Appendix H. – Down-link CA Power Measurement

1. LTE Down-link Carrier Aggregation Conducted Powers

SAR test exclusion for LTE downlink Carrier Aggregation is determined by power measurements according to the number component carriers(CCs) supported by test product implementation. For those configurations required by April 2018 TCBC Workshop notes, conducted power measurements with LTE Carrier Aggregation(CA) (downlink 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.

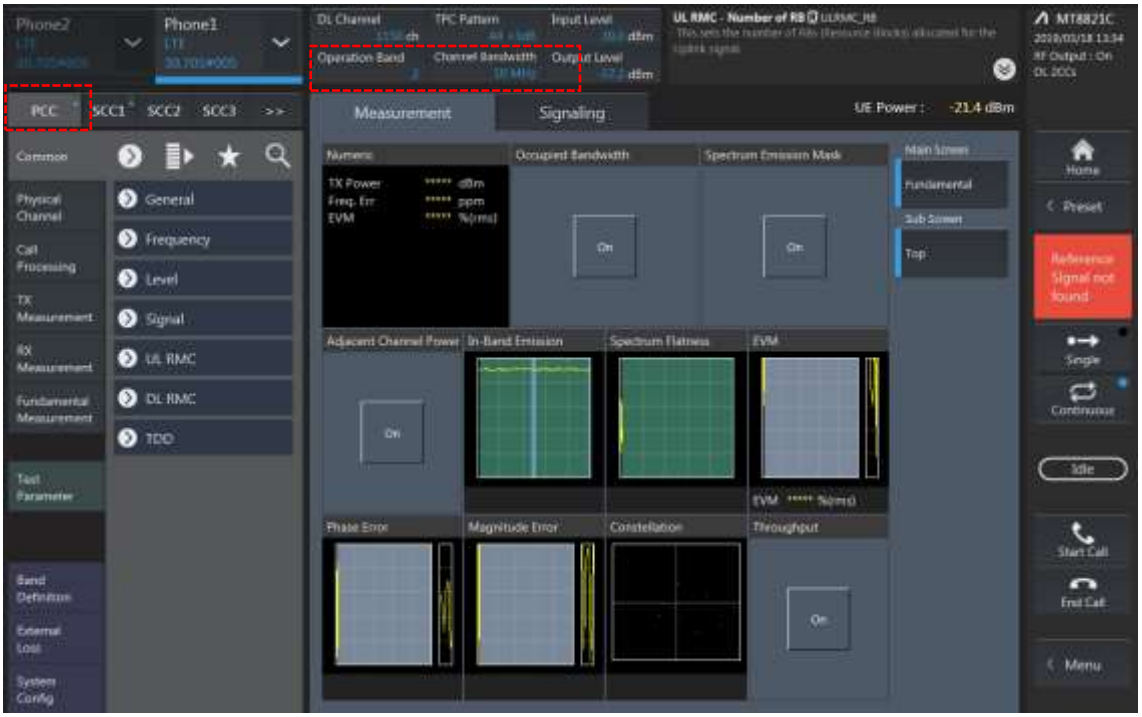
Downlink Carrier aggregation:

1. This device only supports downlink carrier aggregation. For every supported combination of downlink carrier aggregation, power measurements were performed 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.
2. All control and acknowledge data is sent on uplink channels that operate identical to specifications when downlink carrier aggregation is inactive.
3. Per FCC KDB publication 941225 D05A v01r02, Section C)3)b)ii), PCC uplink channel was selected at downlink carrier aggregation combinations. The downlink PCC channel was paired with the selected PCC uplink channel according to normal configurations without carrier aggregation.
4. For continuous intra-band carrier aggregation, the downlink channel spacing between the component carriers was set to multiple of 300kHz less than the nominal channel spacing defined in section 5.4.1A of 3GPP TS 36.521.
5. For non-continuous intra-band carrier aggregation, 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.
6. All selected downlink channels remained fully within the downlink transmission band of the respective component carrier.

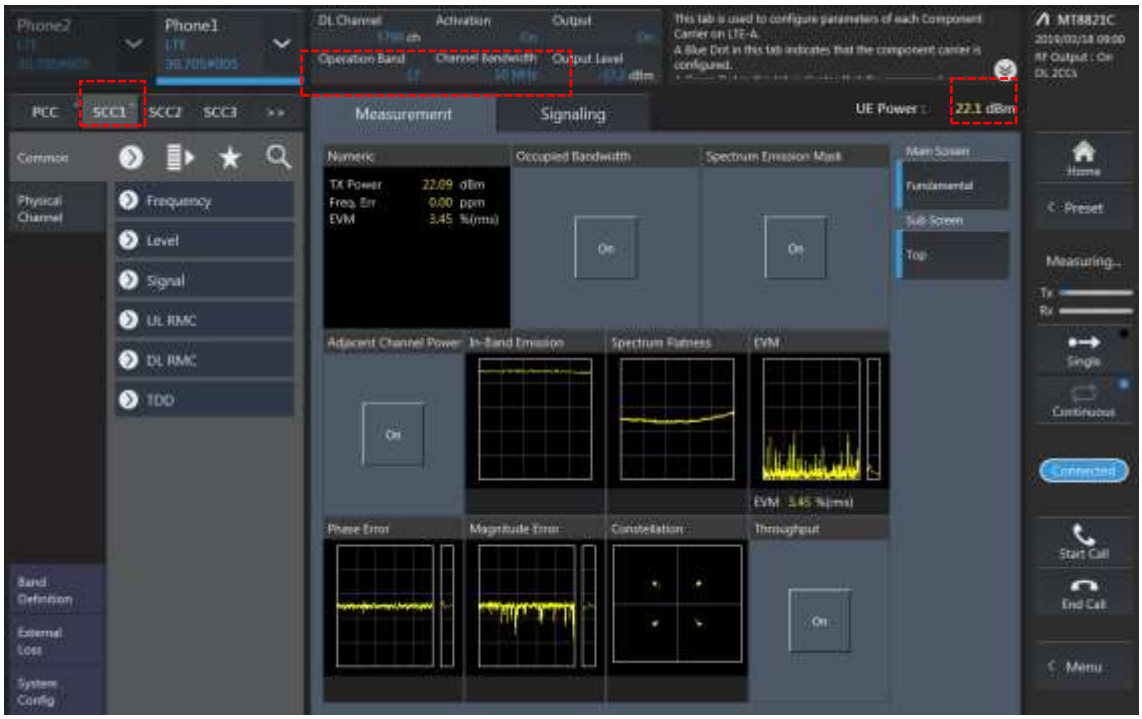
Power Measurement setup

LTE Down Link 2CA Call Setup

PCC Setting : Channel/ RB/ BW/ Modulation



SCC Setting : Channel/ RB/ BW/ Modulation and call Connection



2CA Downlink Carrier aggregation Maximum conducted Powers

Combination	PCC									SCC				LTE Tx Power		
	Band	BW	UL Ch.	UL Freq.	DL Ch.	DL Freq.	Mod.	RB	H	Band	BW	DL Ch.	DL Freq.	Single Carrier (dBm)	Power with DL CA Enabled (dBm)	Deviation
2A-2A	2	5	19175	1907.5	1175	1987.5	QPSK	1	24	2	20	900	1960	23.10	23.00	-0.10
2A-4A(0,1,2)	2	5	19175	1907.5	1175	1987.5	QPSK	1	24	4	10	2175	2132.5	23.10	23.02	-0.08
2A-4A(0,2)	4	20	20300	1745	2300	2145	QPSK	1	49	2	10	900	1960	24.16	23.96	-0.20
2A-4A(1)	4	10	20350	1750	2350	2150	QPSK	1	0	2	10	900	1960	24.16	23.95	-0.21
2A-5A(0,1)	2	5	19175	1907.5	1175	1987.5	QPSK	1	24	5	10	2525	881.5	23.10	22.76	-0.34
2A-5A(0,1)	5	5	20525	836.5	2525	881.5	QPSK	1	12	2	10	900	1960	24.08	24.01	-0.07
2A-12A(0,1,2)	2	5	19175	1907.5	1175	1987.5	QPSK	1	24	12	10	5095	737.5	23.10	23.03	-0.07
2A-12A(0,1,2)	12	5	23155	713.5	5155	743.5	QPSK	1	24	2	10	900	1960	23.80	23.52	-0.28
2A-17A(0,1,2)	2	5	19175	1907.5	1175	1987.5	QPSK	1	24	17	10	5790	740	23.10	22.99	-0.11
2A-17A(0,1,2)	17	10	23790	710	5790	740	QPSK	1	49	2	10	900	1960	23.76	23.58	-0.18
2A-66A(0,1,2)	2	5	19175	1907.5	1175	1987.5	QPSK	1	24	66	10	66786	2165	23.10	22.90	-0.20
2A-66A(0,1,2)	66	5	132322	1745	66786	2165	QPSK	1	0	2	10	900	1960	23.94	23.78	-0.16
2C	2	5	19175	1907.5	1175	1987.5	QPSK	1	24	2	20	1058	1975.8	23.10	22.95	-0.15
4A-4A(0)	4	20	20300	1745	2300	2145	QPSK	1	49	4	20	2050	2120	24.16	24.03	-0.13
4A-4A(1)	4	10	20350	1750	2350	2150	QPSK	1	0	4	10	2000	2115	24.12	24.06	-0.06
4A-5A(0)	4	10	20350	1750	2350	2150	QPSK	1	0	5	10	2525	881.5	24.12	23.99	-0.13
4A-5A(1)	4	20	20300	1745	2300	2145	QPSK	1	49	5	10	2525	881.5	24.16	23.89	-0.27
4A-5A(0,1)	5	5	20525	836.5	2525	881.5	QPSK	1	12	4	10	2175	2132.5	24.08	24.02	-0.06
4A-12A(0,1)	4	1.4	20393	1754.3	2393	2154.3	QPSK	3	1	12	10	5095	737.5	24.17	23.89	-0.28
4A-12A(2,3,4,5)	4	10	20350	1750	2350	2150	QPSK	1	0	12	5	5095	737.5	24.12	23.89	-0.23
4A-12A(0,1,2,3,4,5)	12	5	23155	713.5	5155	743.5	QPSK	1	24	4	10	2175	2132.5	23.80	23.70	-0.10
4A-17A	4	10	20350	1750	2350	2150	QPSK	1	0	17	10	5790	740	24.12	23.89	-0.23
5A-41A	5	5	20525	836.5	2525	881.5	QPSK	1	12	41	20	40620	2593	24.08	23.82	-0.26
5A-66A	5	5	20525	836.5	2525	881.5	QPSK	1	12	66	20	66786	2165	24.08	24.01	-0.07
5A-66A	66	5	132322	1745	66786	2165	QPSK	1	0	5	10	2525	881.5	23.94	23.80	-0.14
12A-66A	12	5	23155	713.5	5155	743.5	QPSK	1	24	66	10	66786	2165	23.80	23.56	-0.24
12A-66A	66	5	132322	1745	66786	2165	QPSK	1	0	12	5	5095	737.5	23.94	23.86	-0.08
26A-41A	26	10	26750	820	8750	865	QPSK	1	24	41	20	40620	2593	24.10	24.00	-0.10
41A-41A(0,1)	41	20	40185	2549.5	40185	2549.5	QPSK	1	0	41	20	41465	2677.5	23.08	22.81	-0.27

Combination	PCC									SCC				LTE Tx Power		
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41C	41	20	40185	2549.5	40185	2549.5	QPSK	1	0	41	20	40383	2569.3	23.08	22.84	-0.24
66A-66A	66	5	132322	1745	66786	2165	QPSK	1	0	66	20	67036	2190	23.94	23.79	-0.15
66B	66	5	132322	1745	66786	2165	QPSK	1	0	66	10	66714	2157.8	23.94	23.84	-0.10
66C	66	5	132322	1745	66786	2165	QPSK	1	0	66	20	66903	2176.7	23.94	23.89	-0.05