

APPENDIX H: 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	BCC	Supported Channel Bandwidth (MHz)				Restriction	Completely Covered by Measurement Superset
		CC1	CC2	CC3	CC4		
CC#01	CA_2A	5, 10, 15, 20	5, 10, 15, 20				Yes
CC#02	CA_2A-5A	5, 10, 15, 20	5, 10, 15, 20				Yes
CC#03	CA_2A-10A	5, 10, 15, 20	5, 10, 15, 20				Yes
CC#04	CA_2A-15A	5, 10, 15, 20	5, 10, 15, 20				Yes
CC#05	CA_2A-20A	5, 10, 15, 20	5, 10, 15, 20				Yes
CC#06	CA_2A-5A-10A	5, 10, 15, 20	5, 10, 15, 20				Yes
CC#07	CA_2A-10A-15A	5, 10, 15, 20	5, 10, 15, 20				Yes
CC#08	CA_2A-15A-20A	5, 10, 15, 20	5, 10, 15, 20				Yes
CC#09	CA_2A-5A-10A-15A	5, 10, 15, 20	5, 10, 15, 20				Yes
CC#10	CA_2A-10A-15A-20A	5, 10, 15, 20	5, 10, 15, 20				Yes
CC#11	CA_2A-5A-10A-15A-20A	5, 10, 15, 20	5, 10, 15, 20				Yes
CC#12	CA_2A-5A-10A-15A-20A	5, 10, 15, 20	5, 10, 15, 20				Yes
CC#13	CA_2A-5A-10A-15A-20A	5, 10, 15, 20	5, 10, 15, 20				Yes
CC#14	CA_2A-5A-10A-15A-20A	5, 10, 15, 20	5, 10, 15, 20				Yes
CC#15	CA_2A-5A-10A-15A-20A	5, 10, 15, 20	5, 10, 15, 20				Yes
CC#16	CA_2A-5A-10A-15A-20A	5, 10, 15, 20	5, 10, 15, 20				Yes
CC#17	CA_2A-5A-10A-15A-20A	5, 10, 15, 20	5, 10, 15, 20				Yes
CC#18	CA_2A-5A-10A-15A-20A	5, 10, 15, 20	5, 10, 15, 20				Yes
CC#19	CA_2A-5A-10A-15A-20A	5, 10, 15, 20	5, 10, 15, 20				Yes
CC#20	CA_2A-5A-10A-15A-20A	5, 10, 15, 20	5, 10, 15, 20				Yes
CC#21	CA_2A-5A-10A-15A-20A	5, 10, 15, 20	5, 10, 15, 20				Yes
CC#22	CA_2A-5A-10A-15A-20A	5, 10, 15, 20	5, 10, 15, 20				Yes
CC#23	CA_2A-5A-10A-15A-20A	5, 10, 15, 20	5, 10, 15, 20				Yes
CC#24	CA_2A-5A-10A-15A-20A	5, 10, 15, 20	5, 10, 15, 20				Yes
CC#25	CA_2A-5A-10A-15A-20A	5, 10, 15, 20	5, 10, 15, 20				Yes
CC#26	CA_2A-5A-10A-15A-20A	5, 10, 15, 20	5, 10, 15, 20				Yes
CC#27	CA_2A-5A-10A-15A-20A	5, 10, 15, 20	5, 10, 15, 20				Yes
CC#28	CA_2A-5A-10A-15A-20A	5, 10, 15, 20	5, 10, 15, 20				Yes
CC#29	CA_2A-5A-10A-15A-20A	5, 10, 15, 20	5, 10, 15, 20				Yes
CC#30	CA_2A-5A-10A-15A-20A	5, 10, 15, 20	5, 10, 15, 20				Yes
CC#31	CA_2A-5A-10A-15A-20A	5, 10, 15, 20	5, 10, 15, 20				Yes
CC#32	CA_2A-5A-10A-15A-20A	5, 10, 15, 20	5, 10, 15, 20				Yes
CC#33	CA_2A-5A-10A-15A-20A	5, 10, 15, 20	5, 10, 15, 20				Yes
CC#34	CA_2A-5A-10A-15A-20A	5, 10, 15, 20	5, 10, 15, 20				Yes
CC#35	CA_2A-5A-10A-15A-20A	5, 10, 15, 20	5, 10, 15, 20				Yes
CC#36	CA_2A-5A-10A-15A-20A	5, 10, 15, 20	5, 10, 15, 20				Yes
CC#37	CA_2A-5A-10A-15A-20A	5, 10, 15, 20	5, 10, 15, 20				Yes
CC#38	CA_2A-5A-10A-15A-20A	5, 10, 15, 20	5, 10, 15, 20				Yes
CC#39	CA_2A-5A-10A-15A-20A	5, 10, 15, 20	5, 10, 15, 20				Yes
CC#40	CA_2A-5A-10A-15A-20A	5, 10, 15, 20	5, 10, 15, 20				Yes
CC#41	CA_2A-5A-10A-15A-20A	5, 10, 15, 20	5, 10, 15, 20				Yes
CC#42	CA_2A-5A-10A-15A-20A	5, 10, 15, 20	5, 10, 15, 20				Yes
CC#43	CA_2A-5A-10A-15A-20A	5, 10, 15, 20	5, 10, 15, 20				Yes
CC#44	CA_2A-5A-10A-15A-20A	5, 10, 15, 20	5, 10, 15, 20				Yes
CC#45	CA_2A-5A-10A-15A-20A	5, 10, 15, 20	5, 10, 15, 20				Yes
CC#46	CA_2A-5A-10A-15A-20A	5, 10, 15, 20	5, 10, 15, 20				Yes
CC#47	CA_2A-5A-10A-15A-20A	5, 10, 15, 20	5, 10, 15, 20				Yes
CC#48	CA_2A-5A-10A-15A-20A	5, 10, 15, 20	5, 10, 15, 20				Yes
CC#49	CA_2A-5A-10A-15A-20A	5, 10, 15, 20	5, 10, 15, 20				Yes
CC#50	CA_2A-5A-10A-15A-20A	5, 10, 15, 20	5, 10, 15, 20				Yes
CC#51	CA_2A-5A-10A-15A-20A	5, 10, 15, 20	5, 10, 15, 20				Yes
CC#52	CA_2A-5A-10A-15A-20A	5, 10, 15, 20	5, 10, 15, 20				Yes
CC#53	CA_2A-5A-10A-15A-20A	5, 10, 15, 20	5, 10, 15, 20				Yes
CC#54	CA_2A-5A-10A-15A-20A	5, 10, 15, 20	5, 10, 15, 20				Yes
CC#55	CA_2A-5A-10A-15A-20A	5, 10, 15, 20	5, 10, 15, 20				Yes
CC#56	CA_2A-5A-10A-15A-20A	5, 10, 15, 20	5, 10, 15, 20				Yes
CC#57	CA_2A-5A-10A-15A-20A	5, 10, 15, 20	5, 10, 15, 20				Yes
CC#58	CA_2A-5A-10A-15A-20A	5, 10, 15, 20	5, 10, 15, 20				Yes
CC#59	CA_2A-5A-10A-15A-20A	5, 10, 15, 20	5, 10, 15, 20				Yes
CC#60	CA_2A-5A-10A-15A-20A	5, 10, 15, 20	5, 10, 15, 20				Yes
CC#61	CA_2A-5A-10A-15A-20A	5, 10, 15, 20	5, 10, 15, 20				Yes
CC#62	CA_2A-5A-10A-15A-20A	5, 10, 15, 20	5, 10, 15, 20				Yes
CC#63	CA_2A-5A-10A-15A-20A	5, 10, 15, 20	5, 10, 15, 20				Yes
CC#64	CA_2A-5A-10A-15A-20A	5, 10, 15, 20	5, 10, 15, 20				Yes
CC#65	CA_2A-5A-10A-15A-20A	5, 10, 15, 20	5, 10, 15, 20				Yes
CC#66	CA_2A-5A-10A-15A-20A	5, 10, 15, 20	5, 10, 15, 20				Yes
CC#67	CA_2A-5A-10A-15A-20A	5, 10, 15, 20	5, 10, 15, 20				Yes
CC#68	CA_2A-5A-10A-15A-20A	5, 10, 15, 20	5, 10, 15, 20				Yes
CC#69	CA_2A-5A-10A-15A-20A	5, 10, 15, 20	5, 10, 15, 20				Yes
CC#70	CA_2A-5A-10A-15A-20A	5, 10, 15, 20	5, 10, 15, 20				Yes
CC#71	CA_2A-5A-10A-15A-20A	5, 10, 15, 20	5, 10, 15, 20				Yes
CC#72	CA_2A-5A-10A-15A-20A	5, 10, 15, 20	5, 10, 15, 20				Yes
CC#73	CA_2A-5A-10A-15A-20A	5, 10, 15, 20	5, 10, 15, 20				Yes
CC#74	CA_2A-5A-10A-15A-20A	5, 10, 15, 20	5, 10, 15, 20				Yes
CC#75	CA_2A-5A-10A-15A-20A	5, 10, 15, 20	5, 10, 15, 20				Yes
CC#76	CA_2A-5A-10A-15A-20A	5, 10, 15, 20	5, 10, 15, 20				Yes
CC#77	CA_2A-5A-10A-15A-20A	5, 10, 15, 20	5, 10, 15, 20				Yes
CC#78	CA_2A-5A-10A-15A-20A	5, 10, 15, 20	5, 10, 15, 20				Yes
CC#79	CA_2A-5A-10A-15A-20A	5, 10, 15, 20	5, 10, 15, 20				Yes
CC#80	CA_2A-5A-10A-15A-20A	5, 10, 15, 20	5, 10, 15, 20				Yes
CC#81	CA_2A-5A-10A-15A-20A	5, 10, 15, 20	5, 10, 15, 20				Yes
CC#82	CA_2A-5A-10A-15A-20A	5, 10, 15, 20	5, 10, 15, 20				Yes
CC#83	CA_2A-5A-10A-15A-20A	5, 10, 15, 20	5, 10, 15, 20				Yes
CC#84	CA_2A-5A-10A-15A-20A	5, 10, 15, 20	5, 10, 15, 20				Yes
CC#85	CA_2A-5A-10A-15A-20A	5, 10, 15, 20	5, 10, 15, 20				Yes
CC#86	CA_2A-5A-10A-15A-20A	5, 10, 15, 20	5, 10, 15, 20				Yes
CC#87	CA_2A-5A-10A-15A-20A	5, 10, 15, 20	5, 10, 15, 20				Yes
CC#88	CA_2A-5A-10A-15A-20A	5, 10, 15, 20	5, 10, 15, 20				Yes
CC#89	CA_2A-5A-10A-15A-20A	5, 10, 15, 20	5, 10, 15, 20				Yes
CC#90	CA_2A-5A-10A-15A-20A	5, 10, 15, 20	5, 10, 15, 20				Yes
CC#91	CA_2A-5A-10A-15A-20A	5, 10, 15, 20	5, 10, 15, 20				Yes
CC#92	CA_2A-5A-10A-15A-20A	5, 10, 15, 20	5, 10, 15, 20				Yes
CC#93	CA_2A-5A-10A-15A-20A	5, 10, 15, 20	5, 10, 15, 20				Yes
CC#94	CA_2A-5A-10A-15A-20A	5, 10, 15, 20	5, 10, 15, 20				Yes
CC#95	CA_2A-5A-10A-15A-20A	5, 10, 15, 20	5, 10, 15, 20				Yes
CC#96	CA_2A-5A-10A-15A-20A	5, 10, 15, 20	5, 10, 15, 20				Yes
CC#97	CA_2A-5A-10A-15A-20A	5, 10, 15, 20	5, 10, 15, 20				Yes
CC#98	CA_2A-5A-10A-15A-20A	5, 10, 15, 20	5, 10, 15, 20				Yes
CC#99	CA_2A-5A-10A-15A-20A	5, 10, 15, 20	5, 10, 15, 20				Yes
CC#100	CA_2A-5A-10A-15A-20A	5, 10, 15, 20	5, 10, 15, 20				Yes

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

Index	BCC	Supported Channel Bandwidth (MHz)				Restriction	Completely Covered by Measurement Superset
		CC1	CC2	CC3	CC4		
CC#M01	CA_12C	5, 10, 15, 20	5, 10, 15, 20				No
CC#M02	CA_12A-2A	5, 10, 15, 20	5, 10, 15, 20				No
CC#M03	CA_12A-12A	5, 10, 15, 20	5, 10, 15, 20				No
CC#M04	CA_12A-12A-12C	5, 10, 15, 20	5, 10, 15, 20				No
CC#M05	CA_12A-12A-12C	5, 10, 15, 20	5, 10, 15, 20				No
CC#M06	CA_12A-12A	5, 10, 15, 20	5, 10, 15, 20				No
CC#M07	CA_12A-12A-12C	5, 10, 15, 20	5, 10, 15, 20				No
CC#M08	CA_12A-12A	5, 10, 15, 20	5, 10, 15, 20				No
CC#M09	CA_12A-12A-12C	5, 10, 15, 20	5, 10, 15, 20				No
CC#M10	CA_12A-12A-12C	5, 10, 15, 20	5, 10, 15, 20				No
CC#M11	CA_12A-12A-12C	5, 10, 15, 20	5, 10, 15, 20				No
CC#M12	CA_12A-12A-12C	5, 10, 15, 20	5, 10, 15, 20				No
CC#M13	CA_12A-12A-12C	5, 10, 15, 20	5, 10, 15, 20				No
CC#M14	CA_12A-12A-12C	5, 10, 15, 20	5, 10, 15, 20				No
CC#M15	CA_12A-12A-12C	5, 10, 15, 20	5, 10, 15, 20				No
CC#M16	CA_12A-12A-12C	5, 10, 15, 20	5, 10, 15, 20				No
CC#M17	CA_12A-12A-12C	5, 10, 15, 20	5, 10, 15, 20				No
CC#M18	CA_12A-12A-12C	5, 10, 15, 20	5, 10, 15, 20				No
CC#M19	CA_12A-12A-12C	5, 10, 15, 20	5, 10, 15, 20				No
CC#M20	CA_12A-12A-12C	5, 10, 15, 20	5, 10, 15, 20				No
CC#M21	CA_12A-12A-12C	5, 10, 15, 20	5, 10, 15, 20				No
CC#M22	CA_12A-12A-12C	5, 10, 15, 20	5, 10, 15, 20				No
CC#M23	CA_12A-12A-12C	5, 10, 15, 20	5, 10, 15, 20				No
CC#M24	CA_12A-12A-12C	5, 10, 15, 20	5, 10, 15, 20				No
CC#M25	CA_12A-12A-12C	5, 10, 15, 20	5, 10, 15, 20				No
CC#M26	CA_12A-12A-12C	5, 10, 15, 20	5, 10, 15, 20				No
CC#M27	CA_12A-12A-12C	5, 10, 15, 20	5, 10, 15, 20				No
CC#M28	CA_1						

H.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 the RF Conducted Powers Section and LTE/NR Lower Bandwidth RF Conducted Power Appendix. 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.

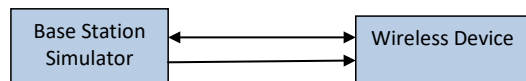


Figure H-1
DL CA Power Measurement Setup

FCC ID: PY7-84558E	SAR EVALUATION REPORT	Approved by: Technical Manager
DUT Type: Portable Handset		APPENDIX H: Page 2 of 12



H.2.4 LTE Band 5 as PCC

Table H-6

Maximum Output Powers

Combination	PCC Band	PCC BW [MHz]	PCC (UL) Ch. Freq. [MHz]	PCC (DL) Ch. Freq. [MHz]	Mod.	PCC UL RB	PCC UL Offset	PCC (DL) Channel	PCC (DL) Freq. [MHz]	SCC 1		SCC 2		SCC 3		SCC 4		SCC 5		LTE Tx Power with 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 2A-5A (1)	LTE B5	5	2052	881.5	QPSK	1	7	2525	881.5	LTE B5	5	2052	881.5	-	-	-	-	-	-	-	24.02	24.04	
CA 5A (1)	LTE B5	5	2052	881.5	QPSK	1	7	2525	881.5	LTE B5	5	2052	881.5	-	-	-	-	-	-	-	24.02	24.04	
CA 2A-5A-6A	LTE B5	5	2052	881.5	QPSK	1	12	2625	891.5	LTE B2	20	300	1960	LTE B4	20	300	1960	LTE B4	20	300	1960	24.01	24.04
CA 2A-5A-6A-7A	LTE B5	5	2052	881.5	QPSK	1	12	2625	891.5	LTE B2	20	300	1960	LTE B4	20	300	1960	LTE B7	20	300	1960	24.01	24.04
CA 2A-5A-6A-8A	LTE B5	5	2052	881.5	QPSK	1	12	2625	891.5	LTE B2	20	300	1960	LTE B4	20	300	1960	LTE B8	20	300	1960	24.01	24.04
CA 2A-5A-6A-9A	LTE B5	5	2052	881.5	QPSK	1	12	2625	891.5	LTE B2	20	300	1960	LTE B4	20	300	1960	LTE B9	20	300	1960	24.01	24.04
CA 2A-5A-6A-10A	LTE B5	5	2052	881.5	QPSK	1	12	2625	891.5	LTE B2	20	300	1960	LTE B4	20	300	1960	LTE B10	20	300	1960	24.01	24.04
CA 2A-5A-6A-11A	LTE B5	5	2052	881.5	QPSK	1	12	2625	891.5	LTE B2	20	300	1960	LTE B4	20	300	1960	LTE B11	20	300	1960	24.01	24.04
CA 2A-5A-6A-12A	LTE B5	5	2052	881.5	QPSK	1	12	2625	891.5	LTE B2	20	300	1960	LTE B4	20	300	1960	LTE B12	20	300	1960	24.01	24.04
CA 2A-5A-6A-13A	LTE B5	5	2052	881.5	QPSK	1	12	2625	891.5	LTE B2	20	300	1960	LTE B4	20	300	1960	LTE B13	20	300	1960	24.01	24.04
CA 2A-5A-6A-14A	LTE B5	5	2052	881.5	QPSK	1	12	2625	891.5	LTE B2	20	300	1960	LTE B4	20	300	1960	LTE B14	20	300	1960	24.01	24.04
CA 2A-5A-6A-15A	LTE B5	5	2052	881.5	QPSK	1	12	2625	891.5	LTE B2	20	300	1960	LTE B4	20	300	1960	LTE B15	20	300	1960	24.01	24.04
CA 2A-5A-6A-16A	LTE B5	5	2052	881.5	QPSK	1	12	2625	891.5	LTE B2	20	300	1960	LTE B4	20	300	1960	LTE B16	20	300	1960	24.01	24.04
CA 2A-5A-6A-17A	LTE B5	5	2052	881.5	QPSK	1	12	2625	891.5	LTE B2	20	300	1960	LTE B4	20	300	1960	LTE B17	20	300	1960	24.01	24.04
CA 2A-5A-6A-18A	LTE B5	5	2052	881.5	QPSK	1	12	2625	891.5	LTE B2	20	300	1960	LTE B4	20	300	1960	LTE B18	20	300	1960	24.01	24.04
CA 2A-5A-6A-19A	LTE B5	5	2052	881.5	QPSK	1	12	2625	891.5	LTE B2	20	300	1960	LTE B4	20	300	1960	LTE B19	20	300	1960	24.01	24.04
CA 2A-5A-6A-20A	LTE B5	5	2052	881.5	QPSK	1	12	2625	891.5	LTE B2	20	300	1960	LTE B4	20	300	1960	LTE B20	20	300	1960	24.01	24.04

H.2.5 LTE Band 66 as PCC

Table H-7

Maximum Output Powers

Combination	PCC Band	PCC BW [MHz]	PCC (UL) Ch. Freq. [MHz]	PCC (DL) Ch. Freq. [MHz]	Mod.	PCC UL RB	PCC UL Offset	PCC (DL) Channel	PCC (DL) Freq. [MHz]	SCC 1		SCC 2		SCC 3		SCC 4		SCC 5		LTE Tx Power with 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 13A-66A (1)	LTE B66	10	13232	1745	QPSK	1	0	88788	2145	LTE B12	10	5000	737.5	-	-	-	-	-	-	-	24.02	24.04	
CA 13A-66A (2)	LTE B66	10	13232	1745	QPSK	1	0	88788	2145	LTE B12	10	5000	737.5	-	-	-	-	-	-	-	24.02	24.04	
CA 13A-66A-6A	LTE B66	10	13232	1745	QPSK	1	0	88788	2145	LTE B12	10	5000	737.5	LTE B12	10	5000	737.5	-	-	-	24.01	24.04	
CA 13A-66A-7A	LTE B66	10	13232	1745	QPSK	1	0	88788	2145	LTE B12	10	5000	737.5	LTE B12	10	5000	737.5	LTE B7	10	5000	737.5	24.01	24.04
CA 13A-66A-8A	LTE B66	10	13232	1745	QPSK	1	0	88788	2145	LTE B12	10	5000	737.5	LTE B12	10	5000	737.5	LTE B8	10	5000	737.5	24.01	24.04
CA 13A-66A-9A	LTE B66	10	13232	1745	QPSK	1	0	88788	2145	LTE B12	10	5000	737.5	LTE B12	10	5000	737.5	LTE B9	10	5000	737.5	24.01	24.04
CA 13A-66A-10A	LTE B66	10	13232	1745	QPSK	1	0	88788	2145	LTE B12	10	5000	737.5	LTE B12	10	5000	737.5	LTE B10	10	5000	737.5	24.01	24.04
CA 13A-66A-11A	LTE B66	10	13232	1745	QPSK	1	0	88788	2145	LTE B12	10	5000	737.5	LTE B12	10	5000	737.5	LTE B11	10	5000	737.5	24.01	24.04
CA 13A-66A-12A	LTE B66	10	13232	1745	QPSK	1	0	88788	2145	LTE B12	10	5000	737.5	LTE B12	10	5000	737.5	LTE B12	10	5000	737.5	24.01	24.04
CA 13A-66A-13A	LTE B66	10	13232	1745	QPSK	1	0	88788	2145	LTE B12	10	5000	737.5	LTE B12	10	5000	737.5	LTE B13	10	5000	737.5	24.01	24.04
CA 13A-66A-14A	LTE B66	10	13232	1745	QPSK	1	0	88788	2145	LTE B12	10	5000	737.5	LTE B12	10	5000	737.5	LTE B14	10	5000	737.5	24.01	24.04
CA 13A-66A-15A	LTE B66	10	13232	1745	QPSK	1	0	88788	2145	LTE B12	10	5000	737.5	LTE B12	10	5000	737.5	LTE B15	10	5000	737.5	24.01	24.04
CA 13A-66A-16A	LTE B66	10	13232	1745	QPSK	1	0	88788	2145	LTE B12	10	5000	737.5	LTE B12	10	5000	737.5	LTE B16	10	5000	737.5	24.01	24.04
CA 13A-66A-17A	LTE B66	10	13232	1745	QPSK	1	0	88788	2145	LTE B12	10	5000	737.5	LTE B12	10	5000	737.5	LTE B17	10	5000	737.5	24.01	24.04
CA 13A-66A-18A	LTE B66	10	13232	1745	QPSK	1	0	88788	2145	LTE B12	10	5000	737.5	LTE B12	10	5000	737.5	LTE B18	10	5000	737.5	24.01	24.04
CA 13A-66A-19A	LTE B66	10	13232	1745	QPSK	1	0	88788	2145	LTE B12	10	5000	737.5	LTE B12	10	5000	737.5	LTE B19	10	5000	737.5	24.01	24.04
CA 13A-66A-20A	LTE B66	10	13232	1745	QPSK	1	0	88788	2145	LTE B12	10	5000	737.5	LTE B12	10	5000	737.5	LTE B20	10	5000	737.5	24.01	24.04

FCC ID: PY7-84558E

SAR EVALUATION REPORT

Approved by:
Technical Manager

DUT Type:
Portable Handset

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H.2.6 LTE Band 30 as PCC

Table H-8
Maximum Output Powers

Combination	PCC								SCC 1				SCC 2				SCC 3				SCC 4				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 (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]	LTE Tx Power with DL CA Enabled [dBm]	LTE Single Carrier Tx Power [dBm]
CA 2A-4A-30A	LTE B30	5	27710	2310	QPSK	1	12	9820	2305	LTE B2	20	900	1960	LTE B4	20	2175	2132.5	-	-	-	-	-	-	-	-	23.45	23.52
CA 4A-12A-30A	LTE B30	5	27710	2310	QPSK	1	12	9820	2305	LTE B4	20	2175	2132.5	LTE B12	10	5095	737.5	-	-	-	-	-	-	-	-	23.47	23.52
CA 4A-2A-30A	LTE B30	5	27710	2310	QPSK	1	12	9820	2305	LTE B4	20	2175	2132.5	LTE B20	10	9715	722.5	-	-	-	-	-	-	-	-	23.45	23.52
CA 4A-3A-30A	LTE B30	5	27710	2310	QPSK	1	12	9820	2305	LTE B4	20	2175	2132.5	LTE B5	10	2925	881.5	-	-	-	-	-	-	-	-	23.48	23.52
CA 2A-30A-66A-66A	LTE B30	5	27710	2310	QPSK	1	12	9820	2305	LTE B20	10	9715	722.5	LTE B66	20	66786	2145	LTE B66	20	67236	2190	-	-	-	-	23.45	23.52
CA 2A-30A-30A-66A	LTE B30	5	27710	2310	QPSK	1	12	9820	2305	LTE B2	20	900	1960	LTE B20	10	9715	722.5	LTE B66	20	66786	2145	-	-	-	-	23.43	23.52
CA 2A-2A-30A-30A	LTE B30	5	27710	2310	QPSK	1	12	9820	2305	LTE B2	20	900	1960	LTE B2	20	700	1940	LTE B20	10	9715	722.5	-	-	-	-	23.44	23.52
CA 2A-12A-30A-66A-66A	LTE B30	5	27710	2310	QPSK	1	12	9820	2305	LTE B2	20	900	1960	LTE B12	10	5095	737.5	LTE B66	20	66786	2145	LTE B66	20	67236	2190	23.51	23.52
CA 2A-2A-12A-30A-66A	LTE B30	5	27710	2310	QPSK	1	12	9820	2305	LTE B2	20	900	1960	LTE B2	20	700	1940	LTE B12	10	5095	737.5	LTE B66	20	66786	2145	23.48	23.52
CA 2A-2A-5A-30A-66A	LTE B30	5	27710	2310	QPSK	1	12	9820	2305	LTE B2	20	900	1960	LTE B2	20	700	1940	LTE B5	10	2525	881.5	LTE B66	20	66786	2145	23.46	23.52
CA 2A-5A-30A-66A-66A	LTE B30	5	27710	2310	QPSK	1	12	9820	2305	LTE B2	20	900	1960	LTE B5	10	2525	881.5	LTE B66	20	66786	2145	LTE B66	20	67236	2190	23.50	23.52
CA 2A-4B-30A-66A	LTE B30	5	27710	2310	QPSK	1	12	9820	2305	LTE B2	20	900	1960	LTE B5	10	2525	881.5	LTE B5	5	3453	874.3	LTE B66	20	66786	2145	23.47	23.52
CA 5B-30A-66A-66A	LTE B30	5	27710	2310	QPSK	1	12	9820	2305	LTE B5	10	2525	881.5	LTE B5	5	2453	874.3	LTE B66	20	66786	2145	LTE B66	20	67236	2190	23.46	23.52

H.2.7 LTE Band 41 as PCC

Table H-9
Maximum Output Powers

Combination	PCC								SCC 1				SCC 2				SCC 3				SCC 4				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 (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]	LTE Tx Power with DL CA Enabled [dBm]	LTE Single Carrier Tx Power [dBm]
CA 41A-46A	LTE B41	5	41480	2680	QPSK	1	12	41480	2680	LTE B46	20	50665	5537.5	-	-	-	-	-	-	-	-	-	-	-	-	24.18	24.16
CA 41C (1)	LTE B41	5	41480	2680	QPSK	1	12	41480	2680	LTE B41	20	41373	2658.3	-	-	-	-	-	-	-	-	-	-	-	-	24.18	24.16
CA 41A-46C	LTE B41	5	41480	2680	QPSK	1	12	41480	2680	LTE B46	20	50665	5537.5	LTE B46	20	50467	5517.7	-	-	-	-	-	-	-	-	24.18	24.16
CA 41D	LTE B41	10	41480	2680	QPSK	1	25	41480	2680	LTE B41	20	41346	2655.6	LTE B41	20	41148	2645.8	-	-	-	-	-	-	-	-	24.18	24.10
CA 41A-46C	LTE B41	5	41480	2680	QPSK	1	12	41480	2680	LTE B46	20	50665	5537.5	LTE B46	20	50467	5517.7	LTE B46	20	50663	5517.3	-	-	-	-	24.18	24.16
CA 41A-46E	LTE B41	5	41480	2680	QPSK	1	12	41480	2680	LTE B46	20	50665	5537.5	LTE B46	20	50467	5517.7	LTE B46	20	50663	5517.3	LTE B46	20	50663	5517.3	24.17	24.16

H.2.8 LTE Band 48 as PCC

Table H-10
Maximum Output Powers

Combination	PCC								SCC 1				SCC 2				SCC 3				SCC 4				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 (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]	LTE Tx Power with DL CA Enabled [dBm]	LTE Single Carrier Tx Power [dBm]
CA 48A-48A	LTE B48	5	56715	3697.5	QPSK	1	12	56715	3697.5	LTE B48	20	55340	3560	-	-	-	-	-	-	-	-	-	-	-	-	24.78	24.75
CA 48A-48C	LTE B48	5	56715	3697.5	QPSK	1	12	56715	3697.5	LTE B48	20	55340	3560	LTE B48	20	55338	3579.8	-	-	-	-	-	-	-	-	24.74	24.75
CA 48C-48A	LTE B48	5	56715	3697.5	QPSK	1	12	41480	2680	LTE B46	20	50665	5537.5	LTE B46	20	50467	5517.7	-	-	-	-	-	-	-	-	24.78	24.75
CA 48A-48D	LTE B48	5	56715	3697.5	QPSK	1	12	56715	3697.5	LTE B48	20	55340	3560	LTE B48	20	55338	3579.8	LTE B48	20	55736	3599.6	-	-	-	-	24.67	24.75
CA 48C-48C	LTE B48	5	56715	3697.5	QPSK	1	12	56715	3697.5	LTE B48	20	55340	3560	LTE B48	20	55340	3560	-	-	-	-	-	-	-	-	24.73	24.75
CA 48A-48E	LTE B48	5	56715	3697.5	QPSK	1	12	56715	3697.5	LTE B48	20	55340	3560	LTE B48	20	55338	3579.8	LTE B48	20	55736	3599.6	LTE B48	20	55934	3619.4	24.76	24.75
CA 48C-48E	LTE B48	5	56715	3697.5	QPSK	1	12	56715	3697.5	LTE B48	20	55340	3560	LTE B48	20	55340	3560	LTE B48	20	55338	3579.8	LTE B48	20	55736	3599.6	24.77	24.75

H.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 H.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.

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DUT Type: Portable Handset		APPENDIX H: Page 5 of 12

