

# **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:

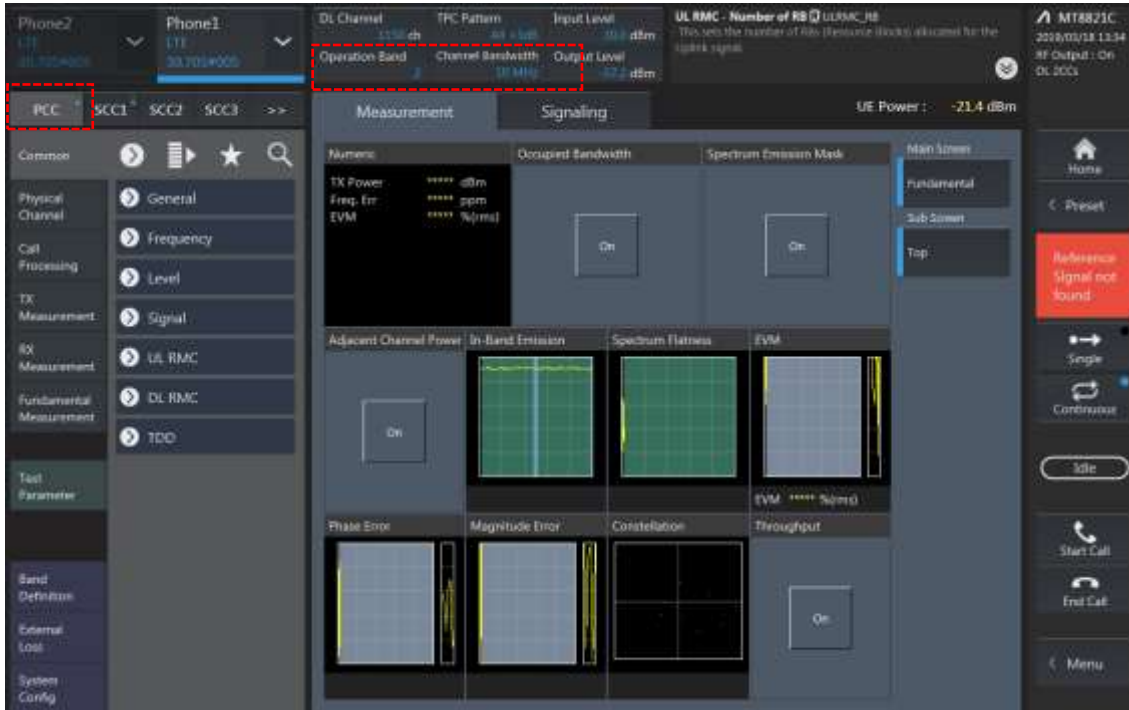
1. This device only supports downlink carrier aggregation. For every supported combination of downlink carrier aggregation, power measurements were performed with the downlink carrier aggregation active for the configuration with highest measured maximum conducted power with downlink carrier aggregation 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.



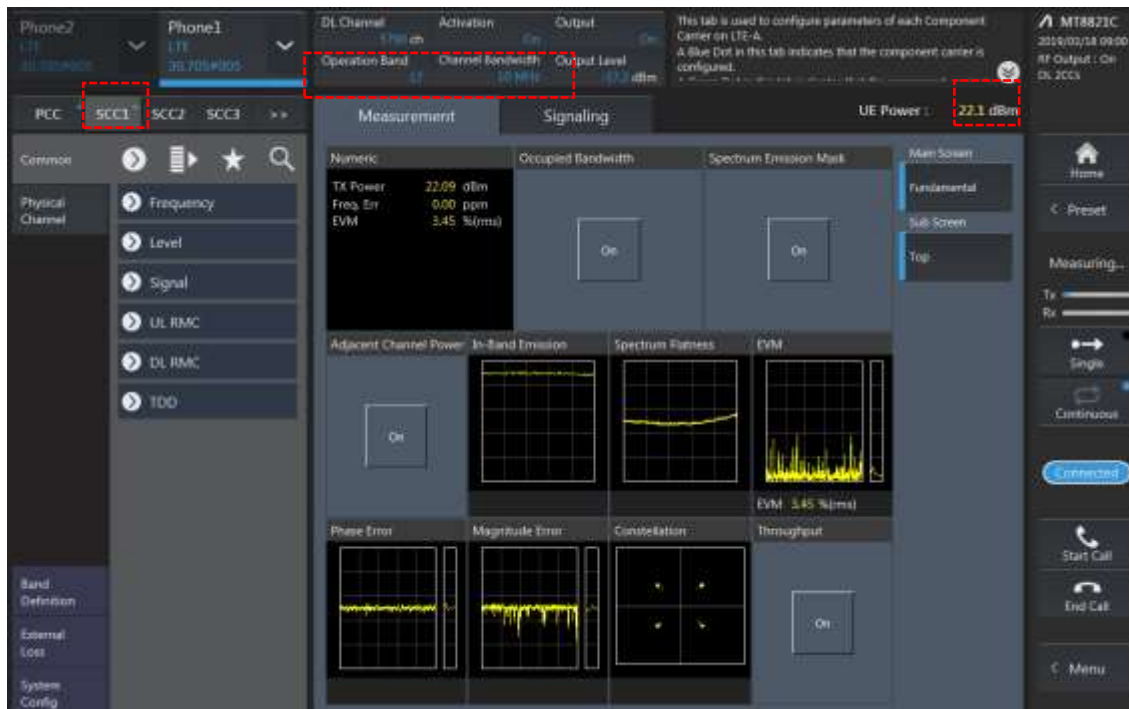
Power Measurement setup

### LTE Down Link 2CA Call Setup

PCC Setting : Channel/ RB/ BW/ Modulation



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

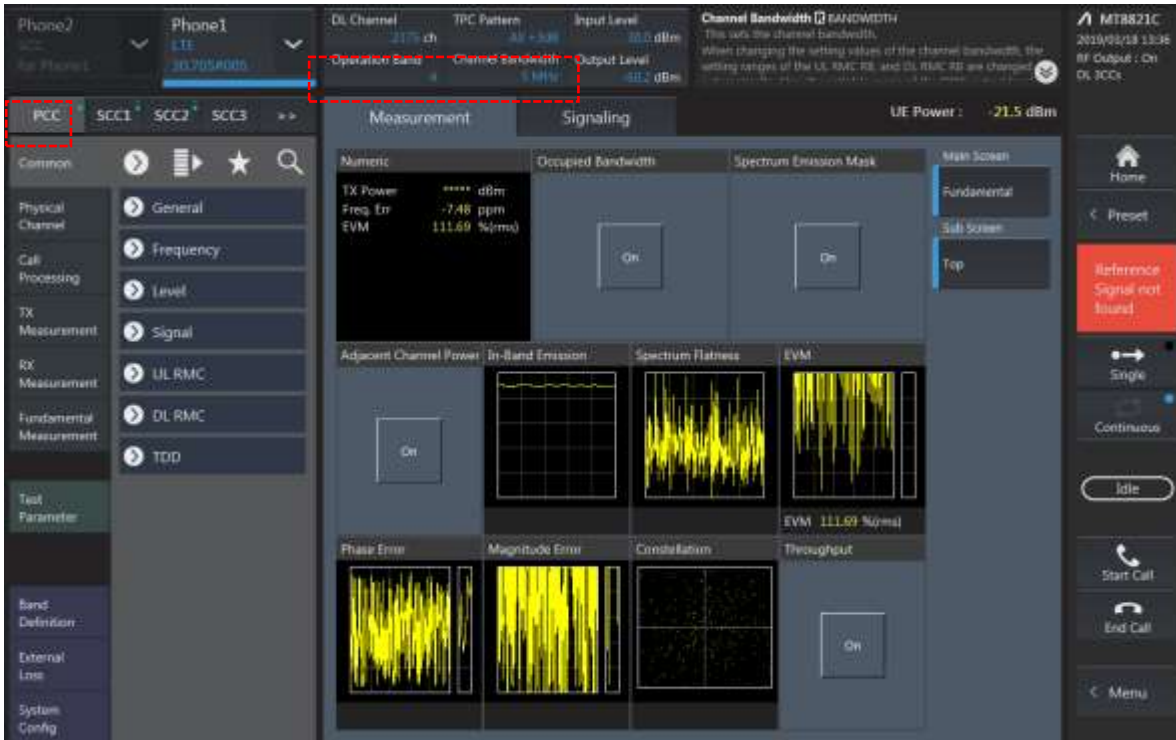


### 2CA Downlink Carrier aggregation Maximum conducted Powers

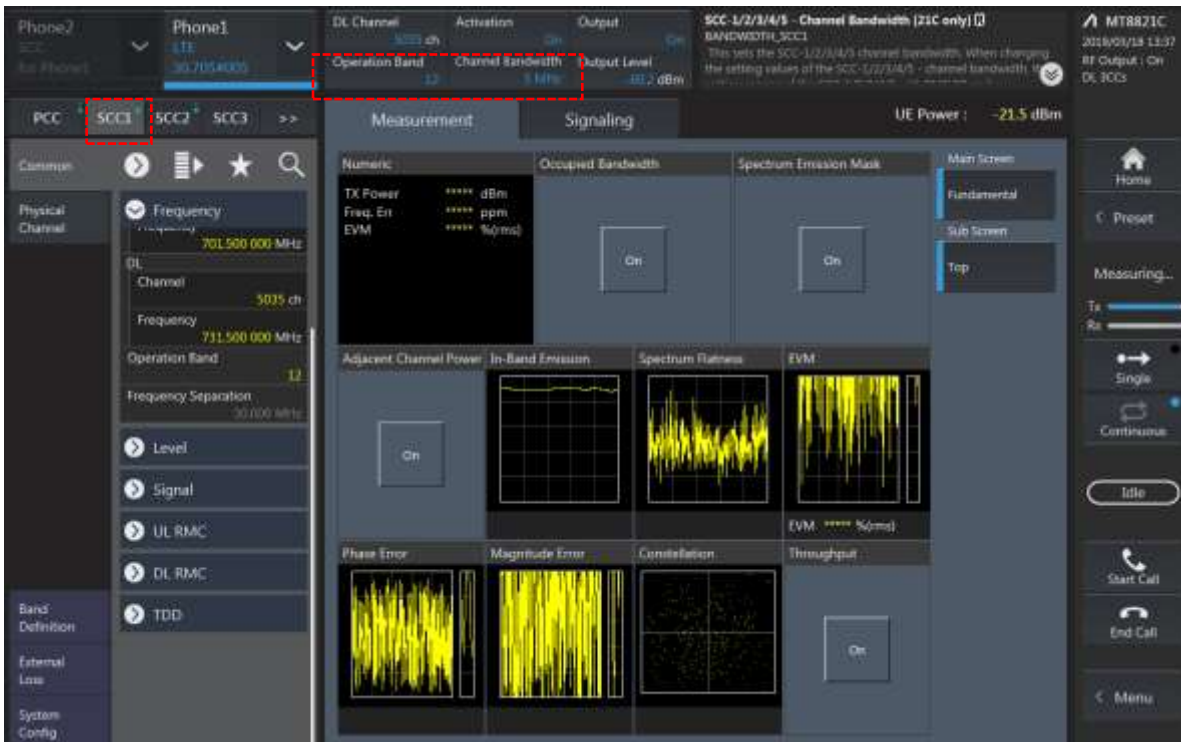
Combination	PCC									SCC				Tx Power		
	Band	BW	PCC UL Channel	PCC UL Frequency	PCC DL Channel	PCC DL Frequency	Modulation	RB	offset	Band	BW	SCC DL Channel	SCC DL Frequency	LTE Single Carrier Tx Power (dBm) (1)	LTE Tx Power with DL CA Enabled (dBm) (2)	Deviation (dB) (2)-(1)
5A-25A	5	10	20525	836.5	2525	881.5	QPSK	1	24	25	20	8365	1962.5	24.99	24.85	-0.14
5A-25A	25	20	26140	1860	8140	1940	QPSK	1	49	5	10	2525	881.5	24.65	24.85	0.20
5A-41A	5	10	20525	836.5	2525	881.5	QPSK	1	24	41	20	40620	2593	24.99	25.15	0.16
12A-25A	12	10	23095	707.5	5095	737.5	QPSK	1	24	25	20	8365	1962.5	24.86	24.70	-0.16
12A-25A	25	20	26140	1860	8140	1940	QPSK	1	49	12	10	5095	737.5	24.65	24.71	0.06
25A-25A(0)	25	5	26065	1852.5	8065	1932.5	QPSK	1	1	25	10	8640	1990	24.67	24.81	0.14
25A-25A(1)	25	20	26140	1860	8140	1940	QPSK	1	49	25	20	8590	1985	24.65	24.45	-0.20

### 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

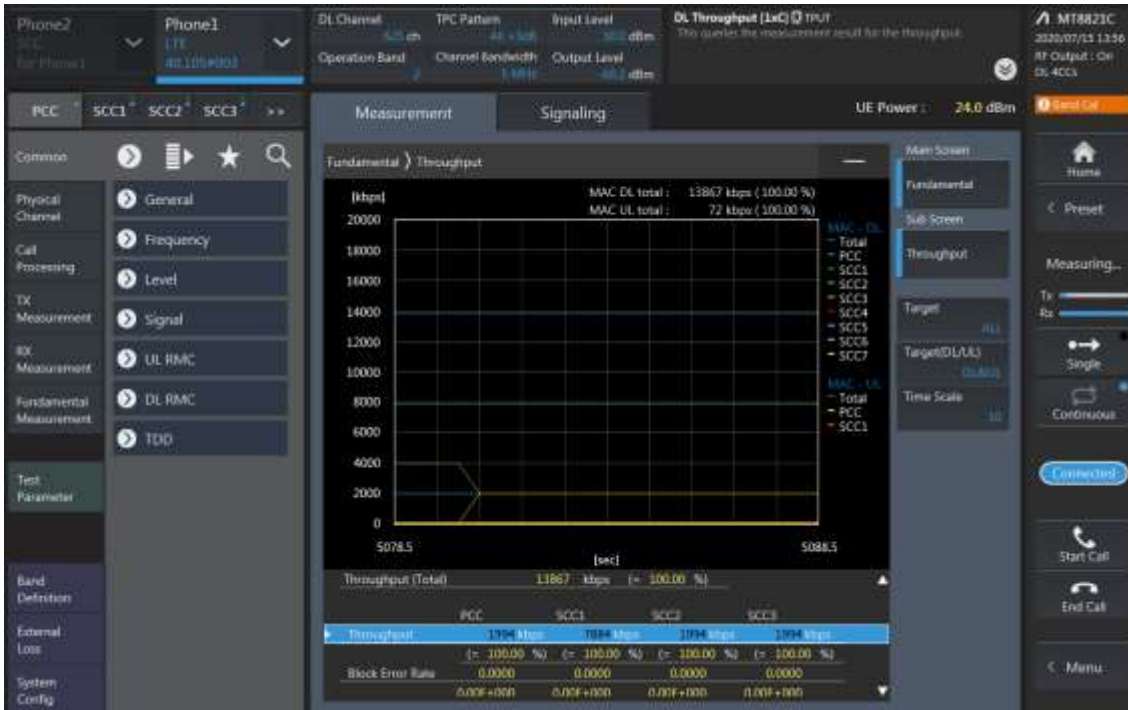


### 3CA Downlink Carrier aggregation Maximum conducted Powers

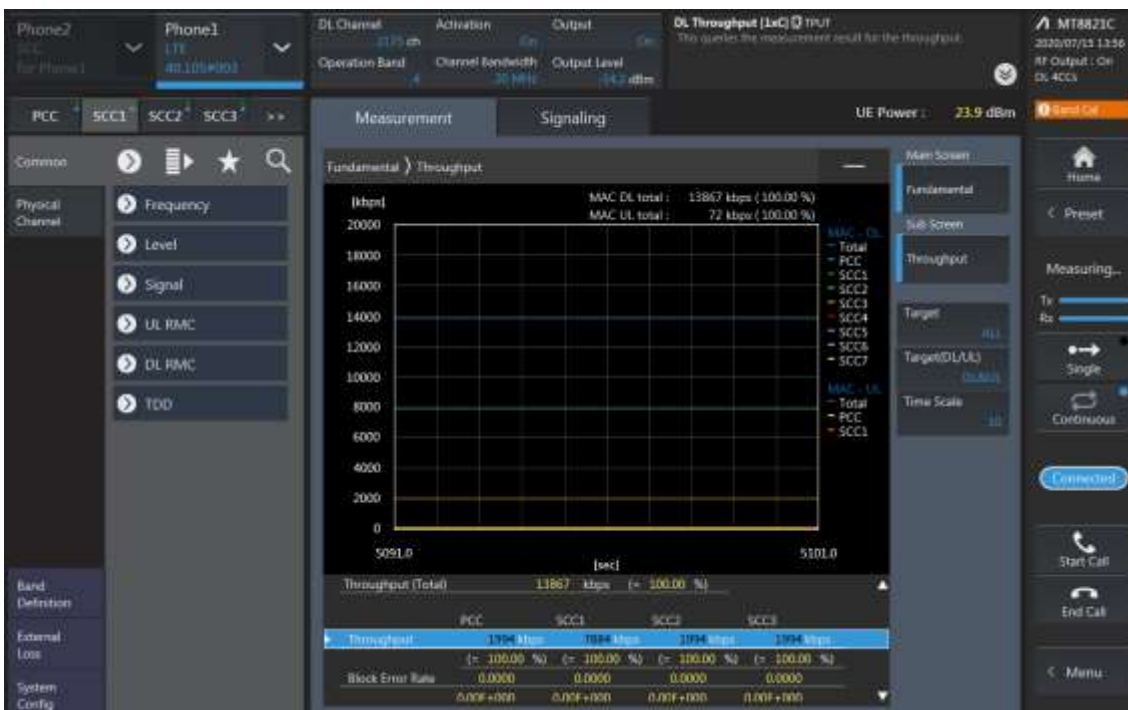
Combination	PCC									SCC				SCC				Tx Power		
	Band	BW	PCC UL Channel	PCC UL Frequency	PCC DL Channel	PCC DL Frequency	Modulation	RB	offset	Band	BW	SCC DL Channel	SCC DL Frequency	Band	BW	SCC DL Channel	SCC DL Frequency	LTE Single Carrier Tx Power (dBm) (1)	LTE Tx Power with DL CA Enabled (dBm) (2)	Deviation (dB) (2)-(1)
2A-4A-13A	2	5	18625	1852.5	625	1932.5	QPSK	1	0	4	20	2175	2132.5	13	10	5230	751	24.75	24.55	-0.20
2A-4A-13A	4	10	20000	1715	2000	2115	QPSK	1	24	2	20	900	1960	13	10	5230	751	24.42	24.44	0.02
2A-4A-13A	13	10	23230	782	5230	751	QPSK	1	0	2	20	900	1960	4	20	2175	2132.5	24.99	24.81	-0.18
2A-4A-30A	2	5	18625	1852.5	625	1932.5	QPSK	1	0	4	20	2175	2132.5	30	10	9820	2355	24.75	24.57	-0.18
2A-4A-30A	4	10	20000	1715	2000	2115	QPSK	1	24	2	20	900	1960	30	10	9820	2355	24.42	24.32	-0.10
2A-4A-30A	30	5	27735	2312.5	9845	2357.5	QPSK	1	12	2	20	900	1960	4	20	2175	2132.5	22.87	22.91	0.04
2A-4A-71A	2	5	18625	1852.5	625	1932.5	QPSK	1	0	4	20	2175	2132.5	71	20	68786	637	24.75	24.87	0.12
2A-4A-71A	4	10	20000	1715	2000	2115	QPSK	1	24	4	20	2175	2132.5	2	20	900	1960	24.42	24.36	-0.06
2A-4A-71A	71	20	133322	683	68786	637	QPSK	1	0	4	20	2175	2132.5	2	20	900	1960	24.86	24.88	0.02
4A-4A-13A(0,1)	4	10	20000	1715	2000	2115	QPSK	1	24	4	20	2300	2145	13	10	5230	751	24.42	24.32	-0.10
4A-4A-13A	13	10	23230	782	5230	751	QPSK	1	0	4	20	2175	2132.5	4	20	2300	2145	24.99	24.91	-0.08
48A-48A-71A	71	20	133322	683	68786	637	QPSK	1	0	48	20	56207	3646.7	48	20	55340	3560	24.86	25.04	0.18
48C-71A	71	20	133322	683	68786	637	QPSK	1	0	48	20	55340	3560	48	20	55538	3579.8	24.86	24.98	0.12

### LTE Down Link 4CA Call Setup

PCC Setting: Channel /RB/BW/Modulation

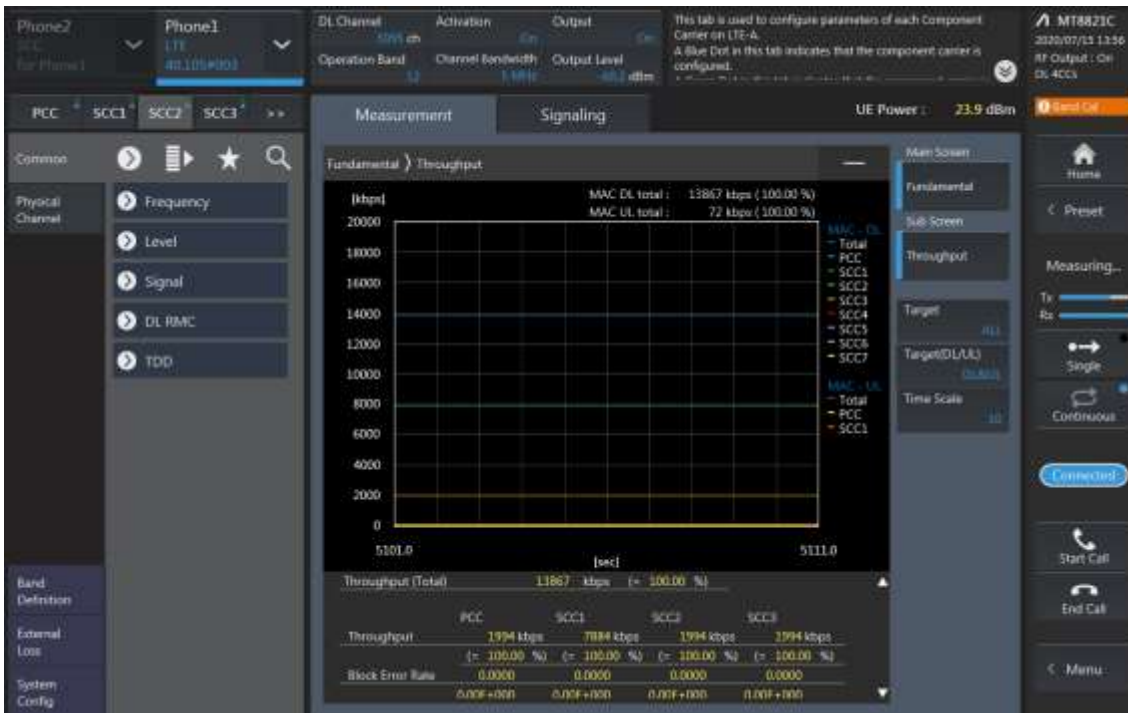


### SCC1 Setting (Channel /RB/BW/Modulation) and call Connection

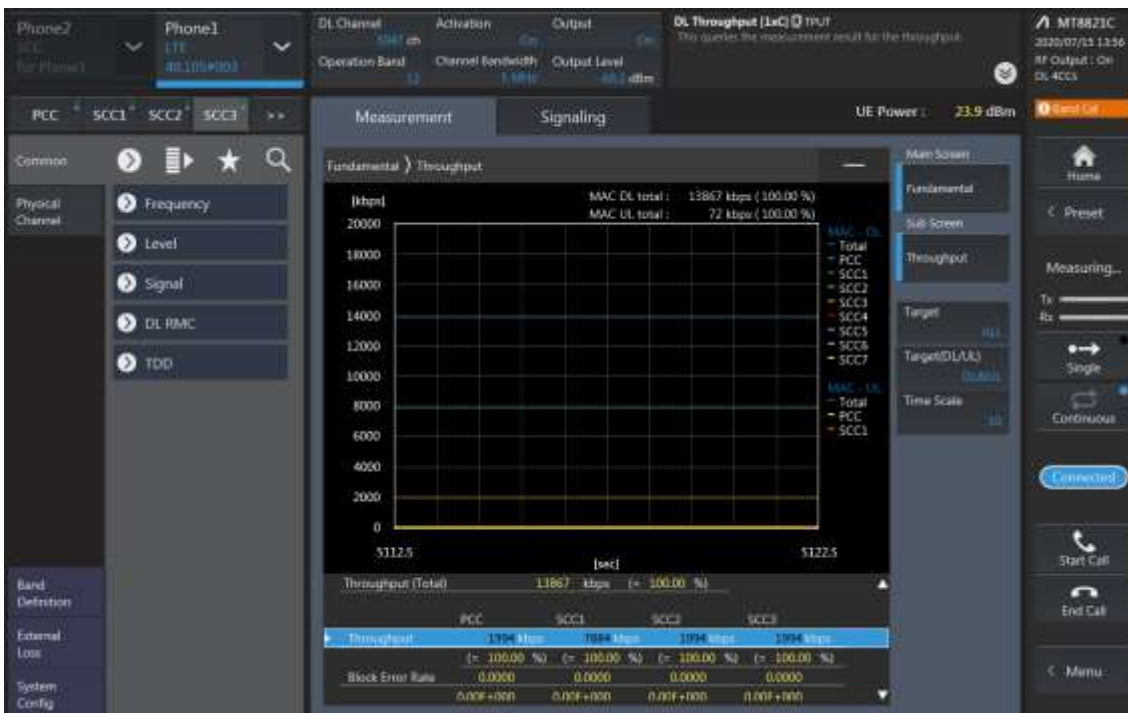




SCC2 Setting (Channel /RB/BW/Modulation )and call Connection



SCC3 Setting (Channel /RB/BW/Modulation )and call Connection



### 4CA Downlink Carrier aggregation Maximum conducted Powers

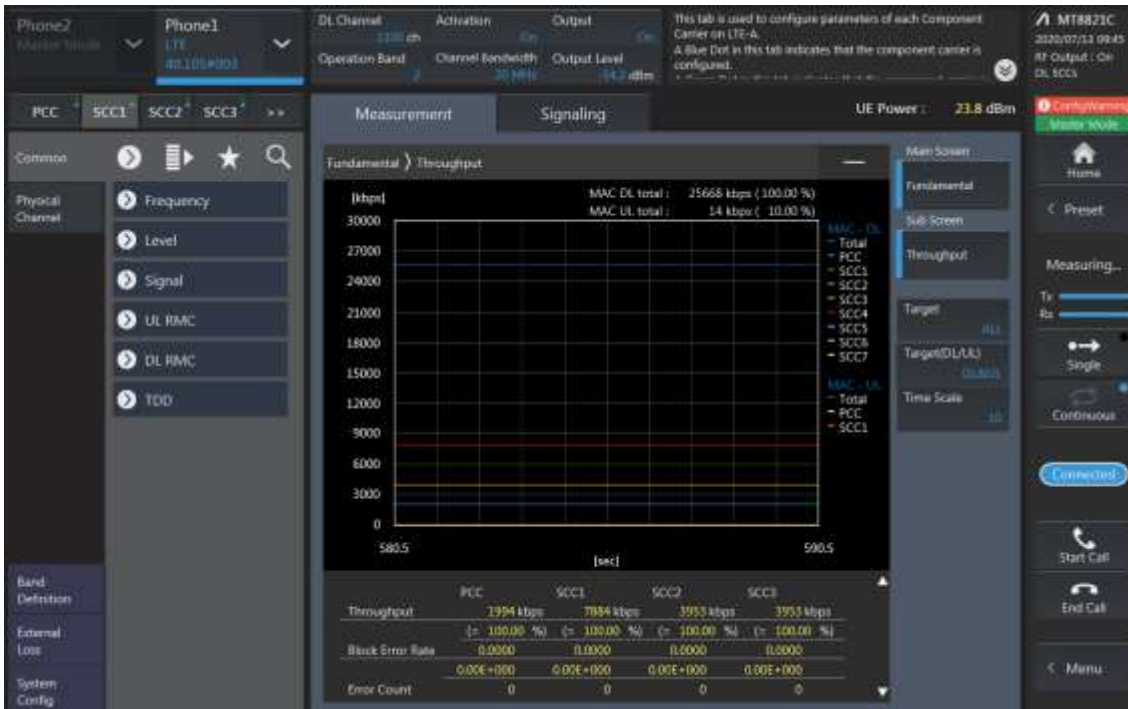
Combination	PCC									SCC				SCC				SCC				Tx Power		
	Band	BW	PCC UL Channel	PCC UL Frequency	PCC DL Channel	PCC DL Frequency	Modulation	RB	offset	Band	BW	SCC DL Channel	SCC DL Frequency	Band	BW	SCC DL Channel	SCC DL Frequency	Band	BW	SCC DL Channel	SCC DL Frequency	LTE Single Carrier Tx Power (dBm) (1)	LTE Tx Power with DL CA (dBm) (2)	Deviation (dB) (2)-(1)
2A-2A-4A-4A	2	5	18625	1862.5	625	1932.5	QPSK	1	0	2	20	1100	1980	4	20	2050	2120	4	20	2300	2145	2475	24.83	0.08
2A-2A-4A-4A	4	10	20000	1715	2000	2115	QPSK	1	24	4	20	2300	2145	2	20	900	1960	2	20	1100	1980	24.42	24.34	-0.08
2A-2A-4A-5A	2	5	18625	1862.5	625	1932.5	QPSK	1	0	2	20	1100	1980	4	20	2050	2120	5	10	2525	881.5	24.75	24.75	0.00
2A-2A-4A-5A	4	10	20000	1715	2000	2115	QPSK	1	24	2	20	900	1960	2	20	1100	1980	5	10	2525	881.5	24.42	24.52	0.10
2A-2A-4A-5A	5	10	20525	836.5	2525	881.5	QPSK	1	24	2	20	900	1960	2	20	1100	1980	4	20	2350	2120	24.98	25.01	0.02
2A-2A-4A-12A	2	5	18625	1862.5	625	1932.5	QPSK	1	0	2	20	1100	1980	4	20	2050	2120	12	10	5095	737.5	24.75	24.55	-0.20
2A-2A-4A-12A	4	10	20000	1715	2000	2115	QPSK	1	24	2	20	900	1960	2	20	1100	2120	12	10	5095	737.5	24.42	24.26	-0.16
2A-2A-4A-12A	12	10	23095	707.5	5095	737.5	QPSK	1	24	2	20	900	1960	2	20	1100	2120	4	20	2050	2120	24.86	24.92	0.06
2A-2A-66A-71A	2	5	18625	1862.5	625	1932.5	QPSK	1	0	2	20	1100	1980	66	20	66786	2165	71	20	66786	637	24.75	24.59	-0.16
2A-2A-66A-71A	66	20	132072	1720	66536	2140	QPSK	1	0	2	20	900	1960	2	20	1100	2120	71	20	66786	637	24.34	24.26	-0.08
2A-2A-66A-71A	71	20	133322	683	66786	637	QPSK	1	0	2	20	900	1960	2	20	1100	2120	66	20	66786	2165	24.86	24.72	-0.14
2A-4A-4A-5A	2	5	18625	1862.5	625	1932.5	QPSK	1	0	4	20	2050	2120	4	20	2300	2145	5	10	2525	881.5	24.75	24.83	0.08
2A-4A-4A-5A	4	10	20000	1715	2000	2115	QPSK	1	24	4	20	2300	2145	2	20	900	1960	5	10	2525	881.5	24.42	24.30	-0.12
2A-4A-4A-5A	5	10	20525	836.5	2525	881.5	QPSK	1	24	2	20	900	1960	4	20	2050	2120	4	20	2300	2145	24.99	24.91	-0.08
2A-4A-4A-12A	2	5	18625	1862.5	625	1932.5	QPSK	1	0	4	20	2050	2120	4	20	2300	2145	12	10	5095	737.5	24.75	24.81	0.06
2A-4A-4A-12A	4	10	20000	1715	2000	2115	QPSK	1	24	4	20	2300	2145	2	20	900	1960	12	10	5095	737.5	24.42	24.32	-0.10
2A-4A-4A-12A	12	10	23095	707.5	5095	737.5	QPSK	1	24	2	20	900	1960	4	20	2050	2120	4	20	2300	2145	24.86	25.06	0.20
2A-4A-12B	2	5	18625	1862.5	625	1932.5	QPSK	1	0	4	20	2050	2120	12	10	5090	734	12	5	5132	741.2	24.75	24.67	-0.08
2A-4A-12B	4	10	20000	1715	2000	2115	QPSK	1	24	2	20	900	1960	12	10	5090	734	12	5	5132	741.2	24.42	24.54	0.12
2A-4A-12B	12	10	23095	707.5	5095	737.5	QPSK	1	24	12	5	5023	730.3	2	20	900	1960	4	20	2050	2120	24.86	24.80	-0.06
2A-66C-71A	2	5	18625	1862.5	625	1932.5	QPSK	1	0	66	20	66786	2165	66	20	66568	2145.2	71	20	66786	637	24.75	24.81	0.06
2A-66C-71A	66	20	132072	1720	66536	2140	QPSK	1	0	66	20	66734	2159.8	2	20	900	1960	71	20	66786	637	24.34	24.24	-0.10
2A-66C-71A	71	20	133322	683	66786	637	QPSK	1	0	66	20	66786	2165	66	20	66568	2145.2	2	20	900	1960	24.86	24.72	-0.14
4A-4A-12B	4	10	20000	1715	2000	2115	QPSK	1	24	4	20	2300	2145	12	10	5090	734	12	5	5132	741.2	24.42	24.34	-0.08
4A-4A-12B	12	10	23095	707.5	5095	737.5	QPSK	1	24	12	5	5023	730.3	4	20	2050	2120	4	20	2300	2145	24.86	24.84	-0.02
13A-48A-66B	13	10	23230	782	5230	751	QPSK	1	0	48	20	56207	3646.7	66	15	56786	2165	66	5	66693	2155.7	24.98	24.99	0.00
13A-48A-66B	66	5	131997	1712.5	66461	2132.5	QPSK	1	0	66	15	66564	2141.8	48	20	56207	3646.7	13	10	5230	751	24.49	24.43	-0.06
13A-48A-66C	13	10	23230	782	5230	751	QPSK	1	0	48	20	56207	3646.7	66	20	66786	2165	66	20	66568	2145.2	24.99	24.79	-0.20
13A-48A-66C	66	20	132072	1720	66536	2140	QPSK	1	0	66	20	66734	2159.8	48	20	56207	3646.7	13	10	5230	751	24.34	24.24	-0.10
25A-41D	25	20	26140	1960	8140	1940	QPSK	1	49	41	20	40620	2593	41	20	40422	2573.2	41	20	40224	2553.4	24.67	24.73	0.06
25A-41D	41	20	41460	2660	41460	2660	QPSK	1	0	41	20	41292	2660.2	41	20	41094	2640.4	25	20	8365	1962.5	24.31	24.39	0.08
29A-30A-66A-66A	30	5	27735	2312.5	9645	2367.5	QPSK	1	12	66	20	66786	2145	66	20	67236	2190	29	10	9715	722.5	22.87	22.89	0.02
29A-30A-66A-66A	66	20	132072	1720	66536	2140	QPSK	1	0	66	20	67236	2190	30	10	9820	2355	29	10	9715	722.5	24.34	24.36	0.02

### LTE Down Link 5CA Call Setup

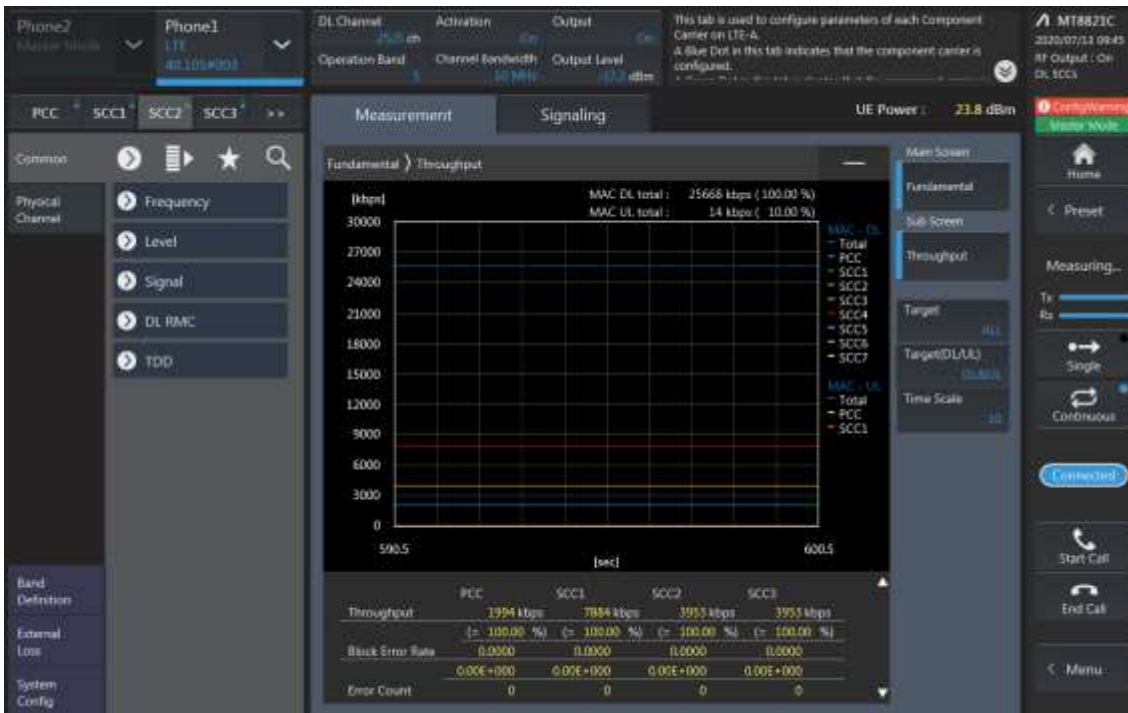
PCC Setting: Channel /RB/BW/Modulation



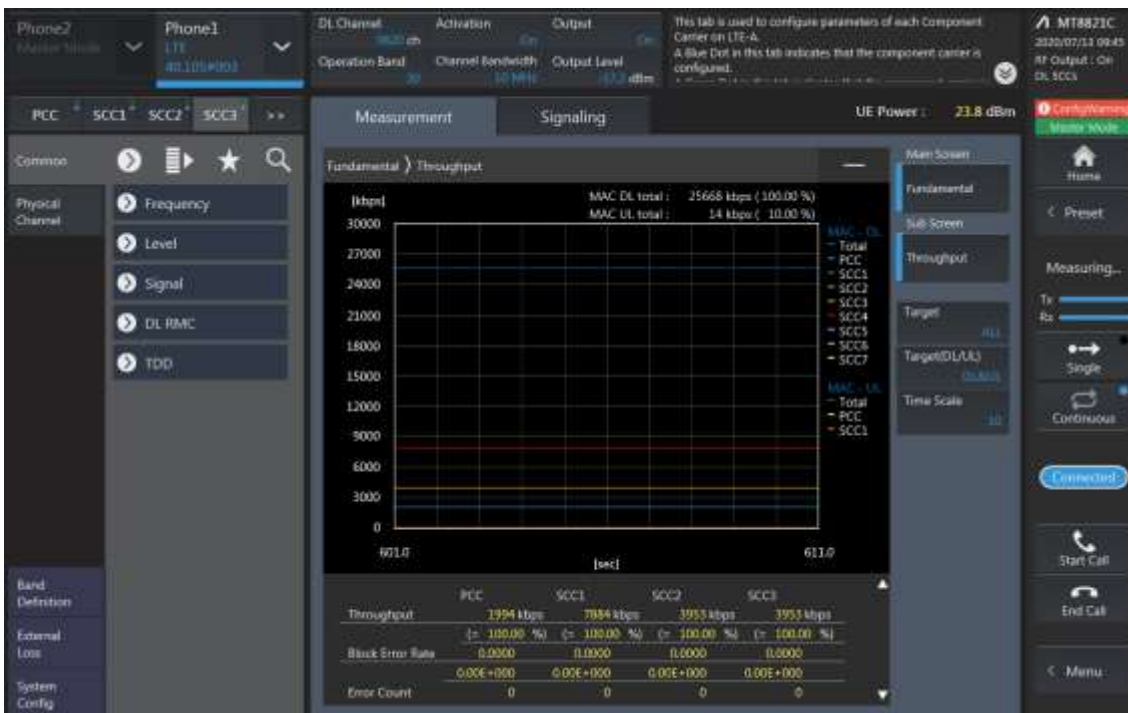
### SCC1 Setting (Channel /RB/BW/Modulation )and call Connection



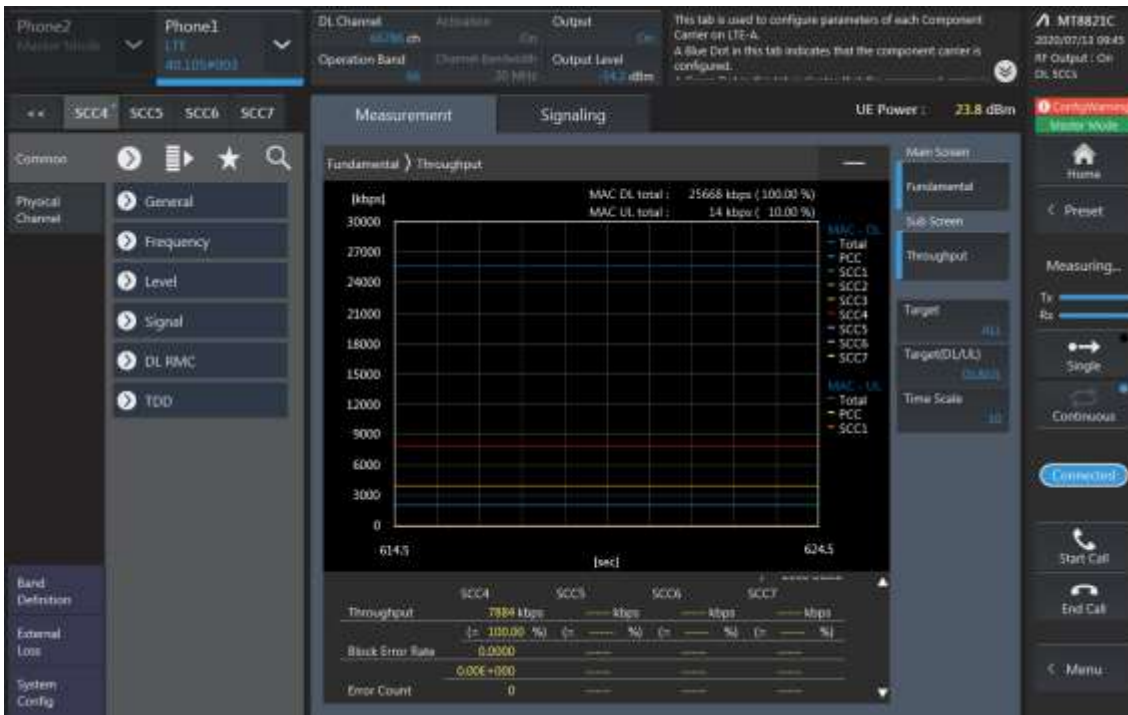
SCC2 Setting (Channel /RB/BW/Modulation)and call Connection



SCC3 Setting (Channel /RB/BW/Modulation )and call Connection



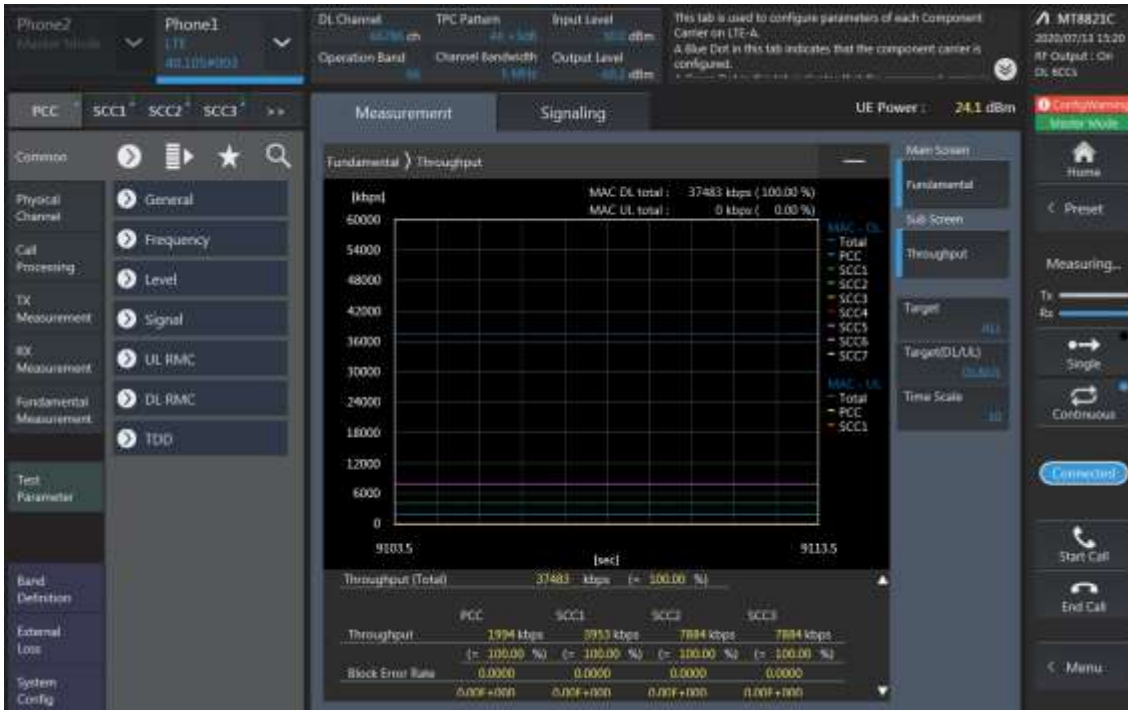
SCC4 Setting (Channel /RB/BW/Modulation )and call Connection



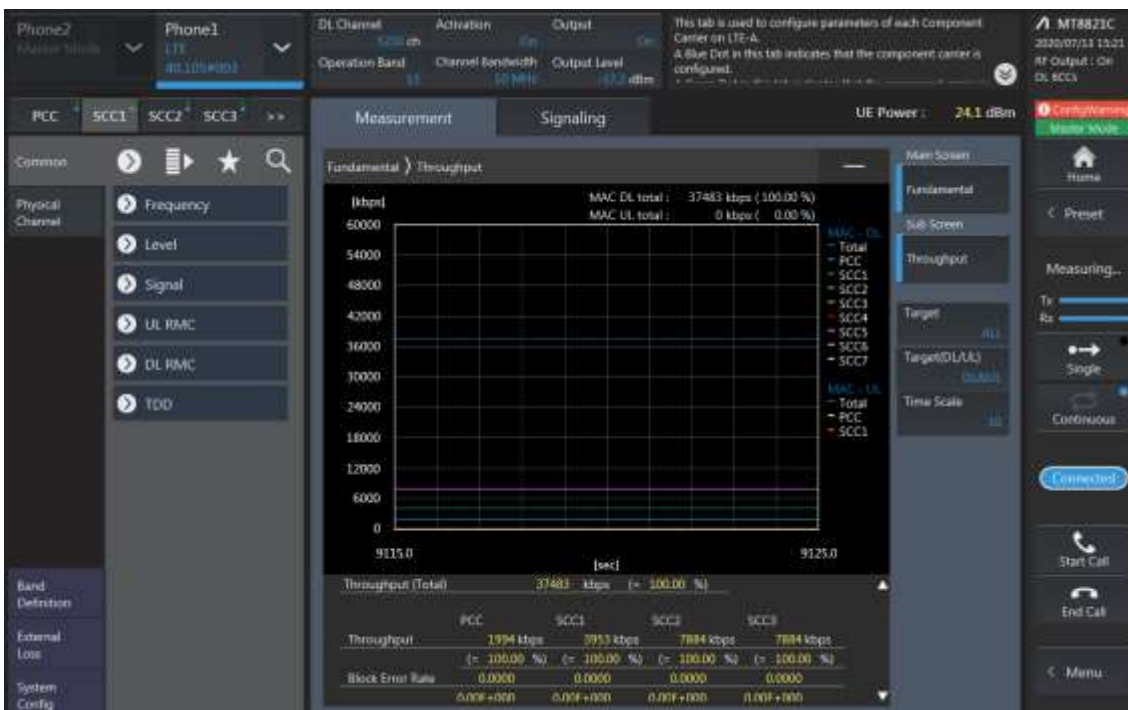


### LTE Down Link 6CA Call Setup

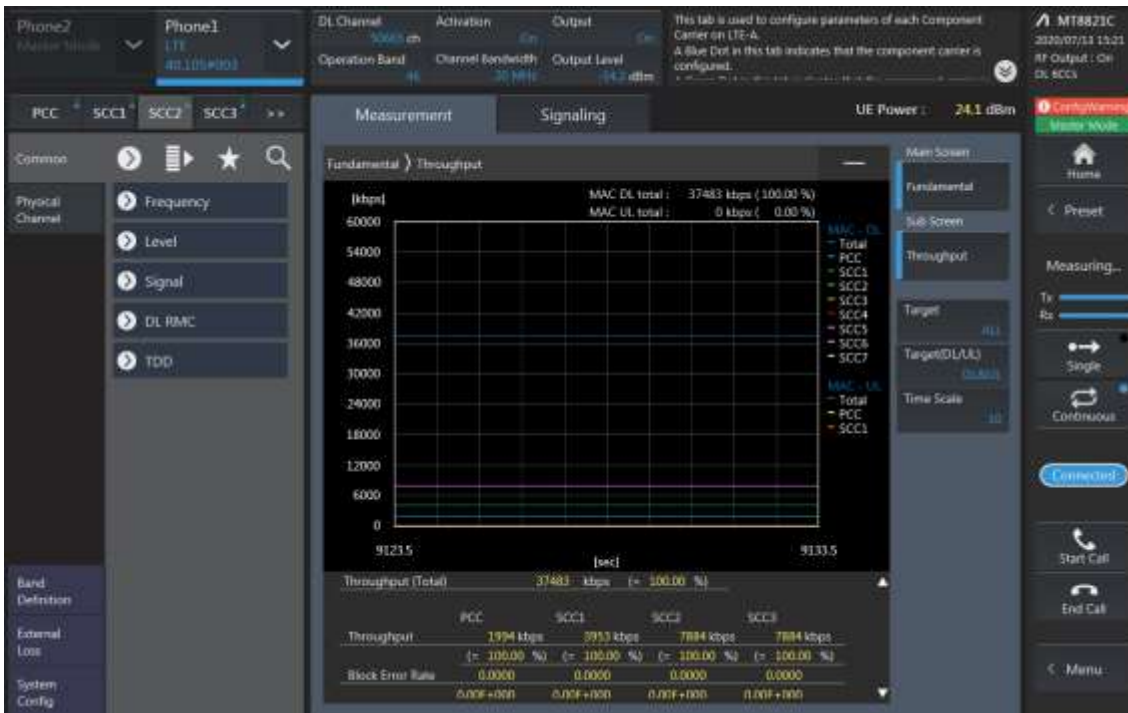
#### PCC Setting (Channel/ RB/ BW/ Modulation)



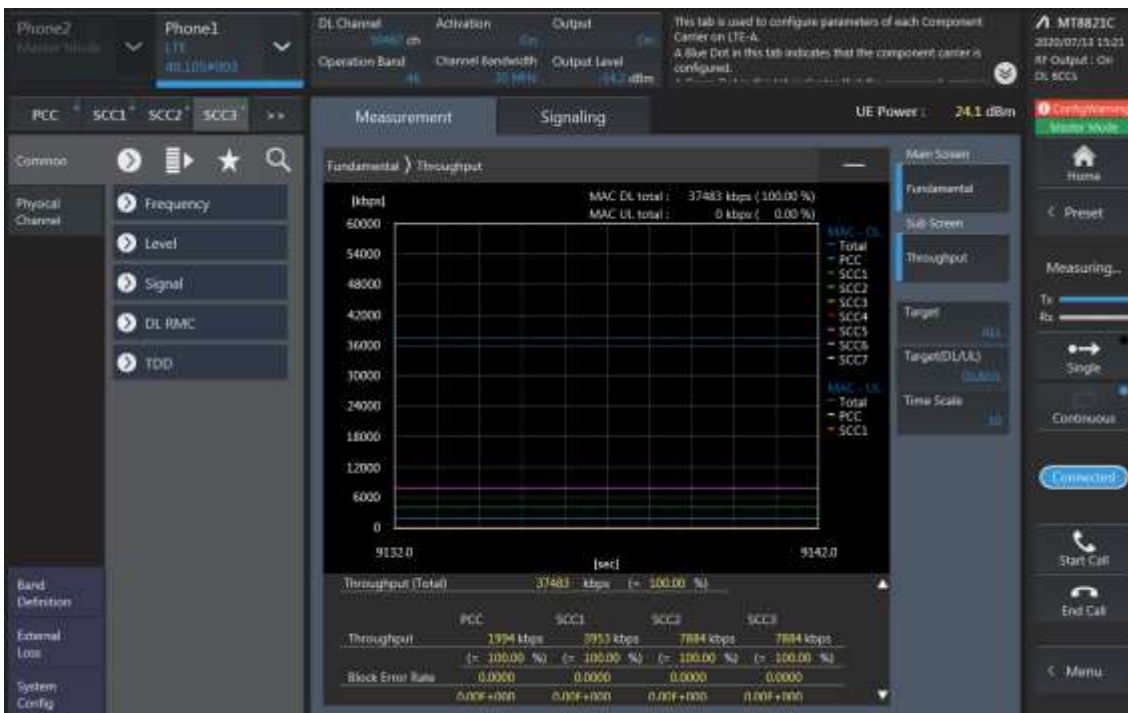
#### SCC1 Setting (Channel/ RB/ BW/ Modulation) and call Connection



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

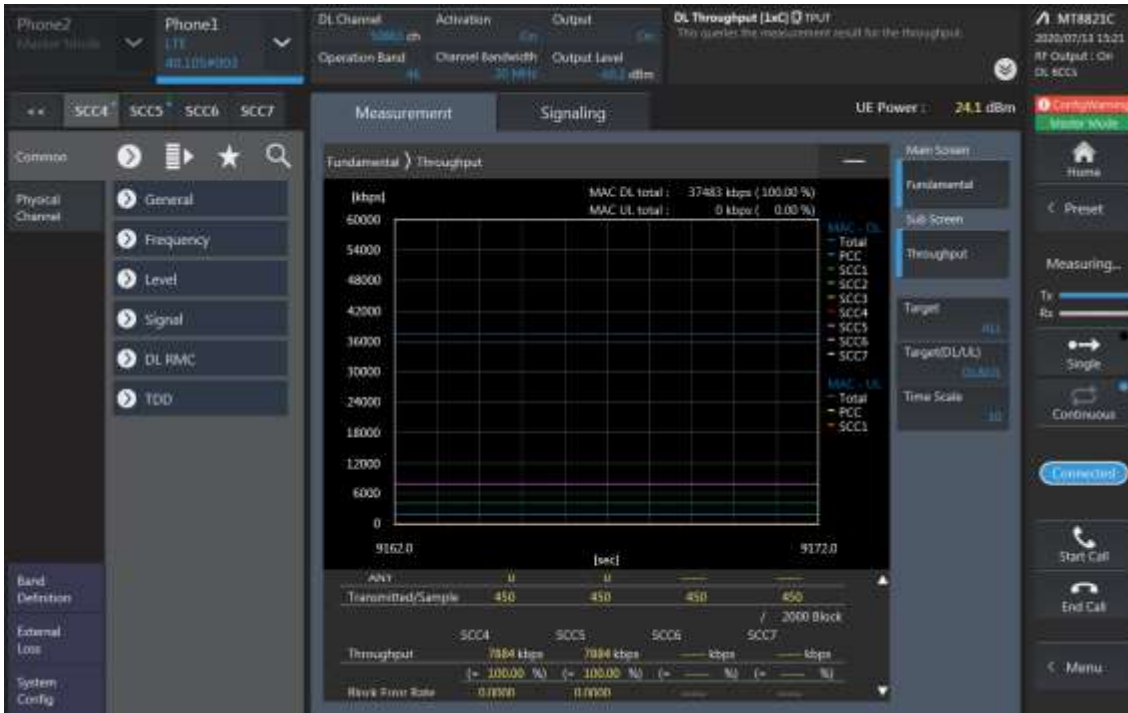


SCC3 Setting (Channel /RB/BW/Modulation) and call Connection

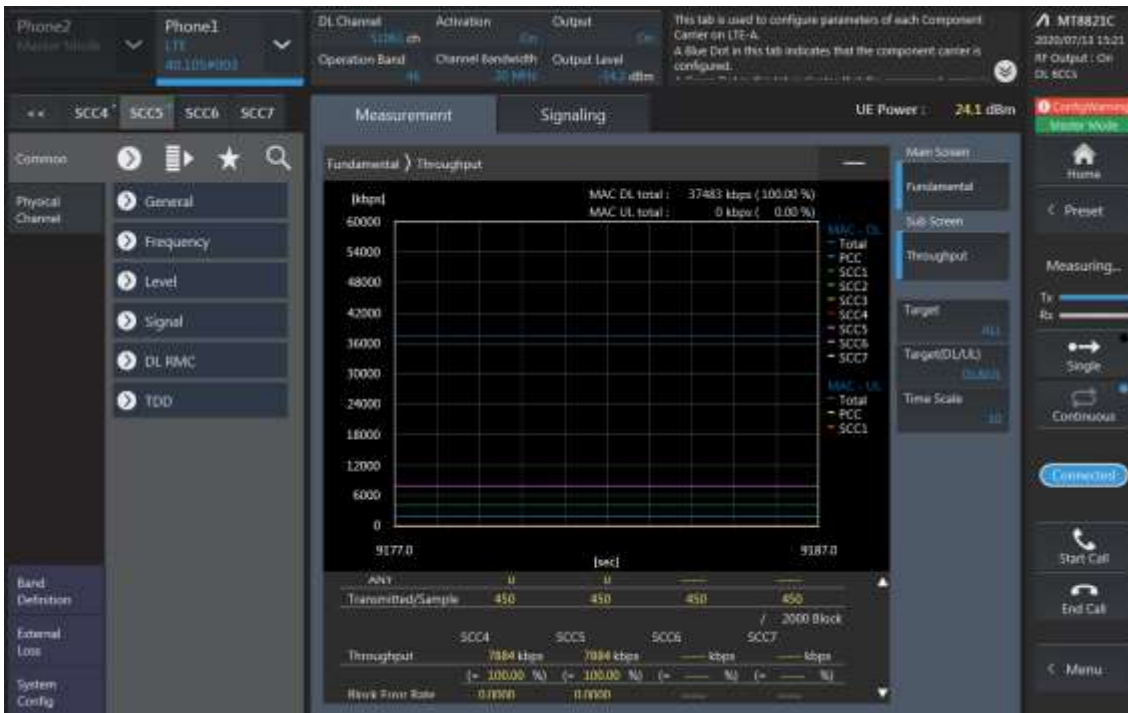




### SCC4 Setting (Channel /RB/BW/Modulation) and call Connection



### SCC5 Setting (Channel /RB/BW/Modulation) and call Connection

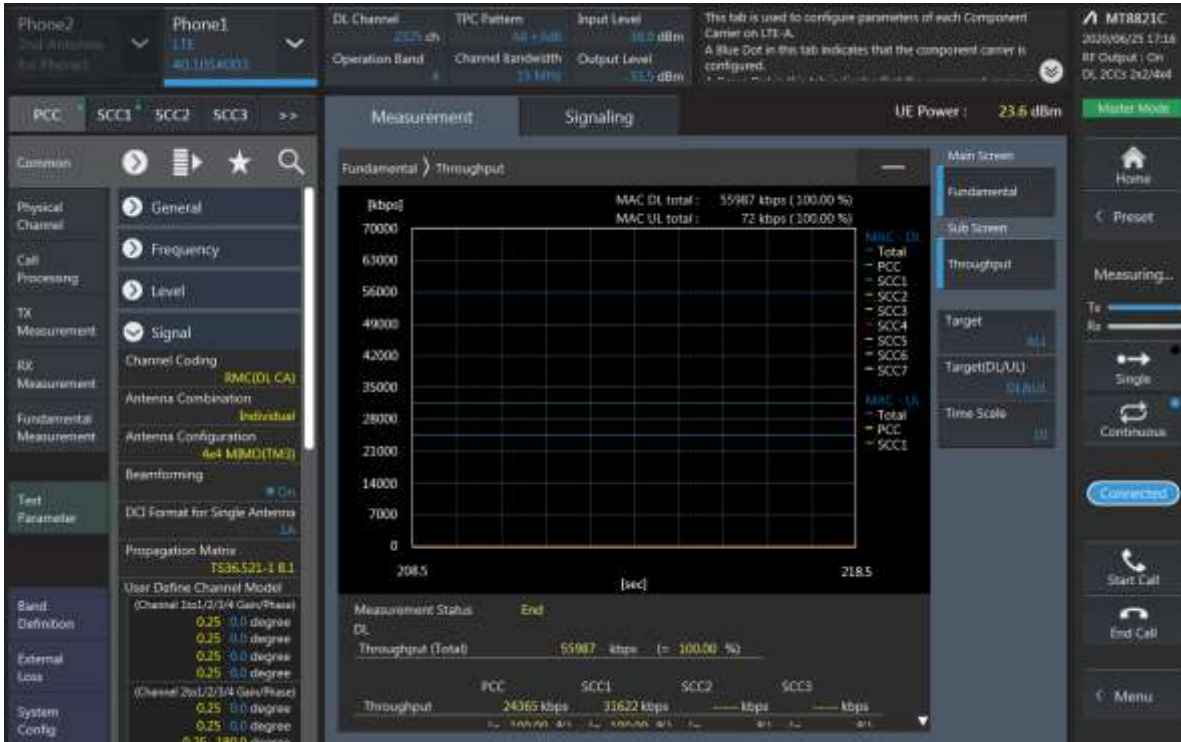


6CA Downlink Carrier aggregation conducted Powers

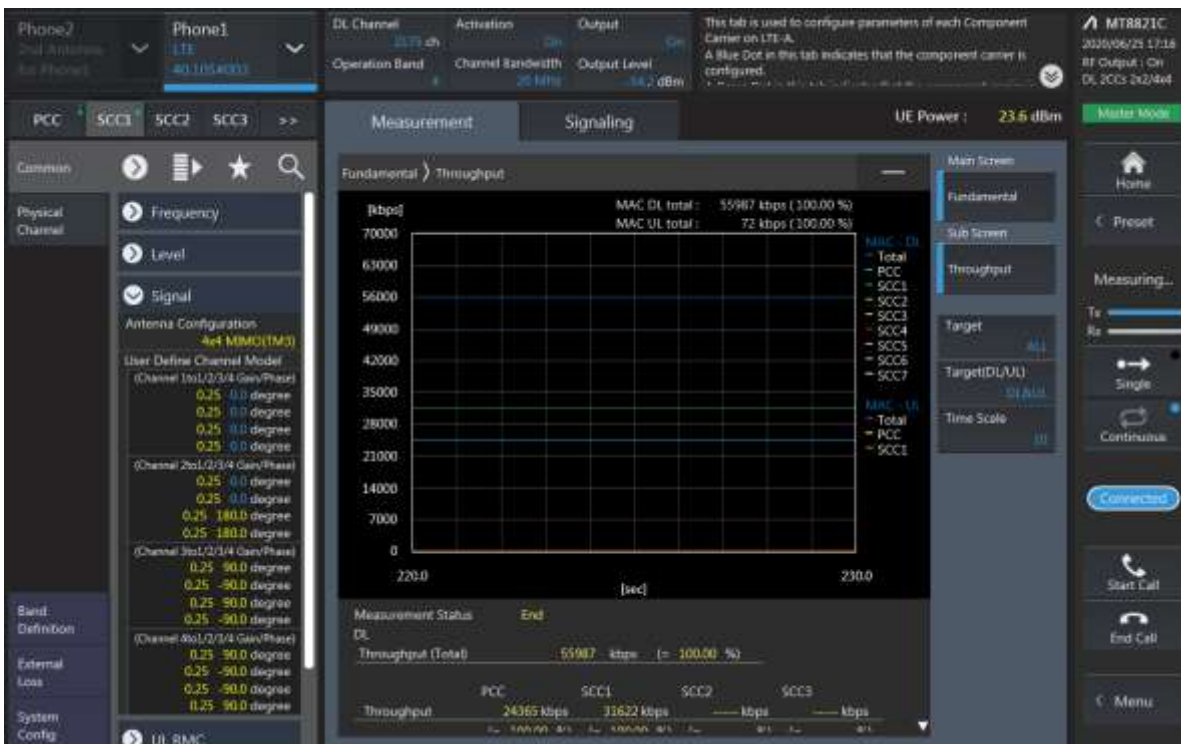
S	PCC					SCC				SCC				SCC				SCC				Tx Power		Deviation(dB) (2.1)							
	Band	BW	PCC UL Channel	PCC UL Frequency	PCC DL Channel	PCC DL Frequency	Modulation	RB	offset	Band	BW	SCC DL Channel	SCC DL Frequency	Band	BW	SCC DL Channel	SCC DL Frequency	Band	BW	SCC DL Channel	SCC DL Frequency	Band	BW		SCC DL Channel	SCC DL Frequency	LTE Single Carrier Tx Power (dBm)	LTE Tx Power with DL CA (dBm)			
2	5	1825	1825.5	62	1932.5	QPSK	1	0	5	10	2525	881.5	48	20	5590	3625	48	20	5618	3644.8	66	20	5678	2145	66	20	5726	2190	24.79	24.63	-0.12
5	10	2025	836.5	2525	881.5	QPSK	1	24	48	20	5590	3625	48	20	5618	3644.8	2	20	900	1960	66	20	5678	2145	66	20	5726	2190	24.99	25.03	0.04
66	20	13072	1720	6636	2140	QPSK	1	0	66	20	6726	2190	2	20	900	1960	5	10	2525	881.5	48	20	5590	3625	48	20	5618	3644.8	24.34	24.22	-0.12
2	5	1825	1825.5	62	1932.5	QPSK	1	0	48	20	5590	3625	48	20	5618	3644.8	48	20	5638	3644.8	66	20	5654	3644.8	66	20	5678	2145	24.75	24.91	0.16
66	20	13072	1720	6636	2140	QPSK	1	0	2	20	900	1960	48	20	5590	3625	48	20	5618	3644.8	48	20	5638	3644.8	48	20	5654	3644.8	24.34	24.52	0.18
5	10	2025	836.5	2525	881.5	QPSK	1	24	66	20	6678	2145	66	20	6726	2190	48	20	5590	3625	48	20	5618	3644.8	48	20	5638	3644.8	24.99	24.79	-0.20
66	20	13072	1720	6636	2140	QPSK	1	0	66	20	6726	2190	5	10	2525	881.5	48	20	5590	3625	48	20	5618	3644.8	48	20	5638	3644.8	24.34	24.18	-0.16
13	10	2320	752	3220	751	QPSK	1	0	66	20	6678	2145	48	20	5590	3625	48	20	5618	3644.8	48	20	5638	3644.8	48	20	5654	3644.8	24.99	25.13	0.14
66	20	13072	1720	6636	2140	QPSK	1	0	53	10	5230	751	48	20	5590	3625	48	20	5618	3644.8	48	20	5638	3644.8	48	20	5654	3644.8	24.34	24.18	-0.16

### LTE Down Link 2CA 4x4 MIMO Call Setup

PCC Setting : Channel/ RB/ BW/ Modulation



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

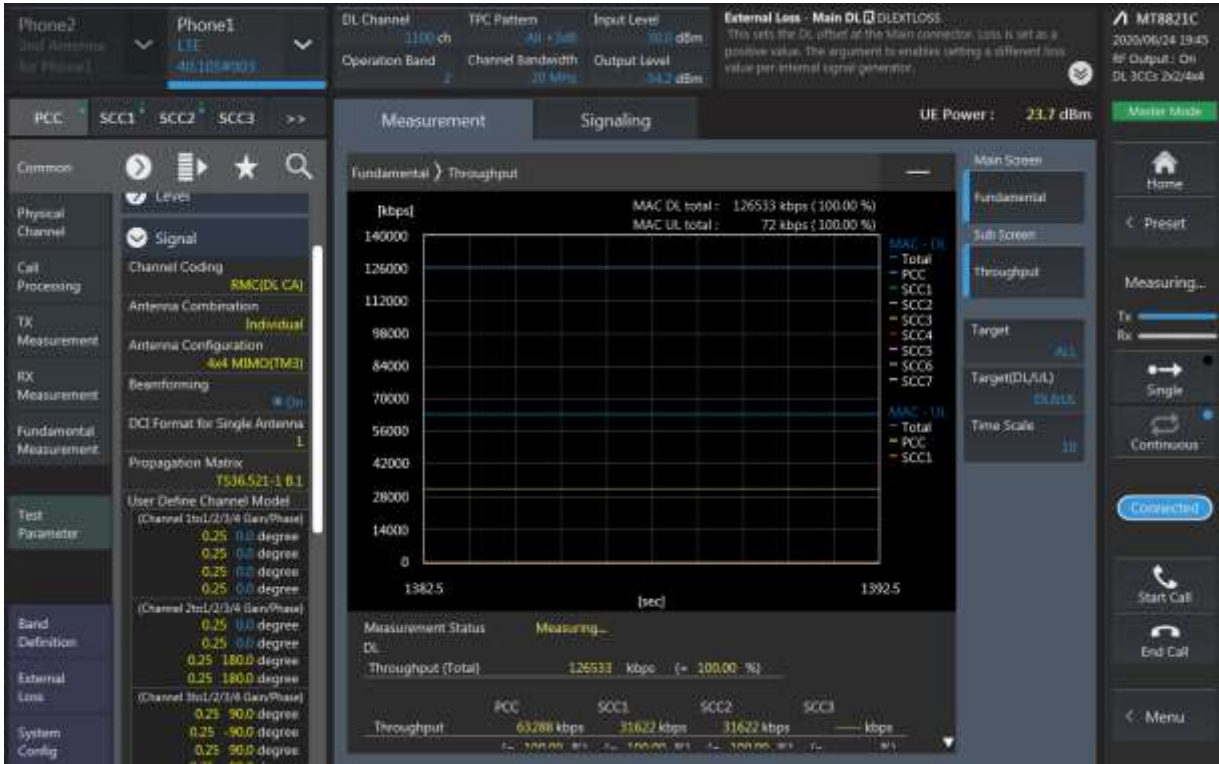


**LTE Downlink 2CA 4X4 MIMO Maximum Conducted Power**

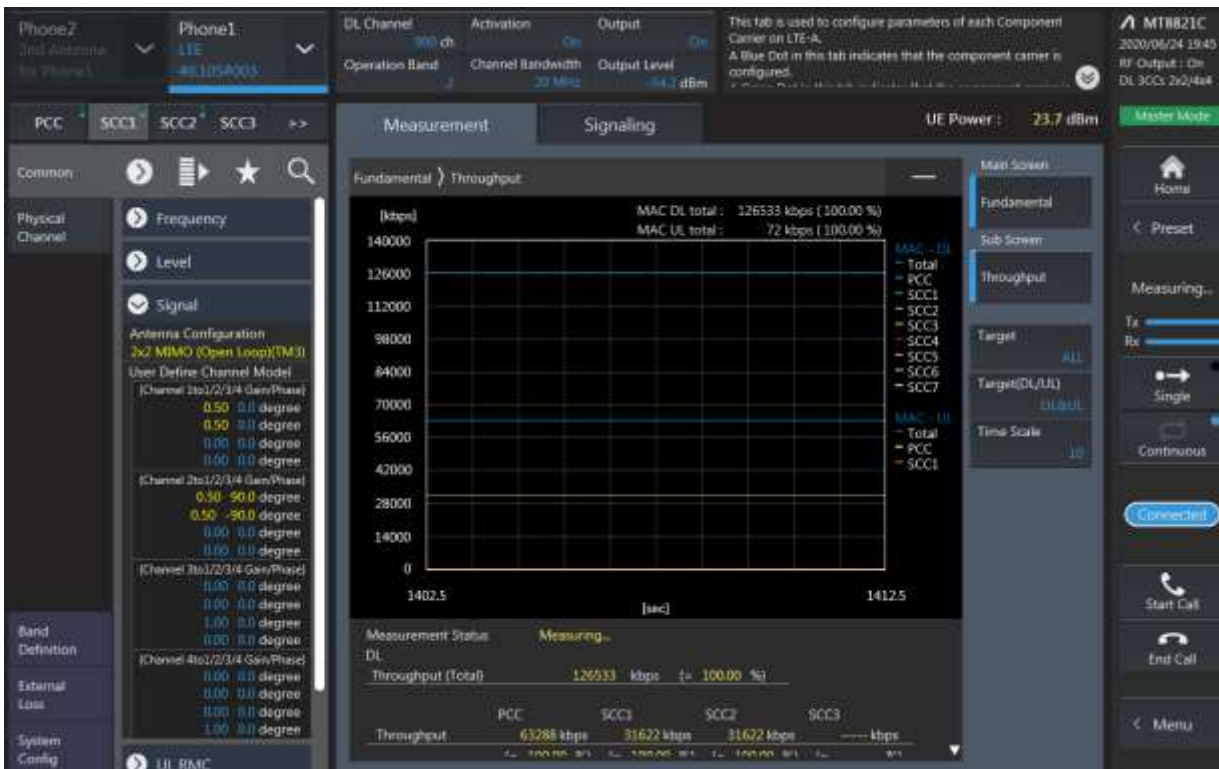
Combination	PCC									SCC				Tx Power		
	Band	BW	PCC UL Channel	PCC UL Frequency	PCC DL Channel	PCC DL Frequency	Modulation	RB	offset	Band	BW	SCC DL Channel	SCC DL Frequency	LTE Single Carrier Tx Power (dBm) (1)	LTE Tx Power with DL CA Enabled (dBm) (2)	Deviation (dB) (2)-(1)
5A-[25A]	5	10	20525	836.5	2525	881.5	QPSK	1	24	25	20	8365	1962.5	24.99	25.03	0.04
5A-[25A]	25	20	26140	1860	8140	1940	QPSK	1	49	5	10	2525	881.5	24.65	24.51	-0.14
5A-[41A]	5	10	20525	836.5	2525	881.5	QPSK	1	24	41	20	40620	2593	24.99	24.95	-0.04
12A-[25A]	12	10	23095	707.5	5095	737.5	QPSK	1	24	25	20	8365	1962.5	24.86	24.74	-0.12
12A-[25A]	25	20	26140	1860	8140	1940	QPSK	1	49	12	10	5095	737.5	24.65	24.67	0.02
[25A]-[25A](0)	25	5	26065	1852.5	8065	1932.5	QPSK	1	1	25	10	8640	1990	24.67	24.47	-0.20
[25A]-[25A](1)	25	20	26140	1860	8140	1940	QPSK	1	49	25	20	8590	1985	24.65	24.59	-0.06

### LTE Down Link 3CA 4x4 MIMO Call Setup

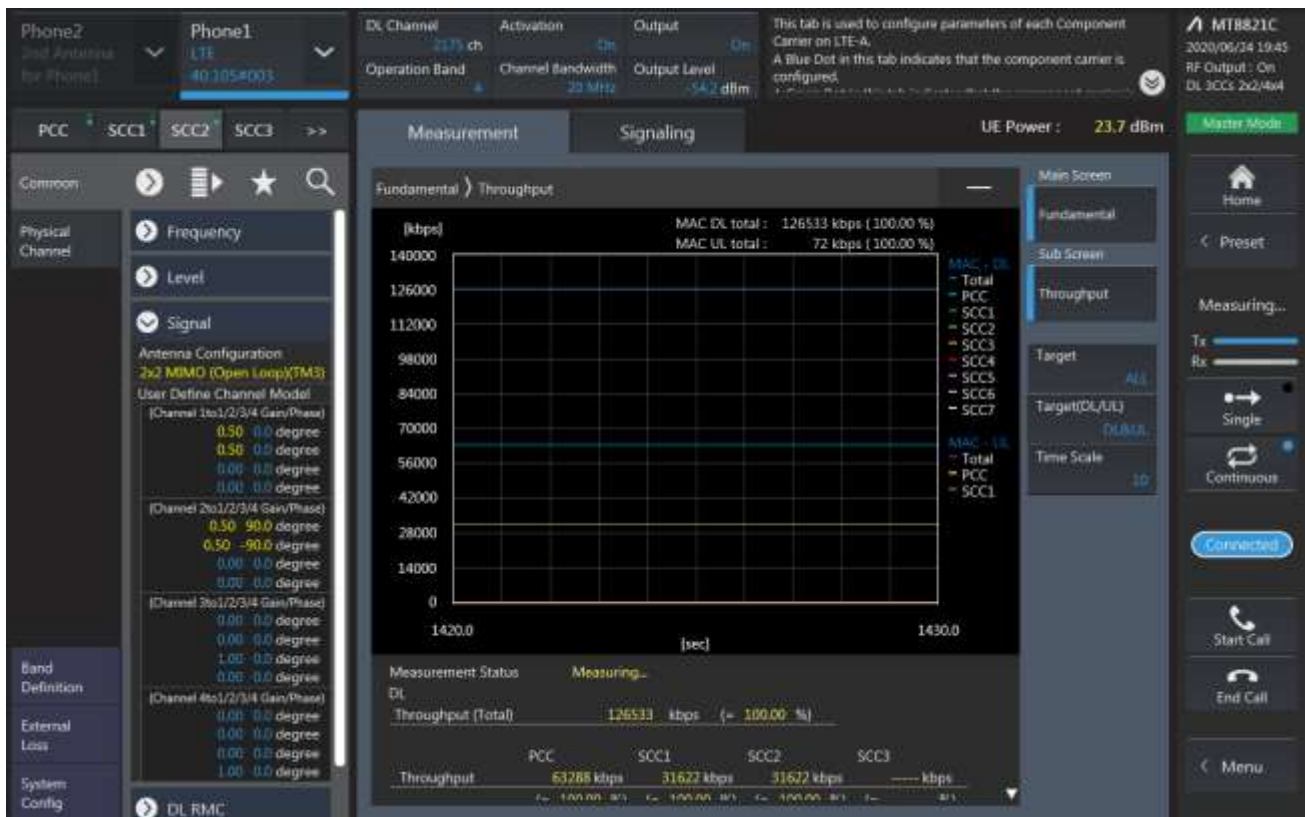
PCC Setting: Channel /RB/BW/Modulation



### CC1 Setting : Channel /RB/BW/Modulation



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

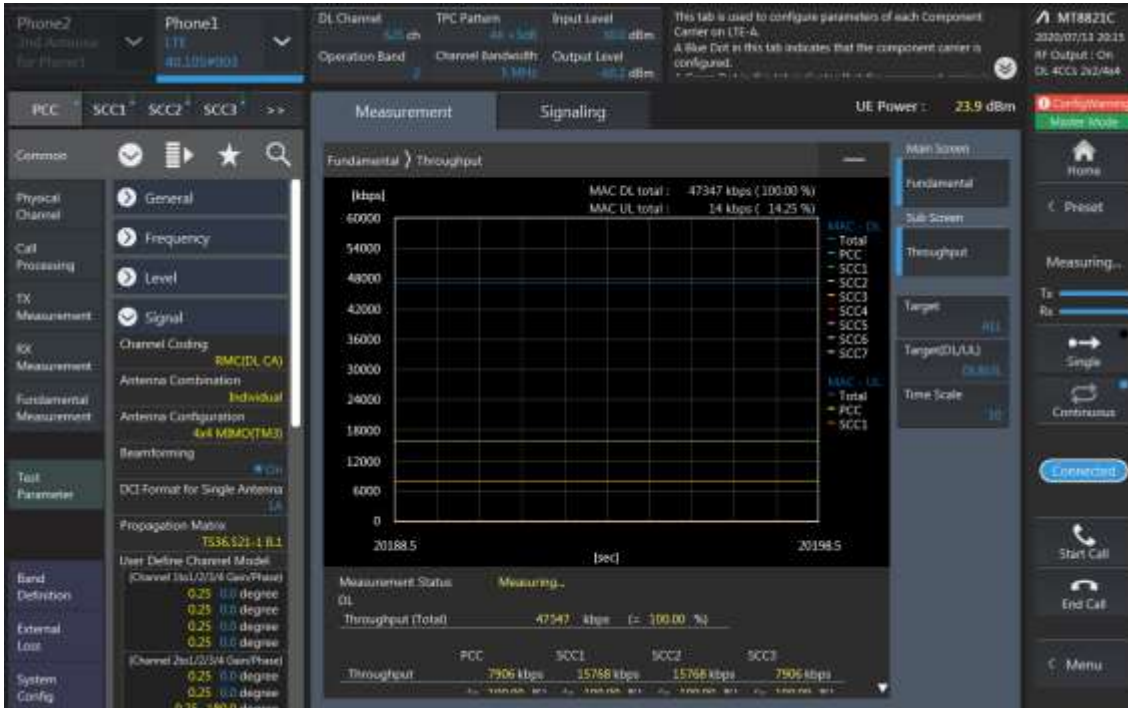


**LTE Downlink 3CA 4X4 MIMO Maximum Conducted Power**

Combination	PCC									SCC				SCC				Tx Power		
	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	Band	BW	SCC DL Channel	SCC DL Frequency	LTE Single Carrier Tx Power (dBm) (1)	LTE Tx Power with DL CA Enabled (dBm) (2)	Deviation (dB) (2)-(1)
[2A]-[4A]-13A	2	5	18625	1852.5	625	1932.5	QPSK	1	0	4	20	2175	2132.5	13	10	5230	751	24.75	24.55	-0.20
[2A][4A]-13A	4	10	20000	1715	2000	2115	QPSK	1	24	2	20	900	1960	13	10	5230	751	24.42	24.40	-0.02
[2A]-[4A]-13A	13	10	23230	782	5230	751	QPSK	1	0	2	20	900	1960	4	20	2175	2132.5	24.99	25.09	0.10
[2A]-[4A]-[30A]	2	5	18625	1852.5	625	1932.5	QPSK	1	0	4	20	2175	2132.5	30	10	9820	2355	24.75	24.93	0.18
[2A]-[4A]-[30A]	4	10	20000	1715	2000	2115	QPSK	1	24	2	20	900	1960	30	10	9820	2355	24.42	24.48	0.06
[2A]-[4A]-[30A]	30	5	27735	2312.5	9845	2357.5	QPSK	1	12	2	20	900	1960	4	20	2175	2132.5	22.87	22.75	-0.12
[2A]-[4A]-71A	2	5	18625	1852.5	625	1932.5	QPSK	1	0	4	20	2175	2132.5	71	20	68786	637	24.75	24.81	0.06
[2A]-[4A]-71A	4	10	20000	1715	2000	2115	QPSK	1	24	4	20	2175	2132.5	2	20	900	1960	24.42	24.56	0.14
[2A]-[4A]-71A	71	20	133322	683	68786	637	QPSK	1	0	4	20	2175	2132.5	2	20	900	1960	24.86	25.00	0.14
[4A]-[4A]-13A(0.1)	4	10	20000	1715	2000	2115	QPSK	1	24	4	20	2300	2145	13	10	5230	751	24.42	24.62	0.20
[4A]-[4A]-13A	13	10	23230	782	5230	751	QPSK	1	0	4	20	2175	2132.5	4	20	2300	2145	24.99	24.91	-0.08
[48A]-[48A]-71A	71	20	133322	683	68786	637	QPSK	1	0	48	20	56207	3646.7	48	20	55340	3560	24.86	24.82	-0.04
[48C]-71A	71	20	133322	683	68786	637	QPSK	1	0	48	20	55340	3560	48	20	55538	3579.8	24.86	24.90	0.04

### LTE Down Link 4CA 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



SCC3 Setting (Channel /RB/BW/Modulation ) and call Connection

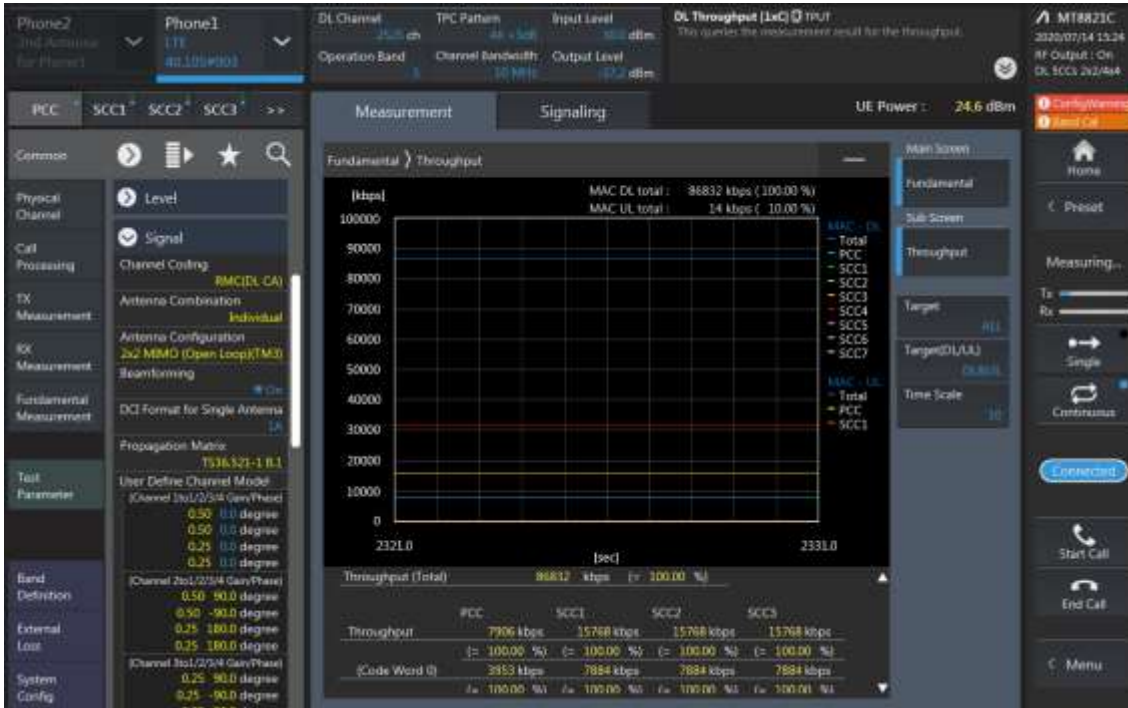


**LTE Downlink 4CA 4X4 MIMO Maximum Conducted Power**

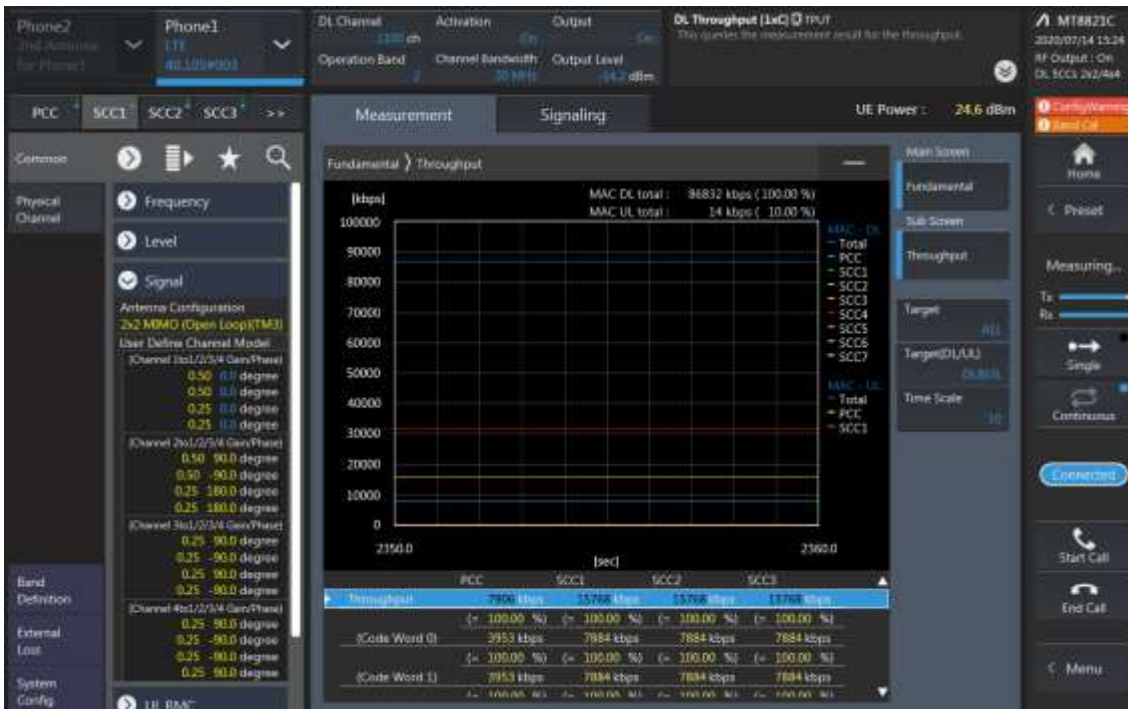
Combination	PCC										SCC				SCC				SCC				Tx Power		
	Band	BW	PCC UL Channel	PCC UL Frequency	PCC DL Channel	PCC DL Frequency	Modulation	RB	offset	Band	BW	SCC DL Channel	SCC DL Frequency	Band	BW	SCC DL Channel	SCC DL Frequency	Band	BW	SCC DL Channel	SCC DL Frequency	LTE Single Carrier Power (dBm) (1)	LTE Tx Power with DL CA (dBm) (2)	Deviation(dB) (2)-(1)	
[2A]-[2A]-[4A]-[4A]	2	5	18625	1852.5	625	1932.5	QPSK	1	0	2	20	1100	1980	4	20	2050	2120	4	20	2300	2145	24.75	24.91	0.16	
[2A]-[2A]-[4A]-[4A]	4	10	20000	1715	2000	2115	QPSK	1	24	4	20	2300	2145	2	20	900	1960	2	20	1100	1980	24.42	24.24	-0.18	
[2A]-[2A]-[4A]-5A	2	5	18625	1852.5	625	1932.5	QPSK	1	0	2	20	1100	1980	4	20	2050	2120	5	10	2525	881.5	24.75	24.93	0.18	
[2A]-[2A]-[4A]-5A	4	10	20000	1715	2000	2115	QPSK	1	24	2	20	900	1960	2	20	1100	1980	5	10	2525	881.5	24.42	24.28	-0.14	
[2A]-[2A]-[4A]-5A	5	10	20525	836.5	2525	881.5	QPSK	1	24	2	20	900	1960	2	20	1100	1980	4	20	2050	2120	24.99	25.11	0.12	
[2A]-[2A]-[4A]-12A	2	5	18625	1852.5	625	1932.5	QPSK	1	0	2	20	1100	1980	4	20	2050	2120	12	10	5095	737.5	24.75	24.95	0.20	
[2A]-[2A]-[4A]-12A	4	10	20000	1715	2000	2115	QPSK	1	24	2	20	900	1960	2	20	1100	2120	12	10	5095	737.5	24.42	24.62	0.20	
[2A]-[2A]-[4A]-12A	12	10	23095	707.5	5095	737.5	QPSK	1	24	2	20	900	1960	2	20	1100	2120	4	20	2050	2120	24.86	24.96	0.10	
[2A]-[2A]-[66A]-71A	2	5	18625	1852.5	625	1932.5	QPSK	1	0	2	20	1100	1980	66	20	66786	2165	71	20	66786	637	24.75	24.89	0.14	
[2A]-[2A]-[66A]-71A	66	20	132072	1720	66536	2140	QPSK	1	0	2	20	900	1960	2	20	1100	2120	71	20	66786	637	24.34	24.40	0.06	
[2A]-[2A]-[66A]-71A	71	20	133322	683	68786	637	QPSK	1	0	2	20	900	1960	2	20	1100	2120	66	20	66786	2165	24.86	25.04	0.18	
[2A]-[4A]-[4A]-5A	2	5	18625	1852.5	625	1932.5	QPSK	1	0	4	20	2050	2120	4	20	2300	2145	5	10	2525	881.5	24.75	24.91	0.16	
[2A]-[4A]-[4A]-5A	4	10	20000	1715	2000	2115	QPSK	1	24	4	20	2300	2145	2	20	900	1960	5	10	2525	881.5	24.42	24.60	0.18	
[2A]-[4A]-[4A]-5A	5	10	20525	836.5	2525	881.5	QPSK	1	24	2	20	900	1960	4	20	2050	2120	4	20	2300	2145	24.99	25.07	0.08	
[2A]-[4A]-[4A]-12A	2	5	18625	1852.5	625	1932.5	QPSK	1	0	4	20	2050	2120	4	20	2300	2145	12	10	5095	737.5	24.75	24.59	-0.16	
[2A]-[4A]-[4A]-12A	4	10	20000	1715	2000	2115	QPSK	1	24	4	20	2300	2145	2	20	900	1960	12	10	5095	737.5	24.42	24.36	-0.06	
[2A]-[4A]-[4A]-12A	12	10	23095	707.5	5095	737.5	QPSK	1	24	2	20	900	1960	4	20	2050	2120	4	20	2300	2145	24.86	24.66	-0.20	
[2A]-[4A]-12B	2	5	18625	1852.5	625	1932.5	QPSK	1	0	4	20	2050	2120	12	10	5095	734	12	5	5132	741.2	24.75	24.83	0.08	
[2A]-[4A]-12B	4	10	20000	1715	2000	2115	QPSK	1	24	2	20	900	1960	12	10	5095	734	12	5	5132	741.2	24.42	24.44	0.02	
[2A]-[4A]-12B	12	10	23095	707.5	5095	737.5	QPSK	1	24	12	5	503.9	730.3	2	20	900	1960	4	20	2050	2120	24.86	24.65	-0.20	
[2A]-[66C]-71A	2	5	18625	1852.5	625	1932.5	QPSK	1	0	66	20	66786	2165	66	20	66588	2145.2	71	20	66786	637	24.75	24.93	0.18	
[2A]-[66C]-71A	66	20	132072	1720	66536	2140	QPSK	1	0	66	20	66734	2159.8	2	20	900	1960	71	20	66786	637	24.34	24.32	-0.02	
[2A]-[66C]-71A	71	20	133322	683	68786	637	QPSK	1	0	66	20	66786	2165	66	20	66588	2145.2	2	20	900	1960	24.86	24.72	-0.14	
[4A]-[4A]-12B	4	10	20000	1715	2000	2115	QPSK	1	24	4	20	2300	2145	12	10	5095	734	12	5	5132	741.2	24.42	24.24	-0.18	
[4A]-[4A]-12B	12	10	23095	707.5	5095	737.5	QPSK	1	24	12	5	522.3	730.3	4	20	2050	2120	4	20	2300	2145	24.86	24.72	-0.14	
13A-[48A]-[66B]	13	10	23230	782	5230	751	QPSK	1	0	48	20	56207	3646.7	66	15	66786	2165	66	5	66693	2155.7	24.99	24.89	-0.10	
13A-[48A]-[66B]	66	5	131997	1712.5	66461	2132.5	QPSK	1	0	66	15	66564	2141.8	48	20	56207	3646.7	13	10	5230	751	24.49	24.53	0.04	
13A-[48A]-[66B]	13	10	23230	782	5230	751	QPSK	1	0	48	20	56207	3646.7	66	20	66786	2165	66	20	66588	2145.2	24.99	24.83	-0.16	
13A-[48A]-[66C]	66	20	132072	1720	66536	2140	QPSK	1	0	66	20	66734	2159.8	48	20	56207	3646.7	13	10	5230	751	24.34	24.50	0.16	
[25A]-[41D]	25	20	26140	1860	8140	1940	QPSK	1	49	41	20	40422	2573.2	41	20	40224	2533.4	24.67	24.83	0.16					
[25A]-[41D]	41	20	41480	2880	41480	2880	QPSK	1	0	41	20	41292	2860.2	41	20	41094	2840.4	25	20	8365	1982.5	24.31	24.39	0.08	
29A-[30A]-[66A]-[66A]	30	5	27735	2312.5	9845	2357.5	QPSK	1	12	66	20	66786	2145	66	20	67236	2190	29	10	9715	722.5	22.87	22.97	0.20	
29A-[30A]-[66A]-[66A]	66	20	132072	1720	66536	2140	QPSK	1	0	66	20	67236	2190	30	10	9820	2355	29	10	9715	722.5	24.34	24.54	0.20	

### LTE Down Link 5CA 4x4 MIMO Call Setup

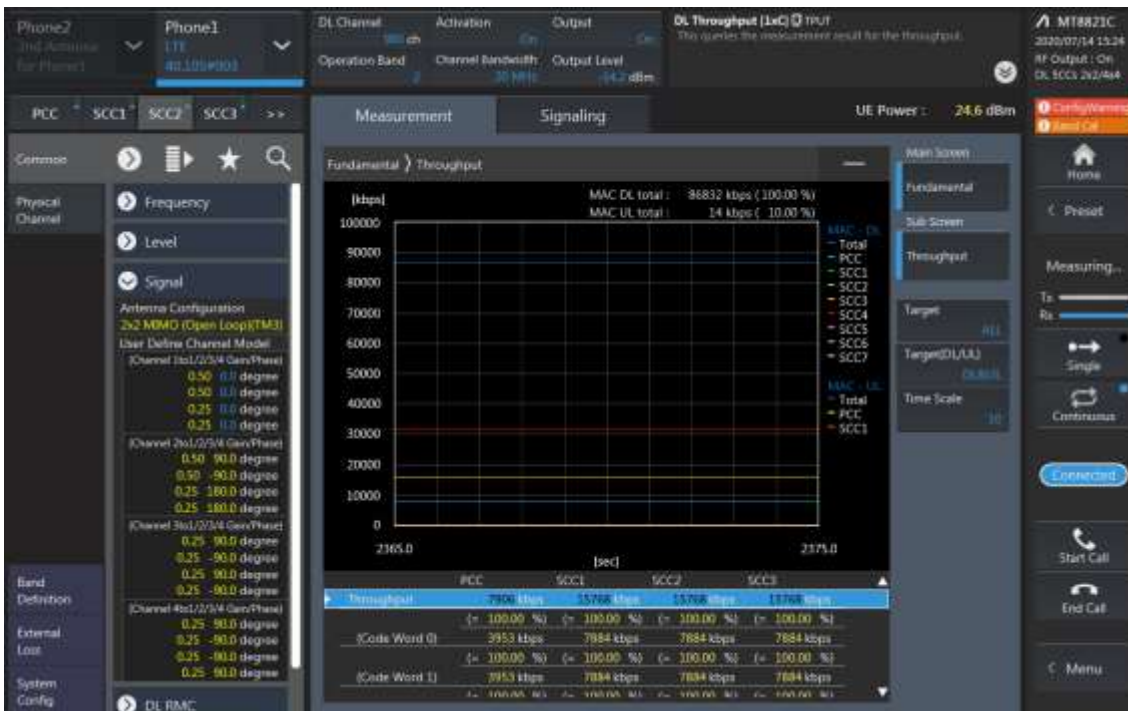
PCC Setting: Channel /RB/BW/Modulation



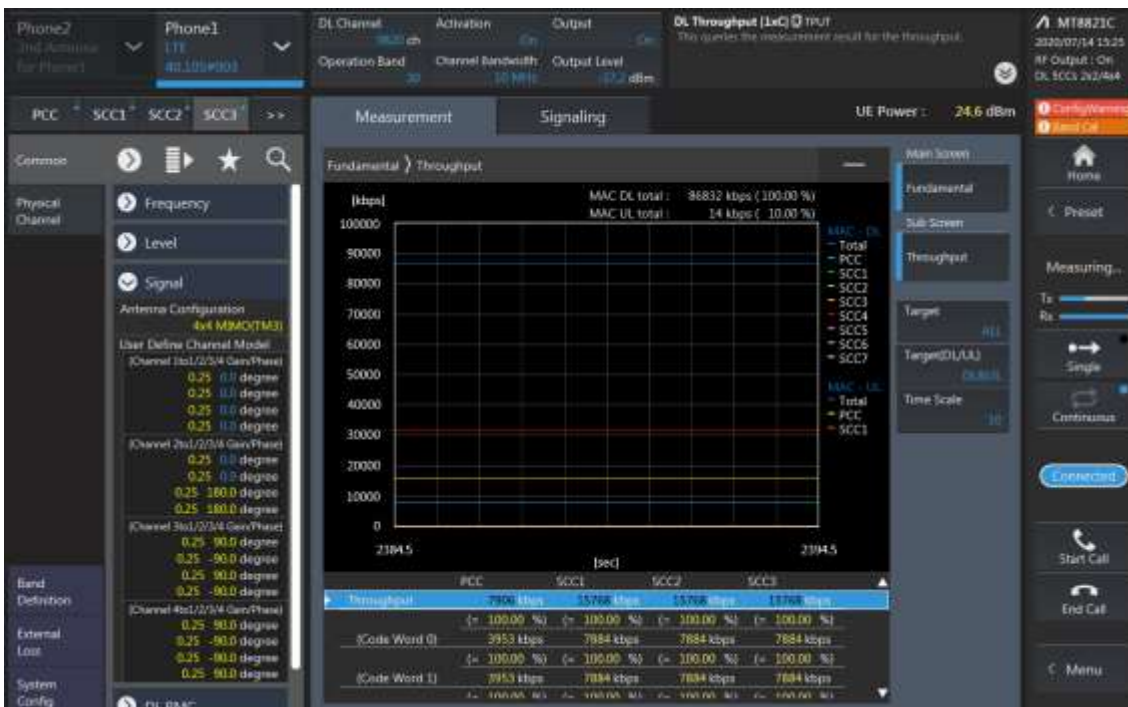
### SCC1 Setting : Channel /RB/BW/Modulation



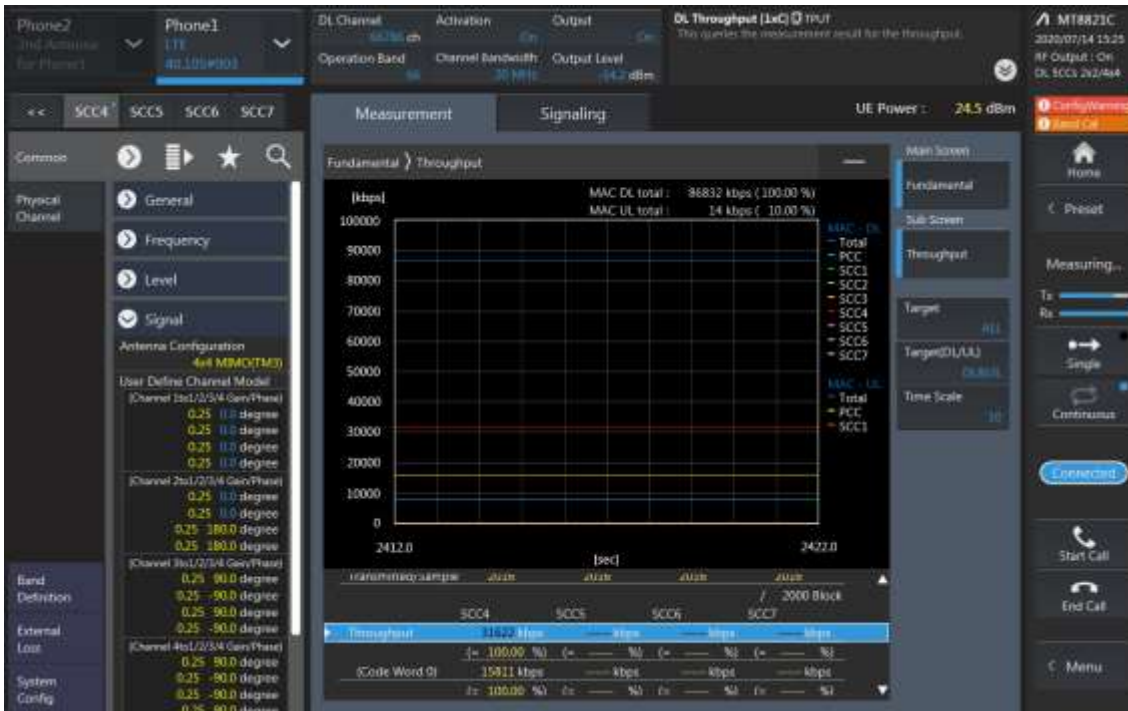
SCC2 Setting (Channel /RB/BW/Modulation ) and call Connection



SCC3 Setting (Channel /RB/BW/Modulation ) and call Connection



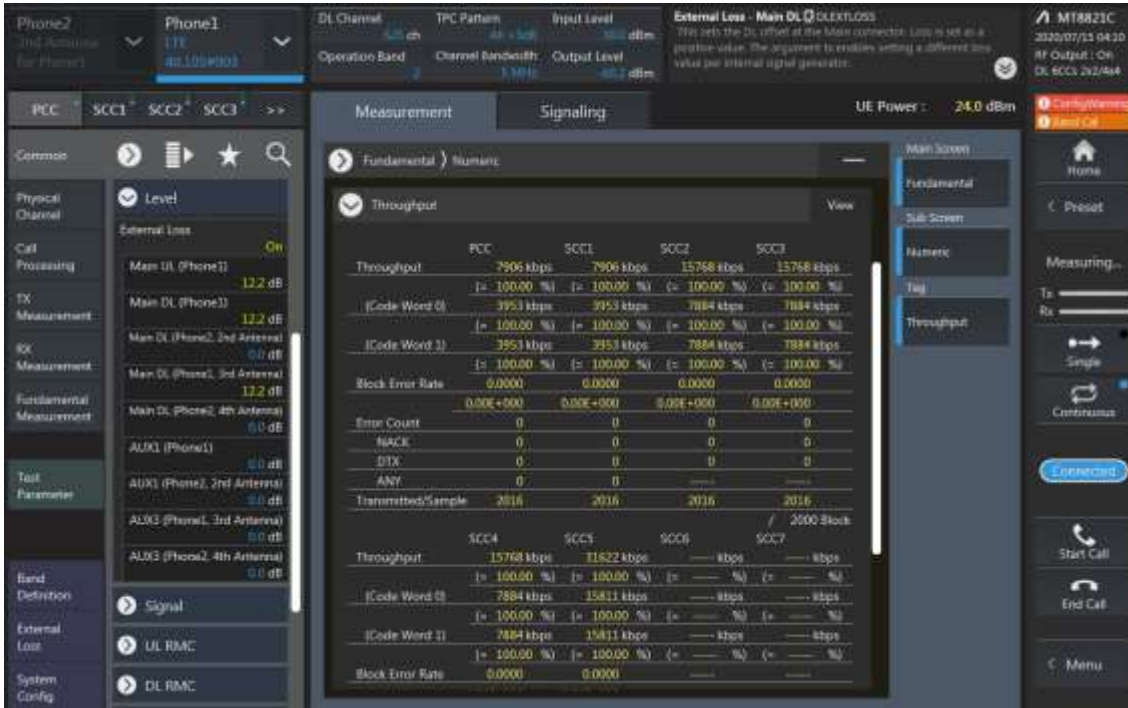
SCC4 Setting (Channel /RB/BW/Modulation ) and call Connection





### LTE Down Link 6CA 4x4 MIMO Call Setup

#### PCC Setting (Channel/ RB/ BW/ Modulation)



#### SCC1 Setting (Channel/ RB/ BW/ Modulation) and call Connection



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

The screenshot displays the SCC2 configuration and measurement results. The 'Signal' tab shows antenna configuration and channel models. The 'Measurement' tab shows throughput and error rate data for PCC, SCC1, SCC2, and SCC3.

	PCC	SCC1	SCC2	SCC3
Throughput	7906 kbps	7906 kbps	15768 kbps	15768 kbps
(Code Word 0)	3953 kbps	3953 kbps	7884 kbps	7884 kbps
(Code Word 1)	3953 kbps	3953 kbps	7884 kbps	7884 kbps
Block Error Rate	0.0000	0.0000	0.0000	0.0000
Error Count	0	0	0	0
NACK	0	0	0	0
DTX	0	0	0	0
ANY	0	0	0	0
Transmitted/Sample	2016	2016	2016	2016

SCC3 Setting (Channel/ RB/ BW/ Modulation) and call Connection

The screenshot displays the SCC3 configuration and measurement results. The 'Signal' tab shows antenna configuration and channel models. The 'Measurement' tab shows throughput and error rate data for PCC, SCC1, SCC2, and SCC3.

	PCC	SCC1	SCC2	SCC3
Throughput	7906 kbps	7906 kbps	15768 kbps	15768 kbps
(Code Word 0)	3953 kbps	3953 kbps	7884 kbps	7884 kbps
(Code Word 1)	3953 kbps	3953 kbps	7884 kbps	7884 kbps
Block Error Rate	0.0000	0.0000	0.0000	0.0000
Error Count	0	0	0	0
NACK	0	0	0	0
DTX	0	0	0	0
ANY	0	0	0	0
Transmitted/Sample	2016	2016	2016	2016



SCC4 Setting (Channel/ RB/ BW/ Modulation) and call Connection

DL Channel: 62.700 ch, Activation: On, Output: 23.9 dBm

Operation Band: 4G LTE, Channel Bandwidth: 30 MHz, Output Level: 23.9 dBm

UE Power: 23.9 dBm

	PCC	SCC1	SCC2	SCC3
Throughput	7906 kbps	7906 kbps	15768 kbps	15768 kbps
(Code Word 0)	3953 kbps	3953 kbps	7884 kbps	7884 kbps
(Code Word 1)	3953 kbps	3953 kbps	7884 kbps	7884 kbps
Block Error Rate	0.0000	0.0000	0.0000	0.0000
Error Count	0	0	0	0
NACK	0	0	0	0
DTX	0	0	0	0
ANY	0	0	0	0
Transmitted Sample	1818	1818	1800	1800
	/ 2000 Blocks			
Throughput	15768 kbps	11822 kbps	— kbps	— kbps
(Code Word 0)	7884 kbps	15811 kbps	— kbps	— kbps
(Code Word 1)	7884 kbps	15811 kbps	— kbps	— kbps
Block Error Rate	0.0000	0.0000	—	—

SCC5 Setting (Channel/ RB/ BW/ Modulation) and call Connection

DL Channel: 62.700 ch, Activation: On, Output: 23.9 dBm

Operation Band: 4G LTE, Channel Bandwidth: 30 MHz, Output Level: 23.9 dBm

UE Power: 23.9 dBm

	PCC	SCC1	SCC2	SCC3
Throughput	7906 kbps	7906 kbps	15768 kbps	15768 kbps
(Code Word 0)	3953 kbps	3953 kbps	7884 kbps	7884 kbps
(Code Word 1)	3953 kbps	3953 kbps	7884 kbps	7884 kbps
Block Error Rate	0.0000	0.0000	0.0000	0.0000
Error Count	0	0	0	0
NACK	0	0	0	0
DTX	0	0	0	0
ANY	0	0	0	0
Transmitted Sample	2016	2016	2016	2016
	/ 2000 Blocks			
Throughput	15768 kbps	11822 kbps	— kbps	— kbps
(Code Word 0)	7884 kbps	15811 kbps	— kbps	— kbps
(Code Word 1)	7884 kbps	15811 kbps	— kbps	— kbps
Block Error Rate	0.0000	0.0000	—	—

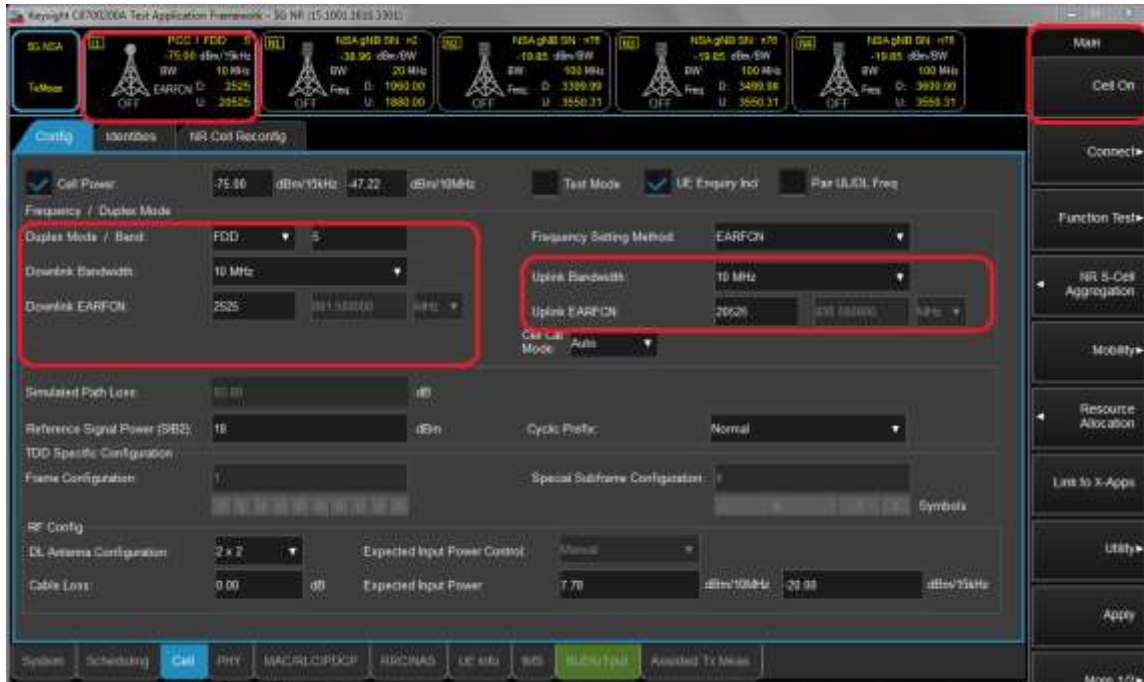
**LTE Downlink 6CA 4X4 MIMO Maximum Conducted Power**

Combination	PCC				SCC				SCC				SCC				SCC				LTE Max Power (dBm)	LTE Max Power (dBm) (2+1)	Revised (2+1)									
	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	Band	BW	SCC DL Channel	SCC DL Frequency	Band	BW	SCC DL Channel				SCC DL Frequency	Band	BW	SCC DL Channel	SCC DL Frequency				
TA1 SA14BC1 (66A) 166A	2	5	18625	1862.5	625	1832.5	QPSK	1	0	5	10	2525	881.5	48	20	5590	3625	48	20	55188	3644.8	68	20	66786	2145	68	20	67236	2190	24.75	24.65	-0.10
TA1 SA14BC1 (66A) 166A	5	10	20525	836.5	2325	881.5	QPSK	1	24	48	20	5590	3625	48	20	55188	3644.8	2	20	900	1980	68	20	66786	2145	68	20	67236	2190	24.99	25.01	0.02
TA1 SA14BC1 (66A) 166A	66	20	132072	1720	66536	2140	QPSK	1	0	66	20	67236	2190	2	20	900	1980	5	10	2525	881.5	48	20	5590	3625	48	20	55188	3644.8	24.24	24.54	0.30
TA1 SA14BC1 (66A) 166A	2	5	18625	1862.5	625	1832.5	QPSK	1	0	48	20	5590	3625	48	20	55188	3644.8	48	20	55386	3664.6	48	20	55584	3684.4	68	20	66786	2145	24.75	24.89	-0.14
TA1 SA14BC1 (66A) 166A	66	20	132072	1720	66536	2140	QPSK	1	0	2	20	900	1980	48	20	5590	3625	48	20	55188	3644.8	48	20	55386	3664.6	48	20	55584	3684.4	24.34	24.28	-0.06
SA14BC1 (66A) 166A	5	10	20525	836.5	2325	881.5	QPSK	1	24	66	20	66786	2145	66	20	67236	2190	48	20	5590	3625	48	20	55188	3644.8	48	20	55386	3664.6	24.50	24.95	-0.45
SA14BC1 (66A) 166A	66	20	132072	1720	66536	2140	QPSK	1	0	66	20	67236	2190	5	10	2525	881.5	48	20	5590	3625	48	20	55188	3644.8	48	20	55386	3664.6	24.34	24.50	0.16
13A-48E (66A)	13	10	23230	782	2230	751	QPSK	1	0	66	20	66786	2145	48	20	5590	3625	48	20	55188	3644.8	48	20	55386	3664.6	48	20	55584	3684.4	24.99	24.97	-0.02
13A-48E (66A)	66	20	132072	1720	66536	2140	QPSK	1	0	13	10	5200	751	48	20	5590	3625	48	20	55188	3644.8	48	20	55386	3664.6	48	20	55584	3684.4	24.34	24.46	-0.12

## 2. 5G NR Call Box Setup

Procedure used to establish output Power measurement for NR Bands  
 Select operating band, BW and Channel.

- Click Cell on button in the right of Test application screen.
- Turn the LTE Cell On using “ON/OFF” Key.

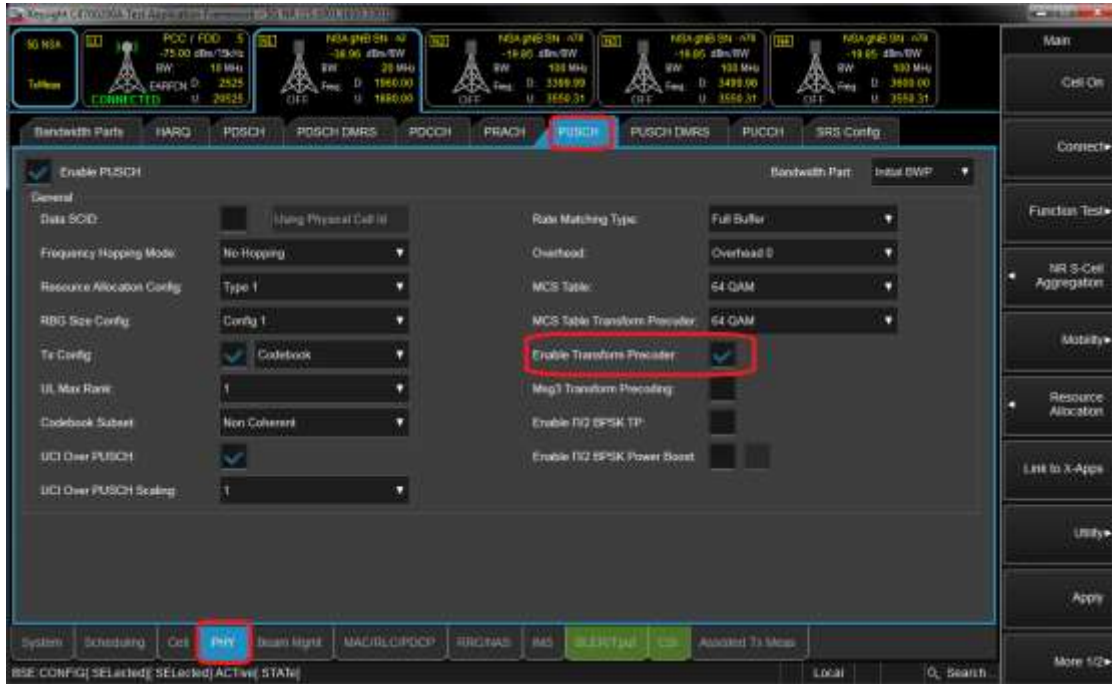


- Turn the Airplane Mode On and then turn the Airplane mode off.
- Select All down bits for UL Power control Mode in LTE.



Setup for NR Band

- Select waveform for Setting NR Band (PHY->PUSCH->Enable Transform Precoder)
  - Enable : DFT-s-OFDM, Disable : CP-OFDM



- Select operating band, BW, SCS and Channel.
- Turn the NR Cell On using “ON/OFF” Key.



Connect NR S-Cell Aggregation

- Click NR S-Cell Aggregation
- Check the Cell 1's DL and UL box(PCC) and than Click Apply.
- Check the message summary If message shows NR Msg 5, It is connected.



Max Power setting

- Click "Cell in the bottom of screen.
- Click "UE Power control" than change UE Power control mode to All Up bits.



### Selecting Start RB/Count/MCS

- Select the each test configuring (Start RB, Count, MCS).



### View Tx Power

- Click “Link to X-Apps.”(Please refer to Figure-7)
- Select “Channel Power”.

