Appendix H. – Power reduction verification

Per the May 2017 TCBC Workshop notes, demonstration of proper functioning of the power reduction mechanism is required to support the corresponding SAR Configurations.

The verification process was divided into two parts:

1). Evaluation of output power levels for individual triggering mechanism

2) Evaluation of the triggering distances for proximity-based sensors.

1. Power Reduction Verification for Main Bands

The Hotspot power reduction applied to this product has a higher priority than the proximity sensor, so these two conditions do not work simultaneously. and In both cases, powers were reduced to the same Power level.

All Hotspot SAR evaluations for this device were performed at the maximum allowed output Power when Hotspot is activated. FCC KDB Publication 616217D04v01r02 section 6 was used as a guideline for selection SAR test distances for this device when being used in phablet use conditions.

For detailed measurement conducted power results, please refer to the Section .11

The Power verification was performed according to the following procedure:

1. A base station simulator was used to establish a conducted RF connection and output power was monitored. The Power measurements were conformed to be within expected tolerances for all states before and after a power reduction mechanism was triggered.
2. Step 1 was repeated for all relevant modes and frequency bands for the mechanism being investigated.
3. Step 1 and 2 were repeated for all individual power reduction mechanism and combinations thereof. For the combination cases, one mechanism was switched to a “triggered” state at a time; powers were conformed to be within tolerance after each additional mechanism was activated.

Mechanism(s)	Mode/Band	Conducted Power (dBm)		
		Un-triggered (Max Power)	Triggered (Reduced Power)	Triggered (Reduced Power)
Grip	GSM/GPRS 1900 1Tx	29.41	27.16	
Grip	GSM/GPRS 1900 2Tx	26.88	25.28	
Grip	GSM/GPRS 1900 3Tx	25.28	23.53	
Grip	GSM/GPRS 1900 4Tx	24.33	21.75	
Grip	WCDMA B2	23.22	19.94	
Grip	WCDMA B4	23.11	20.52	
Grip	LTE Band 2	22.90	18.90	
Grip	LTE Band 4	23.16	19.12	
Grip	LTE Band 25	23.49	18.78	
Grip	LTE Band 41(PC3)	24.88	22.64	
Grip	LTE Band 41(PC2)	25.91	22.77	
Grip	LTE Band 66	23.34	19.83	
Grip	Sub 6 Band n7	24.21	20.94	
Grip	Sub 6 Band n66	24.63	19.71	
Hotspot On	GSM/GPRS 1900 1Tx	29.41	27.23	
Hotspot On	GSM/GPRS 1900 2Tx	26.88	25.26	
Hotspot On	GSM/GPRS 1900 3Tx	25.28	23.82	
Hotspot On	GSM/GPRS 1900 4Tx	24.33	21.60	
Hotspot On	WCDMA B2	23.22	19.72	
Hotspot On	WCDMA B4	23.11	20.52	
Hotspot On	LTE Band 2	22.90	18.91	
Hotspot On	LTE Band 4	23.16	19.59	
Hotspot On	LTE Band 25	23.49	19.14	
Hotspot On	LTE Band 41(PC3)	24.88	22.59	
Hotspot On	LTE Band 41(PC2)	25.91	22.88	
Hotspot On	LTE Band 66	23.34	19.82	
Hotspot On	Sub 6 Band n66	24.63	19.73	
Hotspot On, Then Grip	GSM/GPRS 1900 1Tx	29.41	27.22	27.22
Hotspot On, Then Grip	GSM/GPRS 1900 2Tx	26.88	25.26	25.26
Hotspot On, Then Grip	GSM/GPRS 1900 3Tx	25.28	23.84	23.84
Hotspot On, Then Grip	GSM/GPRS 1900 4Tx	24.33	21.58	21.58
Hotspot On, Then Grip	WCDMA B2	23.22	19.73	19.73
Hotspot On, Then Grip	WCDMA B4	23.11	20.52	20.52
Hotspot On, Then Grip	LTE Band 2	22.90	18.92	18.92
Hotspot On, Then Grip	LTE Band 4	23.16	19.52	19.52
Hotspot On, Then Grip	LTE Band 25	23.49	19.17	19.17
Hotspot On, Then Grip	LTE Band 41(PC3)	24.88	22.61	22.61
Hotspot On, Then Grip	LTE Band 41(PC2)	25.91	22.87	22.87
Hotspot On, Then Grip	LTE Band 66	23.34	19.80	19.80
Hotspot On, Then Grip	Sub 6 Band n66	24.63	19.72	19.72
Grip, then Hotspot On	GSM/GPRS 1900 1Tx	29.41	27.17	27.22
Grip, then Hotspot On	GSM/GPRS 1900 2Tx	26.88	25.26	25.26
Grip, then Hotspot On	GSM/GPRS 1900 3Tx	25.28	23.51	23.83
Grip, then Hotspot On	GSM/GPRS 1900 4Tx	24.33	21.74	21.62
Grip, then Hotspot On	WCDMA B2	23.22	19.92	19.71
Grip, then Hotspot On	WCDMA B4	23.11	20.50	20.49
Grip, then Hotspot On	LTE Band 2	22.90	18.91	18.90
Grip, then Hotspot On	LTE Band 4	23.16	19.14	19.55
Grip, then Hotspot On	LTE Band 25	23.49	18.75	19.11
Grip, then Hotspot On	LTE Band 41(PC3)	24.88	22.61	22.57
Grip, then Hotspot On	LTE Band 41(PC2)	25.91	22.76	22.84
Grip, then Hotspot On	LTE Band 66	23.34	19.85	19.83
Grip, then Hotspot On	Sub 6 Band n66	24.63	19.73	19.74

1.1. Distance Verification Procedure

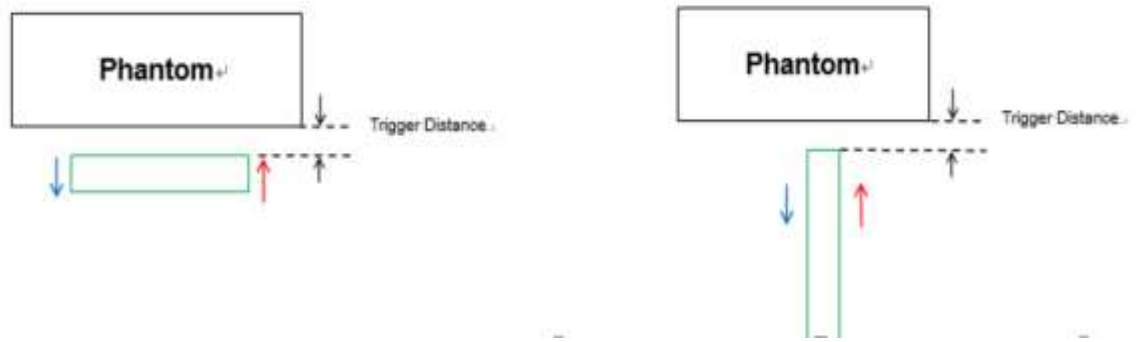
Procedures for determining proximity sensor triggering distances

(KDB 616217D04v01r02§6.2)

The distance verification procedure was performed according to the following procedure:

1. A base station simulator was used to establish an RF connection and to monitor the power levels. The device being tested was placed below the relevant section of the phantom with the relevant side or edge of the device facing toward the phantom.
2. The device was moved toward and away from the phantom to determine the distance at which the mechanism triggers and the output power is reduced,per KDB Publication 616217 D04v01r02 .Each applicable test position was evaluated. The distance were conformed to be the same or larger (more conservative) than the minimum distances provided by the manufacturer.
3. Step 1 and 2 were repeated for the relevant modes, as appropriate
4. Steps1 through 3 were repeated for all distance-based power reduction mechanisms.

For detailed measurement conducted power results, please refer to the Section .11



Proximity Sensor Trigger Distance Assessment KDB 616217 D04§6.2 (Rear / Front / Bottom side)

LEGEND

→ Direction of DUT travel for determination of power reduction triggering point

→ Direction of DUT travel for determination of full power resumption triggering point

Tissue simulating liquid	Trigger distance - Rear		Trigger distance - Front		Trigger distance - Bottom	
	Moving toward phantom [mm]	Moving away from phantom [mm]	Moving toward phantom [mm]	Moving away from phantom [mm]	Moving toward phantom [mm]	Moving away from phantom [mm]
1 800 MHz Tissue	10	11	7	8	13	14
1 900 MHz Tissue	10	11	7	8	13	14
2 600 MHz Tissue	10	11	7	8	13	14

Distance Measurement verification for Proximity sensor

Rear side (Main Ant#1-1, Main Ant#1-2) – EUT Moving toward (trigger) to the Phantom

Mode	Distance to DUT Output power (dBm)									
	15[mm]	14[mm]	13[mm]	12[mm]	11[mm]	10[mm]	9[mm]	8[mm]	7[mm]	6[mm]
GSM1900 /GPRS 1Tx	29.39	29.45	29.48	29.34	29.36	27.12	27.12	27.11	27.20	27.17
GSM1900 /GPRS 2Tx	26.88	26.94	26.92	26.83	26.95	25.21	25.34	25.27	25.34	25.22
GSM1900 /GPRS 3Tx	25.35	25.23	25.18	25.26	25.18	23.63	23.57	23.56	23.55	23.46
GSM1900 /GPRS 4Tx	24.37	24.39	24.41	24.35	24.34	21.76	21.74	21.83	21.69	21.76
WCDMA B2	23.18	23.22	23.31	23.16	23.16	19.99	19.92	19.90	20.01	19.91
WCDMA B4	23.14	23.10	23.12	23.13	23.09	20.46	20.43	20.52	20.49	20.51
LTE Band 2	22.88	22.91	22.97	22.88	22.97	18.89	18.85	18.84	18.84	18.98
LTE Band 4	23.25	23.22	23.11	23.22	23.21	19.12	19.13	19.06	19.07	19.05
LTE Band 25	23.56	23.52	23.39	23.51	23.46	18.70	18.87	18.88	18.78	18.85
LTE Band 41(Class 3)	24.78	24.91	24.94	24.91	24.79	22.58	22.73	22.63	22.65	22.63
LTE Band 41(Class 2)	25.91	25.89	25.81	25.99	25.85	22.79	22.77	22.84	22.82	22.79
LTE Band 66	23.24	23.43	23.41	23.36	23.27	19.83	19.77	19.88	19.83	19.80
Sub 6 Band n66	24.59	24.63	24.59	24.70	24.58	19.79	19.78	19.71	19.74	19.63

Rear side (Main Ant#1-1, Main Ant#1-2) – EUT Moving away (Release) from the Phantom

Mode	Distance to DUT Output power (dBm)									
	7[mm]	8[mm]	9[mm]	10[mm]	11[mm]	12[mm]	13[mm]	14mm]	15[mm]	16[mm]
GSM1900 /GPRS 1Tx	27.10	27.16	27.15	27.14	27.06	29.43	29.47	29.41	29.41	29.49
GSM1900 /GPRS 2Tx	25.33	25.29	25.37	25.28	25.33	26.93	26.79	26.82	26.96	26.78
GSM1900 /GPRS 3Tx	23.46	23.53	23.48	23.50	23.58	25.28	25.22	25.21	25.28	25.29
GSM1900 /GPRS 4Tx	21.65	21.75	21.80	21.65	21.72	24.28	24.43	24.26	24.32	24.24
WCDMA B2	20.00	19.88	19.88	19.91	19.88	23.12	23.30	23.27	23.31	23.23
WCDMA B4	20.42	20.46	20.48	20.54	20.56	23.02	23.11	23.06	23.20	23.02
LTE Band 2	18.84	18.89	18.97	18.88	18.82	22.86	22.94	22.94	22.88	22.85
LTE Band 4	19.20	19.18	19.20	19.12	19.09	23.16	23.17	23.08	23.26	23.12
LTE Band 25	18.80	18.85	18.71	18.72	18.73	23.53	23.55	23.58	23.52	23.55
LTE Band 41(Class 3)	22.73	22.67	22.68	22.56	22.70	24.79	24.83	24.88	24.94	24.91
LTE Band 41(Class 2)	22.86	22.80	22.77	22.86	22.70	25.92	25.96	25.85	25.98	25.97
LTE Band 66	19.90	19.86	19.74	19.91	19.80	23.34	23.44	23.40	23.37	23.41
Sub 6 Band n66	19.77	19.80	19.63	19.77	19.62	24.63	24.65	24.61	24.63	24.58

Based on the most conservative measured triggering distance of 10mm, additional Phablet SAR measurements were required at 9mm from rear side for the above modes

Front side (Main Ant#1-1, Main Ant#1-2) – EUT Moving toward (trigger) to the Phantom

Mode	Distance to DUT Output power (dBm)									
	12[mm]	11[mm]	10[mm]	9[mm]	8[mm]	7[mm]	6[mm]	5[mm]	4[mm]	3[mm]
GSM1900 /GPRS 1Tx	29.50	29.34	29.30	29.52	29.41	27.09	27.19	27.06	27.10	27.12
GSM1900 /GPRS 2Tx	26.93	26.91	26.75	26.75	26.82	25.27	25.26	25.36	25.38	25.28
GSM1900 /GPRS 3Tx	25.40	25.15	25.30	25.15	25.27	23.47	23.46	23.41	23.40	23.65
GSM1900 /GPRS 4Tx	24.21	24.36	24.22	24.31	24.29	21.74	21.80	21.68	21.85	21.73
WCDMA B2	23.24	23.23	23.32	23.12	23.33	19.89	19.97	19.98	19.89	19.92
WCDMA B4	23.17	23.07	23.09	23.23	23.22	20.56	20.59	20.44	20.55	20.39
LTE Band 2	22.80	22.78	22.88	22.89	22.82	18.89	18.87	18.77	18.91	18.93
LTE Band 4	23.19	23.25	23.28	23.23	23.25	19.04	19.16	19.23	19.25	19.19
LTE Band 25	23.42	23.49	23.56	23.56	23.38	18.76	18.69	18.71	18.66	18.70
LTE Band 41(Class 3)	24.83	24.95	25.00	24.81	24.84	22.61	22.54	22.52	22.66	22.69
LTE Band 41(Class 2)	25.96	25.78	25.90	25.85	25.84	22.74	22.88	22.65	22.72	22.77
LTE Band 66	23.29	23.38	23.37	23.37	23.30	19.87	19.75	19.96	19.93	19.80
Sub 6 Band n66	24.65	24.55	24.50	24.65	24.67	19.71	19.65	19.79	19.74	19.78

Front side (Main Ant#1-1, Main Ant#1-2) – EUT Moving away (Release) from the Phantom

Mode	Distance to DUT Output power (dBm)									
	4[mm]	5[mm]	6[mm]	7[mm]	8[mm]	9[mm]	10[mm]	11[mm]	12[mm]	13[mm]
GSM1900 /GPRS 1Tx	27.16	27.1	27.11	27.22	27.25	29.44	29.54	29.38	29.45	29.42
GSM1900 /GPRS 2Tx	25.23	25.34	25.37	25.34	25.37	26.75	26.80	26.92	26.99	26.88
GSM1900 /GPRS 3Tx	23.54	23.55	23.55	23.63	23.55	25.39	25.37	25.38	25.15	25.36
GSM1900 /GPRS 4Tx	21.77	21.67	21.74	21.84	21.81	24.29	24.26	24.36	24.40	24.32
WCDMA B2	20.02	20.06	20.06	20.02	19.89	23.32	23.14	23.10	23.09	23.18
WCDMA B4	20.52	20.55	20.58	20.65	20.44	23.21	23.01	23.16	23.17	23.23
LTE Band 2	18.83	19.02	18.80	18.89	18.79	22.96	22.78	23.00	22.92	22.80
LTE Band 4	19.08	19.24	19.04	19.25	19.12	23.16	23.22	23.12	23.13	23.20
LTE Band 25	18.79	18.8	18.81	18.65	18.81	23.47	23.47	23.50	23.39	23.50
LTE Band 41(Class 3)	22.60	22.59	22.68	22.51	22.64	24.90	24.77	24.80	24.76	24.94
LTE Band 41(Class 2)	22.70	22.64	22.89	22.85	22.73	25.90	25.92	25.97	26.03	25.84
LTE Band 66	19.81	19.95	19.76	19.88	19.73	23.22	23.25	23.39	23.21	23.40
Sub 6 Band n66	19.67	19.69	19.81	19.62	19.72	24.62	24.60	24.74	24.63	24.69

Based on the most conservative measured triggering distance of 7mm, additional Phablet SAR measurements were required at 6mm from Front side for the above modes

Bottom side (Main Ant#1-1, Main Ant#1-2) – EUT Moving toward (trigger) to the Phantom

Mode	Distance to DUT Output power (dBm)									
	18[mm]	17[mm]	16[mm]	15[mm]	14[mm]	13[mm]	12[mm]	11[mm]	10[mm]	9[mm]
GSM1900 /GPRS 1Tx	29.30	29.35	29.32	29.52	29.32	27.29	27.04	27.06	27.11	27.03
GSM1900 /GPRS 2Tx	26.77	26.90	26.77	26.89	26.97	25.24	25.19	25.28	25.37	25.41
GSM1900 /GPRS 3Tx	25.29	25.15	25.21	25.41	25.18	23.56	23.64	23.44	23.41	23.59
GSM1900 /GPRS 4Tx	24.35	24.23	24.37	24.21	24.37	21.88	21.62	21.83	21.88	21.73
WCDMA B2	23.20	23.31	23.34	23.35	23.09	19.94	19.81	19.84	19.99	19.96
WCDMA B4	23.13	230	23.15	23.12	23.23	20.40	20.48	20.53	20.60	20.43
LTE Band 2	22.96	23.01	22.79	22.89	22.90	18.94	18.90	18.88	18.77	18.81
LTE Band 4	23.14	23.07	23.23	23.26	23.23	19.18	19.22	19.06	19.25	19.03
LTE Band 25	23.53	23.57	23.48	23.47	23.49	18.72	18.83	18.83	18.69	18.76
LTE Band 41(Class 3)	24.90	24.75	25.01	24.86	24.96	22.74	22.60	22.55	22.60	22.56
LTE Band 41(Class 2)	25.94	25.92	25.97	25.98	26.03	22.73	22.89	22.80	22.79	22.78
LTE Band 66	23.33	23.26	23.31	23.40	23.37	19.78	19.96	19.83	19.94	19.94
Sub 6 Band n66	24.65	24.54	24.51	24.70	24.66	19.73	19.71	19.72	19.71	19.64

Bottom side (Main Ant#1-1, Main Ant#1-2) – EUT Moving away (Release) from the Phantom

Mode	Distance to DUT Output power (dBm)									
	10[mm]	11[mm]	12[mm]	13[mm]	14[mm]	15[mm]	16[mm]	17[mm]	18[mm]	19[mm]
GSM1900 /GPRS 1Tx	27.06	27.22	27.11	27.26	27.23	29.51	29.29	29.29	29.5	29.37
GSM1900 /GPRS 2Tx	25.19	25.37	25.15	25.27	25.37	26.82	26.82	26.82	26.96	26.84
GSM1900 /GPRS 3Tx	23.5	23.44	23.63	23.45	23.46	25.18	25.17	25.27	25.27	25.37
GSM1900 /GPRS 4Tx	21.88	21.75	21.78	21.82	21.64	24.42	24.44	24.27	24.42	24.3
WCDMA B2	19.98	19.90	19.86	19.85	19.83	23.27	23.30	23.31	23.22	23.18
WCDMA B4	20.64	20.43	20.53	20.43	20.61	23.10	23.22	23.19	23.08	22.99
LTE Band 2	18.92	18.81	18.79	18.81	19.00	22.95	22.80	22.96	22.85	22.86
LTE Band 4	19.02	19.08	19.05	18.99	19.25	23.06	23.27	23.07	23.11	23.27
LTE Band 25	18.72	18.79	18.8	18.83	18.86	23.45	23.40	23.43	23.57	23.57
LTE Band 41(Class 3)	22.67	22.73	22.61	22.75	22.68	24.76	24.90	25.00	24.87	24.91
LTE Band 41(Class 2)	22.69	22.74	22.80	22.90	22.73	25.94	25.83	26.03	25.98	26.04
LTE Band 66	19.81	19.81	19.95	19.82	19.74	23.46	23.31	23.21	23.36	23.41
Sub 6 Band n66	19.59	19.70	19.65	19.81	19.73	24.70	24.64	24.59	24.69	24.67

Based on the most conservative measured triggering distance of 13mm, additional Phablet SAR measurements were required at 12mm from Bottom side for the above modes

1.2 Proximity Sensor Coverage for SAR measurements

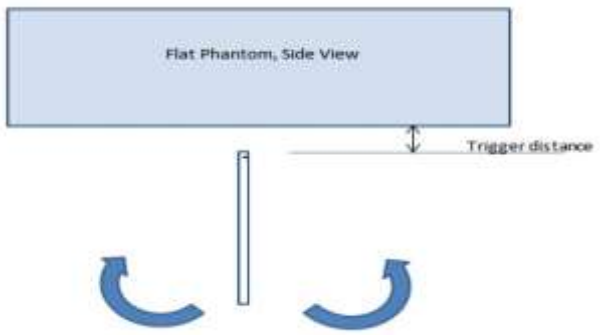
(KDB 616217 D04v01r02§6.3)

As there is no spatial offset between the antenna and the proximity sensor element, proximity sensor coverage did not need to be assessed.

1.3 Proximity Sensor Tilt Angle Assessment

(KDB 616217 D04v01r02 §6.4)

The DUT was positioned directly below the flat phantom at the minimum measured trigger distance with Bottom side parallel to the base of the flat phantom for each band.The EUT was rotated about Bottom side for angles up to ±45°. If the output power increased during the rotation the DUT was moved 1mm toward the phantom and the rotation repeated. This procedure was repeated until the power remained reduced for all angles up±45°.



Proximity sensor tilt angle assessment (Bottom side) KDB 616217 §6.4

Summary of Tablet Tilt Angle influence to Proximity Sensor Triggering (Bottom side)

Tissue	Minimumdistance atwhich power reduction was maintained over-45°	Power reduction status										
		-45°	-40°	-30°	-20°	-10°	0°	10°	20°	30°	40°	45°
1800 MHz Tissue	13 mm	On	On	On	On	On	On	On	On	On	On	On
1900 MHz Tissue	13 mm	On	On	On	On	On	On	On	On	On	On	On
2600 MHz Tissue	13 mm	On	On	On	On	On	On	On	On	On	On	On

1.5 Resulting test positions for Phablet SAR measurements

Wireless technologies	Position	§6.2 Triggering Distance [mm]	§6.3 Coverage	§6.4 Tilt Angle	Worst case distance for Phablet SAR [mm]
WWAN (GSM1900/ WCDMAB2/B4/ LTEB2/B4/B25/B41(PC3)/ B41(PC2)/B66/Sub6n66)	Rear	10	N/A	N/A	9
	Front	7	N/A	N/A	6
	Bottom	13	N/A	N/A	12

Note: FCC KDB Publication 616217 D04v01r02 Section 6 was used as a guideline for selecting SAR test distances for this device when being used in phablet use conditions

2. Power reduction Verification for RCV-ON

This device uses a power reduction mechanism for SAR compliance for operations during voice or VoIP held to ear scenarios.

When a user makes or receives a voice call or VOIP call for Main Ant#6 and Sub Ant#8 the audio of the call is sent through the Receiver at the top of the device will trigger the Power reduction for Main Ant#6 and Sub Ant#8 (i.e. reducing output power for Head SAR compliance)

Detailed descriptions of the power reduction mechanism are included in the Main operational description document

Sub Ant#6

Condition For Power reduction	Wireless Technologies	Conducted Power[dBm]	
		Un-Triggered (Max Power)	Triggered (Reduced Power)
RCV-on	NR n66(upper)	22.83	18.52

3. Power reduction Verification for WLAN Ant

This device uses a power reduction mechanism for SAR compliance for WLAN operations during voice or VoIP held to ear scenarios.

When a user makes or receives a WLAN voice or WLAN VOIP call for WLAN Ant the audio of the call is sent through the Receiver at the top of the device will trigger the Power reduction for WLAN Ant (i.e. reducing output power for Head SAR compliance)

Detailed descriptions of the power reduction mechanism are included in the Main operational description document

Power Measurement Verification for WLAN

Condition For Power reduction	Wireless Technologies	Conducted Power[dBm]			
		Un-Triggered (Max Power)		Triggered (Reduced Power)	
		Ant1	Ant2	Ant1	Ant2
RCV-on	2.4GHz 802.11b (except ch 12, ch 13)	17.39	17.93	13.30	13.42
RCV-on	2.4GHz 802.11g (except ch 12, ch 13)	16.62	17.17	13.45	13.45
RCV-on	2.4GHz 802.11n (except ch 12, ch 13)	16.36	16.86	13.29	13.31
RCV-on	5GHz 802.11a	16.92	16.60	10.59	10.66
RCV-on	5GHz 802.11n 20MHz	16.63	16.29	10.43	10.51
RCV-on	5GHz 802.11n 40MHz	14.76	15.76	10.55	10.48
RCV-on	5GHz 802.11ac 20MHz	16.61	16.20	10.40	10.65
RCV-on	5GHz 802.11ac 40MHz	15.30	15.90	10.31	10.60
RCV-on	5GHz 802.11ac 80MHz	14.49	14.87	10.57	10.61

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.

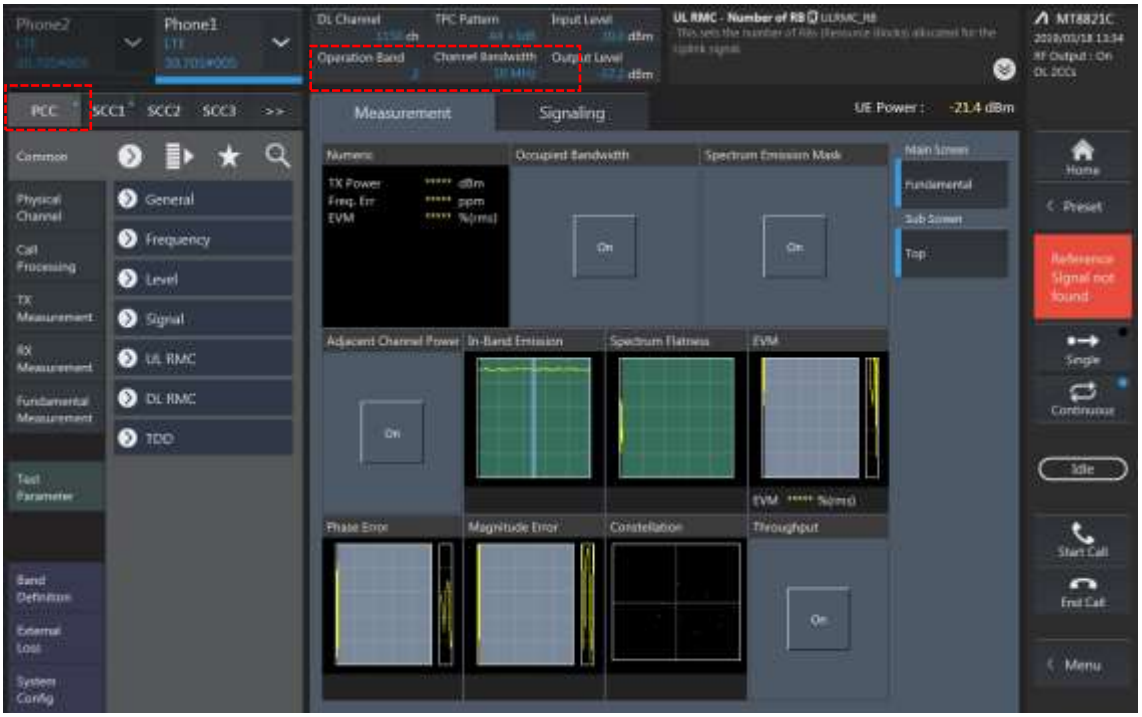
Downlink Carrier aggregation:

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.

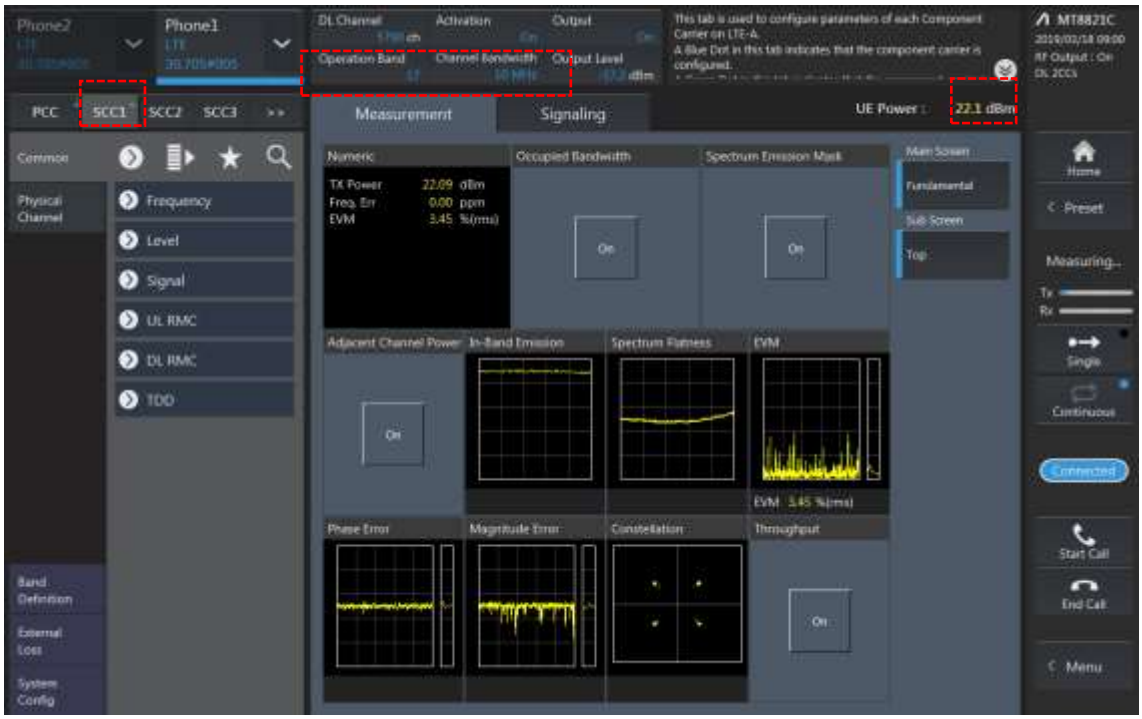
Power Measurement setup

LTE Down Link 2CA Call Setup

PCC Setting : Channel/ RB/ BW/ Modulation



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

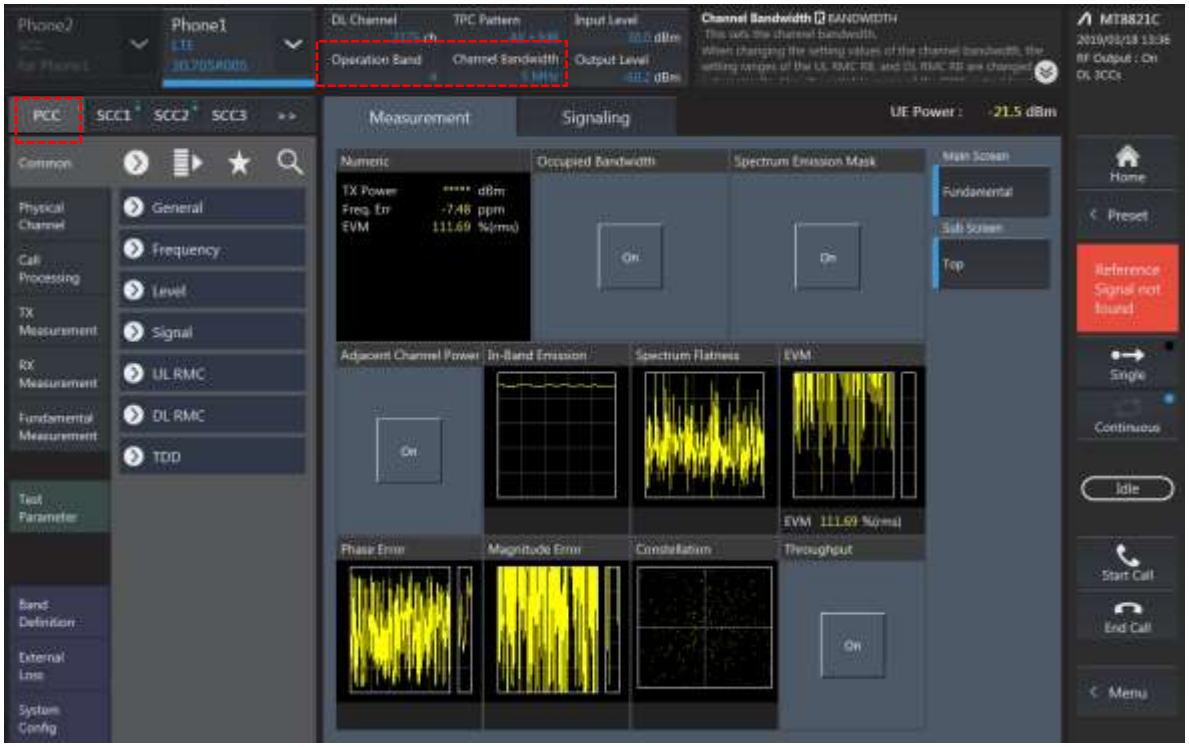


2CA Downlink Carrier aggregation Maximum conducted Powers

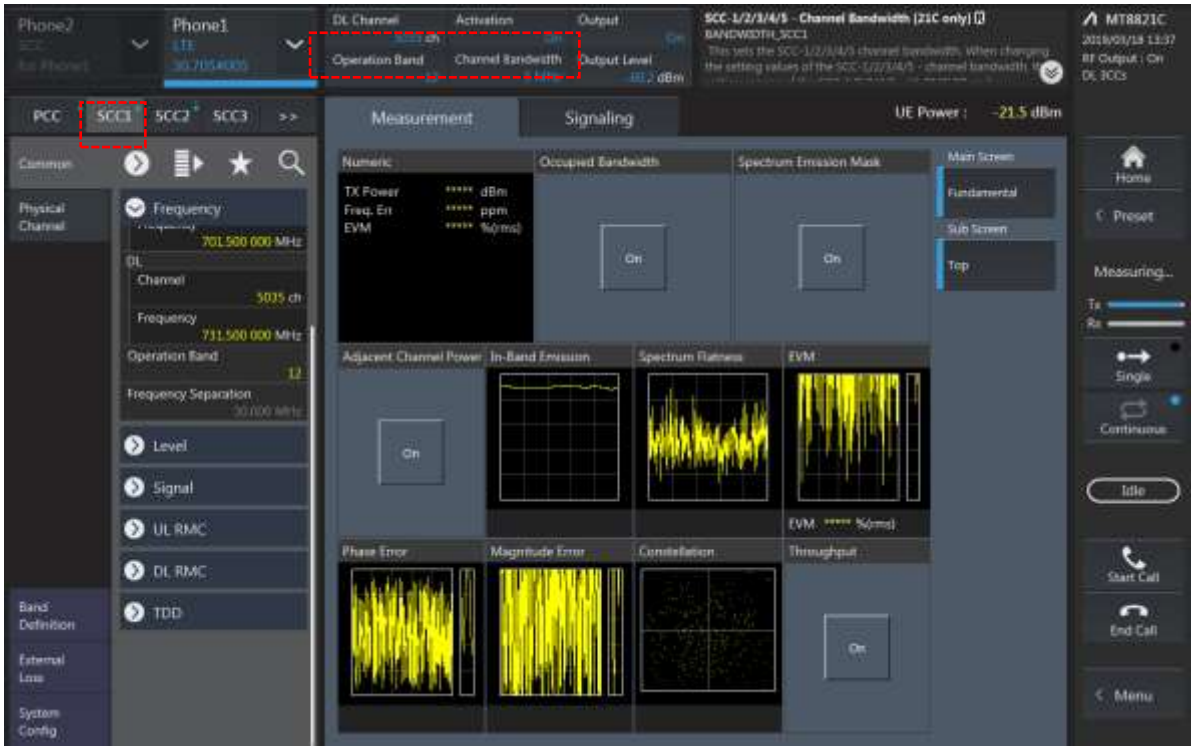
Combination	PCC									SCC				Tx Power		Delta (2)-(1)
	Band	BW	PCC UL Ch.	PCC UL Freq.	PCC DL Ch.	PCC DL Freq.	Modulation	RB	RB offset	Band	BW	SCC DL Ch.	SCC DL Freq.	LTE Single Carrier Tx Power (dBm) (1)	LTE Tx Power with DL CA Enabled (dBm) (2)	
2A-2A	2	10	19150	1905	1150	1985	QPSK	1	0	2	20	700	1940	23.11	23.21	0.10
2C	2	10	19150	1905	1150	1985	QPSK	1	0	2	20	1006	1970.6	23.11	22.93	-0.18
2A-4A(0,2)	2	10	19150	1905	1150	1985	QPSK	1	0	4	20	2175	2132.5	23.11	23.27	0.16
2A-4A(1)	2	10	19150	1905	1150	1985	QPSK	1	0	4	10	2175	2132.5	23.11	23.12	0.01
2A-4A(0,2)	4	15	20325	1747.5	2325	2147.5	QPSK	1	36	2	20	900	1960	23.70	23.94	0.24
2A-4A(1)	4	10	20350	1750	2350	2150	QPSK	1	0	2	10	900	1960	23.64	23.56	-0.09
2A-5A(0,1)	2	10	19150	1905	1150	1985	QPSK	1	0	5	10	2525	881.5	23.11	23.27	0.16
2A-5A(0)	5	5	20425	826.5	2425	871.5	QPSK	1	12	2	20	900	1960	24.06	24.27	0.21
2A-5A(1)	5	5	20425	826.5	2425	871.5	QPSK	1	12	2	10	900	1960	24.06	23.88	-0.18
2A-12A(0,1,2)	2	10	19150	1905	1150	1985	QPSK	1	0	12	10	5095	737.5	23.11	22.94	-0.18
2A-12A(0,1)	12	5	23095	707.5	5095	737.5	QPSK	1	12	2	20	900	1960	24.11	23.86	-0.25
2A-12A(2)	12	5	23095	707.5	5095	737.5	QPSK	1	12	2	10	900	1960	24.11	23.83	-0.28
2A-13A(0,1)	2	10	19150	1905	1150	1985	QPSK	1	0	13	10	5230	751	23.11	23.21	0.09
2A-13A(0)	13	10	23230	782	5230	751	QPSK	1	0	2	20	900	1960	23.60	23.45	-0.15
2A-13A(1)	13	10	23230	782	5230	751	QPSK	1	0	2	10	900	1960	23.60	23.44	-0.16
2A-17A	2	10	19150	1905	1150	1985	QPSK	1	0	17	10	5790	740	23.11	23.14	0.03
2A-17A	17	10	23790	710	5790	740	QPSK	1	0	2	10	900	1960	23.31	23.31	0.00
2A-66A(0,2)	2	10	19150	1905	1150	1985	QPSK	1	0	66	20	66786	2145	23.11	22.95	-0.16
2A-66A(1)	2	10	19150	1905	1150	1985	QPSK	1	0	66	10	66786	2145	23.11	23.20	0.09
2A-66A(0,2)	66	10	132622	1775	67086	2175	QPSK	1	0	2	20	900	1960	23.65	23.65	0.00
2A-66A(1)	66	10	132622	1775	67086	2175	QPSK	1	0	2	10	900	1960	23.65	23.40	-0.25
4A-4A(0)	4	15	20325	1747.5	2325	2147.5	QPSK	1	36	4	20	2050	2120	23.70	23.91	0.20
4A-4A(1)	4	10	20350	1750	2350	2150	QPSK	1	0	4	10	2000	2115	23.64	23.72	0.08
4A-5A(0)	4	10	20350	1750	2350	2150	QPSK	1	0	5	10	2525	881.5	23.64	23.77	0.13
4A-5A(1)	4	15	20325	1747.5	2325	2147.5	QPSK	1	36	5	10	2525	881.5	23.70	23.54	-0.16
4A-5A(0)	5	5	20425	826.5	2425	871.5	QPSK	1	12	4	10	2175	2132.5	24.06	24.27	0.20
4A-5A(1)	5	5	20425	826.5	2425	871.5	QPSK	1	12	4	20	2175	2132.5	24.06	24.02	-0.05
4A-12A(0,3)	4	10	20350	1750	2350	2150	QPSK	1	0	12	10	5095	737.5	23.64	23.80	0.16
4A-12A(1,2,4)	4	15	20325	1747.5	2325	2147.5	QPSK	1	36	12	10	5095	737.5	23.70	23.71	0.00
4A-12A(5)	4	15	20325	1747.5	2325	2147.5	QPSK	1	36	12	5	5095	737.5	23.70	23.76	0.05
4A-12A(0,3)	12	5	23095	707.5	5095	737.5	QPSK	1	12	4	10	2175	2132.5	24.11	23.81	-0.31
4A-12A(1,4)	12	5	23095	707.5	5095	737.5	QPSK	1	12	4	20	2175	2132.5	24.11	23.77	-0.34
4A-12A(2)	12	3	23095	707.5	5095	737.5	QPSK	1	7	4	20	2175	2132.5	23.98	23.80	-0.18
4A-12A(5)	12	5	23095	707.5	5095	737.5	QPSK	1	12	4	15	2175	2132.5	24.11	23.81	-0.30
4A-13A(0)	4	15	20325	1747.5	2325	2147.5	QPSK	1	36	13	10	5230	751	23.70	23.79	0.09
4A-13A(1)	4	10	20350	1750	2350	2150	QPSK	1	0	13	10	5230	751	23.64	23.65	0.00
4A-13A(0)	13	10	23230	782	5230	751	QPSK	1	0	4	20	2175	2132.5	23.60	23.33	-0.27
4A-13A(1)	13	10	23230	782	5230	751	QPSK	1	0	4	10	2175	2132.5	23.60	23.46	-0.14
4A-17A	4	10	20350	1750	2350	2150	QPSK	1	0	17	10	5790	740	23.64	23.62	-0.02
5A-41A	5	5	20425	826.5	2425	871.5	QPSK	1	12	41	20	40620	2593	24.06	23.84	-0.23
5A-66A	5	5	20425	826.5	2425	871.5	QPSK	1	12	66	20	66786	2145	24.06	24.25	0.18
5A-66A	66	10	132622	1775	67086	2175	QPSK	1	0	5	10	2525	881.5	23.65	23.50	-0.16
12A-66A(0,3)	12	5	23095	707.5	5095	737.5	QPSK	1	12	66	10	66786	2145	24.11	24.09	-0.02
12A-66A(1,4)	12	5	23095	707.5	5095	737.5	QPSK	1	12	66	20	66786	2145	24.11	24.01	-0.10
12A-66A(2)	12	3	23095	707.5	5095	737.5	QPSK	1	7	66	20	66786	2145	23.98	23.85	-0.13
12A-66A(5)	12	5	23095	707.5	5095	737.5	QPSK	1	12	66	15	66786	2145	24.11	23.72	-0.40
12A-66A(0,1)	66	3	132657	1778.5	67121	2178.5	QPSK	1	0	12	10	5095	737.5	23.66	23.87	0.20
12A-66A(2,3,4)	66	10	132622	1775	67086	2175	QPSK	1	0	12	10	5095	737.5	23.65	23.84	0.18
12A-66A(5)	66	10	132622	1775	67086	2175	QPSK	1	0	12	5	5095	737.5	23.65	23.54	-0.11
26A-41A	26	5	26715	816.5	8715	861.5	QPSK	1	12	41	20	40620	2593	24.14	24.27	0.13
41A-41A PC3	41	20	41055	2636.5	41055	2636.5	QPSK	1	0	41	20	39750	2506	24.94	24.78	-0.16
41A-41A PC2	41	15	41055	2636.5	41055	2636.5	QPSK	1	36	41	20	39750	2506	25.99	25.90	-0.09
41C PC3	41	20	41055	2636.5	41055	2636.5	QPSK	1	0	41	20	40857	2616.7	24.94	24.95	0.01
41C PC2	41	15	41055	2636.5	41055	2636.5	QPSK	1	36	41	20	40884	2619.4	25.99	25.92	-0.07
66A-66A	66	10	132622	1775	67086	2175	QPSK	1	0	66	20	67236	2190	23.65	23.73	0.08
66B	66	10	132622	1775	67086	2175	QPSK	1	0	66	10	66987	2165.1	23.65	23.58	-0.07
66C	66	10	132622	1775	67086	2175	QPSK	1	0	66	20	66942	2160.6	23.65	23.70	0.05

LTE Down Link 3CA Call Setup

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



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



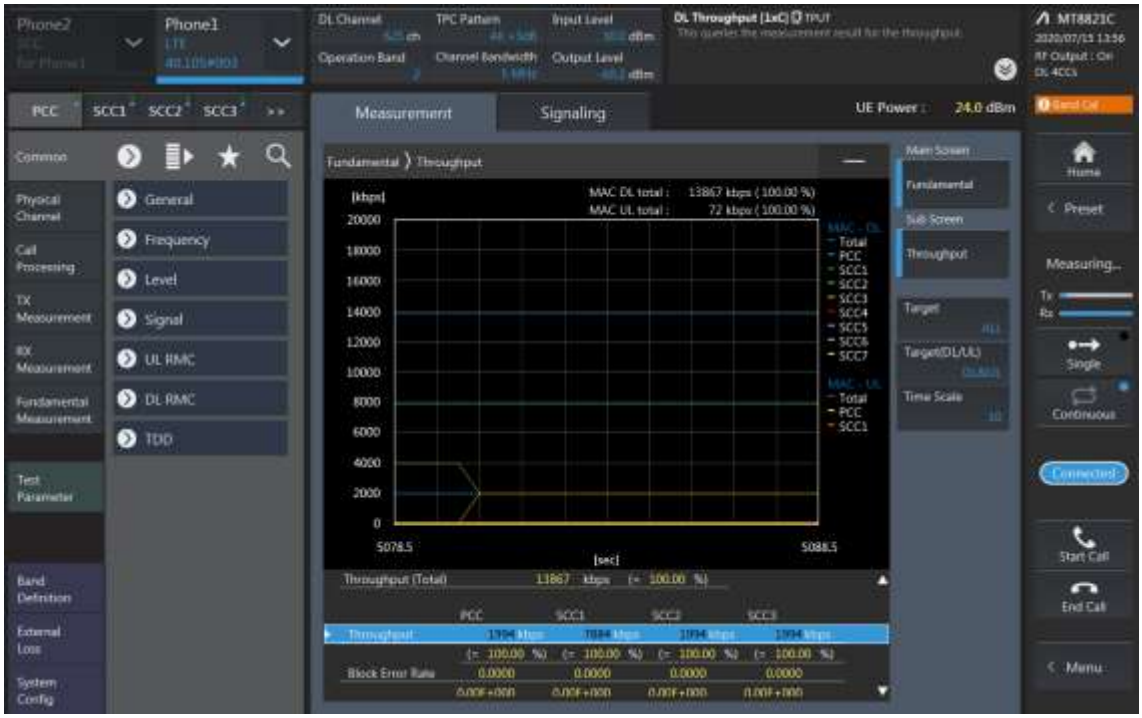
3) SCC2 Setting (Channel /RB/BW/Modulation)and call Connection

3CA Downlink Carrier aggregation Maximum conducted Powers

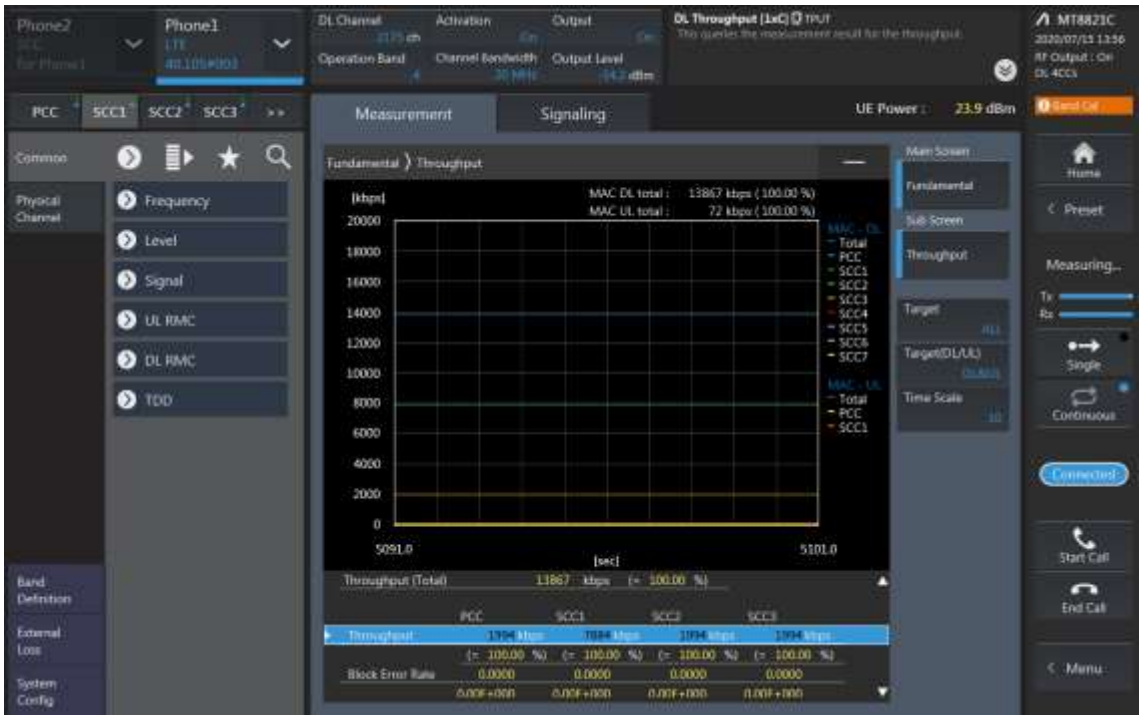
Combination	PCC									SCC				SCC				Tx Power		Delta (2)-(1)
	Band	BW	PCC UL Ch.	PCC UL Freq.	PCC DL Ch.	PCC DL Freq.	Modulation	RB	RB offset	Band	BW	SCC DL Ch.	SCC DL Freq.	Band	BW	SCC DL Ch.	SCC DL Freq.	LTE Single Carrier Tx Power (dBm) (1)	LTE Tx Power with DL CA Enabled (dBm) (2)	
2A-4A-5A	2	10	19150	1905	1150	1985	QPSK	1	0	4	20	2175	2132.5	5	10	2525	881.5	23.11	23.09	-0.02
2A-4A-5A	4	15	20325	1747.5	2325	2147.5	QPSK	1	36	2	20	900	1960	5	10	2525	881.5	23.70	23.78	0.08
2A-4A-5A	5	5	20425	826.5	2425	871.5	QPSK	1	12	2	20	900	1960	4	20	2175	2132.5	24.06	24.07	0.01
2A-4A-13A	2	10	19150	1905	1150	1985	QPSK	1	0	4	20	2175	2132.5	13	10	5230	751	23.11	23.10	-0.01
2A-4A-13A	4	15	20325	1747.5	2325	2147.5	QPSK	1	36	2	20	900	1960	13	10	5230	751	23.70	23.68	-0.02
2A-4A-13A	13	10	23230	782	5230	751	QPSK	1	0	2	20	900	1960	4	20	2175	2132.5	23.60	23.48	-0.12
4A-4A-12A	4	15	20325	1747.5	2325	2147.5	QPSK	1	36	4	20	2050	2120	12	10	5095	737.5	23.70	23.72	0.02
4A-4A-12A	12	5	23095	707.5	5095	737.5	QPSK	1	12	4	20	2175	2132.5	4	10	2350	2150	24.11	23.95	-0.16
4A-4A-17A	4	15	20325	1747.5	2325	2147.5	QPSK	1	36	4	20	2050	2120	17	10	5790	740	23.70	23.64	-0.06
5A-66A-66A	5	5	20425	826.5	2425	871.5	QPSK	1	12	66	20	66786	2145	66	20	67236	2190	24.06	24.05	-0.01
5A-66A-66A	66	10	132622	1775	67086	2175	QPSK	1	0	66	20	67236	2190	5	10	2525	881.5	23.65	23.57	-0.08
12A-66A-66A	12	5	23095	707.5	5095	737.5	QPSK	1	12	66	20	66786	2145	66	20	67236	2190	24.11	23.88	-0.23
12A-66A-66A	66	10	132622	1775	67086	2175	QPSK	1	0	66	20	67236	2190	12	10	5095	737.5	23.65	23.71	0.06
26A-41C	26	5	26715	816.5	8715	861.5	QPSK	1	12	41	20	40620	2593	41	20	40818	2612.8	24.14	24.05	-0.09
41A-41C PC3	41	20	41055	2636.5	41055	2636.5	QPSK	1	0	41	20	39948	2525.8	41	20	39750	2506	24.94	24.85	-0.09
41A-41C PC3	41	20	41055	2636.5	41055	2636.5	QPSK	1	0	41	20	40857	2616.7	41	20	39750	2506	24.94	24.84	-0.10
41A-41C PC2	41	15	41055	2636.5	41055	2636.5	QPSK	1	36	41	20	39948	2525.8	41	20	39750	2506	25.99	25.90	-0.09
41A-41C PC2	41	15	41055	2636.5	41055	2636.5	QPSK	1	36	41	20	40884	2619.4	41	20	39750	2506	25.99	25.92	-0.07
41D PC3	41	20	41055	2636.5	41055	2636.5	QPSK	1	0	41	20	40857	2616.7	41	20	40659	2596.9	24.94	24.91	-0.03
41D PC2	41	15	41055	2636.5	41055	2636.5	QPSK	1	36	41	20	40884	2619.4	41	20	40686	2599.6	25.99	25.93	-0.06

LTE Down Link 4CA Call Setup

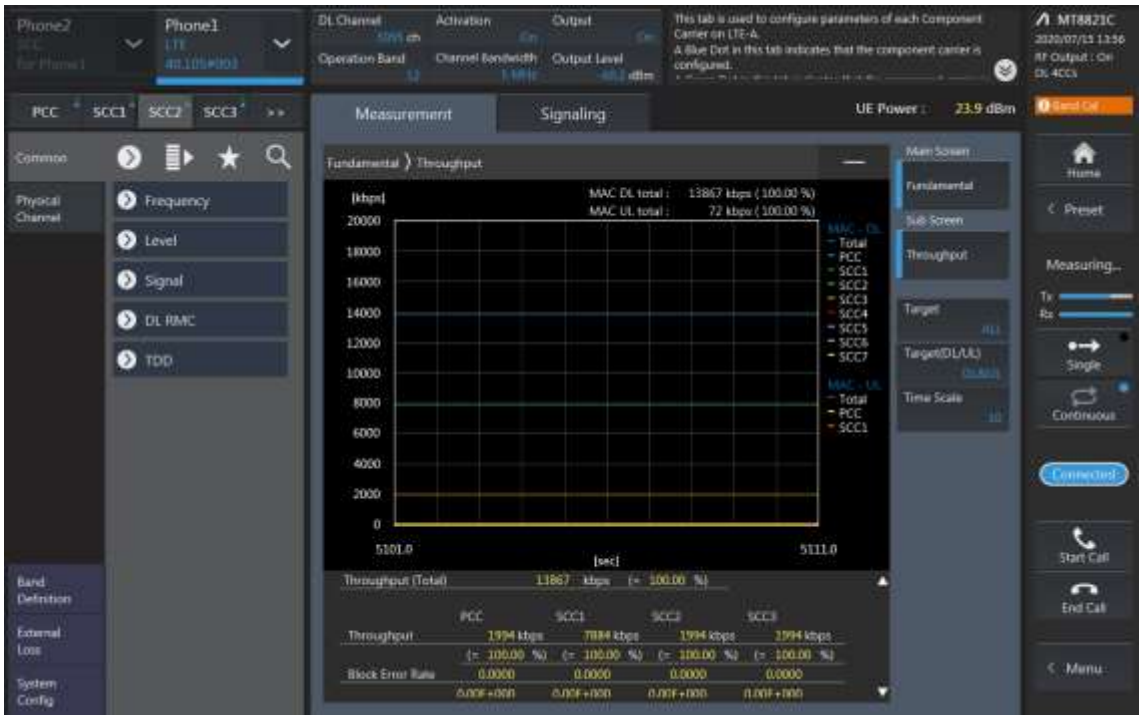
PCC Setting: Channel /RB/BW/Modulation



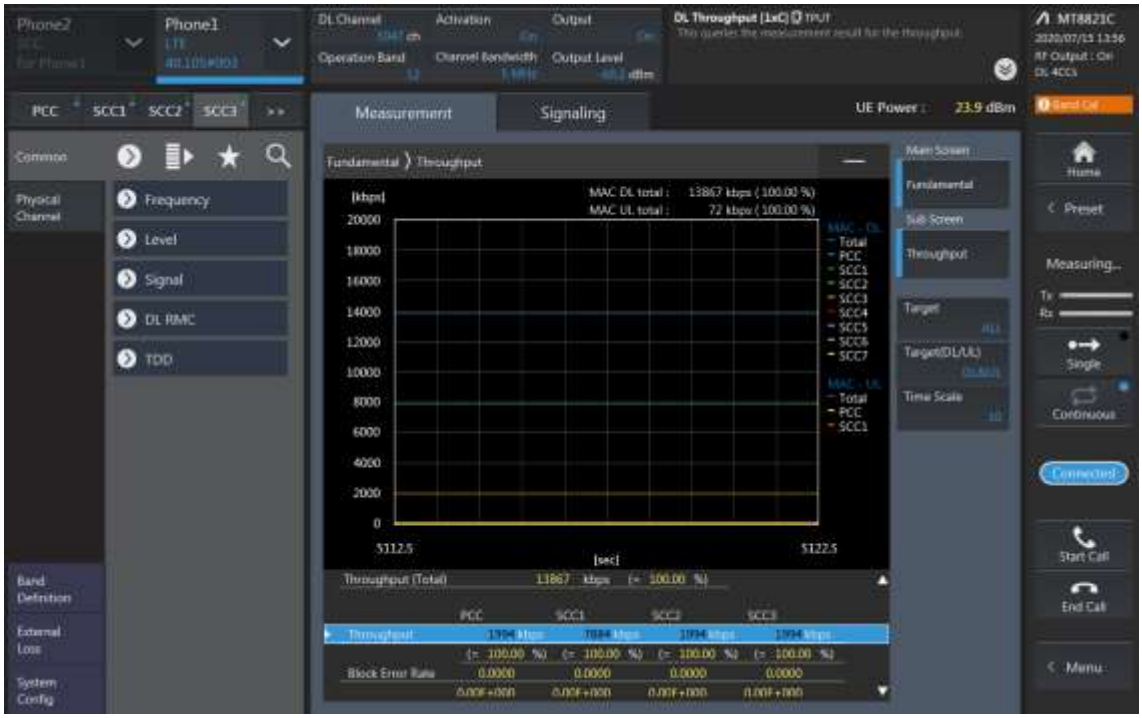
SCC1 Setting (Channel /RB/BW/Modulation)and call Connection



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



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

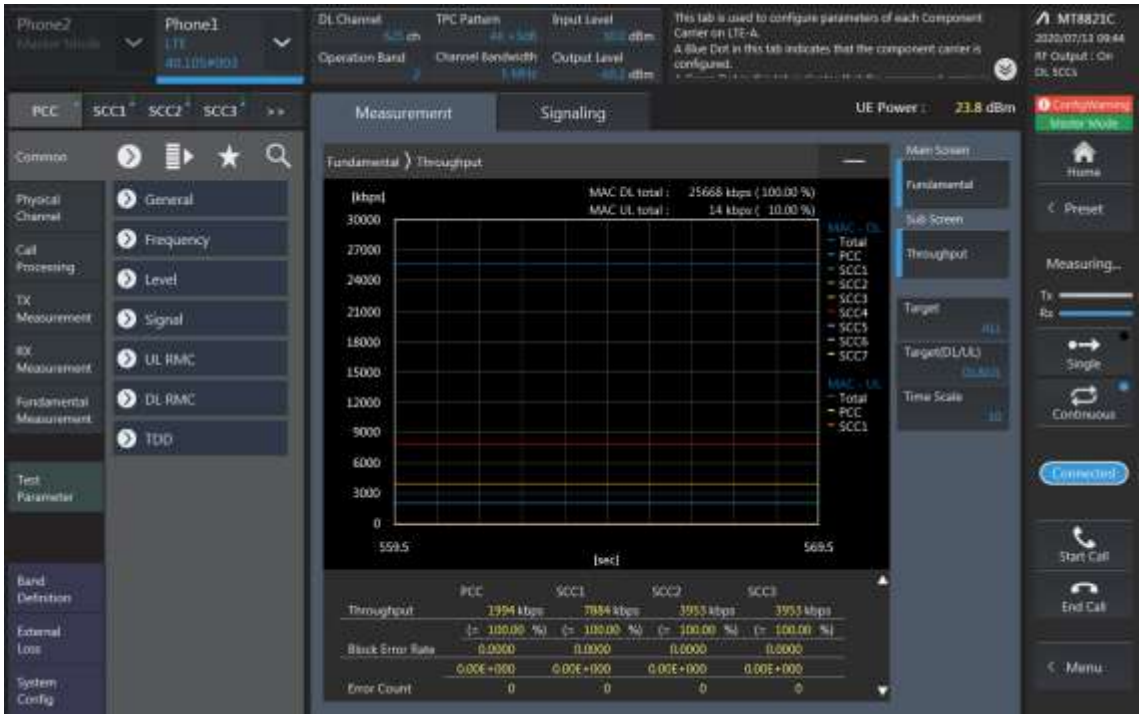


4CA Downlink Carrier aggregation Maximum conducted Powers

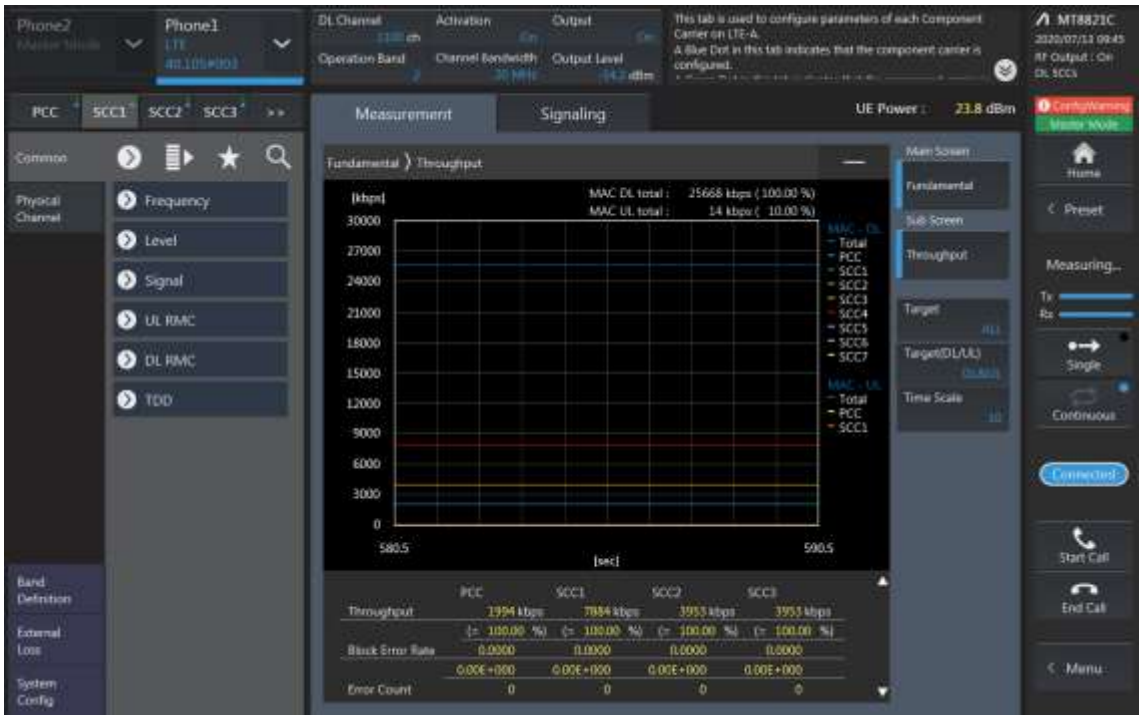
Combination	PCC									SCC				SCC				SCC				Tx Power		Delta (2)-(1)
	Band	BW	PCC UL Ch.	PCC UL Freq.	PCC DL Ch.	PCC DL Freq.	Modulation	RB	RB offset	Band	BW	SCC DL Ch.	SCC DL Freq.	Band	BW	SCC DL Ch.	SCC DL Freq.	Band	BW	SCC DL Ch.	SCC DL Freq.	LTE Single Carrier Tx Power (dBm) (1)	LTE Tx Power with DL CA Enabled (dBm) (2)	
41A-41D PC3	41	20	41055	2636.5	41055	2636.5	QPSK	1	0	41	20	40146	2545.6	41	20	39948	2525.8	41	20	39750	2506	24.94	24.92	-0.02
41A-41D PC3	41	20	41055	2636.5	41055	2636.5	QPSK	1	0	41	20	40857	2616.7	41	20	40659	2596.9	41	20	39750	2506	24.94	24.92	-0.02
41A-41D PC2	41	15	41055	2636.5	41055	2636.5	QPSK	1	36	41	20	40146	2545.6	41	20	39948	2525.8	41	20	39750	2506	25.99	25.95	-0.04
41A-41D PC2	41	15	41055	2636.5	41055	2636.5	QPSK	1	36	41	20	40884	2619.4	41	20	40686	2599.6	41	20	39750	2506	25.99	25.92	-0.07
41C-41C PC3	41	20	41055	2636.5	41055	2636.5	QPSK	1	0	41	20	40857	2616.7	41	20	39948	2525.8	41	20	39750	2506	24.94	24.91	-0.03
41C-41C PC2	41	15	41055	2636.5	41055	2636.5	QPSK	1	36	41	20	40884	2619.4	41	20	39948	2525.8	41	20	39750	2506	25.99	25.94	-0.05
41E PC3	41	20	41055	2636.5	41055	2636.5	QPSK	1	0	41	20	40857	2616.7	41	20	40659	2596.9	41	20	40461	2577.1	24.94	24.91	-0.03
41E PC2	41	15	41055	2636.5	41055	2636.5	QPSK	1	36	41	20	40884	2619.4	41	20	40686	2599.6	41	20	40488	2579.8	25.99	25.95	-0.04

LTE Down Link 5CA Call Setup

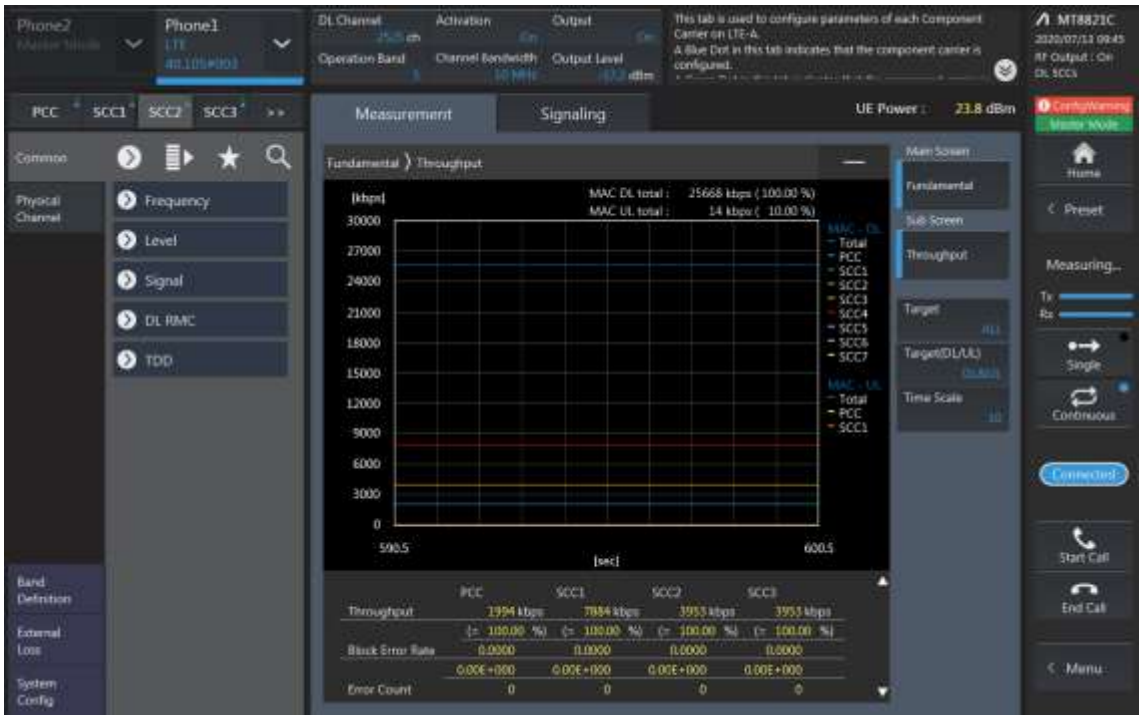
PCC Setting: Channel /RB/BW/Modulation



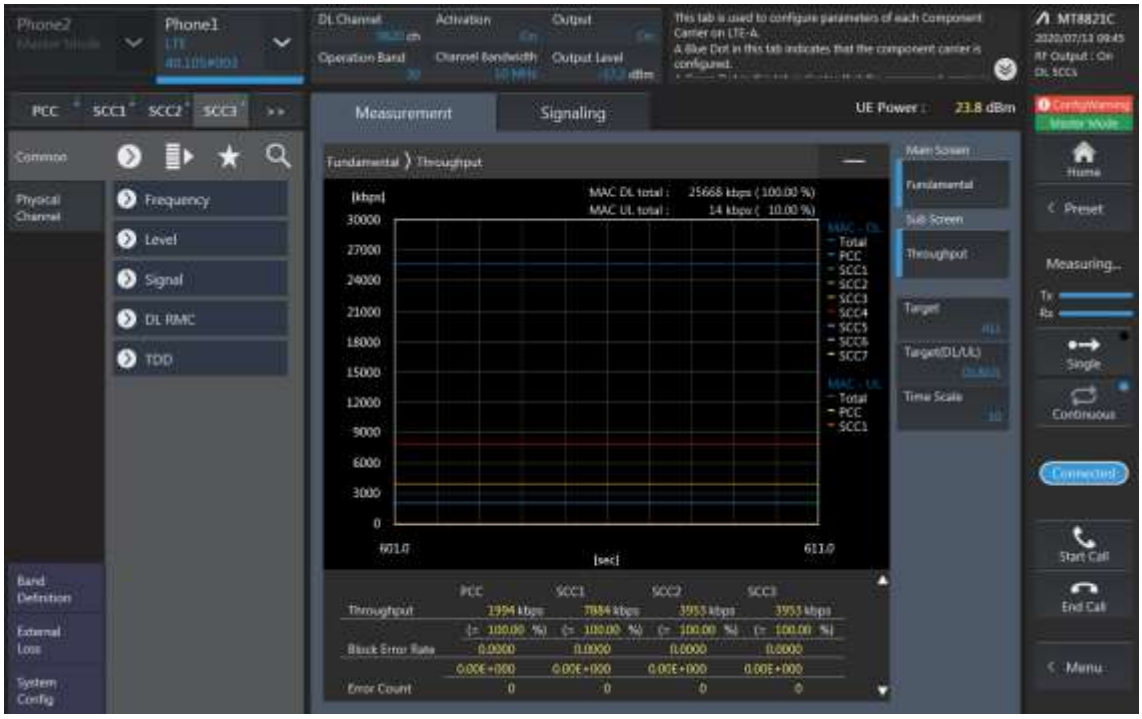
SCC1 Setting (Channel /RB/BW/Modulation)and call Connection



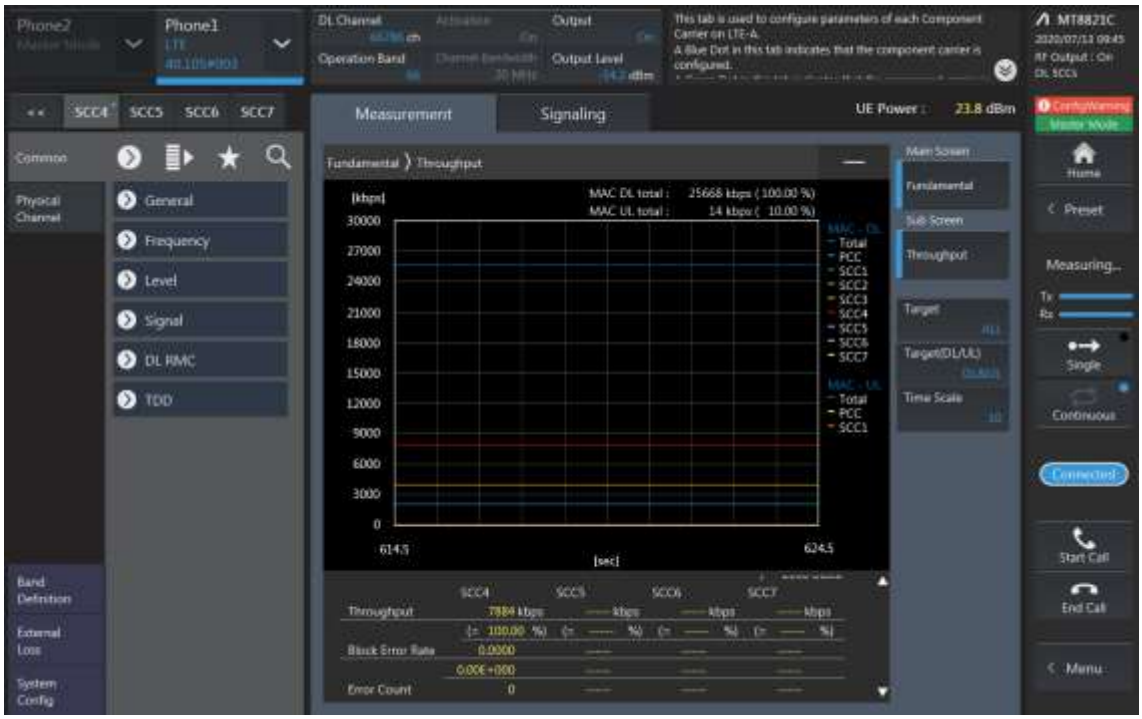
SCC2 Setting (Channel /RB/BW/Modulation)and call Connection



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



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

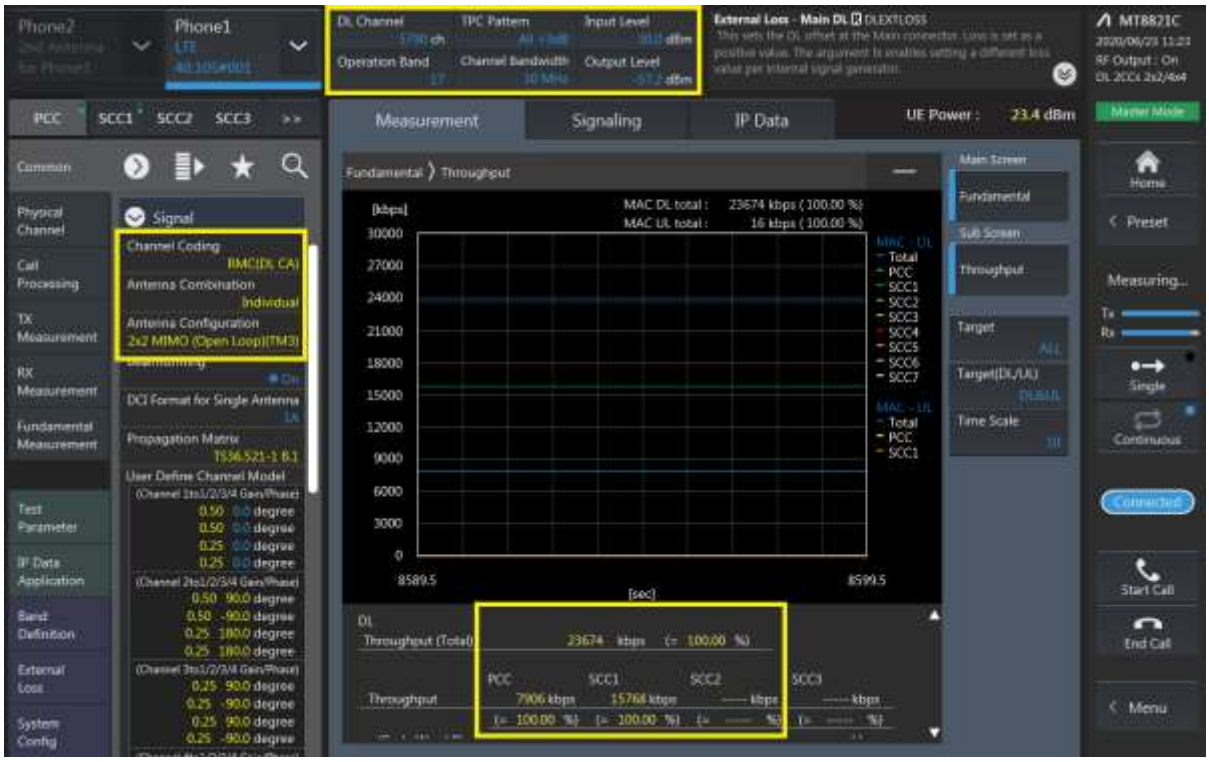


5CA Downlink Carrier aggregation Maximum conducted Powers

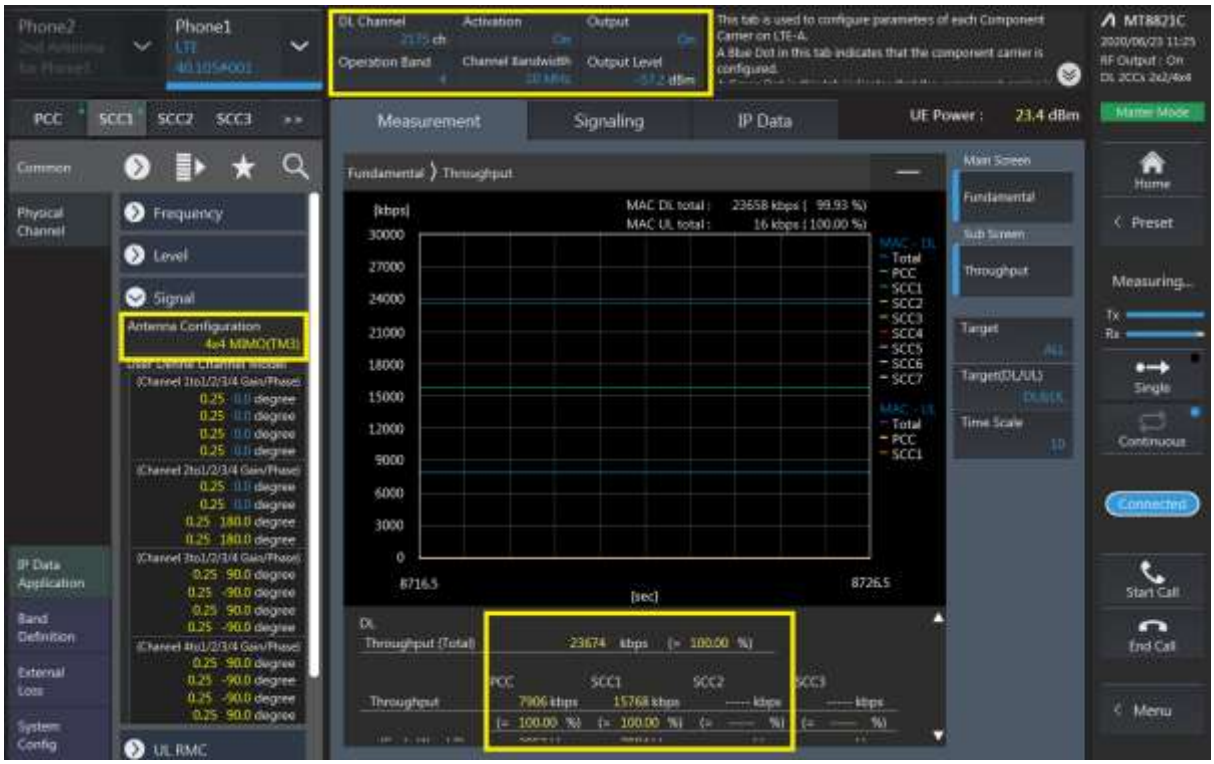
Combination	PCC									SCC				SCC				SCC				SCC				Tx Power		Delta (2)-(1)
	Band	BW	PCC UL Ch.	PCC UL Freq.	PCC DL Ch.	PCC DL Freq.	Modulation	RB	RB offset	Band	BW	SCC DL Ch.	SCC DL Freq.	Band	BW	SCC DL Ch.	SCC DL Freq.	Band	BW	SCC DL Ch.	SCC DL Freq.	Band	BW	SCC DL Ch.	SCC DL Freq.	LTE Single Carrier Tx Power (dBm) (1)	LTE Tx Power with DL CA Enabled (dBm) (2)	
41C-41D PC3	41	20	41055	2636.5	41055	2636.5	QPSK	1	0	41	20	40857	2616.7	41	20	40146	2545.6	41	20	39948	2525.8	41	20	39750	2506	24.94	24.91	-0.03
41C-41D PC3	41	20	41055	2636.5	41055	2636.5	QPSK	1	0	41	20	40857	2616.7	41	20	40659	2596.9	41	20	39948	2525.8	41	20	39750	2506	24.94	24.90	-0.04
41C-41D PC2	41	15	41055	2636.5	41055	2636.5	QPSK	1	36	41	20	40884	2619.4	41	20	40146	2545.6	41	20	39948	2525.8	41	20	39750	2506	25.99	25.90	-0.09
41C-41D PC2	41	15	41055	2636.5	41055	2636.5	QPSK	1	36	41	20	40884	2619.4	41	20	40686	2599.6	41	20	39948	2525.8	41	20	39750	2506	25.99	25.91	-0.08

LTE Down Link 2CA 4x4 MIMO Call Setup

PCC Setting : Channel/ RB/ BW/ Modulation



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

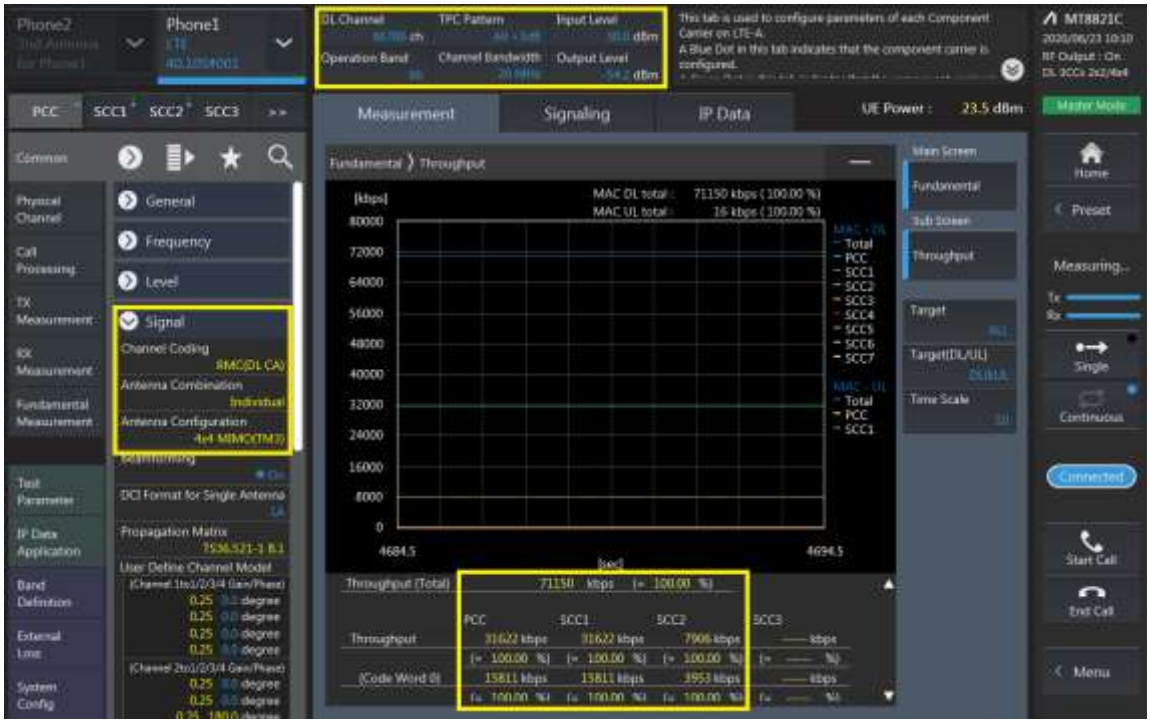


LTE Downlink 2CA 4X4 MIMO Maximum Conducted Power

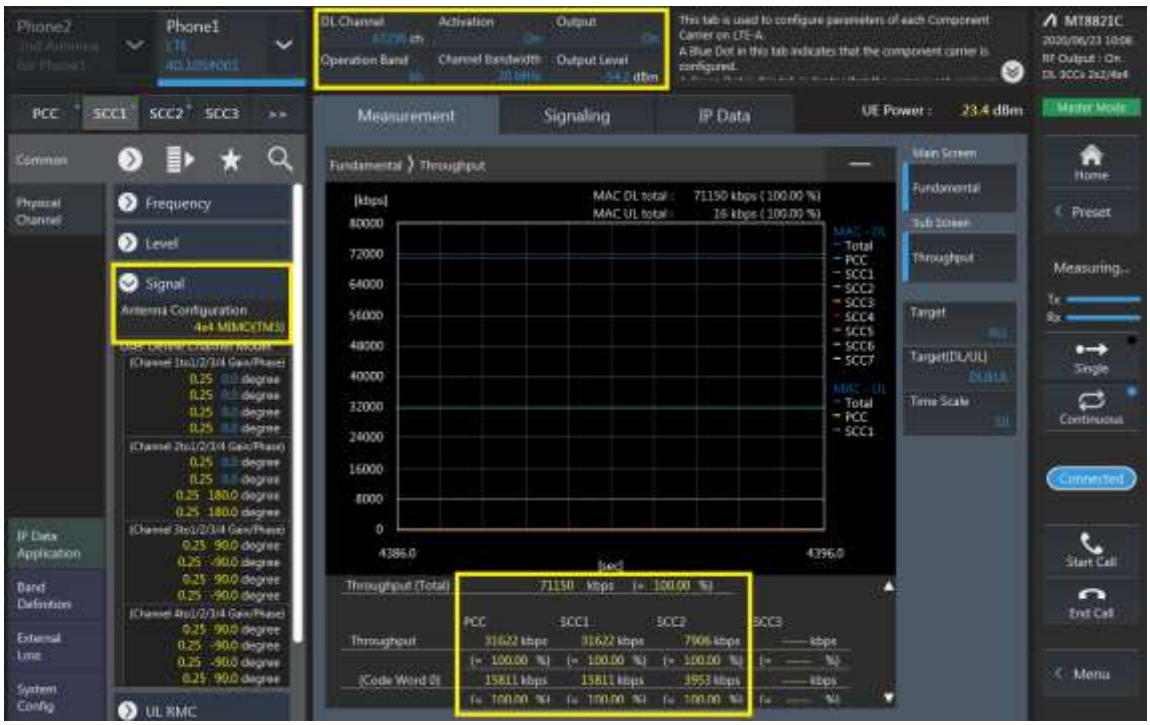
Combination	PCC									SCC				Tx Power		Delta (2)-(1)
	Band	BW	PCC UL Ch.	PCC UL Freq.	PCC DL Ch.	PCC DL Freq.	Modulation	RB	RB offset	Band	BW	SCC DL Ch.	SCC DL Freq.	LTE Single Carrier Tx Power (dBm) (1)	LTE Tx Power with DL CA Enabled (dBm) (2)	
2A-[4A](0,2)	2	10	19150	1905	1150	1985	QPSK	1	0	4	20	2175	2132.5	23.11	23.08	-0.03
2A-[4A](1)	2	10	19150	1905	1150	1985	QPSK	1	0	4	10	2175	2132.5	23.11	23.12	0.01
2A-[4A](0,2)	4	15	20325	1747.5	2325	2147.5	QPSK	1	36	2	20	900	1960	23.70	23.71	0.01
2A-[4A](1)	4	10	20350	1750	2350	2150	QPSK	1	0	2	10	900	1960	23.64	23.81	0.17
2A-[66A](0,2)	2	10	19150	1905	1150	1985	QPSK	1	0	66	20	66786	2145	23.11	23.09	-0.02
2A-[66A](1)	2	10	19150	1905	1150	1985	QPSK	1	0	66	10	66786	2145	23.11	23.08	-0.03
2A-[66A](0,2)	66	10	132622	1775	67086	2175	QPSK	1	0	2	20	900	1960	23.65	23.62	-0.03
2A-[66A](1)	66	10	132622	1775	67086	2175	QPSK	1	0	2	10	900	1960	23.65	23.67	0.02
[4A]-4A(0)	4	15	20325	1747.5	2325	2147.5	QPSK	1	36	4	20	2050	2120	23.70	23.71	0.01
4A-[4A](0)	4	15	20325	1747.5	2325	2147.5	QPSK	1	36	4	20	2050	2120	23.70	23.72	0.02
[4A]-[4A](0)	4	15	20325	1747.5	2325	2147.5	QPSK	1	36	4	20	2050	2120	23.70	23.69	-0.01
[4A]-4A(1)	4	10	20350	1750	2350	2150	QPSK	1	0	4	10	2000	2115	23.64	23.65	0.01
4A-[4A](1)	4	10	20350	1750	2350	2150	QPSK	1	0	4	10	2000	2115	23.64	23.65	0.01
[4A]-[4A](1)	4	10	20350	1750	2350	2150	QPSK	1	0	4	10	2000	2115	23.64	23.63	-0.01
[4A]-5A(0)	4	10	20350	1750	2350	2150	QPSK	1	0	5	10	2525	881.5	23.64	23.65	0.01
[4A]-5A(1)	4	15	20325	1747.5	2325	2147.5	QPSK	1	36	5	10	2525	881.5	23.70	23.71	0.01
[4A]-5A(0)	5	5	20425	826.5	2425	871.5	QPSK	1	12	4	10	2175	2132.5	24.06	24.05	-0.01
[4A]-5A(1)	5	5	20425	826.5	2425	871.5	QPSK	1	12	4	20	2175	2132.5	24.06	24.04	-0.02
[4A]-12A(0,3)	4	10	20350	1750	2350	2150	QPSK	1	0	12	10	5095	737.5	23.64	23.59	-0.05
[4A]-12A(1,2,4)	4	15	20325	1747.5	2325	2147.5	QPSK	1	36	12	10	5095	737.5	23.70	23.56	-0.14
[4A]-12A(5)	4	15	20325	1747.5	2325	2147.5	QPSK	1	36	12	5	5095	737.5	23.70	23.57	-0.13
[4A]-12A(0,3)	12	5	23095	707.5	5095	737.5	QPSK	1	12	4	10	2175	2132.5	24.11	23.92	-0.19
[4A]-12A(1,4)	12	5	23095	707.5	5095	737.5	QPSK	1	12	4	20	2175	2132.5	24.11	23.81	-0.30
[4A]-12A(2)	12	3	23095	707.5	5095	737.5	QPSK	1	7	4	20	2175	2132.5	23.98	23.79	-0.19
[4A]-12A(5)	12	5	23095	707.5	5095	737.5	QPSK	1	12	4	15	2175	2132.5	24.11	23.99	-0.12
[4A]-13A(0)	4	15	20325	1747.5	2325	2147.5	QPSK	1	36	13	10	5230	751	23.70	23.76	0.06
[4A]-13A(1)	4	10	20350	1750	2350	2150	QPSK	1	0	13	10	5230	751	23.64	23.70	0.06
[4A]-13A(0)	13	10	23230	782	5230	751	QPSK	1	0	4	20	2175	2132.5	23.60	23.45	-0.15
[4A]-13A(1)	13	10	23230	782	5230	751	QPSK	1	0	4	10	2175	2132.5	23.60	23.44	-0.16
[4A]-17A	4	10	20350	1750	2350	2150	QPSK	1	0	17	10	5790	740	23.64	23.59	-0.05
5A-[41A]	5	5	20425	826.5	2425	871.5	QPSK	1	12	41	20	40620	2593	24.06	24.02	-0.04
5A-[66A]	5	5	20425	826.5	2425	871.5	QPSK	1	12	66	20	66786	2145	24.06	24.06	0.00
5A-[66A]	66	10	132622	1775	67086	2175	QPSK	1	0	5	10	2525	881.5	23.65	23.66	0.01
12A-[66A](0,3)	12	5	23095	707.5	5095	737.5	QPSK	1	12	66	10	66786	2145	24.11	23.82	-0.29
12A-[66A](1,4)	12	5	23095	707.5	5095	737.5	QPSK	1	12	66	20	66786	2145	24.11	23.86	-0.25
12A-[66A](2)	12	3	23095	707.5	5095	737.5	QPSK	1	7	66	20	66786	2145	23.98	23.99	0.01
12A-[66A](5)	12	5	23095	707.5	5095	737.5	QPSK	1	12	66	15	66786	2145	24.11	23.79	-0.32
12A-[66A](0,1)	66	3	132657	1778.5	67121	2178.5	QPSK	1	0	12	10	5095	737.5	23.66	23.62	-0.04
12A-[66A](2,3,4)	66	10	132622	1775	67086	2175	QPSK	1	0	12	10	5095	737.5	23.65	23.67	0.02
12A-[66A](5)	66	10	132622	1775	67086	2175	QPSK	1	0	12	5	5095	737.5	23.65	23.68	0.03
26A-[41A]	26	5	26715	816.5	8715	861.5	QPSK	1	12	41	20	40620	2593	24.14	24.15	0.01
[41A]-41A PC3	41	20	41055	2636.5	41055	2636.5	QPSK	1	0	41	20	39750	2506	24.94	24.92	-0.02
41A-[41A] PC3	41	20	41055	2636.5	41055	2636.5	QPSK	1	0	41	20	39750	2506	24.94	24.89	-0.05
[41A]-[41A] PC3	41	20	41055	2636.5	41055	2636.5	QPSK	1	0	41	20	39750	2506	24.94	24.88	-0.06
[41A]-41A PC2	41	15	41055	2636.5	41055	2636.5	QPSK	1	36	41	20	39750	2506	25.99	25.92	-0.07
41A-[41A] PC2	41	15	41055	2636.5	41055	2636.5	QPSK	1	36	41	20	39750	2506	25.99	25.91	-0.08
[41A]-[41A] PC2	41	15	41055	2636.5	41055	2636.5	QPSK	1	36	41	20	39750	2506	25.99	25.90	-0.09
[41C] PC3	41	20	41055	2636.5	41055	2636.5	QPSK	1	0	41	20	40857	2616.7	24.94	24.91	-0.03
[41C] PC2	41	15	41055	2636.5	41055	2636.5	QPSK	1	36	41	20	40884	2619.4	25.99	25.93	-0.06
[66A]-66A	66	10	132622	1775	67086	2175	QPSK	1	0	66	20	67236	2190	23.65	23.65	0.00
66A-[66A]	66	10	132622	1775	67086	2175	QPSK	1	0	66	20	67236	2190	23.65	23.66	0.01
[66A]-[66A]	66	10	132622	1775	67086	2175	QPSK	1	0	66	20	67236	2190	23.65	23.71	0.06

LTE Down Link 3CA 4x4 MIMO Call Setup

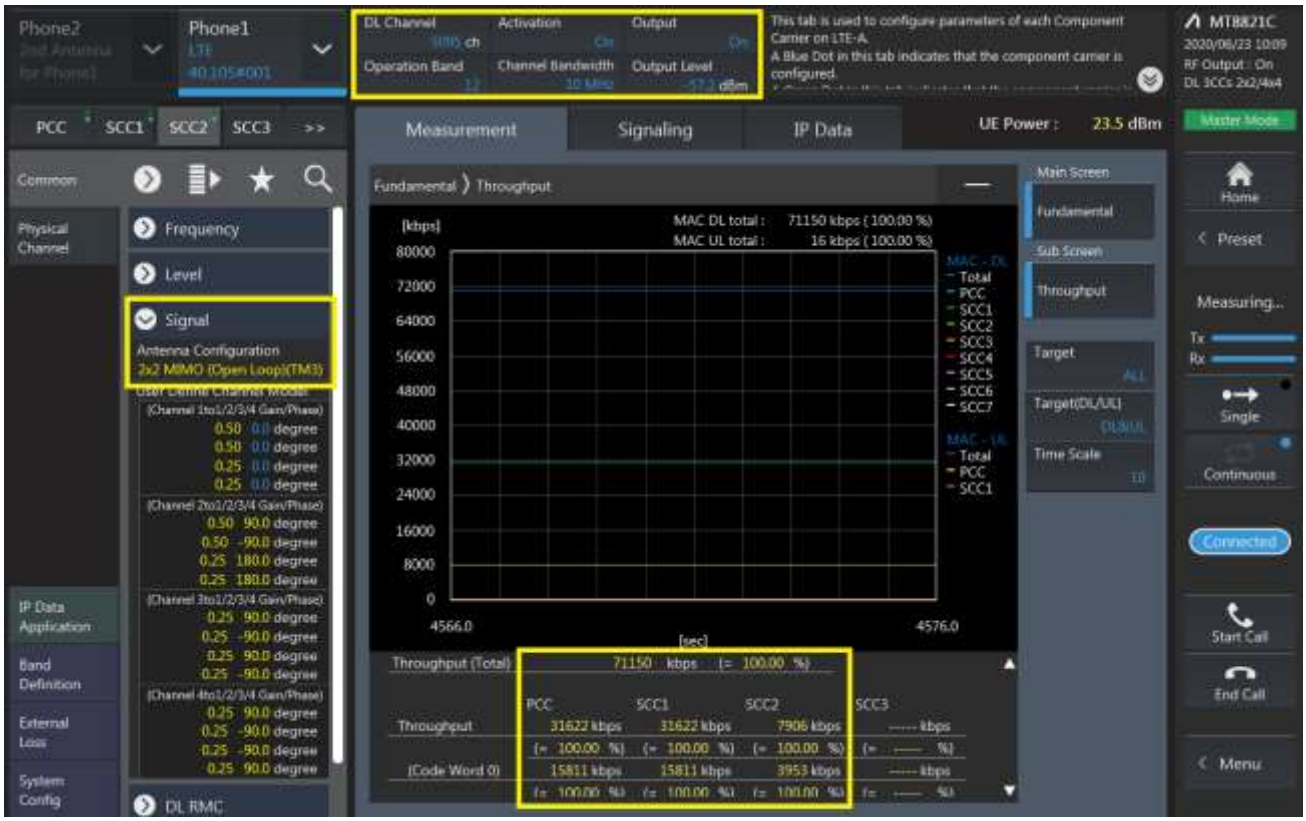
PCC Setting: Channel /RB/BW/Modulation



SCC1 Setting : Channel /RB/BW/Modulation



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

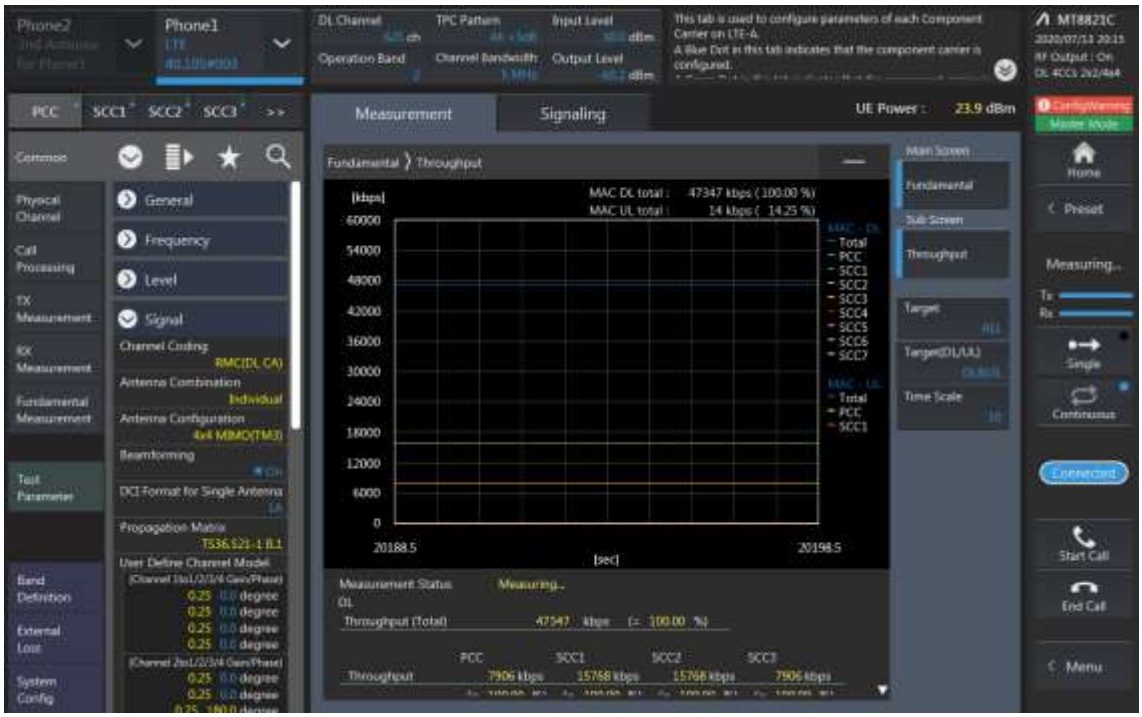


LTE Downlink 3CA 4X4 MIMO Maximum Conducted Power

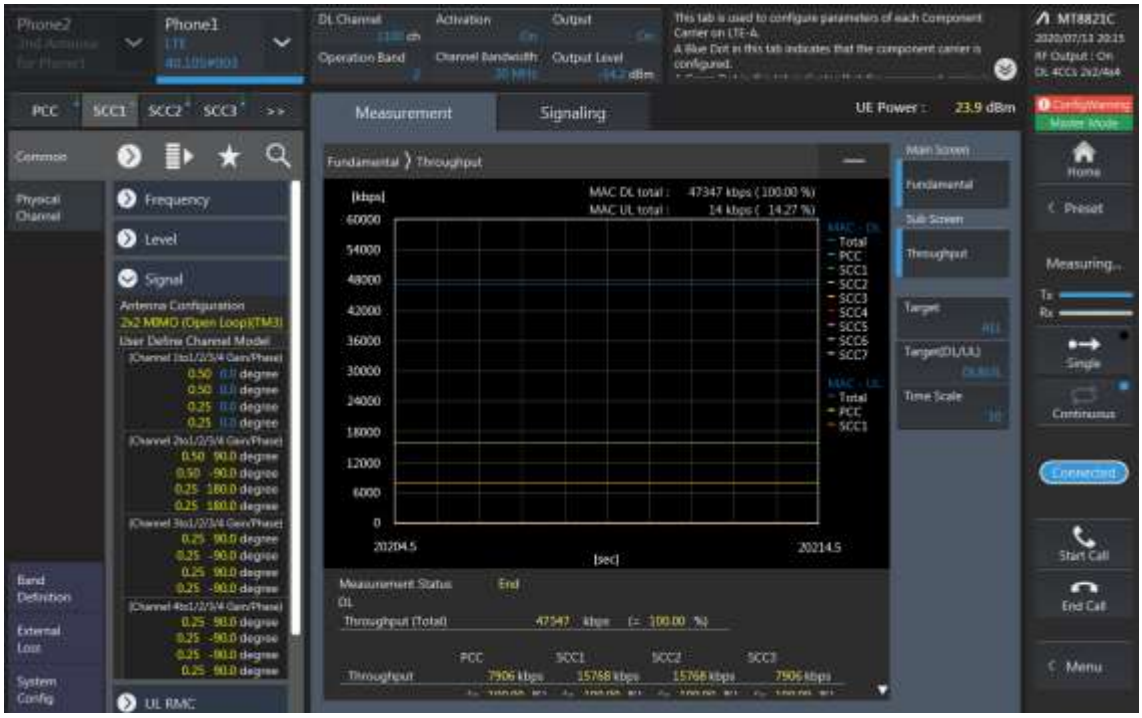
Combination	PCC									SCC				SCC				Tx Power		Delta (2)-(1)
	Band	BW	PCC UL Ch.	PCC UL Freq.	PCC DL Ch.	PCC DL Freq.	Modulation	RB	RB offset	Band	BW	SCC DL Ch.	SCC DL Freq.	Band	BW	SCC DL Ch.	SCC DL Freq.	LTE Single Carrier Tx Power (dBm) (1)	LTE Tx Power with DL CA Enabled (dBm) (2)	
2A-[4A]-5A	2	10	19150	1905	1150	1985	QPSK	1	0	4	20	2175	2132.5	5	10	2525	881.5	23.11	23.21	0.10
2A-[4A]-5A	4	15	20325	1747.5	2325	2147.5	QPSK	1	36	2	20	900	1960	5	10	2525	881.5	23.70	23.75	0.05
2A-[4A]-5A	5	5	20425	826.5	2425	871.5	QPSK	1	12	2	20	900	1960	4	20	2175	2132.5	24.06	24.12	0.06
2A-[4A]-13A	2	10	19150	1905	1150	1985	QPSK	1	0	4	20	2175	2132.5	13	10	5230	751	23.11	23.21	0.10
2A-[4A]-13A	4	15	20325	1747.5	2325	2147.5	QPSK	1	36	2	20	900	1960	13	10	5230	751	23.70	23.65	-0.05
2A-[4A]-13A	13	10	23230	782	5230	751	QPSK	1	0	2	20	900	1960	4	20	2175	2132.5	23.60	23.57	-0.03
[4A]-4A-12A	4	15	20325	1747.5	2325	2147.5	QPSK	1	36	4	20	2050	2120	12	10	5095	737.5	23.70	23.69	-0.01
4A-[4A]-12A	4	15	20325	1747.5	2325	2147.5	QPSK	1	36	4	20	2050	2120	12	10	5095	737.5	23.70	23.71	0.01
[4A]-[4A]-12A	4	15	20325	1747.5	2325	2147.5	QPSK	1	36	4	20	2050	2120	12	10	5095	737.5	23.70	23.82	0.12
[4A]-4A-12A	12	5	23095	707.5	5095	737.5	QPSK	1	12	4	20	2175	2132.5	4	10	2350	2150	24.11	23.89	-0.22
4A-[4A]-12A	12	5	23095	707.5	5095	737.5	QPSK	1	12	4	20	2175	2132.5	4	10	2350	2150	24.11	23.91	-0.20
[4A]-[4A]-12A	12	5	23095	707.5	5095	737.5	QPSK	1	12	4	20	2175	2132.5	4	10	2350	2150	24.11	23.85	-0.26
[4A]-4A-17A	4	15	20325	1747.5	2325	2147.5	QPSK	1	36	4	20	2050	2120	17	10	5790	740	23.70	23.69	-0.01
4A-[4A]-17A	4	15	20325	1747.5	2325	2147.5	QPSK	1	36	4	20	2050	2120	17	10	5790	740	23.70	23.69	-0.01
[4A]-[4A]-17A	4	15	20325	1747.5	2325	2147.5	QPSK	1	36	4	20	2050	2120	17	10	5790	740	23.70	23.72	0.02
5A-[66A]-66A	5	5	20425	826.5	2425	871.5	QPSK	1	12	66	20	66786	2145	66	20	67236	2190	24.06	24.08	0.02
5A-66A-[66A]	5	5	20425	826.5	2425	871.5	QPSK	1	12	66	20	66786	2145	66	20	67236	2190	24.06	24.09	0.03
5A-[66A]-[66A]	5	5	20425	826.5	2425	871.5	QPSK	1	12	66	20	66786	2145	66	20	67236	2190	24.06	24.07	0.01
5A-[66A]-66A	66	10	132622	1775	67086	2175	QPSK	1	0	66	20	67236	2190	5	10	2525	881.5	23.65	23.65	0.00
5A-66A-[66A]	66	10	132622	1775	67086	2175	QPSK	1	0	66	20	67236	2190	5	10	2525	881.5	23.65	23.49	-0.16
5A-[66A]-[66A]	66	10	132622	1775	67086	2175	QPSK	1	0	66	20	67236	2190	5	10	2525	881.5	23.65	23.52	-0.13
12A-[66A]-66A	12	5	23095	707.5	5095	737.5	QPSK	1	12	66	20	66786	2145	66	20	67236	2190	24.11	23.89	-0.22
12A-66A-[66A]	12	5	23095	707.5	5095	737.5	QPSK	1	12	66	20	66786	2145	66	20	67236	2190	24.11	23.92	-0.19
12A-[66A]-[66A]	12	5	23095	707.5	5095	737.5	QPSK	1	12	66	20	66786	2145	66	20	67236	2190	24.11	23.95	-0.16
12A-[66A]-66A	66	10	132622	1775	67086	2175	QPSK	1	0	66	20	67236	2190	12	10	5095	737.5	23.65	23.52	-0.13
12A-66A-[66A]	66	10	132622	1775	67086	2175	QPSK	1	0	66	20	67236	2190	12	10	5095	737.5	23.65	23.54	-0.11
12A-[66A]-[66A]	66	10	132622	1775	67086	2175	QPSK	1	0	66	20	67236	2190	12	10	5095	737.5	23.65	23.49	-0.16
26A-[41C]	26	5	26715	816.5	8715	861.5	QPSK	1	12	41	20	40620	2593	41	20	40818	2612.8	24.14	24.19	0.05
[41A]-41C PC3	41	20	41055	2636.5	41055	2636.5	QPSK	1	0	41	20	39948	2525.8	41	20	39750	2506	24.94	24.92	-0.02
41A-[41C] PC3	41	20	41055	2636.5	41055	2636.5	QPSK	1	0	41	20	39948	2525.8	41	20	39750	2506	24.94	24.91	-0.03
[41A]-[41C] PC3	41	20	41055	2636.5	41055	2636.5	QPSK	1	0	41	20	39948	2525.8	41	20	39750	2506	24.94	24.89	-0.05
[41A]-41C PC3	41	20	41055	2636.5	41055	2636.5	QPSK	1	0	41	20	40857	2616.7	41	20	39750	2506	24.94	24.88	-0.06
41A-[41C] PC3	41	20	41055	2636.5	41055	2636.5	QPSK	1	0	41	20	40857	2616.7	41	20	39750	2506	24.94	24.93	-0.01
[41A]-[41C] PC3	41	20	41055	2636.5	41055	2636.5	QPSK	1	0	41	20	40857	2616.7	41	20	39750	2506	24.94	24.91	-0.03
[41A]-41C PC2	41	15	41055	2636.5	41055	2636.5	QPSK	1	36	41	20	39948	2525.8	41	20	39750	2506	25.99	25.95	-0.04
41A-[41C] PC2	41	15	41055	2636.5	41055	2636.5	QPSK	1	36	41	20	39948	2525.8	41	20	39750	2506	25.99	25.90	-0.09
[41A]-[41C] PC2	41	15	41055	2636.5	41055	2636.5	QPSK	1	36	41	20	39948	2525.8	41	20	39750	2506	25.99	25.88	-0.11
[41A]-41C PC2	41	15	41055	2636.5	41055	2636.5	QPSK	1	36	41	20	40884	2619.4	41	20	39750	2506	25.99	25.87	-0.12
41A-[41C] PC2	41	15	41055	2636.5	41055	2636.5	QPSK	1	36	41	20	40884	2619.4	41	20	39750	2506	25.99	25.89	-0.10
[41A]-[41C] PC2	41	15	41055	2636.5	41055	2636.5	QPSK	1	36	41	20	40884	2619.4	41	20	39750	2506	25.99	25.87	-0.12
[41D] PC3	41	20	41055	2636.5	41055	2636.5	QPSK	1	0	41	20	40857	2616.7	41	20	40659	2596.9	24.94	24.92	-0.02
[41D] PC2	41	15	41055	2636.5	41055	2636.5	QPSK	1	36	41	20	40884	2619.4	41	20	40686	2599.6	25.99	25.95	-0.04

LTE Down Link 4CA 4x4 MIMO Call Setup

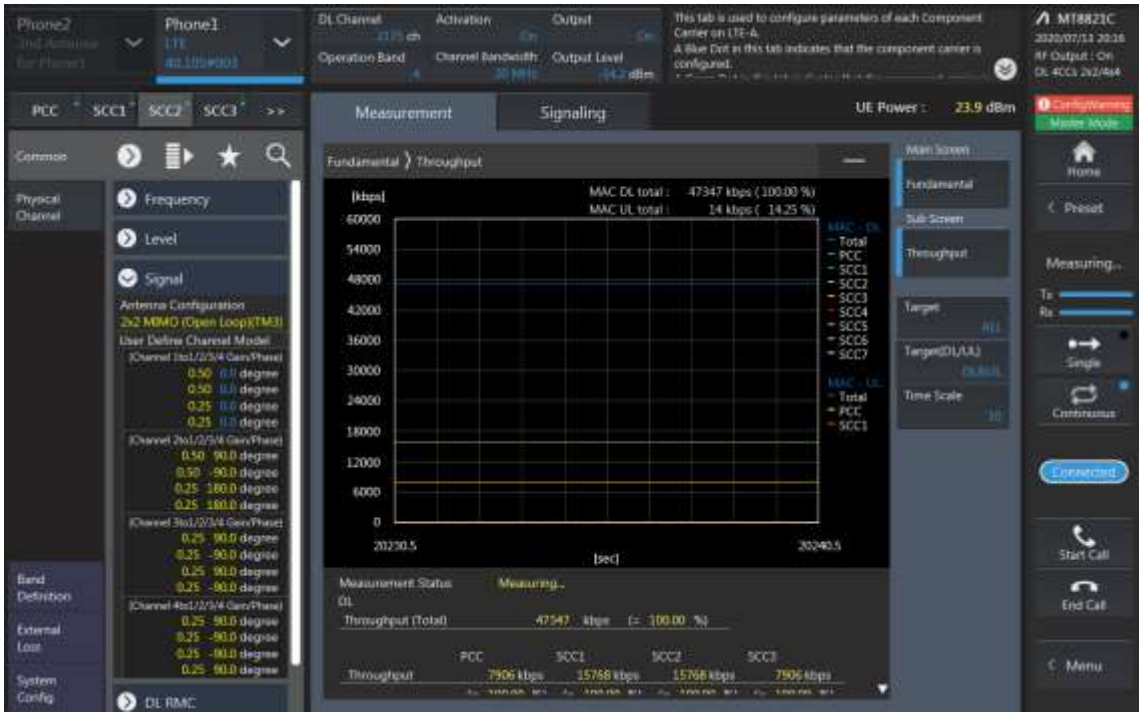
PCC Setting: Channel /RB/BW/Modulation



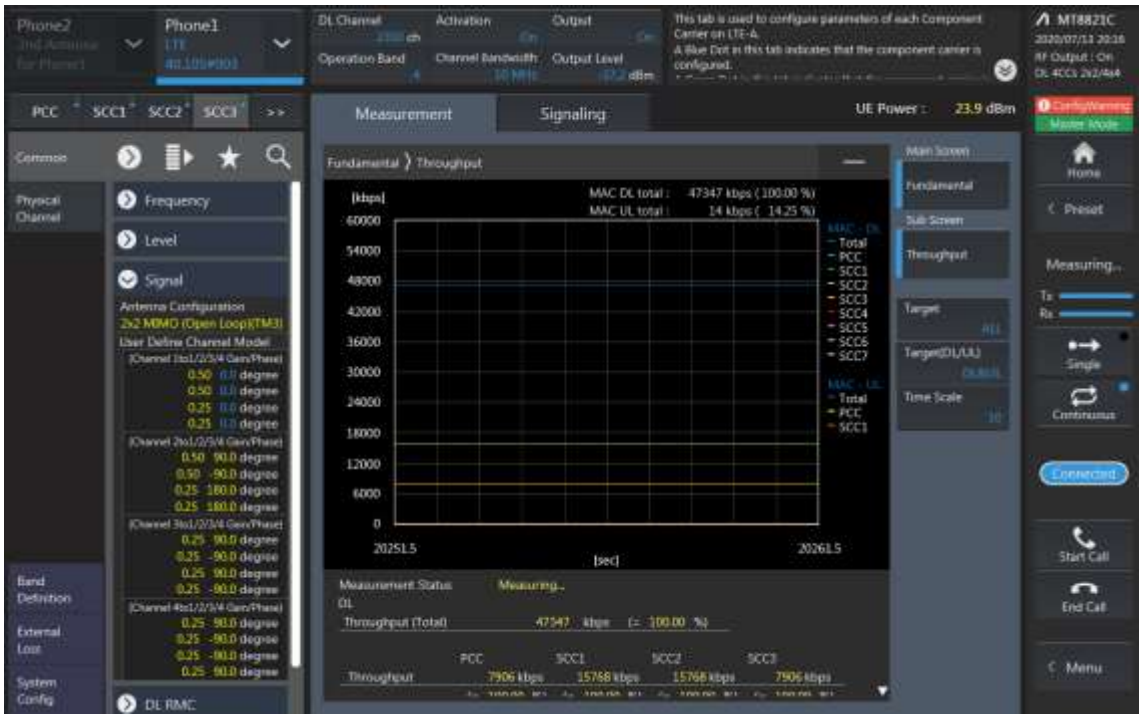
SCC1 Setting : Channel /RB/BW/Modulation



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

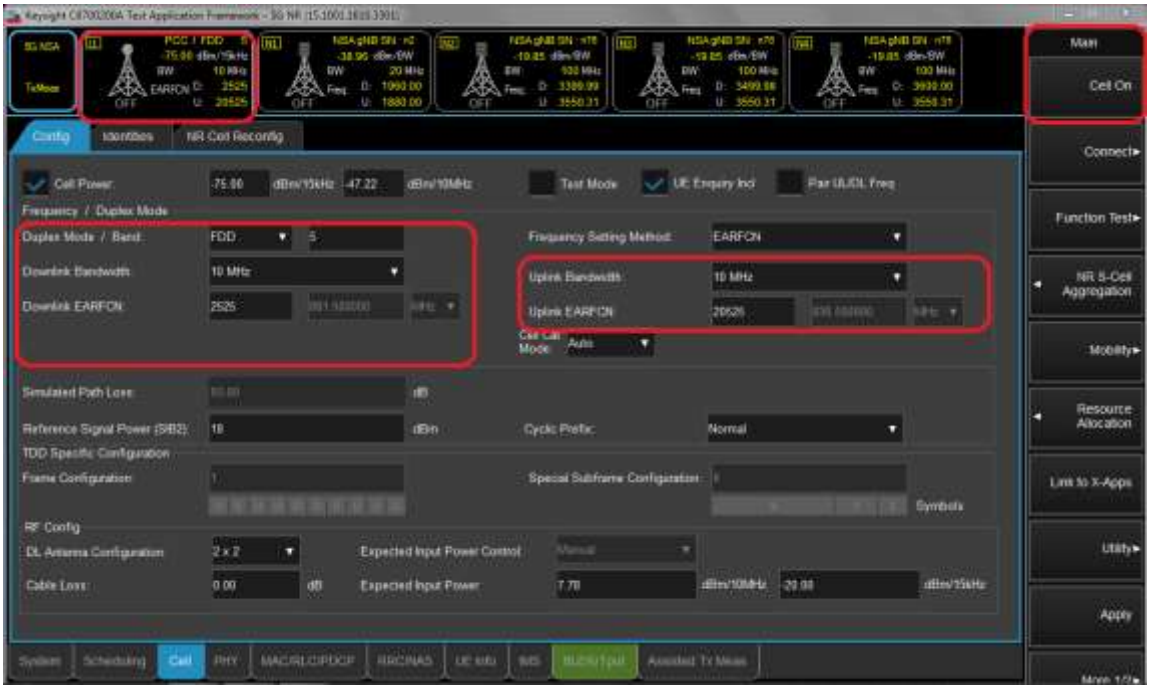
Combination	PCC									SCC				SCC				SCC				Tx Power		Delta (2)-(1)
	Band	BW	PCC UL Ch.	PCC UL Freq.	PCC DL Ch.	PCC DL Freq.	Modulation	RB	RB offset	Band	BW	SCC DL Ch.	SCC DL Freq.	Band	BW	SCC DL Ch.	SCC DL Freq.	Band	BW	SCC DL Ch.	SCC DL Freq.	LTE Single Carrier Tx Power (dBm) (1)	LTE Tx Power with DL CA Enabled (dBm) (2)	
[41A]-41D PC3	41	20	41055	2636.5	41055	2636.5	QPSK	1	0	41	20	40146	2545.6	41	20	39948	2525.8	41	20	39750	2506	24.94	24.83	-0.11
41A-[41D] PC3	41	20	41055	2636.5	41055	2636.5	QPSK	1	0	41	20	40146	2545.6	41	20	39948	2525.8	41	20	39750	2506	24.94	24.86	-0.08
[41A]-[41D] PC3	41	20	41055	2636.5	41055	2636.5	QPSK	1	0	41	20	40146	2545.6	41	20	39948	2525.8	41	20	39750	2506	24.94	24.90	-0.04
[41A]-41D PC3	41	20	41055	2636.5	41055	2636.5	QPSK	1	0	41	20	40857	2616.7	41	20	40659	2596.9	41	20	39750	2506	24.94	24.79	-0.15
41A-[41D] PC3	41	20	41055	2636.5	41055	2636.5	QPSK	1	0	41	20	40857	2616.7	41	20	40659	2596.9	41	20	39750	2506	24.94	24.73	-0.21
[41A]-[41D] PC3	41	20	41055	2636.5	41055	2636.5	QPSK	1	0	41	20	40857	2616.7	41	20	40659	2596.9	41	20	39750	2506	24.94	24.89	-0.05
[41A]-41D PC2	41	15	41055	2636.5	41055	2636.5	QPSK	1	36	41	20	40146	2545.6	41	20	39948	2525.8	41	20	39750	2506	25.99	25.79	-0.20
41A-[41D] PC2	41	15	41055	2636.5	41055	2636.5	QPSK	1	36	41	20	40146	2545.6	41	20	39948	2525.8	41	20	39750	2506	25.99	25.95	-0.04
[41A]-[41D] PC2	41	15	41055	2636.5	41055	2636.5	QPSK	1	36	41	20	40146	2545.6	41	20	39948	2525.8	41	20	39750	2506	25.99	25.91	-0.08
[41A]-41D PC2	41	15	41055	2636.5	41055	2636.5	QPSK	1	36	41	20	40884	2619.4	41	20	40686	2599.6	41	20	39750	2506	25.99	25.75	-0.24
41A-[41D] PC2	41	15	41055	2636.5	41055	2636.5	QPSK	1	36	41	20	40884	2619.4	41	20	40686	2599.6	41	20	39750	2506	25.99	25.85	-0.14
[41A]-[41D] PC2	41	15	41055	2636.5	41055	2636.5	QPSK	1	36	41	20	40884	2619.4	41	20	40686	2599.6	41	20	39750	2506	25.99	25.98	-0.01
[41C]-41C PC3	41	20	41055	2636.5	41055	2636.5	QPSK	1	0	41	20	40857	2616.7	41	20	39948	2525.8	41	20	39750	2506	24.94	24.70	-0.24
41C-[41C] PC3	41	20	41055	2636.5	41055	2636.5	QPSK	1	0	41	20	40857	2616.7	41	20	39948	2525.8	41	20	39750	2506	24.94	24.90	-0.04
[41C]-[41C] PC3	41	20	41055	2636.5	41055	2636.5	QPSK	1	0	41	20	40857	2616.7	41	20	39948	2525.8	41	20	39750	2506	24.94	24.91	-0.03
[41C]-41C PC2	41	15	41055	2636.5	41055	2636.5	QPSK	1	36	41	20	40884	2619.4	41	20	39948	2525.8	41	20	39750	2506	25.99	25.81	-0.18
41C-[41C] PC2	41	15	41055	2636.5	41055	2636.5	QPSK	1	36	41	20	40884	2619.4	41	20	39948	2525.8	41	20	39750	2506	25.99	25.89	-0.10
[41C]-[41C] PC2	41	15	41055	2636.5	41055	2636.5	QPSK	1	36	41	20	40884	2619.4	41	20	39948	2525.8	41	20	39750	2506	25.99	25.92	-0.07
[41E] PC3	41	20	41055	2636.5	41055	2636.5	QPSK	1	0	41	20	40857	2616.7	41	20	40659	2596.9	41	20	40461	2577.1	24.94	24.85	-0.09
[41E] PC2	41	15	41055	2636.5	41055	2636.5	QPSK	1	36	41	20	40884	2619.4	41	20	40686	2599.6	41	20	40488	2579.8	25.99	25.91	-0.08

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.

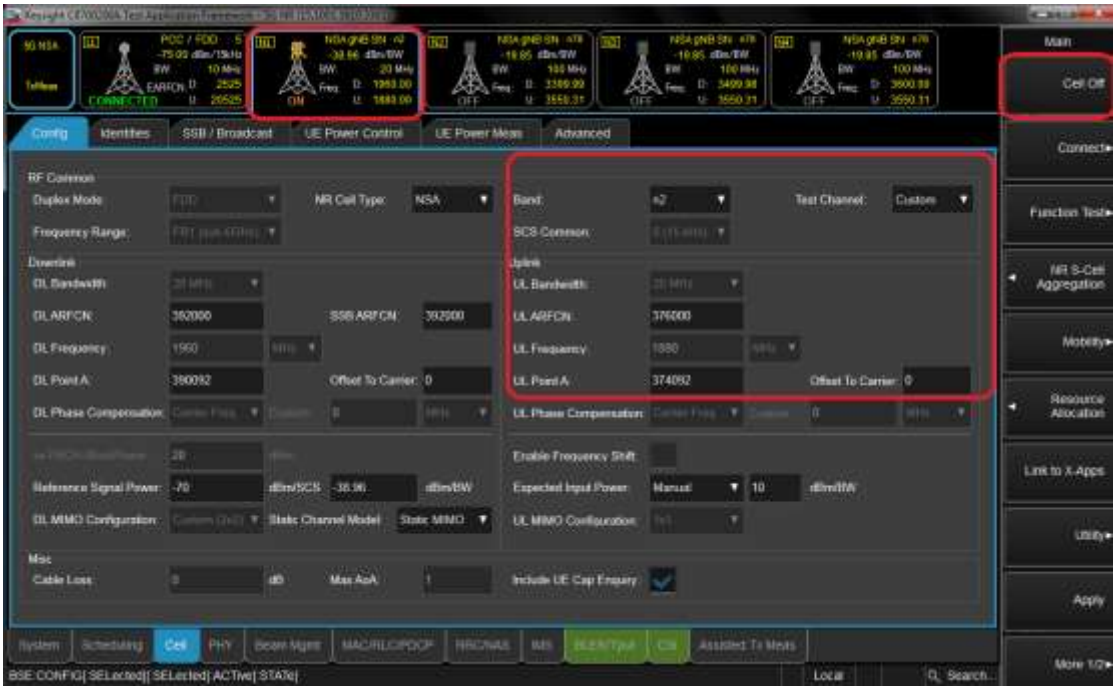


- Turn the Airplane Mode On and then turn the Airplane mode off.
- Select All down bits for UL Power control Mode in LTE.

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.

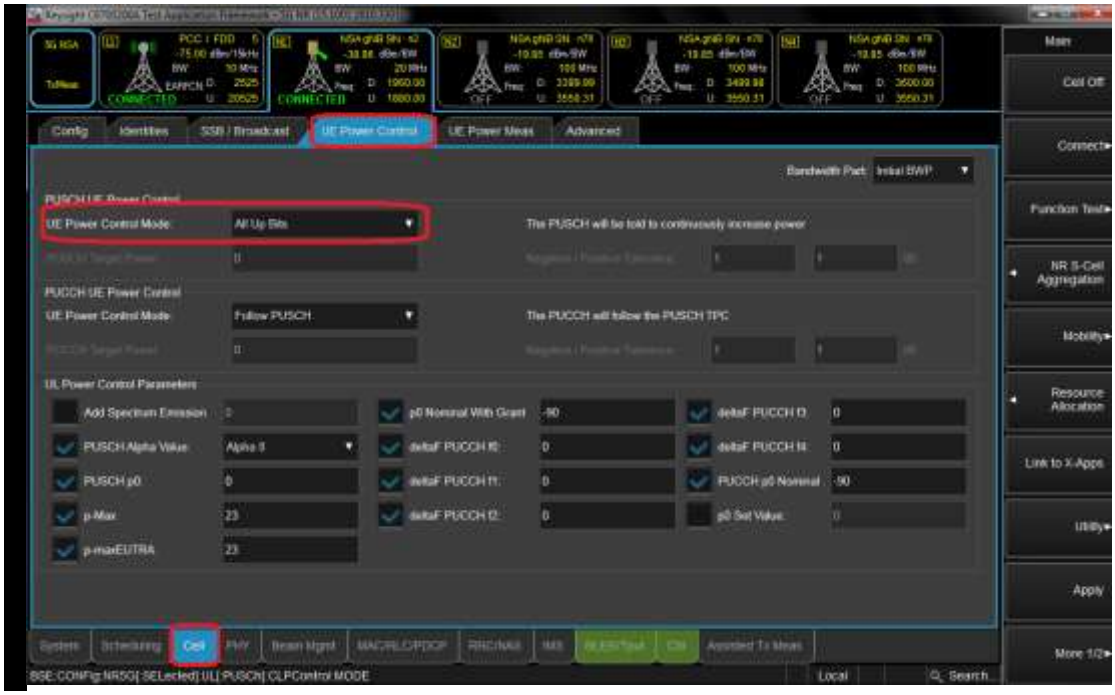


Connect NR S-Cell Aggregation

- 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 configurating (Start RB, Count, MCS).

View Tx Power

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