

# APPENDIX H: DOWNLINK LTE CA RF CONDUCTED POWERS

## H.1 LTE Downlink Only Carrier Aggregation Test Reduction Methodology

SAR test exclusion for LTE downlink Carrier Aggregation is determined by power measurements according to the number of component carriers (CCs) supported by the product implementation. Per April 2018 TCBC Workshop Notes, the following test reduction methodology was applied to determine the combinations required for conducted power measurements.

### LTE DLCA Test Reduction Methodology:

- The supported combinations were arranged by the number of component carriers in columns.
- Any limitations on the PCC or SCC for each combination were identified alongside the combination (e.g. CA\_2A-2A-4A-12A, but B12 can only be configured as a SCC).
- Power measurements were performed for "supersets" (LTE CA combinations with multiple components carriers) and any "subsets" (LTE CA combinations with fewer component carriers) that were not completely covered by the supersets.
- Only subsets that have the exact same components as a superset were excluded for measurement.
- When there were certain restrictions on component carriers that existed in the superset that were not applied for the subset, the subset configuration was additionally evaluated.
- Both inter-band and intra-band downlink carrier aggregation scenarios were considered.
- Downlink CA combinations for SISO and 4x4 Downlink MIMO operations were measured independently, per May 2017 TCBC Workshop notes.



Table H-1 – Example of Exclusion Table for SISO Configurations

Index	ZCC	Supported Channel Bandwidth [MHz]				Restriction	Completely Covered by Measurement Superset
		CC1	CC2	CC3	CC4		
CC01	CA_2A	5, 10, 15, 20	5, 10, 15, 20			No	
CC02	CA_2A-5A	5, 10, 15, 20	5, 10, 15, 20			No	
CC03	CA_2A-10A	5, 10, 15, 20	5, 10, 15, 20			No	
CC04	CA_2A-15A	5, 10, 15, 20	5, 10, 15, 20			No	
CC05	CA_2A-20A	5, 10, 15, 20	5, 10, 15, 20			No	
CC06	CA_2A-5A-10A	5, 10, 15, 20	5, 10, 15, 20			No	
CC07	CA_2A-10A-15A	5, 10, 15, 20	5, 10, 15, 20			No	
CC08	CA_2A-15A-20A	5, 10, 15, 20	5, 10, 15, 20			No	
CC09	CA_2A-5A-10A-15A	5, 10, 15, 20	5, 10, 15, 20			No	
CC10	CA_2A-10A-15A-20A	5, 10, 15, 20	5, 10, 15, 20			No	
CC11	CA_2A-5A-10A-15A-20A	5, 10, 15, 20	5, 10, 15, 20			No	

Table H-2 – Example of Exclusion Table for 4x4 Downlink MIMO Configurations

Index	ZCC	Supported Channel Bandwidth [MHz]				Restriction	Completely Covered by Measurement Superset
		CC1	CC2	CC3	CC4		
CCC#M1	CA_12C1	5, 10, 15, 20	5, 10, 15, 20			No	
CCC#M2	CA_12A-2A	5, 10, 15, 20	5, 10, 15, 20			No	
CCC#M3	CA_12A-12A	5, 10, 15, 20	5, 10, 15, 20			No	
CCC#M4	CA_12A-4A-12A	5, 10, 15, 20	5, 10, 15, 20			No	
CCC#M5	CA_12A-14A-12A	5, 10, 15, 20	5, 10, 15, 20			No	
CCC#M6	CA_12A-5A	5, 10, 15, 20	5, 10			No	
CCC#M7	CA_12A-13A-12A	5, 10, 15, 20	5, 10			No	
CCC#M8	CA_12A-13A	5, 10, 15, 20	5, 10			No	
CCC#M9	CA_12A-17A	5, 10	5, 10			No	
CCC#M10	CA_12A-20A-12A	5, 10, 15, 20	5, 10			B29 SCC Only	
CCC#M11	CA_12A-20A	5, 10, 15, 20	5, 10				
CCC#M12	CA_12A-66A-12A	5, 10, 15, 20	5, 10, 15, 20				
CCC#M13	CA_12A-66A-12A	5, 10, 15, 20	5, 10, 15, 20				
CCC#M14	CA_12A-166A-12A	5, 10, 15, 20	5, 10, 15, 20				
CCC#M15	CA_12A-71A	5, 10, 15, 20	5, 10, 15, 20				
CCC#M16	CA_5A-66A	5, 10, 15, 20	5, 10, 15, 20				
CCC#M17	CA_13A-66A	5, 10, 15, 20	5, 10, 15, 20				
CCC#M18	CA_30A-66A	5, 10, 15, 20	5, 10, 15, 20				
CCC#M19	CA_66C	5, 10, 15, 20	5, 10, 15, 20				
CCC#M20	CA_66A-66A	5, 10, 15, 20	5, 10, 15, 20				
CCC#M21	CA_66A-66A	5, 10, 15, 20	5, 10, 15, 20				

Note: [CC] indicates component carrier with 4x4 DL MIMO antenna configuration

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## H.2 LTE Downlink Only Carrier Aggregation Test Selection and Setup

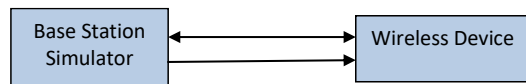
SAR test exclusion for LTE downlink Carrier Aggregation is determined by power measurements according to the number component carriers (CCs) supported by the product implementation. For those configurations required by April 2018 TCBC Workshop Notes, conducted power measurements with LTE Carrier Aggregation (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. All uplink communications and acknowledgements remain identical to specifications when downlink carrier aggregation is inactive on the PCC. Additional conducted output powers are measured with the downlink carrier aggregation active for the configuration with highest measured maximum conducted power with downlink carrier aggregation inactive among the channel bandwidth, modulation, and RB combinations in each frequency band.

This device supports LAA with downlink carrier aggregation only. It uses carrier aggregation in the downlink to combine LTE in the unlicensed spectrum (i.e. LTE Band 46) with LTE in the licensed band (served as PCC). All uplink communications and acknowledgements on the PCC remain identical to specifications when downlink carrier aggregation is inactive.




Per FCC KDB Publication 941225 D05Av01r02, no SAR measurements are required for carrier aggregation configurations when the maximum average output power with downlink only carrier aggregation active is not more than 0.25 dB higher than the average output power with downlink only carrier aggregation inactive. All bands required for SAR testing per FCC KDB procedures were considered. Based on the measured maximum powers below, no additional SAR tests were required for DLCA SAR configurations.

### General PCC and SCC configuration selection procedure

- PCC uplink channel, channel bandwidth, modulation and RB configurations were selected based on section C)3)b)ii) of KDB 941225 D05 V01r02. All LTE bandwidth conducted powers needed for PCC uplink configuration selection can be found in Section 9 of the main body report, Appendix A1 and A2, and appendix I. The downlink PCC channel was paired with the selected PCC uplink channel according to normal configurations without carrier aggregation.
- To maximize aggregated bandwidth, highest channel bandwidth available for that CA combination was selected for SCC. For inter-band CA, the SCC downlink channels were selected near the middle of their transmission bands. For contiguous intra-band CA, the downlink channel spacing between the component carriers was set to multiple of 300 kHz less than the nominal channel spacing defined in section 5.4.1A of 3GPP TS 36.521. For non-contiguous intra-band CA, 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.
- All selected PCC and SCC(s) remained fully within the uplink/downlink transmission band of the respective component carrier.



**Figure H-1**  
**DL CA Power Measurement Setup**

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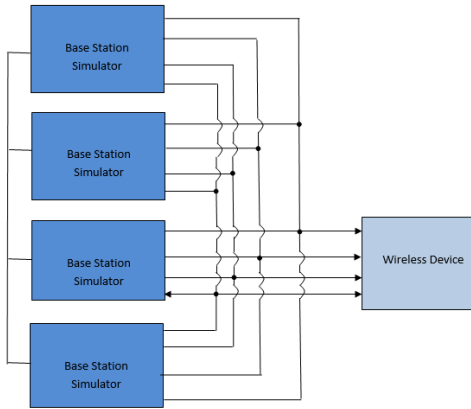


Figure H-2  
DL CA with DL 4x4 MIMO Power Measurement Setup

### H.3 Downlink Carrier Aggregation RF Conducted Powers

#### H.3.1 LTE Band 71 South Antenna Measured P<sub>max</sub> as PCC

Table H-3  
Maximum Output Powers

Combination	PCC Band	PCC BW [MHz]	PCC (UL) Ch.	PCC (UL) Freq. [MHz]	Mod.	PCC UL RB	PCC UL RB Offset	PCC (DL) Channel	PCC (DL) Freq. [MHz]	SCC 1			SCC 2			SCC 3			LTE Tx Power with DL CA Enabled [dBm]	LTE Single Carrier Tx Power [dBm]			
										SCC Band	SCC BW [MHz]	SCC (DL) Channel	SCC (DL) Freq. [MHz]	SCC Band	SCC BW [MHz]	SCC (DL) Channel	SCC (DL) Freq. [MHz]	SCC Band			SCC BW [MHz]	SCC (DL) Channel	SCC (DL) Freq. [MHz]
CA_4A-4A-71A	LTE B71	5	133147	665.5	QPSK	1	0	68611	619.5	LTE B4	20	2175	2132.5	LTE B4	10	2350	-	-	-	24.75	24.70		
CA_2A-6A-66A-71A	LTE B71	5	133147	665.5	QPSK	1	0	68611	619.5	LTE B2	20	900	1960	LTE B66	20	66786	2145	LTE B66	20	67236	2190	24.69	24.70
CA_2A-6B-71A	LTE B71	5	133147	665.5	QPSK	1	0	68611	619.5	LTE B2	20	900	1960	LTE B66	20	66786	2145	LTE B66	20	66984	2164.8	24.71	24.70
CA_2A-2A-4A-71A	LTE B71	5	133147	665.5	QPSK	1	0	68611	619.5	LTE B2	20	900	1960	LTE B2	20	700	1940	LTE B4	20	2175	2132.5	24.72	24.70
CA_2A-2A-6A-71A	LTE B71	5	133147	665.5	QPSK	1	0	68611	619.5	LTE B2	20	900	1960	LTE B2	20	700	1940	LTE B66	20	66786	2145	24.74	24.70

#### H.3.2 LTE Band 12 South Antenna Measured P<sub>max</sub> as PCC

Table H-4  
Maximum Output Powers

Combination	PCC Band	PCC BW [MHz]	PCC (UL) Ch.	PCC (UL) Freq. [MHz]	Mod.	PCC UL RB	PCC UL RB Offset	PCC (DL) Channel	PCC (DL) Freq. [MHz]	SCC 1			SCC 2			SCC 3			SCC 4			LTE Tx Power with DL CA Enabled [dBm]	LTE Single Carrier Tx Power [dBm]					
										SCC Band	SCC BW [MHz]	SCC (DL) Channel	SCC (DL) Freq. [MHz]	SCC Band	SCC BW [MHz]	SCC (DL) Channel	SCC (DL) Freq. [MHz]	SCC Band	SCC BW [MHz]	SCC (DL) Channel	SCC (DL) Freq. [MHz]			SCC Band	SCC BW [MHz]	SCC (DL) Channel	SCC (DL) Freq. [MHz]	
CA_2A-12A (1)	LTE B12	5	23035	701.5	QPSK	1	0	5035	731.5	LTE B2	20	900	1960	-	-	-	-	-	-	-	-	-	-	24.64	24.65			
CA_4A-12A (1)	LTE B12	5	23035	701.5	QPSK	1	0	5035	731.5	LTE B4	20	2175	2132.5	-	-	-	-	-	-	-	-	-	-	-	24.63	24.65		
CA_4A-12A (2)	LTE B12	5	23035	701.5	QPSK	1	0	5035	731.5	LTE B4	20	2175	2132.5	-	-	-	-	-	-	-	-	-	-	-	24.65	24.65		
CA_12A-25A	LTE B12	5	23035	701.5	QPSK	1	0	5035	731.5	LTE B25	20	8365	1962.5	-	-	-	-	-	-	-	-	-	-	-	-	24.66	24.65	
CA_12A-66A (1)	LTE B12	5	23035	701.5	QPSK	1	0	5035	731.5	LTE B66	20	66786	2145	-	-	-	-	-	-	-	-	-	-	-	-	24.67	24.65	
CA_12A-66A (2)	LTE B12	5	23035	701.5	QPSK	1	0	5035	731.5	LTE B66	20	66786	2145	-	-	-	-	-	-	-	-	-	-	-	-	-	24.67	24.65
CA_12A-66C	LTE B12	5	23035	701.5	QPSK	1	0	5035	731.5	LTE B66	20	66786	2145	LTE B66	20	66984	2164.8	-	-	-	-	-	-	-	-	-	24.70	24.65
CA_2A-4A-12A-30A	LTE B12	5	23035	701.5	QPSK	1	0	5035	731.5	LTE B2	20	900	1960	LTE B4	20	2175	2132.5	LTE B30	10	9820	2395	-	-	-	-	-	24.68	24.65
CA_2A-4A-4A-12A	LTE B12	5	23035	701.5	QPSK	1	0	5035	731.5	LTE B2	20	900	1960	LTE B4	20	2175	2132.5	LTE B4	10	2350	2150	-	-	-	-	-	24.72	24.65
CA_4A-4A-12A-30A	LTE B12	5	23035	701.5	QPSK	1	0	5035	731.5	LTE B4	20	2175	2132.5	LTE B4	10	2350	2150	LTE B30	10	9820	2395	-	-	-	-	-	24.70	24.65
CA_2A-12A-12A-66A-66A	LTE B12	5	23035	701.5	QPSK	1	0	5035	731.5	LTE B2	20	900	1960	LTE B30	10	9820	2395	LTE B66	20	66786	2145	LTE B66	20	67236	2190	24.85	24.85	
CA_2A-12A-12A-30A-66A	LTE B12	5	23035	701.5	QPSK	1	0	5035	731.5	LTE B2	20	900	1960	LTE B2	20	700	1940	LTE B30	10	9820	2395	LTE B66	20	66786	2145	24.69	24.65	
CA_2A-2A-12A-66A-66A	LTE B12	5	23035	701.5	QPSK	1	0	5035	731.5	LTE B2	20	900	1960	LTE B2	20	700	1940	LTE B66	20	66786	2145	LTE B66	20	67236	2190	24.71	24.65	

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DUT Type:  
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H.3.3

LTE Band 13 South Antenna Measured Pmax as PCC

Table H-5 Maximum Output Powers

Table with columns: Combination, PCC Band, PCC BW [MHz], PCC (UL) Ch., PCC (UL) Freq. [MHz], Mod., PCC UL RB, PCC UL RB Offset, PCC (DL) Channel, PCC (DL) Freq. [MHz], SCC Band, SCC BW [MHz], SCC (DL) Channel, SCC (DL) Freq. [MHz], SCC Band, SCC BW [MHz], SCC (DL) Channel, SCC (DL) Freq. [MHz], SCC Band, SCC BW [MHz], SCC (DL) Channel, SCC (DL) Freq. [MHz], LTE Tx Power with DR CA Enabled [dBm], LTE Single Carrier Tx Power [dBm].

H.3.4

LTE Band 14 South Antenna Measured Pmax as PCC

Table H-6 Maximum Output Powers

Table with columns: Combination, PCC Band, PCC BW [MHz], PCC (UL) Ch., PCC (UL) Freq. [MHz], Mod., PCC UL RB, PCC UL RB Offset, PCC (DL) Channel, PCC (DL) Freq. [MHz], SCC Band, SCC BW [MHz], SCC (DL) Channel, SCC (DL) Freq. [MHz], SCC Band, SCC BW [MHz], SCC (DL) Channel, SCC (DL) Freq. [MHz], SCC Band, SCC BW [MHz], SCC (DL) Channel, SCC (DL) Freq. [MHz], LTE Tx Power with DR CA Enabled [dBm], LTE Single Carrier Tx Power [dBm].

H.3.5

LTE Band 5 South Antenna Measured Pmax as PCC

Table H-7 Maximum Output Powers

Table with columns: Combination, PCC Band, PCC BW [MHz], PCC (UL) Ch., PCC (UL) Freq. [MHz], Mod., PCC UL RB, PCC UL RB Offset, PCC (DL) Channel, PCC (DL) Freq. [MHz], SCC Band, SCC BW [MHz], SCC (DL) Channel, SCC (DL) Freq. [MHz], SCC Band, SCC BW [MHz], SCC (DL) Channel, SCC (DL) Freq. [MHz], SCC Band, SCC BW [MHz], SCC (DL) Channel, SCC (DL) Freq. [MHz], LTE Tx Power with DR CA Enabled [dBm], LTE Single Carrier Tx Power [dBm].

H.3.6

LTE Band 26 South Antenna Measured Pmax as PCC

Table H-8 Maximum Output Powers

Table with columns: Combination, PCC Band, PCC BW [MHz], PCC (UL) Ch., PCC (UL) Freq. [MHz], Mod., PCC UL RB, PCC UL RB Offset, PCC (DL) Channel, PCC (DL) Freq. [MHz], SCC Band, SCC BW [MHz], SCC (DL) Channel, SCC (DL) Freq. [MHz], SCC Band, SCC BW [MHz], SCC (DL) Channel, SCC (DL) Freq. [MHz], LTE Tx Power with DR CA Enabled [dBm], LTE Single Carrier Tx Power [dBm].

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H.4.4

LTE Band 13 South Antenna Measured Pmax as PCC

Table H-18
Maximum Output Powers

Table with columns for Combination, PCC Band, PCC BW, PCC Ch, PCC (DU) Freq, Mod, PCC UL RB, PCC UL RB Offset, PCC (DU) Freq, DL Ant. Config, SCC Band, SCC BW, SCC (DU) Freq, DL Ant. Config, SCC Band, SCC BW, SCC (DU) Freq, DL Ant. Config, SCC Band, SCC BW, SCC (DU) Freq, DL Ant. Config, SCC Band, SCC BW, SCC (DU) Freq, DL Ant. Config, LTE Tx Power with DL CA Enabld (dBm), LTE Single Carrier Tx Power (dBm). Rows list various combinations of LTE bands (e.g., CA [2A]-[4A]-[13A]) and their maximum power outputs.

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# H.4.5

# LTE Band 14 South Antenna Measured P<sub>max</sub> as PCC

## Table H-19 Maximum Output Powers

Combination	PCC									SCC 1			SCC 2			SCC 3			SCC 4			Power										
	PCC Band	PCC BW [MHz]	PCC [UL] Ch.	PCC [DL] Freq. [MHz]	Mod.	PCC UL RB Offset	PCC [DL] Ch.	PCC [DL] Freq. [MHz]	DL Ant. Config.	SCC Band	SCC BW [MHz]	SCC [DL] Ch.	SCC [DL] Freq. [MHz]	DL Ant. Config.	SCC Band	SCC BW [MHz]	SCC [DL] Ch.	SCC [DL] Freq. [MHz]	DL Ant. Config.	SCC Band	SCC BW [MHz]	SCC [DL] Ch.	SCC [DL] Freq. [MHz]	DL Ant. Config.	SCC Band	SCC BW [MHz]	SCC [DL] Ch.	SCC [DL] Freq. [MHz]	DL Ant. Config.	LTE Tx Power with DL CA Enabled [dBm]	LTE Single Carrier Tx Power [dBm]	
CA [2A] 14A 30A 66A 66A	LTE B14	10	2330	703	QPSK	1	0	5330	763	2x2	LTE B2	20	900	1960	4x4	LTE B30	10	9620	2355	2x2	LTE B66	20	66786	2145	2x2	LTE B66	20	67236	2190	2x2	24.59	24.52

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H.4.8

LTE Band 66 South Antenna Measured Pmax as PCC

Table H-22
Maximum Output Powers

Table with columns: Combination, PCC Band, PCC BW, PCC Freq, PCC Mod, PCC UL, PCC DL, PCC DL Freq, DL Ant. Config, SCC Band, SCC BW, SCC Freq, DL Ant. Config, SCC Band, SCC BW, SCC Freq, DL Ant. Config, SCC Band, SCC BW, SCC Freq, DL Ant. Config, SCC Band, SCC BW, SCC Freq, DL Ant. Config, LTE Tx Power, LTE Tx Power with DL CA, LTE Single Carrier Tx Power.

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Combination	PCC Band	PCC BW (MHz)	PCC (UL/Ch)	PCC (DL/Ch)	Mod.	PCC RB	PCC UL RB Offset	PCC (UL) Ch.	PCC (DL) Freq. (MHz)	DL Ant. Config.	SIC Band	SIC 1			SIC 2			SIC 3			DL Ant. Config.	SIC Band	SIC 4			DL Ant. Config.	SIC Band	SIC 5			DL Ant. Config.	LTE Pwr (dBm)	LTE Sfrq (KHz)				
												SIC BW (MHz)	SIC (DL) Ch.	SIC (DL) Freq. (MHz)	SIC BW (MHz)	SIC (DL) Ch.	SIC (DL) Freq. (MHz)	SIC BW (MHz)	SIC (DL) Ch.	SIC (DL) Freq. (MHz)			SIC BW (MHz)	SIC (DL) Ch.	SIC (DL) Freq. (MHz)			SIC BW (MHz)	SIC (DL) Ch.	SIC (DL) Freq. (MHz)							
CA_12A_14B_48A_68A	LTE B66	15	15047	717.5	QPSK	1	38	66511	2117.5	2x2	LTE B66	20	900	1940	44	LTE B5	15	5065	881.5	2x2	LTE B48	20	5090	3625	2x2	LTE B48	20	5090	3625	2x2	LTE B48	20	5090	3625	2x2	24.20	24.17
CA_2A_5A_48C_18A	LTE B66	15	15047	717.5	QPSK	1	38	66511	2117.5	2x2	LTE B66	20	900	1940	44	LTE B5	10	5225	881.5	2x2	LTE B48	20	5090	3625	2x2	LTE B48	20	5090	3625	2x2	LTE B48	20	5090	3625	2x2	24.20	24.17
CA_12A_14B_48C_18A	LTE B66	15	15047	717.5	QPSK	1	38	66511	2117.5	2x2	LTE B66	20	900	1940	44	LTE B5	10	5225	881.5	2x2	LTE B48	20	5090	3625	2x2	LTE B48	20	5090	3625	2x2	LTE B48	20	5090	3625	2x2	24.20	24.17
CA_12A_14B_48C_68A	LTE B66	15	15047	717.5	QPSK	1	38	66511	2117.5	2x2	LTE B66	20	900	1940	44	LTE B5	15	5225	881.5	2x2	LTE B48	20	5090	3625	2x2	LTE B48	20	5090	3625	2x2	LTE B48	20	5090	3625	2x2	24.20	24.17
CA_12A_14B_48C_18A_68A	LTE B66	15	15047	717.5	QPSK	1	38	66511	2117.5	2x2	LTE B66	20	900	1940	44	LTE B5	10	5225	881.5	2x2	LTE B48	20	5090	3625	2x2	LTE B48	20	5090	3625	2x2	LTE B48	20	5090	3625	2x2	24.20	24.17
CA_2A_5A_18A_68A	LTE B66	15	15047	717.5	QPSK	1	38	66511	2117.5	2x2	LTE B66	20	900	1940	44	LTE B5	10	5225	881.5	2x2	LTE B48	20	5090	3625	2x2	LTE B48	20	5090	3625	2x2	LTE B48	20	5090	3625	2x2	24.20	24.17
CA_12A_14B_48C_68A_18A	LTE B66	15	15047	717.5	QPSK	1	38	66511	2117.5	2x2	LTE B66	20	900	1940	44	LTE B5	10	5225	881.5	2x2	LTE B48	20	5090	3625	2x2	LTE B48	20	5090	3625	2x2	LTE B48	20	5090	3625	2x2	24.20	24.17
CA_2A_5A_18A_68A_18A	LTE B66	15	15047	717.5	QPSK	1	38	66511	2117.5	2x2	LTE B66	20	900	1940	44	LTE B5	10	5225	881.5	2x2	LTE B48	20	5090	3625	2x2	LTE B48	20	5090	3625	2x2	LTE B48	20	5090	3625	2x2	24.20	24.17
CA_12A_14B_48C_68A_18A_68A	LTE B66	15	15047	717.5	QPSK	1	38	66511	2117.5	2x2	LTE B66	20	900	1940	44	LTE B5	10	5225	881.5	2x2	LTE B48	20	5090	3625	2x2	LTE B48	20	5090	3625	2x2	LTE B48	20	5090	3625	2x2	24.20	24.17
CA_2A_5A_18A_68A_18A_68A	LTE B66	15	15047	717.5	QPSK	1	38	66511	2117.5	2x2	LTE B66	20	900	1940	44	LTE B5	10	5225	881.5	2x2	LTE B48	20	5090	3625	2x2	LTE B48	20	5090	3625	2x2	LTE B48	20	5090	3625	2x2	24.20	24.17
CA_12A_14B_48C_68A_18A_68A_18A	LTE B66	15	15047	717.5	QPSK	1	38	66511	2117.5	2x2	LTE B66	20	900	1940	44	LTE B5	10	5225	881.5	2x2	LTE B48	20	5090	3625	2x2	LTE B48	20	5090	3625	2x2	LTE B48	20	5090	3625	2x2	24.20	24.17
CA_2A_5A_18A_68A_18A_68A_18A	LTE B66	15	15047	717.5	QPSK	1	38	66511	2117.5	2x2	LTE B66	20	900	1940	44	LTE B5	10	5225	881.5	2x2	LTE B48	20	5090	3625	2x2	LTE B48	20	5090	3625	2x2	LTE B48	20	5090	3625	2x2	24.20	24.17
CA_2A_5A_18A_68A_18A_68A_18A_68A	LTE B66	15	15047	717.5	QPSK	1	38	66511	2117.5	2x2	LTE B66	20	900	1940	44	LTE B5	10	5225	881.5	2x2	LTE B48	20	5090	3625	2x2	LTE B48	20	5090	3625	2x2	LTE B48	20	5090	3625	2x2	24.20	24.17
CA_2A_5A_18A_68A_18A_68A_18A_68A_18A	LTE B66	15	15047	717.5	QPSK	1	38	66511	2117.5	2x2	LTE B66	20	900	1940	44	LTE B5	10	5225	881.5	2x2	LTE B48	20	5090	3625	2x2	LTE B48	20	5090	3625	2x2	LTE B48	20	5090	3625	2x2	24.20	24.17



H.4.9

LTE Band 25 South Antenna Measured Pmax as PCC

Table H-23
Maximum Output Powers

Table with columns: Combination, FCC Band, PCC BW, PCC UL, PCC DL, Mod., PCC UL RB, PCC UL Ch, PCC UL Freq, DL Ant. Config., SCC Band, SCC BW, SCC UL, SCC DL, DL Ant. Config., SCC Band, SCC BW, SCC UL, SCC DL, DL Ant. Config., SCC Band, SCC BW, SCC UL, SCC DL, DL Ant. Config., LTE Tx Power, LTE Single Carrier Tx Power.

H.4.10

LTE Band 30 South Antenna Measured Pmax as PCC

Table H-24
Maximum Output Powers

Table with columns: Combination, FCC Band, PCC BW, PCC UL, PCC DL, Mod., PCC UL RB, PCC UL Ch, PCC UL Freq, DL Ant. Config., SCC Band, SCC BW, SCC UL, SCC DL, DL Ant. Config., SCC Band, SCC BW, SCC UL, SCC DL, DL Ant. Config., SCC Band, SCC BW, SCC UL, SCC DL, DL Ant. Config., LTE Tx Power, LTE Single Carrier Tx Power.

FCC ID: C3K1995



SAR EVALUATION REPORT



Reviewed by: Quality Manager

Test Dates: 06/21/2021 - 09/09/2021

DUT Type: Portable Handset

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## H.5 Downlink Carrier Aggregation with CA\_41C Uplink Carrier Aggregation enabled

This device supports uplink carrier aggregation (ULCA) with additional Carrier Aggregation configurations active in the downlink. Power measurements were performed with ULCA active and additional CA configurations active in the downlink for the configuration per Fall 2017 TCB Workshop Notes.

Per FCC Guidance, additional SAR measurements for these configurations were not required since their maximum output power was not more than 0.25 dB higher than the maximum output power for with only ULCA active.

### H.5.1 DL Carrier Aggregation RF Conducted Powers

Table H-28  
Maximum Output Powers



Combination	PCC										SCC 1										SCC 2										SCC 3										Power	
	PCC Band	PCC BW [MHz]	PCC [UL] Ch.	PCC [UL] Freq. [MHz]	Mod.	PCC UL# RB	PCC UL RB Offset	PCC [DL] Channel	PCC [DL] Freq. [MHz]	SCC Band	SCC BW [MHz]	SCC [UL] Ch.	SCC [UL] Freq. [MHz]	Mod.	SCC UL# RB	SCC UL RB Offset	SCC [DL] Channel	SCC [DL] Freq. [MHz]	SCC Band	SCC BW [MHz]	SCC [DL] Channel	SCC [DL] Freq. [MHz]	SCC Band	SCC BW [MHz]	SCC [DL] Channel	SCC [DL] Freq. [MHz]	DL Ant. Config.	ULCA Tx Power with add'l CA config. active (dBm)	ULCA Tx Power (dBm)													
CA_41D	LTE B48	20	5640	3600	QPSK	8	0	5640	3600	LTE B48	20	5642	3670.2	QPSK	8	92	5642	3670.2	LTE B48	20	5624	3650.4	-	-	-	-	-	23.49	23.60													
CA_41C-61A	LTE B48	20	5640	3600	QPSK	8	0	5640	3600	LTE B48	20	0	0	QPSK	8	92	5642	3670.2	LTE B48	20	5624	3650.4	LTE B66	20	6678	2145	23.45	23.60														
CA_41E	LTE B48	20	5640	3600	QPSK	8	0	5640	3600	LTE B48	20	0	0	QPSK	8	92	5642	3670.2	LTE B48	20	5624	3650.4	LTE B48	20	5606	3620.8	23.52	23.60														

### H.5.2 DL Carrier Aggregation with DL 4x4 MIMO RF Conducted Powers

Note: 4x4 DL MIMO is only operating in the downlink. Uplink transmission is limited to a single output stream for each component carrier of ULCA.

Table H-29  
Maximum Output Powers

Combination	PCC										SCC 1										SCC 2										SCC 3										Power	
	PCC Band	PCC BW [MHz]	PCC [UL] Ch.	PCC [UL] Freq. [MHz]	Mod.	PCC UL# RB	PCC UL RB Offset	PCC [DL] Channel	PCC [DL] Freq. [MHz]	DL Ant. Config.	SCC Band	SCC BW [MHz]	SCC [UL] Ch.	SCC [UL] Freq. [MHz]	Mod.	SCC UL# RB	SCC UL RB Offset	SCC [DL] Channel	SCC [DL] Freq. [MHz]	DL Ant. Config.	SCC Band	SCC BW [MHz]	SCC [DL] Channel	SCC [DL] Freq. [MHz]	DL Ant. Config.	SCC Band	SCC BW [MHz]	SCC [DL] Channel	SCC [DL] Freq. [MHz]	DL Ant. Config.	ULCA Tx Power with add'l CA config. active (dBm)	ULCA Tx Power (dBm)										
CA_[66C]	LTE B66	20	132072	1720	QPSK	1	99	66536	2120	4x4	LTE B66	20	132270	1739.8	QPSK	1	0	66734	2139.8	4x4	-	-	-	-	-	-	-	-	-	-	25.00	25.00										
CA_[7C]	LTE B7	20	21100	2535	QPSK	1	0	3100	2655	4x4	LTE B7	20	20902	2515.2	QPSK	1	99	2902	2635.2	4x4	-	-	-	-	-	-	-	-	-	-	24.37	24.37										
CA_[48C]	LTE B48	20	5640	3600	QPSK	8	0	5640	3600	4x4	LTE B48	20	5642	3670.2	QPSK	8	92	5642	3670.2	4x4	LTE B48	20	5624	3650.4	4x4	-	-	-	-	-	-	23.58	23.60									
CA_[48D]	LTE B48	20	5640	3600	QPSK	8	0	5640	3600	4x4	LTE B48	20	0	0	QPSK	8	92	5642	3670.2	4x4	LTE B48	20	5624	3650.4	4x4	LTE B66	20	6678	2145	24.2	23.94	23.60										
CA_[48D]66A	LTE B48	20	5640	3600	QPSK	8	0	5640	3600	2x2	LTE B48	20	0	0	QPSK	8	92	5642	3670.2	2x2	LTE B48	20	5624	3650.4	2x2	LTE B66	20	6678	2145	24.4	23.97	23.60										
CA_[48D]66A	LTE B48	20	5640	3600	QPSK	8	0	5640	3600	4x4	LTE B48	20	0	0	QPSK	8	92	5642	3670.2	4x4	LTE B48	20	5624	3650.4	4x4	LTE B66	20	6678	2145	24.4	23.91	23.60										
CA_[48E]	LTE B48	20	5640	3600	QPSK	8	0	5640	3600	4x4	LTE B48	20	0	0	QPSK	8	92	5642	3670.2	4x4	LTE B48	20	5624	3650.4	4x4	LTE B48	20	5606	3620.8	23.52	23.60											
CA_[41C]	LTE B41	20	39750	2506	QPSK	1	99	39750	2506	4x4	LTE B41	20	39948	2525.8	QPSK	1	0	39948	2525.8	4x4	-	-	-	-	-	-	-	-	-	25.20	25.20											
CA_[41C]41A	LTE B41	20	39750	2506	QPSK	1	99	39750	2506	2x2	LTE B41	20	39948	2525.8	QPSK	1	0	39948	2525.8	2x2	LTE B41	20	41480	2680	4x4	LTE B41	20	41480	2680	24.89	25.20											
CA_[41C]41A	LTE B41	20	39750	2506	QPSK	1	99	39750	2506	4x4	LTE B41	20	39948	2525.8	QPSK	1	0	39948	2525.8	4x4	LTE B41	20	41480	2680	2x2	LTE B41	20	41480	2680	24.38	25.20											
CA_[41C]41A	LTE B41	20	39750	2506	QPSK	1	99	39750	2506	4x4	LTE B41	20	39948	2525.8	QPSK	1	0	39948	2525.8	4x4	LTE B41	20	41480	2680	4x4	LTE B41	20	41480	2680	25.21	25.20											
CA_[41D]	LTE B41	20	39750	2506	QPSK	1	99	39750	2506	4x4	LTE B41	20	39948	2525.8	QPSK	1	0	39948	2525.8	4x4	LTE B41	20	40146	2545.6	4x4	LTE B41	20	40146	2545.6	25.20	25.20											

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