

LTE Downlink Carrier Aggregation configurations (Continued)

2. DL Inter Band(3CC)

E-UTRA CA configuration	Bandwidth Combination Set	E-UTRA Band	Bandwidth					Max Aggregated
			1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	
5A-5A-66A	(0)	Band 5	5A-5A BCS 0					40
		Band 66	Yes	Yes	Yes	Yes	Yes	
5B-66A	(0)	Band 5	5B BCS 0					40
		Band 66	Yes	Yes	Yes	Yes	Yes	
5A-7A-7A	(0)	Band 5	7A BCS 0					50
		Band 7	Yes	Yes	Yes	Yes	Yes	
5A-7C	(0)	Band 5	7C BCS 1					50
		Band 7	Yes	Yes	Yes	Yes	Yes	
5A-7A-66A	(0)	Band 5	Yes	Yes	Yes	Yes	50	
		Band 7	Yes	Yes	Yes	Yes		
		Band 66	Yes	Yes	Yes	Yes		
5A-48C	(0)	Band 5	48C BCS 1					50
		Band 48	Yes	Yes	Yes	Yes	Yes	
5A-48A-66A	(0)	Band 5	Yes	Yes	Yes	Yes	50	
		Band 48	Yes	Yes	Yes	Yes		
		Band 66	Yes	Yes	Yes	Yes		
5A-66A-66A	(0)	Band 5	66A-66A BCS 0					50
		Band 66	Yes	Yes	Yes	Yes	Yes	
5A-66B	(0)	Band 5	66B BCS 0					30
		Band 66	Yes	Yes	Yes	Yes	Yes	
5A-66C	(0)	Band 5	66C BCS 0					50
		Band 66	Yes	Yes	Yes	Yes	Yes	
7A-7A-13A	(0)	Band 7	7A-7A BCS 1					50
		Band 13	Yes	Yes	Yes	Yes	Yes	
7C-13A	(0)	Band 7	7C BCS 1					50
		Band 13	Yes	Yes	Yes	Yes	Yes	
7C-25A	(0)	Band 7	7C BCS 1					50
		Band 25	Yes	Yes	Yes	Yes	Yes	
7A-7A-29A	(0)	Band 7	7A-7A BCS 1					50
		Band 29	Yes	Yes	Yes	Yes	Yes	
7C-29A	(0)	Band 7	7C BCS 1					50
		Band 29	Yes	Yes	Yes	Yes	Yes	
7A-7A-66A	(0)	Band 7	7A-7A BCS 1					60
		Band 66	Yes	Yes	Yes	Yes	Yes	
7C-66A	(0)	Band 7	7C BCS 1					60
		Band 66	Yes	Yes	Yes	Yes	Yes	
7A-12B	(0)	Band 7	12B BCS 0					35
		Band 12	Yes	Yes	Yes	Yes	Yes	
7A-12A-66A	(0)	Band 7	Yes	Yes	Yes	Yes	50	
		Band 12	Yes	Yes	Yes	Yes		
		Band 66	Yes	Yes	Yes	Yes		
7A-13A-66A	(0)	Band 7	Yes	Yes	Yes	Yes	50	
		Band 13	Yes	Yes	Yes	Yes		
		Band 66	Yes	Yes	Yes	Yes		
7A-29A-66A	(0)	Band 7	Yes	Yes	Yes	Yes	50	
		Band 29	Yes	Yes	Yes	Yes		
		Band 66	Yes	Yes	Yes	Yes		
7A-66A-66A	(0)	Band 7	66A-66A BCS 0					60
		Band 66	Yes	Yes	Yes	Yes	Yes	
12B-66A	(0)	Band 12	12B BCS 0					35
		Band 66	Yes	Yes	Yes	Yes	Yes	
12A-48C	(0)	Band 12	48C BCS 0					50
		Band 48	Yes	Yes	Yes	Yes	Yes	
12A-66A-66A	(0)	Band 12	66A-66A BCS 0					50
		Band 66	Yes	Yes	Yes	Yes	Yes	

3. DL Inter Band(4CC)

E-UTRA CA configuration	Bandwidth Combination Set	E-UTRA Band	Bandwidth					Max Aggregated
			1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	
2A-48A-48C	(0)	Band 2	48A-48C BCS 0					100
		Band 48	Yes	Yes	Yes	Yes	Yes	
2A-48D	(0)	Band 2	48D BCS 0					80
		Band 48	Yes	Yes	Yes	Yes	Yes	
2A-48C-66A	(0)	Band 2	48C BCS 0					80
		Band 48	Yes	Yes	Yes	Yes	Yes	
		Band 66	Yes	Yes	Yes	Yes	Yes	
2A-66A-66B	(0)	Band 2	66A-66B BCS 0					60
		Band 66	Yes	Yes	Yes	Yes	Yes	
2A-66A-66A-71A	(0)	Band 2	66A-66A BCS 0					80
		Band 66	Yes	Yes	Yes	Yes	Yes	
		Band 71	Yes	Yes	Yes	Yes	Yes	
2A-66C-71A	(0)	Band 2	66C BCS 0					80
		Band 66	Yes	Yes	Yes	Yes	Yes	
4A-4A-5B	(0)	Band 4	4A-4A BCS 0					60
		Band 5	5B BCS 0					
4A-4A-12B	(0)	Band 4	4A-4A BCS 0					55
		Band 12	12B BCS 0					
4A-48D	(0)	Band 4	48D BCS 0					80
		Band 48	Yes	Yes	Yes	Yes	Yes	
5A-5A-66A-66A	(0)	Band 5	5A-5A BCS 0					60
		Band 66	66A-66A BCS 0					
5A-5A-66B	(0)	Band 5	5A-5A BCS 0					40
		Band 66	66B BCS 0					
5A-5A-66C	(0)	Band 5	5A-5A BCS 0					60
		Band 66	66C BCS 0					
5B-66A-66A	(0)	Band 5	66A-66A BCS 0					60
		Band 66	5B BCS 0					
5B-66B	(0)	Band 5	66B BCS 0					40
		Band 66	5B BCS 0					
5B-66C	(0)	Band 5	66C BCS 0					60
		Band 66	5B BCS 0					
5A-7C-66A	(0)	Band 5	7C BCS 1					70
		Band 7	7C BCS 1					
		Band 66	Yes	Yes	Yes	Yes	Yes	
5A-7A-66A-66A	(0)	Band 5	66A-66A BCS 0					70
		Band 7	66A-66A BCS 0					
		Band 66	Yes	Yes	Yes	Yes	Yes	
5A-48D	(0)	Band 5	48D BCS 0					70
		Band 48	Yes	Yes	Yes	Yes	Yes	
5A-48C-66A	(0)	Band 5	48C BCS 0					70
		Band 48	Yes	Yes	Yes	Yes	Yes	
		Band 66	Yes	Yes	Yes	Yes	Yes	
5A-48A-66A-66A	(0)	Band 5	66A-66A BCS 0					70
		Band 48	66A-66A BCS 0					
		Band 66	Yes	Yes	Yes	Yes	Yes	
7C-13A-66A	(0)	Band 7	7C BCS 1					70
		Band 13	7C BCS 1					
7C-25A-25A	(0)	Band 7	25A-25A BCS 1					80
		Band 25	7C BCS 1					
7A-7A-29A-66A	(0)	Band 7	7A-7A BCS 1					70
		Band 29	7A-7A BCS 1					

LTE Downlink Carrier Aggregation configurations (Continued)

2. DL Inter Band(3CC)

E-UTRA CA configuration	Bandwidth Combination Set	E-UTRA Band	Bandwidth						Max Aggregated
			1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz	
12A-66C	(0)	Band 12			Yes	Yes			50
		Band 66	66C BCS 0						
13A-48A-48A	(0)	Band 13			Yes	Yes			50
		Band 48	48A-48A BCS 0						
13A-48C	(0)	Band 13			Yes	Yes			50
		Band 48	48C BCS 0						
13A-48A-66A	(0)	Band 13			Yes	Yes			50
		Band 48			Yes	Yes	Yes	Yes	
		Band 66			Yes	Yes	Yes	Yes	
13A-66A-66A	(0)	Band 13			Yes	Yes			50
		Band 66	66A-66A BCS 0						
13A-66B	(0)	Band 13			Yes	Yes			30
		Band 66	66B BCS 0						
13A-66C	(0)	Band 13			Yes	Yes			50
		Band 66	66C BCS 0						
14A-66A-66A	(0)	Band 14			Yes	Yes			50
		Band 66	66A-66A BCS 0						
29A-66A-66A	(0)	Band 29			Yes	Yes			50
		Band 66	66A-66A BCS 0						
48A-48A-66A	(0)	Band 48			Yes	Yes	Yes	Yes	60
		Band 66	48A-48A BCS 0						
48C-66A	(0)	Band 48			Yes	Yes	Yes	Yes	60
		Band 66	48C BCS 0						
48A-66A-66A	(0)	Band 48			Yes	Yes	Yes	Yes	60
		Band 66	66A-66A BCS 0						
48A-66B	(0)	Band 48			Yes	Yes	Yes	Yes	40
		Band 66	66B BCS 0						
48A-66C	(0)	Band 48			Yes	Yes	Yes	Yes	60
		Band 66	66C BCS 0						
66A-66A-71A	(0)	Band 66			Yes	Yes	Yes	Yes	60
		Band 71	66A-66A BCS 0						
66C-71A	(0)	Band 66			Yes	Yes	Yes	Yes	60
		Band 71	66C BCS 0						
48A-48A-71A	(0)	Band 48			Yes	Yes	Yes	Yes	60
		Band 71	48A-48A BCS 0						
48C-71A	(0)	Band 48			Yes	Yes	Yes	Yes	60
		Band 66	48C BCS 0						

3. DL Inter Band(4CC)

E-UTRA CA configuration	Bandwidth Combination Set	E-UTRA Band	Bandwidth						Max Aggregated
			1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz	
7C-29A-66A	(0)	Band 7							70
		Band 29			Yes	Yes			
		Band 66			Yes	Yes	Yes	Yes	
7A-7A-66A-66A	(0)	Band 7						80	
		Band 66	7A-7A BCS 1						
7C-66A-66A	(0)	Band 7						80	
		Band 66	66A-66A BCS 0						
7C-12B-66A	(0)	Band 7						70	
		Band 12							
		Band 66							
12B-66A-66A	(0)	Band 12						55	
		Band 66	66A-66A BCS 0						
13A-48A-48C	(0)	Band 13			Yes	Yes		70	
		Band 48	48A-48C BCS 0						
13A-48D	(0)	Band 13			Yes	Yes		70	
		Band 48	48D BCS 0						
13A-48C-66A	(0)	Band 13			Yes	Yes		70	
		Band 48	48C BCS 0						
		Band 66			Yes	Yes	Yes		Yes
13A-48A-66B	(0)	Band 13			Yes	Yes		50	
		Band 48			Yes	Yes	Yes		Yes
		Band 66	66B BCS 0						
13A-48A-66C	(0)	Band 13			Yes	Yes		70	
		Band 48			Yes	Yes	Yes		Yes
		Band 66	66C BCS 0						
13A-66A-66B	(0)	Band 13			Yes	Yes		50	
		Band 66	66A-66B BCS 0						
25A-41D	(0)	Band 25			Yes	Yes	Yes	Yes	80
		Band 41	41D BCS 0						
48A-48C-66A	(0)	Band 48						80	
		Band 66			Yes	Yes	Yes		Yes
48D-66A	(0)	Band 48						80	
		Band 66			Yes	Yes	Yes		Yes
48A-48A-66A-66A	(0)	Band 48						80	
		Band 66	66A-66A BCS 0						
48C-66A-66A	(0)	Band 48						80	
		Band 66	66A-66A BCS 0						
48A-48A-66B	(0)	Band 48						80	
		Band 66	66B BCS 0						
48C-66B	(0)	Band 48						60	
		Band 66	66B BCS 0						
48A-48A-66C	(0)	Band 48						80	
		Band 66	66C BCS 0						
48C-66C	(0)	Band 48						80	
		Band 66	66C BCS 0						

LTE Downlink Carrier Aggregation configurations (Continued)

4. DL Intra Band(non-contiguous)

E-UTRA CA configuration	Bandwidth Combination Set	E-UTRA Band	Allowed Channel BW Per Carrier (MHz)				Max Aggregated BW
			1st Carrier	2nd Carrier	3rd Carrier	4th Carrier	
2A-2A	(0)	Band 2	5, 10, 15, 20	5, 10, 15, 20			40
4A-4A	(0)	Band 4	5, 10, 15, 20	5, 10, 15, 20			40
	(1)	Band 4	5, 10	5, 10			20
5A-5A	(0)	Band 5	5, 10	5, 10			20
	(1)	Band 5	3	5			8
7A-7A	(0)	Band 7	5	15			40
		Band 7	10	10, 15			
		Band 7	15	15, 20			
		Band 7	20	20			
	(1)	Band 7	5, 10, 15, 20	5, 10, 15, 20			40
	(2)	Band 7	5, 10, 15, 20	5, 10			30
	(3)	Band 7	10, 15, 20	10, 15, 20			40
25A-25A	(0)	Band 25	5, 10	5, 10			20
	(1)	Band 25	5, 10, 15, 20	5, 10, 15, 20			40
41A-41A	(0)	Band 41	10, 15, 20	10, 15, 20			40
	(1)	Band 41	5, 10, 15, 20	5, 10, 15, 20			40
48A-48A	(0)	Band 48	5, 10, 15, 20	5, 10, 15, 20			40
66A-66A	(0)	Band 66	5, 10, 15, 20	5, 10, 15, 20			40
41A-41C	(0)	Band 41	5, 10, 15, 20	41C BCS 1			60
		Band 41	41C BCS 1	5, 10, 15, 20			
48A-48C	(0)	Band 48	5, 10, 15, 20	48C BCS 0			60
		Band 48	48C BCS 0	5, 10, 15, 20			
66A-66B	(0)	Band 66	5, 10, 15, 20	66B BCS 0			40
		Band 66	66B BCS 0	5, 10, 15, 20			
66A-66C	(0)	Band 66	5, 10, 15, 20	66C BCS 0			60
		Band 66	66C BCS 0	5, 10, 15, 20			
48A-48D	(0)	Band 48	5, 10, 15, 20	48D BCS 0			80
		Band 48	48D BCS 0	5, 10, 15, 20			
48C-48C	(0)	Band 48	48C BCS 0	48C BCS 0			80

5. DL Intra Band(contiguous)

E-UTRA CA configuration	Bandwidth Combination Set	E-UTRA Band	Allowed Channel BW Per Carrier (MHz)				Max Aggregated BW	
			1st Carrier	2nd Carrier	3rd Carrier	4th Carrier		
2C	(0)	Band 2	5	20			40	
			10	15, 20				
			15	10, 15, 20				
			20	5, 10, 15, 20				
5B	(0)	Band 5	5	20			20	
			10	15, 20				
	(1)	Band 5	15	10, 15, 20			8	
			20	5, 10, 15, 20				
7C	(0)	Band 7	15	15			40	
			20	20				
	(1)	Band 7	10	20			40	
			15	15, 20				
12B	(0)	Band 12	5	10, 15			15	
			10	20				
			15	15, 20				
41C	(0)	Band 41	10	20			40	
			15	15, 20				
			20	10, 15, 20				
	(1)	Band 41	5, 10	20			40	
			15	15, 20				
			20	5, 10, 15, 20				
	(2)	Band 41	10	15, 20			40	
			15	10, 15, 20				
			20	10, 15, 20				
	(3)	Band 41	10	20			40	
			15	20				
			20	20				
48C	(0)	Band 48	5, 10, 15, 20	20			40	
66B	(0)	Band 66	5	5, 10, 15			20	
			10	5, 10				
			15	5				
66C	(0)	Band 66	5	20			40	
			10	15, 20				
			15	10, 15, 20				
			20	5, 10, 15, 20				
41D	(0)	Band 41	10	20	15		60	
			10	15, 20	20			
			15	20	10, 15			
			15	10, 15, 20	20			
			20	15, 20	10			
48D	(0)	Band 48	5, 10, 15, 20	20	20		60	
			20	20	5, 10, 15			
48E	(0)	Band 48	5, 10, 15, 20	20	20	20	5, 10, 15	80

LTE Downlink Carrier Aggregation configurations (Continued)

E-UTRA CA configuration	Bandwidth Combination Set	E-UTRA Band	Allowed Channel BW Per Carrier (MHz)				Max Aggregated BW
			1st Carrier	2nd Carrier	3rd Carrier	4th Carrier	
41C	(0)	Band 41	10	20			40
			15	15, 20			
			20	10, 15, 20			
	(1)	Band 41	5, 10	20			40
			15	15, 20			
			20	10, 15, 20			
	(2)	Band 41	10	15, 20			40
			15	10, 15, 20			
			20	10, 15, 20			
	(3)	Band 41	10	20			40
			20	20			

Note(s):

LTE CA_41C is supported in both Uplink and Downlink, other CA configurations are supported only Downlink.

LTE Uplink Carrier Aggregation Combinations

Maximum Output Power (Tune-up Limit) for LTE UL Carrier Aggregation

UL CA shall be tested based on the worst-case SAR configuration determined from non-CA SAR testing result. The channel BW, channel number, RB Allocation, etc. would be selected to allow contiguous CA of PCC and SCC. Uplink output power for UL CA is the total power measured across the PCC and SCC.

UL CA power measurements were performed with QPSK modulation based on the worst-case standalone SAR. The tune-up limits are provided in table below. The UL CA mode power measurements represent the total power across both carriers. Measurements were made for all supported PCC bandwidths using the channel/RB combination resulting in the highest standalone output power at the least MPR (0 dB). SCCs were set to use configurations similar to the PCC to establish conservative or worst case equivalent SAR test conditions (highest maximum power with MPR of 0 dB).

The standalone power measurement is the power for the PCC in the non-CA mode (i.e. single carrier power). In all cases the UL CA power is less than or equal to the standalone power, which is in accordance with the tune-up limits in table below.

According to November 2017 TCB workshop, Uplink CA SAR Test Guidance as follows;

- a) When the maximum output for UL CA is ≤ standalone LTE mode (without CA)
 - PCC is configured according to the highest standalone SAR configuration tested
 - SCC and subsequent CCs are configured according to procedures used for power measurement and parameters (BW, RB etc.) similar to that used for the PCC.
- b) When the Reported SAR for UL CA configuration, described above, is > 1.2 W/kg, UL CA SAR is also required for all required test channels (PCC based).
- c) UL CA SAR is also required for standalone SAR configurations > 1.2 W/kg when they are scaled to the UL CA power level.

SAR measurement is not required for the 16QAM and 64QAM. When the highest maximum output power for 16QAM and 64QAM is ≤ 0.25 dB higher than the QPSK or when the reported SAR for the QPSK configuration is ≤ 1.45 W/kg.

RF Exposure conditions	Pwr back-off	Antenna	E-UTRA CA configuration (BCS)	Bands		DL						UL										MPR	Standalone	PCC + SCC								
				PCC	SCC	PCC			SCC			PCC					SCC							LTE Rel.8	Aggregated BW	MPR	Tune-Up Limit	CA power (total PCC+SCC)	3GPP Rel.			
				1st	2nd	BW	Freq	ch	BW	Freq	ch	Modulation	RB	Offset	BW	Freq	ch	Modulation	RB	Offset	BW									Freq	ch	
Standalone(Max)	Off	Main 2	CA_41C(0)(1)(2)(3)	41C	41C	20	2506.0	39750	20	2525.8	39948	QPSK	1	99	20	2506.0	39750	QPSK	1	0	20	2525.8	39948	0	23.00	40	0	24.0	23.20	16		
																									40	0						
																									40	0						
Standalone(Reduced)	On	Main 2	CA_41C(0)(1)(2)(3)	41C	41C	20	2549.5	40185	20	2569.3	40383	QPSK	1	99	20	2549.5	40185	QPSK	1	0	20	2569.3	40383	0	13.13	40	0	14.0	13.30	16		
																									40	0						
																									40	0						

Note:
 Standalone output power values are referenced from Sec.9.3 in the SAR Part.1 Test Report.

LTE Downlink Carrier Aggregation Combinations

The DL CA power measurement conditions for various CC's combinations were determined according LTE DL CA SAR Test Exclusion guidance in TCB workshop note (April 2018). Only yellow highlighted cells need power measurement. The following power measurements were performed with a single carrier uplink; CA for this particular project only supports one (1) uplink and up to four (4) downlinks.

LTE Release 10 Carrier Aggregation

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

Note:

Only yellow highlight cells need power measurement according to LTE DL CA SAR test Exclusion in TCB workshop (April.2018).

Single Carrier Downlink 4x4 MIMO output power results

LTE Bands	Modulation	BW (MHz)	Channel	Freq. (MHz)	RB/Offset	LTE Rel 8 Tx. Power [dBm]	DL 4x4 MIMO Tx. Power [dBm]	Delta
Band 2	QPSK	20	18700	1860.0	1/0	22.74	22.61	-0.13
Band 4	QPSK	20	20175	1732.5	1/49	21.86	21.75	-0.11
Band 25	QPSK	20	26365	1882.5	1/99	22.68	22.66	-0.02
Band 41	QPSK	20	39750	2506.0	1/99	22.73	22.65	-0.08
Band 48	QPSK	20	55773	3603.3	1/99	21.83	21.75	-0.08
Band 66	QPSK	20	132072	1720.0	1/49	22.72	22.76	0.04

Note:

According to LTE Test Conditions in TCB workshop (May, 2017), SAR is excluded for LTE downlink 4x4 MIMO operation when uplink output with DL MIMO does not exceed highest uplink output power configuration without DL MIMO by more than 1/4 dB. And for DL MIMO with carrier aggregation, the same SAR test exclusion procedure is considered.

DL CA output power results (Continued)

E-UTRA CA configuration (BCS)	Bands				UL				DL									LTE Rel 8 Tx. Power [dBm]	LTE Rel 10 Tx. Power	Delta				
	PCC	SCC1	SCC2	SCC3	PCC				PCC			SCC1			SCC2						SCC3			
	1st	2nd	3rd	4th	Mode	BW (MHz)	Channel	Freq. (MHz)	RB/Offset	BW (MHz)	Channel	Freq. (MHz)	BW (MHz)	Channel	Freq. (MHz)	BW (MHz)	Channel				Freq. (MHz)	BW (MHz)	Channel	Freq. (MHz)
25A-41D	25A	41D	41D	41D	QPSK	20	26365	1882.5	1/99	20	8365	1962.5	20	40620	2593	20	40818	2612.8	20	40422	2573.2	22.68	22.89	-0.21
48A-48D	48A	48D	48D	48D	QPSK	20	55773	3603.3	1/99	20	55773	3603.3	20	56640	3690	20	56442	3670.2	20	56244	3650.4	21.83	21.97	-0.14
	48D	48D	48D	48A	QPSK	20	55773	3603.3	1/99	20	55773	3603.3	20	55971	3623.1	20	56169	3642.9	20	56640	3690	20	56640	3690
48C-48C	48C	48C	48C	48C	QPSK	20	55773	3603.3	1/99	20	55773	3603.3	20	55971	3623.1	20	56640	3690	20	56442	3670.2	21.83	21.96	-0.13
	48E	48E	48E	48E	QPSK	20	55773	3603.3	1/99	20	55773	3603.3	20	55971	3623.1	20	56169	3642.9	20	56367	3662.7	21.83	22.00	-0.17
66A-48A-48C	66A	48A	48C	48C	QPSK	20	132072	1720	1/49	20	66536	2120	20	55340	3560	20	56640	3690	20	56442	3670.2	22.72	22.87	-0.15
66A-48D	66A	48D	48D	48D	QPSK	20	132072	1720	1/49	20	66536	2120	20	55773	3603.3	20	55971	3623.1	20	55575	3583.5	22.72	22.92	-0.20
66A-48A-48A-66A	66A	48A	48A	66A	QPSK	20	132072	1720	1/49	20	66536	2120	20	55340	3560	20	56640	3690	20	67036	2170	22.72	22.82	-0.10
66A-48C-66A	66A	48C	48C	66A	QPSK	20	132072	1720	1/49	20	66536	2120	20	56640	3690	20	56442	3670.2	20	67036	2170	22.72	22.93	-0.21
66B-48A-66A	66B	66B	48A	66A	QPSK	15	132047	1717.5	1/37	15	66511	2117.5	5	66629	2129.3	20	55340	3560	20	67036	2170	22.73	22.86	-0.13
66B-48C	66B	66B	48C	48C	QPSK	15	132047	1717.5	1/37	15	66511	2117.5	5	66629	2129.3	20	56405	3666.5	20	56009	3626.9	22.73	22.95	-0.22
66C-48A-48A	66C	66C	48A	48A	QPSK	20	132072	1720	1/49	20	66536	2120	20	66734	2139.8	20	55340	3560	20	56640	3690	22.72	22.91	-0.19
66C-48C	66C	66C	48C	48C	QPSK	20	132072	1720	1/49	20	66536	2120	20	66734	2139.8	20	56405	3666.5	20	56009	3626.9	22.72	22.93	-0.21

Note:

1. Per KDB 941225 D05A LTE Rel. 10 KDB Inquiry Sheet: SAR is excluded for Carrier Aggregation when measured power does not exceed LTE Release 8 by more than a 1/4 dB.
2. When the same frequency band is used for both contiguous and non-contiguous in DL CA Intra band, power was measured using the configuration with the largest aggregated bandwidth and maximum output power among the contiguous and non-contiguous in DL CA Intra band configurations.

DL CA with 4x4 MIMO output power results (Continued)

E-UTRA CA configuration (BCS)	Bands				UL					DL											LTE Rel 8 Tx. Power [dBm]	LTE Rel 10 Tx. Power	Delta	
	PCC	SCC1	SCC2	SCC3	PCC					SCC1			SCC2			SCC3								
	1st	2nd	3rd	4th	Mode	BW (MHz)	Channel	Freq. (MHz)	RB/Offset	BW (MHz)	Channel	Freq. (MHz)	BW (MHz)	Channel	Freq. (MHz)	BW (MHz)	Channel	Freq. (MHz)	BW (MHz)	Channel				Freq. (MHz)
13A-[66A]-66B	13A	[66A]	66B	66B	QPSK	10	23230	782	1/0	10	5230	751	20	67036	2170	15	66511	2117.5	5	66604	2126.8	23.80	23.94	-0.14
	[66A]	66B	66B	13A	QPSK	20	132072	1720	1/49	20	66536	2120	15	67061	2172.5	5	66968	2163.2	10	5230	751	22.72	22.88	-0.16
	66B	66B	[66A]	13A	QPSK	15	132047	1717.5	1/37	15	66511	2117.5	5	66604	2126.8	20	67036	2170	10	5230	751	22.73	22.86	-0.13
[25A]-41D	[25A]	41D	41D	41D	QPSK	20	26365	1882.5	1/99	20	8365	1962.5	20	40620	2593	20	40818	2612.8	20	41016	2632.6	22.68	22.86	-0.18
[48A]-48D	[48A]	48D	48D	48D	QPSK	20	55773	3603.3	1/99	20	55773	3603.3	20	56640	3690	20	56442	3670.2	20	56244	3650.4	21.83	21.96	-0.13
	48D	48D	48D	[48A]	QPSK	20	55773	3603.3	1/99	20	55773	3603.3	20	55971	3623.1	20	56169	3642.9	20	56640	3690	21.83	21.99	-0.16
48C-[48C]	48C	48C	[48C]	[48C]	QPSK	20	55773	3603.3	1/99	20	55773	3603.3	20	55971	3623.1	20	56640	3690	20	56442	3670.2	21.83	22.01	-0.18
	[48C]	[48C]	48C	48C	QPSK	20	55773	3603.3	1/99	20	55773	3603.3	20	55971	3623.1	20	56640	3690	20	56442	3670.2	21.83	21.93	-0.10
66A-48A-[48C]	66A	[48C]	[48C]	48A	QPSK	20	132072	1720	1/49	20	66536	2120	20	55340	3560	20	55538	3579.8	20	56640	3690	22.72	22.93	-0.21
66A-[48A]-48C	[66A]	[48A]	48C	48C	QPSK	20	132072	1720	1/49	20	66536	2120	20	56640	3690	20	55340	3560	20	55538	3579.8	22.72	22.92	-0.20
[66A]-[48A]-48C	[66A]	[48A]	48C	48C	QPSK	20	132072	1720	1/49	20	66536	2120	20	55340	3560	20	55538	3579.8	20	56640	3690	22.72	22.82	-0.10
66A-48A-48A-[66A]	66A	[66A]	[48A]	48A	QPSK	20	132072	1720	1/49	20	66536	2120	20	67036	2170	20	55340	3560	20	56640	3690	22.72	22.83	-0.11
66A-48A-[48A]-[66A]	[66A]	66A	[48A]	48A	QPSK	20	132072	1720	1/49	20	66536	2120	20	67036	2170	20	55340	3560	20	56640	3690	22.72	22.87	-0.15
[66A]-48A-48A-[66A]	[66A]	66A	[48A]	48A	QPSK	20	132072	1720	1/49	20	66536	2120	20	67036	2170	20	55340	3560	20	56640	3690	22.72	22.87	-0.15
66A-[48A]-[48A]-66A	66A	66A	[48C]	[48C]	QPSK	20	132072	1720	1/49	20	66536	2120	20	67036	2170	20	55990	3625	20	56188	3644.8	22.72	22.83	-0.11
66A-48C-[66A]	[66A]	[66A]	48C	48C	QPSK	20	132072	1720	1/49	20	66536	2120	20	67036	2170	20	55990	3625	20	56188	3644.8	22.72	22.82	-0.10
[66A]-48C-[66A]	[66A]	[66A]	48C	48C	QPSK	20	132072	1720	1/49	20	66536	2120	20	67036	2170	20	55990	3625	20	56188	3644.8	22.72	22.82	-0.10
[66B]-48A-48A	[66B]	[66B]	48A	48A	QPSK	15	132047	1717.5	1/37	15	66511	2117.5	5	66604	2126.8	20	55340	3560	20	56640	3690	22.73	22.95	-0.22
66B-48A-[48A]	66B	66B	[48A]	[48A]	QPSK	15	132047	1717.5	1/37	15	66511	2117.5	5	66604	2126.8	20	55340	3560	20	56640	3690	22.73	22.86	-0.13
66B-[48A]-[48A]	66B	66B	[48C]	[48C]	QPSK	15	132047	1717.5	1/37	15	66511	2117.5	5	66604	2126.8	20	55990	3625	20	56188	3644.8	22.73	22.92	-0.19
[66B]-48C	[66B]	[66B]	48C	48C	QPSK	15	132047	1717.5	1/37	15	66511	2117.5	5	66604	2126.8	20	55990	3625	20	56188	3644.8	22.73	22.84	-0.11
[66C]-48A-48A	[66C]	[66C]	48A	48A	QPSK	20	132072	1720	1/49	20	66536	2120	20	66734	2139.8	20	55340	3560	20	56640	3690	22.72	22.87	-0.15
66C-[48A]-[48A]	66C	66C	[48A]	[48A]	QPSK	20	132072	1720	1/49	20	66536	2120	20	66734	2139.8	20	55340	3560	20	56640	3690	22.72	22.92	-0.20
66C-[48C]	66C	66C	[48C]	[48C]	QPSK	20	132072	1720	1/49	20	66536	2120	20	66734	2139.8	20	55990	3625	20	56188	3644.8	22.72	22.84	-0.12
[66C]-48C	[66C]	[66C]	48C	48C	QPSK	20	132072	1720	1/49	20	66536	2120	20	66734	2139.8	20	55990	3625	20	56188	3644.8	22.72	22.86	-0.14

Note:

1. Per KDB 941225 D05A LTE Rel. 10 KDB Inquiry Sheet: SAR is excluded for Carrier Aggregation when measured power does not exceed LTE Release 8 by more than a 1/4 dB.
2. When the same frequency band is used for both contiguous and non-contiguous in DL CA Intra band, power was measured using the configuration with the largest aggregated bandwidth and maximum output power among the contiguous and non-contiguous in DL CA Intra band configurations.

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