

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

Index	BCC	Supported Channel Bandwidth (MHz)				Restriction	Completely Covered by Measurement Superset
		CC1	CC2	CC3	CC4		
CCC#1	CA_2A	5, 10, 15, 20	5, 10, 15, 20				Yes
CCC#2	CA_2A-5A	5, 10, 15, 20	5, 10, 15, 20				Yes
CCC#3	CA_2A-5A	5, 10, 15, 20	5, 10, 15, 20				Yes
CCC#4	CA_2A-5A	5, 10, 15, 20	5, 10, 15, 20				Yes
CCC#5	CA_2A-5A	5, 10, 15, 20	5, 10, 15, 20				Yes
CCC#6	CA_2A-5A	5, 10, 15, 20	5, 10, 15, 20				Yes
CCC#7	CA_2A-5A	5, 10, 15, 20	5, 10, 15, 20				Yes
CCC#8	CA_2A-5A	5, 10, 15, 20	5, 10, 15, 20				Yes
CCC#9	CA_2A-5A	5, 10, 15, 20	5, 10, 15, 20				Yes
CCC#10	CA_2A-5A	5, 10, 15, 20	5, 10, 15, 20				Yes
CCC#11	CA_2A-5A	5, 10, 15, 20	5, 10, 15, 20				Yes
CCC#12	CA_2A-5A	5, 10, 15, 20	5, 10, 15, 20				Yes
CCC#13	CA_2A-5A	5, 10, 15, 20	5, 10, 15, 20				Yes
CCC#14	CA_2A-5A	5, 10, 15, 20	5, 10, 15, 20				Yes
CCC#15	CA_2A-5A	5, 10, 15, 20	5, 10, 15, 20				Yes
CCC#16	CA_2A-5A	5, 10, 15, 20	5, 10, 15, 20				Yes
CCC#17	CA_2A-5A	5, 10, 15, 20	5, 10, 15, 20				Yes
CCC#18	CA_2A-5A	5, 10, 15, 20	5, 10, 15, 20				Yes
CCC#19	CA_2A-5A	5, 10, 15, 20	5, 10, 15, 20				Yes
CCC#20	CA_2A-5A	5, 10, 15, 20	5, 10, 15, 20				Yes
CCC#21	CA_2A-5A	5, 10, 15, 20	5, 10, 15, 20				Yes
CCC#22	CA_2A-5A	5, 10, 15, 20	5, 10, 15, 20				Yes
CCC#23	CA_2A-5A	5, 10, 15, 20	5, 10, 15, 20				Yes
CCC#24	CA_2A-5A	5, 10, 15, 20	5, 10, 15, 20				Yes
CCC#25	CA_2A-5A	5, 10, 15, 20	5, 10, 15, 20				Yes
CCC#26	CA_2A-5A	5, 10, 15, 20	5, 10, 15, 20				Yes
CCC#27	CA_2A-5A	5, 10, 15, 20	5, 10, 15, 20				Yes
CCC#28	CA_2A-5A	5, 10, 15, 20	5, 10, 15, 20				Yes
CCC#29	CA_2A-5A	5, 10, 15, 20	5, 10, 15, 20				Yes
CCC#30	CA_2A-5A	5, 10, 15, 20	5, 10, 15, 20				Yes
CCC#31	CA_2A-5A	5, 10, 15, 20	5, 10, 15, 20				Yes
CCC#32	CA_2A-5A	5, 10, 15, 20	5, 10, 15, 20				Yes
CCC#33	CA_2A-5A	5, 10, 15, 20	5, 10, 15, 20				Yes
CCC#34	CA_2A-5A	5, 10, 15, 20	5, 10, 15, 20				Yes
CCC#35	CA_2A-5A	5, 10, 15, 20	5, 10, 15, 20				Yes
CCC#36	CA_2A-5A	5, 10, 15, 20	5, 10, 15, 20				Yes
CCC#37	CA_2A-5A	5, 10, 15, 20	5, 10, 15, 20				Yes
CCC#38	CA_2A-5A	5, 10, 15, 20	5, 10, 15, 20				Yes
CCC#39	CA_2A-5A	5, 10, 15, 20	5, 10, 15, 20				Yes
CCC#40	CA_2A-5A	5, 10, 15, 20	5, 10, 15, 20				Yes
CCC#41	CA_2A-5A	5, 10, 15, 20	5, 10, 15, 20				Yes
CCC#42	CA_2A-5A	5, 10, 15, 20	5, 10, 15, 20				Yes
CCC#43	CA_2A-5A	5, 10, 15, 20	5, 10, 15, 20				Yes
CCC#44	CA_2A-5A	5, 10, 15, 20	5, 10, 15, 20				Yes
CCC#45	CA_2A-5A	5, 10, 15, 20	5, 10, 15, 20				Yes
CCC#46	CA_2A-5A	5, 10, 15, 20	5, 10, 15, 20				Yes
CCC#47	CA_2A-5A	5, 10, 15, 20	5, 10, 15, 20				Yes
CCC#48	CA_2A-5A	5, 10, 15, 20	5, 10, 15, 20				Yes
CCC#49	CA_2A-5A	5, 10, 15, 20	5, 10, 15, 20				Yes
CCC#50	CA_2A-5A	5, 10, 15, 20	5, 10, 15, 20				Yes
CCC#51	CA_2A-5A	5, 10, 15, 20	5, 10, 15, 20				Yes
CCC#52	CA_2A-5A	5, 10, 15, 20	5, 10, 15, 20				Yes
CCC#53	CA_2A-5A	5, 10, 15, 20	5, 10, 15, 20				Yes
CCC#54	CA_2A-5A	5, 10, 15, 20	5, 10, 15, 20				Yes
CCC#55	CA_2A-5A	5, 10, 15, 20	5, 10, 15, 20				Yes
CCC#56	CA_2A-5A	5, 10, 15, 20	5, 10, 15, 20				Yes
CCC#57	CA_2A-5A	5, 10, 15, 20	5, 10, 15, 20				Yes
CCC#58	CA_2A-5A	5, 10, 15, 20	5, 10, 15, 20				Yes
CCC#59	CA_2A-5A	5, 10, 15, 20	5, 10, 15, 20				Yes
CCC#60	CA_2A-5A	5, 10, 15, 20	5, 10, 15, 20				Yes
CCC#61	CA_2A-5A	5, 10, 15, 20	5, 10, 15, 20				Yes
CCC#62	CA_2A-5A	5, 10, 15, 20	5, 10, 15, 20				Yes
CCC#63	CA_2A-5A	5, 10, 15, 20	5, 10, 15, 20				Yes
CCC#64	CA_2A-5A	5, 10, 15, 20	5, 10, 15, 20				Yes
CCC#65	CA_2A-5A	5, 10, 15, 20	5, 10, 15, 20				Yes
CCC#66	CA_2A-5A	5, 10, 15, 20	5, 10, 15, 20				Yes
CCC#67	CA_2A-5A	5, 10, 15, 20	5, 10, 15, 20				Yes
CCC#68	CA_2A-5A	5, 10, 15, 20	5, 10, 15, 20				Yes
CCC#69	CA_2A-5A	5, 10, 15, 20	5, 10, 15, 20				Yes
CCC#70	CA_2A-5A	5, 10, 15, 20	5, 10, 15, 20				Yes
CCC#71	CA_2A-5A	5, 10, 15, 20	5, 10, 15, 20				Yes
CCC#72	CA_2A-5A	5, 10, 15, 20	5, 10, 15, 20				Yes
CCC#73	CA_2A-5A	5, 10, 15, 20	5, 10, 15, 20				Yes
CCC#74	CA_2A-5A	5, 10, 15, 20	5, 10, 15, 20				Yes
CCC#75	CA_2A-5A	5, 10, 15, 20	5, 10, 15, 20				Yes
CCC#76	CA_2A-5A	5, 10, 15, 20	5, 10, 15, 20				Yes
CCC#77	CA_2A-5A	5, 10, 15, 20	5, 10, 15, 20				Yes
CCC#78	CA_2A-5A	5, 10, 15, 20	5, 10, 15, 20				Yes
CCC#79	CA_2A-5A	5, 10, 15, 20	5, 10, 15, 20				Yes
CCC#80	CA_2A-5A	5, 10, 15, 20	5, 10, 15, 20				Yes
CCC#81	CA_2A-5A	5, 10, 15, 20	5, 10, 15, 20				Yes
CCC#82	CA_2A-5A	5, 10, 15, 20	5, 10, 15, 20				Yes
CCC#83	CA_2A-5A	5, 10, 15, 20	5, 10, 15, 20				Yes
CCC#84	CA_2A-5A	5, 10, 15, 20	5, 10, 15, 20				Yes
CCC#85	CA_2A-5A	5, 10, 15, 20	5, 10, 15, 20				Yes
CCC#86	CA_2A-5A	5, 10, 15, 20	5, 10, 15, 20				Yes
CCC#87	CA_2A-5A	5, 10, 15, 20	5, 10, 15, 20				Yes
CCC#88	CA_2A-5A	5, 10, 15, 20	5, 10, 15, 20				Yes
CCC#89	CA_2A-5A	5, 10, 15, 20	5, 10, 15, 20				Yes
CCC#90	CA_2A-5A	5, 10, 15, 20	5, 10, 15, 20				Yes
CCC#91	CA_2A-5A	5, 10, 15, 20	5, 10, 15, 20				Yes
CCC#92	CA_2A-5A	5, 10, 15, 20	5, 10, 15, 20				Yes
CCC#93	CA_2A-5A	5, 10, 15, 20	5, 10, 15, 20				Yes
CCC#94	CA_2A-5A	5, 10, 15, 20	5, 10, 15, 20				Yes
CCC#95	CA_2A-5A	5, 10, 15, 20	5, 10, 15, 20				Yes
CCC#96	CA_2A-5A	5, 10, 15, 20	5, 10, 15, 20				Yes
CCC#97	CA_2A-5A	5, 10, 15, 20	5, 10, 15, 20				Yes
CCC#98	CA_2A-5A	5, 10, 15, 20	5, 10, 15, 20				Yes
CCC#99	CA_2A-5A	5, 10, 15, 20	5, 10, 15, 20				Yes
CCC#100	CA_2A-5A	5, 10, 15, 20	5, 10, 15, 20				Yes

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

Supported Channel Bandwidth (MHz)								Restriction	Completely Covered by Measurement Superset
Index	BCC	CC1	CC2	CC3	CC4	CC5	CC6		
CCC#M1	CA_2A	5, 10, 15, 20	5, 10, 15, 20						
CCC#M2	CA_2A-2A	5, 10, 15, 20	5, 10, 15, 20						
CCC#M3	CA_2A-2A-2A	5, 10, 15, 20	5, 10, 15, 20						
CCC#M4	CA_2A-2A-2A	5, 10, 15, 20	5, 10, 15, 20						
CCC#M5	CA_2A-2A-2A	5, 10, 15, 20	5, 10, 15, 20						
CCC#M6	CA_2A-2A	5, 10, 15, 20	5, 10						
CCC#M7	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M8	CA_2A-2A	5, 10, 15, 20	5, 10						
CCC#M9	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M10	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M11	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M12	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M13	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M14	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M15	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M16	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M17	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M18	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M19	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M20	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M21	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M22	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M23	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M24	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M25	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M26	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M27	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M28	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M29	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M30	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M31	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M32	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M33	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M34	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M35	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M36	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M37	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M38	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M39	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M40	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M41	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M42	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M43	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M44	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M45	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M46	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M47	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M48	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M49	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M50	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M51	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M52	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M53	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M54	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M55	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M56	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M57	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M58	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M59	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M60	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M61	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M62	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M63	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M64	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M65	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M66	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M67	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M68	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M69	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M70	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M71	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M72	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M73	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M74	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M75	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M76	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M77	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M78	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M79	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M80	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M81	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M82	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M83	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M84	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M85	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M86	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M87	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M88	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M89	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M90	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M91	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M92	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M93	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M94	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M95	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M96	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M97	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M98	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M99	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M100	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M101	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M102	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M103	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M104	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M105	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M106	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M107	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M108	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M109	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M110	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M111	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M112	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M113	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M114	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M115	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M116	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M117	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M118	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M119	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M120	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M121	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M122	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M123	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M124	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M125	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M126	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M127	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M128	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M129	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M130	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M131	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M132	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M133	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M134	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M135	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M136	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M137	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M138	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M139	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M140	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M141	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M142	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M143	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M144	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M145	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M146	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M147	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M148	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M149	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M150	CA_2A-2A-2A	5, 10, 15, 20	5, 10						
CCC#M151	CA_2A-2A-2A	5, 10, 15, 20	5, 10						

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.

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.

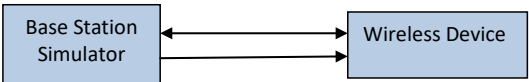


Figure I-1
DL CA Power Measurement Setup

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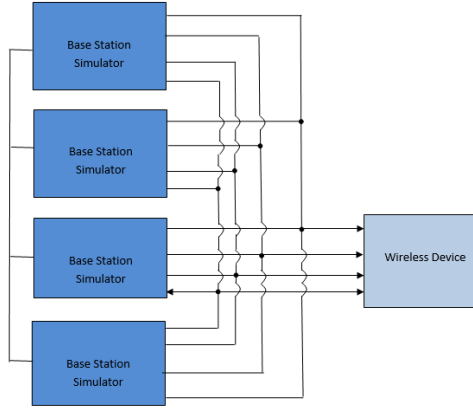


Figure I-2
DL CA with DL 4x4 MIMO Power Measurement Setup

I.2 Downlink Carrier Aggregation RF Conducted Powers

I.2.1 LTE Band 12 as PCC

Table I-3
Maximum Output Powers

Combination	PCC									SCC				Power	
	PCC Band	PCC BW [MHz]	PCC (UL) Channel	PCC (UL) Freq. [MHz]	Modulation	PCC UL# RB	PCC UL RB Offset	PCC (DL) Ch.	PCC (DL) Freq. [MHz]	SCC Band	SCC BW [MHz]	SCC (DL) Ch.	SCC (DL) Freq. [MHz]	LTE Tx.Power with DL CA Enabled (dBm)	LTE Single Carrier Tx Power (dBm)
CA 2A-12A (1)	LTE B12	5	23155	713.5	QPSK	1	24	5155	743.5	LTE B2	20	900	1960	23.94	23.93
CA 4A-12A (1)	LTE B12	5	23155	713.5	QPSK	1	24	5155	743.5	LTE B4	20	2175	2132.5	23.93	23.93
CA 4A-12A (2)	LTE B12	5	23155	713.5	QPSK	1	24	5155	743.5	LTE B4	20	2175	2132.5	23.93	23.93
CA 12A-66A (1)	LTE B12	5	23155	713.5	QPSK	1	24	5155	743.5	LTE B66	20	66786	2145	23.92	23.93
CA 12A-66A (2)	LTE B12	5	23155	713.5	QPSK	1	24	5155	743.5	LTE B66	20	66786	2145	23.92	23.93

I.2.2 LTE Band 13 as PCC

Table I-4
Maximum Output Powers

Combination	PCC									SCC				Power	
	PCC Band	PCC BW [MHz]	PCC (UL) Channel	PCC (UL) Freq. [MHz]	Modulation	PCC UL# RB	PCC UL RB Offset	PCC (DL) Ch.	PCC (DL) Freq. [MHz]	SCC Band	SCC BW [MHz]	SCC (DL) Ch.	SCC (DL) Freq. [MHz]	LTE Tx.Power with DL CA Enabled (dBm)	LTE Single Carrier Tx Power (dBm)
CA_2A-13A (2)	LTE B13	10	23230	782	QPSK	1	0	5230	751	LTE B2	20	900	1960	24.36	24.34
CA_4A-13A	LTE B13	10	23230	782	QPSK	1	0	5230	751	LTE B4	20	2175	2132.5	24.35	24.34

I.2.3 LTE Band 26 as PCC

Table I-5
Maximum Output Powers

	PCC									SCC				Power	
Combination	PCC Band	PCC BW [MHz]	PCC (UL) Channel	PCC (UL) Freq. [MHz]	Modulation	PCC UL# RB	PCC UL RB Offset	PCC (DL) Ch.	PCC (DL) Freq. [MHz]	SCC Band	SCC BW [MHz]	SCC (DL) Ch.	SCC (DL) Freq. [MHz]	LTE Tx.Power with DL CA Enabled (dBm)	LTE Single Carrier Tx Power (dBm)
CA 26A-41A	LTE B26	10	26990	844	QPSK	1	49	8990	889	LTE B41	20	40620	2593	24.07	24.06

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I.2.4 LTE Band 66 as PCC

Table I-6
Maximum Output Powers

	PCC									SCC				Power	
Combination	PCC Band	PCC BW [MHz]	PCC (UL) Channel	PCC (UL) Freq. [MHz]	Modulation	PCC UL# RB	PCC UL RB Offset	PCC (DL) Ch.	PCC (DL) Freq. [MHz]	SCC Band	SCC BW [MHz]	SCC (DL) Ch.	SCC (DL) Freq. [MHz]	LTE Tx.Power with DL CA Enabled (dBm)	LTE Single Carrier Tx Power (dBm)
CA 2A-66A	LTE B66	20	132072	1720	QPSK	1	0	66536	2120	LTE B2	20	900	1960	23.44	23.42
CA 12A-66A (1)	LTE B66	20	132072	1720	QPSK	1	0	66536	2120	LTE B12	10	5095	737.5	23.40	23.42
CA 12A-66A (2)	LTE B66	20	132072	1720	QPSK	1	0	66536	2120	LTE B12	10	5095	737.5	23.40	23.42
CA 66A-66A	LTE B66	20	132072	1720	QPSK	1	0	66536	2120	LTE B66	20	67236	2190	23.43	23.42
CA 66B	LTE B66	5	131997	1712.5	QPSK	1	12	66461	2112.5	LTE B66	15	66554	2121.8	23.42	23.41
CA 66C	LTE B66	20	132072	1720	QPSK	1	0	66536	2120	LTE B66	20	66734	2139.8	23.44	23.42

I.2.5 LTE Band 2 as PCC

Table I-7
Maximum Output Powers

Combination	PCC									SCC				Power	
	PCC Band	PCC BW [MHz]	PCC (UL) Channel	PCC (UL) Freq. [MHz]	Modulation	PCC UL# RB	PCC UL RB Offset	PCC (DL) Ch.	PCC (DL) Freq. [MHz]	SCC Band	SCC BW [MHz]	SCC (DL) Ch.	SCC (DL) Freq. [MHz]	LTE Tx.Power with DL CA Enabled (dBm)	LTE Single Carrier Tx Power (dBm)
CA 2A-2A	LTE B2	10	19150	1905	QPSK	1	0	1150	1985	LTE B2	20	700	1940	23.54	23.53
CA 2A-4A	LTE B2	10	19150	1905	QPSK	1	0	1150	1985	LTE B4	20	2175	2132.5	23.55	23.53
CA 2A-4A (1)	LTE B2	10	19150	1905	QPSK	1	0	1150	1985	LTE B4	10	2175	2132.5	23.53	23.53
CA 2A-4A (2)	LTE B2	10	19150	1905	QPSK	1	0	1150	1985	LTE B4	20	2175	2132.5	23.55	23.53
CA 2A-5A	LTE B2	10	19150	1905	QPSK	1	0	1150	1985	LTE B5	10	2525	881.5	23.54	23.53
CA 2A-5A (1)	LTE B2	10	19150	1905	QPSK	1	0	1150	1985	LTE B5	10	2525	881.5	23.54	23.53
CA 2A-12A	LTE B2	10	19150	1905	QPSK	1	0	1150	1985	LTE B12	10	5095	737.5	23.56	23.53
CA 2A-12A (1)	LTE B2	10	19150	1905	QPSK	1	0	1150	1985	LTE B12	10	5095	737.5	23.56	23.53
CA 2A-12A (2)	LTE B2	10	19150	1905	QPSK	1	0	1150	1985	LTE B12	10	5095	737.5	23.56	23.53
CA 2A-13A	LTE B2	10	19150	1905	QPSK	1	0	1150	1985	LTE B13	10	5230	751	23.55	23.53
CA 2A-13A (1)	LTE B2	10	19150	1905	QPSK	1	0	1150	1985	LTE B13	10	5230	751	23.55	23.53
CA 2A-13A (2)	LTE B2	10	19150	1905	QPSK	1	0	1150	1985	LTE B13	10	5230	751	23.55	23.53
CA 2A-17A	LTE B2	10	19150	1905	QPSK	1	0	1150	1985	LTE B17	10	5790	740	23.56	23.53
CA 2A-66A	LTE B2	10	19150	1905	QPSK	1	0	1150	1985	LTE B66	20	66786	2145	23.57	23.53
CA 2A-66A (1)	LTE B2	10	19150	1905	QPSK	1	0	1150	1985	LTE B66	10	66786	2145	23.53	23.53
CA 2A-66A (2)	LTE B2	10	19150	1905	QPSK	1	0	1150	1985	LTE B66	20	66786	2145	23.57	23.53

I.2.6 LTE Band 41 as PCC

Table I-8
Maximum Output Powers

	PCC									SCC				Power	
Combination	PCC Band	PCC BW [MHz]	PCC (UL) Channel	PCC (UL) Freq. [MHz]	Modulation	PCC UL# RB	PCC UL RB Offset	PCC (DL) Ch.	PCC (DL) Freq. [MHz]	SCC Band	SCC BW [MHz]	SCC (DL) Ch.	SCC (DL) Freq. [MHz]	LTE Tx.Power with DL CA Enabled (dBm)	LTE Single Carrier Tx Power (dBm)
CA 41A-41A (1)	LTE B41	20	39750	2506	QPSK	1	0	39750	2506	LTE B41	20	41490	2680	23.03	23.06
CA 41C (1)	LTE B41	20	39750	2506	QPSK	1	0	39750	2506	LTE B41	20	39948	2525.8	23.04	23.06

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I.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 I.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.

I.3.1 LTE 4x4 MIMO DL Standalone Powers

Table I-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]
41	20	39750	2506	QPSK	1	0	23.04	23.06	23.0

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