

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:

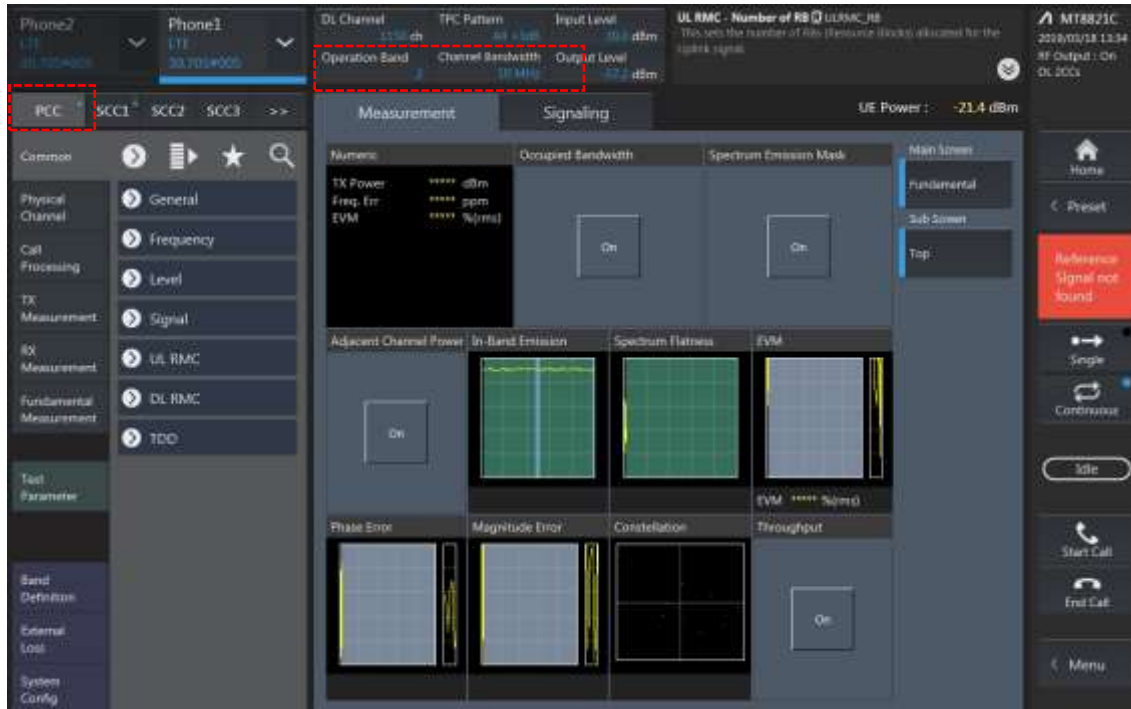
1. This device only supports downlink carrier aggregation. For every supported combination of downlink carrier aggregation, power measurements were performed with the downlink carrier aggregation active for the configuration with highest measured maximum conducted power with downlink carrier aggregation 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.



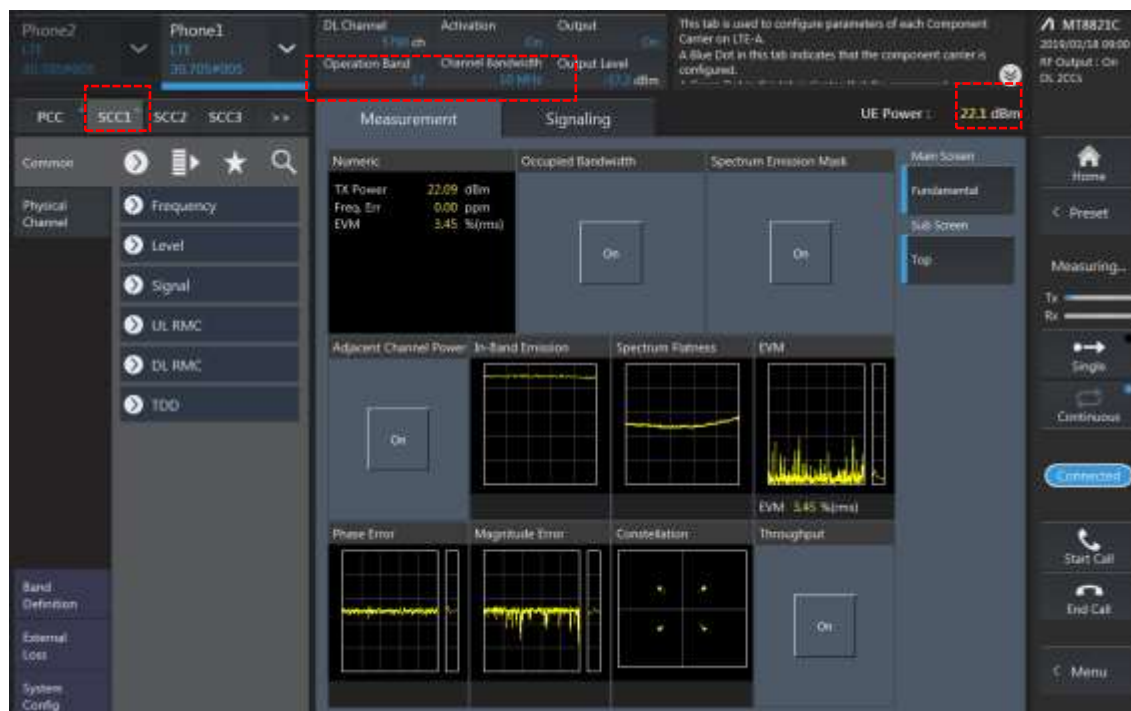
Power Measurement setup

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	15	18675	1857.5	675	1937.5	QPSK	1	36	2	20	1100	1980	23.09	23.01	-0.08
2A-4A(0)	2	15	18675	1857.5	675	1937.5	QPSK	1	36	4	20	2175	2132.5	23.09	22.97	-0.12
2A-4A(0)	4	15	20025	1717.5	2025	2117.5	QPSK	1	36	2	20	900	1960	23.32	23.21	-0.11
2A-4A(1)	2	5	18625	1852.5	625	1932.5	QPSK	1	24	4	10	2175	2132.5	23.01	22.95	-0.06
2A-4A(1)	4	5	20175	1732.5	2175	2132.5	QPSK	1	12	2	10	900	1960	23.21	23.1	-0.11
2A-5A(0)	2	15	18675	1857.5	675	1937.5	QPSK	1	36	5	10	2525	881.5	23.09	23	-0.09
2A-5A(0)	5	5	20425	826.5	2425	871.5	QPSK	1	24	2	20	900	1960	24.64	24.44	-0.20
2A-5A(1)	2	5	18625	1852.5	625	1932.5	QPSK	1	24	5	10	2525	881.5	23.01	22.89	-0.12
2A-5A(1)	5	5	20425	826.5	2425	871.5	QPSK	1	24	2	10	900	1960	24.64	24.48	-0.16
2A-12A(0)	2	15	18675	1857.5	675	1937.5	QPSK	1	36	12	10	5095	737.5	23.09	22.91	-0.18
2A-12A(0)	12	5	23095	707.5	5095	737.5	QPSK	1	0	2	20	900	1960	23.72	23.65	-0.07
2A-12A(2)	2	5	18625	1852.5	625	1932.5	QPSK	1	24	12	10	5095	737.5	23.01	22.98	-0.03
2A-12A(2)	12	5	23095	707.5	5095	737.5	QPSK	1	0	2	10	900	1960	23.72	23.66	-0.06
2A-13A(0)	2	15	18675	1857.5	675	1937.5	QPSK	1	36	13	10	5230	751	23.09	22.91	-0.18
2A-13A(0)	13	10	23230	782	5230	751	QPSK	1	49	2	20	1100	1980	23.71	23.67	-0.04
2A-13A(1)	2	5	18625	1852.5	625	1932.5	QPSK	1	24	13	10	5230	751	23.01	22.97	-0.04
2A-13A(1)	13	10	23230	782	5230	751	QPSK	1	49	2	10	1100	1980	23.71	23.51	-0.20
2A-17A	2	5	18625	1852.5	625	1932.5	QPSK	1	24	17	10	5790	740	23.01	22.94	-0.07
2A-66A(0)	2	15	18675	1857.5	675	1937.5	QPSK	1	36	66	20	67236	2190	23.09	23.02	-0.07
2A-66A(0)	66	20	132322	1745	66786	2165	QPSK	1	99	2	20	900	1960	23.18	23.15	-0.03
2A-66A(1)	2	5	18625	1852.5	625	1932.5	QPSK	1	24	66	10	67286	2195	23.01	22.96	-0.05
2A-66A(1)	66	10	132322	1745	66786	2165	QPSK	1	49	2	10	1100	1980	23.13	23.07	-0.06
2C	2	15	18675	1857.5	675	1937.5	QPSK	1	36	2	20	846	1954.6	23.09	22.98	-0.11
4A-4A(0)	4	15	20025	1717.5	2025	2117.5	QPSK	1	36	4	20	2300	2145	23.32	23.25	-0.07
4A-4A(1)	4	5	20175	1732.5	2175	2132.5	QPSK	1	12	4	10	2350	2150	23.21	23.11	-0.10
4A-5A(0)	4	5	20175	1732.5	2175	2132.5	QPSK	1	12	5	10	2525	881.5	23.21	23.15	-0.06
4A-5A(0)	5	5	20425	826.5	2425	871.5	QPSK	1	24	4	10	2350	2150	24.64	24.5	-0.14
4A-5A(1)	4	15	20025	1717.5	2025	2117.5	QPSK	1	36	5	10	2525	881.5	23.32	23.27	-0.05
4A-5A(1)	5	5	20425	826.5	2425	871.5	QPSK	1	24	4	20	2350	2150	24.64	24.51	-0.13
4A-12A(0)	4	5	20175	1732.5	2175	2132.5	QPSK	1	12	12	10	5095	737.5	23.21	23.14	-0.07

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
4A-12A(0)	12	5	23095	707.5	5095	737.5	QPSK	1	0	4	10	2175	2132.5	23.72	23.51	-0.21
4A-12A(1)	4	15	20025	1717.5	2025	2117.5	QPSK	1	36	12	10	5095	737.5	23.32	23.3	-0.02
4A-12A(1)	12	5	23095	707.5	5095	737.5	QPSK	1	0	4	20	2175	2132.5	23.72	23.55	-0.17
4A-12A(5)	4	15	20025	1717.5	2025	2117.5	QPSK	1	36	12	5	5095	737.5	23.32	23.2	-0.12
4A-12A(5)	12	5	23095	707.5	5095	737.5	QPSK	1	0	4	15	2175	2132.5	23.72	23.6	-0.12
4A-13A(0)	4	15	20025	1717.5	2025	2117.5	QPSK	1	36	13	10	5230	751	23.32	23.21	-0.11
4A-13A(0)	13	10	23230	782	5230	751	QPSK	1	49	4	20	2175	2132.5	23.71	23.55	-0.16
4A-13A(1)	4	5	20175	1732.5	2175	2132.5	QPSK	1	12	13	10	5230	751	23.21	23.17	-0.04
4A-13A(1)	13	10	23230	782	5230	751	QPSK	1	49	4	10	2175	2132.5	23.71	23.63	-0.08
4A-17A	4	5	20175	1732.5	2175	2132.5	QPSK	1	12	17	10	5790	740	23.21	23.08	-0.13
5A-41A	5	5	20425	826.5	2425	871.5	QPSK	1	24	41	20	40620	2593	24.64	24.41	-0.23
5A-66A	5	5	20425	826.5	2425	871.5	QPSK	1	24	66	20	67236	2190	24.64	24.48	-0.16
5A-66A	66	20	132322	1745	66786	2165	QPSK	1	99	5	10	2525	881.5	23.18	23.1	-0.08
12A-66A(0)	12	5	23095	707.5	5095	737.5	QPSK	1	0	66	10	67286	2195	23.72	23.49	-0.23
12A-66A(0)	66	10	132322	1745	66786	2165	QPSK	1	49	12	10	5095	737.5	23.13	23.09	-0.04
12A-66A(1)	12	5	23095	707.5	5095	737.5	QPSK	1	0	66	20	67236	2190	23.72	23.56	-0.16
12A-66A(1)	66	20	132322	1745	66786	2165	QPSK	1	99	12	10	5095	737.5	23.18	23.08	-0.10
12A-66A(5)	12	5	23095	707.5	5095	737.5	QPSK	1	0	66	15	67261	2192.5	23.72	23.51	-0.21
12A-66A(5)	66	15	132322	1745	66786	2165	QPSK	1	74	12	5	5095	737.5	23.14	23.01	-0.13
41A-41A	41	15	40185	2549.5	40185	2549.5	QPSK	1	36	41	20	41490	2680	23.41	23.3	-0.11
41C(0)	41	15	40185	2549.5	40185	2549.5	QPSK	1	36	41	20	40356	2566.6	23.41	23.35	-0.06
41C(3)	41	10	40185	2549.5	40185	2549.5	QPSK	1	0	41	20	40329	2563.9	23.38	23.28	-0.10
66A-66A	66	20	132322	1745	66786	2165	QPSK	1	99	66	20	67236	2190	23.18	23.02	-0.16
66B	66	15	132322	1745	66786	2165	QPSK	1	74	66	5	66879	2174.3	23.14	23.08	-0.06
66C	66	20	132322	1745	66786	2165	QPSK	1	99	66	20	67236	2190	23.18	23.11	-0.07