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.

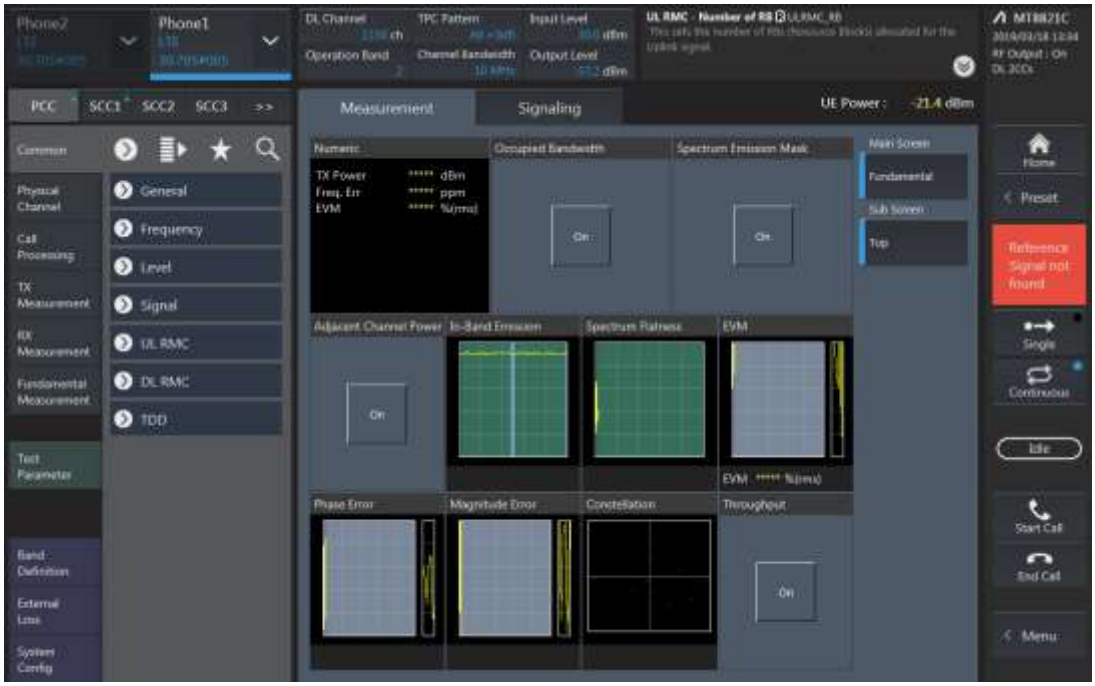
Downlink Carrier aggregation:

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.

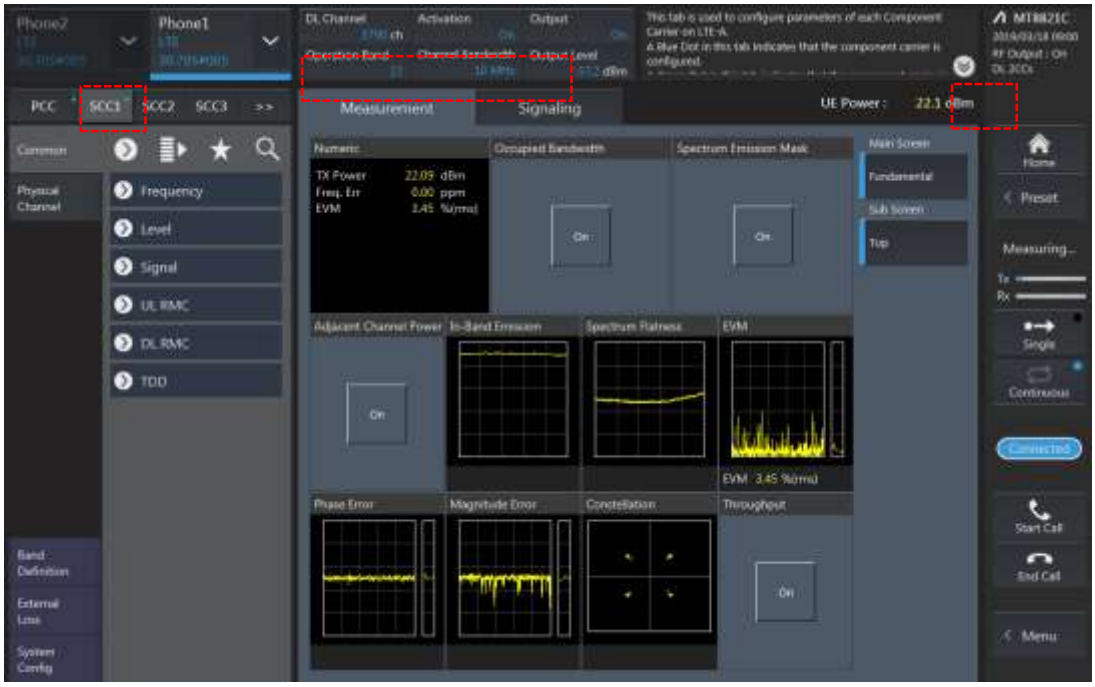
Power Measurement setup

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				Tx Power		Deviation
	Band	BW	PCC UL Channel	PCC UL Frequency	PCC DL Channel	PCC DL Frequency	Modulation	RB	offset	Band	BW	SCC DL Channel	SCC DL Frequency	LTE Single Carrier Tx Power (dBm)	LTE Tx Power with DL CA Enabled(dBm)	
2A-2A	2	20	19100	1900	1100	1980	QPSK	1	49	2	20	700	1940	23.27	23.26	-0.01
2A-4A(0,2)	2	20	19100	1900	1100	1980	QPSK	1	49	4	20	2175	2132.5	23.27	23.21	-0.06
2A-4A(1)	2	5	19175	1907.5	1175	1987.5	QPSK	1	12	4	10	2175	2132.5	23.26	23.1	-0.16
2A-4A(0,2)	4	20	20175	1732.5	2175	2132.5	QPSK	1	49	2	20	900	1960	23.29	23.43	0.14
2A-4A(1)	4	10	20350	1750	2350	2150	QPSK	1	24	2	10	900	1960	23.21	23.41	0.20
2A-12A(0,1)	2	20	19100	1900	1100	1980	QPSK	1	49	12	10	5095	737.5	23.27	23.47	0.20
2A-12A(2)	2	5	19175	1907.5	1175	1987.5	QPSK	1	12	12	10	5095	737.5	23.26	23.18	-0.08
2A-12A(0,1)	12	10	23095	707.5	5095	737.5	QPSK	1	0	2	20	900	1960	23.02	23.05	0.03
2A-12A(2)	12	10	23095	707.5	5095	737.5	QPSK	1	0	2	10	900	1960	23.02	23.17	0.15
2A-17A	2	5	19175	1907.5	1175	1987.5	QPSK	1	12	17	10	5790	740	23.26	23.3	0.04
2A-17A	17	10	23800	711	5800	741	QPSK	1	0	2	10	900	1960	23.04	23.16	0.12
2A-66A(0,2)	2	20	19100	1900	1100	1980	QPSK	1	49	66	20	66786	2145	23.27	23.34	0.07
2A-66A(1)	2	5	19175	1907.5	1175	1987.5	QPSK	1	12	66	10	66786	2145	23.26	23.04	-0.22
2A-66A(0,2)	66	20	132322	1745	66786	2145	QPSK	1	49	2	20	900	1960	23.24	23.12	-0.12
2A-66A(1)	66	10	132322	1745	66786	2145	QPSK	1	24	2	10	900	1960	23.21	23.14	-0.07
2C	2	20	19100	1900	1100	1980	QPSK	1	49	2	20	902	1960.2	23.27	23.22	-0.05
4A-4A(0,1)	4	10	20350	1750	2350	2150	QPSK	1	24	4	10	2175	2132.5	23.21	23.44	0.23
4A-5A(0)	4	10	20350	1750	2350	2150	QPSK	1	24	5	10	2525	881.5	23.21	23.18	-0.03
4A-5A(1)	4	20	20175	1732.5	2175	2132.5	QPSK	1	49	5	10	2525	881.5	23.29	23.16	-0.13
4A-5A(0,1)	5	5	20625	846.5	2625	891.5	QPSK	1	12	4	10	2175	2132.5	22.97	23.19	0.22
4A-12A(0,3,5)	4	10	20350	1750	2350	2150	QPSK	1	24	12	10	5095	737.5	23.21	23.19	-0.02
4A-12A(1,2,4)	4	20	20175	1732.5	2175	2132.5	QPSK	1	49	12	10	5095	737.5	23.29	23.24	-0.05
4A-12A(0,1,2,3,4)	12	10	23095	707.5	5095	737.5	QPSK	1	0	4	10	2175	2132.5	23.02	22.94	-0.08
4A-12A(5)	12	5	23155	713.5	5155	743.5	QPSK	1	12	4	10	2175	2132.5	22.99	22.98	-0.01
4A-17A	4	10	20350	1750	2350	2150	QPSK	1	24	17	10	5790	740	23.21	23.2	-0.01
4A-17A	17	10	23800	711	5800	741	QPSK	1	0	4	10	2175	2132.5	23.04	23.07	0.03
5A-41A	5	5	20625	846.5	2625	891.5	QPSK	1	12	41	20	40620	2593	22.97	22.99	0.02
5A-41A	41	20	40620	2593	40620	2593	QPSK	1	49	5	10	2525	881.5	23.62	23.81	0.19
5A-66A	5	5	20625	846.5	2625	891.5	QPSK	1	12	66	20	66786	2145	22.97	22.84	-0.13
5A-66A	66	20	132322	1745	66786	2145	QPSK	1	49	5	10	2525	881.5	23.24	23.13	-0.11
12A-66A(0,1,2,3,4)	12	10	23095	707.5	5095	737.5	QPSK	1	0	66	10	66786	2145	23.02	22.88	-0.14
12A-66A(5)	12	5	23155	713.5	5155	743.5	QPSK	1	12	66	10	66786	2145	22.99	23.2	0.21
12A-66A(0,3,5)	66	10	132322	1745	66786	2145	QPSK	1	24	12	5	5095	737.5	23.21	23.32	0.11
12A-66A(1,2,4)	66	20	132322	1745	66786	2145	QPSK	1	49	12	10	5095	737.5	23.24	23.48	0.24
41A-41A(0,1)	41	20	40620	2593	40620	2593	QPSK	1	49	41	20	39750	2506	23.62	23.39	-0.23
41C	41	20	40620	2593	40620	2593	QPSK	1	49	41	20	40422	2573.2	23.62	23.68	0.06
66A-66A	66	20	132322	1745	66786	2145	QPSK	1	49	66	20	67236	2190	23.24	23.04	-0.20
66B	66	10	132322	1745	66786	2145	QPSK	1	24	66	10	66687	2155.1	23.21	23.08	-0.13
66C	66	20	132322	1745	66786	2145	QPSK	1	49	66	20	66588	2145.2	23.24	23.31	0.07