

Appendix I. – Down-link CA Power Measurement / 5G NR Call Box Setup

1. LTE Down-link Carrier Aggregation Conducted Powers

SAR test exclusion for LTE downlink Carrier Aggregation is determined by power measurements according to the number component carriers (CCs) supported by test product implementation. For those configurations required by April 2018 TCBC Workshop notes, conducted power measurements with LTE Carrier Aggregation (CA) (downlink only) active are made in accordance to KDB Publication 941225 D05Av01r02. The RRC connection is only handled by one cell, the primary component carrier (PCC) for downlink and uplink communications. After making a data connection to the PCC, the UE device adds secondary component carrier(s) (SCC) on the downlink only.

Downlink Carrier aggregation:

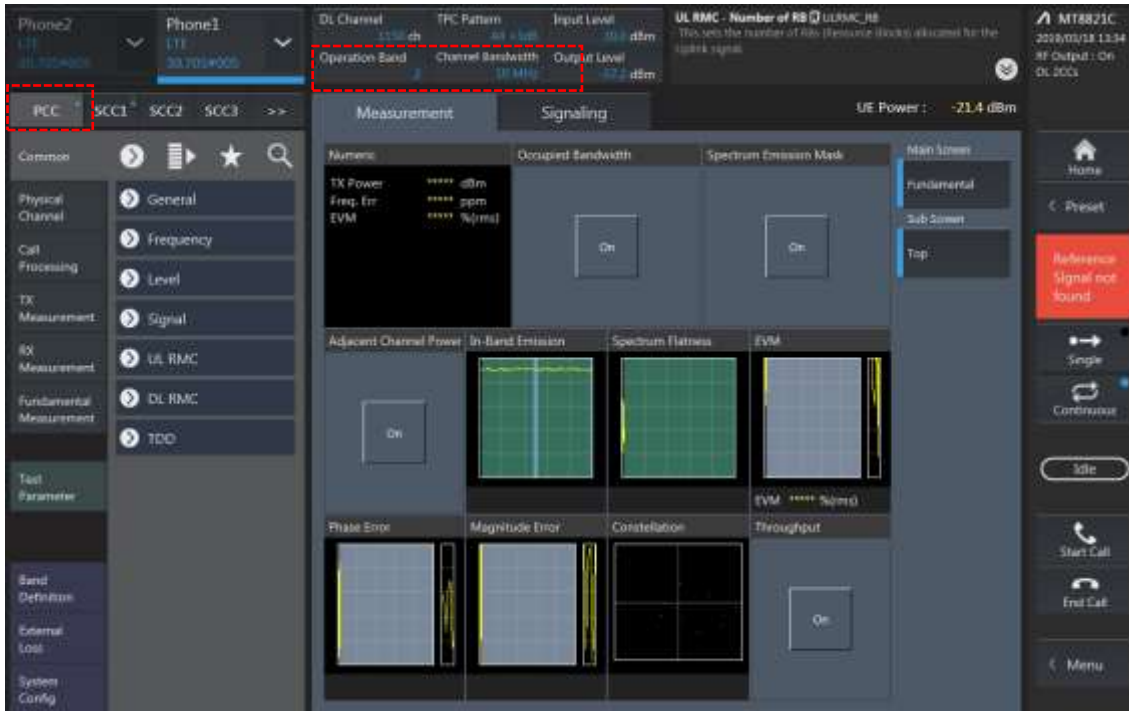
1. This device only supports downlink carrier aggregation. For every supported combination of downlink carrier aggregation, power measurements were performed with the downlink carrier aggregation active for the configuration with highest measured maximum conducted power with downlink carrier aggregation inactive measured among the channel bandwidth, modulation, and RB combinations in each frequency band.
2. All control and acknowledge data is sent on uplink channels that operate identical to specifications when downlink carrier aggregation is inactive.
3. Per FCC KDB publication 941225 D05A v01r02, Section C)3)b)ii), PCC uplink channel was selected at downlink carrier aggregation combinations. The downlink PCC channel was paired with the selected PCC uplink channel according to normal configurations without carrier aggregation.
4. For continuous intra-band carrier aggregation, the downlink channel spacing between the component carriers was set to multiple of 300kHz less than the nominal channel spacing defined in section 5.4.1A of 3GPP TS 36.521.
5. For non-continuous intra-band carrier aggregation, the downlink channel spacing between the component carriers was set to be larger than the nominal channel spacing and provided maximum separation between the component carriers.
6. All selected downlink channels remained fully within the downlink transmission band of the respective component carrier.



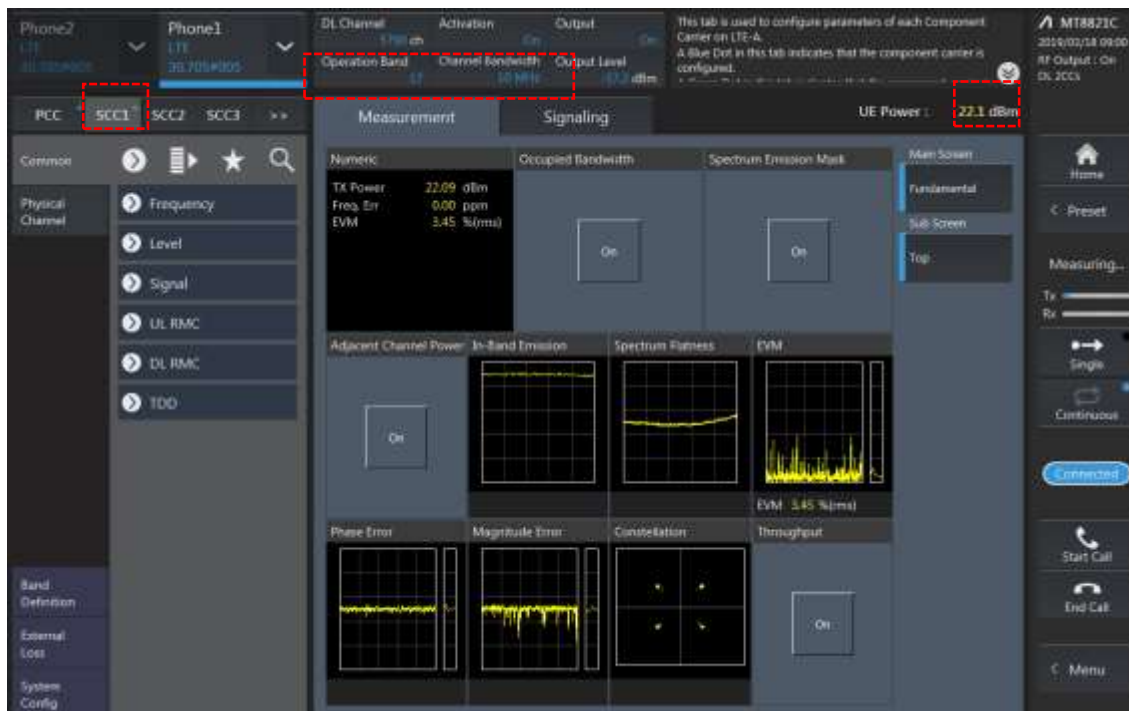
Power Measurement setup

LTE Down Link 2CA Call Setup

PCC Setting: Channel/ RB/ BW/ Modulation



SCC Setting: Channel/ RB/ BW/ Modulation and call Connection

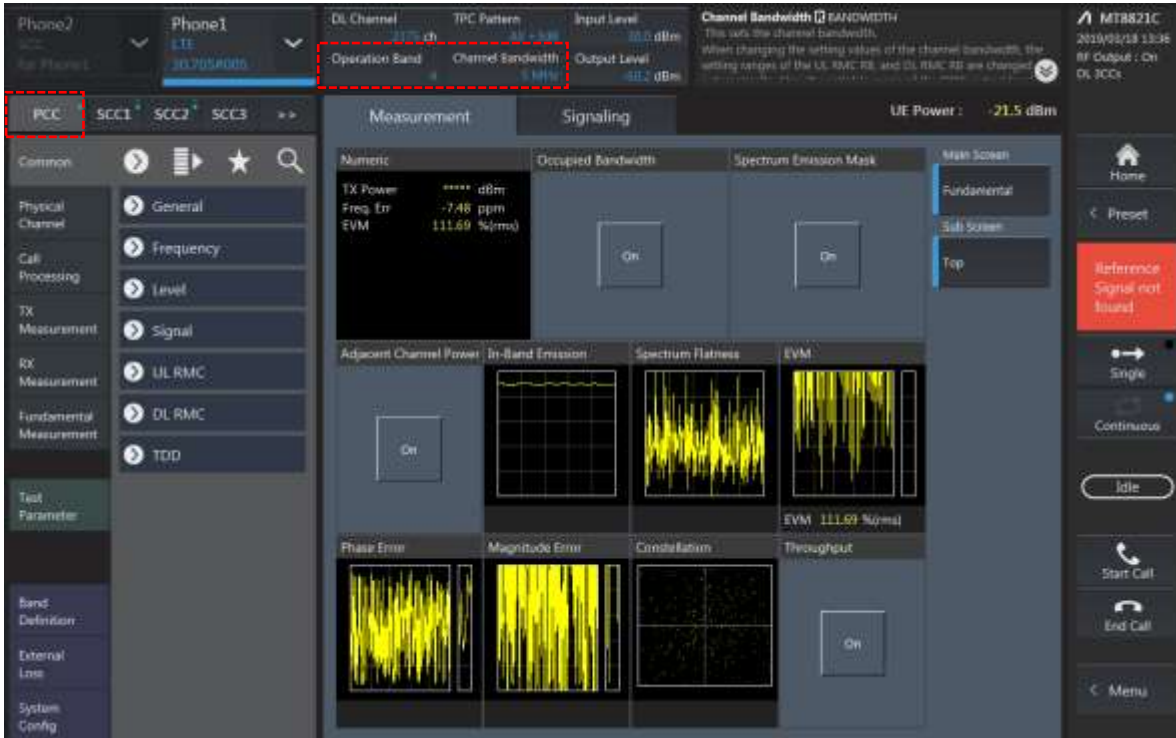


2CA Downlink Carrier aggregation Maximum conducted Powers

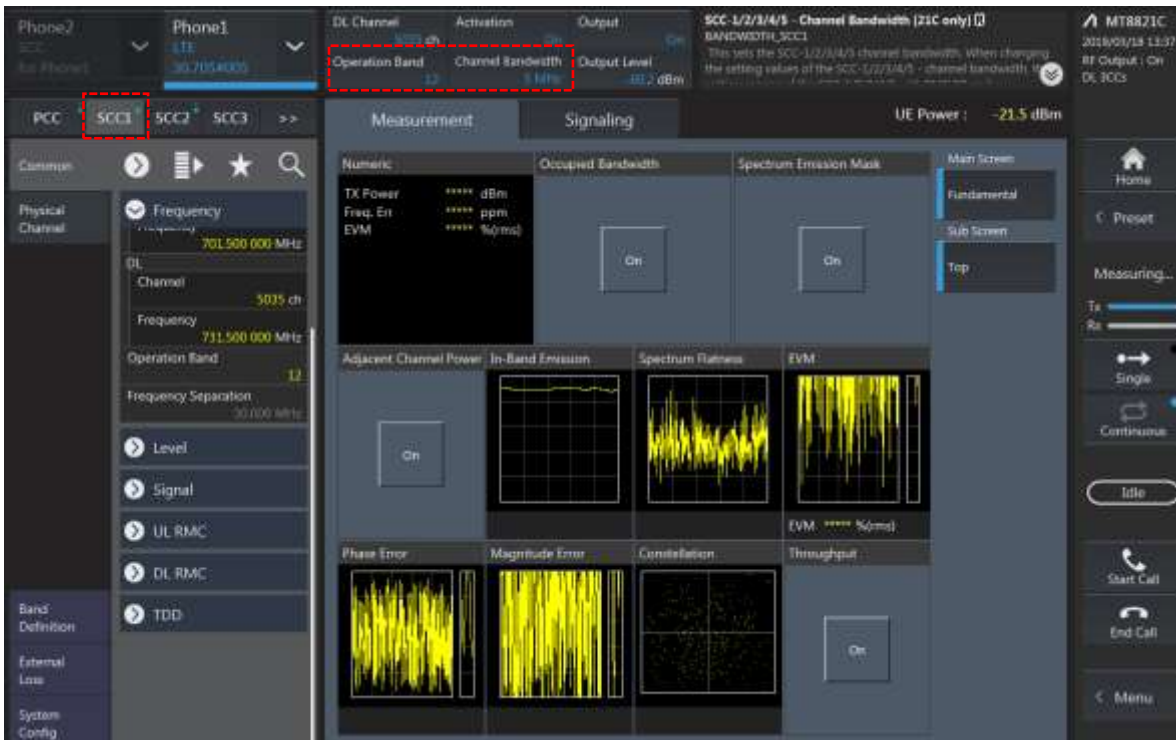
Combination	PCC									SCC				Tx Power		Deration (dB) (Z_T)
	Band	BW	PCC UL Channel	PCC UL Frequency	PCC DL Channel	PCC DL Frequency	Modulation	RB	offset	Band	BW	SCC DL Channel	SCC DL Frequency	LTE Single Carrier Tx Power (dBm)	LTE Tx Power with DL CA Enhancement (dB)	
CA_2A-2A	2	15	18675	1857.5	675	1937.5	QPSK	1	36	2	20	1100	1900	23.41	23.30	-0.11
CA_2C	2	15	18675	1857.5	675	1937.5	QPSK	1	36	2	20	846	1954.6	23.41	23.34	-0.07
CA_2A-12A(0,1)	2	15	18675	1857.5	675	1937.5	QPSK	1	36	12	10	5095	737.5	23.41	23.39	-0.02
CA_2A-12A(2)	2	10	18650	1855	650	1935	QPSK	1	0	12	10	5095	737.5	23.34	23.23	-0.11
CA_2A-12A	12	5	23155	713.5	5155	743.5	QPSK	1	24	2	10	900	1960	23.83	23.78	-0.05
CA_2A-17A	2	10	18650	1855	650	1935	QPSK	1	0	17	10	5790	740	23.34	23.26	-0.08
CA_2A-17A	17	5	23825	713.5	5825	743.5	QPSK	1	12	2	10	900	1960	23.82	23.71	-0.11
CA_4A-17A	4	5	20175	1732.5	2175	2132.5	QPSK	1	24	17	10	5790	740	23.64	23.53	-0.11
CA_4A-17A	17	5	23825	713.5	5825	743.5	QPSK	1	12	4	10	2175	2132.5	23.82	23.72	-0.10
CA_5A-41A	5	10	20525	836.5	2525	861.5	QPSK	1	0	41	20	40620	2503	23.88	23.81	-0.07
CA_5A-41A	41	5	40620	2503	40620	2503	QPSK	1	12	5	10	2525	861.5	23.55	23.43	-0.12
CA_41A-41A(0)	41	20	40620	2503	40620	2503	QPSK	1	0	41	20	39750	2506	23.55	23.48	-0.07
CA_41A-41A(1)	41	5	40620	2503	40620	2503	QPSK	1	12	41	20	39750	2506	23.55	23.48	-0.07
CA_66B	66	15	132322	1745	66786	2165	QPSK	1	74	66	5	66693	2135.7	24.04	24.00	-0.04
CA_66C	66	15	132322	1745	66786	2165	QPSK	1	74	66	20	66957	2182.1	24.04	23.93	-0.11

LTE Down Link 3CA Call Setup

1) PCC Setting: Channel /RB/BW/Modulation



2) SCC1 Setting: Channel /RB/BW/Modulation



3) SCC2 Setting (Channel /RB/BW/Modulation) and call Connection

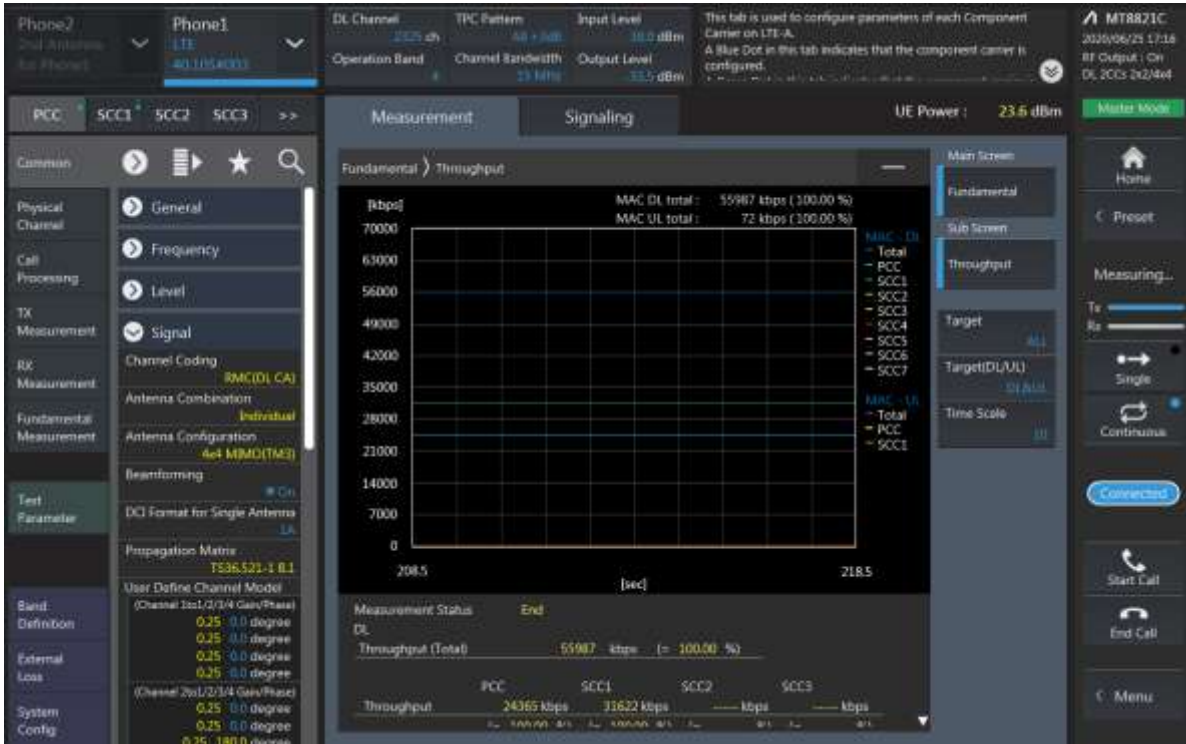


3CA Downlink Carrier aggregation Maximum conducted Powers

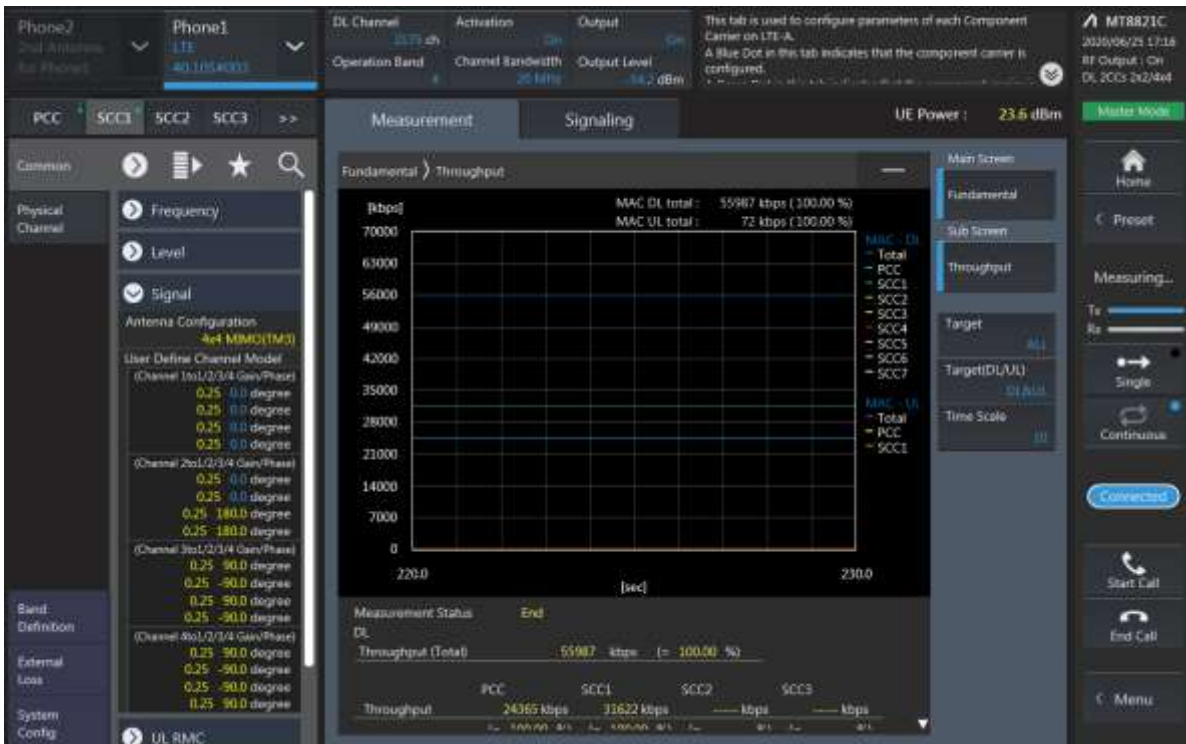
Combination	PCC									SCC				TCC				Tx Power		Dissipat (dB) (1)
	Band	BW	PCC DL Channel	PCC UL Frequency	PCC DL Channel	PCC DL Frequency	Modulation	RB	offset	Band	BW	SCC DL Channel	SCC DL Frequency	Band	BW	SCC DL Channel	SCC DL Frequency	EIRP Single Carrier (dBm)	EIRP Tx Power with CA (Maximum) (dBm)	
CA_2A-4A-5A	2	15	18675	1897.5	675	1937.5	QPSK	1	36	4	20	2175	2132.5	5	10	2525	881.5	23.41	23.41	0.00
CA_2A-4A-5A	4	5	19975	1712.5	1975	2112.5	QPSK	1	24	2	20	900	1960	5	10	2525	881.5	23.64	23.54	-0.10
CA_2A-4A-5A	5	10	2525	836.5	2525	881.5	QPSK	1	0	4	20	2175	2132.5	2	20	900	1960	23.88	23.86	-0.02
CA_2A-5A-6A	2	15	18675	1897.5	675	1937.5	QPSK	1	36	5	10	2525	881.5	65	20	66786	2165	23.41	23.32	-0.09
CA_2A-5A-6A	5	10	2525	836.5	2525	881.5	QPSK	1	0	2	20	900	1960	65	20	66786	2165	23.88	23.82	-0.06
CA_2A-5A-6A	66	15	132322	1745	66786	2165	QPSK	1	74	2	20	900	1960	6	10	2525	881.5	24.04	23.96	-0.08
CA_4A-4A-12A(0.1)	4	5	26175	1732.5	2175	2132.5	QPSK	1	24	4	10	2350	2150	12	10	5995	737.5	23.64	23.59	-0.05
CA_4A-4A-12A	12	5	23155	713.5	5155	743.5	QPSK	1	24	4	20	2175	2132.5	4	10	2350	2150	23.83	23.79	-0.04
CA_5A-6A-66A	5	10	2525	836.5	2525	881.5	QPSK	1	0	66	15	66786	2165	66	20	67036	2190	23.88	23.85	-0.03
CA_5A-6A-66A	66	15	132322	1745	66786	2165	QPSK	1	74	66	20	67036	2190	5	10	2525	881.5	24.04	23.95	-0.09
CA_12A-66A-66A	12	5	23155	713.5	5155	743.5	QPSK	1	24	66	20	66786	2165	66	20	67036	2190	23.83	23.78	-0.05
CA_12A-66A-66A	66	15	132322	1745	66786	2165	QPSK	1	74	66	20	67036	2190	12	10	5995	737.5	24.04	24.00	-0.04
CA_26A-41C	26	10	26990	864	8990	805	QPSK	1	49	41	20	40620	2593	41	20	40816	2612.6	23.61	23.50	-0.11
CA_26A-41C	41	20	40620	2593	40620	2593	QPSK	1	0	41	20	40816	2612.6	26	10	8865	870.5	23.53	23.46	-0.07
CA_41A-41C	41	5	40620	2593	40620	2593	QPSK	1	12	41	20	41490	2680	41	20	41292	2680.2	23.55	23.49	-0.06
CA_41A-41C	41	5	40620	2593	40620	2593	QPSK	1	12	41	20	40920	2581.3	41	20	41490	2680	23.55	23.49	-0.06
CA_41D	41	20	40620	2593	40620	2593	QPSK	1	0	41	20	40816	2612.6	41	20	41016	2632.6	23.53	23.49	-0.04

LTE Down Link 2CA 4x4 MIMO Call Setup

PCC Setting: Channel/ RB/ BW/ Modulation



SCC Setting: Channel/ RB/ BW/ Modulation and call Connection

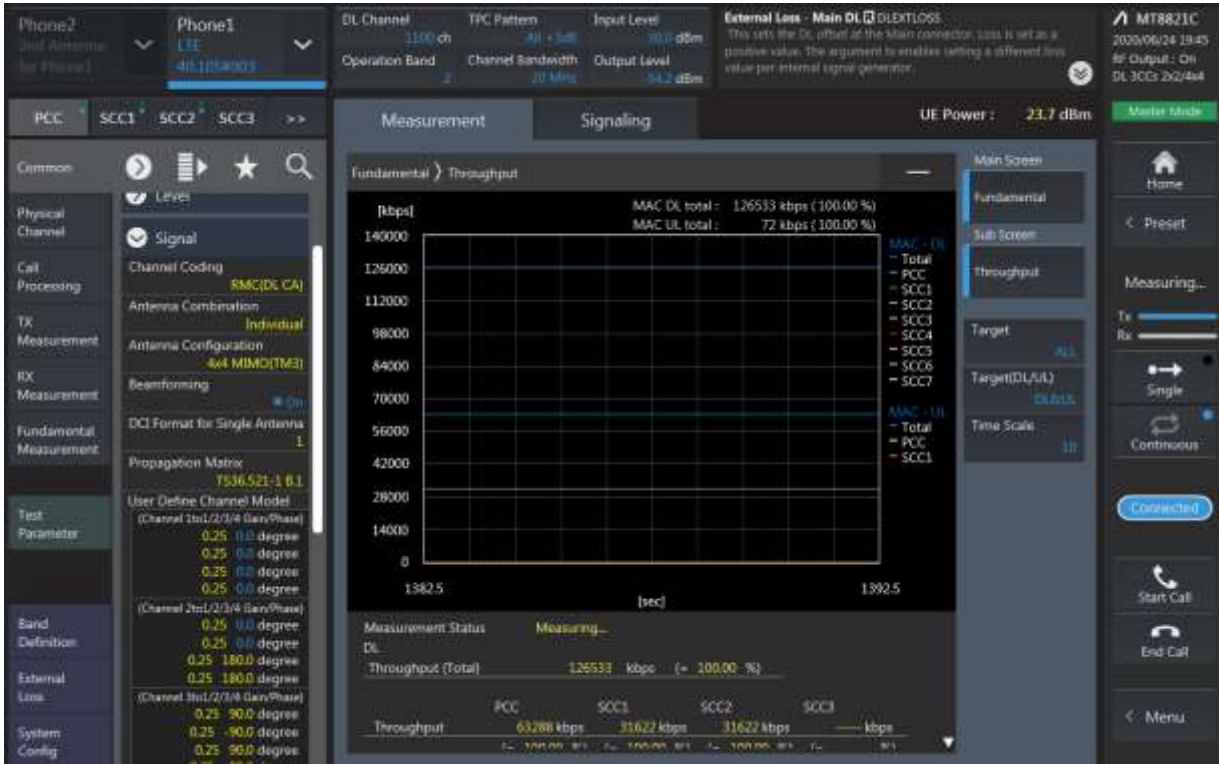


LTE Downlink 2CA 4X4 MIMO Maximum Conducted Power

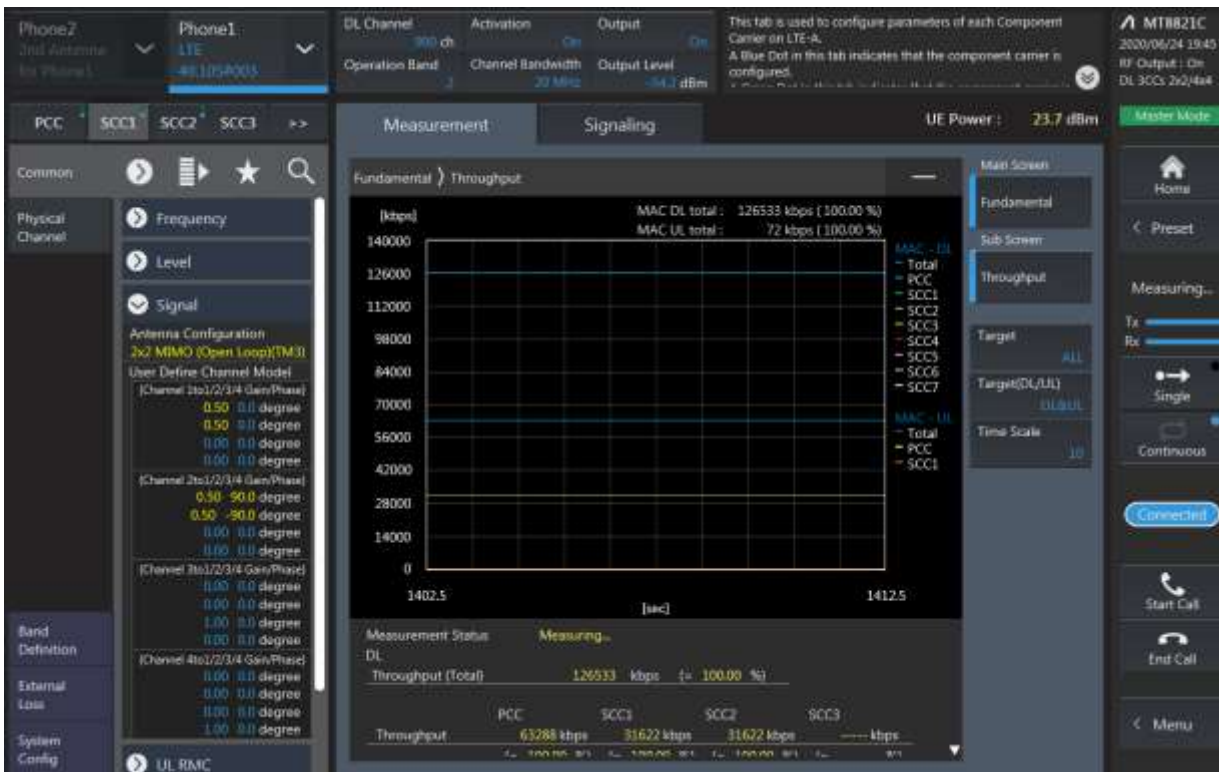
Combination	PCC									SCC				Tx Power		Deviation (dB) (2)-(1)
	Band	BW	PCC UL Channel	PCC UL Freqenc. y	PCC DL Channel	PCC DL Freqenc. y	Modulation	RB	offset	Band	BW	SCC DL Channel	SCC DL Freqenc. y	LTE Single Carrier Tx Power (dBm) (1)	LTE Tx Power with DL CA Enabled (dBm) (2)	
5A-[41A]	5	10	20525	836.5	2525	881.5	QPSK	1	0	[41]	20	40620	2593	23.88	23.88	-0.02
5A-[41A]	[41]	5	40620	2593	40620	2593	QPSK	1	12	5	10	2525	881.5	23.55	23.46	-0.09
[41A]-41A	[41]	20	40620	2593	40620	2593	QPSK	1	0	41	20	39750	2506	23.55	23.52	-0.03
41A-[41A]	41	20	40620	2593	40620	2593	QPSK	1	0	[41]	20	39750	2506	23.55	23.55	0.00
[41A]-[41A]	[41]	20	40620	2593	40620	2593	QPSK	1	0	[41]	20	39750	2506	23.55	23.52	-0.03
[41A]-41A	[41]	5	40620	2593	40620	2593	QPSK	1	12	41	20	39750	2506	23.55	23.53	-0.02
41A-[41A]	41	5	40620	2593	40620	2593	QPSK	1	12	[41]	20	39750	2506	23.55	23.53	-0.02
[41A]-[41A]	[41]	5	40620	2593	40620	2593	QPSK	1	12	[41]	20	39750	2506	23.55	23.53	-0.02
[41C]	[41]	20	40620	2593	40620	2593	QPSK	1	0	[41]	20	40618	2512.8	23.53	23.46	-0.07

LTE Down Link 3CA 4x4 MIMO Call Setup

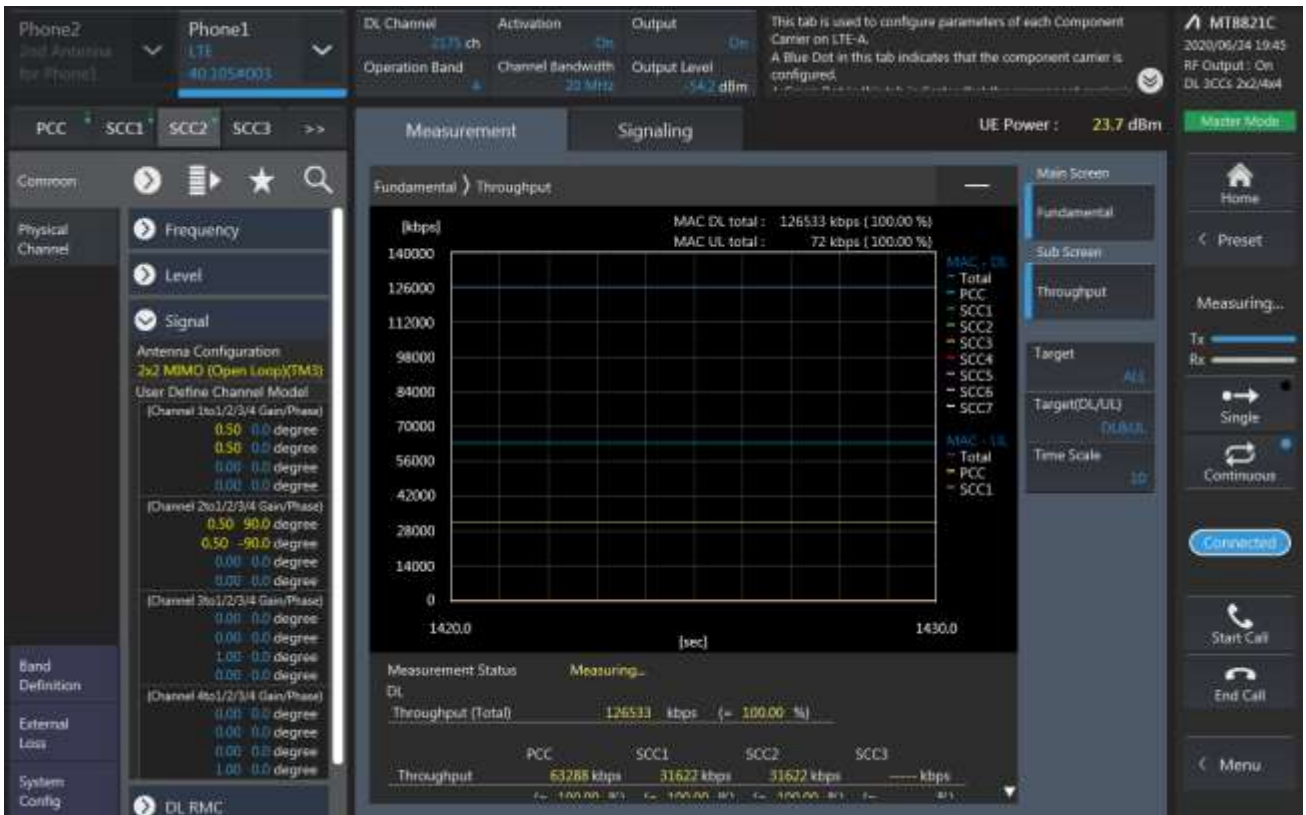
PCC Setting: Channel /RB/BW/Modulation



SCC1 Setting: Channel /RB/BW/Modulation



SCC2 Setting: (Channel /RB/BW/Modulation) and call Connection



LTE Downlink 3CA 4X4 MIMO Maximum Conducted Power

Combination	PCC									SCC				T-Channel						
	Band	BW	PCC DL Channel	PCC UL Frequency	PCC DL Channel	PCC DL Frequency	Modulation	RB	offset	Band	BW	SCC DL Channel	SCC DL Frequency	Band	BW	SCC DL Channel	SCC DL Frequency	LTE Range Power (dB)	LTE Tx Power with 0.4 dB margin (dB)	Clearance (dB) (D-1)
26A[41C]	26	10	26980	844	8980	889	QPSK	1	48	[41]	20	40620	2593	[41]	20	40618	2612.8	23.61	23.51	-0.10
26A[41C]	[41]	20	40620	2593	40620	2593	QPSK	1	0	[41]	20	40618	2612.8	[41]	10	8990	889	23.53	23.39	-0.14
[41A]-41C	[41]	5	40620	2593	40620	2593	QPSK	1	12	[41]	20	41490	2680	[41]	20	41292	2680.2	23.55	23.45	-0.10
41A[41C]	41	5	40620	2593	40620	2593	QPSK	1	12	[41]	20	41490	2680	[41]	20	41292	2680.2	23.55	23.56	0.01
[41A]-41C	[41]	5	40620	2593	40620	2593	QPSK	1	12	[41]	20	41490	2680	[41]	20	41292	2680.2	23.55	23.36	-0.19
[41A]-41C	[41]	20	41490	2680	41490	2680	QPSK	1	0	[41]	20	41292	2680.2	[41]	20	39750	2506	23.55	23.40	-0.15
41A[41C]	41	20	41490	2680	41490	2680	QPSK	1	0	[41]	20	41292	2680.2	[41]	20	39750	2506	23.55	23.33	-0.22
[41A]-41C	[41]	20	41490	2680	41490	2680	QPSK	1	0	[41]	20	41292	2680.2	[41]	20	39750	2506	23.55	23.54	-0.01
[41D]	[41]	20	40620	2593	40620	2593	QPSK	1	0	[41]	20	40618	2612.8	[41]	20	41016	2632.6	23.53	23.36	-0.15