

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		
CCC#01	CA [2A]	5, 10, 15, 20	5, 10, 15, 20		Yes
CCC#02	CA [2A]	5, 10, 15, 20	5, 10, 15, 20		Yes
CCC#03	CA [2A]	5, 10, 15, 20	5, 10, 15, 20		Yes
CCC#04	CA [2A]	5, 10, 15, 20	5, 10, 15, 20		Yes
CCC#05	CA [2A]	5, 10, 15, 20	5, 10, 15, 20		Yes
CCC#06	CA [2A]	5, 10, 15, 20	5, 10, 15, 20		Yes
CCC#07	CA [2A]	5, 10, 15, 20	5, 10, 15, 20		Yes
CCC#08	CA [2A]	5, 10, 15, 20	5, 10, 15, 20		Yes
CCC#09	CA [2A]	5, 10, 15, 20	5, 10, 15, 20		Yes
CCC#10	CA [2A]	5, 10, 15, 20	5, 10, 15, 20		Yes
CCC#11	CA [2A]	5, 10, 15, 20	5, 10, 15, 20		Yes
CCC#12	CA [2A]	5, 10, 15, 20	5, 10, 15, 20		Yes
CCC#13	CA [2A]	5, 10, 15, 20	5, 10, 15, 20		Yes
CCC#14	CA [2A]	5, 10, 15, 20	5, 10, 15, 20		Yes
CCC#15	CA [2A]	5, 10, 15, 20	5, 10, 15, 20		Yes
CCC#16	CA [2A]	5, 10, 15, 20	5, 10, 15, 20		Yes
CCC#17	CA [2A]	5, 10, 15, 20	5, 10, 15, 20		Yes
CCC#18	CA [2A]	5, 10, 15, 20	5, 10, 15, 20		Yes
CCC#19	CA [2A]	5, 10, 15, 20	5, 10, 15, 20		Yes
CCC#20	CA [2A]	5, 10, 15, 20	5, 10, 15, 20		Yes
CCC#21	CA [2A]	5, 10, 15, 20	5, 10, 15, 20		Yes
CCC#22	CA [2A]	5, 10, 15, 20	5, 10, 15, 20		Yes
CCC#23	CA [2A]	5, 10, 15, 20	5, 10, 15, 20		Yes
CCC#24	CA [2A]	5, 10, 15, 20	5, 10, 15, 20		Yes
CCC#25	CA [2A]	5, 10, 15, 20	5, 10, 15, 20		Yes
CCC#26	CA [2A]	5, 10, 15, 20	5, 10, 15, 20		Yes
CCC#27	CA [2A]	5, 10, 15, 20	5, 10, 15, 20		Yes
CCC#28	CA [2A]	5, 10, 15, 20	5, 10, 15, 20		Yes
CCC#29	CA [2A]	5, 10, 15, 20	5, 10, 15, 20		Yes
CCC#30	CA [2A]	5, 10, 15, 20	5, 10, 15, 20		Yes
CCC#31	CA [2A]	5, 10, 15, 20	5, 10, 15, 20		Yes
CCC#32	CA [2A]	5, 10, 15, 20	5, 10, 15, 20		Yes
CCC#33	CA [2A]	5, 10, 15, 20	5, 10, 15, 20		Yes
CCC#34	CA [2A]	5, 10, 15, 20	5, 10, 15, 20		Yes
CCC#35	CA [2A]	5, 10, 15, 20	5, 10, 15, 20		Yes
CCC#36	CA [2A]	5, 10, 15, 20	5, 10, 15, 20		Yes
CCC#37	CA [2A]	5, 10, 15, 20	5, 10, 15, 20		Yes
CCC#38	CA [2A]	5, 10, 15, 20	5, 10, 15, 20		Yes
CCC#39	CA [2A]	5, 10, 15, 20	5, 10, 15, 20		Yes
CCC#40	CA [2A]	5, 10, 15, 20	5, 10, 15, 20		Yes
CCC#41	CA [2A]	5, 10, 15, 20	5, 10, 15, 20		Yes
CCC#42	CA [2A]	5, 10, 15, 20	5, 10, 15, 20		Yes
CCC#43	CA [2A]	5, 10, 15, 20	5, 10, 15, 20		Yes
CCC#44	CA [2A]	5, 10, 15, 20	5, 10, 15, 20		Yes
CCC#45	CA [2A]	5, 10, 15, 20	5, 10, 15, 20		Yes
CCC#46	CA [2A]	5, 10, 15, 20	5, 10, 15, 20		Yes
CCC#47	CA [2A]	5, 10, 15, 20	5, 10, 15, 20		Yes
CCC#48	CA [2A]	5, 10, 15, 20	5, 10, 15, 20		Yes
CCC#49	CA [2A]	5, 10, 15, 20	5, 10, 15, 20		Yes
CCC#50	CA [2A]	5, 10, 15, 20	5, 10, 15, 20		Yes
CCC#51	CA [2A]	5, 10, 15, 20	5, 10, 15, 20		Yes
CCC#52	CA [2A]	5, 10, 15, 20	5, 10, 15, 20		Yes
CCC#53	CA [2A]	5, 10, 15, 20	5, 10, 15, 20		Yes
CCC#54	CA [2A]	5, 10, 15, 20	5, 10, 15, 20		Yes
CCC#55	CA [2A]	5, 10, 15, 20	5, 10, 15, 20		Yes
CCC#56	CA [2A]	5, 10, 15, 20	5, 10, 15, 20		Yes
CCC#57	CA [2A]	5, 10, 15, 20	5, 10, 15, 20		Yes
CCC#58	CA [2A]	5, 10, 15, 20	5, 10, 15, 20		Yes
CCC#59	CA [2A]	5, 10, 15, 20	5, 10, 15, 20		Yes
CCC#60	CA [2A]	5, 10, 15, 20	5, 10, 15, 20		Yes
CCC#61	CA [2A]	5, 10, 15, 20	5, 10, 15, 20		Yes
CCC#62	CA [2A]	5, 10, 15, 20	5, 10, 15, 20		Yes
CCC#63	CA [2A]	5, 10, 15, 20	5, 10, 15, 20		Yes
CCC#64	CA [2A]	5, 10, 15, 20	5, 10, 15, 20		Yes
CCC#65	CA [2A]	5, 10, 15, 20	5, 10, 15, 20		Yes
CCC#66	CA [2A]	5, 10, 15, 20	5, 10, 15, 20		Yes
CCC#67	CA [2A]	5, 10, 15, 20	5, 10, 15, 20		Yes
CCC#68	CA [2A]	5, 10, 15, 20	5, 10, 15, 20		Yes
CCC#69	CA [2A]	5, 10, 15, 20	5, 10, 15, 20		Yes
CCC#70	CA [2A]	5, 10, 15, 20	5, 10, 15, 20		Yes
CCC#71	CA [2A]	5, 10, 15, 20	5, 10, 15, 20		Yes
CCC#72	CA [2A]	5, 10, 15, 20	5, 10, 15, 20		Yes
CCC#73	CA [2A]	5, 10, 15, 20	5, 10, 15, 20		Yes
CCC#74	CA [2A]	5, 10, 15, 20	5, 10, 15, 20		Yes
CCC#75	CA [2A]	5, 10, 15, 20	5, 10, 15, 20		Yes
CCC#76	CA [2A]	5, 10, 15, 20	5, 10, 15, 20		Yes
CCC#77	CA [2A]	5, 10, 15, 20	5, 10, 15, 20		Yes
CCC#78	CA [2A]	5, 10, 15, 20	5, 10, 15, 20		Yes
CCC#79	CA [2A]	5, 10, 15, 20	5, 10, 15, 20		Yes
CCC#80	CA [2A]	5, 10, 15, 20	5, 10, 15, 20		Yes
CCC#81	CA [2A]	5, 10, 15, 20	5, 10, 15, 20		Yes
CCC#82	CA [2A]	5, 10, 15, 20	5, 10, 15, 20		Yes
CCC#83	CA [2A]	5, 10, 15, 20	5, 10, 15, 20		Yes
CCC#84	CA [2A]	5, 10, 15, 20	5, 10, 15, 20		Yes
CCC#85	CA [2A]	5, 10, 15, 20	5, 10, 15, 20		Yes
CCC#86	CA [2A]	5, 10, 15, 20	5, 10, 15, 20		Yes
CCC#87	CA [2A]	5, 10, 15, 20	5, 10, 15, 20		Yes
CCC#88	CA [2A]	5, 10, 15, 20	5, 10, 15, 20		Yes
CCC#89	CA [2A]	5, 10, 15, 20	5, 10, 15, 20		Yes
CCC#90	CA [2A]	5, 10, 15, 20	5, 10, 15, 20		Yes
CCC#91	CA [2A]	5, 10, 15, 20	5, 10, 15, 20		Yes
CCC#92	CA [2A]	5, 10, 15, 20	5, 10, 15, 20		Yes
CCC#93	CA [2A]	5, 10, 15, 20	5, 10, 15, 20		Yes
CCC#94	CA [2A]	5, 10, 15, 20	5, 10, 15, 20		Yes
CCC#95	CA [2A]	5, 10, 15, 20	5, 10, 15, 20		Yes
CCC#96	CA [2A]	5, 10, 15, 20	5, 10, 15, 20		Yes
CCC#97	CA [2A]	5, 10, 15, 20	5, 10, 15, 20		Yes
CCC#98	CA [2A]	5, 10, 15, 20	5, 10, 15, 20		Yes
CCC#99	CA [2A]	5, 10, 15, 20	5, 10, 15, 20		Yes
CCC#100	CA [2A]	5, 10, 15, 20	5, 10, 15, 20		Yes

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

Index	2CC	Supported Channel Bandwidth (MHz)		Restriction	Completely Covered by Measurement Superset
		CC1	CC2		
CCC#01	CA [2A]	5, 10, 15, 20	5, 10, 15, 20		CCC#06
CCC#02	CA [2A]	5, 10, 15, 20	5, 10, 15, 20		CCC#07
CCC#03	CA [2A]	5, 10, 15, 20	5, 10, 15, 20		CCC#08
CCC#04	CA [2A]	5, 10, 15, 20	5, 10, 15, 20		CCC#09
CCC#05	CA [2A]	5, 10, 15, 20	5, 10, 15, 20		CCC#10
CCC#06	CA [2A]	5, 10, 15, 20	5, 10		CCC#01
CCC#07	CA [2A]	5, 10, 15, 20	5, 10		CCC#02
CCC#08	CA [2A]	5, 10, 15, 20	5, 10		CCC#03
CCC#09	CA [2A]	5, 10, 15, 20	5, 10		CCC#04
CCC#10	CA [2A]	5, 10, 15, 20	5, 10		CCC#05
CCC#11	CA [2A]	5, 10, 15, 20	5, 10		CCC#06
CCC#12	CA [2A]	5, 10, 15, 20	5, 10		CCC#07
CCC#13	CA [2A]	5, 10, 15, 20	5, 10		CCC#08
CCC#14	CA [2A]	5, 10, 15, 20	5, 10		CCC#09
CCC#15	CA [2A]	5, 10, 15, 20	5, 10		CCC#10
CCC#16	CA [2A]	5, 10, 15, 20	5, 10		CCC#11
CCC#17	CA [2A]	5, 10, 15, 20	5, 10		CCC#12
CCC#18	CA [2A]	5, 10, 15, 20	5, 10		CCC#13
CCC#19	CA [2A]	5, 10, 15, 20	5, 10		CCC#14
CCC#20	CA [2A]	5, 10, 15, 20	5, 10		CCC#15
CCC#21	CA [2A]	5, 10, 15, 20	5, 10		CCC#16
CCC#22	CA [2A]	5, 10, 15, 20	5, 10		CCC#17
CCC#23	CA [2A]	5, 10, 15, 20	5, 10		CCC#18
CCC#24	CA [2A]	5, 10, 15, 20	5, 10		CCC#19
CCC#25	CA [2A]	5, 10, 15, 20	5, 10		CCC#20
CCC#26	CA [2A]	5, 10, 15, 20	5, 10		CCC#21
CCC#27	CA [2A]	5, 10, 15, 20	5, 10		CCC#22
CCC#28	CA [2A]	5, 10, 15, 20	5, 10		CCC#23
CCC#29	CA [2A]	5, 10, 15, 20	5, 10		CCC#24
CCC#30	CA [2A]	5, 10, 15, 20	5, 10		CCC#25
CCC#31	CA [2A]	5, 10, 15, 20	5, 10		CCC#26
CCC#32	CA [2A]	5, 10, 15, 20	5, 10		CCC#27
CCC#33	CA [2A]	5, 10, 15, 20	5, 10		CCC#28
CCC#34	CA [2A]	5, 10, 15, 20	5, 10		CCC#29
CCC#35	CA [2A]	5, 10, 15, 20	5, 10		CCC#30
CCC#36	CA [2A]	5, 10, 15, 20	5, 10		CCC#31
CCC#37	CA [2A]	5, 10, 15, 20	5, 10		CCC#32
CCC#38	CA [2A]	5, 10, 15, 20	5, 10		CCC#33
CCC#39	CA [2A]	5, 10, 15, 20	5, 10		CCC#34
CCC#40	CA [2A]	5, 10, 15, 20	5, 10		CCC#35
CCC#41	CA [2A]	5, 10, 15, 20	5, 10		CCC#36
CCC#42	CA [2A]	5, 10, 15, 20	5, 10		CCC#37
CCC#43	CA [2A]	5, 10, 15, 20	5, 10		CCC#38
CCC#44	CA [2A]	5, 10, 15, 20	5, 10		CCC#39
CCC#45	CA [2A]	5, 10, 15, 20	5, 10		CCC#40
CCC#46	CA [2A]	5, 10, 15, 20	5, 10		CCC#41
CCC#47	CA [2A]	5, 10, 15, 20	5, 10		CCC#42
CCC#48	CA [2A]	5, 10, 15, 20	5, 10		CCC#43
CCC#49	CA [2A]	5, 10, 15, 20	5, 10		CCC#44
CCC#50	CA [2A]	5, 10, 15, 20	5, 10		CCC#45
CCC#51	CA [2A]	5, 10, 15, 20	5, 10		CCC#46
CCC#52	CA [2A]	5, 10, 15, 20	5, 10		CCC#47
CCC#53	CA [2A]	5, 10, 15, 20	5, 10		CCC#48
CCC#54	CA [2A]	5, 10, 15, 20	5, 10		CCC#49
CCC#55	CA [2A]	5, 10, 15, 20	5, 10		CCC#50
CCC#56	CA [2A]	5, 10, 15, 20	5, 10		CCC#51
CCC#57	CA [2A]	5, 10, 15, 20	5, 10		CCC#52
CCC#58	CA [2A]	5, 10, 15, 20	5, 10		CCC#53
CCC#59	CA [2A]	5, 10, 15, 20	5, 10		CCC#54
CCC#60	CA [2A]	5, 10, 15, 20	5, 10		CCC#55
CCC#61	CA [2A]	5, 10, 15, 20	5, 10		CCC#56
CCC#62	CA [2A]	5, 10, 15, 20	5, 10		CCC#57
CCC#63	CA [2A]	5, 10, 15, 20	5, 10		CCC#58
CCC#64	CA [2A]	5, 10, 15, 20	5, 10		CCC#59
CCC#65	CA [2A]	5, 10, 15, 20	5, 10		CCC#60
CCC#66	CA [2A]	5, 10, 15, 20	5, 10		CCC#61
CCC#67	CA [2A]	5, 10, 15, 20	5, 10		CCC#62
CCC#68	CA [2A]	5, 10, 15, 20	5, 10		CCC#63
CCC#69	CA [2A]	5, 10, 15, 20	5, 10		CCC#64
CCC#70	CA [2A]	5, 10, 15, 20	5, 10		CCC#65
CCC#71	CA [2A]	5, 10, 15, 20	5, 10		CCC#66
CCC#72	CA [2A]	5, 10, 15, 20	5, 10		CCC#67
CCC#73	CA [2A]	5, 10, 15, 20	5, 10		CCC#68
CCC#74	CA [2A]	5, 10, 15, 20	5, 10		CCC#69
CCC#75	CA [2A]	5, 10, 15, 20	5, 10		CCC#70
CCC#76	CA [2A]	5, 10, 15, 20	5, 10		CCC#71
CCC#77	CA [2A]	5, 10, 15, 20	5, 10		CCC#72
CCC#78	CA [2A]	5, 10, 15, 20	5, 10		CCC#73
CCC#79	CA [2A]	5, 10, 15, 20	5, 10		CCC#74
CCC#80	CA [2A]	5, 10, 15, 20	5, 10		CCC#75
CCC#81	CA [2A]	5, 10, 15, 20	5, 10		CCC#76
CCC#82	CA [2A]	5, 10, 15, 20	5, 10		CCC#77
CCC#83	CA [2A]	5, 10, 15, 20	5, 10		CCC#78
CCC#84	CA [2A]	5, 10, 15, 20	5, 10		CCC#79
CCC#85	CA [2A]	5, 10, 15, 20	5, 10		CCC#80
CCC#86	CA [2A]	5, 10, 15, 20	5, 10		CCC#81
CCC#87	CA [2A]	5, 10, 15, 20	5, 10		CCC#82
CCC#88	CA [2A]	5, 10, 15, 20	5, 10		CCC#83
CCC#89	CA [2A]	5, 10, 15, 20	5, 10		CCC#84
CCC#90	CA [2A]	5, 10, 15, 20	5, 10		CCC#85
CCC#91	CA [2A]	5, 10, 15, 20	5, 10		CCC#86
CCC#92	CA [2A]	5, 10, 15, 20	5, 10		CCC#87
CCC#93	CA [2A]	5, 10, 15, 20	5, 10		CCC#88
CCC#94	CA [2A]	5, 10, 15, 20	5, 10		CCC#89
CCC#95	CA [2A]	5, 10, 15, 20	5, 10		CCC#90
CCC#96	CA [2A]	5, 10, 15, 20	5, 10		CCC#91
CCC#97	CA [2A]	5, 10, 15, 20	5, 10		CCC#92
CCC#98	CA [2A]	5, 10, 15, 20	5, 10		CCC#93
CCC#99	CA [2A]	5, 10, 15, 20	5, 10		CCC#94
CCC#100	CA [2A]	5, 10, 15, 20	5, 10		CCC#95
CCC#101	CA [2A]	5, 10, 15, 20	5, 10		CCC#96
CCC#102	CA [2A]	5, 10, 15, 20	5, 10		CCC#97
CCC#103	CA [2A]	5, 10, 15, 20	5, 10		CCC#98
CCC#104	CA [2A]	5, 10, 15, 20	5, 10		CCC#99
CCC#105	CA [2A]	5, 10, 15, 20	5, 10		CCC#100
CCC#106	CA [2A]	5, 10, 15, 20	5, 10		CCC#101
CCC#107	CA [2A]	5, 10, 15, 20	5, 10		CCC#102
CCC#108	CA [2A]	5, 10, 15, 20	5, 10		CCC#103
CCC#109	CA [2A]	5, 10, 15, 20	5, 10		CCC#104
CCC#110	CA [2A]	5, 10, 15, 20	5, 10		CCC#105
CCC#111	CA [2A]	5, 10, 15, 20	5, 10		CCC#106
CCC#112	CA [2A]	5, 10, 15, 20	5, 10		CCC#107
CCC#113	CA [2A]	5, 10, 15, 20	5, 10		CCC#108
CCC#114	CA [2A]	5, 10, 15, 20	5, 10		CCC#109
CCC#115	CA [2A]	5, 10, 15, 20	5, 10		CCC#110
CCC#116	CA [2A]	5, 10, 15, 20	5, 10		CCC#111
CCC#117	CA [2A]	5, 10, 15, 20	5, 10		CCC#112
CCC#118	CA [2A]	5, 10, 15, 20	5, 10		CCC#113
CCC#119	CA [2A]	5, 10, 15, 20	5, 10		CCC#114
CCC#120	CA [2A]	5, 10, 15, 20	5, 10		CCC#115
CCC#121	CA [2A]	5, 10, 15, 20	5, 10		CCC#116
CCC#122	CA [2A]	5, 10, 15, 20	5, 10		CCC#117
CCC#123	CA [2A]	5, 10, 15, 20	5, 10		CCC#118
CCC#124	CA [2A]	5, 10, 15, 20	5, 10		CCC#119
CCC#125	CA [2A]	5, 10, 15, 20	5, 10		CCC#120
CCC#126	CA [2A]	5, 10, 15, 20	5, 10		CCC#121
CCC#127	CA [2A]	5, 10, 15, 20	5, 10		CCC#122
CCC#128	CA [2A]	5, 10, 15, 20	5, 10		CCC#123
CCC#129	CA [2A]	5, 10, 15, 20	5, 10		CCC#124
CCC#130	CA [2A]	5, 10, 15, 20	5, 10		CCC#125
CCC#131	CA [2A]	5, 10, 15, 20	5, 10		CCC#126
CCC#132	CA [2A]	5, 10, 15, 20	5, 10		CCC#127
CCC#133	CA [2A]	5, 10, 15, 20	5, 10		CCC#128
CCC#134	CA [2A]	5, 10, 15, 20	5, 10		CCC#129
CCC#135	CA [2A]	5, 10, 15, 20	5, 10		CCC#130
CCC#136	CA [2A]	5, 10, 15, 20	5, 10		CCC#131
CCC#137	CA [2A]	5, 10, 15, 20	5, 10		CCC#132
CCC#138	CA [2A]	5, 10, 15, 20	5, 10		CCC#133
CCC#139	CA [2A]	5, 10, 15, 20	5, 10		CCC#134
CCC#140	CA [2A]	5, 10, 15, 20	5, 10		CCC#135
CCC#141	CA [2A]	5, 10, 15, 20	5, 10		CCC#136
CCC#142	CA [2A]	5, 10, 15, 20	5, 10		CCC#137
CCC#143	CA [2A]	5, 10, 15, 20	5, 10		CCC#138
CCC#144	CA [2A]	5, 10, 15, 20	5, 10		CCC#139
CCC#145	CA [2A]	5, 10, 15, 20	5, 10		CCC#140
CCC#146	CA [2A]	5, 10, 15, 20	5, 10		CCC#141
CCC#147	CA [2A]	5, 10, 15, 20	5, 10		CCC#142
CCC#148	CA [2A]	5, 10, 15, 20	5, 10		CCC#143
CCC#149	CA [2A]	5, 10, 15, 20	5, 10		CCC#144
CCC#150	CA [2A]	5, 10, 15, 20	5, 10		CCC#145
CCC#151	CA [2A]	5, 10, 15, 20	5, 10		CCC#146
CCC#152	CA [2A]	5, 10, 15, 20	5, 10		CCC#147
CCC#153	CA [2A]	5, 10, 15, 20	5, 10		CCC#148
CCC#154	CA [2A]	5, 10, 15, 20	5, 10		CCC#149
CCC#155	CA [2A]	5, 10, 15, 20	5, 10		CCC#150
CCC#156	CA [2A]	5, 10, 15, 20	5, 10		CCC#151
CCC#157	CA [2A]	5, 10, 15, 20	5, 10		CCC#152
CCC#158	CA [2A]	5, 10, 15, 20	5, 10		CCC#153
CCC#159	CA [2A]	5, 10, 15, 20	5, 10		CCC#154
CCC#160	CA [2A]	5, 10, 15, 20	5, 10		CCC#155
CCC#161	CA [2A]	5, 10, 15, 20	5, 10		CCC#156
CCC#162	CA [2A]	5, 10, 15, 20	5, 10		CCC#157
CCC#163	CA [2A]	5, 10, 15, 20	5, 10		CCC#158
CCC#164	CA [2A]	5, 10, 15, 20	5, 10		CCC#159
CCC#165	CA [2A]	5, 10, 15, 20	5, 10		CCC#160
CCC#166	CA [2A]	5, 10, 15, 20	5, 10		CCC#161
CCC#167	CA [2A]	5, 10, 15, 20	5, 10		CCC#162
CCC#168	CA [2A]	5, 10, 15, 20	5, 10		CCC#163
CCC#169	CA [2A]	5, 10, 15, 20	5, 10		CCC#164
CCC#170	CA [2A]	5, 10, 15, 20	5, 10		CCC#165
CCC#171	CA [2A]	5, 10, 15, 20	5, 10		CCC#166
CCC#172	CA [2A]	5, 10, 15, 20	5, 10		CCC#167
CCC#173	CA [2A]	5, 10, 15, 20	5, 10		CCC#168
CCC#174	CA [2A]	5, 10, 15, 20	5, 10		CCC#169
CCC#175	CA [2A]	5, 10, 15, 20	5, 10		CCC#170
CCC#176	CA [2A]	5, 10, 15, 20	5, 10		CCC#171
CCC#177	CA [2A]	5, 10, 15, 20	5, 10		CCC#172
CCC#178	CA [2A]	5, 10, 15, 20	5, 10		CCC#173
CCC#179	CA [2A]	5, 10, 15, 20	5, 10		CCC#174
CCC#180	CA [2A]	5, 10, 15, 20	5, 10		CCC#175
CCC#181	CA [2A]	5, 10, 15, 20	5, 10		CCC#176
CCC#182	CA [2A]	5, 10, 15, 20	5, 10		CCC#177
CCC#183	CA [2A]	5, 10, 15, 20	5, 10		CCC#178
CCC#184	CA [2A]	5, 10, 15, 20	5, 10		CCC#179
CCC#185	CA [2A]	5, 10, 15, 20	5, 10		CCC#180
CCC#186	CA [2A]	5, 10, 15, 20	5, 10		CCC#181
CCC#187	CA [2A]	5, 10, 15, 20	5, 10		CCC#182
CCC#188	CA [2A]	5, 10, 15, 20	5, 10		CCC#183
CCC#189	CA [2A]	5, 10, 15, 20	5, 10		CCC#184
CCC#190	CA [2A]	5, 10, 15, 20	5, 10		CCC#185
CCC#191	CA [2A]	5, 10, 15, 20	5, 10		CCC#186
CCC#192	CA [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.

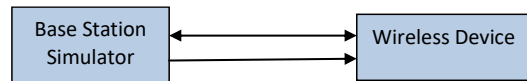


Figure I-1
DL CA Power Measurement Setup

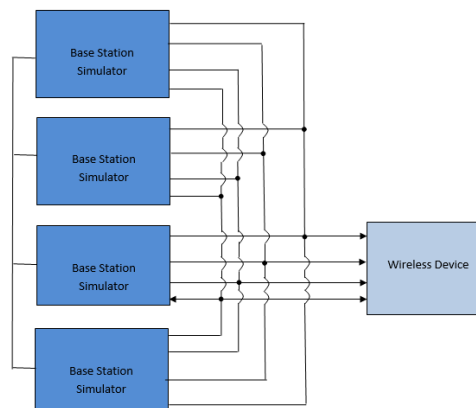


Figure I-2
DL CA with DL 4x4 MIMO Power Measurement Setup

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I.2 Downlink Carrier Aggregation RF Conducted Powers

I.2.1 LTE Band 41 as PCC

Table I-3
Maximum Output Powers

	PCC									SCC 1				SCC 2				Power	
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 DL CA Enabled (dbm)	LTE Single Carrier Tx Power (dbm)
CA_41C (1)	LTE B41	20	40185	2549.5	QPSK	1	0	40185	2549.5	LTE B41	20	40383	2569.3	-	-	-	-	23.51	23.54
CA_41D	LTE B41	20	40185	2549.5	QPSK	1	0	40185	2549.5	LTE B41	20	40383	2569.3	LTE B41	20	40581	2589.1	23.44	23.54

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-4
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	40185	2549.5	16QAM	1	0	21.33	21.30	21.0

I.3.2 LTE Band 41 as PCC

Table I-5
Maximum Output Powers

Combination	PCC										SCC 1				SCC 2				Power				
	PCC Band	PCC BW [MHz]	PCC (UL) Ch.	PCC (UL) Freq. [MHz]	Mod.	PCC UL# RB	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.	LTE Tx.Power with DL CA Enabled	LTE Single Carrier Tx Power (dBm)	
CA_41C (1)	LTE B41	20	40185	2549.5	QPSK	1	0	40185	2549.5	4x4	LTE B41	20	40383	2569.3	4x4	-	-	-	-	-	-	23.43	23.54
CA_41D	LTE B41	20	40185	2549.5	QPSK	1	0	40185	2549.5	4x4	LTE B41	20	40383	2569.3	4x4	LTE B41	20	40581	2589.1	4x4	-	23.50	23.54

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