

1. LTE Downlink Carrier Aggregation configurations

1. DL Inter Band(2CC)

E-UTRA CA configuration	Combination Set	E-UTRA Band	Bandwidth						Max Aggregated BW
			1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz	
2A-4A	(0)	Band 2	Yes	Yes	Yes	Yes	Yes	Yes	40
		Band 4			Yes	Yes	Yes	Yes	
	(1)	Band 2			Yes	Yes			20
		Band 4			Yes	Yes			
	(2)	Band 2			Yes	Yes	Yes	Yes	40
		Band 4			Yes	Yes	Yes	Yes	
2A-5A	(0)	Band 2			Yes	Yes	Yes	Yes	30
		Band 5			Yes	Yes			
	(1)	Band 2			Yes	Yes			20
		Band 5			Yes	Yes			
2A-12A	(0)	Band 2			Yes	Yes	Yes	Yes	30
		Band 12			Yes	Yes			
2A-17A	(0)	Band 2			Yes	Yes			20
		Band 17			Yes	Yes			
2A-66A	(0)	Band 2	Yes	Yes	Yes	Yes	Yes	Yes	40
		Band 66			Yes	Yes	Yes	Yes	
	(1)	Band 2			Yes	Yes			20
		Band 66			Yes	Yes			
	(2)	Band 2			Yes	Yes	Yes	Yes	40
		Band 66			Yes	Yes	Yes	Yes	
4A-5A	(0)	Band 2			Yes	Yes			20
		Band 71			Yes	Yes			
	(1)	Band 4			Yes	Yes	Yes	Yes	30
		Band 5			Yes	Yes			
4A-12A	(0)	Band 4	Yes	Yes	Yes	Yes			20
		Band 12			Yes	Yes			
	(1)	Band 4	Yes	Yes	Yes	Yes	Yes	Yes	30
		Band 12			Yes	Yes			
	(2)	Band 4			Yes	Yes	Yes	Yes	30
		Band 12			Yes	Yes			
	(3)	Band 4			Yes	Yes			20
		Band 12			Yes	Yes			
	(4)	Band 4			Yes	Yes	Yes	Yes	30
		Band 12			Yes	Yes			
(5)	Band 4			Yes	Yes	Yes	Yes	20	
	Band 12			Yes	Yes				
4A-13A	(0)	Band 4			Yes	Yes	Yes	Yes	30
		Band 13			Yes	Yes			
	(1)	Band 4			Yes	Yes			20
4A-17A	(0)	Band 4			Yes	Yes			20
		Band 17			Yes	Yes			
5A-41A	(0)	Band 5			Yes	Yes			30
		Band 41						Yes	
5A-66A	(0)	Band 5			Yes	Yes			30
		Band 66			Yes	Yes	Yes	Yes	
12A-66A	(0)	Band 12			Yes	Yes			20
		Band 66	Yes	Yes	Yes	Yes			
	(1)	Band 12			Yes	Yes			30
		Band 66	Yes	Yes	Yes	Yes	Yes	Yes	
	(2)	Band 12			Yes	Yes			30
		Band 66			Yes	Yes	Yes	Yes	
	(3)	Band 12			Yes	Yes			20
		Band 66			Yes	Yes			
	(4)	Band 12			Yes	Yes			30
		Band 66			Yes	Yes	Yes	Yes	
(5)	Band 12			Yes	Yes			20	
	Band 66			Yes	Yes	Yes	Yes		
2A-13A	(0)	Band 2			Yes	Yes	Yes	Yes	30
		Band 13			Yes	Yes			
(1)	Band 2			Yes	Yes			20	
	Band 13			Yes	Yes				
26A-41A	(0)	Band 26			Yes	Yes	Yes		35
		Band 41			Yes	Yes	Yes	Yes	

2. DL Inter Band(3CC)

E-UTRA CA configuration	Combination Set	E-UTRA Band	Bandwidth						Max Aggregated BW
			1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz	
2A-4A-5A	(0)	Band 2			Yes	Yes	Yes	Yes	50
		Band 4			Yes	Yes	Yes	Yes	
		Band 5			Yes	Yes			
2A-4A-13A	(0)	Band 2			Yes	Yes	Yes	Yes	50
		Band 4			Yes	Yes	Yes	Yes	
		Band 13				Yes			
4A-4A-12A	(0)	Band 4	4A-4A BCS 0						50
		Band 12			Yes	Yes			
5A-66A-66A	(0)	Band 5			Yes	Yes			50
		Band 12			Yes	Yes			
12A-66A-66A	(0)	Band 12			Yes	Yes			50
		Band 66	66A-66A BCS 0						

3. DL Intra Band(non-contiguous)

E-UTRA CA configuration	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
			5, 10, 15, 20	5, 10, 15, 20			
4A-4A	(0)	Band 4	5, 10, 15, 20	5, 10, 15, 20			40
			5, 10	5, 10			
41A-41A	(0)	Band 41	5, 10, 15, 20	5, 10, 15, 20			40
			5, 10, 15, 20	5, 10, 15, 20			
41A-41C	(0)	Band 41	5, 10, 15, 20	41C BCS 1			60
			5, 10, 15, 20	41C BCS 1	5, 10, 15, 20		
41A-41D	(0)	Band 41	15, 20	BCS 0			80
			5, 10, 15, 20	41D BCS 0			
41C-41C	(0)	Band 41	41C BCS 1				80
41C-41D	(0)	Band 41	41C BCS 0	41D BCS 0			100
66A-66A	(0)	Band 66	5, 10, 15, 20	5, 10, 15, 20			40

4. DL Intra Band(contiguous)

E-UTRA CA configuration	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					
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			
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				
2C	(0)	Band 2	5	20				40
			10	15, 20				
			15	10, 15, 20				
	(0)	Band 2	20	5, 10, 15, 20				

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 (5) downlinks.

LTE Release 10 Carrier Aggregation

Index	2CC	Restriction	Completely Covered by Measurement Superset
2CC#1	2A-2A		
2CC#2	2C		
2CC#3	2A-4A		3CC#1
2CC#4	2A-5A		3CC#1
2CC#5	2A-12A		
2CC#6	2A-13A		3CC#2
2CC#7	2A-17A		
2CC#8	2A-66A		
2CC#9	4A-4A		3CC#3
2CC#10	4A-5A		3CC#1
2CC#11	4A-12A		3CC#3
2CC#12	4A-13A		3CC#2
2CC#13	4A-17A		
2CC#14	5A-41A	B41 SCC Only	
2CC#15	5A-66A		3CC#4
2CC#16	12A-66A		3CC#5
2CC#17	26A-41A	B41 SCC Only	
2CC#18	41A-41A		
2CC#19	41C		5CC#1
2CC#20	66A-66A		3CC#4
2CC#21	66B		
2CC#22	66C		

Index	3CC	Restriction	Completely Covered by Measurement Superset
3CC#1	2A-4A-5A		
3CC#2	2A-4A-13A		
3CC#3	4A-4A-12A		
3CC#4	5A-66A-66A		
3CC#5	12A-66A-66A		
3CC#6	41A-41C		
3CC#7	41D		

Index	4CC	Restriction	Completely Covered by Measurement Superset
4CC#1	41A-41D		
4CC#2	41C-41C		

Index	5CC	Restriction	Completely Covered by Measurement Superset
5CC#1	41C-41D		

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-[4A]		3CC#1
2CC#2	2A-[66A]		
2CC#3	4A-[4A]		3CC#3
2CC#4	[4A]-4A		3CC#4
2CC#5	[4A]-[4A]		3CC#5
2CC#6	[4A]-5A		3CC#1
2CC#7	[4A]-12A		3CC#3
2CC#8	[4A]-13A		3CC#2
2CC#9	[4A]-17A		
2CC#10	5A-[41A]		
2CC#11	5A-[66A]		3CC#7
2CC#12	12A-[66A]		3CC#10
2CC#13	26A-[41A]		
2CC#14	41A-[41A]		
2CC#15	[41A]-41A		
2CC#16	[41A]-[41A]		
2CC#17	[41C]		3CC#15
2CC#18	66A-[66A]		3CC#9
2CC#19	[66A]-66A		3CC#10
2CC#20	[66A]-[66A]		3CC#11
2CC#21	[66B]		
2CC#22	[66C]		

Index	3CC	Restriction	Completely Covered by Measurement Superset
3CC#1	2A-[4A]-5A		
3CC#2	2A-[4A]-13A		
3CC#3	4A-[4A]-12A		
3CC#4	[4A]-4A-12A		
3CC#5	[4A]-[4A]-12A		
3CC#6	5A-66A-[66A]		
3CC#7	5A-[66A]-66A		
3CC#8	5A-[66A]-[66A]		
3CC#9	12A-66A-[66A]		
3CC#10	12A-[66A]-66A		
3CC#11	12A-[66A]-[66A]		
3CC#12	26A-[41C]		
3CC#13	41A-[41C]		
3CC#14	[41A]-41C		
3CC#15	[41A]-[41C]		
3CC#16	[41D]		4CC#1

Index	4CC	Restriction	Completely Covered by Measurement Superset
4CC#1	41A-[41D]		
4CC#2	[41A]-41D		
4CC#3	[41A]-[41D]		

Note:

Only yellow highlight cells need power measurement according to LTE DL CA SAR test Exclusion in TCB workshop (April.2018).
 [*] is 4X4 MIMO configuration.

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 4	QPSK	20	20175	1732.5	1/49	24.2	24.1	-0.08
Band 41	QPSK	20	40620	2593	1/49	23.5	23.4	-0.08
Band 66	QPSK	20	132322	1745	1/49	24.4	24.3	-0.12

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.

