

APPENDIX J: 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 J-1 – Example of Exclusion Table for SISO Configurations

Index	BCC	Supported Channel Bandwidth (MHz)		Restriction	Completely Covered by Measurement Superset	Index	BCC	Supported Channel Bandwidth (MHz)		Restriction	Completely Covered by Measurement Superset	Index	BCC	Supported Channel Bandwidth (MHz)		Restriction	Completely Covered by Measurement Superset
		CC1	CC2					CC1	CC2					CC1	CC2		
CCC #0	CA_1	5, 10, 15, 20	5, 10, 15, 20		Yes	CCC #1	CA_1	5, 10, 15, 20	5, 10, 15, 20		Yes	CCC #1	CA_1	5, 10, 15, 20	5, 10, 15, 20		Yes
CCC #2	CA_2A-2A	5, 10, 15, 20	5, 10, 15, 20		Yes	CCC #3	CA_2A-2A-4A	5, 10, 15, 20	5, 10, 15, 20		Yes	CCC #4	CA_2A-2A-4A-12A	5, 10, 15, 20	5, 10, 15, 20		Yes
CCC #5	CA_2A-2A-4A	5, 10, 15, 20	5, 10, 15, 20		Yes	CCC #6	CA_2A-2A-4A-12A	5, 10, 15, 20	5, 10, 15, 20		Yes	CCC #7	CA_2A-2A-4A-12A-12A	5, 10, 15, 20	5, 10, 15, 20		Yes
CCC #10	CA_2A-2A-4A-12A	5, 10, 15, 20	5, 10, 15, 20		Yes	CCC #11	CA_2A-2A-4A-12A-12A	5, 10, 15, 20	5, 10, 15, 20		Yes	CCC #12	CA_2A-2A-4A-12A-12A	5, 10, 15, 20	5, 10, 15, 20		Yes

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

Index	BCC	Supported Channel Bandwidth (MHz)		Restriction	Completely Covered by Measurement Superset	Index	BCC	Supported Channel Bandwidth (MHz)		Restriction	Completely Covered by Measurement Superset	Index	BCC	Supported Channel Bandwidth (MHz)		Restriction	Completely Covered by Measurement Superset
		CC1	CC2					CC1	CC2					CC1	CC2		
CCC #M1	CA_1	5, 10, 15, 20	5, 10, 15, 20		Yes	CCC #M1	CA_1	5, 10, 15, 20	5, 10, 15, 20		Yes	CCC #M1	CA_1	5, 10, 15, 20	5, 10, 15, 20		Yes
CCC #M2	CA_2A-2A	5, 10, 15, 20	5, 10, 15, 20		Yes	CCC #M2	CA_2A-2A-4A	5, 10, 15, 20	5, 10, 15, 20		Yes	CCC #M2	CA_2A-2A-4A-66A	5, 10, 15, 20	5, 10, 15, 20		Yes
CCC #M3	CA_2A-2A-4A	5, 10, 15, 20	5, 10, 15, 20		Yes	CCC #M3	CA_2A-2A-4A-12A	5, 10, 15, 20	5, 10, 15, 20		Yes	CCC #M3	CA_2A-2A-4A-66A	5, 10, 15, 20	5, 10, 15, 20		Yes
CCC #M4	CA_2A-2A-4A-12A	5, 10, 15, 20	5, 10, 15, 20		Yes	CCC #M4	CA_2A-2A-4A-12A	5, 10, 15, 20	5, 10, 15, 20		Yes	CCC #M4	CA_2A-2A-4A-66A	5, 10, 15, 20	5, 10, 15, 20		Yes
CCC #M5	CA_2A-2A-4A-12A	5, 10, 15, 20	5, 10, 15, 20		Yes	CCC #M5	CA_2A-2A-4A-12A	5, 10, 15, 20	5, 10, 15, 20		Yes	CCC #M5	CA_2A-2A-4A-66A	5, 10, 15, 20	5, 10, 15, 20		Yes
CCC #M6	CA_2A-2A-4A-12A	5, 10, 15, 20	5, 10, 15, 20		Yes	CCC #M6	CA_2A-2A-4A-12A	5, 10, 15, 20	5, 10, 15, 20		Yes	CCC #M6	CA_2A-2A-4A-66A	5, 10, 15, 20	5, 10, 15, 20		Yes
CCC #M7	CA_2A-2A-4A-12A	5, 10, 15, 20	5, 10, 15, 20		Yes	CCC #M7	CA_2A-2A-4A-12A	5, 10, 15, 20	5, 10, 15, 20		Yes	CCC #M7	CA_2A-2A-4A-66A	5, 10, 15, 20	5, 10, 15, 20		Yes
CCC #M8	CA_2A-2A-4A-12A	5, 10, 15, 20	5, 10, 15, 20		Yes	CCC #M8	CA_2A-2A-4A-12A	5, 10, 15, 20	5, 10, 15, 20		Yes	CCC #M8	CA_2A-2A-4A-66A	5, 10, 15, 20	5, 10, 15, 20		Yes

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

FCC ID PY7-57325M	SAR EVALUATION REPORT	Approved by: Technical Manager
DUT Type: Portable Handset		APPENDIX J: Page 1 of 11

J.1 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 measured 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 9.3 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.

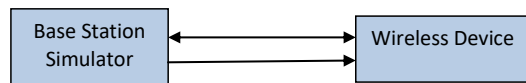


Figure J-1
DL CA Power Measurement Setup

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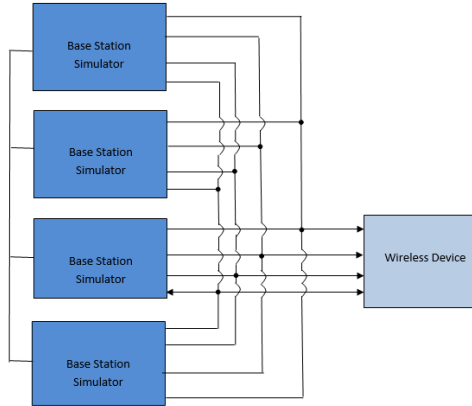


Figure J-2
DL CA with DL 4x4 MIMO Power Measurement Setup

J.2 Downlink Carrier Aggregation RF Conducted Powers

J.2.1 LTE Band 71 as PCC

Table J-3
Maximum Output Powers

Combination	PCC Band	PCC BW [MHz]	PCC (UL) Ch. Freq. [MHz]	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	10	13297	680.5	QPSK	1	49	68761	634.5	LTE B4	20	2175	2132.5	LTE B4	10	2390	2150	-	-	23.93	24.09		
CA_2A-2A-4A-71A	LTE B71	10	13297	680.5	QPSK	1	49	68761	634.5	LTE B2	20	900	1960	LTE B2	20	700	1940	LTE B4	20	2175	2132.5	23.93	24.09
CA_2A-2A-6A-71A	LTE B71	10	13297	680.5	QPSK	1	49	68761	634.5	LTE B2	20	900	1960	LTE B6	20	69786	2145	LTE B6	20	69786	2145	23.85	24.09
CA_2A-6A-71A	LTE B71	10	13297	680.5	QPSK	1	49	68761	634.5	LTE B2	20	900	1960	LTE B6	20	69786	2145	LTE B6	20	69884	2164.0	23.85	24.09

J.2.2 LTE Band 12 as PCC

Table J-4
Maximum Output Powers

Combination	PCC Band	PCC BW [MHz]	PCC (UL) Ch. Freq. [MHz]	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_12A-6A-12	LTE B12	5	25035	701.5	QPSK	1	7	6035	731.5	LTE B6	20	66786	2145	-	-	-	-	-	-	-	-	-	24.05	24.05			
CA_12A-6A-12	LTE B12	3	25035	700.5	QPSK	1	7	6035	730.5	LTE B6	20	66786	2145	-	-	-	-	-	-	-	-	-	24.07	24.12			
CA_4A-12A-12	LTE B12	5	25035	700.5	QPSK	1	12	6035	731.5	LTE B4	20	900	1960	-	-	-	-	-	-	-	-	-	24.04	24.04			
CA_4A-12A-12	LTE B12	5	25035	701.5	QPSK	1	12	6035	731.5	LTE B4	20	2175	2132.5	-	-	-	-	-	-	-	-	-	24.05	24.09			
CA_4A-12A-12	LTE B12	3	25035	700.5	QPSK	1	12	6035	730.5	LTE B4	20	2175	2132.5	-	-	-	-	-	-	-	-	-	24.05	24.12			
CA_12A-6A-6A	LTE B12	5	25035	701.5	QPSK	1	12	6035	731.5	LTE B12	10	6107	736.7	LTE B6	20	66786	2145	-	-	-	-	-	-	24.02	24.05		
CA_2A-4A-12A	LTE B12	5	25035	701.5	QPSK	1	12	6035	731.5	LTE B2	20	900	1960	LTE B4	20	2175	2132.5	-	-	-	-	-	-	24.04	24.09		
CA_4A-4A-12A	LTE B12	5	25035	701.5	QPSK	1	12	6035	731.5	LTE B12	10	6107	736.7	LTE B4	20	2175	2132.5	-	-	-	-	-	-	24.04	24.09		
CA_2A-4A-12A	LTE B12	5	25035	701.5	QPSK	1	12	6035	731.5	LTE B4	20	2175	2132.5	LTE B4	20	2390	2150	-	-	-	-	-	-	24.05	24.09		
CA_2A-12A-6A	LTE B12	5	25035	701.5	QPSK	1	12	6035	731.5	LTE B2	20	900	1960	LTE B6	20	66786	2145	LTE B6	20	66884	2164.0	-	-	24.04	24.09		
CA_2A-2A-12A-6A-6A	LTE B12	5	25035	701.5	QPSK	1	12	6035	731.5	LTE B2	20	900	1960	LTE B2	20	700	1940	LTE B6	20	66786	2145	LTE B6	20	67236	2160	24.05	24.09

J.2.3 LTE Band 13 as PCC

Table J-5
Maximum Output Powers

Combination	PCC Band	PCC BW [MHz]	PCC (UL) Ch. Freq. [MHz]	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			SCC 5			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_13A-6A-6A	LTE B13	5	26230	782	QPSK	1	12	6230	782	LTE B4	20	5995	5517.5	LTE B4	20	4700	5145	-	-	-	-	-	-	-	-	23.93	24.05
CA_13A-6A-6A	LTE B13	3	26230	782	QPSK	1	12	6230	781	LTE B4	20	5995	5517.5	LTE B4	20	4700	5145	-	-	-	-	-	-	-	-	24.07	24.09
CA_2A-13A-6A	LTE B13	5	26230	782	QPSK	1	12	6230	781	LTE B2	20	900	1960	LTE B4	20	5995	5517.5	-	-	-	-	-	-	-	-	24.05	24.10
CA_2A-13A-6A	LTE B13	3	26230	782	QPSK	1	12	6230	781	LTE B2	20	2175	2132.5	LTE B4	20	5995	5517.5	-	-	-	-	-	-	-	-	24.05	24.12
CA_4A-4A-13A	LTE B13	5	26230	782	QPSK	1	12	6230	781	LTE B4	20	2175	2132.5	LTE B4	20	5995	5517.5	-	-	-	-	-	-	-	-	24.05	24.10
CA_13A-6A-6A-6A	LTE B13	5	26230	782	QPSK	1	12	6230	781	LTE B2	20	900	1960	LTE B4	20	5995	5517.5	LTE B6	20	66786	2145	-	-	-	-	24.05	24.10
CA_13A-6A-6A-6A	LTE B13	3	26230	782	QPSK	1	12	6230	781	LTE B2	20	900	1960	LTE B4	20	5995	5517.5	LTE B6	20	66786	2145	-	-	-	-	24.05	24.12
CA_13A-6A-6A-6A	LTE B13	3	26230	782	QPSK	1	12	6230	781	LTE B2	20	2175	2132.5	LTE B4	20	5995	5517.5	LTE B6	20	66786	2145	-	-	-	-	24.05	24.12
CA_2A-13A-6A-6A	LTE B13	5	26230	782	QPSK	1	12	6230	781	LTE B2	20	900	1960	LTE B4	20	5995	5517.5	LTE B6	20	66786	2145	-	-	-	-	24.05	24.12
CA_13A-6A-6A-6A-6A	LTE B13	5	26230	782	QPSK	1	12	6230	781	LTE B2	20	900	1960	LTE B4	20	5995	5517.5	LTE B6	20	66786	2145	LTE B6	20	66884	2164.0	24.05	24.12
CA_2A-13A-6A-6A-6A	LTE B13	5	26230	782	QPSK	1	12	6230	781	LTE B2	20	900	1960	LTE B4	20	5995	5517.5	LTE B6	20	66786	2145	LTE B6	20	66884	2164.0	24.05	24.12
CA_13A-6A-6A-6A	LTE B13	5	26230	782	QPSK	1	12	6230	781	LTE B4	20	5995	5517.5	LTE B4	20	5995	5517.5	LTE B4	20	5995	5517.5	-	-	-	-	24.05	24.12
CA_13A-6A-6A-6A	LTE B13	3	26230	782	QPSK	1	12	6230	781	LTE B4	20	5995	5517.5	LTE B4	20	5995	5517.5	LTE B4	20	5995	5517.5	-	-	-	-	24.05	24.12
CA_2A-13A-6A-6A-6A	LTE B13	5	26230	782	QPSK	1	12	6230	781	LTE B2	20	900	1960	LTE B4	20	5995	5517.5	LTE B6	20	66786	2145	-	-	-	-	24.05	24.12
CA_2A-13A-6A-6A-6A	LTE B13	3	26230	782	QPSK	1	12	6230	781	LTE B2	20	900	1960	LTE B4	20	5995	5517.5	LTE B6	20	66786	2145	-	-	-	-	24.05	24.12
CA_2A-13A-6A-6A-6A	LTE B13	3	26230	782	QPSK	1	12	6230	781	LTE B2	20	2175	2132.5	LTE B4	20	5995	5517.5	LTE B6	20	66786	2145	-	-	-	-	24.05	24.12
CA_2A-13A-6A-6A-6A	LTE B13	5	26230	782	QPSK	1	12	6230	781	LTE B2	20	900	1960	LTE B4	20	5995	5517.5	LTE B6	20	66786	2145	LTE B6	20	66884	2164.0	24.05	24.12
CA_2A-13A-6A-6A-6A	LTE B13	3	26230	782	QPSK	1	12	6230	781	LTE B2	20	900	1960	LTE B4	20	5995	5517.5	LTE B6	20	66786	2145	LTE B6	20	66884	2164.0	24.05	24.12
CA_2A-13A-6A-6A-6A	LTE B13	5	26230	782	QPSK	1	12	6230	781	LTE B2	20	900	1960	LTE B4	20	5995	5517.5	LTE B6	20	66786	2145	LTE B6	20	66884	2164.0	24.05	24.12

J.2.4 LTE Band 5 as PCC

Table J-6 Maximum Output Powers

Combination	PCC Band	PCC BW (MHz)	PCC (M) CA	PCC						SCC 1					SCC 2				SCC 3				SCC 4				SCC 5				LTE Tx Power with Dk CA Enabled (dBm)	LTE Single Carrier Tx Power (dBm)			
				Mod.	PCC Upl BWP	PCC DL BWP Channel	PCC (M) Freq. (MHz)	SCC Band	SCC BW (MHz)	SCC (M) Channel	SCC (M) Freq. (MHz)	SCC Band	SCC BW (MHz)	SCC (M) Channel	SCC (M) Freq. (MHz)	SCC Band	SCC BW (MHz)	SCC (M) Channel	SCC (M) Freq. (MHz)	SCC Band	SCC BW (MHz)	SCC (M) Channel	SCC (M) Freq. (MHz)	SCC Band	SCC BW (MHz)	SCC (M) Channel	SCC (M) Freq. (MHz)	SCC Band	SCC BW (MHz)	SCC (M) Channel			SCC (M) Freq. (MHz)		
CA-SA-BBA (1)	LTE-B5	5	20425	B20.5	QPSK	1	0	20425	871.5	LTE-B5	20	50905	5517.5																			24.05	24.11		
CA-SA-SA (1)	LTE-B5	0	20425	B20.5	QPSK	1	7	20425	871.5	LTE-B5	0	20425	871.5	LTE-B5	0	20425	871.5	LTE-B5	0	20425	871.5	LTE-B5	0	20425	871.5	LTE-B5	0	20425	871.5	LTE-B5	0	20425	871.5	24.06	24.11
CA-SA (1)	LTE-B5	0	20425	B20.5	QPSK	1	0	20425	871.5	LTE-B5	0	20425	871.5	LTE-B5	0	20425	871.5	LTE-B5	0	20425	871.5	LTE-B5	0	20425	871.5	LTE-B5	0	20425	871.5	LTE-B5	0	20425	871.5	24.05	24.11
CA-SA-BA (1)	LTE-B5	1	20425	B20.5	QPSK	1	0	20425	871.5	LTE-B5	20	50905	5517.5	LTE-B5	20	50905	5517.5	LTE-B5	20	50905	5517.5	LTE-B5	20	50905	5517.5	LTE-B5	20	50905	5517.5	LTE-B5	20	50905	5517.5	24.05	24.11
CA-SA-BBA-BA (1)	LTE-B5	1	20425	B20.5	QPSK	1	0	20425	871.5	LTE-B5	20	50905	5517.5	LTE-B5	20	50905	5517.5	LTE-B5	20	50905	5517.5	LTE-B5	20	50905	5517.5	LTE-B5	20	50905	5517.5	LTE-B5	20	50905	5517.5	24.05	24.11
CA-SA-BA-BA (1)	LTE-B5	0	20425	B20.5	QPSK	1	0	20425	871.5	LTE-B5	20	50905	5517.5	LTE-B5	20	50905	5517.5	LTE-B5	20	50905	5517.5	LTE-B5	20	50905	5517.5	LTE-B5	20	50905	5517.5	LTE-B5	20	50905	5517.5	24.05	24.11
CA-SA-BA-BA-BA (1)	LTE-B5	0	20425	B20.5	QPSK	1	0	20425	871.5	LTE-B5	20	50905	5517.5	LTE-B5	20	50905	5517.5	LTE-B5	20	50905	5517.5	LTE-B5	20	50905	5517.5	LTE-B5	20	50905	5517.5	LTE-B5	20	50905	5517.5	24.05	24.11
CA-SA-BA-BA-BA (1)	LTE-B5	0	20425	B20.5	QPSK	1	0	20425	871.5	LTE-B5	20	50905	5517.5	LTE-B5	20	50905	5517.5	LTE-B5	20	50905	5517.5	LTE-B5	20	50905	5517.5	LTE-B5	20	50905	5517.5	LTE-B5	20	50905	5517.5	24.05	24.11
CA-SA-BA-BA-BA (1)	LTE-B5	1	20425	B20.5	QPSK	1	0	20425	871.5	LTE-B5	20	50905	5517.5	LTE-B5	20	50905	5517.5	LTE-B5	20	50905	5517.5	LTE-B5	20	50905	5517.5	LTE-B5	20	50905	5517.5	LTE-B5	20	50905	5517.5	24.05	24.11
CA-SA-BA-BA-BA (1)	LTE-B5	1	20425	B20.5	QPSK	1	0	20425	871.5	LTE-B5	20	50905	5517.5	LTE-B5	20	50905	5517.5	LTE-B5	20	50905	5517.5	LTE-B5	20	50905	5517.5	LTE-B5	20	50905	5517.5	LTE-B5	20	50905	5517.5	24.05	24.11
CA-SA-BA-BA-BA (1)	LTE-B5	0	20425	B20.5	QPSK	1	0	20425	871.5	LTE-B5	20	50905	5517.5	LTE-B5	20	50905	5517.5	LTE-B5	20	50905	5517.5	LTE-B5	20	50905	5517.5	LTE-B5	20	50905	5517.5	LTE-B5	20	50905	5517.5	24.05	24.11
CA-SA-BA-BA-BA (1)	LTE-B5	1	20425	B20.5	QPSK	1	0	20425	871.5	LTE-B5	20	50905	5517.5	LTE-B5	20	50905	5517.5	LTE-B5	20	50905	5517.5	LTE-B5	20	50905	5517.5	LTE-B5	20	50905	5517.5	LTE-B5	20	50905	5517.5	24.05	24.11

J.3 DL CA with DL 4x4 MIMO RF Conduction Powers

This device supports downlink 4x4 MIMO operations for some LTE bands. Uplink transmission is limited to a single output stream. When carrier aggregation was applicable, the general test selection and setup procedures described in Section J.1 were applied.

Per May 2017 TCB Workshop Notes, SAR for 4x4 DL MIMO was not needed since the maximum average output power in 4x4 DL MIMO mode was not more than 0.25 dB higher than the maximum output power with 4x4 DL MIMO inactive. Additionally, SAR for 4x4 MIMO Downlink Carrier Aggregation was not needed since the maximum average output power in 4x4 MIMO Downlink Carrier Aggregation mode was not more than 0.25 dB higher than the maximum output power with 4x4 MIMO Downlink and downlink carrier aggregation inactive.

J.3.1 LTE 4x4 MIMO DL Standalone Powers

Table J-9
Maximum Output Powers

LTE Band	Bandwidth [MHz]	Channel	Frequency [MHz]	Modulation	RB Size	RB Offset	4x4 DL MIMO Tx. Power [dBm]	Single Antenna Tx. Power [dBm]	Target Power [dBm]
5	1.4	20525	836.5	QPSK	1	2	24.07	24.16	24.0
66	1.4	132665	1779.3	QPSK	1	2	23.84	24.07	24.0
41	10	41055	2636.5	QPSK	1	25	24.31	24.28	24.0
48	10	56690	3695	QPSK	1	49	24.14	24.41	24.0

J.3.1 LTE Band 71 as PCC

Table J-10
Maximum Output Powers

Combination	PCC Band	PCC BW [MHz]	PCC (UL) Freq. [MHz]	Mod.	PCC				SCC 1				SCC 2				SCC 3				Power						
					PCC UL RB	PCC UL RB Offset	PCC (DL) Freq. [MHz]	DL Ant. Config.	SCC Band	SCC BW [MHz]	SCC (DL) Freq. [MHz]	DL Ant. Config.	SCC Band	SCC BW [MHz]	SCC (DL) Freq. [MHz]	DL Ant. Config.	SCC Band	SCC BW [MHz]	SCC (DL) Freq. [MHz]	DL Ant. Config.	LTE Tx Power with DL CA Enabled [dBm]	LTE Single Carrier Tx Power [dBm]					
CA [4A]-[4A]-71A	LTE B71	10	133297	680.5	QPSK	1	49	68761	634.5	2x2	LTE B4	20	2175	2132.5	4x4	LTE B4	20	2350	2150	2x2	-	-	-	-	-	23.99	24.09
CA [4A]-[4A]-71A	LTE B71	10	133297	680.5	QPSK	1	49	68761	634.5	2x2	LTE B4	20	2175	2132.5	4x4	LTE B4	20	2350	2150	4x4	-	-	-	-	-	23.98	24.08
CA [2A]-[2A]-[4A]-71A	LTE B71	10	133297	680.5	QPSK	1	49	68761	634.5	2x2	LTE B2	20	900	1960	4x4	LTE B2	20	700	1940	2x2	LTE B4	20	2175	2132.5	2x2	23.88	24.05
CA [2A]-[2A]-[4A]-71A	LTE B71	10	133297	680.5	QPSK	1	49	68761	634.5	2x2	LTE B2	20	900	1960	4x4	LTE B2	20	700	1940	4x4	LTE B4	20	2175	2132.5	2x2	23.90	24.05
CA [2A]-[2A]-[4A]-71A	LTE B71	10	133297	680.5	QPSK	1	49	68761	634.5	2x2	LTE B2	20	900	1960	2x2	LTE B2	20	700	1940	2x2	LTE B4	20	2175	2132.5	4x4	23.97	24.09
CA [2A]-[2A]-[4A]-71A	LTE B71	10	133297	680.5	QPSK	1	49	68761	634.5	2x2	LTE B2	20	900	1960	4x4	LTE B2	20	700	1940	4x4	LTE B4	20	2175	2132.5	4x4	23.93	24.05
CA [2A]-[2A]-[4A]-71A	LTE B71	10	133297	680.5	QPSK	1	49	68761	634.5	2x2	LTE B2	20	900	1960	4x4	LTE B2	20	700	1940	2x2	LTE B6	20	66786	2145	2x2	23.96	24.09
CA [2A]-[2A]-[66A]-71A	LTE B71	10	133297	680.5	QPSK	1	49	68761	634.5	2x2	LTE B2	20	900	1960	4x4	LTE B2	20	700	1940	4x4	LTE B6	20	66786	2145	2x2	23.93	24.09
CA [2A]-[2A]-[66A]-71A	LTE B71	10	133297	680.5	QPSK	1	49	68761	634.5	2x2	LTE B2	20	900	1960	4x4	LTE B2	20	700	1940	2x2	LTE B6	20	66786	2145	4x4	23.97	24.09
CA [2A]-[2A]-[66A]-71A	LTE B71	10	133297	680.5	QPSK	1	49	68761	634.5	2x2	LTE B2	20	900	1960	4x4	LTE B2	20	700	1940	4x4	LTE B6	20	66786	2145	4x4	23.98	24.09
CA [2A]-[66A]-[66A]-71A	LTE B71	10	133297	680.5	QPSK	1	49	68761	634.5	2x2	LTE B2	20	900	1960	4x4	LTE B6	20	66786	2145	2x2	LTE B6	20	67236	2190	2x2	23.96	24.09
CA [2A]-[66A]-[66A]-71A	LTE B71	10	133297	680.5	QPSK	1	49	68761	634.5	2x2	LTE B2	20	900	1960	2x2	LTE B6	20	66786	2145	4x4	LTE B6	20	67236	2190	2x2	23.97	24.09
CA [2A]-[66A]-[66A]-71A	LTE B71	10	133297	680.5	QPSK	1	49	68761	634.5	2x2	LTE B2	20	900	1960	2x2	LTE B6	20	66786	2145	4x4	LTE B6	20	67236	2190	4x4	23.96	24.09
CA [2A]-[66A]-[66A]-71A	LTE B71	10	133297	680.5	QPSK	1	49	68761	634.5	2x2	LTE B2	20	900	1960	4x4	LTE B6	20	66786	2145	4x4	LTE B6	20	67236	2190	2x2	24.27	24.09
CA [2A]-[66A]-[66A]-71A	LTE B71	10	133297	680.5	QPSK	1	49	68761	634.5	2x2	LTE B2	20	900	1960	4x4	LTE B6	20	66786	2145	4x4	LTE B6	20	67236	2190	4x4	23.92	24.09
CA [2A]-[66C]-71A	LTE B71	10	133297	680.5	QPSK	1	49	68761	634.5	2x2	LTE B2	20	900	1960	4x4	LTE B6	20	66786	2145	2x2	LTE B6	20	66884	2164.8	2x2	23.90	24.05
CA [2A]-[66C]-71A	LTE B71	10	133297	680.5	QPSK	1	49	68761	634.5	2x2	LTE B2	20	900	1960	2x2	LTE B6	20	66786	2145	4x4	LTE B6	20	66884	2164.8	4x4	23.95	24.09
CA [2A]-[66C]-71A	LTE B71	10	133297	680.5	QPSK	1	49	68761	634.5	2x2	LTE B2	20	900	1960	4x4	LTE B6	20	66786	2145	4x4	LTE B6	20	66884	2164.8	4x4	23.90	24.05

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J.3.4 LTE Band 5 as PCC

Table J-13 Maximum Output Powers

DUT Model	FCC Band	FDD-LTE	FDD-LTE Tx Power	FDD-LTE Rx Power	FDD-LTE Rx Power	TDD-LTE	TDD-LTE Tx Power	TDD-LTE Rx Power	TDD-LTE Rx Power	SAR (1g)		SAR (10g)		SAR (15g)		SAR (1g) Avg. Power	SAR (1g) Peak Power	SAR (10g) Avg. Power	SAR (10g) Peak Power	SAR (15g) Avg. Power	SAR (15g) Peak Power
										1g Avg. Power	1g Peak Power	10g Avg. Power	10g Peak Power	15g Avg. Power	15g Peak Power						
...
...
...
...

Table J-16
Maximum Output Powers (continued)

Combination	PCC Band	PCC								SCC1				SCC2				SCC3				Power										
		PCC BW	PCC (U)	PCC (I)	PCC (U) Freq.	Mod.	PCC L1 RB	PCC L1 RB Offset	PCC (U) Ch.	PCC (I) Freq.	DL Ant. Config.	SCC Band	SCC BW	SCC (U) Ch.	SCC (I) Freq.	DL Ant. Config.	SCC Band	SCC BW	SCC (U) Ch.	SCC (I) Freq.	DL Ant. Config.	SCC Band	SCC BW	SCC (U) Ch.	SCC (I) Freq.	DL Ant. Config.	LTE Tx Power with DC TA Enable	LTE Single Carrier Tx Power (dBm)				
CA 13A-400-95A	LTE B36	30	11052	1700	QPSK	1	0	42036	2130	444	LTE B36	30	56956	3550	2x2	LTE B36	30	56956	3550	2x2	LTE B36	30	56956	3550	2x2	LTE B36	30	56956	3550	2x2	23.18	23.18
CA 13A-400-95A (H)	LTE B36	30	11052	1700	QPSK	1	0	42036	2130	444	LTE B36	30	56956	3550	2x2	LTE B36	30	56956	3550	2x2	LTE B36	30	56956	3550	2x2	LTE B36	30	56956	3550	2x2	23.18	23.18
CA 13A-400-95A (L)	LTE B36	30	11052	1700	QPSK	1	0	42036	2130	444	LTE B36	30	56956	3550	2x2	LTE B36	30	56956	3550	2x2	LTE B36	30	56956	3550	2x2	LTE B36	30	56956	3550	2x2	23.18	23.18
CA 13A-400-95A (M)	LTE B36	30	11052	1700	QPSK	1	0	42036	2130	444	LTE B36	30	56956	3550	2x2	LTE B36	30	56956	3550	2x2	LTE B36	30	56956	3550	2x2	LTE B36	30	56956	3550	2x2	23.18	23.18
CA 13A-400-95A (S)	LTE B36	30	11052	1700	QPSK	1	0	42036	2130	444	LTE B36	30	56956	3550	2x2	LTE B36	30	56956	3550	2x2	LTE B36	30	56956	3550	2x2	LTE B36	30	56956	3550	2x2	23.18	23.18

J.3.6 LTE Band 41 as PCC

Table J-17
Maximum Output Powers

Combination	PCC Band	PCC								SCC1				SCC2				SCC3				Power										
		PCC BW	PCC (U)	PCC (I)	PCC (U) Freq.	Mod.	PCC L1 RB	PCC L1 RB Offset	PCC (U) Ch.	PCC (I) Freq.	DL Ant. Config.	SCC Band	SCC BW	SCC (U) Ch.	SCC (I) Freq.	DL Ant. Config.	SCC Band	SCC BW	SCC (U) Ch.	SCC (I) Freq.	DL Ant. Config.	SCC Band	SCC BW	SCC (U) Ch.	SCC (I) Freq.	DL Ant. Config.	LTE Tx Power with DC TA Enable	LTE Single Carrier Tx Power (dBm)				
CA 141A-480	LTE B41	10	41055	2638.5	QPSK	1	25	41055	2638.5	444	LTE B41	20	50661	3537.5	2x2	LTE B41	20	50661	3537.5	2x2	LTE B41	20	50661	3537.5	2x2	LTE B41	20	50661	3537.5	2x2	24.20	24.20
CA 141C (T)	LTE B41	10	41055	2638.5	QPSK	1	25	41055	2638.5	444	LTE B41	20	50661	3537.5	2x2	LTE B41	20	50661	3537.5	2x2	LTE B41	20	50661	3537.5	2x2	LTE B41	20	50661	3537.5	2x2	24.20	24.20
CA 141A-480 (H)	LTE B41	10	41055	2638.5	QPSK	1	25	41055	2638.5	444	LTE B41	20	50661	3537.5	2x2	LTE B41	20	50661	3537.5	2x2	LTE B41	20	50661	3537.5	2x2	LTE B41	20	50661	3537.5	2x2	24.20	24.20
CA 141A-480 (L)	LTE B41	10	41055	2638.5	QPSK	1	25	41055	2638.5	444	LTE B41	20	50661	3537.5	2x2	LTE B41	20	50661	3537.5	2x2	LTE B41	20	50661	3537.5	2x2	LTE B41	20	50661	3537.5	2x2	24.20	24.20
CA 141A-480 (M)	LTE B41	10	41055	2638.5	QPSK	1	25	41055	2638.5	444	LTE B41	20	50661	3537.5	2x2	LTE B41	20	50661	3537.5	2x2	LTE B41	20	50661	3537.5	2x2	LTE B41	20	50661	3537.5	2x2	24.20	24.20
CA 141A-480 (S)	LTE B41	10	41055	2638.5	QPSK	1	25	41055	2638.5	444	LTE B41	20	50661	3537.5	2x2	LTE B41	20	50661	3537.5	2x2	LTE B41	20	50661	3537.5	2x2	LTE B41	20	50661	3537.5	2x2	24.20	24.20

J.3.1 LTE Band 48 as PCC

Combination	PCC Band	PCC								SCC1				SCC2				SCC3				Power										
		PCC BW	PCC (U)	PCC (I)	PCC (U) Freq.	Mod.	PCC L1 RB	PCC L1 RB Offset	PCC (U) Ch.	PCC (I) Freq.	DL Ant. Config.	SCC Band	SCC BW	SCC (U) Ch.	SCC (I) Freq.	DL Ant. Config.	SCC Band	SCC BW	SCC (U) Ch.	SCC (I) Freq.	DL Ant. Config.	SCC Band	SCC BW	SCC (U) Ch.	SCC (I) Freq.	DL Ant. Config.	LTE Tx Power with DC TA Enable	LTE Single Carrier Tx Power (dBm)				
CA 48A-480	LTE B48	10	56690	3695	QPSK	1	49	56690	3695	2x2	LTE B48	20	55340	3560	4x4	LTE B48	20	55340	3560	2x2	LTE B48	20	55340	3560	2x2	LTE B48	20	55340	3560	2x2	24.41	24.41
CA 48A-480 (H)	LTE B48	10	56690	3695	QPSK	1	49	56690	3695	4x4	LTE B48	20	55340	3560	4x4	LTE B48	20	55340	3560	2x2	LTE B48	20	55340	3560	2x2	LTE B48	20	55340	3560	2x2	24.41	24.41
CA 48A-480 (L)	LTE B48	10	56690	3695	QPSK	1	49	56690	3695	4x4	LTE B48	20	55340	3560	4x4	LTE B48	20	55340	3560	2x2	LTE B48	20	55340	3560	2x2	LTE B48	20	55340	3560	2x2	24.41	24.41
CA 48A-480 (M)	LTE B48	10	56690	3695	QPSK	1	49	56690	3695	4x4	LTE B48	20	55340	3560	4x4	LTE B48	20	55340	3560	2x2	LTE B48	20	55340	3560	2x2	LTE B48	20	55340	3560	2x2	24.41	24.41
CA 48A-480 (S)	LTE B48	10	56690	3695	QPSK	1	49	56690	3695	4x4	LTE B48	20	55340	3560	4x4	LTE B48	20	55340	3560	2x2	LTE B48	20	55340	3560	2x2	LTE B48	20	55340	3560	2x2	24.41	24.41

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Approved by:
Technical Manager

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