' and 'Spectrum Emission Mask' both set to 'On'. The 'TDD - Special Subframe Configuration' is highlighted in the left sidebar, showing 'Uplink Downlink Configuration 0: (5ms) D S U U U D S U U U' and 'Special Subframe Configuration 5'. The 'UE Power' is 23.5 dBm. The interface also includes a 'Main Screen' section with 'Fundamental', 'Sub Screen', and 'Top' options, and a 'Connected' status indicator.



<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 TDDSSFCONF
 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: Numeric TX Power 26.16 dBm

Signaling: Occupied Bandwidth, Spectrum Emission Mask (On)

Adjacent Channel Power, In-Band Emission, Spectrum Flatness, EVM (On)

Phase Error, Magnitude Error, Constellation, Throughput (On)

Test Parameter: Uplink Downlink Configuration 1: (5ms) D S U U D D S U U D | Special Subframe Configuration 5

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: 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

<5G NR FR1>

DL RMC Configuration:

- 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 Results:

- Tx Power: 25.88 dBm
- OBW: 18.787 MHz
- ACLR(-): -53.74 dB
- ACLR(+): -55.90 dB

Modulation: PI/2 BPSK

Other Parameters:

- 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
- Aggregation Level: 4

DL Subcarrier Spacing Configuration:

- DL Subcarrier Spacing(data): 15kHz
- UL Subcarrier Spacing(data): 15kHz

Measurement Results:

- Tx Power: 25.83 dBm
- OBW: 18.787 MHz
- ACLR(-): -53.70 dB
- ACLR(+): -55.93 dB

Other Parameters:

- N_TAoffset: NR only
- BW Setting Mode: Symmetric
- DL Channel Bandwidth: 20MHz
- UL Channel Bandwidth: 20MHz
- DL Number of Additional BWP: 0
- UL Number of Additional BWP: 0
- BWP1: 25 0 25 0
- BWP2: 25 0 25 0
- BWP3: 25 0 25 0
- BWP4: 25 0 25 0
- BWP Switch Delay Type: Type2
- BWP Configuration Option: Option2
- Active DL BWP: 0
- Active UL BWP: 0



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

Power Measurement - Count PWR_AVG

MT8000A
2024/05/24 14:12
Ref. Int

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

Common

Level / Freq Cell

Level / Freq Routing / ARB

Physical Channel

Call Processing

Tx Measurement

Rx Measurement

OTA Position

Fundamental Measurement

Test Parameter

External Loss

System Config

Frequency

UL

Offset To Carrier 504

PointA Channel 116048

PointA Frequency 580.240 000 MHz

Center Channel 136100

Center Frequency 680.500 000 MHz

7.5 kHz Frequency Shift Off

DL

Offset To Carrier 102

PointA Channel 121320

PointA Frequency 606.600 000 MHz

Center Channel 126900

Center Frequency 634.500 000 MHz

Absolute Frequency SSB 125550

SSB Frequency 627.750 000 MHz

Channel Setting Mode Lowest GSCN

Operation Band 71

Measurement

Numeric

Tx Power 25.84 dBm

OBW 18.787 MHz

ACLR(-) -53.57 dB

ACLR(+) -55.98 dB

Occupied Bandwidth

OBW 18.787 MHz

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 : 25.9 dBm

Main Screen

Fundamental

Sub Screen

Top

Home

Preset

Measuring...

Tx

Rx

Single

Continuous

NR

Connected

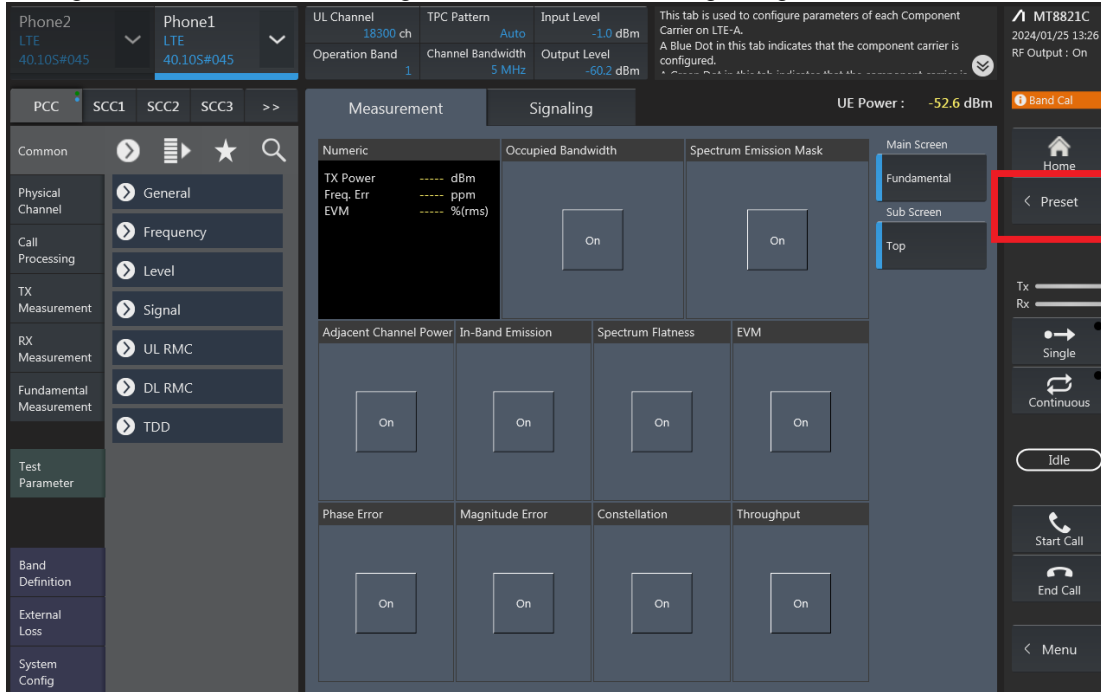
Start Call

End Call

Menu

LTE Downlink Carrier Aggregation configurations:

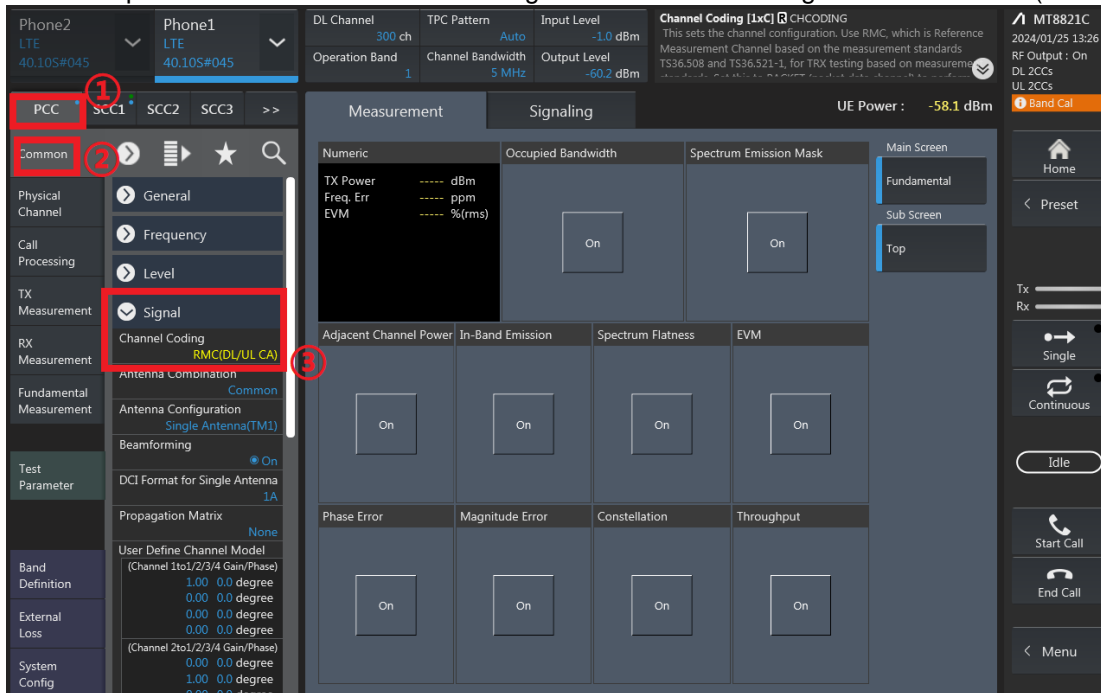
1. Change the Scenario in the Configuration of Phone1 LTE Signaling and Preset.



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)】



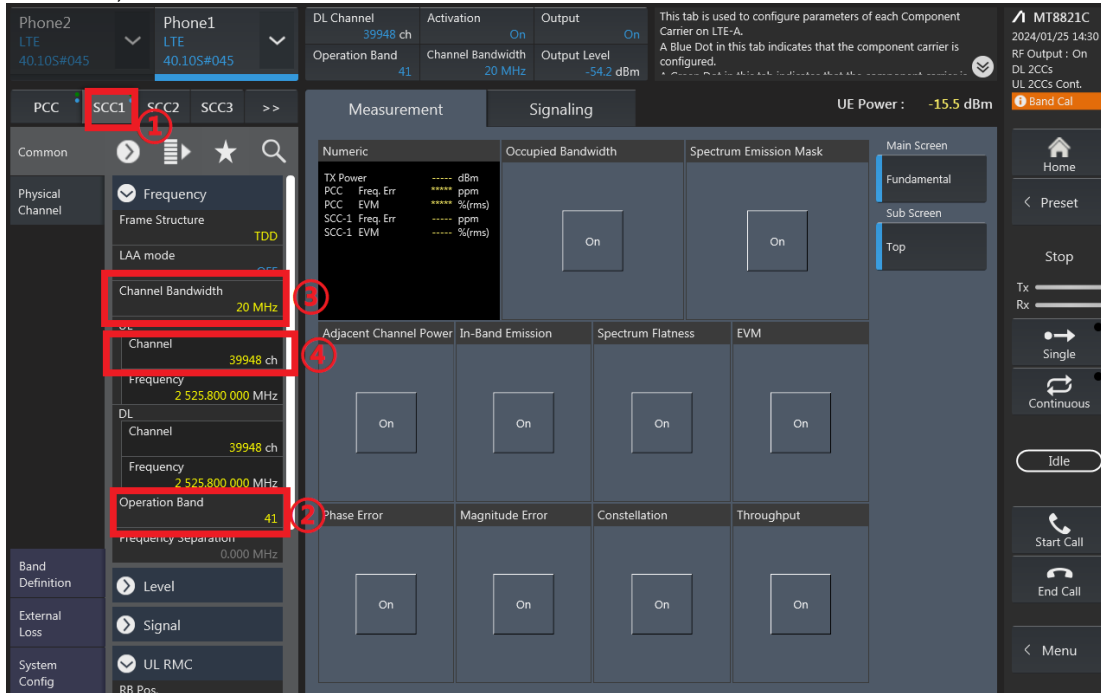
3. PCC parameter Settings: on the screen, and then select the PCC tab and Set operating band, BW, channel and RB configurations for PCC;

The screenshot shows the PCC parameter settings interface. The left sidebar has 'Common' selected. The main area shows 'Measurement' and 'Signaling' tabs. Red boxes and numbers highlight: 1. Common tab, 2. Operation Band (41), 3. Channel Bandwidth (20 MHz), 4. Channel (39750 ch).

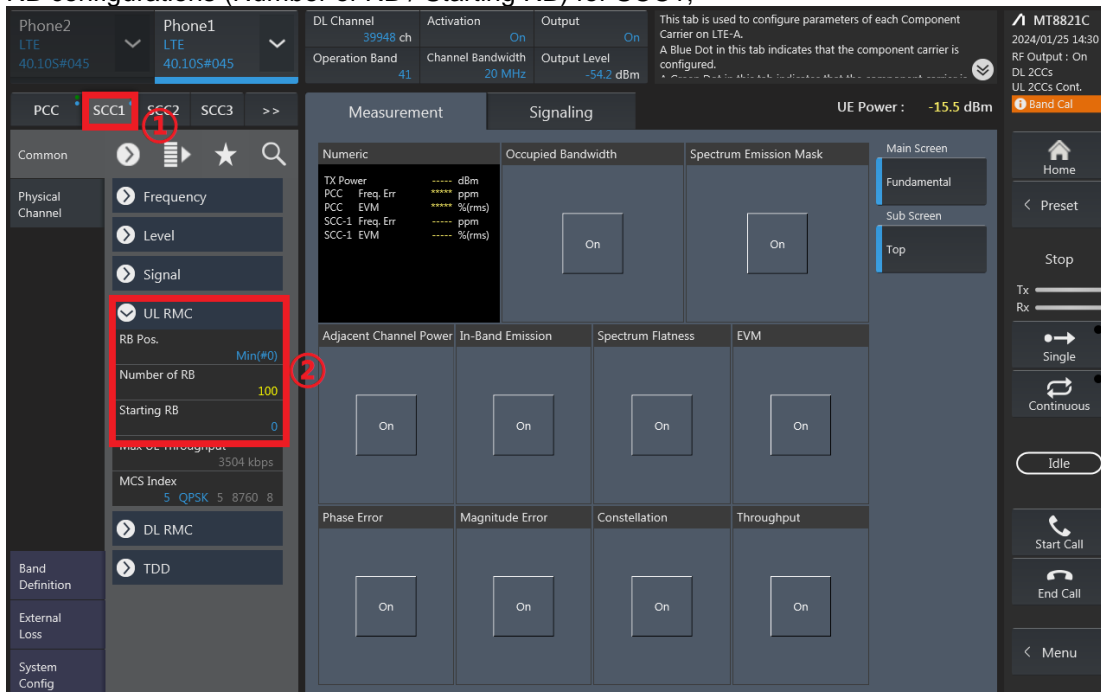
RB configurations (Number of RB / Starting RB) for PCC;

The screenshot shows the RB configurations interface. The left sidebar has 'UL RMC' selected. The main area shows 'Measurement' and 'Signaling' tabs. Red boxes and numbers highlight: 1. UL RMC, 2. UL Allocation Mode (Normal), 3. Number of RB (100), 4. Starting RB (0).

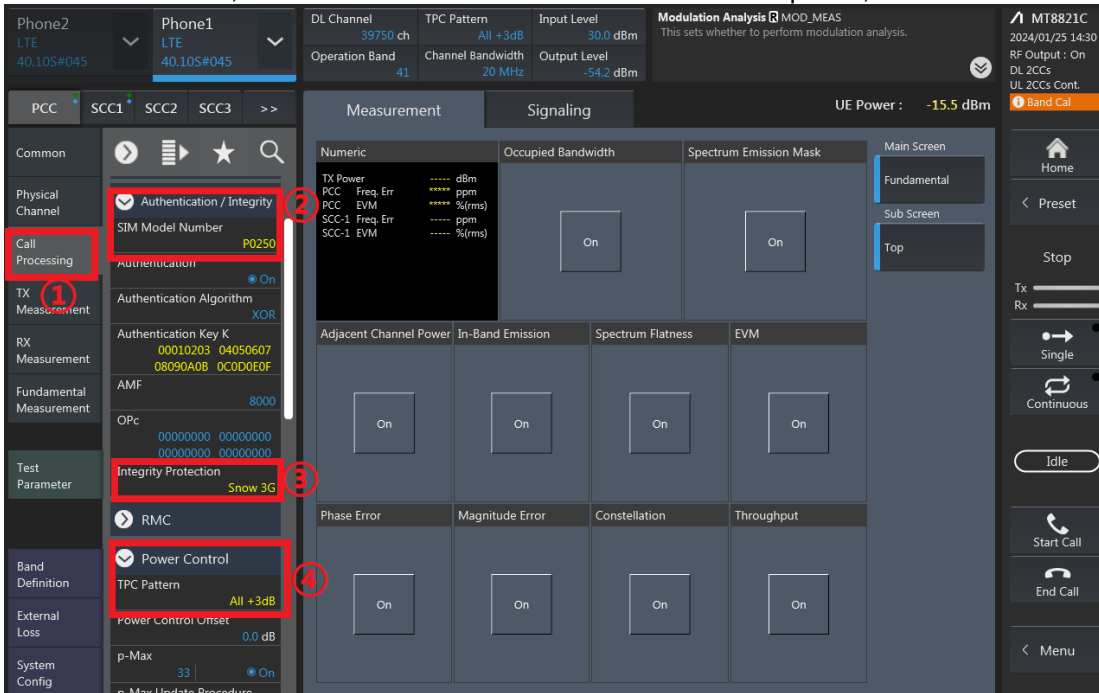
4. SCC parameter Settings: Select the SCC1 tab, Set operating band, BW, channel, and RB configurations for SCC1;



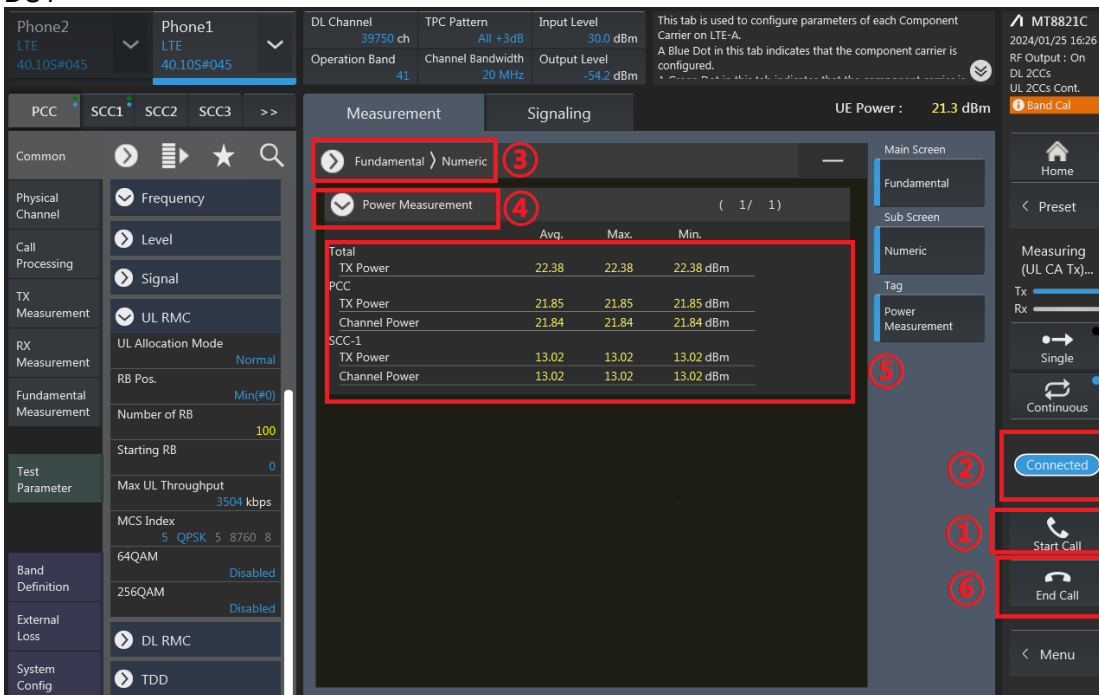
RB configurations (Number of RB / Starting RB) for SCC1;



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

LTE bandS	Modulation	BW (MHz)	Ch.	Freq. (MHz)	RB offset	LTE Rel 8 TX power (dBm)	DL 4X4 MIMO TX power (dBm)	Delta
LTE Band 42	QPSK	20M	42190	3460	1/0	22.98	22.87	0.11
LTE Band 43	QPSK	20M	44590	3650	1/0	22.72	22.67	0.05
LTE Band 38	QPSK	20M	38000	2595	1/0	23.15	23.07	0.08
LTE Band 7	QPSK	20M	21100	2535	1/0	22.21	22.17	0.04
LTE Band 41	QPSK	20M	40620	2593	1/0	23.14	23.11	0.03
LTE Band 48	QPSK	20M	55830	3609	1/0	22.72	22.67	0.05

Downlink CA Power

CA List	2CA DL													Power	
	PCD						SCC						DL Antenna Configuration	With CA Tx. Power (dBm)	Without CA Tx. Power (dBm)
	LTE Band	BW (MHz)	Ant	UL Freq (MHz)	UL Chann	Mod.	UL# RB	UL RB Offset	DL Antenna Configuration	LTE Band	BW (MHz)	DL Freq			
CA_2A-2A	Band 2	20M	Ant1	1880	1890	QPSK	1	0		Band 2	5M	1987.5	1175	23.29	23.41
CA_2A-4A	Band 2	20M	Ant1	1880	1890	QPSK	1	0		Band 4	20M	2132.5	2175	23.29	23.41
CA_2A-5A	Band 2	20M	Ant1	1880	1890	QPSK	1	0		Band 5	10M	881.5	2525	23.41	23.41
CA_2A-7A	Band 2	20M	Ant1	1880	1890	QPSK	1	0		Band 7	20M	2655	3100	23.19	23.41
CA_2A-12A	Band 2	20M	Ant2	2535	2110	QPSK	1	0	4x4MIMO	Band 2	20M	1980	900	22.09	22.21
CA_2A-13A	Band 2	20M	Ant1	1880	1890	QPSK	1	0		Band 13	10M	751	5230	23.22	23.41
CA_2A-14A	Band 2	20M	Ant1	1880	1890	QPSK	1	0		Band 2	20M	1960	900	24.05	24.11
CA_2A-66A	Band 2	20M	Ant1	1880	1890	QPSK	1	0		Band 66	20M	2155	66886	23.41	23.41
CA_2A-71A	Band 2	20M	Ant1	1880	1890	QPSK	1	0		Band 71	20M	683	68786	23.29	23.41
CA_4A-4A	Band 4	20M	Ant1	1732.5	20175	QPSK	1	0		Band 4	5M	2152.5	2375	23.11	23.33
CA_4A-5A	Band 4	20M	Ant1	1732.5	20175	QPSK	1	0		Band 5	10M	881.5	2525	23.15	23.33
CA_4A-7A	Band 4	20M	Ant1	1732.5	20175	QPSK	1	0		Band 7	20M	2655	3100	23.14	23.33
CA_4A-12A	Band 4	20M	Ant2	2535	2110	QPSK	1	0	4x4MIMO	Band 4	20M	2132.5	2175	23.06	23.21
CA_4A-13A	Band 4	20M	Ant1	1732.5	20175	QPSK	1	0		Band 13	10M	751	5230	23.24	23.33
CA_4A-48A	Band 4	20M	Ant1	1732.5	20175	QPSK	1	0		Band 48	20M	3609	56830	23.11	23.33
CA_4A-71A	Band 4	20M	Ant1	1732.5	20175	QPSK	1	0		Band 71	20M	683	68786	23.23	23.33
CA_5A-5A	Band 5	10M	Ant1	836.5	20525	QPSK	1	0		Band 5	5M	881.5	2625	23.62	23.71
CA_5A-7A	Band 5	10M	Ant1	836.5	20525	QPSK	1	0		Band 7	20M	2655	3100	23.94	24.03
CA_5A-48A	Band 5	10M	Ant1	836.5	20525	QPSK	1	0	4x4MIMO	Band 48	20M	3609	56830	23.05	24.03
CA_5A-66A	Band 5	10M	Ant1	836.5	20525	QPSK	1	0		Band 66	20M	2155	66886	23.87	24.03
CA_5A-71A	Band 5	10M	Ant1	836.5	20525	QPSK	1	0		Band 71	20M	683	68786	23.20	23.36
CA_7A-7A	Band 7	20M	Ant2	2535	2110	QPSK	1	0	4x4MIMO	Band 7	5M	2687.5	3425	22.14	22.21
CA_7A-12A	Band 7	20M	Ant2	2535	2110	QPSK	1	0	4x4MIMO	Band 12	10M	737.5	5095	22.16	22.21
CA_7A-66A	Band 7	20M	Ant2	2535	2110	QPSK	1	0	4x4MIMO	Band 66	20M	2155	66886	22.02	22.21
CA_7C	Band 7	20M	Ant2	2535	2110	QPSK	1	0	4x4MIMO	Band 7	20M	2554.8	3296	22.06	22.21
CA_12A-66A	Band 12	10M	Ant1	707.5	23095	QPSK	1	0		Band 66	20M	2155	66886	24.09	24.10
CA_12B	Band 12	10M	Ant1	707.5	23095	QPSK	1	0		Band 12	5M	743.5	5155	24.02	24.10
CA_13A-48A	Band 13	10M	Ant1	782	23230	QPSK	1	0		Band 48	20M	3609	56830	24.04	24.11
CA_13A-66A	Band 13	10M	Ant1	782	23230	QPSK	1	0		Band 66	20M	2155	66886	23.94	24.11
CA_14A-66A	Band 14	10M	Ant1	793	23330	QPSK	1	0		Band 13	10M	751	5230	23.13	23.36
CA_14A-66A	Band 14	10M	Ant1	793	23330	QPSK	1	0		Band 66	20M	2155	66886	23.96	24.13
CA_14A-66A	Band 66	20M	Ant1	1745	132322	QPSK	1	0		Band 14	10M	763	5330	23.20	23.36
CA_14A-71A	Band 41	20M	Ant2	2593	46920	QPSK	1	0	4x4MIMO	Band 41	5M	2687.5	3195	22.90	23.14
CA_14C	Band 41	20M	Ant2	2593	46920	QPSK	1	0	4x4MIMO	Band 41	20M	2012.8	45818	22.91	23.14
CA_48A-48A	Band 48	20M	Ant6	3609	56830	QPSK	1	0	4x4MIMO	Band 48	5M	3607.5	56715	22.91	22.72
CA_48C	Band 48	20M	Ant6	3609	56830	QPSK	1	0	4x4MIMO	Band 48	20M	3628.8	56028	22.67	22.72
CA_48A-71A	Band 71	20M	Ant1	683	133322	QPSK	1	0		Band 48	20M	3609	56830	23.65	23.71
CA_66A-66A	Band 66	20M	Ant1	1745	132322	QPSK	1	0		Band 66	5M	2197.5	67311	23.14	23.36
CA_66A-71A	Band 66	20M	Ant1	1745	132322	QPSK	1	0		Band 71	20M	683	68786	23.36	23.36
CA_66B	Band 66	20M	Ant1	1745	132322	QPSK	1	0		Band 66	20M	2155	66886	23.56	23.71
CA_66B	Band 66	20M	Ant1	1745	132322	QPSK	1	0		Band 66	5M	2164.3	69979	23.29	23.36
CA_66C	Band 66	20M	Ant1	1745	132322	QPSK	1	0		Band 66	20M	2164.8	69984	23.32	23.36
CA_3C	Band 2	20M	Ant1	1880	1890	QPSK	1	0		Band 2	20M	1979.8	1168	23.92	23.36
CA_2A-48A	Band 2	20M	Ant1	1880	1890	QPSK	1	0		Band 48	20M	3609	56830	23.24	23.36
CA_48A-66A	Band 66	20M	Ant1	1745	132322	QPSK	1	0	4x4MIMO	Band 48	20M	3609	56830	23.13	23.36