

LTE Downlink Carrier Aggregation configurations (Continued)

2. DL Inter Band(3CC)							
E-UTRA CA configuration	Bandwidth Combination Set	E-UTRA Band	Bandwidth				Max Aggregated BW
			1.4 MHz	3 MHz	5 MHz	10 MHz	
46A-46A-66A	(0)	Band 46	46A-46A BCS 0				60
		Band 66	Yes	Yes	Yes	Yes	
46A-48A-66A	(0)	Band 46				Yes	60
		Band 48	Yes	Yes	Yes	Yes	
		Band 66	Yes	Yes	Yes	Yes	
46C-66A	(0)	Band 46	46C BCS 0				60
		Band 66	Yes	Yes	Yes	Yes	
46A-66A-66A	(0)	Band 46	66A-66A BCS 0				50
		Band 66					
48A-48A-66A	(0)	Band 48	48A-48A BCS 0				60
		Band 66	Yes	Yes	Yes	Yes	
48C-71A	(0)	Band 48	48C BCS 0				60
		Band 71	Yes	Yes	Yes	Yes	
48A-66A-66A	(0)	Band 48	66A-66A BCS 0				60
		Band 66	Yes	Yes	Yes	Yes	
48C-66A	(0)	Band 48	48C BCS 0				60
		Band 66	Yes	Yes	Yes	Yes	
66A-66A-71A	(0)	Band 66	66A-66A BCS 0				60
		Band 71	Yes	Yes	Yes	Yes	
66C-71A	(0)	Band 66	66C BCS 0				60
		Band 71	Yes	Yes	Yes	Yes	

3. DL Inter Band(4CC)							
E-UTRA CA configuration	Bandwidth Combination Set	E-UTRA Band	Bandwidth				Max Aggregated BW
			1.4 MHz	3 MHz	5 MHz	10 MHz	
5B-66A-66A	(0)	Band 5	5B BCS 0				60
		Band 66	66A-66A BCS 0				
5A-30A-66A-66A	(0)	Band 5			Yes	Yes	60
		Band 30	Yes	Yes	Yes	Yes	
		Band 66	66A-66A BCS 0				
5A-48C-66A	(0)	Band 5			Yes	Yes	70
		Band 48	48C BCS 0				
		Band 66	Yes	Yes	Yes	Yes	
5A-48A-66A-66A	(0)	Band 5			Yes	Yes	70
		Band 48	Yes	Yes	Yes	Yes	
		Band 66	66A-66A BCS 0				
12A-30A-66A-66A	(0)	Band 12			Yes	Yes	60
		Band 30	Yes	Yes	Yes	Yes	
		Band 66	66A-66A BCS 0				
14A-30A-66A-66A	(0)	Band 14			Yes	Yes	60
		Band 30	Yes	Yes	Yes	Yes	
		Band 66	66A-66A BCS 0				
25A-41D	(0)	Band 25			Yes	Yes	80
		Band 41	41D BCS 0				
29A-30A-66A-66A	(0)	Band 29			Yes	Yes	60
		Band 30	Yes	Yes	Yes	Yes	
		Band 66	66A-66A BCS 0				
46A-46C-66A	(0)	Band 46	46A-46C BCS 0				80
		Band 66	Yes	Yes	Yes	Yes	
46D-66A	(0)	Band 46	46D BCS 0				80
		Band 66	Yes	Yes	Yes	Yes	
46C-48A-66A	(0)	Band 46	66C BCS 0				80
		Band 66	Yes	Yes	Yes	Yes	
46C-66A-66A	(0)	Band 46	46C BCS 0				80
		Band 66	66A-66A BCS 0				
46A-48C-66A	(0)	Band 46				Yes	80
		Band 48	66C BCS 0				
		Band 66	Yes	Yes	Yes	Yes	
48A-48C-66A	(0)	Band 48	48A-48C BCS 0				80
		Band 66	Yes	Yes	Yes	Yes	
48A-48A-66A-66A	(0)	Band 48	48A-48C BCS 0				80
		Band 66	66A-66A BCS 0				
48C-66A-66A	(0)	Band 48	48C BCS 0				80
		Band 66	66A-66A BCS 0				
48D-66A	(0)	Band 48	48D BCS 0				80
		Band 66	Yes	Yes	Yes	Yes	

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
		Band 4	5, 10, 15, 20	5, 10, 15, 20			
4A-4A	(1)	Band 4	5, 10	5, 10			20
		Band 5	5, 10	5, 10			
5A-5A	(1)	Band 5	3	5			8
		Band 7	5	15			
7A-7A	(0)	Band 7	10	10, 15			40
		Band 7	15	15, 20			
		Band 7	20	20			
		Band 7	5, 10, 15, 20	5, 10, 15, 20			
		Band 7	5, 10, 15, 20	5, 10, 15, 20			
41A-41A	(1)	Band 41	10, 15, 20	10, 15, 20			40
		Band 41	5, 10, 15, 20	5, 10, 15, 20			
		Band 41	5, 10, 15, 20	5, 10, 15, 20			
46A-46A	(0)	Band 46	20	20			40
		Band 46	20	46C BCS 0			
46A-46C	(0)	Band 46	46C BCS 0		20		60
		Band 48	5, 10, 15, 20	5, 10, 15, 20			
48A-48A	(0)	Band 48	5, 10, 15, 20	48C BCS 0			40
		Band 48	5, 10, 15, 20	48C BCS 0			
48A-48C	(1)	Band 48	48C BCS 0	5, 10, 15, 20			60
		Band 48	5, 10, 15, 20	48D BCS 0			
48A-48D	(0)	Band 48	48D BCS 0	5, 10, 15, 20			80
		Band 48	48C BCS 0	48C BCS 0			
48C-48C	(0)	Band 48	48C BCS 0	48C BCS 0			80
		Band 66	5, 10, 15, 20	5, 10, 15, 20			
66A-66A-66A	(0)	Band 66	5, 10, 15, 20	5, 10, 15, 20	5, 10, 15, 20		60
		Band 66	5, 10, 15, 20	66B BCS 0			
66A-66B	(0)	Band 66	5, 10, 15, 20	66B BCS 0			40
		Band 66	5, 10, 15, 20	66B BCS 0			
66A-66C	(0)	Band 66	5, 10, 15, 20	66C BCS 0			60
		Band 66	66C BCS 0	5, 10, 15, 20			

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
			10	10, 15			
			15	15, 20			
			20				
	(1)	Band 7	5, 10, 15, 20	5, 10, 15, 20			40
	(2)	Band 7	5, 10, 15, 20	5, 10, 15, 20			40
41A-41A	(0)	Band 41	10, 15, 20	10, 15, 20			40
	(1)		5, 10, 15, 20	5, 10, 15, 20			40
46A-46A	(0)	Band 46	20	20			40
46A-46C	(0)	Band 46	20	46C BCS 0			60
		Band 46	46C BCS 0	20			
48A-48A	(0)	Band 48	5, 10, 15, 20	5, 10, 15, 20			40
48A-48C	(0)	Band 48	5, 10, 15, 20	48C BCS 0			60
	(1)	Band 48	48C BCS 0	5, 10, 15, 20			
48A-48D	(0)	Band 48	5, 10, 15, 20	48D BCS 0			80
			48D BCS 0	5, 10, 15, 20			80
48C-48C	(0)	Band 48	48C BCS 0	48C BCS 0			80
66A-66A	(0)	Band 66	5, 10, 15, 20	5, 10, 15, 20			40
66A-66A-66A	(0)	Band 66	5, 10, 15, 20	5, 10, 15, 20	5, 10, 15, 20		60
			5, 10, 15, 20	66B BCS0			40
66A-66B	(0)	Band 66	66B BCS0	5, 10, 15, 20			40
			5, 10, 15, 20	66C BCS0			60
66A-66C	(0)	Band 66	66C BCS0	5, 10, 15, 20			60

4. 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	5th Carrier	
2C	(0)	Band 2	5	20				40
			10	15, 20				
			15	10, 15, 20				
5B	(0)	Band 5	5, 10	10				20
			10	5				
	(1)	Band 5	3	5				8
			5	3				
12B	(0)	Band 12	5, 10	5				15
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					
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			
			20	10, 15, 20	15, 20			
46C	(0)	Band 46	20	20				40
	(1)	Band 46	20	10, 20				40
46D	(0)	Band 46	20	20	20			60
	(1)	Band 46	20	20	10, 20			60
48B	(0)	Band 48	10, 20	20				60
			10	20				
48C	(0)	Band 48	10	10				20
			5, 10, 15, 20	20				
48D	(0)	Band 48	20	5, 10, 15				40
			5, 10, 15, 20	20	20			
66B	(0)	Band 66	20	5, 10, 15				60
			5, 10, 15	20				
			5	5, 10, 15				
66C	(0)	Band 66	5	20				40
			10	15, 20				
			15	10, 15, 20				
			20	5, 10, 15, 20				

LTE Uplink / Downlink Carrier Aggregation Intra-band configurations

6 UL 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	5th 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	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
			20	20				
	48C	(0)	Band 48	5, 10, 15, 20	20			
20				5, 10, 15				

Note:
 LTE CA_48C 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.

E-UTRA CA configurations	RF exposure conditions	Bands		UL																LTE Rel.8 Tune-up Limit (dBm)	
		PCC	SCC	PCC				SCC				MPR	PCC + SCC								
		1st	2nd	Mod	RB	Offset	BW	Freq	Ch	Mod	RB		Offset	BW	Freq	Ch	Aggregated BW	Tune-up Limit (dBm)	CA power (total PCC+SCC) (dBm)		3GPP Rel.#
CA_41C (0)(1)(2)(3)	Head	41C	41C	QPSK	1	0	20	2636.5	41055	QPSK	1	99	20	2616.7	40857	0	40	24.00	23.50	16	20.50
CA_41C (0)(1)(2)(3)	Body Worn	41C	41C	QPSK	1	0	20	2636.5	41055	QPSK	1	99	20	2616.7	40857	0	40	24.00	23.50	16	20.50
CA_41C (0)(1)(2)(3)	Hotspot	41C	41C	QPSK	1	0	20	2636.5	41055	QPSK	1	99	20	2616.7	40857	0	40	22.00	21.65	16	20.50
CA_48C (0)	Head	48C	48C	QPSK	50	0	20	56296	3636.7	QPSK	50	50	20	3626.9	56009	0	40	21.50	18.55	16	20.50
CA_48C (0)	Body Worn & Hotspot	48C	48C	QPSK	1	0	20	56207	3646.7	QPSK	1	99	20	3626.9	56009	0	40	22.00	20.41	16	21.00

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
2CC#1	2A-2A		3CC#1
2CC#2	2C		3CC#9
2CC#3	2A-4A		3CC#1
2CC#4	2A-5A		3CC#2
2CC#5	2A-7A		
2CC#6	2A-12A		3CC#3
2CC#7	2A-13A		3CC#24
2CC#8	2A-14A		3CC#4
2CC#9	2A-29A	B29 SCC only	3CC#27
2CC#10	2A-30A		3CC#6
2CC#11	2A-46A	B46 SCC only	3CC#7
2CC#12	2A-48A	B48 SCC only	3CC#34
2CC#13	2A-66A		3CC#8
2CC#14	2A-71A		3CC#10
2CC#15	4A-4A		3CC#11
2CC#16	4A-5A		3CC#12
2CC#17	4A-12A		3CC#13
2CC#18	4A-13A		3CC#14
2CC#19	4A-46A	B46 SCC only	3CC#44
2CC#20	4A-48A	B48 SCC only	
2CC#21	4A-71A		3CC#15
2CC#22	5B		3CC#47
2CC#23	5A-25A		
2CC#24	5A-30A		3CC#17
2CC#25	5A-46A	B46 SCC only	3CC#18
2CC#26	5A-48A	B48 SCC only	3CC#19
2CC#27	5A-66A		3CC#20
2CC#28	12B		2A-12B
2CC#29	12A-25A		
2CC#30	12A-30A		3CC#22
2CC#31	12A-46A	B46 SCC only	
2CC#32	12A-48A	B48 SCC only	
2CC#33	12A-66A		3CC#23
2CC#34	13A-46A	B46 SCC only	
2CC#35	13A-48A	B48 SCC only	

Index	3CC	Restriction	Completely Covered by Measurement Superset
3CC#1	2A-2A-4A		4CC#1
3CC#2	2A-2A-5A		4CC#2
3CC#3	2A-2A-12A		4CC#3
3CC#4	2A-2A-14A		4CC#11
3CC#5	2A-2A-29A	B29 SCC only	4CC#13
3CC#6	2A-2A-30A		4CC#6
3CC#7	2A-2A-46A	B46 SCC only	
3CC#8	2A-2A-66A		4CC#7
3CC#9	2C-66A		4CC#19
3CC#10	2A-2A-71A		4CC#4
3CC#11	2A-4A-4A		4CC#1
3CC#12	2A-4A-5A		4CC#2
3CC#13	2A-4A-12A		4CC#3
3CC#14	2A-4A-13A		
3CC#15	2A-4A-71A		4CC#4
3CC#16	2A-5B		4CC#24
3CC#17	2A-5A-30A		4CC#6
3CC#18	2A-5A-46A	B46 SCC only	
3CC#19	2A-5A-48A	B48 SCC only	4CC#28
3CC#20	2A-5A-66A		4CC#7
3CC#21	2A-12B		4CC#8
3CC#22	2A-12A-30A		4CC#9
3CC#23	2A-12A-66A		4CC#10
3CC#24	2A-13A-66A		
3CC#25	2A-14A-30A		4CC#11
3CC#26	2A-14A-66A		4CC#12
3CC#27	2A-29A-30A	B29 SCC only	4CC#13
3CC#28	2A-29A-66A	B29 SCC only	4CC#14
3CC#29	2A-30A-66A		4CC#15
3CC#30	2A-46A-46A	B46 SCC only	4CC#42
3CC#31	2A-46C	B46 SCC only	4CC#16
3CC#32	2A-46A-48A	B46/B48 SCC only	4CC#45
3CC#33	2A-46A-66A	B46 SCC only	4CC#42
3CC#34	2A-48A-48A	B48 SCC only	4CC#48
3CC#35	2A-48C	B48 SCC only	4CC#27

Index	4CC	Restriction	Completely Covered by Measurement Superset
4CC#1	2A-2A-4A-4A		
4CC#2	2A-2A-4A-5A		
4CC#3	2A-2A-4A-12A		
4CC#4	2A-2A-4A-71A		
4CC#5	2A-2A-5B		
4CC#6	2A-2A-5A-30A		
4CC#7	2A-2A-5A-66A		
4CC#8	2A-2A-12B		
4CC#9	2A-2A-12A-30A		
4CC#10	2A-2A-12A-66A		
4CC#11	2A-2A-14A-30A		
4CC#12	2A-2A-14A-66A		
4CC#13	2A-2A-29A-30A	B29 SCC only	
4CC#14	2A-2A-29A-66A	B29 SCC only	
4CC#15	2A-2A-30A-66A		
4CC#16	2A-2A-46C	B46 SCC only	
4CC#17	2A-2A-66A-66A		
4CC#18	2A-2A-66C		
4CC#19	2C-66A-66A		
4CC#20	2A-2A-66A-71A		
4CC#21	2A-4A-4A-5A		
4CC#22	2A-4A-4A-12A		
4CC#23	2A-4A-12B		
4CC#24	2A-5B-30A		
4CC#25	2A-5B-66A		
4CC#26	2A-5A-30A-66A		
4CC#27	2A-5A-48C	B48 SCC only	
4CC#28	2A-5A-48A-66A	B48 SCC only	
4CC#29	2A-5A-66A-66A		
4CC#30	2A-12B-66A		
4CC#31	2A-12A-30A-66A		
4CC#32	2A-12A-66A-66A		
4CC#33	2A-12A-66C		
4CC#34	2A-14A-30A-66A		
4CC#35	2A-14A-66A-66A		

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

LTE Release 10 Carrier Aggregation (Continued)

Index	2CC	Restriction	Completely Covered by Measurement Superset
2CC#36	13A-66A		3CC#24
2CC#37	14A-30A		3CC#25
2CC#38	14A-66A		3CC#26
2CC#39	25A-25A		
2CC#40	25A-41A	B41 SCC only	
2CC#41	29A-30A	B29 SCC only	3CC#27
2CC#42	29A-66A	B29 SCC only	3CC#28
2CC#43	30A-66A		3CC#29
2CC#44	41A-41A		
2CC#45	41C		3CC#65
2CC#46	46A-48A	B46 SCC only	3CC#68
2CC#47	46A-66A	B46 SCC only	3CC#50
2CC#48	48A-48A		
2CC#49	48B		
2CC#50	48C		3CC#51
2CC#51	48A-66A	B48 SCC only	3CC#52
2CC#52	48A-71A	B48 SCC only	
2CC#53	66A-66A		3CC#53
2CC#54	66B		
2CC#55	66C		3CC#58
2CC#56	66A-71A		4CC#20

Index	3CC	Restriction	Completely Covered by Measurement Superset
3CC#36	2A-48A-66A	B48 SCC only	4CC#50
3CC#37	2A-66A-66A		4CC#17
3CC#38	2A-66C		4CC#18
3CC#39	2A-66A-71A		4CC#20
3CC#40	4A-4A-5A		4CC#21
3CC#41	4A-4A-12A		4CC#22
3CC#42	4A-4A-71A		
3CC#43	4A-12B		4CC#23
3CC#44	4A-46A-46A	B46 SCC only	
3CC#45	4A-46C	B46 SCC only	4CC#54
3CC#46	4A-48C	B48 SCC only	
3CC#47	5B-30A		4CC#24
3CC#48	5B-66A		4CC#25
3CC#49	5A-30A-66A		4CC#26
3CC#50	5A-46A-66A	B46 SCC only	
3CC#51	5A-48C	B48 SCC only	4CC#27
3CC#52	5A-48A-66A	B48 SCC only	4CC#28
3CC#53	5A-66A-66A		4CC#29
3CC#54	12B-66A		4CC#30
3CC#55	12A-30A-66A		4CC#31
3CC#56	12A-48C	B48 SCC only	
3CC#57	12A-66A-66A		4CC#32
3CC#58	12A-66C		4CC#33
3CC#59	14A-30A-66A		4CC#62
3CC#60	14A-66A-66A		4CC#35
3CC#61	25A-41C	B41 SCC only	
3CC#62	29A-30A-66A	B29 SCC only	4CC#36
3CC#63	29A-66A-66A	B29 SCC only	4CC#37
3CC#64	30A-66A-66A		4CC#38
3CC#65	41A-41C		
3CC#66	41D		
3CC#67	46A-46A-66A	B46 SCC only	4CC#42
3CC#68	46A-48A-66A	B46/B48 SCC only	4CC#45
3CC#69	46C-66A	B46 SCC only	4CC#67
3CC#70	46A-66A-66A	B46 SCC only	
3CC#71	48A-48C		
3CC#72	48D		4CC#70
3CC#73	48A-48A-66A	B48 SCC only	4CC#48
3CC#74	48C-71A	B48 SCC only	4CC#71
3CC#75	48A-66A-66A	B48 SCC only	4CC#50
3CC#76	48C-66A	B48 SCC only	4CC#49
3CC#77	66A-66A-66A		

Index	4CC	Restriction	Completely Covered by Measurement Superset
4CC#36	2A-29A-30A-66A	B29 SCC only	
4CC#37	2A-29A-66A-66A	B29 SCC only	
4CC#38	2A-30A-66A-66A		
4CC#39	2A-46A-46C	B46 SCC only	
4CC#40	2A-46D	B46 SCC only	
4CC#41	2A-46C-48A	B46/B48 SCC only	
4CC#42	2A-46A-46A-66A	B46 SCC only	
4CC#43	2A-46C-66A	B46 SCC only	
4CC#44	2A-46A-48C	B46/B48 SCC only	
4CC#45	2A-46A-48A-66A	B46/B48 SCC only	
4CC#46	2A-48A-48C	B48 SCC only	
4CC#47	2A-48D	B48 SCC only	
4CC#48	2A-48A-48A-66A	B48 SCC only	
4CC#49	2A-48C-66A	B48 SCC only	
4CC#50	2A-48A-66A-66A	B48 SCC only	
4CC#51	2A-66A-66A-71A		
4CC#52	2A-66C-71A		
4CC#53	4A-4A-12B		
4CC#54	4A-46A-46C	B46 SCC only	
4CC#55	4A-46D	B46 SCC only	
4CC#56	5B-30A-66A		
4CC#57	5B-66A-66A		
4CC#58	5A-30A-66A-66A		
4CC#59	5A-48C-66A	B48 SCC only	
4CC#60	5A-48A-66A-66A	B48 SCC only	
4CC#61	12A-30A-66A-66A		
4CC#62	14A-30A-66A-66A		
4CC#63	25A-41D	B41 SCC only	
4CC#64	29A-30A-66A-66A	B29 SCC only	
4CC#65	46A-46C-66A	B46 SCC only	
4CC#66	46D-66A	B46 SCC only	
4CC#67	46C-48A-66A	B46/B48 SCC only	
4CC#68	46C-66A-66A	B46 SCC only	
4CC#69	46A-48C-66A	B46/B48 SCC only	
4CC#70	48A-48D		
4CC#71	48C-48C		
4CC#72	48E		
4CC#73	48A-48C-66A	B48 SCC only	
4CC#74	48A-48A-66A-66A	B48 SCC only	
4CC#75	48C-66A-66A	B48 SCC only	
4CC#76	48D-66A	B48 SCC only	

Note:

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

LTE Release 10 Carrier Aggregation with 4x4 MIMO

Index	2CC	Restriction	Completely Covered by Measurement Superset
2CC#1	[2A]-2A		3CC#2
2CC#2	[2A]-[2A]		3CC#6
2CC#3	[2C]		3CC#27
2CC#4	2A-[4A]		3CC#4
2CC#5	[2A]-4A		3CC#6
2CC#6	[2A]-[4A]		3CC#4
2CC#7	[2A]-5A		3CC#8
2CC#8	[2A]-7A		
2CC#9	[2A]-12A		3CC#10
2CC#10	[2A]-13A		3CC#46
2CC#11	[2A]-14A		3CC#13
2CC#12	[2A]-29A	B29 SCC only	3CC#15
2CC#13	[2A]-30A		3CC#16
2CC#14	[2A]-46A	B46 SCC only	3CC#20
2CC#15	2A-[48A]		3CC#54
2CC#16	[2A]-48A		3CC#55
2CC#17	[2A]-[48A]		3CC#56
2CC#18	2A-[66A]		3CC#21
2CC#19	[2A]-66A		3CC#22
2CC#20	[2A]-[66A]		3CC#23
2CC#21	[2A]-71A		3CC#29
2CC#22	[4A]-4A		3CC#32
2CC#23	[4A]-[4A]		3CC#35
2CC#24	[4A]-5A		3CC#39
2CC#25	[4A]-12A		3CC#42
2CC#26	[4A]-13A	B48 SCC only	3CC#45
2CC#27	[4A]-46A	B46 SCC only	3CC#121
2CC#28	4A-[48A]	B48 SCC only	
2CC#29	[4A]-48A	B48 SCC only	
2CC#30	[4A]-[48A]	B48 SCC only	
2CC#31	[4A]-71A		3CC#48
2CC#32	5A-[25A]		
2CC#33	5A-[48A]	B48 SCC only	3CC#56
2CC#34	5A-[66A]		3CC#57
2CC#35	12A-[25A]		
2CC#36	12A-[48A]	B48 SCC only	
2CC#37	12A-[66A]		3CC#64
2CC#38	13A-[48A]	B48 SCC only	
2CC#39	13A-[66A]		3CC#67
2CC#40	14A-[66A]		3CC#69

Index	3CC	Restriction	Completely Covered by Measurement Superset
3CC#1	2A-2A-[4A]		4CC#1
3CC#2	2A-[2A]-4A		4CC#2
3CC#3	p		4CC#4
3CC#4	[2A]-[2A]-4A		4CC#5
3CC#5	[2A]-[2A]-[4A]		
3CC#6	[2A]-2A-5A		4CC#8
3CC#7	[2A]-[2A]-5A		4CC#9
3CC#8	[2A]-2A-12A		4CC#12
3CC#9	[2A]-[2A]-12A		4CC#13
3CC#10	[2A]-2A-14A		4CC#35
3CC#11	[2A]-[2A]-14A		4CC#36
3CC#12	[2A]-2A-29A	B29 SCC only	4CC#44
3CC#13	[2A]-[2A]-29A	B29 SCC only	4CC#46
3CC#14	[2A]-2A-30A		4CC#48
3CC#15	[2A]-[2A]-30A		4CC#50
3CC#16	2A-[2A]-46A	B46 SCC only	
3CC#17	[2A]-[2A]-46A	B46 SCC only	
3CC#18	2A-2A-[66A]		4CC#47
3CC#19	[2A]-2A-66A		4CC#48
3CC#20	[2A]-2A-[66A]		4CC#49
3CC#21	[2A]-[2A]-66A		4CC#50
3CC#22	[2A]-[2A]-[66A]		
3CC#23	2C-[66A]		4CC#67
3CC#24	[2C]-66A		4CC#68
3CC#25	[2C]-[66A]		4CC#69
3CC#26	2A-[2A]-71A		4CC#16
3CC#27	[2A]-2A-71A		4CC#16
3CC#28	[2A]-[2A]-71A		4CC#17
3CC#29	2A-4A-[4A]		4CC#4
3CC#30	[2A]-4A-4A		4CC#5
3CC#31	2A-[4A]-[4A]		4CC#3
3CC#32	[2A]-4A-[4A]		4CC#4
3CC#33	[2A]-[4A]-[4A]		
3CC#34	2A-[4A]-5A		4CC#6
3CC#35	[2A]-4A-5A		4CC#7
3CC#36	[2A]-[4A]-5A		4CC#8
3CC#37	2A-[4A]-12A		4CC#10
3CC#38	[2A]-4A-12A		4CC#11
3CC#39	[2A]-[4A]-12A		4CC#12
3CC#40	2A-[4A]-13A		

Index	4CC	Restriction	Completely Covered by Measurement Superset
4CC#1	2A-2A-[4A]-4A		
4CC#2	[2A]-2A-4A-4A		
4CC#3	2A-2A-[4A]-[4A]		
4CC#4	[2A]-2A-[4A]-4A		
4CC#5	[2A]-[2A]-4A-4A		
4CC#6	2A-2A-[4A]-5A		
4CC#7	[2A]-2A-4A-5A		
4CC#8	[2A]-2A-[4A]-5A		
4CC#9	[2A]-[2A]-4A-5A		
4CC#10	2A-2A-[4A]-12A		
4CC#11	[2A]-2A-4A-12A		
4CC#12	[2A]-2A-[4A]-12A		
4CC#13	[2A]-[2A]-4A-12A		
4CC#14	2A-2A-[4A]-71A		
4CC#15	[2A]-2A-4A-71A		
4CC#16	[2A]-2A-[4A]-71A		
4CC#17	[2A]-[2A]-4A-71A		
4CC#18	[2A]-2A-5B		
4CC#19	[2A]-[2A]-5B		
4CC#20	[2A]-2A-5A-30A		
4CC#21	[2A]-[2A]-5A-30A		
4CC#22	2A-2A-5A-[66A]		
4CC#23	[2A]-2A-5A-66A		
4CC#24	[2A]-2A-5A-[66A]		
4CC#25	[2A]-[2A]-5A-66A		
4CC#26	[2A]-2A-12B		
4CC#27	[2A]-[2A]-12B		
4CC#28	[2A]-2A-12A-30A		
4CC#29	[2A]-[2A]-12A-30A		
4CC#30	2A-2A-12A-[66A]		
4CC#31	[2A]-2A-12A-66A		
4CC#32	[2A]-2A-12A-[66A]		
4CC#33	[2A]-[2A]-12A-66A		
4CC#34	[2A]-2A-14A-30A		
4CC#35	[2A]-[2A]-14A-30A		
4CC#36	2A-2A-14A-[66A]		
4CC#37	[2A]-2A-14A-66A		
4CC#38	[2A]-2A-14A-[66A]		
4CC#39	[2A]-[2A]-14A-66A		
4CC#40	[2A]-2A-29A-30A	B29 SCC only	

Note:

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

LTE Release 10 Carrier Aggregation with 4x4 MIMO (Continued)

Index	2CC	Restriction	Completely Covered by Measurement Superset
2CC#41	25A-[25A]		
2CC#42	[25A]-[25A]		
2CC#43	25A-[41A]	B41 SCC only	
2CC#44	[25A]-41A	B41 SCC only	
2CC#45	[25A]-[41A]	B41 SCC only	
2CC#46	29A-[66A]		3CC#75
2CC#47	30A-[66A]		3CC#78
2CC#48	41A-[41A]		
2CC#49	[41A]-[41A]		
2CC#50	[41C]		3CC#148
2CC#51	46A-[48A]	B46 SCC only	3CC#83
2CC#52	46A-[66A]	B46 SCC only	3CC#86
2CC#53	[48A]-48A		
2CC#54	[48A]-[48A]		
2CC#55	[48B]		
2CC#56	[48C]		3CC#158
2CC#57	[48A]-66A	B48 SCC only	3CC#100
2CC#58	48A-[66A]	B48 SCC only	3CC#99
2CC#59	[48A]-[66A]	B48 SCC only	3CC#101
2CC#60	[48A]-71A	B48 SCC only	
2CC#61	66A-[66A]		3CC#133
2CC#62	[66A]-66A		3CC#134
2CC#63	[66A]-[66A]		3CC#135
2CC#64	[66B]		
2CC#65	[66C]		3CC#142
2CC#66	[66A]-71A		3CC#185

Index	3CC	Restriction	Completely Covered by Measurement Superset
3CC#41	[2A]-4A-13A		
3CC#42	[2A]-[4A]-13A		
3CC#43	2A-[4A]-71A		4CC#14
3CC#44	[2A]-4A-71A		4CC#15
3CC#45	[2A]-[4A]-71A		4CC#16
3CC#46	[2A]-5B		4CC#18
3CC#47	[2A]-5A-30A		4CC#20
3CC#48	[2A]-5A-46A	B46 SCC only	
3CC#49	2A-5A-[48A]	B48 SCC only	4CC#97
3CC#50	[2A]-5A-48A	B48 SCC only	4CC#98
3CC#51	[2A]-5A-[48A]	B48 SCC only	4CC#101
3CC#52	2A-5A-[66A]		4CC#102
3CC#53	[2A]-5A-66A		4CC#103
3CC#54	[2A]-5A-[66A]		4CC#105
3CC#55	[2A]-12B		4CC#107
3CC#56	[2A]-12A-30A		4CC#110
3CC#57	2A-12A-[66A]		4CC#112
3CC#58	[2A]-12A-66A		4CC#113
3CC#59	[2A]-12A-[66A]		4CC#114
3CC#60	2A-13A-[66A]		
3CC#61	[2A]-13A-66A		
3CC#62	[2A]-13A-[66A]		
3CC#63	[2A]-14A-30A		4CC#118
3CC#64	2A-14A-[66A]		4CC#120
3CC#65	[2A]-14A-66A		4CC#118
3CC#66	[2A]-14A-[66A]		4CC#119
3CC#67	[2A]-29A-30A	B29 SCC only	4CC#125
3CC#68	2A-29A-[66A]	B29 SCC only	4CC#127
3CC#69	[2A]-29A-66A	B29 SCC only	4CC#128
3CC#70	[2A]-29A-[66A]	B29 SCC only	4CC#130
3CC#71	2A-30A-[66A]		4CC#131
3CC#72	[2A]-30A-66A		4CC#132
3CC#73	[2A]-30A-[66A]		4CC#134
3CC#74	[2A]-46A-46A	B46 SCC only	4CC#141
3CC#75	[2A]-46C	B46 SCC only	4CC#135
3CC#76	2A-46A-[48A]	B46/B48 SCC only	4CC#149
3CC#77	[2A]-46A-48A	B46/B48 SCC only	4CC#150
3CC#78	[2A]-46A-[48A]	B46/B48 SCC only	4CC#153
3CC#79	2A-46A-[66A]	B46 SCC only	4CC#148
3CC#80	[2A]-46A-66A	B46 SCC only	4CC#150

Index	4CC	Restriction	Completely Covered by Measurement Superset
4CC#41	[2A]-[2A]-29A-30A	B29 SCC only	
4CC#42	2A-2A-29A-[66A]	B29 SCC only	
4CC#43	[2A]-2A-29A-66A	B29 SCC only	
4CC#44	[2A]-2A-29A-[66A]	B29 SCC only	
4CC#45	[2A]-[2A]-29A-66A	B29 SCC only	
4CC#46	2A-2A-30A-[66A]		
4CC#47	[2A]-2A-30A-66A		
4CC#48	[2A]-2A-30A-[66A]		
4CC#49	[2A]-[2A]-30A-66A		
4CC#50	2A-[2A]-46C	B46 SCC only	
4CC#51	[2A]-[2A]-46C	B46 SCC only	
4CC#52	2A-2A-66A-[66A]		
4CC#53	2A-[2A]-66A-66A		
4CC#54	2A-2A-[66A]-[66A]		
4CC#55	2A-[2A]-66A-[66A]		
4CC#56	[2A]-[2A]-66A-66A		
4CC#57	2A-2A-[66C]		
4CC#58	[2A]-2A-66C		
4CC#59	[2A]-[2A]-66C		
4CC#60	2C-[66A]-66A		
4CC#61	[2C]-66A-66A		
4CC#62	2C-[66A]-[66A]		
4CC#63	2A-2A-[66A]-71A		
4CC#64	2A-[2A]-66A-71A		
4CC#65	2A-[2A]-[66A]-71A		
4CC#66	[2A]-[2A]-66A-71A		
4CC#67	2A-[4A]-4A-5A		
4CC#68	[2A]-4A-4A-5A		
4CC#69	2A-[4A]-[4A]-5A		
4CC#70	[2A]-[4A]-4A-5A		
4CC#71	2A-[4A]-4A-12A		
4CC#72	[2A]-4A-4A-12A		
4CC#73	2A-[4A]-[4A]-12A		
4CC#74	[2A]-[4A]-4A-12A		
4CC#75	2A-[4A]-12B		
4CC#76	[2A]-4A-12B		
4CC#77	[2A]-[4A]-12B		
4CC#78	[2A]-5B-30A		
4CC#79	2A-5B-[66A]		
4CC#80	[2A]-5B-66A		

Note:

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

LTE Release 10 Carrier Aggregation with 4x4 MIMO (Continued)

Index	4CC	Restriction	Completely Covered by Measurement Superset
4CC#201	46C-[66A]-[66A]	B46 SCC only	
4CC#202	46A-[48C]-66A	B46/B48 SCC only	
4CC#203	46A-48C-[66A]	B46/B48 SCC only	
4CC#204	[48A]-48D		
4CC#205	[48C]-48C		
4CC#206	[48A]-48C-66A	B48 SCC only	
4CC#207	48A-[48C]-66A	B48 SCC only	
4CC#208	48A-48C-[66A]	B48 SCC only	
4CC#209	[48A]-48C-[66A]	B48 SCC only	
4CC#210	[48A]-48A-66A-66A	B48 SCC only	
4CC#211	48A-48A-[66A]-66A	B48 SCC only	
4CC#212	[48A]-[48A]-66A-66A	B48 SCC only	
4CC#213	[48A]-48A-[66A]-66A	B48 SCC only	
4CC#214	48A-48A-[66A]-[66A]	B48 SCC only	
4CC#215	[48C]-66A-66A	B48 SCC only	
4CC#216	48C-[66A]-66A	B48 SCC only	
4CC#217	48C-[66A]-[66A]	B48 SCC only	
4CC#218	48D-[66A]	B48 SCC only	

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	1/49	24.4	24.5	0.12
Band 4	QPSK	20	20850	2510	1/0	24.0	24.1	0.15
Band 25	QPSK	20	26140	1860	1/0	24.3	24.3	0.03
Band 41	QPSK	20	41055	2636.5	1/0	23.5	23.6	0.08
Band 48	QPSK	20	55773	3603.3	50/50	20.9	21.0	0.02
Band 66	QPSK	20	132322	1745	1/49	23.9	23.9	0.03

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)

Table with columns for E-UTRA CA configuration (BCS), Bands (PCC, SCC1, SCC2, SCC3), UL (PCC), DL (PCC, SCC1, SCC2, SCC3), LTE Rel 8 Tx. Power [dBm], LTE Rel 10 Tx. Power [dBm], and Delta. It lists various carrier aggregation configurations and their corresponding power results.

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 output power results (Continued)

Table with columns: E-UTRA CA configuration (BCS), Bands (PCC, SCC1, SCC2, SCC3), UL (PCC), DL (PCC, SCC1, SCC2, SCC3), LTE Rel 8 Tx. Power [dBm], LTE Rel 10 Tx. Power [dBm], and Delta. Rows include configurations like 2A-66A-66A-71A, 2A-66C-71A, 4A-4A-12B, etc.

- 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					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)
[48A]-48A-[66A]-66A	66A	[66A]	48A	[48A]	QPSK	20	132072	1720	1/99	20	66536	2120	20	67036	2170	20	55773	3603.3	20	56640	3690	23.84	23.91	-0.07
	[66A]	66A	48A	[48A]	QPSK	20	132072	1720	1/99	20	66536	2120	20	67036	2170	20	55773	3603.3	20	56640	3690	23.84	23.92	-0.08
48A-48A-[66A]-[66A]	[66A]	[66A]	48A	48A	QPSK	20	132072	1720	1/99	20	66536	2120	20	67036	2170	20	55773	3603.3	20	56640	3690	23.84	23.97	-0.13
[48C]-66A-66A	66A	66A	[48C]	[48C]	QPSK	20	132072	1720	1/99	20	66536	2120	20	67036	2170	20	55773	3603.3	20	55575	3583.5	23.84	23.86	-0.02
	66A	[66A]	48C	48C	QPSK	20	132072	1720	1/99	20	66536	2120	20	67036	2170	20	55773	3603.3	20	55575	3583.5	23.84	23.91	-0.07
48C-[66A]-66A	[66A]	66A	48C	48C	QPSK	20	132072	1720	1/99	20	66536	2120	20	67036	2170	20	55773	3603.3	20	55575	3583.5	23.84	23.92	-0.08
48C-[66A]-[66A]	[66A]	[66A]	48C	48C	QPSK	20	132072	1720	1/99	20	66536	2120	20	67036	2170	20	55773	3603.3	20	55575	3583.5	23.84	23.89	-0.05
48D-[66A]	[66A]	48D	48D	48D	QPSK	20	132322	1745	1/49	20	66786	2145	20	55773	3603.3	20	55575	3583.5	20	55971	3623.1	23.88	24.01	-0.13

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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