

APPENDIX F: DOWNLINK LTE CA RF CONDUCTED POWERS

1.1 LTE Downlink Only Carrier Aggregation Test Reduction Methodology

SAR test exclusion for LTE downlink Carrier Aggregation is determined by power measurements according to the number of component carriers (CCs) supported by the product implementation. Per April 2018 TCBC Workshop Notes, the following test reduction methodology was applied to determine the combinations required for conducted power measurements.

LTE DLCA Test Reduction Methodology:

- The supported combinations were arranged by the number of component carriers in columns.
- Any limitations on the PCC or SCC for each combination were identified alongside the combination (e.g. CA_2A-2A-4A-12A, but B12 can only be configured as a SCC).
- Power measurements were performed for "supersets" (LTE CA combinations with multiple components carriers) and any "subsets" (LTE CA combinations with fewer component carriers) that were not completely covered by the supersets.
- Only subsets that have the exact same components as a superset were excluded for measurement.
- When there were certain restrictions on component carriers that existed in the superset that were not applied for the subset, the subset configuration was additionally evaluated.
- Both inter-band and intra-band downlink carrier aggregation scenarios were considered.
- Downlink CA combinations for SISO and 4x4 Downlink MIMO operations were measured independently, per May 2017 TCBC Workshop notes.

Table 1 – Example of Exclusion Table for SISO Configurations

Index	ACC	Supported Channel Bandwidth (MHz)	Restriction	Completely Covered by Measurement Superset
ACC #1	CA [2A]	5, 10, 15, 20	5, 10, 15, 20	Yes
ACC #2	CA [2A]	5, 10, 15, 20	5, 10, 15, 20	Yes
ACC #3	CA [2A]	5, 10, 15, 20	5, 10, 15, 20	Yes
ACC #4	CA [2A]	5, 10, 15, 20	5, 10, 15, 20	Yes
ACC #5	CA [2A]	5, 10, 15, 20	5, 10, 15, 20	Yes
ACC #6	CA [2A]	5, 10, 15, 20	5, 10, 15, 20	Yes
ACC #7	CA [2A]	5, 10, 15, 20	5, 10, 15, 20	Yes
ACC #8	CA [2A]	5, 10, 15, 20	5, 10, 15, 20	Yes
ACC #9	CA [2A]	5, 10, 15, 20	5, 10, 15, 20	Yes
ACC #10	CA [2A]	5, 10, 15, 20	5, 10, 15, 20	Yes
ACC #11	CA [2A]	5, 10, 15, 20	5, 10, 15, 20	Yes
ACC #12	CA [2A]	5, 10, 15, 20	5, 10, 15, 20	Yes
ACC #13	CA [2A]	5, 10, 15, 20	5, 10, 15, 20	Yes
ACC #14	CA [2A]	5, 10, 15, 20	5, 10, 15, 20	Yes
ACC #15	CA [2A]	5, 10, 15, 20	5, 10, 15, 20	Yes
ACC #16	CA [2A]	5, 10, 15, 20	5, 10, 15, 20	Yes
ACC #17	CA [2A]	5, 10, 15, 20	5, 10, 15, 20	Yes
ACC #18	CA [2A]	5, 10, 15, 20	5, 10, 15, 20	Yes
ACC #19	CA [2A]	5, 10, 15, 20	5, 10, 15, 20	Yes
ACC #20	CA [2A]	5, 10, 15, 20	5, 10, 15, 20	Yes
ACC #21	CA [2A]	5, 10, 15, 20	5, 10, 15, 20	Yes
ACC #22	CA [2A]	5, 10, 15, 20	5, 10, 15, 20	Yes
ACC #23	CA [2A]	5, 10, 15, 20	5, 10, 15, 20	Yes
ACC #24	CA [2A]	5, 10, 15, 20	5, 10, 15, 20	Yes
ACC #25	CA [2A]	5, 10, 15, 20	5, 10, 15, 20	Yes
ACC #26	CA [2A]	5, 10, 15, 20	5, 10, 15, 20	Yes
ACC #27	CA [2A]	5, 10, 15, 20	5, 10, 15, 20	Yes
ACC #28	CA [2A]	5, 10, 15, 20	5, 10, 15, 20	Yes
ACC #29	CA [2A]	5, 10, 15, 20	5, 10, 15, 20	Yes
ACC #30	CA [2A]	5, 10, 15, 20	5, 10, 15, 20	Yes
ACC #31	CA [2A]	5, 10, 15, 20	5, 10, 15, 20	Yes
ACC #32	CA [2A]	5, 10, 15, 20	5, 10, 15, 20	Yes
ACC #33	CA [2A]	5, 10, 15, 20	5, 10, 15, 20	Yes
ACC #34	CA [2A]	5, 10, 15, 20	5, 10, 15, 20	Yes
ACC #35	CA [2A]	5, 10, 15, 20	5, 10, 15, 20	Yes
ACC #36	CA [2A]	5, 10, 15, 20	5, 10, 15, 20	Yes
ACC #37	CA [2A]	5, 10, 15, 20	5, 10, 15, 20	Yes
ACC #38	CA [2A]	5, 10, 15, 20	5, 10, 15, 20	Yes
ACC #39	CA [2A]	5, 10, 15, 20	5, 10, 15, 20	Yes
ACC #40	CA [2A]	5, 10, 15, 20	5, 10, 15, 20	Yes
ACC #41	CA [2A]	5, 10, 15, 20	5, 10, 15, 20	Yes
ACC #42	CA [2A]	5, 10, 15, 20	5, 10, 15, 20	Yes
ACC #43	CA [2A]	5, 10, 15, 20	5, 10, 15, 20	Yes
ACC #44	CA [2A]	5, 10, 15, 20	5, 10, 15, 20	Yes
ACC #45	CA [2A]	5, 10, 15, 20	5, 10, 15, 20	Yes
ACC #46	CA [2A]	5, 10, 15, 20	5, 10, 15, 20	Yes
ACC #47	CA [2A]	5, 10, 15, 20	5, 10, 15, 20	Yes
ACC #48	CA [2A]	5, 10, 15, 20	5, 10, 15, 20	Yes
ACC #49	CA [2A]	5, 10, 15, 20	5, 10, 15, 20	Yes
ACC #50	CA [2A]	5, 10, 15, 20	5, 10, 15, 20	Yes
ACC #51	CA [2A]	5, 10, 15, 20	5, 10, 15, 20	Yes
ACC #52	CA [2A]	5, 10, 15, 20	5, 10, 15, 20	Yes
ACC #53	CA [2A]	5, 10, 15, 20	5, 10, 15, 20	Yes
ACC #54	CA [2A]	5, 10, 15, 20	5, 10, 15, 20	Yes
ACC #55	CA [2A]	5, 10, 15, 20	5, 10, 15, 20	Yes
ACC #56	CA [2A]	5, 10, 15, 20	5, 10, 15, 20	Yes
ACC #57	CA [2A]	5, 10, 15, 20	5, 10, 15, 20	Yes
ACC #58	CA [2A]	5, 10, 15, 20	5, 10, 15, 20	Yes
ACC #59	CA [2A]	5, 10, 15, 20	5, 10, 15, 20	Yes
ACC #60	CA [2A]	5, 10, 15, 20	5, 10, 15, 20	Yes
ACC #61	CA [2A]	5, 10, 15, 20	5, 10, 15, 20	Yes
ACC #62	CA [2A]	5, 10, 15, 20	5, 10, 15, 20	Yes
ACC #63	CA [2A]	5, 10, 15, 20	5, 10, 15, 20	Yes
ACC #64	CA [2A]	5, 10, 15, 20	5, 10, 15, 20	Yes
ACC #65	CA [2A]	5, 10, 15, 20	5, 10, 15, 20	Yes
ACC #66	CA [2A]	5, 10, 15, 20	5, 10, 15, 20	Yes
ACC #67	CA [2A]	5, 10, 15, 20	5, 10, 15, 20	Yes
ACC #68	CA [2A]	5, 10, 15, 20	5, 10, 15, 20	Yes
ACC #69	CA [2A]	5, 10, 15, 20	5, 10, 15, 20	Yes
ACC #70	CA [2A]	5, 10, 15, 20	5, 10, 15, 20	Yes
ACC #71	CA [2A]	5, 10, 15, 20	5, 10, 15, 20	Yes
ACC #72	CA [2A]	5, 10, 15, 20	5, 10, 15, 20	Yes
ACC #73	CA [2A]	5, 10, 15, 20	5, 10, 15, 20	Yes
ACC #74	CA [2A]	5, 10, 15, 20	5, 10, 15, 20	Yes
ACC #75	CA [2A]	5, 10, 15, 20	5, 10, 15, 20	Yes
ACC #76	CA [2A]	5, 10, 15, 20	5, 10, 15, 20	Yes
ACC #77	CA [2A]	5, 10, 15, 20	5, 10, 15, 20	Yes
ACC #78	CA [2A]	5, 10, 15, 20	5, 10, 15, 20	Yes
ACC #79	CA [2A]	5, 10, 15, 20	5, 10, 15, 20	Yes
ACC #80	CA [2A]	5, 10, 15, 20	5, 10, 15, 20	Yes
ACC #81	CA [2A]	5, 10, 15, 20	5, 10, 15, 20	Yes
ACC #82	CA [2A]	5, 10, 15, 20	5, 10, 15, 20	Yes
ACC #83	CA [2A]	5, 10, 15, 20	5, 10, 15, 20	Yes
ACC #84	CA [2A]	5, 10, 15, 20	5, 10, 15, 20	Yes
ACC #85	CA [2A]	5, 10, 15, 20	5, 10, 15, 20	Yes
ACC #86	CA [2A]	5, 10, 15, 20	5, 10, 15, 20	Yes
ACC #87	CA [2A]	5, 10, 15, 20	5, 10, 15, 20	Yes
ACC #88	CA [2A]	5, 10, 15, 20	5, 10, 15, 20	Yes
ACC #89	CA [2A]	5, 10, 15, 20	5, 10, 15, 20	Yes
ACC #90	CA [2A]	5, 10, 15, 20	5, 10, 15, 20	Yes
ACC #91	CA [2A]	5, 10, 15, 20	5, 10, 15, 20	Yes
ACC #92	CA [2A]	5, 10, 15, 20	5, 10, 15, 20	Yes
ACC #93	CA [2A]	5, 10, 15, 20	5, 10, 15, 20	Yes
ACC #94	CA [2A]	5, 10, 15, 20	5, 10, 15, 20	Yes
ACC #95	CA [2A]	5, 10, 15, 20	5, 10, 15, 20	Yes
ACC #96	CA [2A]	5, 10, 15, 20	5, 10, 15, 20	Yes
ACC #97	CA [2A]	5, 10, 15, 20	5, 10, 15, 20	Yes
ACC #98	CA [2A]	5, 10, 15, 20	5, 10, 15, 20	Yes
ACC #99	CA [2A]	5, 10, 15, 20	5, 10, 15, 20	Yes
ACC #100	CA [2A]	5, 10, 15, 20	5, 10, 15, 20	Yes

Table 2 – Example of Exclusion Table for 4x4 Downlink MIMO Configurations

Supported Channel Bandwidth (MHz)					Restriction	Completely Covered by Measurement Superset
Index	ACC	CC1	CC2	CC3		
ACC #M01	CA [2C]	5, 10, 15, 20	5, 10, 15, 20		ACC #M06	
ACC #M02	CA [2A-3A]	5, 10, 15, 20	5, 10, 15, 20		ACC #M07	
ACC #M03	CA [2A][2A]	5, 10, 15, 20	5, 10, 15, 20		No	
ACC #M04	CA [2A][2A-3A]	5, 10, 15, 20	5, 10, 15, 20		ACC #M05	
ACC #M05	CA [2A][2A][3A]	5, 10, 15, 20	5, 10, 15, 20		No	
ACC #M06	CA [2A][5A]	5, 10, 15, 20	5, 10		ACC #M08	
ACC #M07	CA [2A][3A1]	5, 10, 15, 20	5, 10		ACC #M09	
ACC #M08	CA [2A][3A]	5, 10, 15, 20	5, 10		ACC #M10	
ACC #M09	CA [2A][3A-7A]	5, 10	5, 10		No	
ACC #M10	CA [2A][3A12]	5, 10, 15, 20	5, 10		ACC #M12	
ACC #M11	CA [2A][3A]	5, 10, 15, 20	5, 10		ACC #M13	
ACC #M12	CA [2A][6A12]	5, 10, 15, 20	5, 10, 15, 20		ACC #M15	
ACC #M13	CA [2A][6A1]	5, 10, 15, 20	5, 10, 15, 20		ACC #M16	
ACC #M14	CA [2A][6A12]	5, 10, 15, 20	5, 10, 15, 20		No	
ACC #M15	CA [2A][7A]	5, 10, 15, 20	5, 10		ACC #M17	
ACC #M16	CA [2A][7A1]	5, 10, 15, 20	5, 10		ACC #M18	
ACC #M17	CA [2A][6A1][4]	5, 10	5, 10, 15, 20		ACC #M19	
ACC #M18	CA [2A][6A]	5, 10	5, 10, 15, 20		ACC #M20	
ACC #M19	CA [2A][6A]	5, 10	5, 10, 15, 20		ACC #M21	
ACC #M20	CA [2A][6A]	5, 10, 15	5, 10, 15		ACC #M22	
ACC #M21	CA [6A1]	5, 10, 15, 20	5, 10, 15, 20		ACC #M23	
ACC #M22	CA [6A1]	5, 10, 15, 20	5, 10, 15, 20		No	
ACC #M23	CA [6A1][6A1]	5, 10, 15, 20	5, 10, 15, 20		No	

Supported Channel Bandwidth (MHz)					Restriction	Completely Covered by Measurement Superset
Index	ACC	CC1	CC2	CC3		
ACC #M01	CA [2A][5A-6A]	5, 10, 15, 20	5, 10	5, 10, 15, 20	No	
ACC #M02	CA [2A-5A][6A]	5, 10, 15, 20	5, 10	5, 10, 15, 20	No	
ACC #M03	CA [2A][5A-6A]	5, 10, 15, 20	5, 10	5, 10, 15	No	
ACC #M04	CA [2A-5A][6A]	5, 10, 15, 20	5, 10	5, 10, 15	No	
ACC #M05	CA [2A][5A-6A]	5, 10, 15, 20	5, 10	5, 10, 15, 20	No	
ACC #M06	CA [2A-5A][6A]	5, 10, 15, 20	5, 10	5, 10, 15, 20	No	
ACC #M07	CA [2A][5A-6A]	5, 10, 15, 20	5, 10	5, 10, 15, 20	No	
ACC #M08	CA [2A][5A-6A]	5, 10, 15, 20	5, 10	5, 10, 15, 20	No	
ACC #M09	CA [2A][5A-6A]	5, 10, 15, 20	5, 10	5, 10, 15, 20	No	
ACC #M10	CA [2A][5A-6A]	5, 10, 15, 20	5, 10	5, 10, 15, 20	No	
ACC #M11	CA [2A][5A-6A]	5, 10, 15, 20	5, 10	5, 10, 15, 20	No	
ACC #M12	CA [2A][5A-6A]	5, 10, 15, 20	5, 10	5, 10, 15, 20	No	
ACC #M13	CA [2A][5A-6A]	5, 10, 15, 20	5, 10	5, 10, 15, 20	No	
ACC #M14	CA [2A][5A-6A]	5, 10, 15, 20	5, 10	5, 10, 15, 20	No	
ACC #M15	CA [2A][5A-6A]	5, 10, 15, 20	5, 10	5, 10, 15, 20	No	
ACC #M16	CA [2A][5A-6A]	5, 10, 15, 20	5, 10	5, 10, 15, 20	No	
ACC #M17	CA [2A][5A-6A]	5, 10, 15, 20	5, 10	5, 10, 15, 20	No	
ACC #M18	CA [2A][5A-6A]	5, 10, 15, 20	5, 10	5, 10, 15, 20	No	
ACC #M19	CA [2A][5A-6A]	5, 10, 15, 20	5, 10	5, 10, 15, 20	No	
ACC #M20	CA [2A][5A-6A]	5, 10, 15, 20	5, 10	5, 10, 15, 20	No	
ACC #M21	CA [2A][5A-6A]	5, 10, 15, 20	5, 10	5, 10, 15, 20	No	
ACC #M22	CA [2A][5A-6A]	5, 10, 15, 20	5, 10	5, 10, 15, 20	No	
ACC #M23	CA [2A][5A-6A]	5, 10, 15, 20	5, 10	5, 10, 15, 20	No	
ACC #M24	CA [2A][5A-6A]	5, 10, 15, 20	5, 10	5, 10, 15, 20	No	
ACC #M25	CA [2A][5A-6A]	5, 10, 15, 20	5, 10	5, 10, 15, 20	No	
ACC #M26	CA [2A][5A-6A]	5, 10, 15, 20	5, 10	5, 10, 15, 20	No	
ACC #M27	CA [2A][5A-6A]	5, 10, 15, 20	5, 10	5, 10, 15, 20	No	
ACC #M28	CA [2A][5A-6A]	5, 10, 15, 20	5, 10	5, 10, 15, 20	No	
ACC #M29	CA [2A][5A-6A]	5, 10, 15, 20	5, 10	5, 10, 15, 20	No	
ACC #M30	CA [2A][5A-6A]	5, 10, 15, 20	5, 10	5, 10, 15, 20	No	
ACC #M31	CA [2A][5A-6A]	5, 10, 15, 20	5, 10	5, 10, 15, 20	No	
ACC #M32	CA [2A][5A-6A]	5, 10, 15, 20	5, 10	5, 10, 15, 20	No	
ACC #M33	CA [2A][5A-6A]	5, 10, 15, 20	5, 10	5, 10, 15, 20	No	
ACC #M34	CA [2A][5A-6A]	5, 10, 15, 20	5, 10	5, 10, 15, 20	No	
ACC #M35	CA [2A][5A-6A]	5, 10, 15, 20	5, 10	5, 10, 15, 20	No	
ACC #M36	CA [2A][5A-6A]	5, 10, 15, 20	5, 10	5, 10, 15, 20	No	
ACC #M37	CA [2A][5A-6A]	5, 10, 15, 20	5, 10	5, 10, 15, 20	No	
ACC #M38	CA [2A][5A-6A]	5, 10, 15, 20	5, 10	5, 10, 15, 20	No	
ACC #M39	CA [2A][5A-6A]	5, 10, 15, 20	5, 10	5, 10, 15, 20	No	
ACC #M40	CA [2A][5A-6A]	5, 10, 15, 20	5, 10	5, 10, 15, 20	No	
ACC #M41	CA [2A][5A-6A]	5, 10, 15, 20	5, 10	5, 10, 15, 20	No	
ACC #M42	CA [2A][5A-6A]	5, 10, 15, 20	5, 10	5, 10, 15, 20	No	
ACC #M43	CA [2A][5A-6A]	5, 10, 15, 20	5, 10	5, 10, 15, 20	No	
ACC #M44	CA [2A][5A-6A]	5, 10, 15, 20	5, 10	5, 10, 15, 20	No	
ACC #M45	CA [2A][5A-6A]	5, 10, 15, 20	5, 10	5, 10, 15, 20	No	
ACC #M46	CA [2A][5A-6A]	5, 10, 15, 20	5, 10	5, 10, 15, 20	No	
ACC #M47	CA [2A][5A-6A]	5, 10, 15, 20	5, 10	5, 10, 15, 20	No	
ACC #M48	CA [2A][5A-6A]	5, 10, 15, 20	5, 10	5, 10, 15, 20	No	
ACC #M49	CA [2A][5A-6A]	5, 10, 15, 20	5, 10	5, 10, 15, 20	No	
ACC #M50	CA [2A][5A-6A]	5, 10, 15, 20	5, 10	5, 10, 15, 20	No	
ACC #M51	CA [2A][5A-6A]	5, 10, 15, 20	5, 10	5, 10, 15, 20	No	
ACC #M52	CA [2A][5A-6A]	5, 10, 15, 20	5, 10	5, 10, 15, 20	No	
ACC #M53	CA [2A][5A-6A]	5, 10, 15, 20	5, 10	5, 10, 15, 20	No	
ACC #M54	CA [2A][5A-6A]	5, 10, 15, 20	5, 10	5, 10, 15, 20	No	
ACC #M55	CA [2A][5A-6A]	5, 10, 15, 20	5, 10	5, 10, 15, 20	No	
ACC #M56	CA [2A][5A-6A]	5, 10, 15, 20	5, 10	5, 10, 15, 20	No	
ACC #M57	CA [2A][5A-6A]	5, 10, 15, 20	5, 10	5, 10, 15, 20	No	
ACC #M58	CA [2A][5A-6A]	5, 10, 15, 20	5, 10	5, 10, 15, 20	No	
ACC #M59	CA [2A][5A-6A]	5, 10, 15, 20	5, 10	5, 10, 15, 20	No	
ACC #M60	CA [2A][5A-6A]	5, 10, 15, 20	5, 10	5, 10, 15, 20	No	
ACC #M61	CA [2A][5A-6A]	5, 10, 15, 20	5, 10	5, 10, 15, 20	No	
ACC #M62	CA [2A][5A-6A]	5, 10, 15, 20	5, 10	5, 10, 15, 20	No	
ACC #M63	CA [2A][5A-6A]	5, 10, 15, 20	5, 10	5, 10, 15, 20	No	
ACC #M64	CA [2A][5A-6A]	5, 10, 15, 20	5, 10	5, 10, 15, 20	No	
ACC #M65	CA [2A][5A-6A]	5, 10, 15, 20	5, 10	5, 10, 15, 20	No	
ACC #M66	CA [2A][5A-6A]	5, 10, 15, 20	5, 10	5, 10, 15, 20	No	
ACC #M67	CA [2A][5A-6A]	5, 10, 15, 20	5, 10	5, 10, 15, 20	No	
ACC #M68	CA [2A][5A-6A]	5, 10, 15, 20	5, 10	5, 10, 15, 20	No	
ACC #M69	CA [2A][5A-6A]	5, 10, 15, 20	5, 10	5, 10, 15, 20	No	
ACC #M70	CA [2A][5A-6A]	5, 10, 15, 20	5, 10	5, 10, 15, 20	No	
ACC #M71	CA [2A][5A-6A]	5, 10, 15, 20	5, 10	5, 10, 15, 20	No	
ACC #M72	CA [2A][5A-6A]	5, 10, 15, 20	5, 10	5, 10, 15, 20	No	
ACC #M73	CA [2A][5A-6A]	5, 10, 15, 20	5, 10	5, 10, 15, 20	No	
ACC #M74	CA [2A][5A-6A]	5, 10, 15, 20	5, 10	5, 10, 15, 20	No	
ACC #M75	CA [2A][5A-6A]	5, 10, 15, 20	5, 10	5, 10, 15, 20	No	
ACC #M76	CA [2A][5A-6A]	5, 10, 15, 20	5, 10	5, 10, 15, 20	No	
ACC #M77	CA [2A][5A-6A]	5, 10, 15, 20	5, 10	5, 10, 15, 20	No	
ACC #M78	CA [2A][5A-6A]	5, 10, 15, 20	5, 10	5, 10, 15, 20	No	
ACC #M79	CA [2A][5A-6A]	5, 10, 15, 20	5, 10	5, 10, 15, 20	No	
ACC #M80	CA [2A][5A-6A]	5, 10, 15, 20	5, 10	5, 10, 15, 20	No	
ACC #M81	CA [2A][5A-6A]	5, 10, 15, 20	5, 10	5, 10, 15, 20	No	
ACC #M82	CA [2A][5A-6A]	5, 10, 15, 20	5, 10	5, 10, 15, 20	No	
ACC #M83	CA [2A][5A-6A]	5, 10, 15, 20	5, 10	5, 10, 15, 20	No	
ACC #M84	CA [2A][5A-6A]	5, 10, 15, 20	5, 10	5, 10, 15, 20	No	
ACC #M85	CA [2A][5A-6A]	5, 10, 15, 20	5, 10	5, 10, 15, 20	No	
ACC #M86	CA [2A][5A-6A]	5, 10, 15, 20	5, 10	5, 10, 15, 20	No	
ACC #M87	CA [2A][5A-6A]	5, 10, 15, 20	5, 10	5, 10, 15, 20	No	
ACC #M88	CA [2A][5A-6A]	5, 10, 15, 20	5, 10	5, 10, 15, 20	No	
ACC #M89	CA [2A][5A-6A]	5, 10, 15, 20	5, 10	5, 10, 15, 20	No	
ACC #M90	CA [2A][5A-6A]	5, 10, 15, 20	5, 10	5, 10, 15, 20	No	
ACC #M91	CA [2A][5A-6A]	5, 10, 15, 20	5, 10	5, 10, 15, 20	No	
ACC #M92	CA [2A][5A-6A]	5, 10, 15, 20	5, 10	5, 10, 15, 20	No	
ACC #M93	CA [2A][5A-6A]	5, 10, 15, 20	5, 10	5, 10, 15, 20	No	
ACC #M94	CA [2A][5A-6A]	5, 10, 15, 20	5, 10	5, 10, 15, 20	No	
ACC #M95	CA [2A][5A-6A]	5, 10, 15, 20	5, 10	5, 10, 15, 20	No	
ACC #M96	CA [2A][5A-6A]	5, 10, 15, 20	5, 10	5, 10, 15, 20	No	
ACC #M97	CA [2A][5A-6A]	5, 10, 15, 20	5, 10	5, 10, 15, 20	No	
ACC #M98	CA [2A][5A-6A]	5, 10, 15, 20	5, 10	5, 10, 15, 20	No	
ACC #M99	CA [2A][5A-6A]	5, 10, 15, 20	5, 10	5, 10, 15, 20	No	
ACC #M100	CA [2A][5A-6A]	5, 10, 15, 20	5, 10	5, 10, 15, 20	No	

1.2 LTE Downlink Only Carrier Aggregation Test Selection and Setup

SAR test exclusion for LTE downlink Carrier Aggregation is determined by power measurements according to the number component carriers (CCs) supported by the 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. All uplink communications and acknowledgements remain identical to specifications when downlink carrier aggregation is inactive on the PCC. Additional conducted output powers are measured 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.

This device supports LAA with downlink carrier aggregation only. It uses carrier aggregation in the downlink to combine LTE in the unlicensed spectrum (i.e. LTE Band 46) with LTE in the licensed band (served as PCC). All uplink communications and acknowledgements on the PCC remain identical to specifications when downlink carrier aggregation is inactive.

Per FCC KDB Publication 941225 D05Av01r02, no SAR measurements are required for carrier aggregation configurations when the maximum average output power with downlink only carrier aggregation active is not more than 0.25 dB higher than the average output power with downlink only carrier aggregation inactive. All bands required for SAR testing per FCC KDB procedures were considered. Based on the measured maximum powers below, no additional SAR tests were required for DLCA SAR configurations.

General PCC and SCC configuration selection procedure

- PCC uplink channel, channel bandwidth, modulation and RB configurations were selected based on section C)3)b)iii) of KDB 941225 D05 V01r02. The downlink PCC channel was paired with the selected PCC uplink channel according to normal configurations without carrier aggregation.
- To maximize aggregated bandwidth, highest channel bandwidth available for that CA combination was selected for SCC. For inter-band CA, the SCC downlink channels were selected near the middle of their transmission bands. For contiguous intra-band CA, the downlink channel spacing between the component carriers was set to multiple of 300 kHz less than the nominal channel spacing defined in section 5.4.1A of 3GPP TS 36.521. For non-contiguous intra-band CA, 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.
- All selected PCC and SCC(s) remained fully within the uplink/downlink transmission band of the respective component carrier.

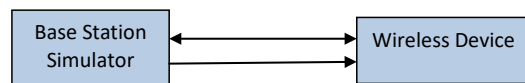


Figure 1
DL CA Power Measurement Setup

FCC ID: BCGA2072	 PCTEST Proud to be part of element	SAR EVALUATION REPORT	Reviewed by: Quality Manager
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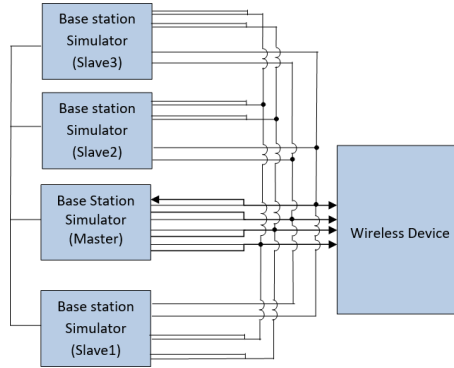


Figure 2
DL CA with DL 4x4 MIMO Power Measurement Setup

1.3 Downlink Carrier Aggregation RF Conducted Powers

1.3.1 LTE Band 12 as PCC

Table 1
Output Powers – Ant 4

Combination	PCC Band	PCC BW [MHz]	PCC [UL] Ch.	PCC				SCC 1				SCC 2				SCC 3				SCC 4				Power					
				PCC [UL] Freq. [MHz]	Mod.	PCC UL RB	PCC UL RB Offset	PCC [DL] Channel	PCC [DL] Freq. [MHz]	SCC Band	SCC BW [MHz]	SCC [DL] Channel	SCC [DL] Freq. [MHz]	SCC Band	SCC BW [MHz]	SCC [DL] Channel	SCC [DL] Freq. [MHz]	SCC Band	SCC BW [MHz]	SCC [DL] Channel	SCC [DL] Freq. [MHz]	SCC Band	SCC BW [MHz]	SCC [DL] Channel	SCC [DL] Freq. [MHz]	LTE Tx Power with DL CA Enabled [dBm]	LTE Single Carrier Tx Power [dBm]		
CA 2A-12A (1)	LTE B12	10	22005	707.5	QPSK	1	0	6055	737.5	LTE B2	20	900	1980	-	-	-	-	-	-	-	-	-	-	-	-	-	30.90	20.90	
CA 4A-12A (1)	LTE B12	10	22005	707.5	QPSK	1	0	6055	737.5	LTE B4	20	2175	2132.5	-	-	-	-	-	-	-	-	-	-	-	-	-	30.90	20.90	
CA 4A-12A (2)	LTE B12	10	22005	707.5	QPSK	1	0	6055	737.5	LTE B4	20	2175	2132.5	-	-	-	-	-	-	-	-	-	-	-	-	-	30.90	20.90	
CA 12A-25A	LTE B12	10	22005	707.5	QPSK	1	0	6055	737.5	LTE B25	20	8305	1982.5	-	-	-	-	-	-	-	-	-	-	-	-	-	30.86	20.90	
CA 12A-46A	LTE B12	10	22005	707.5	QPSK	1	0	6055	737.5	LTE B26	20	8205	1937.5	-	-	-	-	-	-	-	-	-	-	-	-	-	30.90	20.90	
CA 12A-66A (1)	LTE B12	10	22005	707.5	QPSK	1	0	6055	737.5	LTE B26	20	66785	2145	-	-	-	-	-	-	-	-	-	-	-	-	-	30.90	20.90	
CA 12A-66A (2)	LTE B12	10	22005	707.5	QPSK	1	0	6055	737.5	LTE B26	20	66785	2145	-	-	-	-	-	-	-	-	-	-	-	-	-	30.90	20.90	
CA 2C-12A	LTE B12	10	22005	707.5	QPSK	1	0	6055	737.5	LTE B2	20	900	1980	LTE B2	20	700	1940.2	-	-	-	-	-	-	-	-	-	-	30.89	20.86
CA 2A-2A-12B	LTE B12	5	22005	707.5	16QAM	12	6	5015	731.5	LTE B12	10	5107	738.7	LTE B2	20	900	1960	LTE B2	20	700	1940	-	-	-	-	-	-	30.85	20.86
CA 4A-4A-12B	LTE B12	5	22005	707.5	16QAM	12	6	5015	731.5	LTE B12	10	5107	738.7	LTE B4	20	2175	2132.5	LTE B4	10	2050	2150	-	-	-	-	-	-	30.77	20.86
CA 2A-2A-12A-12B	LTE B12	10	22005	707.5	QPSK	1	0	6055	737.5	LTE B2	20	900	1980	LTE B2	20	700	1940	LTE B4	20	2175	2132.5	-	-	-	-	-	-	30.88	20.90
CA 2A-4A-12A	LTE B12	10	22005	707.5	QPSK	1	0	6055	737.5	LTE B2	20	900	1980	LTE B4	20	2175	2132.5	LTE B4	10	2050	2150	-	-	-	-	-	-	30.85	20.90
CA 2A-4A-12B	LTE B12	5	22005	707.5	16QAM	12	6	5015	731.5	LTE B12	10	5107	738.7	LTE B2	20	900	1960	LTE B4	20	2175	2132.5	-	-	-	-	-	-	30.81	20.86
CA 2A-12A-6B	LTE B12	10	22005	707.5	QPSK	1	0	6055	737.5	LTE B2	20	900	1980	LTE B26	20	66785	2145	LTE B26	20	66004	2104.5	-	-	-	-	-	-	30.87	20.90
CA 4A-4A-12A-10A	LTE B12	10	22005	707.5	QPSK	1	0	6055	737.5	LTE B4	20	2175	2132.5	LTE B4	10	2050	2150	LTE B30	10	8000	2105	-	-	-	-	-	-	30.85	20.90
CA 2A-4A-7A-12A	LTE B12	10	22005	707.5	QPSK	1	0	6055	737.5	LTE B2	20	900	1980	LTE B4	20	2175	2132.5	LTE B7	20	3100	2055	-	-	-	-	-	-	30.87	20.90
CA 2A-4A-12A-10A	LTE B12	10	22005	707.5	QPSK	1	0	6055	737.5	LTE B2	20	900	1980	LTE B4	20	2175	2132.5	LTE B30	10	8000	2105	-	-	-	-	-	-	30.84	20.90
CA 2A-7A-12A-66A	LTE B12	10	22005	707.5	QPSK	1	0	6055	737.5	LTE B2	20	900	1980	LTE B7	20	3100	2055	LTE B26	20	66785	2145	-	-	-	-	-	-	30.88	20.90
CA 2A-2A-12A-66A-66A	LTE B12	10	22005	707.5	QPSK	1	0	5055	737.5	LTE B2	20	900	1950	LTE B2	20	700	1940	LTE B26	20	66785	2145	LTE B26	20	67235	2190	30.85	20.90		
CA 2A-2A-12A-30A-66A	LTE B12	10	22005	707.5	QPSK	1	0	5055	737.5	LTE B2	20	900	1950	LTE B30	10	8000	2105	LTE B26	20	66785	2145	LTE B26	20	67235	2190	30.87	20.90		
CA 2A-12A-66A-66A	LTE B12	10	22005	707.5	QPSK	1	0	5055	737.5	LTE B2	20	900	1950	LTE B2	20	700	1940	LTE B26	20	66785	2145	LTE B26	20	67235	2190	30.87	20.90		

1.3.2 LTE Band 13 as PCC

Table 2
Output Powers – Ant 4

Combination	PCC Band	PCC										SCC 1				SCC 2				SCC 3				SCC 4				Power	
		PCC BW [MHz]	PCC [UL] Ch.	PCC [UL] Freq. [MHz]	Mod.	PCC UL RB	PCC UL RB Offset	PCC [DL] Channel	PCC [DL] Freq. [MHz]	SCC Band	SCC BW [MHz]	SCC [DL] Channel	SCC [DL] Freq. [MHz]	SCC Band	SCC BW [MHz]	SCC [DL] Channel	SCC [DL] Freq. [MHz]	SCC Band	SCC BW [MHz]	SCC [DL] Channel	SCC [DL] Freq. [MHz]	SCC Band	SCC BW [MHz]	SCC [DL] Channel	SCC [DL] Freq. [MHz]	LTE Tx Power with DL CA Enabled [dBm]	LTE Single Carrier Tx Power [dBm]		
CA 4A-4A-13A	LTE B13	10	22320	782	16QAM	1	0	6230	751	LTE B4	20	2175	2132.5	LTE B4	10	2050	2150	-	-	-	-	-	-	-	-	-	30.93	21.10	
CA 2A-4A-13A	LTE B13	10	22320	782	16QAM	1	0	6230	751	LTE B2	20	900	1980	LTE B4	20	2175	2132.5	-	-	-	-	-	-	-	-	-	30.91	21.10	
CA 2A-13A-66A	LTE B13	10	22320	782	16QAM	1	0	6230	751	LTE B2	20	900	1980	LTE B46	20	50065	5537.5	-	-	-	-	-	-	-	-	-	30.96	21.10	
CA 13A-46A-66A	LTE B13	10	22320	782	16QAM	1	0	6230	751	LTE B46	20	50065	5537.5	LTE B26	20	66785	2145	-	-	-	-	-	-	-	-	-	30.91	21.10	
CA 13A-48A-66A	LTE B13	10	22320	782	16QAM	1	0	6230	751	LTE B46	20	50065	5537.5	LTE B26	20	66785	2145	-	-	-	-	-	-	-	-	-	30.91	21.10	
CA 13A-66A-66B	LTE B13	10	22320	782	16QAM	1	0	6230	751	LTE B26	20	66785	2145	LTE B26	5	67108	2163.2	LTE B26	15	67261	2162.5	-	-	-	-	-	30.88	21.10	
CA 13A-66A-66C	LTE B13	10	22320	782	16QAM	1	0	6230	751	LTE B26	20	66785	2145	LTE B26	20	67038	2170.2	LTE B26	20	67236	2190	-	-	-	-	-	30.87	21.10	
CA 2A-2A-13A-66A	LTE B13	10	22320	782	16QAM	1	0	6230	751	LTE B2	20	900	1980	LTE B2	20	700	1940	LTE B26	20	66785	2145	-	-	-	-	-	30.90	21.10	
CA 2A-13A-46C	LTE B13	10	22320	782	16QAM	1	0	6230	751	LTE B2	20	900	1980	LTE B46	20	50065	5537.5	LTE B46	20	50467	5517.7	-	-	-	-	-	30.78	21.10	
CA 2A-13A-66A-66A	LTE B13	10	22320	782	16QAM	1	0	6230	751	LTE B2	20	900	1980	LTE B26	20	66785	2145	LTE B26	20	67236	2190	-	-	-	-	-	30.83	21.10	
CA 2A-13A-66B	LTE B13	10	22320	782	16QAM	1	0	6230	751	LTE B2	20	900	1980	LTE B26	15	66785	2145	LTE B26	5	66870	2164.5	-	-	-	-	-	30.83	21.10	
CA 2A-13A-66C	LTE B13	10	22320	782	16QAM	1	0	6230	751	LTE B2	20	900	1980	LTE B26	20	66785	2145	LTE B26	20	66884	2164.5	-	-	-	-	-	30.83	21.10	
CA 13A-46C-66A	LTE B13	10	22320	782	16QAM	1	0	6230	751	LTE B46	20	50065	5537.5	LTE B46	20	50467	5517.7	LTE B26	20	66785	2145	-	-	-	-	-	30.86	21.10	
CA 13A-48C-66A	LTE B13	10	22320	782	16QAM	1	0	6230	751	LTE B46	20	50065	5537.5	LTE B46	20	50467	5517.7	LTE B26	20	66785	2145	-	-	-	-	-	30.83	21.10	
CA 13A-46E	LTE B13	10	22320	782	16QAM	1	0	6230	751	LTE B46	20	50065	5537.5	LTE B46	20	50467	5517.7	LTE B46	20	50863	5557.3	LTE B46	20	50863	5557.3	30.96	21.10		
CA 2A-13A-46D	LTE B13	10	22320	782	16QAM	1	0	6230	751	LTE B2	20	900	1950	LTE B46	20	50065	5537.5	LTE B46	20	50467	5517.7	LTE B46	20	50863	5557.3	30.92	21.10		
CA 13A-46D-66A	LTE B13	10	22320	782	16QAM	1	0	6230	751	LTE B26	20	50065	5537.5	LTE B46	20	50467	5517.7	LTE B46	20	50863	5557.3	LTE B26	20	66785	2145	30.93	21.10		

FCC ID: BCGA2072	 PCTEST Proud to be part of element	SAR EVALUATION REPORT	Reviewed by: Quality Manager
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LTE Band 5 as PCC

Table 3
Output Powers – Ant 4

Combination	PCB Band	PCC BW [MHz]	PCC [UL] CH	PCC [UL] Freq. [MHz]	Mod.	PCC UL# RB	PCC UL RB Offset	PCC (DL) Channel	PCC (DL) Freq. [MHz]	SCC Band	SCC 1				SCC 2				SCC 3				SCC 4				LTE To Power with SC-FS Enabled (dBm)	LTE Single Carrier (dBm)	
											SCC BW [MHz]	SCC (DL) Channel	SCC (DL) Freq. [MHz]	SCC Band	SCC BW [MHz]	SCC (DL) Channel	SCC (DL) Freq. [MHz]	SCC Band	SCC BW [MHz]	SCC (DL) Channel	SCC (DL) Freq. [MHz]	SCC Band	SCC BW [MHz]	SCC (DL) Channel	SCC (DL) Freq. [MHz]				
CA 5A-7A	LTE BB	5	20425	820.5	QPSK	1	24	2425	871.5	LTE B7	20	3100	2605	-	-	-	-	-	-	-	-	-	-	-	-	-	-	21.10	21.10
CA 5A-2A	LTE BB	5	20425	820.5	QPSK	1	24	2425	871.5	LTE B2S	20	8365	1962.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	21.10	21.10
CA 5A-1A	LTE BB	5	20425	820.5	QPSK	1	24	2425	871.5	LTE B4S	20	6050	3625	-	-	-	-	-	-	-	-	-	-	-	-	-	-	21.10	21.10
CA 5A-4A(1)	LTE BB	5	20425	820.5	QPSK	1	24	2425	871.5	LTE B4S	20	6050	5537.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	21.10	21.10
CA 5A-4A	LTE BB	5	20425	820.5	QPSK	1	24	2425	871.5	LTE B4S	20	6050	3625	-	-	-	-	-	-	-	-	-	-	-	-	-	-	21.10	21.10
CA 4A-5B	LTE BB	5	20425	820.5	QPSK	1	24	2425	871.5	LTE B5	20	900	1800	1	1782	30	700	1560	2	1824	30	700	1824	3	1860	30	700	21.08	21.08
CA 4A-5B(1)	LTE BB	5	20425	820.5	QPSK	1	24	2425	871.5	LTE B5	20	2473	873.3	1	1782	30	700	1560	2	1824	30	700	1824	3	1860	30	700	21.08	21.10
CA 5A-7A-7A	LTE BB	5	20425	820.5	QPSK	1	24	2425	871.5	LTE B7	20	3100	2605	1	1782	30	700	1560	2	1824	30	700	1824	3	1860	30	700	21.10	21.10
CA 5A-7A-7C	LTE BB	5	20425	820.5	QPSK	1	24	2425	871.5	LTE B7	20	3100	2605	1	1782	30	700	1560	2	1824	30	700	1824	3	1860	30	700	21.10	21.10
CA 5A-4A(1)	LTE BB	5	20425	820.5	QPSK	1	24	2425	871.5	LTE B4S	20	6050	5537.5	1	1782	30	700	1560	2	1824	30	700	1824	3	1860	30	700	21.08	21.10
CA 2A-5A-4A(1)	LTE BB	5	20425	820.5	QPSK	1	24	2425	871.5	LTE B2	20	900	1800	1	1782	30	700	1560	2	1824	30	700	1824	3	1860	30	700	21.08	21.10
CA 5A-2A-5A-6A	LTE BB	5	20425	820.5	QPSK	1	24	2425	871.5	LTE B2S	20	8365	1962.5	1	1782	30	700	1560	2	1824	30	700	1824	3	1860	30	700	21.08	21.10
CA 5A-2A-5A-6A(1)	LTE BB	5	20425	820.5	QPSK	1	24	2425	871.5	LTE B2S	20	8365	1962.5	1	1782	30	700	1560	2	1824	30	700	1824	3	1860	30	700	21.08	21.10
CA 4A-5A-6B	LTE BB	5	20425	820.5	QPSK	1	24	2425	871.5	LTE B5	20	2477	877.3	1	1782	30	700	1560	2	1824	30	700	1824	3	1860	30	700	21.08	21.10
CA 5A-4B(1)	LTE BB	5	20425	820.5	QPSK	1	24	2425	871.5	LTE B4S	20	6050	5537.5	1	1782	30	700	1560	2	1824	30	700	1824	3	1860	30	700	21.08	21.10
CA 5A-5A-6B(1)	LTE BB	5	20425	820.5	QPSK	1	24	2425	871.5	LTE B4S	20	6050	5537.5	1	1782	30	700	1560	2	1824	30	700	1824	3	1860	30	700	21.08	21.10
CA 5A-6A-6B(1)	LTE BB	5	20425	820.5	QPSK	1	24	2425	871.5	LTE B4S	20	6050	5537.5	1	1782	30	700	1560	2	1824	30	700	1824	3	1860	30	700	21.08	21.10
CA 2A-2A-5A-5A	LTE BB	5	20425	820.5	QPSK	1	24	2425	871.5	LTE B2	20	900	1800	1	1782	30	700	1560	2	1824	30	700	1824	3	1860	30	700	21.08	21.10
CA 2A-2A-5A-5A(1)	LTE BB	5	20425	820.5	QPSK	1	24	2425	871.5	LTE B2	20	900	1800	1	1782	30	700	1560	2	1824	30	700	1824	3	1860	30	700	21.08	21.10
CA 2A-4A-6B	LTE BB	5	20425	820.5	QPSK	1	24	2425	871.5	LTE B5	20	2477	877.3	1	1782	30	700	1560	2	1824	30	700	1824	3	1860	30	700	21.07	21.10
CA 5A-2A-5A-6B	LTE BB	5	20425	820.5	QPSK	1	24	2425	871.5	LTE B2S	20	8365	1962.5	1	1782	30	700	1560	2	1824	30	700	1824	3	1860	30	700	21.08	21.10
CA 5A-2A-5A-6B(1)	LTE BB	5	20425	820.5	QPSK	1	24	2425	871.5	LTE B2S	20	8365	1962.5	1	1782	30	700	1560	2	1824	30	700	1824	3	1860	30	700	21.08	21.10
CA 2A-2A-5A-6A	LTE BB	5	20425	820.5	QPSK	1	24	2425	871.5	LTE B2	20	900	1800	1	1782	30	700	1560	2	1824	30	700	1824	3	1860	30	700	21.10	21.10
CA 2A-2A-5A-6A(1)	LTE BB	5	20425	820.5	QPSK	1	24	2425	871.5	LTE B2	20	900	1800	1	1782	30	700	1560	2	1824	30	700	1824	3	1860	30	700	21.10	21.10
CA 2A-5A-6B(1)	LTE BB	5	20425	820.5	QPSK	1	24	2425	871.5	LTE B2S	20	8365	1962.5	1	1782	30	700	1560	2	1824	30	700	1824	3	1860	30	700	21.08	21.10
CA 2A-5A-6B(1)	LTE BB	5	20425	820.5	QPSK	1	24	2425	871.5	LTE B2S	20	8365	1962.5	1	1782	30	700	1560	2	1824	30	700	1824	3	1860	30	700	21.08	21.10
CA 2A-5A-6B(1)	LTE BB	5	20425	820.5	QPSK	1	24	2425	871.5	LTE B2S	20	8365	1962.5	1	1782	30	700	1560	2	1824	30	700	1824	3	1860	30	700	21.08	21.10
CA 2A-5A-6B(1)	LTE BB	5	20425	820.5	QPSK	1	24	2425	871.5	LTE B2S	20	8365	1962.5	1	1782	30	700	1560	2	1824	30	700	1824	3	1860	30	700	21.08	21.10
CA 2A-5A-6B(1)	LTE BB	5	20425	820.5	QPSK	1	24	2425	871.5	LTE B2S	20	8365	1962.5	1	1782	30	700	1560	2	1824	30	700	1824	3	1860	30	700	21.08	21.10
CA 2A-5A-6B(1)	LTE BB	5	20425	820.5	QPSK	1	24	2425	871.5	LTE B2S	20	8365	1962.5	1	1782	30	700	1560	2	1824	30	700	1824	3	1860	30	700	21.08	21.10
CA 2A-5A-6B(1)	LTE BB	5	20425	820.5	QPSK	1	24	2425	871.5	LTE B2S	20	8365	1962.5	1	1782	30	700	1560	2	1824	30	700	1824	3	1860	30	700	21.08	21.10
CA 2A-5A-6B(1)	LTE BB	5	20425	820.5	QPSK	1	24	2425	871.5	LTE B2S	20	8365	1962.5	1	1782	30	700	1560	2	1824	30	700	1824	3	1860	30	700	21.08	21.10
CA 2A-5A-6B(1)	LTE BB	5	20425	820.5	QPSK	1	24	2425	871.5	LTE B2S	20	8365	1962.5	1	1782	30	700	1560	2	1824	30	700	1824	3	1860	30	700	21.08	21.10
CA 2A-5A-6B(1)	LTE BB	5	20425	820.5	QPSK	1	24	2425	871.5	LTE B2S	20	8365	1962.5	1	1782	30	700	1560	2	1824	30	700	1824	3	1860	30	700	21.08	21.10
CA 2A-5A-6B(1)	LTE BB	5	20425	820.5	QPSK	1	24	2425	871.5	LTE B2S	20	8365	1962.5	1	1782	30	700	1560	2	1824	30	700	1824	3	1860	30	700	21.08	21.10
CA 2A-5A-6B(1)	LTE BB	5	20425	820.5	QPSK	1	24	2425	871.5	LTE B2S	20	8365	1962.5	1	1782	30	700	1560	2	1824	30	700	1824	3	1860	30	700	21.08	21.10
CA 2A-5A-6B(1)	LTE BB	5	20425	820.5	QPSK	1	24	2425	871.5	LTE B2S	20	8365	1962.5	1	1782	30	700	1560	2	1824	30	700	1824	3	1860	30	700	21.08	21.10
CA 2A-5A-6B(1)	LTE BB	5	20425	820.5	QPSK	1	24	2425	871.5	LTE B2S	20	8365	1962.5	1	1782	30	700	1560	2	1824	30	700	1824	3	1860	30	700	21.08	21.10
CA 2A-5A-6B(1)	LTE BB	5	20425	820.5	QPSK	1	24	2425	871.5	LTE B2S	20	8365	1962.5	1	1782	30	700	1560	2	1824	30	700	1824	3	1860	30	700	21.08	21.10
CA 2A-5A-6B(1)	LTE BB	5	20425	820.5	QPSK	1	24	2425	871.5	LTE B2S	20	8365	1962.5	1	1782	30	700	1560	2	1824	30	700	1824	3	1860	30	700	21.08	21.10
CA 2A-5A-6B(1)	LTE BB	5	20425	820.5	QPSK	1	24	2425	871.5	LTE B2S	20	8365	1962.5	1	1782	30	700	1560	2	1824	30	700	1824	3	1860	30	700	21.08	21.10
CA 2A-5A-6B(1)	LTE BB	5	20425	820.5	QPSK	1	24	2425	871.5	LTE B2S	20	8365	1962.5	1	1782	30	700	1560	2	1824	30	700	1824	3	1860	30	700	21.08	21.10
CA 2A-5A-6B(1)	LTE BB	5	20425	820.5	QPSK	1	24	2425	871.5	LTE B2S	20	8365	1962.5	1	1782	30	700	1560	2	1824	30	700	1824	3	1860	30	700	21.08	21.10
CA 2A-5A-6B(1)	LTE BB	5	20425	820.5	QPSK	1	24	2425	871.5	LTE B2S	20	8365	1962.5	1	1782	30	700	1560	2	1824	30	700	1824	3	1860	30	700	21.08	21.10
CA 2A-5A-6B(1)	LTE BB	5	20425	820.5	QPSK	1	24	2425	871.5	LTE B2S	20	8365	1962.5	1	1782	30	700	1560	2	1824	30	700	1824	3	1860	30	700	21.08	21.10
CA 2A-5A-6B(1)	LTE BB	5	20425	820.5	QPSK	1	24	2425	871.5	LTE B2S	20	8365	1962.5	1	1782	30	700	1560	2	1824	30	700	1824	3	1860	30	700	21.08	21.10
CA 2A-5A-6B(1)	LTE BB	5	20425	820.5	QPSK	1	24	2425	871.5	LTE B2S	20	8365	1962.5	1	1782	30	700	1560	2	1824	30	700	1824	3	1860	30	700	21.08	21.10
CA 2A-5A-6B(1)	LTE BB	5	20425	820.5	QPSK	1	24	2425	871.5	LTE B2S	20	8365																	

LTE Band 26 as PCC

Table 4
Output Powers – Ant 4

Combination	PCC Band	PCC								SCC 1				SCC 2				Power	
		PCC BW [MHz]	PCC (UL) Ch.	PCC (UL) Freq. [MHz]	Mod.	PCC UL RB	PCC UL RB Offset	PCC (DL) Channel	PCC (DL) Freq. [MHz]	SCC Band	SCC BW [MHz]	SCC (DL) Channel	SCC (DL) Freq. [MHz]	SCC Band	SCC BW [MHz]	SCC (DL) Channel	SCC (DL) Freq. [MHz]	LTE Tx.Power with DL CA Enabled [dBm]	LTE Single Carrier Tx Power [dBm]
CA 7A-26A	LTE B26	10	26740	819	16QAM	1	0	8740	864	LTE B7	20	3100	2655	-	-	-	-	21.10	21.10
CA 25A-26A	LTE B26	10	26740	819	16QAM	1	0	8740	864	LTE B25	20	8365	1962.5	-	-	-	-	21.10	21.10
CA 26A-41A	LTE B26	10	26740	819	16QAM	1	0	8740	864	LTE B41	20	40620	2593	-	-	-	-	21.10	21.10
CA 7A-7A-26A	LTE B26	10	26740	819	16QAM	1	0	8740	864	LTE B7	20	3100	2655	LTE B7	20	2850	2630	29.95	21.10
CA 25A-25A-26A	LTE B26	3	26705	815.5	64QAM	1	0	8705	860.5	LTE B25	20	8365	1962.5	LTE B25	20	8590	1985	20.89	21.10
CA 26A-41C	LTE B26	10	26740	819	16QAM	1	0	8740	864	LTE B41	20	40620	2593	LTE B41	20	40422	2573.2	21.03	21.10

FCC ID: BCGA2072	 PCTEST Proud to be part of element	SAR EVALUATION REPORT	Reviewed by: Quality Manager
Test Dates: 07/28/2020 – 09/16/2020	DUT Type: Tablet Device	APPENDIX F: Page 4 of 12	

Table 5
Output Powers - Ant 2a

Table 6
Output Powers - Ant 4

Table 7
Output Powers - Ant 1a

[illegible]02/15/2019

1.3.8

LTE Band 7 as PCC

Table 8
Output Powers - Ant 2A

Combination	PCC Band	PCC BW [MHz]	PCC [UL] Ch.	PCC				SCC 1				SCC 2				SCC 3				SCC 4				Power	
				PCC [DL] Freq. [MHz]	Mod.	PCC UL RB	PCC UL RB Offset	PCC [DL] Channel	PCC [DL] Freq. [MHz]	SCC BW [MHz]	SCC [DL] Channel	SCC [DL] Freq. [MHz]	SCC BW [MHz]	SCC [DL] Channel	SCC [DL] Freq. [MHz]	SCC BW [MHz]	SCC [DL] Channel	SCC [DL] Freq. [MHz]	SCC BW [MHz]	SCC [DL] Channel	SCC [DL] Freq. [MHz]	LTE Tx Power with CA Enabled (dBm)	LTE Single Carrier Tx Power (dBm)		
CA 7B	LTE B7	15	20825	2607.5	16QAM	1	74	2625	2627.5	LTE B7	5	2518	2626.8	-	-	-	-	-	-	-	-	14.60	14.60		
CA 5A-7A	LTE B7	20	21100	2535	16QAM	1	99	3100	2555	LTE B5	10	2525	881.5	-	-	-	-	-	-	-	-	14.60	14.60		
CA 7A-26A	LTE B7	20	21100	2535	16QAM	1	99	3100	2555	LTE B25	10	8805	876.5	-	-	-	-	-	-	-	-	14.60	14.60		
CA 7A-46A (1)	LTE B7	20	21100	2535	16QAM	1	99	3100	2555	LTE B45	20	80005	5537.5	-	-	-	-	-	-	-	-	14.60	14.60		
CA 4A-4A-7A (1)	LTE B7	20	21100	2535	16QAM	1	99	3100	2555	LTE B4	10	2175	2132.5	LTE B4	10	2175	2130	-	-	-	-	14.61	14.60		
CA 5A-7A-7A	LTE B7	20	21100	2535	16QAM	1	99	3100	2555	LTE B7	20	2500	2535.2	LTE B5	10	2525	881.5	-	-	-	-	14.43	14.60		
CA 5A-7C	LTE B7	20	21100	2535	16QAM	1	99	3100	2555	LTE B7	20	2500	2535.2	LTE B5	10	2525	881.5	-	-	-	-	14.43	14.60		
CA 7A-7A-26A	LTE B7	20	21100	2535	16QAM	1	99	3100	2555	LTE B7	20	2500	2530	LTE B25	10	8805	876.5	-	-	-	-	14.43	14.60		
CA 7A-46C (1)	LTE B7	20	21100	2535	16QAM	1	99	3100	2555	LTE B45	20	80005	5537.5	LTE B45	20	80005	5537.7	-	-	-	-	14.52	14.60		
CA 7A-5C (1)	LTE B7	20	21100	2535	16QAM	1	99	3100	2555	LTE B7	20	2500	2535.2	LTE B45	20	80005	5537.5	-	-	-	-	14.49	14.60		
CA 7A-4D (1)	LTE B7	20	21100	2535	16QAM	1	99	3100	2555	LTE B45	20	80005	5537.5	LTE B45	20	80005	5537.7	LTE B45	20	80005	5537.7	14.54	14.60		
CA 7C-46C	LTE B7	20	21100	2535	16QAM	1	99	3100	2555	LTE B7	20	2500	2535.2	LTE B45	20	80005	5537.5	LTE B45	20	80005	5537.7	14.57	14.60		
CA 2A-4A-7A-7A	LTE B7	20	21100	2535	16QAM	1	99	3100	2555	LTE B7	20	2500	2530	LTE B2	10	890	1960	LTE B4	20	2175	2132.5	-	14.43	14.60	
CA 2A-4A-7C	LTE B7	20	21100	2535	16QAM	1	99	3100	2555	LTE B7	20	2500	2535.2	LTE B2	10	890	1960	LTE B4	20	2175	2132.5	-	14.44	14.60	
CA 2A-4A-7A-2A	LTE B7	20	21100	2535	16QAM	1	99	3100	2555	LTE B7	20	2500	2530	LTE B2	10	890	1960	LTE B4	20	2175	2132.5	-	14.41	14.60	
CA 2A-7A-7A-46A	LTE B7	20	21100	2535	16QAM	1	99	3100	2555	LTE B7	20	2500	2530	LTE B2	10	890	1960	LTE B45	20	80785	2145	-	14.35	14.60	
CA 2A-7A-12A-26A	LTE B7	20	21100	2535	16QAM	1	99	3100	2555	LTE B2	10	890	1960	LTE B2	10	890	1960	LTE B45	20	80785	2145	-	14.42	14.60	
CA 7C-46D	LTE B7	20	21100	2535	16QAM	1	99	3100	2555	LTE B7	20	2500	2535.2	LTE B45	20	80005	5537.5	LTE B45	20	80005	5537.7	14.24	14.60		

1.3.9

LTE Band 41 as PCC

Table 9
Output Powers - Ant 2A

Combination	PCC Band	PCC BW [MHz]	PCC [UL] Ch.	PCC [UL] Freq. [MHz]	SCC 1										SCC 2										SCC 3										SCC 4										Power	
					PCC UL RB	PCC UL RB Offset	PCC [DL] Channel	PCC [DL] Freq. [MHz]	SCC Band	SCC BW [MHz]	SCC [DL] Channel	SCC [DL] Freq. [MHz]	SCC Band	SCC BW [MHz]	SCC [DL] Channel	SCC [DL] Freq. [MHz]	SCC Band	SCC BW [MHz]	SCC [DL] Channel	SCC [DL] Freq. [MHz]	SCC Band	SCC BW [MHz]	SCC [DL] Channel	SCC [DL] Freq. [MHz]	SCC Band	SCC BW [MHz]	SCC [DL] Channel	SCC [DL] Freq. [MHz]	LTE Tx Power with DL CA Enabled (dBm)	LTE Single Carrier Tx Power (dBm)																
CA 41A-41A (1)	LTE B41	20	40185	2540.5	QPSK	50	0	40185	2540.5	LTE B41	20	41490	2690	-	-	-	-	-	-	-	-	-	-	-	-	-	-	16.58	16.60																	
CA 5A-41A	LTE B41	20	40185	2540.5	QPSK	50	0	40185	2540.5	LTE B5	10	2525	2095	-	-	-	-	-	-	-	-	-	-	-	-	-	-	16.57	16.60																	
CA 26A-41A	LTE B41	20	40185	2540.5	QPSK	50	0	40185	2540.5	LTE B25	10	8805	876.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	16.59	16.60																	
CA 41A-41C	LTE B41	20	40185	2540.5	QPSK	50	0	40185	2540.5	LTE B41	20	41292	2690.2	LTE B41	20	41490	2690	-	-	-	-	-	-	-	-	-	-	16.59	16.60																	
CA 41C-41A	LTE B41	20	40185	2540.5	QPSK	50	0	40185	2540.5	LTE B41	20	40383	2593.3	LTE B41	20	41490	2690	-	-	-	-	-	-	-	-	-	-	16.58	16.60																	
CA 26A-26A-41A	LTE B41	20	40185	2540.5	QPSK	50	0	40185	2540.5	LTE B25	20	8305	1962.5	LTE B25	20	8305	1965	-	-	-	-	-	-	-	-	-	-	16.58	16.60																	
CA 26A-41C	LTE B41	20	40185	2540.5	QPSK	50	0	40185	2540.5	LTE B41	20	40383	2593.3	LTE B25	20	8305	1962.5	-	-	-	-	-	-	-	-	-	-	16.60	16.60																	
CA 41C-41C	LTE B41	20	40185	2540.5	QPSK	50	0	40185	2540.5	LTE B41	20	40383	2593.3	LTE B25	20	8305	1962.5	-	-	-	-	-	-	-	-	-	-	16.59	16.60																	
CA 41A-41D	LTE B41	20	40185	2540.5	QPSK	50	0	40185	2540.5	LTE B41	20	40383	2593.3	LTE B41	20	40291	2593.1	LTE B41	20	40775	2606.9	-	-	-	-	-	-	16.59	16.60																	
CA 41D-41A	LTE B41	20	40185	2540.5	QPSK	50	0	40185	2540.5	LTE B41	20	41094	2640.4	LTE B41	20	41292	2690.2	LTE B41	20	41490	2690	-	-	-	-	-	-	16.53	16.60																	
CA 41C-41C	LTE B41	20	40185	2540.5	QPSK	50	0	40185	2540.5	LTE B41	20	40383	2593.3	LTE B41	20	40291	2593.1	LTE B41	20	41490	2690	-	-	-	-	-	-	16.59	16.60																	
CA 26A-26A-41C	LTE B41	20	40185	2540.5	QPSK	50	0	40185	2540.5	LTE B41	20	40383	2593.3	LTE B41	20	41292	2690.2	LTE B41	20	41490	2690	-	-	-	-	-	-	16.58	16.60																	
CA 26A-26A-41D	LTE B41	20	40185	2540.5	QPSK	50	0	40185	2540.5	LTE B41	20	40383	2593.3	LTE B25	20	8305	1962.5	LTE B25	20	8305	1965	-	-	-	-	-	-	16.60	16.60																	
CA 41C-41D	LTE B41	20	40185	2540.5	QPSK	50	0	40185	2540.5	LTE B41	20	40383	2593.3	LTE B41	20	41094	2640.4	LTE B41	20	41292	2690.2	LTE B41	20	41490	2690	16.50	16.60																			
CA 41D-41C	LTE B41	20	40185	2540.5	QPSK	50	0	40185	2540.5	LTE B41	20	40383	2593.3	LTE B41	20	40291	2593.1	LTE B41	20	41292	2690.2	LTE B41	20	41490	2690	16.51	16.60																			
CA 26A-26A-41D	LTE B41	20	40185	2540.5	QPSK	50	0	40185	2540.5	LTE B41	20	40383	2593.3	LTE B41	20	40291	2593.1	LTE B25	20	8305	1965	LTE B25	20	8305	1965	16.53	16.60																			

1.3.10

LTE Band 48 as PCC

Table 10
Output Powers - Ant 4

Combination	PCC Band	PCC BW [MHz]	PCC [DL] Ch. Freq. [MHz]	PCC				SCC 1			SCC 2			SCC 3			SCC 4			SCC 5			LTE Tx Power with DL CA Enabled [dBm]	LTE Single Carrier Tx Power [dBm]
				Mod.	PCC UL RB	PCC UL RB Offset	PCC [DL] Ch. Freq. [MHz]	SCC Band	SCC BW [MHz]	SCC [DL] Channel	SCC [DL] Freq. [MHz]	SCC Band	SCC BW [MHz]	SCC [DL] Channel	SCC [DL] Freq. [MHz]	SCC Band	SCC BW [MHz]	SCC [DL] Channel	SCC [DL] Freq. [MHz]	SCC Band	SCC BW [MHz]	SCC [DL] Channel		
CA 5A-48A	LTE B48	20	92037	3446.7	QPSK	1	99	92037	3446.7	LTE B5	10	2525	881.5	-	-	-	-	-	-	-	-	-	16.57	16.60
CA 2A-48A-48A	LTE B48	20	92037	3446.7	QPSK	1	99	92037	3446.7	LTE B45	20	80005	5537.5	LTE B2	20	890	1960	-	-	-	-	-	16.43	16.60
CA 1A-48A-48A	LTE B48	20	92037	3446.7	QPSK	1	99	92037	3446.7	LTE B45	20	80005	5537.5	LTE B45	20	80005	5537.5	-	-	-	-	-	16.51	16.60
CA 48A-48A-48A	LTE B48	20	92037	3446.7	QPSK	1	99	92037	3446.7	LTE B45	20	80005	5537.5	LTE B45	20	80005	5537.5	-	-	-	-	-	16.51	16.60
CA 48A-48C-48A	LTE B48	20	92037	3446.7	QPSK	1	99	92037	3446.7	LTE B45	20	80005	5537.5	LTE B45	20	80005	5537.5	-	-	-	-	-	16.50	16.60
CA 48C-48A-48A	LTE B48	20	92037	3446.7	QPSK	1	99	92037	3446.7	LTE B45	20	80005	5537.5	LTE B45	20	80005	5537.5	-	-	-	-	-	16.50	16.60
CA 48C-48A-48C	LTE B48	20	92037	3446.7	QPSK	1	99	92037	3446.7	LTE B45	20	80005	5537.5	LTE B45	20	80005	5537.5	-	-	-	-	-	16.50	16.60
CA 2A-48A-48A-48A	LTE B48	20	92037	3446.7	QPSK	1	99	92037	3446.7	LTE B45	20	80005	5537.5	LTE B45	20	80005	5537.5	-	-	-	-	-	16.57	16.60
CA 2A-48C	LTE B48	20	92037	3446.7	QPSK	1	99	92037	3446.7	LTE B45	20	80005	5537.5	LTE B45	20	80005	5537.5	-	-	-	-	-	16.51	16.60
CA 48C-48C	LTE B48	20	92037	3446.7	QPSK	1	99	92037	3446.7	LTE B45	20	80005	5537.5	LTE B45	20	80005	5537.5	-	-	-	-	-	16.50	16.60
CA 48E-48A	LTE B48	20	92037	3446.7	QPSK	1	99	92037	3446.7	LTE B45	20	80005	5537.5	LTE B45	20	80005	5537.5	-	-	-	-	-	16.50	16.60
CA 2A-48A-48C-48A	LTE B48	20	92037	3446.7	QPSK	1	99	92037	3446.7	LTE B45	20	80005	5537.5	LTE B45	20	80005	5537.5	-	-	-	-	-	16.50	16.60
CA 2A-48C-48C-48A	LTE B48	20	92037	3446.7	QPSK	1	99	92037	3446.7	LTE B45	20	80005	5537.5	LTE B45	20	80005	5537.5	-	-	-	-	-	16.50	16.60
CA 2A-48A-48C-48C	LTE B48	20	92037	3446.7	QPSK	1	99	92037	3446.7	LTE B45	20	80005	5537.5	LTE B45	20	80005	5537.5	-	-	-	-	-	16.50	16.60
CA 2A-48A-48C-48A-48A	LTE B48	20	92037	3446.7	QPSK	1	99	92037	3446.7	LTE B45	20	80005	5537.5	LTE B45	20	80005	5537.5	-	-	-	-	-	16.50	16.60
CA 2A-48C-48C-48C	LTE B48	20	92037	3446.7	QPSK	1	99	92037	3446.7	LTE B45	20	80005	5537.5	LTE B45	20	80005	5537.5	-	-	-	-	-	16.50	16.60
CA 2A-48A-48C-48C-48A	LTE B48	20	92037	3446.7	QPSK	1	99	92037	3446.7	LTE B45	20	80005	5537.5	LTE B45	20	80005	5537.5	-	-	-	-	-	16.50	16.60
CA 2A-48A-48C-48C-48A-48A	LTE B48	20	92037	3446.7	QPSK	1	99	92037	3446.7	LTE B45	20	80005	5537.5	LTE B45	20	80005	5537.5	-	-	-	-	-	16.50	16.60

1.4 DL CA with DL 4x4 MIMO RF Conduction Powers

This device supports downlink 4x4 MIMO operations for some LTE bands. Uplink transmission is limited to a single output stream. When carrier aggregation was applicable, the general test selection and setup procedures described in Section 1.2 were applied.

Per May 2017 TCB Workshop Notes, SAR for 4x4 DL MIMO was not needed since the maximum average output power in 4x4 DL MIMO mode was not more than 0.25 dB higher than the maximum output power with 4x4 DL MIMO inactive. Additionally, SAR for 4x4 MIMO Downlink Carrier Aggregation was not needed since the maximum average output power in 4x4 MIMO Downlink Carrier Aggregation mode was not more than 0.25 dB higher than the maximum output power with 4x4 MIMO Downlink and downlink carrier aggregation inactive.

1.4.1 LTE 4x4 MIMO DL Standalone Powers

Table 11
Output Powers - Ant 2a

LTE Band	Bandwidth [MHz]	Channel	Frequency [MHz]	Modulation	RB Size	RB Offset	4x4 DL MIMO Tx. Power [dBm]	Single Antenna Tx. Power [dBm]	Target Power [dBm]
66	20	132322	1745	64QAM	1	0	15.30	15.30	15.3
7	20	21100	2535	16QAM	1	99	14.60	14.60	14.6
41	20	40185	2549.5	QPSK	50	0	16.57	16.60	16.6

Table 12
Output Powers - Ant 4

LTE Band	Bandwidth [MHz]	Channel	Frequency [MHz]	Modulation	RB Size	RB Offset	4x4 DL MIMO Tx. Power [dBm]	Single Antenna Tx. Power [dBm]	Target Power [dBm]
25	15	26615	1907.5	16QAM	36	0	15.97	15.99	16.0

Table 13
Output Powers - Ant 1a

LTE Band	Bandwidth [MHz]	Channel	Frequency [MHz]	Modulation	RB Size	RB Offset	4x4 DL MIMO Tx. Power [dBm]	Single Antenna Tx. Power [dBm]	Target Power [dBm]
30	10	27710	2310	QPSK	25	25	14.36	14.42	14.5

FCC ID: BCGA2072	 PCTEST Proud to be part of  element	SAR EVALUATION REPORT	Reviewed by: Quality Manager
Test Dates: 07/28/2020 – 09/16/2020	DUT Type: Tablet Device		APPENDIX F: Page 7 of 12

LTE Band 12 as PCC

Table 14
Output Powers - Ant 4

Combination		PCC Band	PCC BW [MHz]	PCC [UL] Freq. [MHz]	PCC [UL] Mod.	PCC				SSC 1				SSC 2				SSC 3				SSC 4				Power						
						PCC UL RB	PCC UL RB Offset	PCC [DL] Freq. [MHz]	DL Ant. Config.	SSC BW [MHz]	SSC [DL] Ch.	SSC [DL] Freq. [MHz]	DL Ant. Config.	SSC BW [MHz]	SSC [DL] Ch.	SSC [DL] Freq. [MHz]	DL Ant. Config.	SSC Band	SSC BW [MHz]	SSC [DL] Ch.	SSC [DL] Freq. [MHz]	DL Ant. Config.	SSC Band	SSC BW [MHz]	SSC [DL] Ch.	SSC [DL] Freq. [MHz]	DL Ant. Config.	LTE Tx Power with SC-FDMA [dBm]	LTE Single Carrier Tx Power [dBm]			
CA (2A)(2A)(1)	LTE B12	10	23095	707.5	QPSK	1	0	5095	737.5	2x2	LTE B2	20	900	1960	4x4	-	-	-	-	-	-	-	-	-	-	20.85	20.90					
CA (4A)(2A)(1)	LTE B12	10	23095	707.5	QPSK	1	0	5095	737.5	2x2	LTE B4	20	2175	2122.5	4x4	-	-	-	-	-	-	-	-	-	-	20.85	20.90					
CA (2A)(2A)(2)	LTE B12	10	23095	707.5	QPSK	1	0	5095	737.5	2x2	LTE B2	20	900	1960	4x4	-	-	-	-	-	-	-	-	-	-	20.85	20.90					
CA (2A)(2A)(3)	LTE B12	10	23095	707.5	QPSK	1	0	5095	737.5	2x2	LTE B05	20	8385	1902.5	4x4	-	-	-	-	-	-	-	-	-	-	20.87	20.90					
CA (2A)(2A)(4)	LTE B12	10	23095	707.5	QPSK	1	0	5095	737.5	2x2	LTE B06	20	66785	2145	4x4	-	-	-	-	-	-	-	-	-	-	20.88	20.90					
CA (2A)(2A)(5)	LTE B12	10	23095	707.5	QPSK	1	0	5095	737.5	2x2	LTE B08	20	900	1960	4x4	-	-	-	-	-	-	-	-	-	-	20.89	20.90					
CA (2A)(2A)(6)	LTE B12	10	23095	707.5	QPSK	1	0	5095	737.5	2x2	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	-	-	-	-	-	-	20.83	20.90				
CA (2A)(2A)(7)	LTE B12	10	23095	707.5	QPSK	1	0	5095	737.5	2x2	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	-	-	20.86	20.98			
CA (4A)(4A)(1)	LTE B12	10	23095	707.5	QPSK	12	6	5035	731.5	2x2	LTE B12	10	5107	738.7	2x2	LTE B4	20	2175	2122.5	4x4	LTE B4	20	2175	2122.5	4x4	-	-	20.90	20.98			
CA (2A)(2A)(12A)	LTE B12	10	23095	707.5	QPSK	1	0	5095	737.5	2x2	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	LTE B30	10	9820	2310	4x4	-	-	20.84	20.90			
CA (2A)(2A)(12A)(6A)	LTE B12	10	23095	707.5	QPSK	1	0	5095	737.5	2x2	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	LTE B06	20	66785	2145	4x4	-	-	20.83	20.90			
CA (2A)(2A)(12A)(6A)(1)	LTE B12	10	23095	707.5	QPSK	1	0	5095	737.5	2x2	LTE B2	20	900	1960	4x4	LTE B4	20	2175	2122.5	4x4	LTE B4	20	2175	2122.5	4x4	-	-	20.86	20.90			
CA (2A)(2A)(12A)(6A)(2)	LTE B12	10	23095	707.5	QPSK	1	0	5095	737.5	2x2	LTE B2	20	900	1960	4x4	LTE B4	20	2175	2122.5	4x4	LTE B06	20	66785	2145	4x4	-	-	20.86	20.90			
CA (2A)(2A)(12A)(6A)(3)	LTE B12	10	23095	707.5	QPSK	1	0	5095	737.5	2x2	LTE B2	20	900	1960	4x4	LTE B4	20	2175	2122.5	4x4	LTE B06	20	66785	2145	4x4	-	-	20.86	20.90			
CA (2A)(2A)(12A)(6A)(4)	LTE B12	10	23095	707.5	QPSK	1	0	5095	737.5	2x2	LTE B2	20	900	1960	4x4	LTE B06	20	66785	2145	4x4	LTE B06	20	66785	2145	4x4	-	-	20.87	20.90			
CA (4A)(4A)(12A)	LTE B12	10	23095	707.5	QPSK	1	0	5095	737.5	2x2	LTE B4	20	2175	2122.5	4x4	LTE B4	20	2175	2122.5	4x4	LTE B30	10	9820	2310	4x4	-	-	20.83	20.90			
CA (2A)(2A)(12A)(12A)	LTE B12	10	23095	707.5	QPSK	1	0	5095	737.5	2x2	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	LTE B06	20	66785	2145	4x4	-	-	20.86	20.90			
CA (2A)(4A)(12A)	LTE B12	10	23095	707.5	QPSK	1	0	5095	737.5	2x2	LTE B2	20	900	1960	4x4	LTE B4	20	2175	2122.5	4x4	LTE B30	10	9820	2310	4x4	-	-	20.83	20.90			
CA (2A)(4A)(12A)(6A)	LTE B12	10	23095	707.5	QPSK	1	0	5095	737.5	2x2	LTE B2	20	900	1960	4x4	LTE B4	20	2175	2122.5	4x4	LTE B06	20	66785	2145	4x4	-	-	20.84	20.90			
CA (2A)(4A)(12A)(6A)(1)	LTE B12	10	23095	707.5	QPSK	1	0	5095	737.5	2x2	LTE B2	20	900	1960	4x4	LTE B30	10	9820	2310	4x4	LTE B06	20	66785	2145	4x4	-	-	20.86	20.90			
CA (2A)(2A)(12A)(6A)(6A)	LTE B12	10	23095	707.5	QPSK	1	0	5095	737.8	2x2	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	LTE B06	20	66785	2145	2x2	LTE B05	20	87230	2190	2x2	20.84	20.90
CA (2A)(2A)(12A)(6A)(6A)(1)	LTE B12	10	23095	707.5	QPSK	1	0	5095	737.8	2x2	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	LTE B06	20	66785	2145	2x2	LTE B05	20	87230	2190	2x2	20.84	20.90
CA (2A)(2A)(12A)(6A)(6A)(2)	LTE B12	10	23095	707.5	QPSK	1	0	5095	737.8	2x2	LTE B2	20	900	1960	2x2	LTE B30	10	9820	2310	2x2	LTE B06	20	66785	2145	2x2	LTE B05	20	87230	2190	2x2	20.84	20.90
CA (2A)(2A)(12A)(6A)(6A)(3)	LTE B12	10	23095	707.5	QPSK	1	0	5095	737.5	2x2	LTE B2	20	900	1960	2x2	LTE B30	10	9820	2310	2x2	LTE B06	20	66785	2145	2x2	LTE B05	20	87230	2190	2x2	20.84	20.90

1.4.3

LTE Band 13 as PCC

Table 15
Output Powers - Ant 4

Combination	PCC										SEC 1				SEC 2				SEC 3				SEC 4				Power			
	PCC Band	PCC BW [MHz]	PCC [UL] Freq. [MHz]	PCC [UL] Mod.	PCC UL RB	PCC UL RB Offset	PCC [DL] Ch. [MHz]	PCC [DL] Freq. [MHz]	DL Ant. Config.	SEC Band	SEC BW [MHz]	SEC [DL] Freq. [MHz]	DL Ant. Config.	SEC Band	SEC BW [MHz]	SEC [DL] Freq. [MHz]	DL Ant. Config.	SEC Band	SEC BW [MHz]	SEC [DL] Freq. [MHz]	DL Ant. Config.	SEC Band	SEC BW [MHz]	SEC [DL] Freq. [MHz]	DL Ant. Config.	LTE Tx Power with CA (dBm)	LTE Single Carrier Tx Power (dBm)			
CA 14A-46A-13A	LTE B13	10	21320	782	16QAM	1	0	5230	751	2x2	LTE B46	20	21275	21225	4x4	LTE B46	10	21250	21250	4x4	-	-	-	-	-	-	20.60	20.10		
CA 24A-46A-13A	LTE B13	10	21320	782	16QAM	1	0	5230	751	2x2	LTE B46	20	900	1960	4x4	LTE B46	10	21250	21250	4x4	-	-	-	-	-	-	-	20.60	20.10	
CA 24A-13A-46A	LTE B13	10	21320	782	16QAM	1	0	5230	751	2x2	LTE B46	20	900	1960	4x4	LTE B46	20	50605	50375	2x2	-	-	-	-	-	-	-	20.81	20.10	
CA 13A-46A-24A	LTE B13	10	21320	782	16QAM	1	0	5230	751	2x2	LTE B46	20	50605	50375	2x2	LTE B46	20	900	1960	4x4	-	-	-	-	-	-	-	20.81	20.10	
CA 13A-46A-16A	LTE B13	10	21320	782	16QAM	1	0	5230	751	2x2	LTE B46	20	50990	50325	2x2	LTE B46	20	66786	2145	4x4	-	-	-	-	-	-	-	20.70	20.10	
CA 13A-16A-46A	LTE B13	10	21320	782	16QAM	1	0	5230	751	2x2	LTE B46	20	66786	2145	4x4	LTE B46	20	50990	50325	2x2	-	-	-	-	-	-	-	20.67	20.10	
CA 13A-16A-46A	LTE B13	10	21320	782	16QAM	1	0	5230	751	2x2	LTE B46	20	66786	2145	4x4	LTE B46	20	50990	50325	2x2	-	-	-	-	-	-	-	20.67	20.10	
CA 24A-24A-13A-16A	LTE B13	10	21320	782	16QAM	1	0	5230	751	2x2	LTE B46	20	900	1960	4x4	LTE B46	20	700	1960	4x4	LTE B46	20	46786	2145	4x4	-	-	-	20.40	20.10
CA 24A-13A-46A	LTE B13	10	21320	782	16QAM	1	0	5230	751	2x2	LTE B46	20	900	1960	4x4	LTE B46	20	50605	50375	2x2	LTE B46	20	50607	50177	2x2	-	-	-	20.40	20.10
CA 13A-13A-46A-16A	LTE B13	10	21320	782	16QAM	1	0	5230	751	2x2	LTE B46	20	900	1960	4x4	LTE B46	20	50605	50375	2x2	LTE B46	20	50607	50177	2x2	-	-	-	20.40	20.10
CA 24A-13A-16A-46A	LTE B13	10	21320	782	16QAM	1	0	5230	751	2x2	LTE B46	20	900	1960	4x4	LTE B46	20	50605	50375	2x2	LTE B46	20	50607	50177	2x2	-	-	-	20.40	20.10
CA 24A-13A-16A-46A	LTE B13	10	21320	782	16QAM	1	0	5230	751	2x2	LTE B46	20	900	1960	4x4	LTE B46	20	50605	50375	2x2	LTE B46	20	50607	50177	2x2	-	-	-	20.40	20.10
CA 13A-13A-46A-16A	LTE B13	10	21320	782	16QAM	1	0	5230	751	2x2	LTE B46	20	900	1960	4x4	LTE B46	20	50605	50375	2x2	LTE B46	20	50607	50177	2x2	-	-	-	20.40	20.10
CA 13A-46A-46A	LTE B13	10	21320	782	16QAM	1	0	5230	751	2x2	LTE B46	20	50990	50325	2x2	LTE B46	20	50605	50375	2x2	LTE B46	20	50607	50177	2x2	-	-	-	20.40	20.10
CA 13A-46A-46A	LTE B13	10	21320	782	16QAM	1	0	5230	751	2x2	LTE B46	20	50990	50325	2x2	LTE B46	20	50605	50375	2x2	LTE B46	20	50607	50177	2x2	-	-	-	20.40	20.10

1.4.4

LTE Band 5 as PCC

Table 16
Output Powers - Ant 4

Combination		PCB Band	PCB BW [MHz]	PCF [UQ] [Hz]	Mod.	PCU				SSC 1				SSC 2				SSC 3				SSC 4				Power			
						PCU RB	PCU RB Offset	PCF [UQ] Freq. [MHz]	DL Ant. Config.	SSC BW [MHz]	SSC [DL] Freq. [MHz]	DL Ant. Config.	SSC Band	SSC BW [MHz]	SSC [DL] Freq. [MHz]	DL Ant. Config.	SSC Band	SSC BW [MHz]	SSC [DL] Freq. [MHz]	DL Ant. Config.	SSC Band	SSC BW [MHz]	SSC [DL] Freq. [MHz]	DL Ant. Config.	SSC Band	SSC BW [MHz]	SSC [DL] Freq. [MHz]	DL Ant. Config.	LTE Tx Power with CA [dBm]
CA SA-5A(7A)	LTE B5	5	20425	826.5	QPSK	1	24	2425	873.5	2x2	LTE B7	20	3100	2655	4x4												21.00	21.10	
CA SA-5A(2A)	LTE B5	5	20425	826.5	QPSK	1	24	2425	873.5	2x2	LTE B25	20	8385	2983	4x4												21.07	21.10	
CA SA-5A(7A)	LTE B5	5	20425	826.5	QPSK	1	24	2425	873.5	2x2	LTE B41	20	40020	1262	4x4												21.07	21.10	
CA SA-5A(7A)	LTE B5	5	20425	826.5	QPSK	1	24	2425	873.5	2x2	LTE B5	20	3100	2655	4x4	LTE B30	20	700	1940	2x2							21.06	21.10	
CA SA-5A(7A)	LTE B5	5	20425	826.5	QPSK	1	24	2425	873.5	2x2	LTE B5	20	2473	873.5	2x2	LTE B4	20	2175	2123.5	2x2							21.04	21.10	
CA SA-5A(7A)	LTE B5	5	20425	826.5	QPSK	1	24	2425	873.5	2x2	LTE B7	20	3100	2655	4x4	LTE B7	20	2880	2630	4x4							20.99	21.10	
CA SA-5A(7A)	LTE B5	5	20425	826.5	QPSK	1	24	2425	873.5	2x2	LTE B5	20	3100	2655	4x4	LTE B5	20	3100	2633.5	2x2							21.03	21.10	
CA SA-5A-6A	LTE B5	5	20425	826.5	QPSK	1	24	2425	873.5	2x2	LTE B2	20	800	1960	4x4	LTE B49	20	50065	5537.5	2x2							20.98	21.10	
CA SA-6A-6A(6A)	LTE B5	5	20425	826.5	QPSK	1	24	2425	873.5	2x2	LTE B46	20	50065	5537.5	2x2	LTE B60	20	66786	2145	4x4							20.96	21.10	
CA SA-1A(4A)-3A	LTE B5	5	20425	826.5	QPSK	1	24	2425	873.5	2x2	LTE B5	20	2487	877.7	2x2	LTE B4	20	2175	2123.5	2x2	LTE B4	20	2360	2190	4x4			21.03	21.10
CA SA-1A(4A)-6A(6A)	LTE B5	5	20425	826.5	QPSK	1	24	2425	873.5	2x2	LTE B5	20	2487	877.7	2x2	LTE B4	20	2175	2123.5	2x2	LTE B60	20	67280	2190	4x4			21.03	21.10
CA SA-1A(6A)-6A(6C)	LTE B5	5	20425	826.5	QPSK	1	24	2425	873.5	2x2	LTE B60	20	66786	2145	4x4	LTE B60	20	67038	2170.2	4x4	LTE B60	20	67280	2190	4x4			21.01	21.10
CA SA-1A(2A)-5A(6A)	LTE B5	5	20425	826.5	QPSK	1	24	2425	873.5	2x2	LTE B2	20	800	1960	4x4	LTE B2	20	700	1940	4x4	LTE B4	20	2175	2123.5	2x2			20.96	21.10
CA SA-1A(2A)-5A(6A)	LTE B5	5	20425	826.5	QPSK	1	24	2425	873.5	2x2	LTE B5	20	800	1960	4x4	LTE B5	20	800	1940	4x4	LTE B4	20	2175	2123.5	2x2			20.96	21.10
CA SA-1A(2A)-5A(6A)	LTE B5	5	20425	826.5	QPSK	1	24	2425	873.5	2x2	LTE B2	20	800	1960	4x4	LTE B46	20	50065	5537.5	2x2	LTE B46	20	50647	5517.7	2x2			20.99	21.10
CA SA-1A(2A)-5A(6A)	LTE B5	5	20425	826.5	QPSK	1	24	2425	873.5	2x2	LTE B2	20	800	1960	4x4	LTE B46	20	50065	5537.5	2x2	LTE B46	20	50647	5517.7	2x2			20.99	21.10
CA SA-1A(2A)-5A(6A)	LTE B5	5	20425	826.5	QPSK	1	24	2425	873.5	2x2	LTE B2	20	800	1960	4x4	LTE B60	20	66786	2145	4x4	LTE B60	20	66786	2145	4x4			20.96	21.10
CA SA-1A(2A)-5A(6A)	LTE B5	5	20425	826.5	QPSK	1	24	2425	873.5	2x2	LTE B2	20	800	1960	4x4	LTE B60	20	66786	2145	4x4	LTE B60	5	66879	2154.3	4x4			21.04	21.10
CA SA-1A(4A)-3A-6A(6A)	LTE B5	5	20425	826.5	QPSK	1	24	2425	873.5	2x2	LTE B4	20	2175	2123.5	4x4	LTE B4	20	2360	2190	4x4	LTE B30	20	66820	2955	4x4			20.97	21.10
CA SA-1A(4A)-3A-6A(6A)	LTE B5	5	20425	826.5	QPSK	1	24	2425	873.5	2x2	LTE B4	20	2175	2123.5	4x4	LTE B60	20	66786	2145	4x4	LTE B60	20	67280	2190	4x4			21.03	21.10
CA SA-4A-6A-6A(6A)	LTE B5	5	20425	826.5	QPSK	1	24	2425	873.5	2x2	LTE B46	20	50065	5537.5	2x2	LTE B46	20	50647	5517.7	2x2	LTE B60	20	66786	2145	4x4			21.02	21.10
CA SA-1A(4A)-3A-6A(6A)	LTE B5	5	20425	826.5	QPSK	1	24	2425	873.5	2x2	LTE B2	20	800	1960	4x4	LTE B4	20	2175	2123.5	4x4	LTE B30	20	66820	2955	4x4			20.96	21.10
CA SA-1A(4A)-3A-6A(6A)	LTE B5	5	20425	826.5	QPSK	1	24	2425	873.5	2x2	LTE B2	20	800	1960	4x4	LTE B4	20	2175	2123.5	4x4	LTE B30	20	66820	2955	4x4			20.96	21.10
CA SA-1A(4A)-3A-6A(6A)	LTE B5	5	20425	826.5	QPSK	1	24	2425	873.5	2x2	LTE B2	20	800	1960	4x4	LTE B2	20	700	1940	4x4	LTE B60	20	66786	2145	2x2			20.99	21.10
CA SA-1A(4A)-3A-6A(6A)	LTE B5	5	20425	826.5	QPSK	1	24	2425	873.5	2x2	LTE B2	20	800	1960	4x4	LTE B2	20	700	1940	4x4	LTE B60	20	66786	2145	2x2			20.99	21.10
CA SA-1A(4A)-3A-6A(6A)	LTE B5	5	20425	826.5	QPSK	1	24	2425	873.5	2x2	LTE B2	20	800	1960	4x4	LTE B4	20	2175	2123.5	2x2	LTE B60	20	66786	2145	4x4			20.98	21.10
CA SA-1A(4A)-3A-6A(6A)	LTE B5	5	20425	826.5	QPSK	1	24	2425	873.5	2x2	LTE B5	20	2487	877.7	2x2	LTE B2	20	800	1960	4x4	LTE B60	5	66879	2154.3	4x4			21.02	21.10
CA SA-1A(4A)-3A-6A(6A)	LTE B5	5	20425	826.5	QPSK	1	24	2425	873.5	2x2	LTE B5	20	2487	877.7	2x2	LTE B2	20	800	1960	4x4	LTE B60	5	66879	2154.3	4x4			21.02	21.10
CA SA-1A(4A)-3A-6A(6A)	LTE B5	5	20425	826.5	QPSK	1	24	2425	873.5	2x2	LTE B5	20	2487	877.7	2x2	LTE B2	20	800	1960	4x4	LTE B60	5	66879	2154.3	4x4			21.02	21.10
CA SA-4A-6A-6A(6A)	LTE B5	5	20425	826.5	QPSK	1	24	2425	873.5	2x2	LTE B46	20	50065	5537.5	2x2	LTE B46	20	50647	5517.7	2x2	LTE B46	20	50647	5517.7	2x2			21.03	21.10
CA SA-4A-6A-6A(6A)	LTE B5	5	20425	826.5	QPSK	1	24	2425	873.5	2x2	LTE B46	20	50065	5537.5	2x2	LTE B46	20	50647	5517.7	2x2	LTE B46	20	50647	5517.7	2x2			21.03	21.10
CA SA-4A-6A-6A(6A)	LTE B5	5	20425	826.5	QPSK	1	24	2425	873.5	2x2	LTE B46	20	50065	5537.5	2x2	LTE B46	20	50647	5517.7	2x2	LTE B46	20	50647	5517.7	2x2			21.03	21.10
CA SA-2A-5A-1A(4A)-6A(6A)	LTE B5	5	20425	826.5	QPSK	1	24	2425	873.5	2x2	LTE B2	20	800	1960	2x2	LTE B2	20	700	1940	2x2	LTE B30	20	66820	2955	4x4			21.04	21.10
CA SA-2A-5A-1A(4A)-6A(6A)	LTE B5	5	20425	826.5	QPSK	1	24	2425	873.5	2x2	LTE B2	20	800	1960	2x2	LTE B30	20	66820	2955	2x2	LTE B60	20	66786	2145	4x4			21.04	21.10
CA SA-2A-5A-1A(4A)-6A(6A)	LTE B5	5	20425	826.5	QPSK	1	24	2425	873.5	2x2	LTE B2	20	800	1960	2x2	LTE B30	20	66820	2955	2x2	LTE B60	20	66786	2145	4x4			21.04	21.10

FCC ID: BCGA2072

Test Dates:
07/28/2020 – 09/16/2020



DUT Type:
Tablet Device

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LTE Band 26 as PCC

Table 17
Output Powers - Ant 4

Combination	PCC										SCC 1					SCC 2					Power	
	PCC Band	PCC BW [MHz]	PCC (UL) Ch.	PCC (UL) Freq. [MHz]	Mod.	PCC UL# RB	PCC UL RB Offset	PCC (DL) Ch.	PCC (DL) Freq. [MHz]	DL Ant. Config.	SCC Band	SCC BW [MHz]	SCC (DL) Ch.	SCC (DL) Freq. [MHz]	DL Ant. Config.	SCC Band	SCC BW [MHz]	SCC (DL) Ch.	SCC (DL) Freq. [MHz]	DL Ant. Config.	LTE Tx Power with DL CA Enabled (dBm)	LTE Single Carrier Tx Power (dBm)
CA [7A]-26A	LTE B26	10	26740	819	16QAM	1	0	8740	864	2x2	LTE B7	20	3100	2655	4x4	-	-	-	-	-	20.58	21.10
CA [25A]-26A	LTE B26	10	26740	819	16QAM	1	0	8740	864	2x2	LTE B25	20	8365	1962.5	4x4	-	-	-	-	-	20.68	21.10
CA 26A-[41A]	LTE B26	10	26740	819	16QAM	1	0	8740	864	2x2	LTE B41	20	40620	2593	4x4	-	-	-	-	-	20.98	21.10
CA [7A]-[7A]-26A	LTE B26	10	26740	819	16QAM	1	0	8740	864	2x2	LTE B7	20	3100	2655	4x4	LTE B7	20	2850	2630	4x4	20.60	21.10
CA [25A]-[25A]-26A	LTE B26	3	26705	815.5	64QAM	1	0	8705	860.5	2x2	LTE B25	20	8365	1962.5	4x4	LTE B25	20	8590	1985	4x4	20.76	21.10
CA 26A-[41C]	LTE B26	10	26740	819	16QAM	1	0	8740	864	2x2	LTE B41	20	40620	2593	4x4	LTE B41	20	40422	2573.2	4x4	20.96	21.10

FCC ID: BCGA2072



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DUT Type:

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[illegible]

Combination	PCB Band	PCC						SEC 1				SEC 2				SEC 3				SEC 4				Power					
		PCB BW [MHz]	PCC [UL] Ch.	PCC [UL] Freq. [MHz]	Mod.	PCC LULB RB	PCC UL RB Offset	PCC [DL] Freq. [MHz]	DL Ant. Config.	SCB Band	SCB BW [MHz]	SEC [DL] Freq. [MHz]	DL Ant. Config.	SCB Band	SCB BW [MHz]	SEC [DL] Freq. [MHz]	DL Ant. Config.	SCB Band	SCB BW [MHz]	SEC [DL] Freq. [MHz]	DL Ant. Config.	SCB Band	SCB BW [MHz]	SEC [DL] Freq. [MHz]	DL Ant. Config.	LTE Tx Power with CA [dBm]	LTE Single Carrier Tx Power [dBm]		
CA 5A(25A)	LTE B20	15	26615	1300.75	1GQAM	0	8615	1387.5	4x4	LTE B05	10	2325	811.5	2x2	-	-	-	-	-	-	-	-	-	-	-	-	13.98	13.98	
CA 12A(25A)	LTE B20	15	26615	1300.75	1GQAM	0	8615	1387.5	4x4	LTE B12	10	5095	727.5	2x2	-	-	-	-	-	-	-	-	-	-	-	-	15.93	15.93	
CA 25A(25A)	LTE B20	15	26615	1300.75	1GQAM	0	8615	1387.5	4x4	LTE B20	10	8865	876.5	2x2	-	-	-	-	-	-	-	-	-	-	-	-	15.98	15.98	
CA 25A(45A)	LTE B20	15	26615	1300.75	1GQAM	0	8615	1387.5	4x4	LTE B20	15	8865	876.5	2x2	-	-	-	-	-	-	-	-	-	-	-	-	15.98	15.98	
CA 25A(25A)20A	LTE B20	15	26615	1300.75	1GQAM	0	8615	1387.5	4x4	LTE B20	20	8140	1540	4x4	LTE B20	5	8865	876.5	2x2	-	-	-	-	-	-	-	-	15.80	15.98
CA 25A(25A)41A	LTE B20	15	26615	1300.75	1GQAM	0	8615	1387.5	4x4	LTE B20	25	8140	1540	4x4	LTE B41	20	40420	2593	4x4	-	-	-	-	-	-	-	-	15.86	15.93
CA 25A(25A)41C	LTE B20	15	26615	1300.75	1GQAM	0	8615	1387.5	4x4	LTE B41	20	40420	2593	4x4	LTE B41	20	40422	2573.2	4x4	-	-	-	-	-	-	-	-	15.83	15.93
CA 25A(25A)42C	LTE B20	15	26615	1300.75	1GQAM	0	8615	1387.5	4x4	LTE B41	20	40420	2593	4x4	LTE B41	20	40422	2573.2	4x4	-	-	-	-	-	-	-	-	15.83	15.93
CA 25A(25A)41C	LTE B20	15	26615	1300.75	1GQAM	0	8615	1387.5	4x4	LTE B20	20	8140	1540	4x4	LTE B41	20	40420	2593	4x4	LTE B4	20	40422	2573.2	4x4	-	-	15.82	15.93	
CA 25A(25A)41D	LTE B20	15	26615	1300.75	1GQAM	0	8615	1387.5	4x4	LTE B41	20	40422	2573.2	4x4	LTE B41	20	40420	2593	4x4	LTE B41	20	40418	2612.8	4x4	-	-	16.04	15.98	
CA 25A(25A)40D	LTE B20	15	26615	1300.75	1GQAM	0	8615	1387.5	4x4	LTE B41	20	40422	2573.2	4x4	LTE B41	20	40420	2593	4x4	LTE B41	20	40418	2612.8	4x4	-	-	15.97	15.93	
CA 25A(25A)41D1	LTE B20	15	26915	1290.75	1GQAM	0	8615	1387.5	4x4	LTE B20	20	8140	1540	4x4	LTE B41	20	40422	2573.2	4x4	LTE B41	20	40418	2612.8	2x2	-	-	16.00	15.93	

LTE Band 30 as PCC

Table 20
Output Powers - Ant 1a

Combination	PCC Band	PCC BW [MHz]	PCC [UL] Freq. [MHz]	Mod.	PCC				SSC 1				SSC 2				SSC 3				SSC 4				Power			
					SSC BW [MHz]	SSC BW [MHz]	SSC [UL] Freq. [MHz]	SSC [UL] Freq. [MHz]	SSC BW [MHz]	SSC BW [MHz]	SSC [UL] Freq. [MHz]	SSC [UL] Freq. [MHz]	SSC BW [MHz]	SSC BW [MHz]	SSC [UL] Freq. [MHz]	SSC [UL] Freq. [MHz]	SSC BW [MHz]	SSC BW [MHz]	SSC [UL] Freq. [MHz]	SSC [UL] Freq. [MHz]	SSC BW [MHz]	SSC BW [MHz]	SSC [UL] Freq. [MHz]	SSC [UL] Freq. [MHz]	LT Tx Power [dBm]	LT Sgnl Power [dBm]		
CA [2C]30A	LTE B20	10	27730	230Q	OPSK	25	25	9820	2355	444	LTE B20	20	900	1360	444	LTE B20	20	702	1940	2	-	-	-	-	-	15.97	14.2	
CA [2A]2A-5A[5A]	LTE B20	10	27730	230Q	OPSK	25	25	9820	2355	444	LTE B20	20	900	1360	444	LTE B20	20	702	1940	444	LTE B5	20	2525	881.5	262	-	14.38	14.2
CA [2A]2A-5A[5A]	LTE B20	10	27730	230Q	OPSK	25	25	9820	2355	444	LTE B20	20	900	1360	444	LTE B20	20	702	1940	444	LTE B12	20	5095	772.5	262	-	14.38	14.2
CA [2A]2A-5A[5A]	LTE B20	10	27730	230Q	OPSK	25	25	9820	2355	444	LTE B20	20	900	1360	444	LTE B20	20	702	1940	444	LTE B12	20	5095	772.5	262	-	14.38	14.2
CA [2A]2A-5A[5A]	LTE B20	10	27730	230Q	OPSK	25	25	9820	2355	444	LTE B20	20	900	1360	262	LTE B20	20	702	1940	444	LTE B69	20	66789	2145	444	-	14.41	14.2
CA [2A]2A-5A[5A]	LTE B20	10	27730	230Q	OPSK	25	25	9820	2355	444	LTE B20	20	900	1360	262	LTE B20	20	702	1940	444	LTE B69	20	66789	2145	444	-	14.41	14.2
CA [2A]2A-5A[5A]	LTE B20	10	27730	230Q	OPSK	25	25	9820	2355	444	LTE B20	20	900	1360	262	LTE B20	20	702	1940	444	LTE B69	20	66789	2145	444	-	14.41	14.2
CA [2A]2A-5A[5A]	LTE B20	10	27730	230Q	OPSK	25	25	9820	2355	444	LTE B20	20	900	1360	262	LTE B20	20	702	1940	444	LTE B69	20	66789	2145	444	-	14.41	14.2
CA [2A]2A-5A[5A]	LTE B20	10	27730	230Q	OPSK	25	25	9820	2355	444	LTE B20	20	900	1360	262	LTE B20	20	702	1940	444	LTE B69	20	66789	2145	444	-	14.41	14.2
CA [2A]2A-5A[5A]	LTE B20	10	27730	230Q	OPSK	25	25	9820	2355	444	LTE B20	20	900	1360	262	LTE B20	20	702	1940	444	LTE B69	20	66789	2145	444	-	14.41	14.2
CA [2A]2A-5A[5A]	LTE B20	10	27730	230Q	OPSK	25	25	9820	2355	444	LTE B20	20	900	1360	262	LTE B20	20	702	1940	444	LTE B69	20	66789	2145	444	-	14.41	14.2
CA [2A]2A-5A[5A]	LTE B20	10	27730	230Q	OPSK	25	25	9820	2355	444	LTE B20	20	900	1360	262	LTE B20	20	702	1940	444	LTE B69	20	66789	2145	444	-	14.41	14.2
CA [2A]2A-5A[5A]	LTE B20	10	27730	230Q	OPSK	25	25	9820	2355	444	LTE B20	20	900	1360	262	LTE B20	20	702	1940	444	LTE B69	20	66789	2145	444	-	14.41	14.2
CA [2A]2A-5A[5A]	LTE B20	10	27730	230Q	OPSK	25	25	9820	2355	444	LTE B20	20	900	1360	262	LTE B20	20	702	1940	444	LTE B69	20	66789	2145	444	-	14.41	14.2
CA [2A]2A-5A[5A]	LTE B20	10	27730	230Q	OPSK	25	25	9820	2355	444	LTE B20	20	900	1360	262	LTE B20	20	702	1940	444	LTE B69	20	66789	2145	444	-	14.41	14.2
CA [2A]2A-5A[5A]	LTE B20	10	27730	230Q	OPSK	25	25	9820	2355	444	LTE B20	20	900	1360	262	LTE B20	20	702	1940	444	LTE B69	20	66789	2145	444	-	14.41	14.2
CA [2A]2A-5A[5A]	LTE B20	10	27730	230Q	OPSK	25	25	9820	2355	444	LTE B20	20	900	1360	262	LTE B20	20	702	1940	444	LTE B69	20	66789	2145	444	-	14.41	14.2
CA [2A]2A-5A[5A]	LTE B20	10	27730	230Q	OPSK	25	25	9820	2355	444	LTE B20	20	900	1360	262	LTE B20	20	702	1940	444	LTE B69	20	66789	2145	444	-	14.41	14.2
CA [2A]2A-5A[5A]	LTE B20	10	27730	230Q	OPSK	25	25	9820	2355	444	LTE B20	20	900	1360	262	LTE B20	20	702	1940	444	LTE B69	20	66789	2145	444	-	14.41	14.2
CA [2A]2A-5A[5A]	LTE B20	10	27730	230Q	OPSK	25	25	9820	2355	444	LTE B20	20	900	1360	262	LTE B20	20	702	1940	444	LTE B69	20	66789	2145	444	-	14.41	14.2
CA [2A]2A-5A[5A]	LTE B20	10	27730	230Q	OPSK	25	25	9820	2355	444	LTE B20	20	900	1360	262	LTE B20	20	702	1940	444	LTE B69	20	66789	2145	444	-	14.41	14.2
CA [2A]2A-5A[5A]	LTE B20	10	27730	230Q	OPSK	25	25	9820	2355	444	LTE B20	20	900	1360	262	LTE B20	20	702	1940	444	LTE B69	20	66789	2145	444	-	14.41	14.2
CA [2A]2A-5A[5A]	LTE B20	10	27730	230Q	OPSK	25	25	9820	2355	444	LTE B20	20	900	1360	262	LTE B20	20	702	1940	444	LTE B69	20	66789	2145	444	-	14.41	14.2
CA [2A]2A-5A[5A]	LTE B20	10	27730	230Q	OPSK	25	25	9820	2355	444	LTE B20	20	900	1360	262	LTE B20	20	702	1940	444	LTE B69	20	66789	2145	444	-	14.41	14.2
CA [2A]2A-5A[5A]	LTE B20	10	27730	230Q	OPSK	25	25	9820	2355	444	LTE B20	20	900	1360	262	LTE B20	20	702	1940	444	LTE B69	20	66789	2145	444	-	14.41	14.2
CA [2A]2A-5A[5A]	LTE B20	10	27730	230Q	OPSK	25	25	9820	2355	444	LTE B20	20	900	1360	262	LTE B20	20	702	1940	444	LTE B69	20	66789	2145	444	-	14.41	14.2
CA [2A]2A-5A[5A]	LTE B20	10	27730	230Q	OPSK	25	25	9820	2355	444	LTE B20	20	900	1360	262	LTE B20	20	702	1940	444	LTE B69	20	66789	2145	444	-	14.41	14.2
CA [2A]2A-5A[5A]	LTE B20	10	27730	230Q	OPSK	25	25	9820	2355	444	LTE B20	20	900	1360	262	LTE B20	20	702	1940	444	LTE B69	20	66789	2145	444	-	14.41	14.2
CA [2A]2A-5A[5A]	LTE B20	10	27730	230Q	OPSK	25	25	9820	2355	444	LTE B20	20	900	1360	262	LTE B20	20	702	1940	444	LTE B69	20	66789	2145	444	-	14.41	14.2
CA [2A]2A-5A[5A]	LTE B20	10	27730	230Q	OPSK	25	25	9820	2355	444	LTE B20	20	900	1360	262	LTE B20	20	702	1940	444	LTE B69	20	66789	2145	444	-	14.41	14.2
CA [2A]2A-5A[5A]	LTE B20	10	27730	230Q	OPSK	25	25	9820	2355	444	LTE B20	20	900	1360	262	LTE B20	20	702	1940	444	LTE B69	20	66789	2145	444	-	14.41	14.2
CA [2A]2A-5A[5A]	LTE B20	10	27730	230Q	OPSK	25	25	9820	2355	444	LTE B20	20	900	1360	262	LTE B20	20	702	1940	444	LTE B69	20	66789	2145	444	-	14.41	14.2
CA [2A]2A-5A[5A]	LTE B20	10	27730	230Q	OPSK	25	25	9820	2355	444	LTE B20	20	900	1360	262	LTE B20	20	702	1940	444	LTE B69	20	66789	2145	444	-	14.41	14.2
CA [2A]2A-5A[5A]	LTE B20	10	27730	230Q	OPSK	25	25	9820	2355	444	LTE B20	20	900	1360	262	LTE B20	20	702	1940	444	LTE B69	20	66789	2145	444	-	14.41	14.2
CA [2A]2A-5A[5A]	LTE B20	10	27730	230Q	OPSK	25	25	9820	2355	444	LTE B20	20	900	1360	262	LTE B20	20	702	1940	444	LTE B69	20	66789	2145	444	-	14.41	14.2
CA [2A]2A-5A[5A]	LTE B20	10	27730	230Q	OPSK	25	25	9820	2355	444	LTE B20	20	900	1360	262	LTE B20	20	702	1940	444	LTE B69	20	66789	2145	444	-	14.41	14.2
CA [2A]2A-5A[5A]	LTE B20	10	27730	230Q	OPSK	25	25	9820	2355	444	LTE B20	20	900	1360	262	LTE B20	20	702	1940	444	LTE B69	20	66789	2145	444	-	14.41	14.2
CA [2A]2A-5A[5A]	LTE B20	10	27730	230Q	OPSK	25	25	9820	2355	444	LTE B20	20	900	1360	262	LTE B20	20	702	1940	444	LTE B69	20	66789	2145	444	-	14.41	14.2
CA [2A]2A-5A[5A]	LTE B20	10	27730	230Q	OPSK	25	25	9820	2355	444	LTE B20	20	900	1360	262	LTE B20	20	702	1940	444	LTE B69	20	66789	2145	444	-	14.41	14.2
CA [2A]2A-5A[5A]	LTE B20	10	27730	230Q	OPSK	25	25	9820	2355	444	LTE B20	20	900	1360	262	LTE B20	20	702	1940	444	LTE B69	20	66789	2145	444	-	14.41	14.2
CA [2A]2A-5A[5A]	LTE B20	10	27730	230Q	OPSK	25	25	9820	2355	444	LTE B20	20	900	1360	262	LTE B20	20	702	1940	444	LTE B69	20	66789	2145	444	-	14.41	14.2
CA [2A]2A-5A[5A]	LTE B20	10	27730	230Q	OPSK	25	25	9820	2355	444	LTE B20	20	900	1360	262	LTE B20	20	702	1940	444	LTE B69	20	66789	2145	444	-	14.41	14.2
CA [2A]2A-5A[5A]	LTE B20	10	27730	230Q	OPSK	25	25	9820	2355	444	LTE B20	20	900	1360	262	LTE B20	20	702	1940	444	LTE B69	20	66789	2145	444	-	14.41	14.2
CA [2A]2A-5A[5A]	LTE B20	10	27730	230Q	OPSK	25	25	9820	2355	444	LTE B20	20	900	1360	262	LTE B20	20	702	1940	444	LTE B69	20	66789	2145	444	-	14.41	14.2
CA [2A]2A-5A[5A]	LTE B20	10	27730	230Q	OPSK	25	25	9820	2355	444	LTE B20	20	900	1360	262	LTE B20	20	702	1940	444	LTE B69	20	66789	2145	444	-	14.41	14.2
CA [2A]2A-5A[5A]	LTE B20	10	27730	230Q	OPSK	25	25	9820	2355	444	LTE B20	20	900	1360	262	LTE B20	20	702	1940	444	LTE B69	20	66789	2145	444	-	14.41	14.2
CA [2A]2A-5A[5A]	LTE B20	10	27730	230Q	OPSK	25	25	9820	2355	444	LTE B20	20	900	1360	262	LTE B20	20	702	1940	444	LTE B69	20	66789	2145	444	-	14.41	14.2
CA [2A]2A-5A[5A]	LTE B20	10	27730	230Q	OPSK	25	25	9820	2355	444	LTE B20																	

1.4.9

LTE Band 7 as PCC

Table 21
Output Powers - Ant 2A

[illegible]

1.4.10

LTE Band 41 as PCC

Table 22
Output Powers - Ant 2A

Combination	PCC										SSC 1				SSC 2				SSC 3				SSC 4				Power	
	PCC Band	PCC BW [MHz]	PCC [U] Freq. [MHz]	Mod.	PCC UL RB	PCC UL RB Offset	PCC [D] Freq. [MHz]	DL Ant. Config.	SSC Band	SSC BW [MHz]	SSC [D] Ch. Freq. [MHz]	DL Ant. Config.	SSC Band	SSC BW [MHz]	SSC [D] Ch. Freq. [MHz]	DL Ant. Config.	SSC Band	SSC BW [MHz]	SSC [D] Ch. Freq. [MHz]	DL Ant. Config.	SSC Band	SSC BW [MHz]	SSC [D] Ch. Freq. [MHz]	DL Ant. Config.	LTE Tx Power with DC Ch. Enabled (dBm)	LTE Single Carrier Tx Power (dBm)		
CA {41A}41A (1)	LTE B41	20	40185	2549.5	QPSK	50	0	50185	2549.5	4x4	LTE B41	20	43490	2580	4x4	-	-	-	-	-	-	-	-	-	-	16.68	16.60	
CA 5A{41A}	LTE B41	20	40185	2549.5	QPSK	50	0	40185	2549.5	4x4	LTE B5	10	2525	2685	2x2	-	-	-	-	-	-	-	-	-	-	16.59	16.60	
CA {26A}41A	LTE B41	20	40185	2549.5	QPSK	50	0	40185	2549.5	4x4	LTE B20	10	8865	876.5	2x2	-	-	-	-	-	-	-	-	-	-	16.60	16.60	
CA {12A}41A	LTE B41	20	40185	2549.5	QPSK	50	0	40185	2549.5	4x4	LTE B41	20	43292	2602.2	4x4	LTE B41	20	43490	2680	4x4	-	-	-	-	-	-	16.59	16.60
CA {12A}41A	LTE B41	20	40185	2549.5	QPSK	50	0	40185	2549.5	4x4	LTE B41	20	43292	2602.2	4x4	LTE B41	20	43490	2680	4x4	-	-	-	-	-	-	16.59	16.60
CA {25A}25A{41A}	LTE B41	20	40185	2549.5	QPSK	50	0	40185	2549.5	4x4	LTE B25	20	8395	1962.5	4x4	LTE B25	20	8390	1985	4x4	-	-	-	-	-	-	16.60	16.60
CA {25A}41A	LTE B41	20	40185	2549.5	QPSK	50	0	40185	2549.5	4x4	LTE B41	20	40183	2569.3	4x4	LTE B25	20	8395	1962.5	4x4	-	-	-	-	-	-	16.60	16.60
CA {26A}41A	LTE B41	20	40185	2549.5	QPSK	50	0	40185	2549.5	4x4	LTE B41	20	40183	2569.3	4x4	LTE B25	20	8395	1962.5	4x4	-	-	-	-	-	-	16.58	16.60
CA {1E}	LTE B41	20	40185	2549.5	QPSK	50	0	40185	2549.5	4x4	LTE B41	20	40183	2569.3	4x4	LTE B41	20	40183	2569.3	4x4	-	-	-	-	-	-	16.48	16.60
CA {12A}41A	LTE B41	20	40185	2549.5	QPSK	50	0	40185	2549.5	4x4	LTE B41	20	43294	2604.4	4x4	LTE B41	20	43292	2602.2	4x4	-	-	-	-	-	-	16.51	16.60
CA {12A}41A	LTE B41	20	40185	2549.5	QPSK	50	0	40185	2549.5	4x4	LTE B41	20	40183	2569.3	4x4	LTE B41	20	43490	2680	4x4	-	-	-	-	-	-	16.50	16.60
CA {12A}41A	LTE B41	20	40185	2549.5	QPSK	50	0	40185	2549.5	4x4	LTE B41	20	40183	2569.3	4x4	LTE B41	20	43292	2602.2	4x4	-	-	-	-	-	-	16.50	16.60
CA {25A}25A{41A}	LTE B41	20	40185	2549.5	QPSK	50	0	40185	2549.5	4x4	LTE B41	20	40183	2569.3	4x4	LTE B25	20	8395	1962.5	4x4	-	-	-	-	-	-	16.40	16.60
CA {25A}41A	LTE B41	20	40185	2549.5	QPSK	50	0	40185	2549.5	4x4	LTE B41	20	40183	2569.3	4x4	LTE B41	20	40183	2569.3	4x4	-	-	-	-	-	-	16.41	16.60
CA {26A}41A	LTE B41	20	40185	2549.5	QPSK	50	0	40185	2549.5	4x4	LTE B41	20	40183	2569.3	2x2	LTE B41	20	43490	2680	2x2	-	-	-	-	-	-	16.46	16.60
CA {26A}25A{41A}	LTE B41	20	40185	2549.5	QPSK	50	0	40185	2549.5	4x4	LTE B41	20	40183	2569.3	2x2	LTE B41	20	43490	2680	2x2	-	-	-	-	-	-	16.46	16.60
CA {25A}25A{41D}	LTE B41	20	40185	2549.5	QPSK	50	0	40185	2549.5	4x4	LTE B41	20	40183	2569.3	2x2	LTE B41	20	8390	1962.5	2x2	-	-	-	-	-	-	16.39	16.60

1.4.11

LTE Band 48 as PCC

Table 23
Output Powers - Ant 4

[illegible]

FCC ID: BCGA2072	 PCTEST Proud to be part of  element	SAR EVALUATION REPORT	Reviewed by: Quality Manager
Test Dates: 07/28/2020 – 09/16/2020	DUT Type: Tablet Device	APPENDIX F: Page 11 of 12	

APPENDIX G: POWER REDUCTION VERIFICATION

FCC ID: BCGA2072	 Proud to be part of  element	SAR EVALUATION REPORT	Approved by: Quality Manager
Test Dates: 07/28/2020 – 09/16/2020	DUT Type: Tablet Device		APPENDIX G Page 1 of 2

The device supports manufacturer's proprietary power reduction mechanism called "Detect Mode" for the Main Cellular Antenna. Details of this mechanism can be found in the Operational Description. When the device is being used "on-body" or "held in hand" by the user, the device will detect motion and reduce the power of the main antenna. Per the manufacturer, the mechanism is agnostic to different cellular air interfaces. Detect Mode operation was verified for two test cases, on-body and held in hand, for each supported cellular band. The power reduction verification results are below.

1.1 Main Antenna Power Reduction Verification Summary

Table G-1
Main Antenna Power Reduction Verification

Model/Band	Antenna	Maximum Scenario Maximum Allowed Target Power [dBm]	Reduced Scenario Maximum Allowed Target Power [dBm]	Conducted Power [dBm]			
				Maximum	Test Case 1	Test Case 2	Verdict
GPRS 850 (2 Tx)	Antenna 4	31.25 (± 0.75)	27.45 (± 0.75)	31.23	27.55	27.54	PASS
	Antenna 3B	30.25 (± 0.75)	24.05 (± 0.75)	30.46	23.99	23.98	PASS
	Antenna 4	29.25 (± 0.75)	22.25 (± 0.75)	29.53	22.31	22.33	PASS
GPRS 1900 (2 Tx)	Antenna 2A	28.25 (± 0.75)	20.45 (± 0.75)	28.36	20.53	20.51	PASS
	Antenna 1A	23.25 (± 0.75)	21.25 (± 0.75)	20.31	21.32	21.30	PASS
	Antenna 3A	28.25 (± 0.75)	19.65 (± 0.75)	28.53	19.77	19.76	PASS
WCDMA B5	Antenna 4	25.00 (± 0.5)	20.60 (± 0.5)	24.89	20.89	20.88	PASS
	Antenna 3B	24.25 (± 0.5)	17.60 (± 0.5)	24.23	17.87	17.89	PASS
	Antenna 4	24.25 (± 0.5)	15.00 (± 0.5)	24.22	15.03	15.01	PASS
WCDMA B4	Antenna 2A	23.50 (± 0.5)	13.80 (± 1)	23.54	13.83	13.84	PASS
	Antenna 1A	24.00 (± 0.5)	14.60 (± 0.5)	24.01	14.96	14.98	PASS
	Antenna 3A	23.25 (± 0.5)	13.00 (± 1)	23.14	13.01	13.03	PASS
WCDMA B2	Antenna 4	24.25 (± 0.5)	15.80 (± 0.5)	24.21	15.93	15.91	PASS
	Antenna 2A	23.50 (± 0.5)	13.80 (± 1)	23.47	13.61	13.64	PASS
	Antenna 1A	24.00 (± 0.5)	13.80 (± 1)	23.51	13.77	13.79	PASS
LTE Band 12	Antenna 4	23.25 (± 0.5)	13.20 (± 1)	23.01	14.11	14.09	PASS
	Antenna 4	25.00 (± 0.5)	20.40 (± 0.5)	25.23	20.50	20.51	PASS
	Antenna 3B	24.25 (± 0.5)	18.40 (± 0.5)	23.89	18.28	18.27	PASS
LTE Band 17	Antenna 4	25.00 (± 0.5)	20.40 (± 0.5)	24.77	20.18	20.17	PASS
	Antenna 3B	24.25 (± 0.5)	18.40 (± 0.5)	23.81	18.19	18.20	PASS
	Antenna 4	25.00 (± 0.5)	20.60 (± 0.5)	25.01	20.68	20.67	PASS
LTE Band 13	Antenna 4	24.25 (± 0.5)	18.70 (± 0.5)	23.91	18.62	18.61	PASS
	Antenna 3B	24.25 (± 0.5)	17.40 (± 0.5)	23.99	17.40	17.39	PASS
	Antenna 4	25.00 (± 0.5)	20.60 (± 0.5)	25.04	20.61	20.62	PASS
LTE Band 26	Antenna 4	24.25 (± 0.5)	13.40 (± 1)	23.84	17.25	17.26	PASS
	Antenna 3B	24.25 (± 0.5)	13.40 (± 1)	23.85	12.50	12.51	PASS
	Antenna 4	25.00 (± 0.5)	20.60 (± 0.5)	25.04	20.61	20.62	PASS
LTE Band 5	Antenna 4	24.25 (± 0.5)	13.40 (± 1)	23.84	17.25	17.26	PASS
	Antenna 3B	24.25 (± 0.5)	13.40 (± 1)	23.85	12.50	12.51	PASS
	Antenna 4	25.00 (± 0.5)	20.60 (± 0.5)	25.04	20.61	20.62	PASS
LTE Band 4	Antenna 2A	23.50 (± 0.5)	14.80 (± 0.5)	23.01	14.36	14.35	PASS
	Antenna 1A	24.00 (± 0.5)	13.80 (± 1)	23.63	13.21	13.20	PASS
	Antenna 3A	23.25 (± 0.5)	13.40 (± 1)	22.83	12.26	12.27	PASS
LTE Band 66	Antenna 4	24.25 (± 0.5)	13.40 (± 1)	24.11	13.02	13.00	PASS
	Antenna 2A	23.50 (± 0.5)	14.80 (± 0.5)	23.51	14.77	14.76	PASS
	Antenna 1A	24.00 (± 0.5)	13.80 (± 1)	24.12	13.23	13.25	PASS
LTE Band 2	Antenna 3A	23.25 (± 0.5)	13.40 (± 1)	22.99	12.91	12.89	PASS
	Antenna 4	24.25 (± 0.5)	15.60 (± 0.5)	23.98	15.13	15.11	PASS
	Antenna 2A	23.50 (± 0.5)	13.40 (± 1)	23.40	13.37	13.36	PASS
LTE Band 25	Antenna 1A	24.00 (± 0.5)	13.60 (± 1)	23.55	13.11	13.10	PASS
	Antenna 3A	23.25 (± 0.5)	13.60 (± 1)	23.03	13.27	13.28	PASS
	Antenna 4	24.25 (± 0.5)	15.60 (± 0.5)	23.87	15.37	15.36	PASS
LTE Band 30	Antenna 2A	23.50 (± 0.5)	13.40 (± 1)	23.14	12.77	12.76	PASS
	Antenna 1A	24.00 (± 0.5)	13.60 (± 1)	23.65	13.10	13.11	PASS
	Antenna 3A	23.25 (± 0.5)	13.60 (± 1)	22.99	12.74	12.73	PASS
LTE Band 7	Antenna 4	22.20 (± 0.5)	12.70 (± 1)	21.85	12.97	12.98	PASS
	Antenna 2A	22.60 (± 0.5)	12.50 (± 1)	22.14	11.57	11.58	PASS
	Antenna 1A	22.00 (± 0.5)	13.50 (± 1)	21.57	12.57	12.58	PASS
LTE Band 41 (PC3)	Antenna 3A	23.00 (± 0.5)	12.70 (± 1)	22.75	12.38	12.40	PASS
	Antenna 4	24.50 (± 0.5)	12.70 (± 1)	24.23	12.01	12.02	PASS
	Antenna 2A	23.25 (± 0.5)	13.60 (± 1)	23.05	12.76	12.77	PASS
LTE Band 41 (PC2)	Antenna 1A	23.75 (± 0.5)	12.90 (± 1)	23.51	12.14	12.15	PASS
	Antenna 3A	23.00 (± 0.5)	11.00 (± 1)	22.61	10.36	10.34	PASS
	Antenna 4	24.00 (± 0.5)	15.10 (± 0.5)	23.61	14.87	14.85	PASS
LTE Band 48	Antenna 2A	23.50 (± 0.5)	16.10 (± 0.5)	23.56	15.77	15.75	PASS
	Antenna 1A	23.75 (± 0.5)	14.50 (± 0.5)	23.52	14.35	14.37	PASS
	Antenna 3A	23.00 (± 0.5)	13.20 (± 1)	22.78	13.12	13.15	PASS
LTE B5 Intra-Band ULCA	Antenna 4	26.00 (± 0.5)	15.10 (± 0.5)	25.93	15.12	15.11	PASS
	Antenna 2A	26.75 (± 0.5)	16.10 (± 0.5)	26.81	16.05	16.06	PASS
	Antenna 1A	26.50 (± 0.5)	14.50 (± 0.5)	26.49	14.61	14.60	PASS
LTE B7 Intra-Band ULCA	Antenna 3A	23.00 (± 0.5)	13.20 (± 1)	22.61	13.15	13.11	PASS
	Antenna 4	24.75 (± 0.5)	16.00 (± 0.5)	24.91	15.93	15.91	PASS
	Antenna 3B	23.25 (± 0.5)	15.70 (± 0.5)	23.13	15.81	15.79	PASS
LTE B41 (PC3) Intra-Band ULCA	Antenna 4	23.75 (± 1)	20.10 (± 1)	23.82	19.73	19.75	PASS
	Antenna 3B	22.75 (± 1)	16.90 (± 1)	22.56	16.73	16.77	PASS
	Antenna 2A	22.25 (± 1)	13.60 (± 1)	22.79	13.51	13.53	PASS
LTE B41 (PC2) Intra-Band ULCA	Antenna 1A	22.75 (± 1)	14.00 (± 1)	22.81	14.15	14.18	PASS
	Antenna 3A	22.00 (± 1)	13.00 (± 1)	22.23	13.05	13.08	PASS
	Antenna 4	24.75 (± 1)	14.60 (± 1)	24.71	14.53	14.52	PASS
LTE B41 (PC2) Intra-Band ULCA	Antenna 2A	24.25 (± 1)	15.60 (± 1)	24.23	15.37	15.39	PASS
	Antenna 1A	24.75 (± 1)	14.00 (± 1)	24.79	14.13	14.10	PASS
	Antenna 3A	24.00 (± 1)	13.20 (± 1)	24.21	13.08	13.09	PASS

Test Case 1: Device Held in Hand

Test Case 2: Device Resting on Lap

Test Cases represent typical scenarios in which the device power would be reduced. In these scenarios detect mode has been verified to identify typical on-body use-cases including when thin objects, such as a magazine or newspaper, are placed between the body and the device. In the absence of detect mode output, the device defaults to the most conservative power.

FCC ID: BCGA2072	 PCTEST Proud to be part of  element	SAR EVALUATION REPORT	Approved by: Quality Manager
Test Dates: 07/28/2020 – 09/16/2020 © 2020 PCTEST	DUT Type: Tablet Device	APPENDIX G Page 2 of 2	

APPENDIX H: IEEE 802.11AX RU SAR EXCLUSION

FCC ID: BCGA2072	 PCTEST Proven to be part of the element	SAR EVALUATION REPORT	Reviewed by: Quality Manager
Test Dates: 07/28/2020 - 09/16/2020	DUT Type: Tablet Device		APPENDIX H: Page 1 of 24

1.1 IEEE 802.11ax RU SAR Exclusion

To make the most efficient use of the additional available subcarriers (data tones), IEEE 802.11ax can utilize Orthogonal Frequency-Division Multiple Access (OFDMA) which divides the existing 802.11 channels into smaller subchannels called Resource Units (RUs). Possible RU sizes are: 26T, 52T, 106T, 242T, 484T and 996T.

Per FCC Guidance, 802.11ax was considered a higher order 802.11 mode when compared to a/b/g/n/ac to apply KDB Publication 248227 D01v02r02 for OFDM mode selection. Therefore, SAR tests were not required for 802.11ax based on the maximum allowed output powers of OFDM modes and the reported SAR values. Per FCC Guidance, maximum conducted powers were performed for each RU size to demonstrate that the output powers would not be higher than the other OFDM 802.11 modes.

1.1 IEEE 802.11ax RU Target Powers

1.1.1 Maximum 802.11ax RU Time-Averaged WLAN Output Power

Mode/ Band		Tones	26T		52T		106T		242T	
		Channel	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal
Modulated Average - Single Tx Chain (dBm) - Antenna 3A	20 MHz Bandwidth	1	13.00	11.50	13.00	11.50	13.00	11.50	13.00	11.50
		2	13.00	11.50	13.00	11.50	13.00	11.50	13.00	11.50
		3	13.00	11.50	13.00	11.50	13.00	11.50	13.00	11.50
		4	13.00	11.50	13.00	11.50	13.00	11.50	13.00	11.50
		5	13.00	11.50	13.00	11.50	13.00	11.50	13.00	11.50
		6	13.00	11.50	13.00	11.50	13.00	11.50	13.00	11.50
		7	13.00	11.50	13.00	11.50	13.00	11.50	13.00	11.50
		8	13.00	11.50	13.00	11.50	13.00	11.50	13.00	11.50
		9	13.00	11.50	13.00	11.50	13.00	11.50	13.00	11.50
		10	13.00	11.50	13.00	11.50	13.00	11.50	13.00	11.50
		11	13.00	11.50	13.00	11.50	13.00	11.50	13.00	11.50
		12	11.00	9.50	11.00	9.50	11.00	9.50	11.00	9.50
		13	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Mode/ Band		Tones	26T		52T		106T		242T	
		Channel	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal
Modulated Average - 2 Tx Chain (dBm) - Antenna 3A	20 MHz Bandwidth	1	12.50	11.00	12.50	11.00	12.50	11.00	12.50	11.00
		2	13.00	11.50	13.00	11.50	13.00	11.50	13.00	11.50
		3	13.00	11.50	13.00	11.50	13.00	11.50	13.00	11.50
		4	13.00	11.50	13.00	11.50	13.00	11.50	13.00	11.50
		5	13.00	11.50	13.00	11.50	13.00	11.50	13.00	11.50
		6	13.00	11.50	13.00	11.50	13.00	11.50	13.00	11.50
		7	13.00	11.50	13.00	11.50	13.00	11.50	13.00	11.50
		8	13.00	11.50	13.00	11.50	13.00	11.50	13.00	11.50
		9	13.00	11.50	13.00	11.50	13.00	11.50	13.00	11.50
		10	13.00	11.50	13.00	11.50	13.00	11.50	13.00	11.50
		11	12.50	11.00	12.50	11.00	12.50	11.00	12.50	11.00
		12	10.50	9.00	10.50	9.00	10.50	9.00	10.50	9.00
		13	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Note: In MIMO operations, each antenna transmits at maximum allowed powers as indicated above.

Mode/ Band		Tones	26T		52T		106T		242T	
		Channel	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal
Modulated Average - Single Tx Chain (dBm) - Antenna 1A	20 MHz Bandwidth	1	13.00	11.50	13.00	11.50	13.00	11.50	13.00	11.50
		2	13.75	12.25	13.75	12.25	13.75	12.25	13.75	12.25
		3	13.75	12.25	13.75	12.25	13.75	12.25	13.75	12.25
		4	13.75	12.25	13.75	12.25	13.75	12.25	13.75	12.25
		5	13.75	12.25	13.75	12.25	13.75	12.25	13.75	12.25
		6	13.75	12.25	13.75	12.25	13.75	12.25	13.75	12.25
		7	13.75	12.25	13.75	12.25	13.75	12.25	13.75	12.25
		8	13.75	12.25	13.75	12.25	13.75	12.25	13.75	12.25
		9	13.75	12.25	13.75	12.25	13.75	12.25	13.75	12.25
		10	13.75	12.25	13.75	12.25	13.75	12.25	13.75	12.25
		11	13.50	12.00	13.50	12.00	13.50	12.00	13.50	12.00
		12	11.00	9.50	11.00	9.50	11.00	9.50	11.00	9.50
		13	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

FCC ID: BCGA2072	 PCTEST Proud to be part of element	SAR EVALUATION REPORT	Reviewed by: Quality Manager
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Mode/ Band		Tones	26T		52T		106T		242T	
		Channel	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal
Modulated Average - 2 Tx Chain (dBm) - Antenna 1A	20 MHz Bandwidth	1	12.50	11.00	12.50	11.00	12.50	11.00	12.50	11.00
		2	13.75	12.25	13.75	12.25	13.75	12.25	13.75	12.25
		3	13.75	12.25	13.75	12.25	13.75	12.25	13.75	12.25
		4	13.75	12.25	13.75	12.25	13.75	12.25	13.75	12.25
		5	13.75	12.25	13.75	12.25	13.75	12.25	13.75	12.25
		6	13.75	12.25	13.75	12.25	13.75	12.25	13.75	12.25
		7	13.75	12.25	13.75	12.25	13.75	12.25	13.75	12.25
		8	13.75	12.25	13.75	12.25	13.75	12.25	13.75	12.25
		9	13.75	12.25	13.75	12.25	13.75	12.25	13.75	12.25
		10	13.75	12.25	13.75	12.25	13.75	12.25	13.75	12.25
		11	12.50	11.00	12.50	11.00	12.50	11.00	12.50	11.00
		12	10.50	9.00	10.50	9.00	10.50	9.00	10.50	9.00
		13	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Note: In MIMO operations, each antenna transmits at maximum allowed powers as indicated above.

Mode/ Band		Tones	26T		52T		106T		242T		484T		996T	
		Channel	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal
Modulated Average - Single Tx Chain (dBm) - Ant 2A	20 MHz Bandwidth	36	10.50	9.00	10.50	9.00	10.50	9.00	10.50	9.00				
		40	10.50	9.00	10.50	9.00	10.50	9.00	10.50	9.00				
		44	10.50	9.00	10.50	9.00	10.50	9.00	10.50	9.00				
		48	10.50	9.00	10.50	9.00	10.50	9.00	10.50	9.00				
		52	9.75	8.25	9.75	8.25	9.75	8.25	9.75	8.25				
		56	9.75	8.25	9.75	8.25	9.75	8.25	9.75	8.25				
		60	9.75	8.25	9.75	8.25	9.75	8.25	9.75	8.25				
		64	9.75	8.25	9.75	8.25	9.75	8.25	9.75	8.25				
		100	10.75	9.25	10.75	9.25	10.75	9.25	10.75	9.25				
		104	10.75	9.25	10.75	9.25	10.75	9.25	10.75	9.25				
		108	10.75	9.25	10.75	9.25	10.75	9.25	10.75	9.25				
		112	10.75	9.25	10.75	9.25	10.75	9.25	10.75	9.25				
		116	10.75	9.25	10.75	9.25	10.75	9.25	10.75	9.25				
		120	10.75	9.25	10.75	9.25	10.75	9.25	10.75	9.25				
		124	10.75	9.25	10.75	9.25	10.75	9.25	10.75	9.25				
		128	10.75	9.25	10.75	9.25	10.75	9.25	10.75	9.25				
		132	10.75	9.25	10.75	9.25	10.75	9.25	10.75	9.25				
		136	10.75	9.25	10.75	9.25	10.75	9.25	10.75	9.25				
		140	10.75	9.25	10.75	9.25	10.75	9.25	10.75	9.25				
		144	10.75	9.25	10.75	9.25	10.75	9.25	10.75	9.25				
		148	11.25	9.75	11.25	9.75	11.25	9.75	11.25	9.75				
		153	11.25	9.75	11.25	9.75	11.25	9.75	11.25	9.75				
		157	11.25	9.75	11.25	9.75	11.25	9.75	11.25	9.75				
		161	11.25	9.75	11.25	9.75	11.25	9.75	11.25	9.75				
		166	11.25	9.75	11.25	9.75	11.25	9.75	11.25	9.75				
	40 MHz Bandwidth	38	10.50	9.00	10.50	9.00	10.50	9.00	10.50	9.00	10.50	9.00		
		46	10.50	9.00	10.50	9.00	10.50	9.00	10.50	9.00	10.50	9.00		
		54	9.75	8.25	9.75	8.25	9.75	8.25	9.75	8.25	9.75	8.25		
		62	9.75	8.25	9.75	8.25	9.75	8.25	9.75	8.25	9.75	8.25		
		102	10.75	9.25	10.75	9.25	10.75	9.25	10.75	9.25	10.75	9.25		
		110	10.75	9.25	10.75	9.25	10.75	9.25	10.75	9.25	10.75	9.25		
		118	10.75	9.25	10.75	9.25	10.75	9.25	10.75	9.25	10.75	9.25		
		126	10.75	9.25	10.75	9.25	10.75	9.25	10.75	9.25	10.75	9.25		
		134	10.75	9.25	10.75	9.25	10.75	9.25	10.75	9.25	10.75	9.25		
		142	10.75	9.25	10.75	9.25	10.75	9.25	10.75	9.25	10.75	9.25		
		151	11.25	9.75	11.25	9.75	11.25	9.75	11.25	9.75	11.25	9.75		
		159	11.25	9.75	11.25	9.75	11.25	9.75	11.25	9.75	11.25	9.75		
	80 MHz Bandwidth	42	10.00	8.50	10.50	9.00	10.50	9.00	10.50	9.00	10.50	9.00	10.50	9.00
		58	9.50	8.00	9.75	8.25	9.75	8.25	9.75	8.25	9.75	8.25	9.75	8.25
		106	9.50	8.00	10.50	9.00	10.75	9.25	10.75	9.25	10.75	9.25	10.75	9.25
		122	10.75	9.25	10.75	9.25	10.75	9.25	10.75	9.25	10.75	9.25	10.75	9.25
		138	10.75	9.25	10.75	9.25	10.75	9.25	10.75	9.25	10.75	9.25	10.75	9.25
		155	11.25	9.75	11.25	9.75	11.25	9.75	11.25	9.75	11.25	9.75	11.25	9.75

FCC ID: BCGA2072	 PCTEST Proud to be part of element	SAR EVALUATION REPORT	Reviewed by: Quality Manager
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Note: In MIMO operations, each antenna transmits at maximum allowed powers as indicated above.

Note: In MIMO operations, each antenna transmits at maximum allowed powers as indicated above.

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[illegible]

Mode/ Band		Tones		26T		52T		106T		242T		484T		996T			
		Channel	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal			
Modulated Average - 2 Tx Chain (dBm) CDD - Ant 2B	20 MHz Bandwidth	36	9.00	7.50	10.50	9.00	10.50	9.00	10.50	9.00	10.50	9.00					
		40	9.00	7.50	10.50	9.00	10.50	9.00	10.50	9.00	10.50	9.00					
		44	9.00	7.50	10.50	9.00	10.50	9.00	10.50	9.00	10.50	9.00					
		48	9.00	7.50	10.50	9.00	10.50	9.00	10.50	9.00	10.50	9.00					
		52	9.00	7.50	11.50	10.00	11.50	10.00	11.50	10.00	11.50	10.00					
		56	9.00	7.50	11.50	10.00	11.50	10.00	11.50	10.00	11.50	10.00					
		60	9.00	7.50	11.50	10.00	11.50	10.00	11.50	10.00	11.50	10.00					
		64	9.00	7.50	11.50	10.00	11.50	10.00	11.50	10.00	11.50	10.00					
		100	9.00	7.50	10.25	8.75	10.25	8.75	10.25	8.75	10.25	8.75					
		104	9.00	7.50	10.25	8.75	10.25	8.75	10.25	8.75	10.25	8.75					
		108	9.00	7.50	10.25	8.75	10.25	8.75	10.25	8.75	10.25	8.75					
		112	9.00	7.50	10.25	8.75	10.25	8.75	10.25	8.75	10.25	8.75					
		116	9.00	7.50	10.25	8.75	10.25	8.75	10.25	8.75	10.25	8.75					
		120	9.00	7.50	10.25	8.75	10.25	8.75	10.25	8.75	10.25	8.75					
		124	9.00	7.50	10.25	8.75	10.25	8.75	10.25	8.75	10.25	8.75					
		128	9.00	7.50	10.25	8.75	10.25	8.75	10.25	8.75	10.25	8.75					
		132	9.00	7.50	10.25	8.75	10.25	8.75	10.25	8.75	10.25	8.75					
		136	9.00	7.50	10.25	8.75	10.25	8.75	10.25	8.75	10.25	8.75					
		140	9.00	7.50	10.25	8.75	10.25	8.75	10.25	8.75	10.25	8.75					
		144	9.00	7.50	10.25	8.75	10.25	8.75	10.25	8.75	10.25	8.75					
		149	9.75	8.25	9.75	8.25	9.75	8.25	9.75	8.25	9.75	8.25					
		153	9.75	8.25	9.75	8.25	9.75	8.25	9.75	8.25	9.75	8.25					
		157	9.75	8.25	9.75	8.25	9.75	8.25	9.75	8.25	9.75	8.25					
		161	9.75	8.25	9.75	8.25	9.75	8.25	9.75	8.25	9.75	8.25					
	165	9.75	8.25	9.75	8.25	9.75	8.25	9.75	8.25	9.75	8.25						
	40 MHz Bandwidth	38	9.00	7.50	10.50	9.00	10.50	9.00	10.50	9.00	10.50	9.00	10.50	9.00			
		46	9.00	7.50	10.50	9.00	10.50	9.00	10.50	9.00	10.50	9.00	10.50	9.00			
		54	9.00	7.50	11.50	10.00	11.50	10.00	11.50	10.00	11.50	10.00	11.50	10.00			
		62	9.00	7.50	11.50	10.00	11.50	10.00	11.50	10.00	11.50	10.00	11.50	10.00			
		102	9.00	7.50	10.25	8.75	10.25	8.75	10.25	8.75	10.25	8.75	10.25	8.75			
		110	9.00	7.50	10.25	8.75	10.25	8.75	10.25	8.75	10.25	8.75	10.25	8.75			
		118	9.00	7.50	10.25	8.75	10.25	8.75	10.25	8.75	10.25	8.75	10.25	8.75			
		126	9.00	7.50	10.25	8.75	10.25	8.75	10.25	8.75	10.25	8.75	10.25	8.75			
		134	9.00	7.50	10.25	8.75	10.25	8.75	10.25	8.75	10.25	8.75	10.25	8.75			
		142	9.00	7.50	10.25	8.75	10.25	8.75	10.25	8.75	10.25	8.75	10.25	8.75			
		151	9.75	8.25	9.75	8.25	9.75	8.25	9.75	8.25	9.75	8.25	9.75	8.25			
		159	9.75	8.25	9.75	8.25	9.75	8.25	9.75	8.25	9.75	8.25	9.75	8.25			
		80 MHz Bandwidth	42	9.00	7.50	10.50	9.00	10.50	9.00	10.50	9.00	10.50	9.00	10.50	9.00	10.50	9.00
			58	9.00	7.50	11.50	10.00	11.50	10.00	11.50	10.00	11.50	10.00	11.50	10.00	11.50	10.00
	106		9.00	7.50	10.25	8.75	10.25	8.75	10.25	8.75	10.25	8.75	10.25	8.75	10.25	8.75	
	122		9.00	7.50	10.25	8.75	10.25	8.75	10.25	8.75	10.25	8.75	10.25	8.75	10.25	8.75	
	138		9.00	7.50	10.25	8.75	10.25	8.75	10.25	8.75	10.25	8.75	10.25	8.75	10.25	8.75	
	155		9.75	8.25	9.75	8.25	9.75	8.25	9.75	8.25	9.75	8.25	9.75	8.25	9.75	8.25	

Note: In MIMO operations, each antenna transmits at maximum allowed powers as indicated above.

FCC ID: BCGA2072	 PCTEST® Proud to be part of element	SAR EVALUATION REPORT	Reviewed by: Quality Manager
Test Dates: 07/28/2020 - 09/16/2020	DUT Type: Tablet Device	APPENDIX H: Page 5 of 24	

Mode/ Band		Tones	26T		52T		106T		242T		484T		996T	
		Channel	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal
Modulated Average - 2 Tx Chain (dBm) SDM - Ant 2B	20 MHz Bandwidth	36	9.00	7.50	10.50	9.00	10.50	9.00	10.50	9.00				
		40	9.00	7.50	10.50	9.00	10.50	9.00	10.50	9.00				
		44	9.00	7.50	10.50	9.00	10.50	9.00	10.50	9.00				
		48	9.00	7.50	10.50	9.00	10.50	9.00	10.50	9.00				
		52	9.00	7.50	11.50	10.00	11.50	10.00	11.50	10.00				
		56	9.00	7.50	11.50	10.00	11.50	10.00	11.50	10.00				
		60	9.00	7.50	11.50	10.00	11.50	10.00	11.50	10.00				
		64	9.00	7.50	11.50	10.00	11.50	10.00	11.50	10.00				
		100	9.00	7.50	10.25	8.75	10.25	8.75	10.25	8.75				
		104	9.00	7.50	10.25	8.75	10.25	8.75	10.25	8.75				
		108	9.00	7.50	10.25	8.75	10.25	8.75	10.25	8.75				
		112	9.00	7.50	10.25	8.75	10.25	8.75	10.25	8.75				
		116	9.00	7.50	10.25	8.75	10.25	8.75	10.25	8.75				
		120	9.00	7.50	10.25	8.75	10.25	8.75	10.25	8.75				
		124	9.00	7.50	10.25	8.75	10.25	8.75	10.25	8.75				
		128	9.00	7.50	10.25	8.75	10.25	8.75	10.25	8.75				
		132	9.00	7.50	10.25	8.75	10.25	8.75	10.25	8.75				
		136	9.00	7.50	10.25	8.75	10.25	8.75	10.25	8.75				
		140	9.00	7.50	10.25	8.75	10.25	8.75	10.25	8.75				
		144	9.00	7.50	10.25	8.75	10.25	8.75	10.25	8.75				
		149	9.75	8.25	9.75	8.25	9.75	8.25	9.75	8.25				
		153	9.75	8.25	9.75	8.25	9.75	8.25	9.75	8.25				
		157	9.75	8.25	9.75	8.25	9.75	8.25	9.75	8.25				
		161	9.75	8.25	9.75	8.25	9.75	8.25	9.75	8.25				
		165	9.75	8.25	9.75	8.25	9.75	8.25	9.75	8.25				
	40 MHz Bandwidth	38	9.00	7.50	10.50	9.00	10.50	9.00	10.50	9.00	10.50	9.00		
		46	9.00	7.50	10.50	9.00	10.50	9.00	10.50	9.00	10.50	9.00		
		54	9.00	7.50	11.50	10.00	11.50	10.00	11.50	10.00	11.50	10.00		
		62	9.00	7.50	11.50	10.00	11.50	10.00	11.50	10.00	11.50	10.00		
		102	9.00	7.50	10.25	8.75	10.25	8.75	10.25	8.75	10.25	8.75		
		110	9.00	7.50	10.25	8.75	10.25	8.75	10.25	8.75	10.25	8.75		
		118	9.00	7.50	10.25	8.75	10.25	8.75	10.25	8.75	10.25	8.75		
		126	9.00	7.50	10.25	8.75	10.25	8.75	10.25	8.75	10.25	8.75		
		134	9.00	7.50	10.25	8.75	10.25	8.75	10.25	8.75	10.25	8.75		
		142	9.00	7.50	10.25	8.75	10.25	8.75	10.25	8.75	10.25	8.75		
		151	9.75	8.25	9.75	8.25	9.75	8.25	9.75	8.25	9.75	8.25		
		159	9.75	8.25	9.75	8.25	9.75	8.25	9.75	8.25	9.75	8.25		
	80 MHz Bandwidth	42	9.00	7.50	10.50	9.00	10.50	9.00	10.50	9.00	10.50	9.00	10.50	9.00
		58	9.00	7.50	11.50	10.00	11.50	10.00	11.50	10.00	11.50	10.00	11.50	10.00
		106	9.00	7.50	10.25	8.75	10.25	8.75	10.25	8.75	10.25	8.75	10.25	8.75
		122	9.00	7.50	10.25	8.75	10.25	8.75	10.25	8.75	10.25	8.75	10.25	8.75
		138	9.00	7.50	10.25	8.75	10.25	8.75	10.25	8.75	10.25	8.75	10.25	8.75
		155	9.75	8.25	9.75	8.25	9.75	8.25	9.75	8.25	9.75	8.25	9.75	8.25

Note: In MIMO operations, each antenna transmits at maximum allowed powers as indicated above.

Mode/ Band		Tones	26T		52T		106T		242T		484T		996T	
		Channel	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal
Modulated Average - Single Tx Chain (dBm) - Ant 1B	20 MHz Bandwidth	36	11.50	10.00	11.50	10.00	11.50	10.00	11.50	10.00				
		40	11.50	10.00	11.50	10.00	11.50	10.00	11.50	10.00				
		44	11.50	10.00	11.50	10.00	11.50	10.00	11.50	10.00				
		48	11.50	10.00	11.50	10.00	11.50	10.00	11.50	10.00				
		52	9.75	8.25	9.75	8.25	9.75	8.25	9.75	8.25				
		56	9.75	8.25	9.75	8.25	9.75	8.25	9.75	8.25				
		60	9.75	8.25	9.75	8.25	9.75	8.25	9.75	8.25				
		64	9.75	8.25	9.75	8.25	9.75	8.25	9.75	8.25				
		100	10.25	8.75	10.25	8.75	10.25	8.75	10.25	8.75				
		104	10.25	8.75	10.25	8.75	10.25	8.75	10.25	8.75				
		108	10.25	8.75	10.25	8.75	10.25	8.75	10.25	8.75				
		112	10.25	8.75	10.25	8.75	10.25	8.75	10.25	8.75				
		116	10.25	8.75	10.25	8.75	10.25	8.75	10.25	8.75				
		120	10.25	8.75	10.25	8.75	10.25	8.75	10.25	8.75				
		124	10.25	8.75	10.25	8.75	10.25	8.75	10.25	8.75				
		128	10.25	8.75	10.25	8.75	10.25	8.75	10.25	8.75				
		132	10.25	8.75	10.25	8.75	10.25	8.75	10.25	8.75				
		136	10.25	8.75	10.25	8.75	10.25	8.75	10.25	8.75				
		140	10.25	8.75	10.25	8.75	10.25	8.75	10.25	8.75				
		144	10.25	8.75	10.25	8.75	10.25	8.75	10.25	8.75				
		149	10.25	8.75	10.25	8.75	10.25	8.75	10.25	8.75				
		153	10.25	8.75	10.25	8.75	10.25	8.75	10.25	8.75				
		157	10.25	8.75	10.25	8.75	10.25	8.75	10.25	8.75				
		161	10.25	8.75	10.25	8.75	10.25	8.75	10.25	8.75				
		165	10.25	8.75	10.25	8.75	10.25	8.75	10.25	8.75				
	40 MHz Bandwidth	38	11.50	10.00	11.50	10.00	11.50	10.00	11.50	10.00	11.50	10.00		
		46	11.50	10.00	11.50	10.00	11.50	10.00	11.50	10.00	11.50	10.00		
		54	9.75	8.25	9.75	8.25	9.75	8.25	9.75	8.25	9.75	8.25		
		62	9.75	8.25	9.75	8.25	9.75	8.25	9.75	8.25	9.75	8.25		
		102	10.25	8.75	10.25	8.75	10.25	8.75	10.25	8.75	10.25	8.75		
		110	10.25	8.75	10.25	8.75	10.25	8.75	10.25	8.75	10.25	8.75		
		118	10.25	8.75	10.25	8.75	10.25	8.75	10.25	8.75	10.25	8.75		
		126	10.25	8.75	10.25	8.75	10.25	8.75	10.25	8.75	10.25	8.75		
		134	10.25	8.75	10.25	8.75	10.25	8.75	10.25	8.75	10.25	8.75		
		142	10.25	8.75	10.25	8.75	10.25	8.75	10.25	8.75	10.25	8.75		
		151	10.25	8.75	10.25	8.75	10.25	8.75	10.25	8.75	10.25	8.75		
		159	10.25	8.75	10.25	8.75	10.25	8.75	10.25	8.75	10.25	8.75		
	80 MHz Bandwidth	42	11.00	9.50	11.50	10.00	11.50	10.00	11.50	10.00	11.50	10.00	11.50	10.00
		58	9.75	8.25	9.75	8.25	9.75	8.25	9.75	8.25	9.75	8.25	9.75	8.25
		106	10.25	8.75	10.25	8.75	10.25	8.75	10.25	8.75	10.25	8.75	10.25	8.75
		122	10.25	8.75	10.25	8.75	10.25	8.75	10.25	8.75	10.25	8.75	10.25	8.75
		138	10.25	8.75	10.25	8.75	10.25	8.75	10.25	8.75	10.25	8.75	10.25	8.75
		155	10.25	8.75	10.25	8.75	10.25	8.75	10.25	8.75	10.25	8.75	10.25	8.75

FCC ID: BCGA2072	 PCTEST Proud to be part of element	SAR EVALUATION REPORT	Reviewed by: Quality Manager
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Mode/ Band		Tones	26T		52T		106T		242T		484T		996T	
		Channel	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal
Modulated Average - 2 Tx Chain (dBm) CDD -Ant 1B	20 MHz Bandwidth	36	9.00	7.50	11.50	10.00	11.50	10.00	11.50	10.00				
		40	9.00	7.50	11.50	10.00	11.50	10.00	11.50	10.00				
		44	9.00	7.50	11.50	10.00	11.50	10.00	11.50	10.00				
		48	9.00	7.50	11.50	10.00	11.50	10.00	11.50	10.00				
		52	9.00	7.50	9.75	8.25	9.75	8.25	9.75	8.25				
		56	9.00	7.50	9.75	8.25	9.75	8.25	9.75	8.25				
		60	9.00	7.50	9.75	8.25	9.75	8.25	9.75	8.25				
		64	9.00	7.50	9.75	8.25	9.75	8.25	9.75	8.25				
		100	9.00	7.50	10.25	8.75	10.25	8.75	10.25	8.75				
		104	9.00	7.50	10.25	8.75	10.25	8.75	10.25	8.75				
		108	9.00	7.50	10.25	8.75	10.25	8.75	10.25	8.75				
		112	9.00	7.50	10.25	8.75	10.25	8.75	10.25	8.75				
		116	9.00	7.50	10.25	8.75	10.25	8.75	10.25	8.75				
		120	9.00	7.50	10.25	8.75	10.25	8.75	10.25	8.75				
		124	9.00	7.50	10.25	8.75	10.25	8.75	10.25	8.75				
		128	9.00	7.50	10.25	8.75	10.25	8.75	10.25	8.75				
		132	9.00	7.50	10.25	8.75	10.25	8.75	10.25	8.75				
		136	9.00	7.50	10.25	8.75	10.25	8.75	10.25	8.75				
		140	9.00	7.50	10.25	8.75	10.25	8.75	10.25	8.75				
		144	9.00	7.50	10.25	8.75	10.25	8.75	10.25	8.75				
		149	10.25	8.75	10.25	8.75	10.25	8.75	10.25	8.75				
		153	10.25	8.75	10.25	8.75	10.25	8.75	10.25	8.75				
		157	10.25	8.75	10.25	8.75	10.25	8.75	10.25	8.75				
		161	10.25	8.75	10.25	8.75	10.25	8.75	10.25	8.75				
		165	10.25	8.75	10.25	8.75	10.25	8.75	10.25	8.75				
	40 MHz Bandwidth	38	9.00	7.50	11.50	10.00	11.50	10.00	11.50	10.00	11.50	10.00		
		46	9.00	7.50	11.50	10.00	11.50	10.00	11.50	10.00	11.50	10.00		
		54	9.00	7.50	9.75	8.25	9.75	8.25	9.75	8.25	9.75	8.25		
		62	9.00	7.50	9.75	8.25	9.75	8.25	9.75	8.25	9.75	8.25		
		102	9.00	7.50	10.25	8.75	10.25	8.75	10.25	8.75	10.25	8.75		
		110	9.00	7.50	10.25	8.75	10.25	8.75	10.25	8.75	10.25	8.75		
		118	9.00	7.50	10.25	8.75	10.25	8.75	10.25	8.75	10.25	8.75		
		126	9.00	7.50	10.25	8.75	10.25	8.75	10.25	8.75	10.25	8.75		
		134	9.00	7.50	10.25	8.75	10.25	8.75	10.25	8.75	10.25	8.75		
		142	9.00	7.50	10.25	8.75	10.25	8.75	10.25	8.75	10.25	8.75		
		151	10.25	8.75	10.25	8.75	10.25	8.75	10.25	8.75	10.25	8.75		
		159	10.25	8.75	10.25	8.75	10.25	8.75	10.25	8.75	10.25	8.75		
	80 MHz Bandwidth	42	9.00	7.50	11.50	10.00	11.50	10.00	11.50	10.00	11.50	10.00	11.50	10.00
		58	9.00	7.50	9.75	8.25	9.75	8.25	9.75	8.25	9.75	8.25	9.75	8.25
		106	9.00	7.50	10.25	8.75	10.25	8.75	10.25	8.75	10.25	8.75	10.25	8.75
		122	9.00	7.50	10.25	8.75	10.25	8.75	10.25	8.75	10.25	8.75	10.25	8.75
		138	9.00	7.50	10.25	8.75	10.25	8.75	10.25	8.75	10.25	8.75	10.25	8.75
		155	10.25	8.75	10.25	8.75	10.25	8.75	10.25	8.75	10.25	8.75	10.25	8.75

Note: In MIMO operations, each antenna transmits at maximum allowed powers as indicated above.

Mode/ Band		Tones	26T		52T		106T		242T		484T		996T	
		Channel	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal
Modulated Average - 2 Tx Chain (dBm) SDM - Ant 1B	20 MHz Bandwidth	36	9.00	7.50	11.50	10.00	11.50	10.00	11.50	10.00				
		40	9.00	7.50	11.50	10.00	11.50	10.00	11.50	10.00				
		44	9.00	7.50	11.50	10.00	11.50	10.00	11.50	10.00				
		48	9.00	7.50	11.50	10.00	11.50	10.00	11.50	10.00				
		52	9.00	7.50	9.75	8.25	9.75	8.25	9.75	8.25				
		56	9.00	7.50	9.75	8.25	9.75	8.25	9.75	8.25				
		60	9.00	7.50	9.75	8.25	9.75	8.25	9.75	8.25				
		64	9.00	7.50	9.75	8.25	9.75	8.25	9.75	8.25				
		100	9.00	7.50	10.25	8.75	10.25	8.75	10.25	8.75				
		104	9.00	7.50	10.25	8.75	10.25	8.75	10.25	8.75				
		108	9.00	7.50	10.25	8.75	10.25	8.75	10.25	8.75				
		112	9.00	7.50	10.25	8.75	10.25	8.75	10.25	8.75				
		116	9.00	7.50	10.25	8.75	10.25	8.75	10.25	8.75				
		120	9.00	7.50	10.25	8.75	10.25	8.75	10.25	8.75				
		124	9.00	7.50	10.25	8.75	10.25	8.75	10.25	8.75				
		128	9.00	7.50	10.25	8.75	10.25	8.75	10.25	8.75				
		132	9.00	7.50	10.25	8.75	10.25	8.75	10.25	8.75				
		136	9.00	7.50	10.25	8.75	10.25	8.75	10.25	8.75				
		140	9.00	7.50	10.25	8.75	10.25	8.75	10.25	8.75				
		144	9.00	7.50	10.25	8.75	10.25	8.75	10.25	8.75				
		149	10.25	8.75	10.25	8.75	10.25	8.75	10.25	8.75				
		153	10.25	8.75	10.25	8.75	10.25	8.75	10.25	8.75				
		157	10.25	8.75	10.25	8.75	10.25	8.75	10.25	8.75				
		161	10.25	8.75	10.25	8.75	10.25	8.75	10.25	8.75				
		165	10.25	8.75	10.25	8.75	10.25	8.75	10.25	8.75				
	40 MHz Bandwidth	38	9.00	7.50	11.50	10.00	11.50	10.00	11.50	10.00	11.50	10.00		
		46	9.00	7.50	11.50	10.00	11.50	10.00	11.50	10.00	11.50	10.00		
		54	9.00	7.50	9.75	8.25	9.75	8.25	9.75	8.25	9.75	8.25		
		62	9.00	7.50	9.75	8.25	9.75	8.25	9.75	8.25	9.75	8.25		
		102	9.00	7.50	10.25	8.75	10.25	8.75	10.25	8.75	10.25	8.75		
		110	9.00	7.50	10.25	8.75	10.25	8.75	10.25	8.75	10.25	8.75		
		118	9.00	7.50	10.25	8.75	10.25	8.75	10.25	8.75	10.25	8.75		
		126	9.00	7.50	10.25	8.75	10.25	8.75	10.25	8.75	10.25	8.75		
		134	9.00	7.50	10.25	8.75	10.25	8.75	10.25	8.75	10.25	8.75		
		142	9.00	7.50	10.25	8.75	10.25	8.75	10.25	8.75	10.25	8.75		
		151	10.25	8.75	10.25	8.75	10.25	8.75	10.25	8.75	10.25	8.75		
		159	10.25	8.75	10.25	8.75	10.25	8.75	10.25	8.75	10.25	8.75		
	80 MHz Bandwidth	42	9.00	7.50	11.50	10.00	11.50	10.00	11.50	10.00	11.50	10.00	11.50	10.00
		58	9.00	7.50	9.75	8.25	9.75	8.25	9.75	8.25	9.75	8.25	9.75	8.25
		106	9.00	7.50	10.25	8.75	10.25	8.75	10.25	8.75	10.25	8.75	10.25	8.75
		122	9.00	7.50	10.25	8.75	10.25	8.75	10.25	8.75	10.25	8.75	10.25	8.75
		138	9.00	7.50	10.25	8.75	10.25	8.75	10.25	8.75	10.25	8.75	10.25	8.75
		155	10.25	8.75	10.25	8.75	10.25	8.75	10.25	8.75	10.25	8.75	10.25	8.75

Note: In MIMO operations, each antenna transmits at maximum allowed powers as indicated above.

FCC ID: BCGA2072	 PCTEST Proud to be part of  element	SAR EVALUATION REPORT	Reviewed by: Quality Manager
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1.1.2 Reduced 802.11ax RU Time-Averaged WLAN Output Power

Below table is applicable in the following conditions:

- Simultaneous conditions with Licensed Bands Antenna 3A/3B active
- Simultaneous conditions with LTE Inter-band ULCA active

Mode/ Band		Tones	26T		52T		106T		242T	
		Channel	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal
Modulated Average - Single Tx Chain (dBm) - Antenna 3A	20 MHz Bandwidth	1	6.00	4.50	6.00	4.50	6.00	4.50	6.00	4.50
		2	6.00	4.50	6.00	4.50	6.00	4.50	6.00	4.50
		3	6.00	4.50	6.00	4.50	6.00	4.50	6.00	4.50
		4	6.00	4.50	6.00	4.50	6.00	4.50	6.00	4.50
		5	6.00	4.50	6.00	4.50	6.00	4.50	6.00	4.50
		6	6.00	4.50	6.00	4.50	6.00	4.50	6.00	4.50
		7	6.00	4.50	6.00	4.50	6.00	4.50	6.00	4.50
		8	6.00	4.50	6.00	4.50	6.00	4.50	6.00	4.50
		9	6.00	4.50	6.00	4.50	6.00	4.50	6.00	4.50
		10	6.00	4.50	6.00	4.50	6.00	4.50	6.00	4.50
		11	6.00	4.50	6.00	4.50	6.00	4.50	6.00	4.50
		12	6.00	4.50	6.00	4.50	6.00	4.50	6.00	4.50
		13	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Below table is applicable in the following conditions:

- Simultaneous conditions with Licensed Bands Antenna 3A/3B active
- Simultaneous conditions with LTE Inter-band ULCA active

Mode/ Band		Tones	26T		52T		106T		242T	
		Channel	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal
Modulated Average - 2 Tx Chain (dBm) - Antenna 3A	20 MHz Bandwidth	1	6.00	4.50	6.00	4.50	6.00	4.50	6.00	4.50
		2	6.00	4.50	6.00	4.50	6.00	4.50	6.00	4.50
		3	6.00	4.50	6.00	4.50	6.00	4.50	6.00	4.50
		4	6.00	4.50	6.00	4.50	6.00	4.50	6.00	4.50
		5	6.00	4.50	6.00	4.50	6.00	4.50	6.00	4.50
		6	6.00	4.50	6.00	4.50	6.00	4.50	6.00	4.50
		7	6.00	4.50	6.00	4.50	6.00	4.50	6.00	4.50
		8	6.00	4.50	6.00	4.50	6.00	4.50	6.00	4.50
		9	6.00	4.50	6.00	4.50	6.00	4.50	6.00	4.50
		10	6.00	4.50	6.00	4.50	6.00	4.50	6.00	4.50
		11	6.00	4.50	6.00	4.50	6.00	4.50	6.00	4.50
		12	6.00	4.50	6.00	4.50	6.00	4.50	6.00	4.50
		13	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Note: In MIMO operations, each antenna transmits at maximum allowed powers as indicated above.

Below table is applicable in the following conditions:

- Simultaneous conditions with Licensed Bands Antenna 1A active
- Simultaneous conditions with LTE Inter-band ULCA active

Mode/ Band		Tones	26T		52T		106T		242T	
		Channel	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal
Modulated Average - Single Tx Chain (dBm) - Antenna 1A	20 MHz Bandwidth	1	6.75	5.25	6.75	5.25	6.75	5.25	6.75	5.25
		2	6.75	5.25	6.75	5.25	6.75	5.25	6.75	5.25
		3	6.75	5.25	6.75	5.25	6.75	5.25	6.75	5.25
		4	6.75	5.25	6.75	5.25	6.75	5.25	6.75	5.25
		5	6.75	5.25	6.75	5.25	6.75	5.25	6.75	5.25
		6	6.75	5.25	6.75	5.25	6.75	5.25	6.75	5.25
		7	6.75	5.25	6.75	5.25	6.75	5.25	6.75	5.25
		8	6.75	5.25	6.75	5.25	6.75	5.25	6.75	5.25
		9	6.75	5.25	6.75	5.25	6.75	5.25	6.75	5.25
		10	6.75	5.25	6.75	5.25	6.75	5.25	6.75	5.25
		11	6.75	5.25	6.75	5.25	6.75	5.25	6.75	5.25
		12	6.75	5.25	6.75	5.25	6.75	5.25	6.75	5.25
		13	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

FCC ID: BCGA2072	 PCTEST Proud to be part of  element	SAR EVALUATION REPORT	Reviewed by: Quality Manager
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Below table is applicable in the following conditions:

- Simultaneous conditions with Licensed Bands Antenna 1A active
- Simultaneous conditions with LTE Inter-band ULCA active

Mode/ Band		Tones	26T		52T		106T		242T	
		Channel	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal
Modulated Average - 2 Tx Chain (dBm) - Antenna 1A	20 MHz Bandwidth	1	6.75	5.25	6.75	5.25	6.75	5.25	6.75	5.25
		2	6.75	5.25	6.75	5.25	6.75	5.25	6.75	5.25
		3	6.75	5.25	6.75	5.25	6.75	5.25	6.75	5.25
		4	6.75	5.25	6.75	5.25	6.75	5.25	6.75	5.25
		5	6.75	5.25	6.75	5.25	6.75	5.25	6.75	5.25
		6	6.75	5.25	6.75	5.25	6.75	5.25	6.75	5.25
		7	6.75	5.25	6.75	5.25	6.75	5.25	6.75	5.25
		8	6.75	5.25	6.75	5.25	6.75	5.25	6.75	5.25
		9	6.75	5.25	6.75	5.25	6.75	5.25	6.75	5.25
		10	6.75	5.25	6.75	5.25	6.75	5.25	6.75	5.25
		11	6.75	5.25	6.75	5.25	6.75	5.25	6.75	5.25
		12	6.75	5.25	6.75	5.25	6.75	5.25	6.75	5.25
		13	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Note: In MIMO operations, each antenna transmits at maximum allowed powers as indicated above.

Below table is applicable in the following conditions:

- Simultaneous conditions with Licensed Bands Antenna 2A active
- Simultaneous conditions with LTE Inter-band ULCA active

Mode/ Band		Tones	26T		52T		106T		242T		484T		996T	
		Channel	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal
Modulated Average - Single Tx Chain (dBm) - Ant 2A	20 MHz Bandwidth	36	3.50	2.00	3.50	2.00	3.50	2.00	3.50	2.00				
		40	3.50	2.00	3.50	2.00	3.50	2.00	3.50	2.00				
		44	3.50	2.00	3.50	2.00	3.50	2.00	3.50	2.00				
		48	3.50	2.00	3.50	2.00	3.50	2.00	3.50	2.00				
		52	2.75	1.25	2.75	1.25	2.75	1.25	2.75	1.25				
		56	2.75	1.25	2.75	1.25	2.75	1.25	2.75	1.25				
		60	2.75	1.25	2.75	1.25	2.75	1.25	2.75	1.25				
		64	2.75	1.25	2.75	1.25	2.75	1.25	2.75	1.25				
		100	3.75	2.25	3.75	2.25	3.75	2.25	3.75	2.25				
		104	3.75	2.25	3.75	2.25	3.75	2.25	3.75	2.25				
		108	3.75	2.25	3.75	2.25	3.75	2.25	3.75	2.25				
		112	3.75	2.25	3.75	2.25	3.75	2.25	3.75	2.25				
		116	3.75	2.25	3.75	2.25	3.75	2.25	3.75	2.25				
		120	3.75	2.25	3.75	2.25	3.75	2.25	3.75	2.25				
		124	3.75	2.25	3.75	2.25	3.75	2.25	3.75	2.25				
		128	3.75	2.25	3.75	2.25	3.75	2.25	3.75	2.25				
		132	3.75	2.25	3.75	2.25	3.75	2.25	3.75	2.25				
		136	3.75	2.25	3.75	2.25	3.75	2.25	3.75	2.25				
		140	3.75	2.25	3.75	2.25	3.75	2.25	3.75	2.25				
		144	3.75	2.25	3.75	2.25	3.75	2.25	3.75	2.25				
		149	4.25	2.75	4.25	2.75	4.25	2.75	4.25	2.75				
		153	4.25	2.75	4.25	2.75	4.25	2.75	4.25	2.75				
		157	4.25	2.75	4.25	2.75	4.25	2.75	4.25	2.75				
		161	4.25	2.75	4.25	2.75	4.25	2.75	4.25	2.75				
		165	4.25	2.75	4.25	2.75	4.25	2.75	4.25	2.75				
	40 MHz Bandwidth	38	3.50	2.00	3.50	2.00	3.50	2.00	3.50	2.00	3.50	2.00		
		46	3.50	2.00	3.50	2.00	3.50	2.00	3.50	2.00	3.50	2.00		
		54	2.75	1.25	2.75	1.25	2.75	1.25	2.75	1.25	2.75	1.25		
		62	2.75	1.25	2.75	1.25	2.75	1.25	2.75	1.25	2.75	1.25		
		102	3.75	2.25	3.75	2.25	3.75	2.25	3.75	2.25	3.75	2.25		
		110	3.75	2.25	3.75	2.25	3.75	2.25	3.75	2.25	3.75	2.25		
		118	3.75	2.25	3.75	2.25	3.75	2.25	3.75	2.25	3.75	2.25		
		126	3.75	2.25	3.75	2.25	3.75	2.25	3.75	2.25	3.75	2.25		
		134	3.75	2.25	3.75	2.25	3.75	2.25	3.75	2.25	3.75	2.25		
		142	3.75	2.25	3.75	2.25	3.75	2.25	3.75	2.25	3.75	2.25		
		151	4.25	2.75	4.25	2.75	4.25	2.75	4.25	2.75	4.25	2.75		
		159	4.25	2.75	4.25	2.75	4.25	2.75	4.25	2.75	4.25	2.75		
	80 MHz Bandwidth	42	3.50	2.00	3.50	2.00	3.50	2.00	3.50	2.00	3.50	2.00	3.50	2.00
		58	2.75	1.25	2.75	1.25	2.75	1.25	2.75	1.25	2.75	1.25	2.75	1.25
		106	3.75	2.25	3.75	2.25	3.75	2.25	3.75	2.25	3.75	2.25	3.75	2.25
		122	3.75	2.25	3.75	2.25	3.75	2.25	3.75	2.25	3.75	2.25	3.75	2.25
		138	3.75	2.25	3.75	2.25	3.75	2.25	3.75	2.25	3.75	2.25	3.75	2.25
		155	4.25	2.75	4.25	2.75	4.25	2.75	4.25	2.75	4.25	2.75	4.25	2.75

FCC ID: BCGA2072	 PCTEST Proud to be part of  element	SAR EVALUATION REPORT	Reviewed by: Quality Manager
Test Dates: 07/28/2020 - 09/16/2020	DUT Type: Tablet Device		APPENDIX H: Page 9 of 24

Below table is applicable in the following conditions:

-Simultaneous conditions with Licensed Bands Antenna 2A active

-Simultaneous conditions with LTE Inter-band ULCA active

Mode/ Band		Tones		26T		52T		106T		242T		484T		996T		
		Channel	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal		
Modulated Average - 2 Tx Chain (dBm) CDD - Ant 2A	20 MHz Bandwidth	36	3.50	2.00	3.50	2.00	3.50	2.00	3.50	2.00	3.50	2.00				
		40	3.50	2.00	3.50	2.00	3.50	2.00	3.50	2.00	3.50	2.00				
		44	3.50	2.00	3.50	2.00	3.50	2.00	3.50	2.00	3.50	2.00				
		48	3.50	2.00	3.50	2.00	3.50	2.00	3.50	2.00	3.50	2.00				
		52	2.75	1.25	2.75	1.25	2.75	1.25	2.75	1.25	2.75	1.25				
		56	2.75	1.25	2.75	1.25	2.75	1.25	2.75	1.25	2.75	1.25				
		60	2.75	1.25	2.75	1.25	2.75	1.25	2.75	1.25	2.75	1.25				
		64	2.75	1.25	2.75	1.25	2.75	1.25	2.75	1.25	2.75	1.25				
		100	3.75	2.25	3.75	2.25	3.75	2.25	3.75	2.25	3.75	2.25				
		104	3.75	2.25	3.75	2.25	3.75	2.25	3.75	2.25	3.75	2.25				
		108	3.75	2.25	3.75	2.25	3.75	2.25	3.75	2.25	3.75	2.25				
		112	3.75	2.25	3.75	2.25	3.75	2.25	3.75	2.25	3.75	2.25				
		116	3.75	2.25	3.75	2.25	3.75	2.25	3.75	2.25	3.75	2.25				
		120	3.75	2.25	3.75	2.25	3.75	2.25	3.75	2.25	3.75	2.25				
		124	3.75	2.25	3.75	2.25	3.75	2.25	3.75	2.25	3.75	2.25				
		128	3.75	2.25	3.75	2.25	3.75	2.25	3.75	2.25	3.75	2.25				
		132	3.75	2.25	3.75	2.25	3.75	2.25	3.75	2.25	3.75	2.25				
		136	3.75	2.25	3.75	2.25	3.75	2.25	3.75	2.25	3.75	2.25				
		140	3.75	2.25	3.75	2.25	3.75	2.25	3.75	2.25	3.75	2.25				
		144	3.75	2.25	3.75	2.25	3.75	2.25	3.75	2.25	3.75	2.25				
		149	4.25	2.75	4.25	2.75	4.25	2.75	4.25	2.75	4.25	2.75				
		153	4.25	2.75	4.25	2.75	4.25	2.75	4.25	2.75	4.25	2.75				
		157	4.25	2.75	4.25	2.75	4.25	2.75	4.25	2.75	4.25	2.75				
		161	4.25	2.75	4.25	2.75	4.25	2.75	4.25	2.75	4.25	2.75				
		165	4.25	2.75	4.25	2.75	4.25	2.75	4.25	2.75	4.25	2.75				
	40 MHz Bandwidth	38	3.50	2.00	3.50	2.00	3.50	2.00	3.50	2.00	3.50	2.00	3.50	2.00		
		46	3.50	2.00	3.50	2.00	3.50	2.00	3.50	2.00	3.50	2.00	3.50	2.00		
		54	2.75	1.25	2.75	1.25	2.75	1.25	2.75	1.25	2.75	1.25	2.75	1.25		
		62	2.75	1.25	2.75	1.25	2.75	1.25	2.75	1.25	2.75	1.25	2.75	1.25		
		102	3.75	2.25	3.75	2.25	3.75	2.25	3.75	2.25	3.75	2.25	3.75	2.25		
		110	3.75	2.25	3.75	2.25	3.75	2.25	3.75	2.25	3.75	2.25	3.75	2.25		
		118	3.75	2.25	3.75	2.25	3.75	2.25	3.75	2.25	3.75	2.25	3.75	2.25		
		126	3.75	2.25	3.75	2.25	3.75	2.25	3.75	2.25	3.75	2.25	3.75	2.25		
		134	3.75	2.25	3.75	2.25	3.75	2.25	3.75	2.25	3.75	2.25	3.75	2.25		
		142	3.75	2.25	3.75	2.25	3.75	2.25	3.75	2.25	3.75	2.25	3.75	2.25		
		151	4.25	2.75	4.25	2.75	4.25	2.75	4.25	2.75	4.25	2.75	4.25	2.75		
		159	4.25	2.75	4.25	2.75	4.25	2.75	4.25	2.75	4.25	2.75	4.25	2.75		
	80 MHz Bandwidth	42	3.50	2.00	3.50	2.00	3.50	2.00	3.50	2.00	3.50	2.00	3.50	2.00	3.50	2.00
		58	2.75	1.25	2.75	1.25	2.75	1.25	2.75	1.25	2.75	1.25	2.75	1.25	2.75	1.25
		106	3.75	2.25	3.75	2.25	3.75	2.25	3.75	2.25	3.75	2.25	3.75	2.25	3.75	2.25
		122	3.75	2.25	3.75	2.25	3.75	2.25	3.75	2.25	3.75	2.25	3.75	2.25	3.75	2.25
		138	3.75	2.25	3.75	2.25	3.75	2.25	3.75	2.25	3.75	2.25	3.75	2.25	3.75	2.25
		155	4.25	2.75	4.25	2.75	4.25	2.75	4.25	2.75	4.25	2.75	4.25	2.75	4.25	2.75

Note: In MIMO operations, each antenna transmits at maximum allowed powers as indicated above.

FCC ID: BCGA2072	 PCTEST Proud to be part of element	SAR EVALUATION REPORT	Reviewed by: Quality Manager
Test Dates: 07/28/2020 - 09/16/2020	DUT Type: Tablet Device		APPENDIX H: Page 10 of 24

Below table is applicable in the following conditions:

-Simultaneous conditions with Licensed Bands Antenna 2A active

-Simultaneous conditions with LTE Inter-band ULCA active

Mode/ Band		Tones	26T		52T		106T		242T		484T		996T	
		Channel	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal
Modulated Average - 2 Tx Chain (dBm) SDM - Ant 2A	20 MHz Bandwidth	36	3.50	2.00	3.50	2.00	3.50	2.00	3.50	2.00				
		40	3.50	2.00	3.50	2.00	3.50	2.00	3.50	2.00				
		44	3.50	2.00	3.50	2.00	3.50	2.00	3.50	2.00				
		48	3.50	2.00	3.50	2.00	3.50	2.00	3.50	2.00				
		52	2.75	1.25	2.75	1.25	2.75	1.25	2.75	1.25				
		56	2.75	1.25	2.75	1.25	2.75	1.25	2.75	1.25				
		60	2.75	1.25	2.75	1.25	2.75	1.25	2.75	1.25				
		64	2.75	1.25	2.75	1.25	2.75	1.25	2.75	1.25				
		100	3.75	2.25	3.75	2.25	3.75	2.25	3.75	2.25				
		104	3.75	2.25	3.75	2.25	3.75	2.25	3.75	2.25				
		108	3.75	2.25	3.75	2.25	3.75	2.25	3.75	2.25				
		112	3.75	2.25	3.75	2.25	3.75	2.25	3.75	2.25				
		116	3.75	2.25	3.75	2.25	3.75	2.25	3.75	2.25				
		120	3.75	2.25	3.75	2.25	3.75	2.25	3.75	2.25				
		124	3.75	2.25	3.75	2.25	3.75	2.25	3.75	2.25				
		128	3.75	2.25	3.75	2.25	3.75	2.25	3.75	2.25				
		132	3.75	2.25	3.75	2.25	3.75	2.25	3.75	2.25				
		136	3.75	2.25	3.75	2.25	3.75	2.25	3.75	2.25				
		140	3.75	2.25	3.75	2.25	3.75	2.25	3.75	2.25				
		144	3.75	2.25	3.75	2.25	3.75	2.25	3.75	2.25				
		149	4.25	2.75	4.25	2.75	4.25	2.75	4.25	2.75				
		153	4.25	2.75	4.25	2.75	4.25	2.75	4.25	2.75				
		157	4.25	2.75	4.25	2.75	4.25	2.75	4.25	2.75				
		161	4.25	2.75	4.25	2.75	4.25	2.75	4.25	2.75				
		165	4.25	2.75	4.25	2.75	4.25	2.75	4.25	2.75				
	40 MHz Bandwidth	38	3.50	2.00	3.50	2.00	3.50	2.00	3.50	2.00	3.50	2.00		
		46	3.50	2.00	3.50	2.00	3.50	2.00	3.50	2.00	3.50	2.00		
		54	2.75	1.25	2.75	1.25	2.75	1.25	2.75	1.25	2.75	1.25		
		62	2.75	1.25	2.75	1.25	2.75	1.25	2.75	1.25	2.75	1.25		
		102	3.75	2.25	3.75	2.25	3.75	2.25	3.75	2.25	3.75	2.25		
		110	3.75	2.25	3.75	2.25	3.75	2.25	3.75	2.25	3.75	2.25		
		118	3.75	2.25	3.75	2.25	3.75	2.25	3.75	2.25	3.75	2.25		
		126	3.75	2.25	3.75	2.25	3.75	2.25	3.75	2.25	3.75	2.25		
		134	3.75	2.25	3.75	2.25	3.75	2.25	3.75	2.25	3.75	2.25		
		142	3.75	2.25	3.75	2.25	3.75	2.25	3.75	2.25	3.75	2.25		
	80 MHz Bandwidth	151	4.25	2.75	4.25	2.75	4.25	2.75	4.25	2.75	4.25	2.75		
		159	4.25	2.75	4.25	2.75	4.25	2.75	4.25	2.75	4.25	2.75		
		42	3.50	2.00	3.50	2.00	3.50	2.00	3.50	2.00	3.50	2.00	3.50	2.00
		58	2.75	1.25	2.75	1.25	2.75	1.25	2.75	1.25	2.75	1.25	2.75	1.25
		106	3.75	2.25	3.75	2.25	3.75	2.25	3.75	2.25	3.75	2.25	3.75	2.25
		122	3.75	2.25	3.75	2.25	3.75	2.25	3.75	2.25	3.75	2.25	3.75	2.25
		138	3.75	2.25	3.75	2.25	3.75	2.25	3.75	2.25	3.75	2.25	3.75	2.25
		155	4.25	2.75	4.25	2.75	4.25	2.75	4.25	2.75	4.25	2.75	4.25	2.75

Note: In MIMO operations, each antenna transmits at maximum allowed powers as indicated above.

FCC ID: BCGA2072	 PCTEST Proud to be part of element	SAR EVALUATION REPORT	Reviewed by: Quality Manager
Test Dates: 07/28/2020 - 09/16/2020	DUT Type: Tablet Device		APPENDIX H: Page 11 of 24

-Simultaneous conditions with LTE Inter-band ULCA active

Mode/ Band		26T			52T		106T		242T		484T		996T	
		Channel	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal
Modulated Average - Single Tx Chain (dBm) - Ant 2B	20 MHz Bandwidth	36	3.50	2.00	3.50	2.00	3.50	2.00	3.50	2.00				
		40	3.50	2.00	3.50	2.00	3.50	2.00	3.50	2.00				
		44	3.50	2.00	3.50	2.00	3.50	2.00	3.50	2.00				
		48	3.50	2.00	3.50	2.00	3.50	2.00	3.50	2.00				
		52	4.50	3.00	4.50	3.00	4.50	3.00	4.50	3.00				
		56	4.50	3.00	4.50	3.00	4.50	3.00	4.50	3.00				
		60	4.50	3.00	4.50	3.00	4.50	3.00	4.50	3.00				
		64	4.50	3.00	4.50	3.00	4.50	3.00	4.50	3.00				
		100	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75				
		104	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75				
		108	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75				
		112	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75				
		116	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75				
		120	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75				
		124	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75				
		128	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75				
		132	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75				
		136	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75				
		140	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75				
		144	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75				
		149	2.75	1.25	2.75	1.25	2.75	1.25	2.75	1.25				
		153	2.75	1.25	2.75	1.25	2.75	1.25	2.75	1.25				
		157	2.75	1.25	2.75	1.25	2.75	1.25	2.75	1.25				
		161	2.75	1.25	2.75	1.25	2.75	1.25	2.75	1.25				
	165	2.75	1.25	2.75	1.25	2.75	1.25	2.75	1.25					
	38	3.50	2.00	3.50	2.00	3.50	2.00	3.50	2.00		3.50	2.00		
	46	3.50	2.00	3.50	2.00	3.50	2.00	3.50	2.00		3.50	2.00		
	54	4.50	3.00	4.50	3.00	4.50	3.00	4.50	3.00		4.50	3.00		
	62	4.50	3.00	4.50	3.00	4.50	3.00	4.50	3.00		4.50	3.00		
	102	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75		3.25	1.75		
	110	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75		3.25	1.75		
	118	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75		3.25	1.75		
	126	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75		3.25	1.75		
	134	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75		3.25	1.75		
	142	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75		3.25	1.75		
	151	2.75	1.25	2.75	1.25	2.75	1.25	2.75	1.25		2.75	1.25		
	159	2.75	1.25	2.75	1.25	2.75	1.25	2.75	1.25		2.75	1.25		
	42	3.50	2.00	3.50	2.00	3.50	2.00	3.50	2.00		3.50	2.00	3.50	2.00
	58	4.50	3.00	4.50	3.00	4.50	3.00	4.50	3.00		4.50	3.00	4.50	3.00
	106	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75		3.25	1.75	3.25	1.75
	122	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75		3.25	1.75	3.25	1.75
	138	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75		3.25	1.75	3.25	1.75
	155	2.75	1.25	2.75	1.25	2.75	1.25	2.75	1.25		2.75	1.25	2.75	1.25

-Simultaneous conditions with LTE Inter-band ULCA active

Mode/ Band		Tones		25T		52T		106T		242T		484T		996T	
		Channel	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal	
Modulated Average - 2 Tx Chain (dBm) CDD - Ant 2B	20 MHz Bandwidth	36	3.50	2.00	3.50	2.00	3.50	2.00	3.50	2.00	3.50	2.00			
		40	3.50	2.00	3.50	2.00	3.50	2.00	3.50	2.00					
		44	3.50	2.00	3.50	2.00	3.50	2.00	3.50	2.00					
		48	3.50	2.00	3.50	2.00	3.50	2.00	3.50	2.00					
		52	4.50	3.00	4.50	3.00	4.50	3.00	4.50	3.00					
		56	4.50	3.00	4.50	3.00	4.50	3.00	4.50	3.00					
		60	4.50	3.00	4.50	3.00	4.50	3.00	4.50	3.00					
		64	4.50	3.00	4.50	3.00	4.50	3.00	4.50	3.00					
		100	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75					
		104	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75					
		108	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75					
		112	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75					
		116	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75					
		120	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75					
		124	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75					
		128	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75					
		132	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75					
		136	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75					
		140	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75					
		144	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75					
		149	2.75	1.25	2.75	1.25	2.75	1.25	2.75	1.25	1.25				
		153	2.75	1.25	2.75	1.25	2.75	1.25	2.75	1.25	2.75	1.25			
		157	2.75	1.25	2.75	1.25	2.75	1.25	2.75	1.25	2.75	1.25			
		161	2.75	1.25	2.75	1.25	2.75	1.25	2.75	1.25	2.75	1.25			
	165	2.75	1.25	2.75	1.25	2.75	1.25	2.75	1.25	2.75	1.25				
	38	3.50	2.00	3.50	2.00	3.50	2.00	3.50	2.00	3.50	2.00	3.50	2.00		
	46	3.50	2.00	3.50	2.00	3.50	2.00	3.50	2.00	3.50	2.00	3.50	2.00		
	54	4.50	3.00	4.50	3.00	4.50	3.00	4.50	3.00	4.50	3.00	4.50	3.00		
	62	4.50	3.00	4.50	3.00	4.50	3.00	4.50	3.00	4.50	3.00	4.50	3.00		
	102	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75		
	110	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75		
	118	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75		
	126	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75		
	134	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75		
	142	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75		
	151	2.75	1.25	2.75	1.25	2.75	1.25	2.75	1.25	2.75	1.25	2.75	1.25		
	159	2.75	1.25	2.75	1.25	2.75	1.25	2.75	1.25	2.75	1.25	2.75	1.25		
	42	3.50	2.00	3.50	2.00	3.50	2.00	3.50	2.00	3.50	2.00	3.50	2.00	3.50	2.00
	58	4.50	3.00	4.50	3.00	4.50	3.00	4.50	3.00	4.50	3.00	4.50	3.00	4.50	3.00
	106	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75
	122	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75
	138	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75
	155	2.75	1.25	2.75	1.25	2.75	1.25	2.75	1.25	2.75	1.25	2.75	1.25	2.75	1.25

FCC ID: BCGA2072	 PCTEST Proud to be part of element	SAR EVALUATION REPORT	Reviewed by: Quality Manager
Test Dates: 07/28/2020 - 09/16/2020	DUT Type: Tablet Device	APPENDIX H: Page 12 of 24	

Below table is applicable in the following conditions:

-Simultaneous conditions with Licensed Bands Antenna 2A active

-Simultaneous conditions with LTE Inter-band ULCA active

Mode/ Band		Tones	26T		52T		106T		242T		484T		996T	
		Channel	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal
Modulated Average - 2 Tx Chain (dBm) SDM - Ant 2B	20 MHz Bandwidth	36	3.50	2.00	3.50	2.00	3.50	2.00	3.50	2.00				
		40	3.50	2.00	3.50	2.00	3.50	2.00	3.50	2.00				
		44	3.50	2.00	3.50	2.00	3.50	2.00	3.50	2.00				
		48	3.50	2.00	3.50	2.00	3.50	2.00	3.50	2.00				
		52	4.50	3.00	4.50	3.00	4.50	3.00	4.50	3.00				
		56	4.50	3.00	4.50	3.00	4.50	3.00	4.50	3.00				
		60	4.50	3.00	4.50	3.00	4.50	3.00	4.50	3.00				
		64	4.50	3.00	4.50	3.00	4.50	3.00	4.50	3.00				
		100	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75				
		104	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75				
		108	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75				
		112	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75				
		116	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75				
		120	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75				
		124	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75				
		128	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75				
		132	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75				
		136	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75				
		140	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75				
		144	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75				
		149	2.75	1.25	2.75	1.25	2.75	1.25	2.75	1.25				
		153	2.75	1.25	2.75	1.25	2.75	1.25	2.75	1.25				
		157	2.75	1.25	2.75	1.25	2.75	1.25	2.75	1.25				
		161	2.75	1.25	2.75	1.25	2.75	1.25	2.75	1.25				
		165	2.75	1.25	2.75	1.25	2.75	1.25	2.75	1.25				
	40 MHz Bandwidth	38	3.50	2.00	3.50	2.00	3.50	2.00	3.50	2.00	3.50	2.00		
		46	3.50	2.00	3.50	2.00	3.50	2.00	3.50	2.00	3.50	2.00		
		54	4.50	3.00	4.50	3.00	4.50	3.00	4.50	3.00	4.50	3.00		
		62	4.50	3.00	4.50	3.00	4.50	3.00	4.50	3.00	4.50	3.00		
		102	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75		
		110	0.00	-1.50	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75		
		118	0.00	-1.50	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75		
		126	0.00	-1.50	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75		
		134	0.00	-1.50	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75		
		142	0.00	-1.50	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75		
		151	2.75	1.25	2.75	1.25	2.75	1.25	2.75	1.25	2.75	1.25		
		159	2.75	1.25	2.75	1.25	2.75	1.25	2.75	1.25	2.75	1.25		
	80 MHz Bandwidth	42	3.50	2.00	3.50	2.00	3.50	2.00	3.50	2.00	3.50	2.00	3.50	2.00
		58	4.50	3.00	4.50	3.00	4.50	3.00	4.50	3.00	4.50	3.00	4.50	3.00
		106	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75
		122	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75
		138	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75
		155	2.75	1.25	2.75	1.25	2.75	1.25	2.75	1.25	2.75	1.25	2.75	1.25

Note: In MIMO operations, each antenna transmits at maximum allowed powers as indicated above.

FCC ID: BCGA2072	 PCTEST Proud to be part of element	SAR EVALUATION REPORT	Reviewed by: Quality Manager
Test Dates: 07/28/2020 - 09/16/2020	DUT Type: Tablet Device		APPENDIX H: Page 13 of 24

Below table is applicable in the following conditions:

-Simultaneous conditions with Licensed Bands Antenna 1A active

-Simultaneous conditions with LTE Inter-band ULCA active

Mode/ Band		Tones	26T		52T		106T		242T		484T		996T	
		Channel	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal
Modulated Average - Single Tx Chain (dBm) - 1B	20 MHz Bandwidth	36	4.50	3.00	4.50	3.00	4.50	3.00	4.50	3.00				
		40	4.50	3.00	4.50	3.00	4.50	3.00	4.50	3.00				
		44	4.50	3.00	4.50	3.00	4.50	3.00	4.50	3.00				
		48	4.50	3.00	4.50	3.00	4.50	3.00	4.50	3.00				
		52	2.75	1.25	2.75	1.25	2.75	1.25	2.75	1.25				
		56	2.75	1.25	2.75	1.25	2.75	1.25	2.75	1.25				
		60	2.75	1.25	2.75	1.25	2.75	1.25	2.75	1.25				
		64	2.75	1.25	2.75	1.25	2.75	1.25	2.75	1.25				
		100	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75				
		104	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75				
		108	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75				
		112	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75				
		116	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75				
		120	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75				
		124	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75				
		128	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75				
		132	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75				
		136	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75				
		140	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75				
		144	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75				
		149	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75				
		153	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75				
		157	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75				
		161	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75				
		165	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75				
	40 MHz Bandwidth	38	4.50	3.00	4.50	3.00	4.50	3.00	4.50	3.00	4.50	3.00		
		46	4.50	3.00	4.50	3.00	4.50	3.00	4.50	3.00	4.50	3.00		
		54	2.75	1.25	2.75	1.25	2.75	1.25	2.75	1.25	2.75	1.25		
		62	2.75	1.25	2.75	1.25	2.75	1.25	2.75	1.25	2.75	1.25		
		102	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75		
		110	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75		
		118	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75		
		126	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75		
		134	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75		
		142	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75		
		151	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75		
		159	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75		
	80 MHz Bandwidth	42	4.50	3.00	4.50	3.00	4.50	3.00	4.50	3.00	4.50	3.00	4.50	3.00
		58	2.75	1.25	2.75	1.25	2.75	1.25	2.75	1.25	2.75	1.25	2.75	1.25
		106	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75
		122	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75
		138	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75
		155	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75

Note: In MIMO operations, each antenna transmits at maximum allowed powers as indicated above.

FCC ID: BCGA2072	 PCTEST Proud to be part of element	SAR EVALUATION REPORT	Reviewed by: Quality Manager
Test Dates: 07/28/2020 - 09/16/2020	DUT Type: Tablet Device		APPENDIX H: Page 14 of 24

Below table is applicable in the following conditions:

-Simultaneous conditions with Licensed Bands Antenna 1A active

-Simultaneous conditions with LTE Inter-band ULCA active

Mode/ Band		Tones	26T		52T		106T		242T		484T		996T	
		Channel	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal
Modulated Average - 2 Tx Chain (dBm) CDD - Ant 18	20 MHz Bandwidth	36	4.50	3.00	4.50	3.00	4.50	3.00	4.50	3.00				
		40	4.50	3.00	4.50	3.00	4.50	3.00	4.50	3.00				
		44	4.50	3.00	4.50	3.00	4.50	3.00	4.50	3.00				
		48	4.50	3.00	4.50	3.00	4.50	3.00	4.50	3.00				
		52	2.75	1.25	2.75	1.25	2.75	1.25	2.75	1.25				
		56	2.75	1.25	2.75	1.25	2.75	1.25	2.75	1.25				
		60	2.75	1.25	2.75	1.25	2.75	1.25	2.75	1.25				
		64	2.75	1.25	2.75	1.25	2.75	1.25	2.75	1.25				
		100	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75				
		104	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75				
		108	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75				
		112	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75				
		116	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75				
		120	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75				
		124	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75				
		128	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75				
		132	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75				
		136	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75				
		140	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75				
		144	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75				
		149	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75				
		153	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75				
		157	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75				
		161	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75				
		165	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75				
	40 MHz Bandwidth	38	4.50	3.00	4.50	3.00	4.50	3.00	4.50	3.00	4.50	3.00		
		46	4.50	3.00	4.50	3.00	4.50	3.00	4.50	3.00	4.50	3.00		
		54	2.75	1.25	2.75	1.25	2.75	1.25	2.75	1.25	2.75	1.25		
		62	2.75	1.25	2.75	1.25	2.75	1.25	2.75	1.25	2.75	1.25		
		102	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75		
		110	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75		
		118	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75		
		126	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75		
		134	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75		
		142	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75		
		151	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75		
		159	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75		
	80 MHz Bandwidth	42	4.50	3.00	4.50	3.00	4.50	3.00	4.50	3.00	4.50	3.00	4.50	3.00
		58	2.75	1.25	2.75	1.25	2.75	1.25	2.75	1.25	2.75	1.25	2.75	1.25
		106	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75
		122	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75
		138	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75
		155	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75

Note: In MIMO operations, each antenna transmits at maximum allowed powers as indicated above.

FCC ID: BCGA2072	 PCTEST Proud to be part of element	SAR EVALUATION REPORT	Reviewed by: Quality Manager
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Below table is applicable in the following conditions:

-Simultaneous conditions with Licensed Bands Antenna 1A active

-Simultaneous conditions with LTE Inter-band ULCA active

Mode/ Band		Tones	26T		52T		106T		242T		484T		996T	
		Channel	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal
Modulated Average - 2 Tx Chain (dBm) SDM - Ant 1B	20 MHz Bandwidth	36	4.50	3.00	4.50	3.00	4.50	3.00	4.50	3.00				
		40	4.50	3.00	4.50	3.00	4.50	3.00	4.50	3.00				
		44	4.50	3.00	4.50	3.00	4.50	3.00	4.50	3.00				
		48	4.50	3.00	4.50	3.00	4.50	3.00	4.50	3.00				
		52	2.75	1.25	2.75	1.25	2.75	1.25	2.75	1.25				
		56	2.75	1.25	2.75	1.25	2.75	1.25	2.75	1.25				
		60	2.75	1.25	2.75	1.25	2.75	1.25	2.75	1.25				
		64	2.75	1.25	2.75	1.25	2.75	1.25	2.75	1.25				
		100	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75				
		104	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75				
		108	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75				
		112	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75				
		116	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75				
		120	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75				
		124	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75				
		128	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75				
		132	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75				
		136	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75				
		140	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75				
		144	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75				
		149	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75				
		153	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75				
		157	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75				
		161	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75				
		165	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75				
	40 MHz Bandwidth	38	4.50	3.00	4.50	3.00	4.50	3.00	4.50	3.00	4.50	3.00		
		46	4.50	3.00	4.50	3.00	4.50	3.00	4.50	3.00	4.50	3.00		
		54	2.75	1.25	2.75	1.25	2.75	1.25	2.75	1.25	2.75	1.25		
		62	2.75	1.25	2.75	1.25	2.75	1.25	2.75	1.25	2.75	1.25		
		102	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75		
		110	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75		
		118	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75		
		126	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75		
		134	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75		
		142	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75		
		151	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75		
		159	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75		
	80 MHz Bandwidth	42	4.50	3.00	4.50	3.00	4.50	3.00	4.50	3.00	4.50	3.00	4.50	3.00
		58	2.75	1.25	2.75	1.25	2.75	1.25	2.75	1.25	2.75	1.25	2.75	1.25
		106	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75
		122	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75
		138	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75
		155	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75	3.25	1.75

Note: In MIMO operations, each antenna transmits at maximum allowed powers as indicated above.

FCC ID: BCGA2072	 PCTEST Proud to be part of  element	SAR EVALUATION REPORT	Reviewed by: Quality Manager
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1.2 IEEE 802.11ax Measured Powers

Table 1
Maximum 2.4 GHz 802.11ax RU Time-Averaged WLAN Output Power – Ant 3A

Freq [MHz]	Channel	Tones	RU Index	Avg Conducted Powers (dBm)	Freq [MHz]	Channel	Tones	RU Index	Avg Conducted Powers (dBm)
2412	1	26T	0	12.02	2412	1	52T	37	12.00
			4	12.20				38	12.01
			8	12.08				40	12.15
2437	6	26T	0	12.07	2437	6	52T	37	12.01
			4	12.07				38	12.19
			8	12.03				40	12.09
2462	11	26T	0	12.00	2462	11	52T	37	12.08
			4	12.03				38	12.02
			8	12.04				40	12.07
Freq [MHz]	Channel	Tones	RU Index	Avg Conducted Powers (dBm)					
2412	1	106T	53	12.05	Freq [MHz]	Channel	Tones	RU Index	Avg Conducted Powers (dBm)
			54	12.02					
2437	6	106T	53	12.04	2412	1	242T	61	12.01
			54	12.18	2437	6	242T	61	12.04
2462	11	106T	53	12.01	2462	11	242T	61	12.18
			54	12.11					

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Table 2
Maximum 2.4 GHz 802.11ax RU Time-Averaged WLAN Output Power – Ant 1A

Freq [MHz]	Channel	Tones	RU Index	Avg Conducted Powers (dBm)	Freq [MHz]	Channel	Tones	RU Index	Avg Conducted Powers (dBm)
2412	1	26T	0	12.05	2412	1	52T	37	12.07
			4	12.10				38	12.11
			8	12.09				40	12.15
2417	2	26T	0	12.70	2417	2	52T	37	12.73
			4	12.85				38	12.90
			8	12.72				40	12.66
2437	6	26T	0	12.72	2437	6	52T	37	12.70
			4	12.63				38	12.71
			8	12.64				40	12.80
2457	10	26T	0	12.70	2457	10	52T	37	12.82
			4	12.75				38	12.77
			8	12.81				40	12.82
2462	11	26T	0	12.53	2462	11	52T	37	12.76
			4	12.46				38	12.90
			8	12.50				40	12.80
Freq [MHz]	Channel	Tones	RU Index	Avg Conducted Powers (dBm)					
2412	1	106T	53	12.04					
			54	12.06					
2417	2	106T	53	12.75	Freq [MHz]	Channel	Tones	RU Index	Avg Conducted Powers (dBm)
			54	12.77					
2437	6	106T	53	12.70	2412	1	242T	61	12.05
			54	12.86	2417	2	242T	61	12.70
2457	10	106T	53	12.90	2437	6	242T	61	12.73
			54	12.72	2457	10	242T	61	12.90
2462	11	106T	53	12.56	2462	11	242T	61	12.55
			54	12.42					

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Table 3
Maximum 5 GHz 802.11ax RU Time-Averaged WLAN Output Power – Ant 2B

20MHz BW	Band	Freq [MHz]	Channel	Tones	Avg Conducted Power (dBm)			20MHz BW	Band	Freq [MHz]	Channel	Tones	Avg Conducted Power (dBm)		
					RU Index								RU Index		
					0	4	8						37	39	40
	1	5180	36	26T	9.51	10.22	9.86		1	5180	36	52T	9.70	10.25	9.92
		5200	40	26T	9.60	10.20	9.85			5200	40	52T	9.77	10.20	9.85
		5220	44	26T	9.75	10.37	10.04			5220	44	52T	9.93	10.41	10.00
		5240	48	26T	9.54	10.15	9.71			5240	48	52T	9.94	10.40	9.99
	2A	5260	52	26T	10.55	11.33	10.75		2A	5260	52	52T	10.77	11.13	10.90
		5280	56	26T	10.53	11.03	10.65			5280	56	52T	10.90	11.37	11.00
		5300	60	26T	10.88	11.44	11.03			5300	60	52T	10.92	11.41	11.15
		5320	64	26T	10.57	11.00	10.52			5320	64	52T	10.95	11.30	11.05
	2C	5500	100	26T	9.61	10.19	9.67		2C	5500	100	52T	9.30	9.70	9.26
		5600	120	26T	9.58	10.13	9.60			5600	120	52T	9.60	9.93	9.52
		5620	124	26T	9.64	10.20	9.62			5580	124	52T	9.50	9.87	9.64
		5720	144	26T	9.90	10.48	10.00			5720	144	52T	9.47	9.84	9.54
3	5745	149	26T	8.76	9.34	8.97	3	5745	149	52T	8.90	9.41	9.05		
	5785	157	26T	8.85	9.46	9.02		5785	157	52T	9.00	9.45	9.11		
	5825	165	26T	9.00	9.61	9.04		5825	165	52T	9.09	9.51	9.24		

20MHz BW	Band	Freq [MHz]	Channel	Tones	Avg Conducted Power (dBm)			20MHz BW	Band	Freq [MHz]	Channel	Tones	Avg Conducted Power (dBm)		
					RU Index								RU Index		
					53	54	N/A						61	N/A	N/A
	1	5180	36	106T	9.75	9.82			1	5180	36	242T	9.90		
		5200	40	106T	9.65	9.78				5200	40	242T	9.77		
		5220	44	106T	9.92	10.10				5220	44	242T	10.01		
		5240	48	106T	9.94	10.02				5240	48	242T	9.99		
	2A	5260	52	106T	10.91	11.01			2A	5260	52	242T	10.75		
		5280	56	106T	10.95	11.04				5280	56	242T	11.06		
		5300	60	106T	10.85	10.92				5300	60	242T	10.94		
		5320	64	106T	11.02	11.00				5320	64	242T	10.85		
	2C	5500	100	106T	9.48	9.42			2C	5500	100	242T	9.70		
		5600	120	106T	9.67	9.76				5600	120	242T	10.00		
		5620	124	106T	9.75	9.82				5620	124	242T	10.02		
		5720	144	106T	9.86	9.95				5720	144	242T	9.97		
3	5745	149	106T	9.00	9.03		3	5745	149	242T	9.99				
	5785	157	106T	8.85	9.04			5785	157	242T	9.27				
	5825	165	106T	9.01	9.01			5825	165	242T	9.33				

40MHz BW	Band	Freq [MHz]	Channel	Tones	Avg Conducted Power (dBm)			40MHz BW	Band	Freq [MHz]	Channel	Tones	Avg Conducted Power (dBm)		
					RU Index								RU Index		
					0	8	17						37	40	44
	1	5190	38	26T	9.60	10.50	9.89		1	5190	38	52T	9.77	10.48	10.09
		5230	46	26T	9.74	10.49	9.92			5230	46	52T	9.85	10.47	10.15
	2A	5270	54	26T	10.78	11.45	10.86		2A	5270	54	52T	10.68	11.36	10.79
		5310	62	26T	10.73	11.30	11.01			5310	62	52T	10.84	11.45	10.87
	2C	5510	102	26T	9.53	10.22	9.56		2C	5510	102	52T	9.30	9.90	9.25
		5590	118	26T	9.33	9.81	9.25			5590	118	52T	9.31	9.86	9.26
		5630	126	26T	9.55	10.01	9.48			5630	126	52T	9.54	10.12	9.55
		5710	142	26T	9.44	10.12	9.70			5710	142	52T	9.53	10.18	9.65
	3	5755	151	26T	8.78	9.65	9.02		3	5755	151	52T	8.86	9.52	9.01
		5795	159	26T	8.66	9.60	9.08			5795	159	52T	8.90	9.74	9.13

40MHz BW	Band	Freq [MHz]	Channel	Tones	Avg Conducted Power (dBm)			40MHz BW	Band	Freq [MHz]	Channel	Tones	Avg Conducted Power (dBm)		
					RU Index								RU Index		
					53	54	56						61	62	N/A
	1	5190	38	106T	9.90	10.50	10.05		1	5190	38	242T	9.90	10.00	
		5230	46	106T	9.89	10.47	10.22			5230	46	242T	9.92	10.17	
	2A	5270	54	106T	10.74	11.24	10.92		2A	5270	54	242T	10.61	10.88	
		5310	62	106T	10.94	11.41	10.92			5310	62	242T	10.75	10.91	
	2C	5510	102	106T	9.78	10.20	9.78		2C	5510	102	242T	10.05	10.10	
		5590	118	106T	9.49	10.02	9.61			5590	118	242T	9.81	9.75	
		5670	126	106T	9.54	10.02	9.68			5670	126	242T	9.54	9.60	
		5710	142	106T	9.40	10.10	9.44			5710	142	242T	9.61	9.58	
	3	5755	151	106T	8.86	9.49	9.15		3	5755	151	242T	9.07	9.20	
		5795	159	106T	8.89	9.45	9.00			5795	159	242T	9.08	9.00	

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40MHz BW	Band	Freq [MHz]	Channel	Tones	Avg Conducted Power (dBm)		
					RU Index		
					65	N/A	N/A
	1	5190	38	484T	9.97		
	2A	5230	46	484T	10.02		
		5270	54	484T	10.61		
		5310	62	484T	10.72		
	2C	5510	102	484T	10.00		
		5590	118	484T	9.72		
		5630	126	484T	9.64		
	3	5710	142	484T	9.85		
		5755	151	484T	9.07		
		5795	159	484T	9.13		
80MHz BW	Band	Freq [MHz]	Channel	Tones	Avg Conducted Power (dBm)		
					RU Index		
					37	44	52
	1	5210	42	52T	9.78	10.38	9.80
	2A	5290	58	52T	10.93	11.31	10.91
		5530	106	52T	9.66	9.91	9.30
		5610	122	52T	9.70	9.90	9.40
	2C	5690	138	52T	9.63	10.04	9.60
		5775	155	52T	9.30	9.69	9.08
80MHz BW	Band	Freq [MHz]	Channel	Tones	Avg Conducted Power (dBm)		
					RU Index		
					61	62	64
	1	5210	42	242T	9.96	10.28	10.02
	2A	5290	58	242T	10.61	10.87	10.75
		5530	106	242T	9.83	10.15	9.79
		5610	122	242T	9.38	9.70	9.31
	2C	5690	138	242T	9.53	9.94	9.71
		5775	155	242T	9.27	9.66	9.02
80MHz BW	Band	Freq [MHz]	Channel	Tones	Avg Conducted Power (dBm)		
					RU Index		
					67	N/A	N/A
	1	5210	42	996T	10.12		
	2A	5290	58	996T	11.11		
		5530	106	996T	9.55		
		5610	122	996T	9.62		
	2C	5690	138	996T	9.59		
		5775	155	996T	9.32		

FCC ID: BCGA2072	 PCTEST Proud to be part of element	SAR EVALUATION REPORT	Reviewed by: Quality Manager
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Table 4
Maximum 5 GHz 802.11ax RU Time-Averaged WLAN Output Power – Ant 2A

20MHz BW	Band	Freq [MHz]	Channel	Tones	Avg Conducted Power (dBm)			20MHz BW	Band	Freq [MHz]	Channel	Tones	Avg Conducted Power (dBm)		
					RU Index								RU Index		
					0	4	8						37	39	40
	1	5180	36	26T	9.73	10.35	9.90		1	5180	36	52T	9.65	10.05	9.83
		5200	40	26T	9.82	10.46	9.97			5200	40	52T	9.62	10.11	9.89
		5220	44	26T	9.77	10.42	9.99			5220	44	52T	9.67	9.99	9.75
		5240	48	26T	9.65	10.30	9.72			5240	48	52T	9.65	10.20	9.82
	2A	5260	52	26T	9.10	9.70	9.21		2A	5260	52	52T	8.94	9.47	9.14
		5280	56	26T	8.95	9.60	9.07			5280	56	52T	8.88	9.30	9.06
		5300	60	26T	8.83	9.62	9.30			5300	60	52T	8.90	9.37	9.11
		5320	64	26T	8.74	9.45	9.09			5320	64	52T	8.78	9.21	8.95
	2C	5500	100	26T	10.06	10.59	10.12		2C	5500	100	52T	10.02	10.40	9.92
		5520	120	26T	10.03	10.54	10.12			5600	120	52T	9.80	10.15	9.84
		5620	124	26T	9.95	10.51	10.04			5580	124	52T	9.77	10.12	9.83
		5720	144	26T	9.93	10.34	9.92			5720	144	52T	9.80	10.06	9.77
3	5745	149	26T	10.75	11.20	10.62	3	5745	149	52T	10.79	11.10	10.76		
	5785	157	26T	10.52	11.00	10.42		5785	157	52T	10.60	10.95	10.55		
	5825	165	26T	10.56	10.90	10.43		5825	165	52T	10.93	11.24	10.92		

20MHz BW	Band	Freq [MHz]	Channel	Tones	Avg Conducted Power (dBm)			20MHz BW	Band	Freq [MHz]	Channel	Tones	Avg Conducted Power (dBm)		
					RU Index								RU Index		
					53	54	N/A						61	N/A	N/A
	1	5180	36	106T	9.67	9.72			1	5180	36	242T	9.93		
		5200	40	106T	9.65	9.70				5200	40	242T	9.88		
		5220	44	106T	9.60	9.70				5200	44	242T	9.90		
		5240	48	106T	9.75	9.90				5240	48	242T	9.83		
	2A	5260	52	106T	9.11	9.42			2A	5260	52	242T	9.15		
		5280	56	106T	9.05	9.30				5260	56	242T	9.24		
		5300	60	106T	9.15	9.28				5300	60	242T	9.19		
		5320	64	106T	9.16	9.32				5320	64	242T	9.05		
	2C	5500	100	106T	10.15	10.26			2C	5500	100	242T	9.78		
		5600	120	106T	10.12	10.19				5600	120	242T	9.95		
		5620	124	106T	10.05	10.21				5620	124	242T	10.01		
		5720	144	106T	10.32	10.24				5720	144	242T	9.98		
3	5745	149	106T	10.65	10.62		3	5745	149	242T	9.90				
	5785	157	106T	10.43	10.30			5785	157	242T	10.51				
	5825	165	106T	10.40	10.30			5825	165	242T	10.88				

40MHz BW	Band	Freq [MHz]	Channel	Tones	Avg Conducted Power (dBm)			40MHz BW	Band	Freq [MHz]	Channel	Tones	Avg Conducted Power (dBm)		
					RU Index								RU Index		
					0	8	17						37	40	44
	1	5190	38	26T	9.51	10.45	9.85		1	5190	38	52T	9.63	10.43	10.08
		5230	46	26T	9.62	10.50	9.94			5230	46	52T	9.54	10.27	9.80
	2A	5270	54	26T	8.80	9.75	9.07		2A	5270	54	52T	8.75	9.60	9.15
		5310	62	26T	8.75	9.74	9.10			5310	62	52T	8.82	9.74	9.29
	2C	5510	102	26T	9.80	10.72	10.08		2C	5510	102	52T	9.75	10.53	10.03
		5590	118	26T	9.90	10.73	10.11			5590	118	52T	9.76	10.60	9.97
		5630	126	26T	9.77	10.58	9.82			5630	126	52T	9.79	10.54	9.87
		5710	142	26T	9.81	10.44	9.50			5710	142	52T	9.84	10.48	9.78
	3	5755	151	26T	10.30	10.84	10.03		3	5755	151	52T	10.41	10.97	10.32
		5795	159	26T	10.55	11.13	10.54			5795	159	52T	10.30	10.87	10.45

40MHz BW	Band	Freq [MHz]	Channel	Tones	Avg Conducted Power (dBm)			40MHz BW	Band	Freq [MHz]	Channel	Tones	Avg Conducted Power (dBm)		
					RU Index								RU Index		
					53	54	56						61	62	N/A
	1	5190	38	106T	9.81	10.49	10.11		1	5190	38	242T	10.01	10.25	
		5230	46	106T	9.57	10.28	9.97			5230	46	242T	10.10	10.42	
	2A	5270	54	106T	8.90	9.49	9.25		2A	5270	54	242T	9.12	9.25	
		5310	62	106T	8.76	9.59	9.01			5310	62	242T	9.13	9.13	
	2C	5510	102	106T	9.95	10.47	10.25		2C	5510	102	242T	10.35	10.40	
		5590	118	106T	10.02	10.61	10.10			5590	118	242T	10.29	10.32	
		5670	126	106T	9.89	10.45	10.03			5670	126	242T	10.10	10.17	
		5710	142	106T	10.07	10.55	10.13			5710	142	242T	10.19	10.19	
	3	5755	151	106T	10.49	11.07	10.60		3	5755	151	242T	10.49	10.70	
		5795	159	106T	10.64	11.04	10.68			5795	159	242T	10.63	10.79	

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40MHz BW	Band	Freq [MHz]	Channel	Tones	Avg Conducted Power (dBm)		
					RU Index		
					65	N/A	N/A
	1	5190	38	484T	10.07		
		5230	46	484T	10.18		
	2A	5270	54	484T	9.60		
		5310	62	484T	9.41		
	2C	5510	102	484T	10.20		
		5550	118	484T	10.34		
		5630	126	484T	10.35		
	3	5710	142	484T	10.33		
		5755	151	484T	10.81		
	1	5210	42	26T	9.40	9.98	9.56
		5290	58	26T	8.67	9.46	8.64
	2C	5530	106	26T	8.72	9.29	8.82
		5610	122	26T	10.07	10.61	9.99
		5690	138	26T	10.30	10.74	9.95
	3	5775	155	26T	10.45	10.95	10.40
80MHz BW	Band	Freq [MHz]	Channel	Tones	Avg Conducted Power (dBm)		
					RU Index		
					37	44	52
	1	5210	42	52T	9.72	10.26	9.90
	2A	5290	58	52T	8.89	9.58	8.90
	2C	5530	106	52T	9.60	10.15	9.78
		5610	122	52T	10.05	10.57	10.05
		5690	138	52T	9.85	10.25	9.75
	3	5775	155	52T	10.90	11.00	10.64
80MHz BW	Band	Freq [MHz]	Channel	Tones	Avg Conducted Power (dBm)		
					RU Index		
					53	56	60
	1	5210	42	106T	9.95	10.31	10.11
	2A	5290	58	106T	9.19	9.63	9.10
	2C	5530	106	106T	10.09	10.51	10.29
		5610	122	106T	10.23	10.70	10.29
		5690	138	106T	10.27	10.45	10.01
	3	5775	155	106T	11.03	11.09	10.89
80MHz BW	Band	Freq [MHz]	Channel	Tones	Avg Conducted Power (dBm)		
					RU Index		
					61	62	64
	1	5210	42	242T	9.96	10.39	10.17
	2A	5290	58	242T	9.13	9.68	9.04
	2C	5530	106	242T	10.15	10.51	10.33
		5610	122	242T	10.12	10.65	10.01
		5690	138	242T	10.14	10.52	10.00
	3	5775	155	242T	10.75	11.00	10.78
80MHz BW	Band	Freq [MHz]	Channel	Tones	Avg Conducted Power (dBm)		
					RU Index		
					67	N/A	N/A
	1	5210	42	996T	10.46		
	2A	5290	58	996T	9.61		
	2C	5530	106	996T	10.51		
		5610	122	996T	10.47		
		5690	138	996T	10.26		
	3	5775	155	996T	11.13		

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Table 5
Maximum 5 GHz 802.11ax RU Time-Averaged WLAN Output Power – Ant 1B

20MHz BW	Band	Freq [MHz]	Channel	Tones	Avg Conducted Power (dBm)			20MHz BW	Band	Freq [MHz]	Channel	Tones	Avg Conducted Power (dBm)		
					RU Index								RU Index		
					0	4	8						37	39	40
	1	5180	36	26T	10.78	11.37	10.90		5180	36	52T	11.00	11.38	11.09	
5200		40	26T	10.87	11.46	10.98	5200	40	52T	10.90	11.31	11.02			
5220		44	26T	10.80	11.37	10.90	5220	44	52T	10.97	11.35	11.02			
5240		48	26T	10.73	11.31	10.90	5240	48	52T	10.87	11.38	10.97			
2A	5260	52	26T	9.25	9.73	9.38	5260	52	52T	9.38	9.73	9.50			
	5280	56	26T	9.18	9.72	9.38	5280	56	52T	9.36	9.73	9.51			
	5300	60	26T	9.13	9.75	9.27	5300	60	52T	9.34	9.72	9.47			
	5320	64	26T	9.21	9.68	9.36	5320	64	52T	9.28	9.68	9.45			
2C	5500	100	26T	9.40	9.94	9.50	5500	100	52T	9.55	9.89	9.75			
	5520	120	26T	9.33	9.85	9.40	5600	120	52T	9.52	9.80	9.51			
	5620	124	26T	9.65	10.13	9.59	5580	124	52T	9.78	10.08	9.73			
	5720	144	26T	9.64	10.01	9.58	5720	144	52T	9.75	10.08	9.73			
3	5745	149	26T	9.67	10.19	9.65	5745	149	52T	9.89	10.15	9.89			
	5785	157	26T	9.73	10.21	9.75	5785	157	52T	9.88	10.24	9.92			
	5825	165	26T	9.77	10.21	9.70	5825	165	52T	9.89	10.23	9.93			

20MHz BW	Band	Freq [MHz]	Channel	Tones	Avg Conducted Power (dBm)			20MHz BW	Band	Freq [MHz]	Channel	Tones	Avg Conducted Power (dBm)		
					RU Index								RU Index		
					53	54	N/A						61	N/A	N/A
	1	5180	36	106T	11.21	11.26			5180	36	242T	11.15			
5200		40	106T	11.11	11.22		5200	40	242T	11.25					
5220		44	106T	11.06	11.15		5200	44	242T	11.13					
5240		48	106T	11.10	11.16		5240	48	242T	11.22					
2A	5260	52	106T	9.53	9.54		5260	52	242T	9.60					
	5280	56	106T	9.46	9.59		5260	56	242T	9.54					
	5300	60	106T	9.48	9.57		5300	60	242T	9.51					
	5320	64	106T	9.50	9.49		5320	64	242T	9.59					
2C	5500	100	106T	9.82	9.80		5500	100	242T	9.89					
	5600	120	106T	9.66	9.58		5600	120	242T	9.73					
	5620	124	106T	9.98	9.93		5620	124	242T	9.95					
	5720	144	106T	9.89	9.90		5720	144	242T	9.92					
3	5745	149	106T	9.97	10.00		5745	149	242T	9.71					
	5785	157	106T	10.21	10.08		5785	157	242T	10.20					
	5825	165	106T	10.05	10.03		5825	165	242T	9.07					

40MHz BW	Band	Freq [MHz]	Channel	Tones	Avg Conducted Power (dBm)			40MHz BW	Band	Freq [MHz]	Channel	Tones	Avg Conducted Power (dBm)		
					RU Index								RU Index		
					0	8	17						37	40	44
	1	5190	38	26T	10.63	11.49	10.90		5190	38	52T	10.56	11.32	10.83	
5230		46	26T	10.58	11.48	10.91	5230	46	52T	10.50	11.35	10.83			
2A	5270	54	26T	8.81	9.71	9.07	5270	54	52T	8.95	9.75	9.11			
	5310	62	26T	8.83	9.70	9.02	5310	62	52T	8.97	9.72	9.23			
2C	5510	102	26T	9.33	10.09	9.50	5510	102	52T	9.49	10.10	9.59			
	5590	118	26T	9.29	10.04	9.27	5590	118	52T	9.71	10.24	9.73			
	5630	126	26T	9.47	10.20	9.64	5630	126	52T	9.60	10.17	9.76			
	5710	142	26T	9.38	10.08	9.52	5710	142	52T	9.50	10.18	9.69			
3	5755	151	26T	9.45	10.21	9.65	5755	151	52T	9.61	10.24	9.87			
	5795	159	26T	9.32	10.21	9.65	5795	159	52T	9.46	10.10	9.77			

40MHz BW	Band	Freq [MHz]	Channel	Tones	Avg Conducted Power (dBm)			40MHz BW	Band	Freq [MHz]	Channel	Tones	Avg Conducted Power (dBm)		
					RU Index								RU Index		
					53	54	56						61	62	N/A
	1	5190	38	106T	10.97	11.50	11.18		5190	38	242T	10.91	11.09		
5230		46	106T	10.67	11.35	10.79	5230	46	242T	10.94	11.18				
2A	5270	54	106T	9.12	9.75	9.33	5270	54	242T	9.42	9.51				
	5310	62	106T	9.05	9.68	9.29	5310	62	242T	9.40	9.57				
2C	5510	102	106T	9.65	10.23	9.71	5510	102	242T	9.88	9.92				
	5590	118	106T	9.80	10.25	9.93	5590	118	242T	10.01	10.18				
	5670	126	106T	9.70	10.18	9.81	5670	126	242T	9.95	10.12				
	5710	142	106T	9.65	10.20	9.75	5710	142	242T	9.97	10.01				
3	5755	151	106T	9.69	10.22	9.95	5755	151	242T	10.00	10.23				
	5795	159	106T	9.61	10.11	9.95	5795	159	242T	9.90	10.19				

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40MHz BW	Band	Freq [MHz]	Channel	Tones	Avg Conducted Power (dBm)		
					RU Index		
					65	N/A	N/A
	1	5190	38	484T	11.20		
		5230	46	484T	11.21		
	2A	5270	54	484T	9.47		
		5310	62	484T	9.45		
		5510	102	484T	9.92		
	2C	5550	118	484T	10.05		
		5630	126	484T	9.95		
		5710	142	484T	10.01		
	3	5755	151	484T	10.10		
		5795	159	484T	9.65		
80MHz BW	Band	Freq [MHz]	Channel	Tones	Avg Conducted Power (dBm)		
					RU Index		
					37	44	52
	1	5210	42	52T	10.80	11.39	10.94
	2A	5290	58	52T	8.85	9.59	9.04
		5530	106	52T	9.20	9.90	9.34
	2C	5610	122	52T	9.46	9.76	9.50
		5690	138	52T	9.53	9.80	9.57
	3	5775	155	52T	9.60	10.09	9.70
80MHz BW	Band	Freq [MHz]	Channel	Tones	Avg Conducted Power (dBm)		
					RU Index		
					53	56	60
	1	5210	42	106T	10.98	11.44	11.13
	2A	5290	58	106T	9.10	9.69	9.22
		5530	106	106T	9.70	10.01	9.65
	2C	5610	122	106T	9.67	10.06	9.72
		5690	138	106T	9.67	10.07	9.74
	3	5775	155	106T	9.92	10.17	9.97
80MHz BW	Band	Freq [MHz]	Channel	Tones	Avg Conducted Power (dBm)		
					RU Index		
					61	62	64
	1	5210	42	242T	10.94	11.21	10.85
	2A	5290	58	242T	9.45	9.74	9.52
		5530	106	242T	9.52	9.93	9.45
	2C	5610	122	242T	9.65	10.03	9.67
		5690	138	242T	9.64	10.01	9.68
	3	5775	155	242T	9.98	10.24	10.18
80MHz BW	Band	Freq [MHz]	Channel	Tones	Avg Conducted Power (dBm)		
					RU Index		
					67	N/A	N/A
	1	5210	42	996T	11.49		
	2A	5290	58	996T	9.70		
		5530	106	996T	10.07		
	2C	5610	122	996T	10.15		
		5690	138	996T	10.22		
	3	5775	155	996T	10.07		

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APPENDIX I: TIME-AVERAGED SAR VERIFICATION

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1.1 Time-Averaged SAR Verification Summary

This device supports the manufacturer's time-averaged SAR (TAS) mechanism for WLAN operations. The output power is controlled in real-time so that the power averaged over any 60 second window does not exceed the level tested for SAR in this report. The time-averaged SAR algorithm tracks the energy contribution relative to the available energy budget for each transmitter, defined as the "utilization ratio." Once the utilization ratios for each of the individual WLAN transmitters are calculated, they are summed to derive the overall WLAN system power utilization ratio. This metric is used by the WLAN chipset to manage power levels over time and ensure that SAR limits are never exceeded.

Per FCC Guidance, the following test scenarios were defined to validate the TAS mechanism. The specific scenarios are constructed to validate the operation of the algorithm in all operational states, including transitions between states/antennas:

- Change in channel/band
- Change in antenna (includes connection drop scenario)
- Change in device state, e.g Cell on/off WiFi power change

Predefined transmit profiles for each test scenario are provided by the manufacturer's test automation software to control the operation of the DUT while synchronized operational data was recorded from internal firmware and external power monitors. The data was plotted over time relative to the utilization limit to demonstrate that the maximum time-averaged power is never exceeded. "Reported" values were output and captured directly from DUT firmware, while "Measured" results were obtained from external power metering. The uncertainty budget applied to the WLAN power control functions for this device is 1.5 dB. In all test cases, WLAN radios were configured to operate at 100% duty cycle.

Table 1-1
Test Configurations for Time-Averaged SAR Verification

Mode	Antenna	Channel	Plim (dBm)	Plim (mW)
802.11b, 22 MHz Bandwidth	3A	6	13	20
802.11b, 22 MHz Bandwidth (Reduced)	3A	6	6	4
802.11b, 22 MHz Bandwidth	1A	6	13.75	24
802.11a, 20 MHz Bandwidth	2B	149	9.75	9
802.11a, 20 MHz Bandwidth	2A	149	11.25	13

Plim is the maximum time-averaged output power evaluated for SAR compliance

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1.2 Verification Summary

Scenario 1: Change in Antenna

For this test, the effect on the time-averaging algorithm from a change in the active transmit antenna was evaluated. Figures I-1 and I-2 show a switch of 2.4 GHz transmissions from antenna 3A to antenna 1A at Time = 120 s, while Figures I-3 and I-4 show a comparable transition for antenna 2B to antenna 2A 5 GHz transmissions. In both cases the test automation is controlling the WLAN radios to operate at 100% duty cycle. In both cases the utilization ratio never exceeds 100% and the average transmit power never exceeds the Plim of each respective antenna.

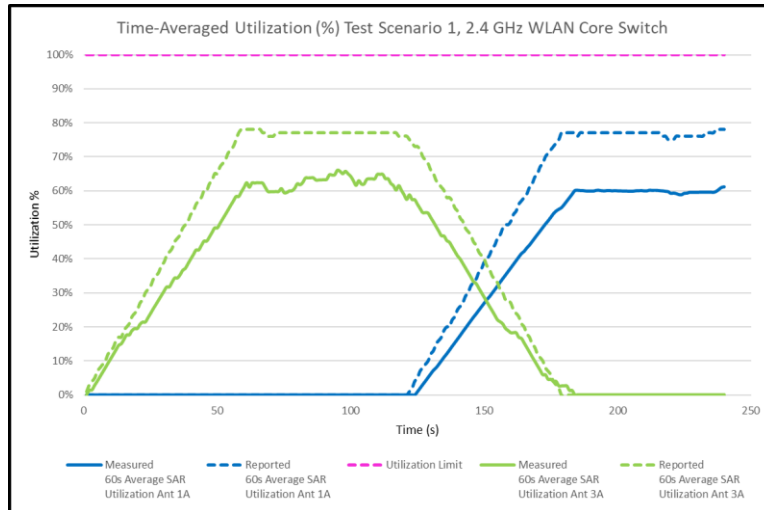


Figure I-1
60s Average SAR Utilization vs. Time, 2.4 GHz

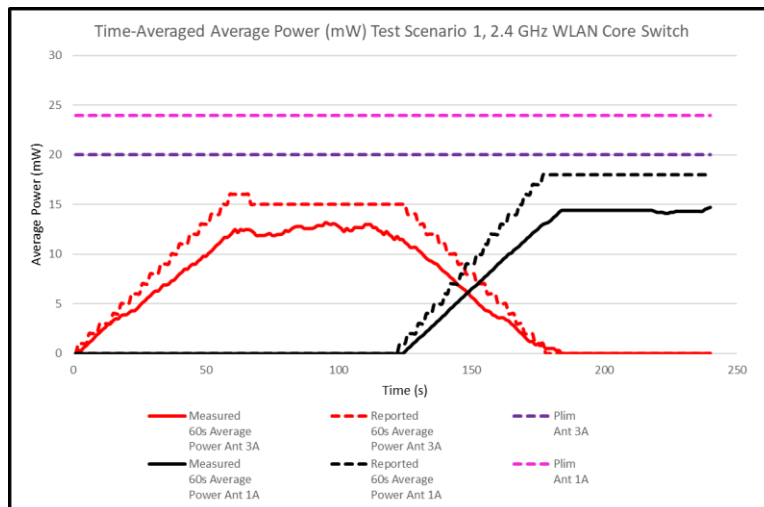


Figure I-2
60s Average Power vs. Time, 2.4 GHz

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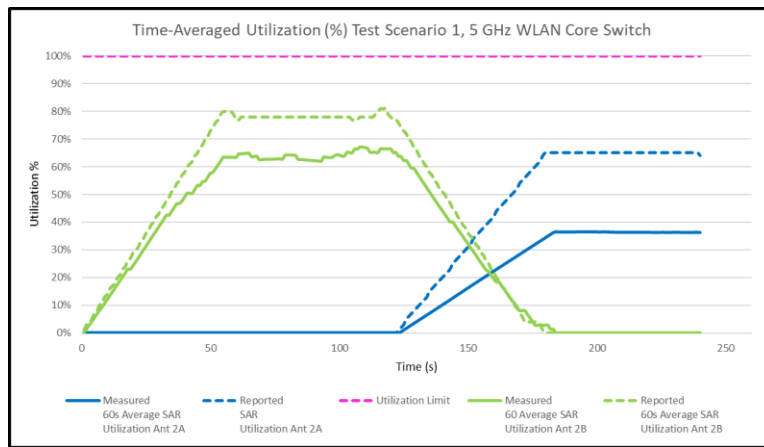


Figure I-3
60s Average SAR Utilization vs. Time, 5 GHz

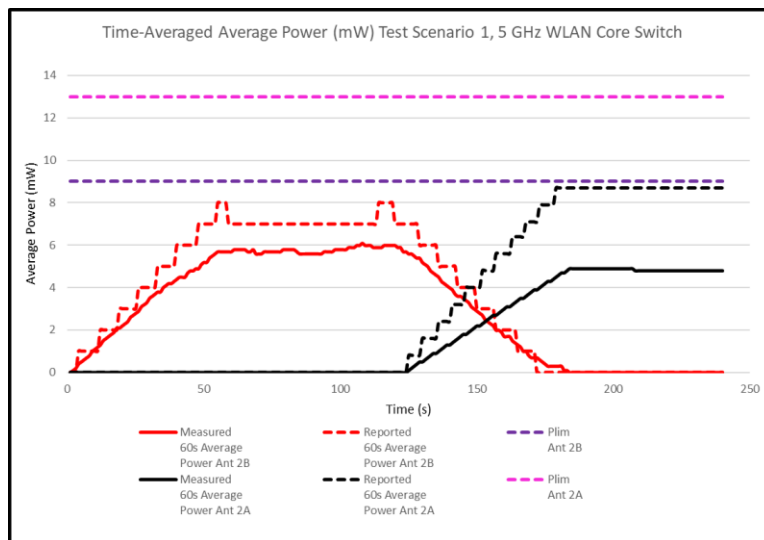


Figure I-4
60s Average Power vs. Time, 5 GHz

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Scenario 2: Change in Channel/Band Test Case

This test demonstrates the efficacy of the time-averaged SAR algorithm while switching between 2.4 GHz and 5 GHz WLAN bands. In addition, it shows that the algorithm tracks time-averaged power and system utilization when the active transmitter is disabled and then reconnects.

The 2.4 GHz Ant 3A transmitter is active at 100% duty cycle until Time = 120 s. When 2.4 GHz transmissions cease, the 5 GHz Ant 2B transmitter is activated and begins to negotiate a new connection. The connection is established and the increase in average transmit power and utilization can clearly be seen. In this case the utilization ratio never exceeds 100% and the average transmit power never exceeds the Plim of each respective antenna.

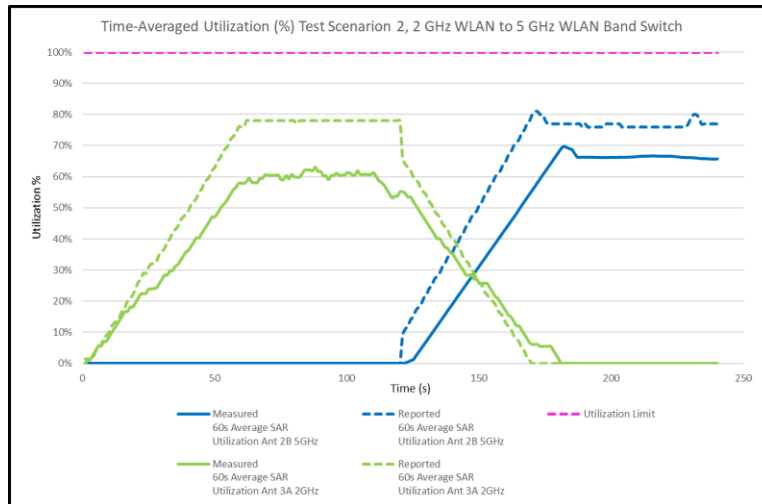


Figure I-5
60s Average Utilization vs. Time during Band Switch

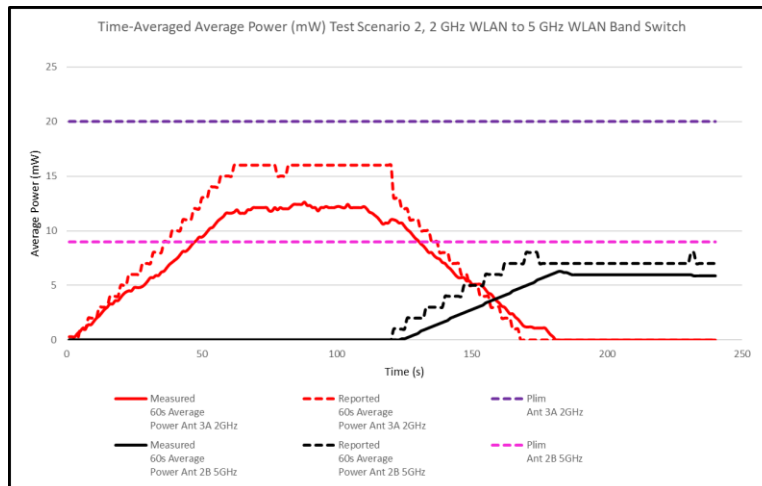


Figure I-6
60s Average Power vs. Time during Band Switch

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Scenario 3: Change in Device State

This test demonstrates the efficacy of the time-averaged SAR algorithm when an external power control trigger is activated, transitioning between cell off and cell on at Time = 120 s.

The 2.4 GHz Ant 3A transmitter is active at 100% duty cycle until Time = 120 s. At this point a cellular connection occurs. The connection is established and the decrease in average transmit power and can clearly be seen, while utilization remains consistent. In this case the utilization ratio never exceeds 100% and the average transmit power never exceeds the Plim of the device state.

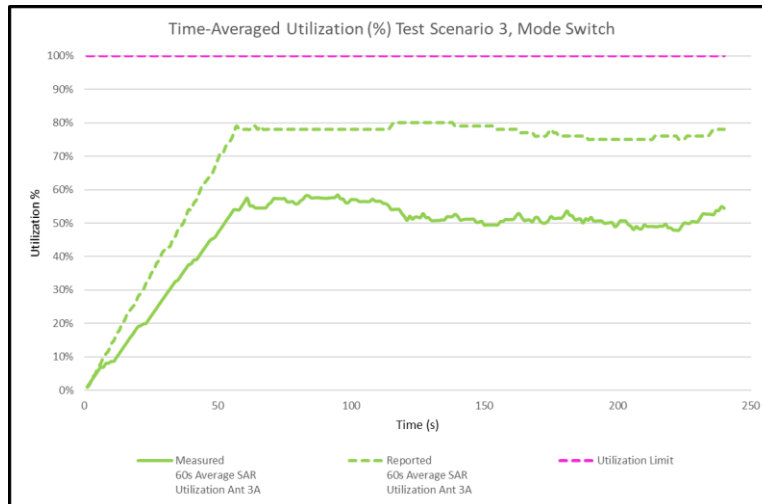


Figure I-7
60s Average Utilization vs. Time during Mode Switch

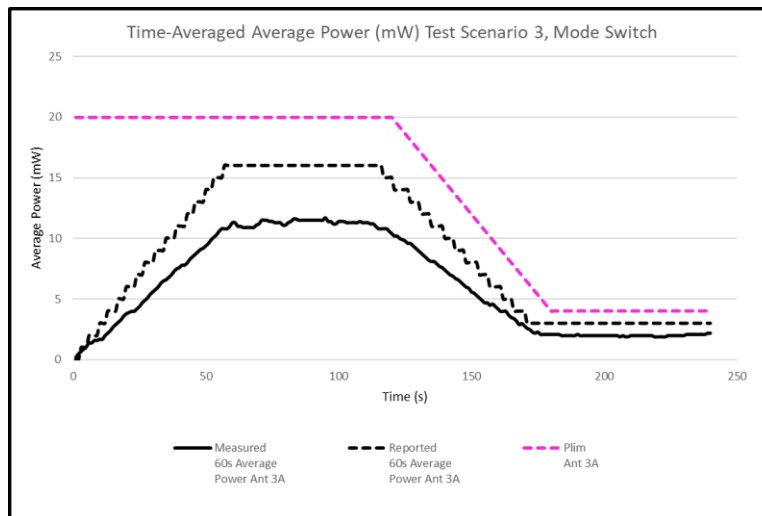


Figure I-8
60s Average Power vs. Time during Mode Switch

FCC ID: BCGA2072	 PCTEST Proud to be part of element	SAR EVALUATION REPORT	Approved by: Quality Manager
Test Dates: 07/28/2020 – 09/16/2020	DUT Type: Tablet Device		APPENDIX I Page 6 of 6

APPENDIX J: PROBE AND DIPOLE CALIBRATION CERTIFICATES

**Calibration Laboratory of
Schmid & Partner
Engineering AG**
Zeughausstrasse 43, 8004 Zurich, Switzerland



S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
S Servizio svizzero di taratura
S Swiss Calibration Service

Accredited by the Swiss Accreditation Service (SAS)
The Swiss Accreditation Service is one of the signatories to the EA
Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 0108**

Client: **PG-Test**

Certificate No.: **D750V3-1097_Sep17**

CALIBRATION CERTIFICATE

Object: **D750V3 - SN:1097**

Calibration procedure(s): **QA-CAL-05.v9**
Calibration procedure for dipole validation kits above 700 MHz

Calibration date: **September 08, 2017**

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature $(22 \pm 3)^\circ\text{C}$ and humidity $< 70\%$.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter NRP	SN: 104778	04-Apr-17 (No. 217-02521/02522)	Apr-18
Power sensor NRP-Z91	SN: 103244	04-Apr-17 (No. 217-02521)	Apr-18
Power sensor NRP-Z91	SN: 103245	04-Apr-17 (No. 217-02522)	Apr-18
Reference 20 dB Attenuator	SN: 5058 (20k)	07-Apr-17 (No. 217-02528)	Apr-18
Type-N mismatch combination	SN: 5047.2 / 06327	07-Apr-17 (No. 217-02529)	Apr-18
Reference Probe EX3DV4	SN: 7349	31-May-17 (No. EX3-7349_May17)	May-18
DAE4	SN: 601	28-Mar-17 (No. DAE4-601_Mar17)	Mar-18
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter EPM-442A	SN: GB37480704	07-Oct-15 (in house check Oct-16)	In house check: Oct-18
Power sensor HP 8481A	SN: US37292763	07-Oct-15 (in house check Oct-16)	In house check: Oct-18
Power sensor HP 8481A	SN: MY41092317	07-Oct-15 (in house check Oct-16)	In house check: Oct-18
RF generator R&S SMT-06	SN: 100972	15-Jun-15 (in house check Oct-16)	In house check: Oct-18
Network Analyzer HP 8753E	SN: US37390585	18-Oct-01 (in house check Oct-16)	In house check: Oct-17

Calibrated by: **Claudio Leubler** (Name) **Laboratory Technician** (Function)

Approved by: **Katja Pokóvic** (Name) **Technical Manager** (Function)

Signature

Issued: September 8, 2017

This calibration certificate shall not be reproduced except in full without written approval of the laboratory.



Accredited by the Swiss Accreditation Service (SAS)
The Swiss Accreditation Service is one of the signatories to the EA
Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 0108**

Glossary:

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORM x,y,z
N/A	not applicable or not measured

Calibration is Performed According to the Following Standards:

- IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
- IEC 62209-1, "Measurement procedure for the assessment of Specific Absorption Rate (SAR) from hand-held and body-mounted devices used next to the ear (frequency range of 300 MHz to 6 GHz)", July 2016
- IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010
- KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

- DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

- Measurement Conditions:** Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- Antenna Parameters with TSL:** The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- Feed Point Impedance and Return Loss:** These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- Electrical Delay:** One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- SAR measured:** SAR measured at the stated antenna input power.
- SAR normalized:** SAR as measured, normalized to an input power of 1 W at the antenna connector.
- SAR for nominal TSL parameters:** The measured TSL parameters are used to calculate the nominal SAR result.

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k=2$, which for a normal distribution corresponds to a coverage probability of approximately 95%.

Measurement Conditions

DASY system configuration, as far as not given on page 1.

DASY Version	DASY5	V52.10.0
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	750 MHz $\pm$ 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	41.9	0.89 mho/m
Measured Head TSL parameters	(22.0 $\pm$ 0.2) °C	41.2 $\pm$ 6 %	0.90 mho/m $\pm$ 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.08 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	8.22 W/kg $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.36 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	5.39 W/kg $\pm$ 16.5 % (k=2)

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	55.5	0.96 mho/m
Measured Body TSL parameters	(22.0 $\pm$ 0.2) °C	55.5 $\pm$ 6 %	0.96 mho/m $\pm$ 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	2.14 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	8.56 W/kg $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	1.42 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	5.68 W/kg $\pm$ 16.5 % (k=2)

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	54.4 Ω - 0.6 j Ω
Return Loss	- 27.5 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	50.0 Ω - 3.6 j Ω
Return Loss	- 28.8 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.034 ns
----------------------------------	----------

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.

No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	July 05, 2013

DASY5 Validation Report for Head TSL

Date: 08.09.2017

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 750 MHz; Type: D750V3; Serial: D750V3 - SN:1097

Communication System: UID 0 - CW; Frequency: 750 MHz

Medium parameters used: $f = 750 \text{ MHz}$; $\sigma = 0.9 \text{ S/m}$; $\epsilon_r = 41.2$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(10.49, 10.49, 10.49); Calibrated: 31.05.2017;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 28.03.2017
- Phantom: Flat Phantom 4.9 (front); Type: QD 00L P49 AA; Serial: 1001
- DASY52 52.10.0(1446); SEMCAD X 14.6.10(7417)

Dipole Calibration for Head Tissue/Pin=250 mW, $d=15\text{mm}$ /Zoom Scan (7x7x7)/Cube 0:

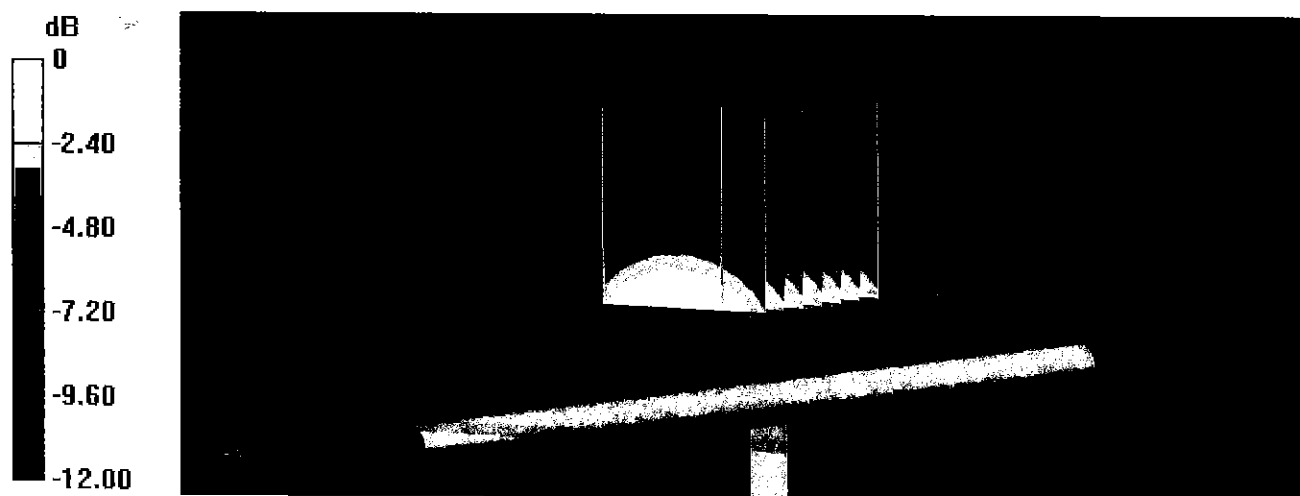
Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 58.59 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 3.19 W/kg

SAR(1 g) = 2.08 W/kg; SAR(10 g) = 1.36 W/kg

Maximum value of SAR (measured) = 2.80 W/kg



0 dB = 2.80 W/kg = 4.47 dBW/kg

Impedance Measurement Plot for Head TSL

8 Sep 2017 13:09:24
 CH1 S11 1 U FS 1: 54.383 Ω -552.73 m Ω 383.92 pF 750.000 000 MHz

*

De1

CA

Avg
16

H1d

CH2 S11 LOG 5 dB/REF -20 dB 1:-27.463 dB 750.000 000 MHz

CA

Avg
16

H1d

START 550.000 000 MHz

STOP 950.000 000 MHz

DASY5 Validation Report for Body TSL

Date: 08.09.2017

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 750 MHz; Type: D750V3; Serial: D750V3 - SN:1097

Communication System: UID 0 - CW; Frequency: 750 MHz

Medium parameters used: $f = 750$ MHz; $\sigma = 0.96$ S/m; $\epsilon_r = 55.5$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(10.35, 10.35, 10.35); Calibrated: 31.05.2017;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 28.03.2017
- Phantom: Flat Phantom 4.9 (Back); Type: QD 00R P49 AA; Serial: 1005
- DASY52 52.10.0(1446); SEMCAD X 14.6.10(7417)

Dipole Calibration for Body Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

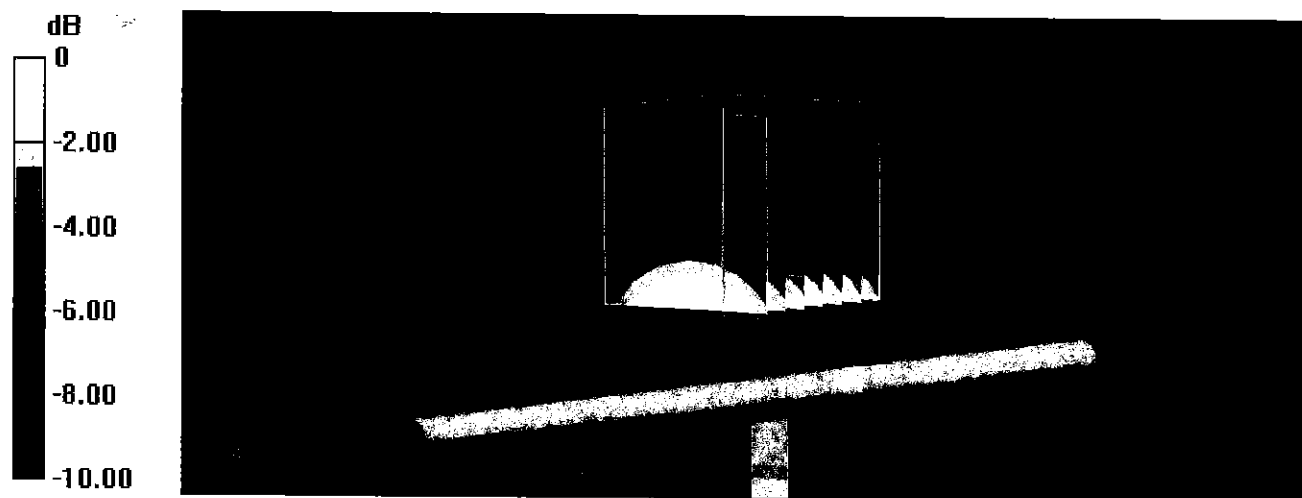
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 56.96 V/m; Power Drift = -0.00 dB

Peak SAR (extrapolated) = 3.16 W/kg

SAR(1 g) = 2.14 W/kg; SAR(10 g) = 1.42 W/kg

Maximum value of SAR (measured) = 2.81 W/kg



0 dB = 2.81 W/kg = 4.49 dBW/kg

Impedance Measurement Plot for Body TSL

8 Sep 2017 13:08:43
[CH1] S11 1 U FS 1: 49.951 Ω -3.6172 Ω 58.666 pF 750.000 000 MHz

*

De1

CA

Avg
15

H1d

CH2 S11 LOG 5 dB/REF -20 dB 1: -28.833 dB 750.000 000 MHz

CA

Avg
16

H1d

START 550.000 000 MHz

STOP 950.000 000 MHz

Certification of Calibration

Object D750V3 – SN: 1097

Calibration procedure(s) Procedure for Calibration Extension for SAR Dipoles.

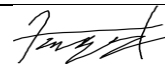
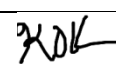
Extended Calibration date: September 08, 2018

Description: SAR Validation Dipole at 750 MHz.

Calibration Equipment used:

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
Agilent	8753ES	S-Parameter Network Analyzer	9/14/2017	Annual	9/14/2018	US39170118
Agilent	N5182A	MXG Vector Signal Generator	3/19/2018	Annual	3/19/2019	US46240505
Amplifier Research	15S1G6	Amplifier	CBT	N/A	CBT	343972
Anritsu	ML2496A	Power Meter	10/9/2017	Annual	10/9/2018	1138001
Anritsu	MA2411B	Pulse Power Sensor	11/15/2017	Annual	11/15/2018	1339007
Anritsu	MA2411B	Pulse Power Sensor	11/22/2017	Annual	11/22/2018	1339008
Control Company	4040	Temperature / Humidity Monitor	2/28/2018	Biennial	2/28/2020	150761911
Control Company	4352	Ultra Long Stem Thermometer	2/14/2017	Biennial	2/14/2019	170112507
Keysight	772D	Dual Directional Coupler	CBT	N/A	CBT	MY52180215
Keysight Technologies	85033E	Standard Mechanical Calibration Kit (DC to 9GHz, 3.5mm)	6/4/2018	Annual	6/4/2019	MY53401181
Mini-Circuits	BW-N20W5+	DC to 18 GHz Precision Fixed 20 dB Attenuator	CBT	N/A	CBT	N/A
Mini-Circuits	NLP-2950+	Low Pass Filter DC to 2700 MHz	CBT	N/A	CBT	N/A
Narda	4772-3	Attenuator (3dB)	CBT	N/A	CBT	9406
Pasternack	PE2209-10	Bidirectional Coupler	CBT	N/A	CBT	N/A
Pasternack	PE5011-1	Torque Wrench	7/19/2017	Biennial	7/19/2019	N/A
SPEAG	DAK-3.5	Dielectric Assessment Kit	5/15/2018	Annual	5/15/2019	1070
SPEAG	ES3DV3	SAR Probe	9/18/2017	Annual	9/18/2018	3287
SPEAG	DAE4	Data Acquisition Electronics	1/26/2018	Annual	1/26/2019	1533
SPEAG	EX3DV4	SAR Probe	7/20/2018	Annual	7/20/2019	7416
SPEAG	DAE4	Dasy Data Acquisition Electronics	1/18/2018	Annual	1/18/2019	793

Measurement Uncertainty = $\pm 23\%$ (k=2)

	Name	Function	Signature
Calibrated By:	Sangmin Cha	Team Lead Engineer	
Approved By:	Kaitlin O'Keefe	Senior Technical Manager	

DIPOLE CALIBRATION EXTENSION

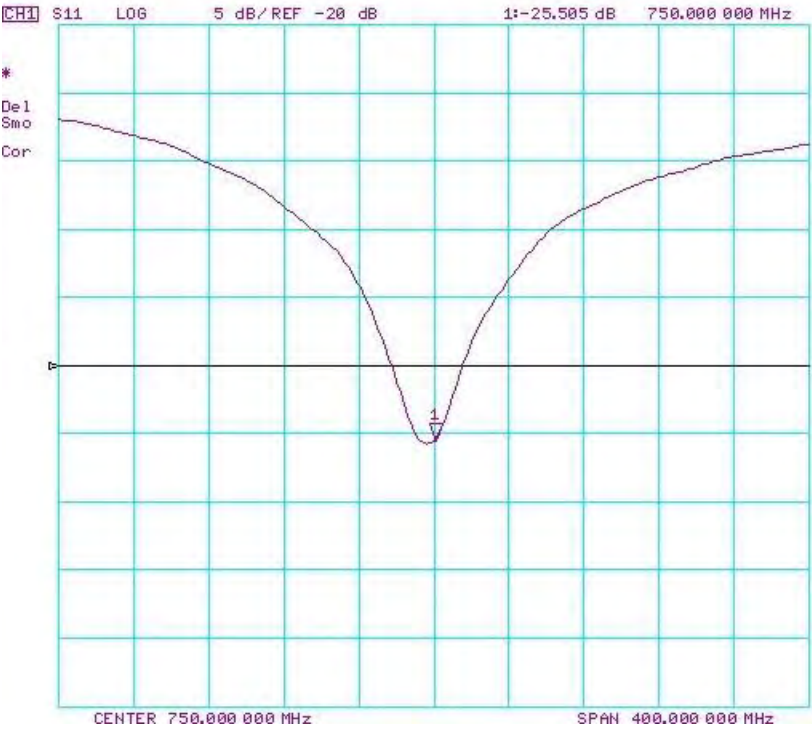
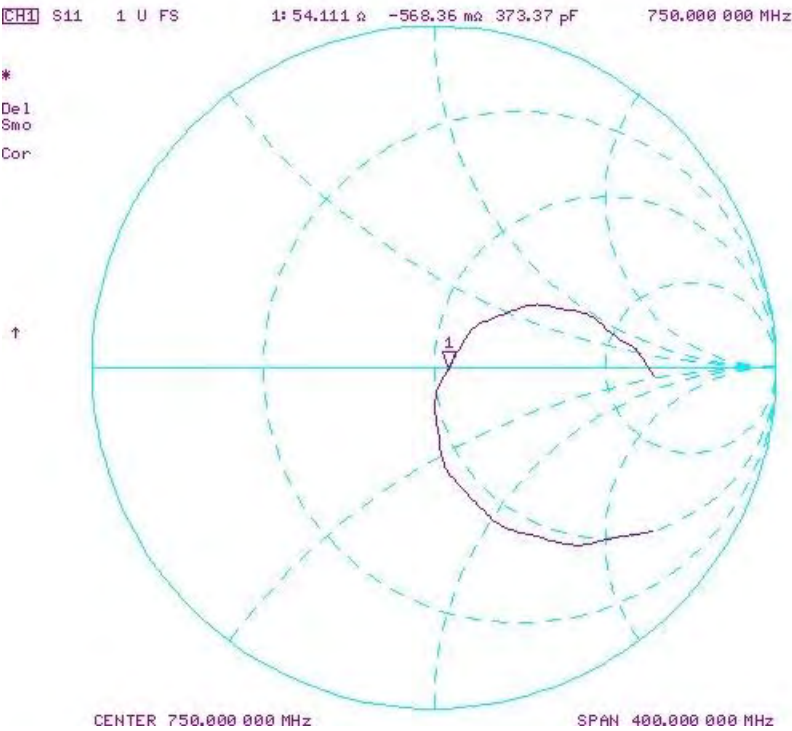
Per KDB 865664 D01, calibration intervals of up to three years may be considered for reference dipoles when it is demonstrated that the SAR target, impedance and return loss of a dipole have remained stable according to the following requirements:

1. The measured SAR does not deviate more than 10% from the target on the calibration certificate.
2. The return-loss does not deviate more than 20% from the previous measurement and meets the required 20dB minimum return-loss requirement.
3. The measurement of real or imaginary parts of impedance does not deviate more than 5Ω from the previous measurement.

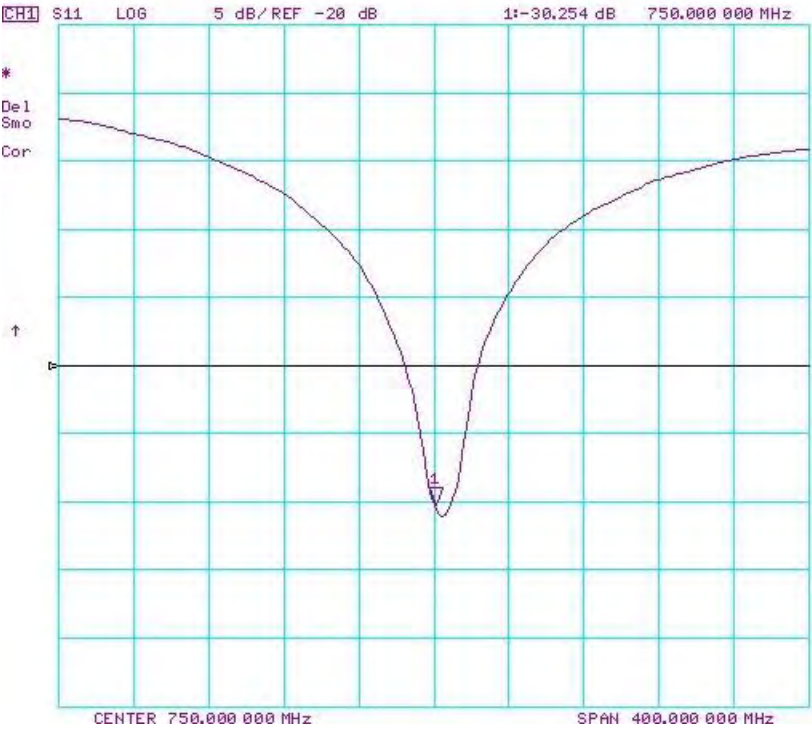
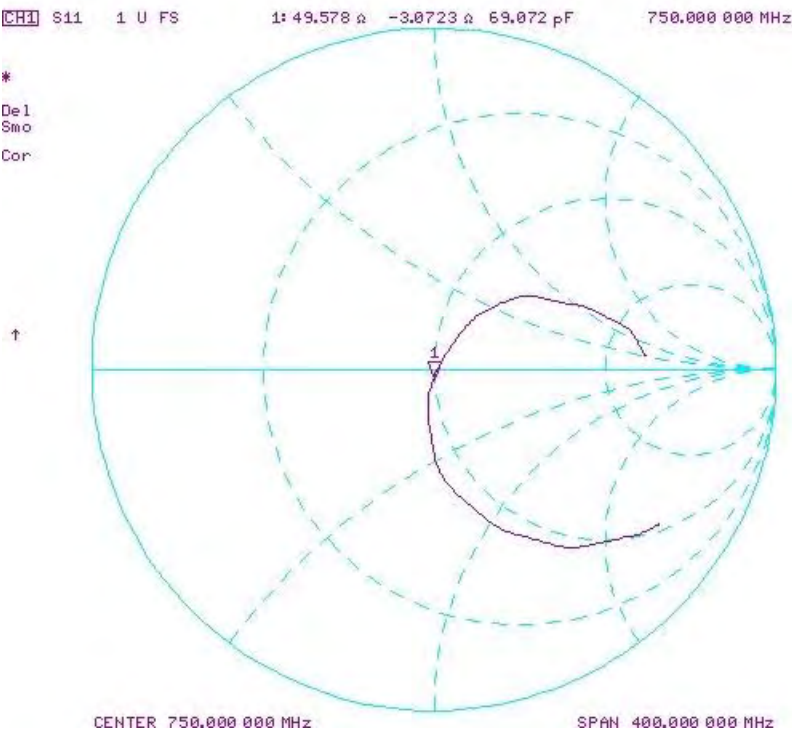
The following dipole was checked to pass the above 3 requirements to have 2-year calibration period from the calibration date:

Calibration Date	Extension Date	Certificate Electrical Delay (ns)	Certificate SAR Target Head (1g) W/kg @ 23.0 dBm	Measured Head SAR (1g) W/kg @ 23.0 dBm	Deviation 1g (%)	Certificate SAR Target Body (10g) W/kg @ 23.0 dBm	Measured Body SAR (10g) W/kg @ 23.0 dBm	Deviation 10g (%)	Certificate Impedance Head (Ohm) Real	Measured Impedance Head (Ohm) Real	Difference (Ohm) Real	Certificate Impedance Head (Ohm) Imaginary	Measured Impedance Head (Ohm) Imaginary	Difference (Ohm) Imaginary	Certificate Return Loss Head (dB)	Measured Return Loss Head (dB)	Deviation (%)	PASS/FAIL
9/8/2017	9/8/2018	1.034	1.644	1.7	3.41%	1.078	1.12	3.90%	54.4	54.1	0.3	-0.6	-0.6	0	-27.5	-25.5	7.30%	PASS
Calibration Date	Extension Date	Certificate Electrical Delay (ns)	Certificate SAR Target Body (1g) W/kg @ 23.0 dBm	Measured Body SAR (1g) W/kg @ 23.0 dBm	Deviation 1g (%)	Certificate SAR Target Body (10g) W/kg @ 23.0 dBm	Measured Body SAR (10g) W/kg @ 23.0 dBm	Deviation 10g (%)	Certificate Impedance Body (Ohm) Real	Measured Impedance Body (Ohm) Real	Difference (Ohm) Real	Certificate Impedance Body (Ohm) Imaginary	Measured Impedance Body (Ohm) Imaginary	Difference (Ohm) Imaginary	Certificate Return Loss Body (dB)	Measured Return Loss Body (dB)	Deviation (%)	PASS/FAIL
9/8/2017	9/8/2018	1.034	1.712	1.78	3.97%	1.136	1.17	2.99%	50	49.6	0.4	-3.6	-3.1	0.5	-28.8	-30.3	-5.20%	PASS

Impedance & Return-Loss Measurement Plot for Head TSL



Impedance & Return-Loss Measurement Plot for Body TSL



Certification of Calibration

Object: D750V3 – SN: 1097

Calibration procedure(s): Procedure for Calibration Extension for SAR Dipoles.

Extended Calibration date: September 8, 2019

Description: SAR Validation Dipole at 750 MHz.

Calibration Equipment used:

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
Agilent	8753ES	S-Parameter Network Analyzer	10/2/2018	Annual	10/2/2019	US39170118
Agilent	E4438C	ESG Vector Signal Generator	6/27/2019	Annual	6/27/2020	MY45093852
Amplifier Research	15S1G6	Amplifier	CBT	N/A	CBT	343972
Anritsu	ML2495A	Power Meter	10/21/2018	Annual	10/21/2019	941001
Anritsu	MA2411B	Pulse Power Sensor	10/30/2018	Annual	10/30/2019	1207470
Anritsu	MA2411B	Pulse Power Sensor	11/20/2018	Annual	11/20/2019	1339007
Control Company	4040	Temperature / Humidity Monitor	2/28/2018	Biennial	2/28/2020	150761911
Control Company	4352	Ultra Long Stem Thermometer	2/28/2018	Biennial	2/28/2020	170330160
Keysight Technologies	85033E	Standard Mechanical Calibration Kit (DC to 9GHz, 3.5mm)	7/2/2019	Annual	7/2/2020	MY53401181
Keysight	772D	Dual Directional Coupler	CBT	N/A	CBT	MY52180215
Mini-Circuits	BW-N20W5+	DC to 18 GHz Precision Fixed 20 dB Attenuator	CBT	N/A	CBT	N/A
Mini-Circuits	NLP-2950+	Low Pass Filter DC to 2700 MHz	CBT	N/A	CBT	N/A
Narda	4772-3	Attenuator (3dB)	CBT	N/A	CBT	9406
Pasternack	PE2208-6	Bidirectional Coupler	CBT	N/A	CBT	N/A
Pasternack	NC-100	Torque Wrench	11/1/2017	Biennial	11/1/2019	N/A
SPEAG	DAK-3.5	Dielectric Assessment Kit	5/7/2019	Annual	5/7/2020	1070
SPEAG	EX3DV4	SAR Probe	1/24/2019	Annual	1/24/2020	7490
SPEAG	DAE4	Data Acquisition Electronics	1/15/2019	Annual	1/15/2020	1532

Measurement Uncertainty = $\pm 23\%$ (k=2)

	Name	Function	Signature
Calibrated By:	Parker Jones	Team Lead Engineer	<i>Parker Jones</i>
Approved By:	Kaitlin O'Keefe	Senior Technical Manager	<i>KOK</i>

DIPOLE CALIBRATION EXTENSION

Per KDB 865664 D01, calibration intervals of up to three years may be considered for reference dipoles when it is demonstrated that the SAR target, impedance and return loss of a dipole have remained stable according to the following requirements:

1. The measured SAR does not deviate more than 10% from the target on the calibration certificate.
2. The return-loss does not deviate more than 20% from the previous measurement and meets the required 20dB minimum return-loss requirement.
3. The measurement of real or imaginary parts of impedance does not deviate more than 5Ω from the previous measurement.

The following dipole was checked to pass the above 3 requirements to have 3-year calibration period from the calibration date:

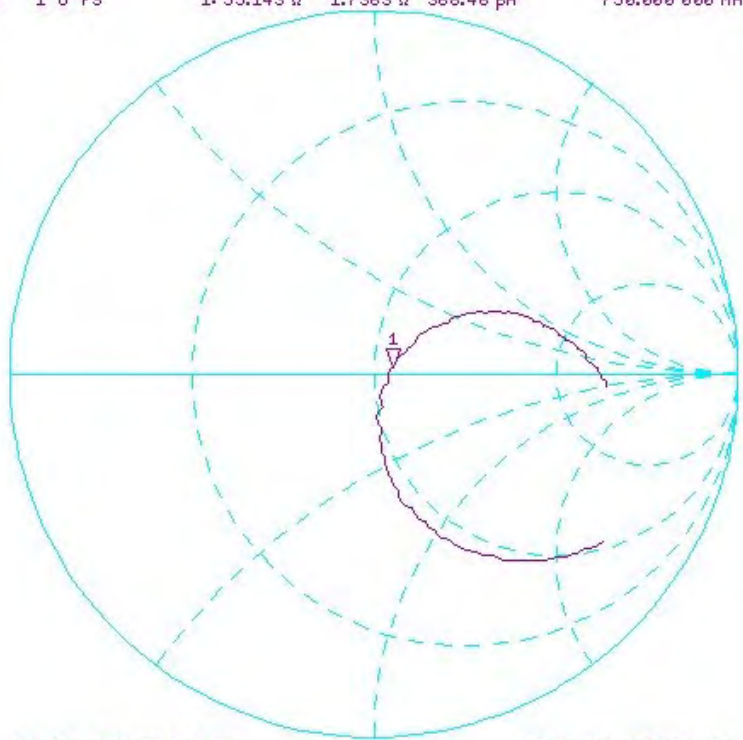
Calibration Date	Extension Date	Certificate Electrical Delay (ns)	Certificate SAR Target Head (1g) W/kg @ 23.0 dBm	Measured Head SAR (1g) W/kg @ 23.0 dBm	Deviation 1g (%)	Certificate SAR Target Head (10g) W/kg @ 23.0 dBm	Measured Head SAR (10g) W/kg @ 23.0 dBm	Deviation 10g (%)	Certificate Impedance Head (Ohm) Real	Measured Impedance Head (Ohm) Real	Difference (Ohm) Real	Certificate Impedance Head (Ohm) Imaginary	Measured Impedance Head (Ohm) Imaginary	Difference (Ohm) Imaginary	Certificate Return Loss Head (dB)	Measured Return Loss Head (dB)	Deviation (%)	PASS/FAIL
9/8/2017	9/8/2019	1.034	1.644	1.55	-5.11%	1.078	1.03	-4.45%	54.4	55.1	0.7	-0.6	1.7	2.3	-27.5	-25	5.50%	PASS
Calibration Date	Extension Date	Certificate Electrical Delay (ns)	Certificate SAR Target Body (1g) W/kg @ 23.0 dBm	Measured Body SAR (1g) W/kg @ 23.0 dBm	Deviation 1g (%)	Certificate SAR Target Body (10g) W/kg @ 23.0 dBm	Measured Body SAR (10g) W/kg @ 23.0 dBm	Deviation 10g (%)	Certificate Impedance Body (Ohm) Real	Measured Impedance Body (Ohm) Real	Difference (Ohm) Real	Certificate Impedance Body (Ohm) Imaginary	Measured Impedance Body (Ohm) Imaginary	Difference (Ohm) Imaginary	Certificate Return Loss Body (dB)	Measured Return Loss Body (dB)	Deviation (%)	PASS/FAIL
9/8/2017	9/8/2019	1.034	1.712	1.65	-3.62%	1.136	1.1	-3.17%	50	51	1	-3.6	-1.3	2.3	-28.8	-31.9	-10.80%	PASS

Impedance & Return-Loss Measurement Plot for Head TSL

CH1 S11 1 U FS 1: 55.143 Ω 1.7363 Ω 368.46 pF 750.000 000 MHz

*
De1
Cor

↑

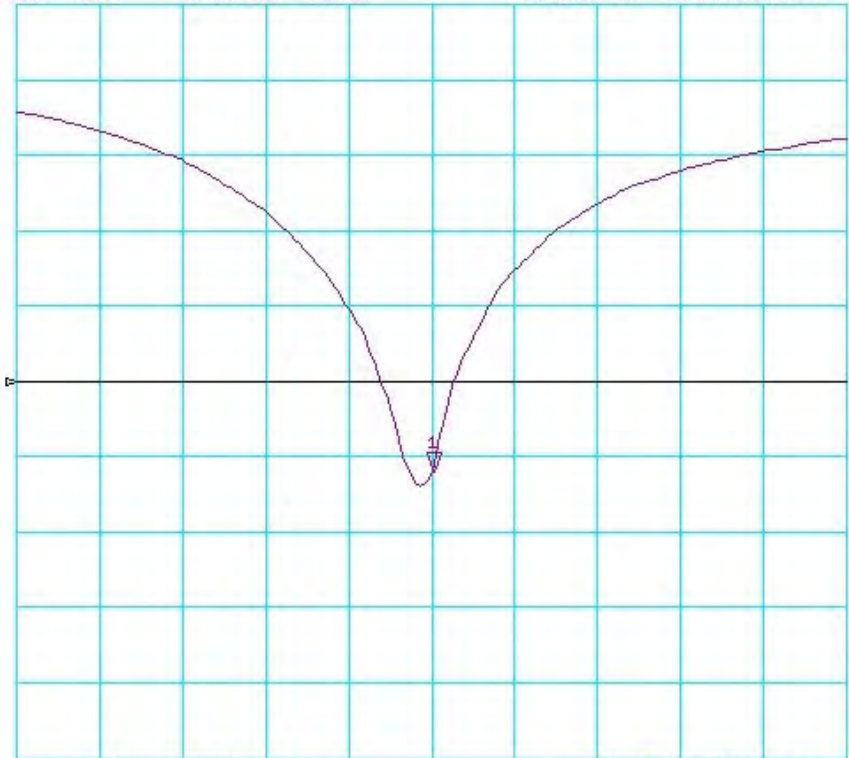


CENTER 750.000 000 MHz SPAN 400.000 000 MHz

CH1 S11 LOG 5 dB/REF -20 dB 1:-26.011 dB 750.000 000 MHz

*
De1
Smo
Cor

↑



CENTER 750.000 000 MHz SPAN 400.000 000 MHz

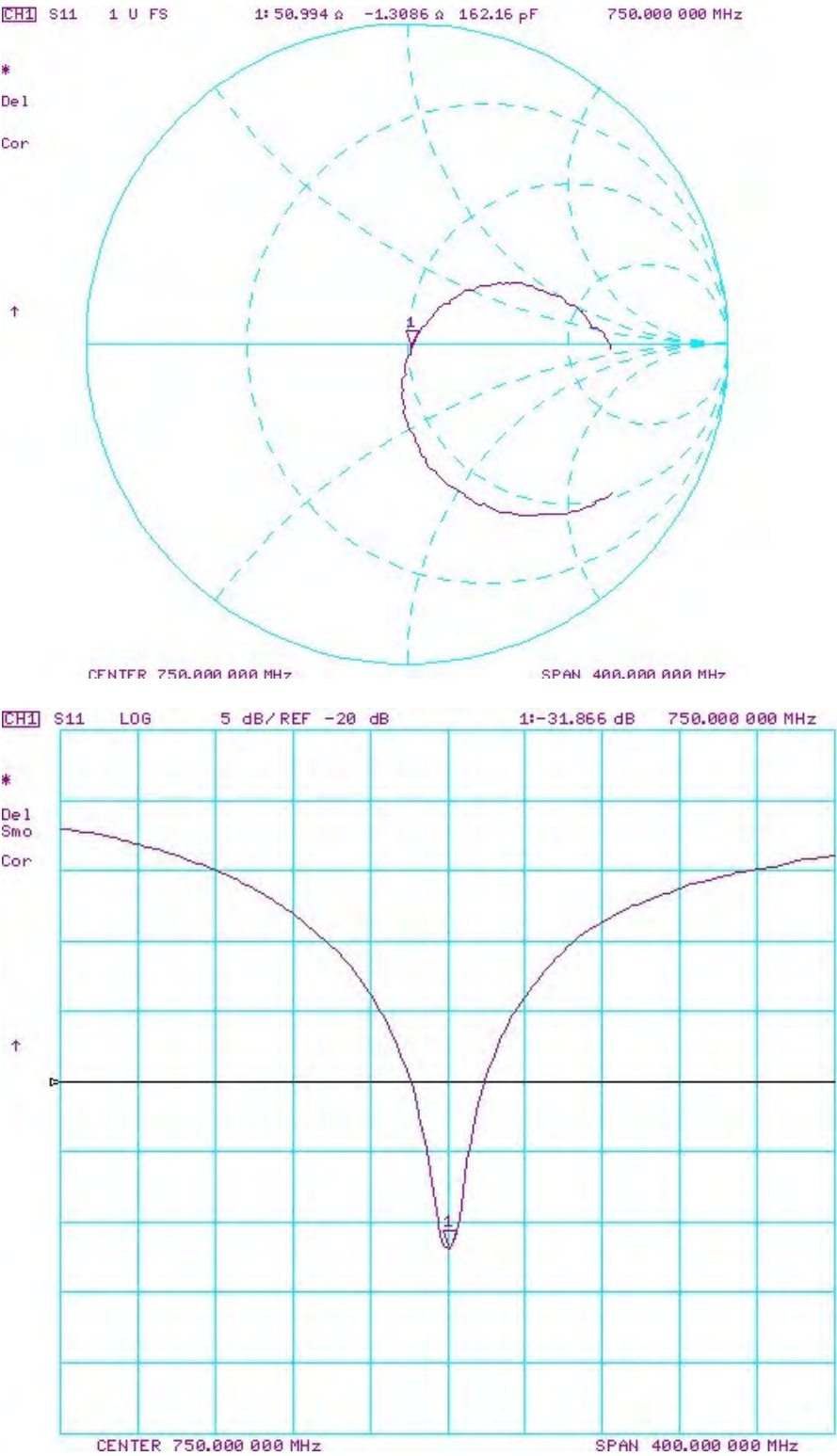
Object:

D750V3 – SN: 1097

Date Issued:

09/08/2019

Impedance & Return-Loss Measurement Plot for Body TSL





Accredited by the Swiss Accreditation Service (SAS)
The Swiss Accreditation Service is one of the signatories to the EA
Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 0108**

Client: **PC Test**

Certificate No.: **D835V2-4d180_May18**

CALIBRATION CERTIFICATE

Object: **D835V2 - SN:4d180**

Calibration procedure(s): **QA CAL 05 V10**
Calibration procedure for dipole validation kits above 700 MHz

Calibration date: **May 18, 2018**

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature $(22 \pm 3)^{\circ}\text{C}$ and humidity $< 70\%$.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter NRP	SN: 104778	04-Apr-18 (No. 217-02672/02673)	Apr-19
Power sensor NRP-Z91	SN: 103244	04-Apr-18 (No. 217-02672)	Apr-19
Power sensor NRP-Z91	SN: 103245	04-Apr-18 (No. 217-02673)	Apr-19
Reference 20 dB Attenuator	SN: 5058 (20k)	04-Apr-18 (No. 217-02682)	Apr-19
Type-N mismatch combination	SN: 5047.2 / 06327	04-Apr-18 (No. 217-02683)	Apr-19
Reference Probe EX3DV4	SN: 7349	30-Dec-17 (No. EX3-7349_Dec17)	Dec-18
DAE4	SN: 601	28-Oct-17 (No. DAE4-601_Oct17)	Oct-18

Secondary Standards	ID #	Check Date (In house)	Scheduled Check
Power meter EPM-442A	SN: GB37480704	07-Oct-15 (In house check Oct-16)	In house check: Oct-18
Power sensor HP 8481A	SN: US37292783	07-Oct-15 (In house check Oct-16)	In house check: Oct-18
Power sensor HP 8481A	SN: MY41092317	07-Oct-15 (In house check Oct-16)	In house check: Oct-18
RF generator R&S SMT-06	SN: 100972	15-Jun-15 (In house check Oct-16)	In house check: Oct-18
Network Analyzer HP 8753E	SN: US37390585	18-Oct-01 (In house check Oct-17)	In house check: Oct-18

Calibrated by: **Manu Seltz** Name: **Manu Seltz** Function: **Laboratory Technician** Signature:

Approved by: **Karla Pokovic** Name: **Karla Pokovic** Function: **Technical Manager** Signature:

Issued: May 22, 2018

This calibration certificate shall not be reproduced except in full without written approval of the laboratory.



Accredited by the Swiss Accreditation Service (SAS)

The Swiss Accreditation Service is one of the signatories to the EA
Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 0108**

Glossary:

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORM x,y,z
N/A	not applicable or not measured

Calibration is Performed According to the Following Standards:

- IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
- IEC 62209-1, "Measurement procedure for the assessment of Specific Absorption Rate (SAR) from hand-held and body-mounted devices used next to the ear (frequency range of 300 MHz to 6 GHz)", July 2016
- IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010
- KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

- DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

- Measurement Conditions:** Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- Antenna Parameters with TSL:** The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- Feed Point Impedance and Return Loss:** These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- Electrical Delay:** One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- SAR measured:** SAR measured at the stated antenna input power.
- SAR normalized:** SAR as measured, normalized to an input power of 1 W at the antenna connector.
- SAR for nominal TSL parameters:** The measured TSL parameters are used to calculate the nominal SAR result.

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k=2$, which for a normal distribution corresponds to a coverage probability of approximately 95%.

Measurement Conditions

DASY system configuration, as far as not given on page 1.

DASY Version	DASY5	V52.10.1
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	835 MHz $\pm$ 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	41.5	0.90 mho/m
Measured Head TSL parameters	(22.0 $\pm$ 0.2) °C	40.8 $\pm$ 6 %	0.92 mho/m $\pm$ 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.45 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	9.60 W/kg $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.58 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	6.22 W/kg $\pm$ 16.5 % (k=2)

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	55.2	0.97 mho/m
Measured Body TSL parameters	(22.0 $\pm$ 0.2) °C	54.6 $\pm$ 6 %	0.99 mho/m $\pm$ 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	2.44 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	9.59 W/kg $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	1.60 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	6.31 W/kg $\pm$ 16.5 % (k=2)

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	50.7 Ω - 5.1 j Ω
Return Loss	- 25.9 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	47.2 Ω - 8.2 j Ω
Return Loss	- 21.1 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.396 ns
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After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.

No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	September 24, 2014

DASY5 Validation Report for Head TSL

Date: 17.05.2018

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:4d180

Communication System: UID 0 - CW; Frequency: 835 MHz

Medium parameters used: $f = 835 \text{ MHz}$; $\sigma = 0.92 \text{ S/m}$; $\epsilon_r = 40.8$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(9.9, 9.9, 9.9) @ 835 MHz; Calibrated: 30.12.2017
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 26.10.2017
- Phantom: Flat Phantom 4.9 (front); Type: QD 00L P49 AA; Serial: 1001
- DASY52 52.10.1(1476); SEMCAD X 14.6.11(7439)

Dipole Calibration for Head Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

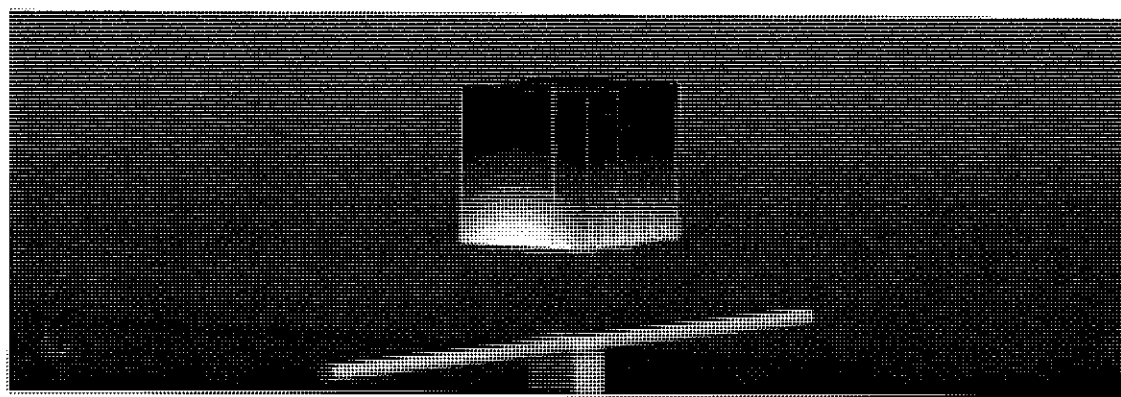
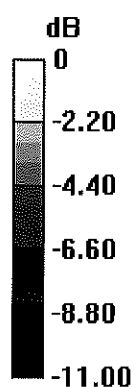
Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 65.39 V/m; Power Drift = -0.06 dB

Peak SAR (extrapolated) = 3.78 W/kg

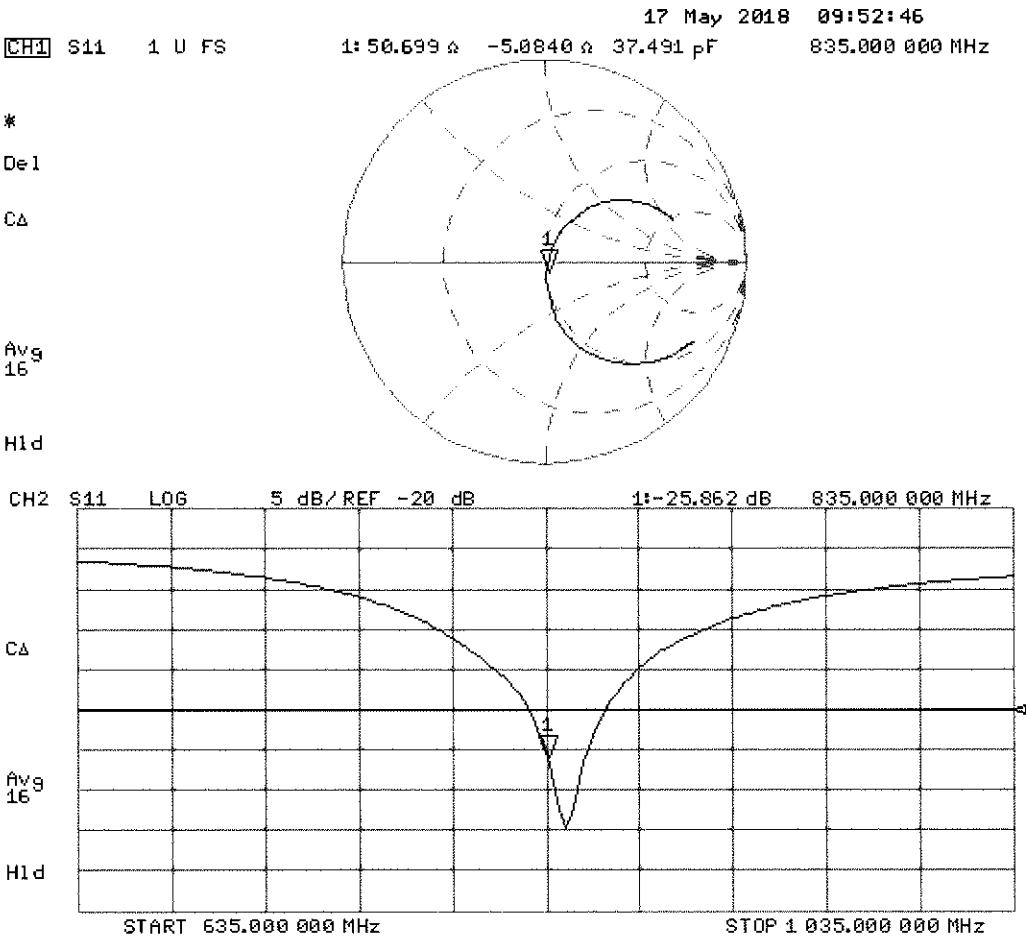
SAR(1 g) = 2.45 W/kg; SAR(10 g) = 1.58 W/kg

Maximum value of SAR (measured) = 3.32 W/kg



0 dB = 3.32 W/kg = 5.21 dBW/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 18.05.2018

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:4d180

Communication System: UID 0 - CW; Frequency: 835 MHz

Medium parameters used: $f = 835$ MHz; $\sigma = 0.99$ S/m; $\epsilon_r = 54.6$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(10.05, 10.05, 10.05) @ 835 MHz; Calibrated: 30.12.2017
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 26.10.2017
- Phantom: Flat Phantom 4.9 (Back); Type: QD 00R P49 AA; Serial: 1005
- DASY52 52.10.1(1476); SEMCAD X 14.6.11(7439)

Dipole Calibration for Body Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

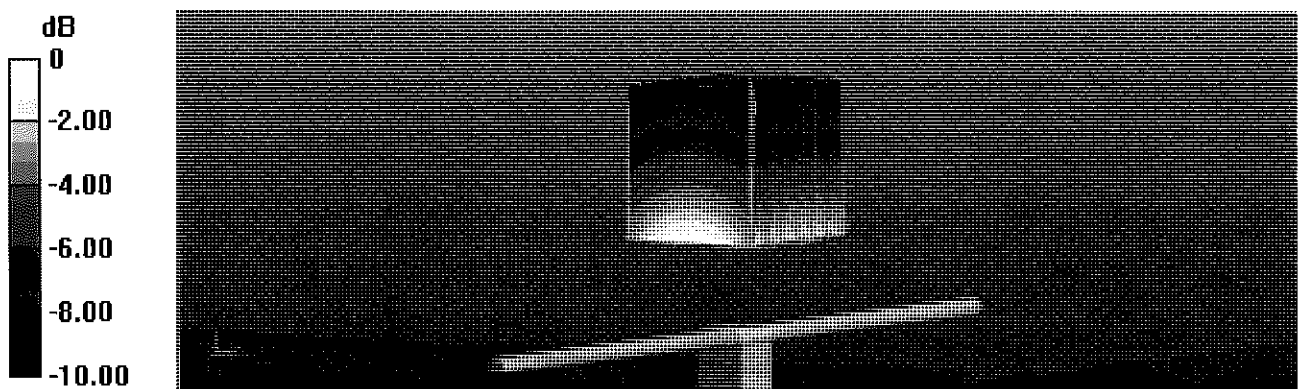
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 60.80 V/m; Power Drift = -0.02 dB

Peak SAR (extrapolated) = 3.62 W/kg

SAR(1 g) = 2.44 W/kg; SAR(10 g) = 1.6 W/kg

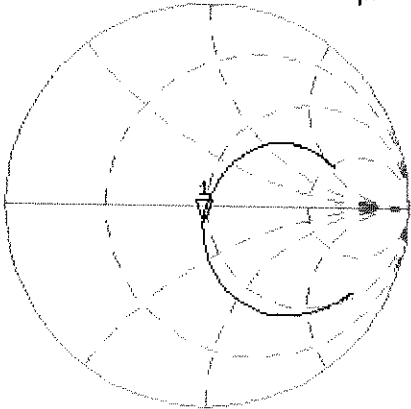
Maximum value of SAR (measured) = 3.23 W/kg



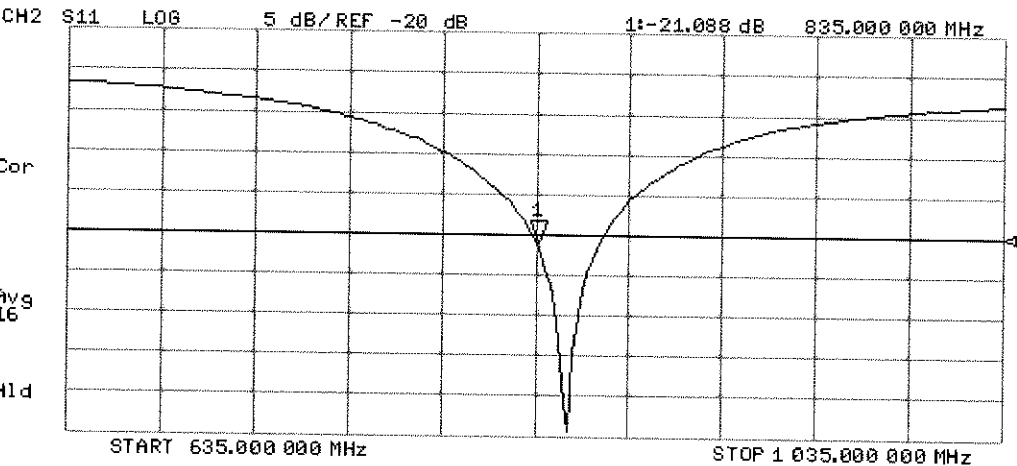
Impedance Measurement Plot for Body TSL

CH1 S11 1 U FS 18 May 2018 10:19:30
1: 47.234 Ω -8.1504 Ω 23.386 pF 835.000 000 MHz

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Certification of Calibration

Object D835V2 – SN: 4d180

Calibration procedure(s) Procedure for Calibration Extension for SAR Dipoles.

Extended Calibration date: May 16, 2019

Description: SAR Validation Dipole at 835 MHz.

Calibration Equipment used:

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
Agilent	8753ES	S-Parameter Network Analyzer	10/2/2018	Annual	10/2/2019	US39170118
Agilent	N5182A	MXG Vector Signal Generator	6/15/2018	Annual	6/15/2019	MY47420837
Amplifier Research	15S1G6	Amplifier	CBT	N/A	CBT	343972
Anritsu	ML2495A	Power Meter	10/21/2018	Annual	10/21/2019	941001
Anritsu	MA2411B	Pulse Power Sensor	10/30/2018	Annual	10/30/2019	1207470
Anritsu	MA2411B	Pulse Power Sensor	11/20/2018	Annual	11/20/2019	1339007
Control Company	4040	Temperature / Humidity Monitor	2/28/2018	Biennial	2/28/2020	150761911
Control Company	4352	Ultra Long Stem Thermometer	2/28/2018	Biennial	2/28/2020	170330160
Keysight	772D	Dual Directional Coupler	CBT	N/A	CBT	MY52180215
Keysight Technologies	85033E	Standard Mechanical Calibration Kit (DC to 9GHz, 3.5mm)	6/4/2018	Annual	6/4/2019	MY53401181
Mini-Circuits	BW-N20W5+	DC to 18 GHz Precision Fixed 20 dB Attenuator	CBT	N/A	CBT	N/A
Mini-Circuits	NLP-2950+	Low Pass Filter DC to 2700 MHz	CBT	N/A	CBT	N/A
Narda	4772-3	Attenuator (3dB)	CBT	N/A	CBT	9406
Pasternack	PE2208-6	Bidirectional Coupler	CBT	N/A	CBT	N/A
Pasternack	PE5011-1	Torque Wrench	7/19/2017	Biennial	7/19/2019	N/A
SPEAG	DAKS-3.5	Portable DAK	9/11/2018	Annual	9/11/2019	1045
SPEAG	EX3DV4	SAR Probe	7/20/2018	Annual	7/20/2019	7416
SPEAG	DAE4	Dasy Data Acquisition Electronics	7/10/2018	Annual	7/10/2019	1402

Measurement Uncertainty = $\pm 23\%$ (k=2)

	Name	Function	Signature
Calibrated By:	Parker Jones	Team Lead Engineer	<i>Parker Jones</i>
Approved By:	Kaitlin O'Keefe	Senior Technical Manager	<i>KOK</i>

DIPOLE CALIBRATION EXTENSION

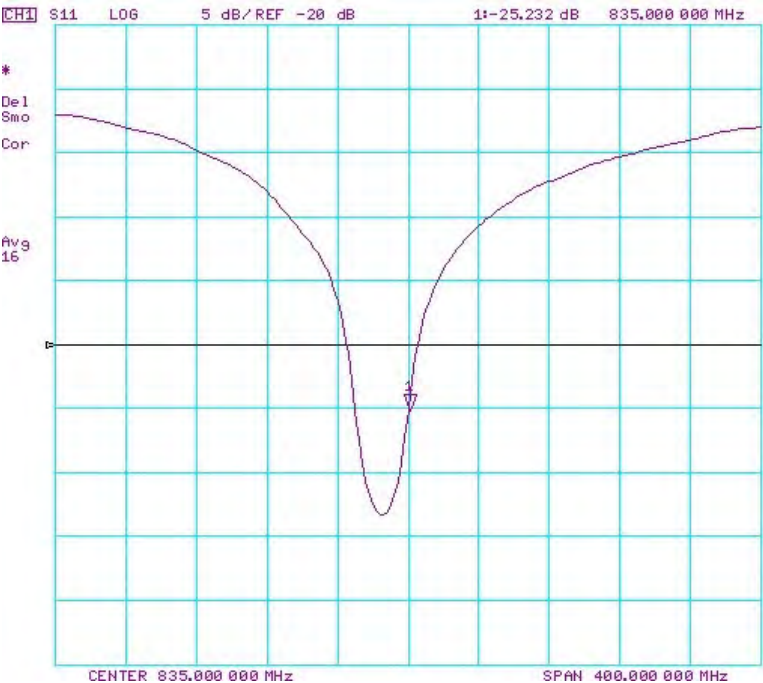
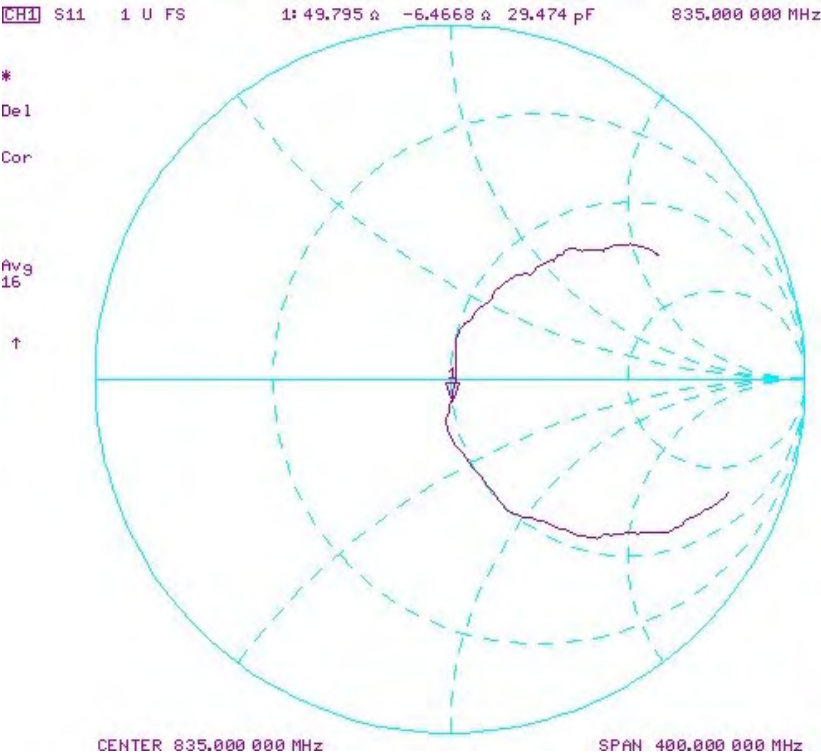
Per KDB 865664 D01, calibration intervals of up to three years may be considered for reference dipoles when it is demonstrated that the SAR target, impedance and return loss of a dipole have remained stable according to the following requirements:

1. The measured SAR does not deviate more than 10% from the target on the calibration certificate.
2. The return-loss does not deviate more than 20% from the previous measurement and meets the required 20dB minimum return-loss requirement.
3. The measurement of real or imaginary parts of impedance does not deviate more than 5Ω from the previous measurement.

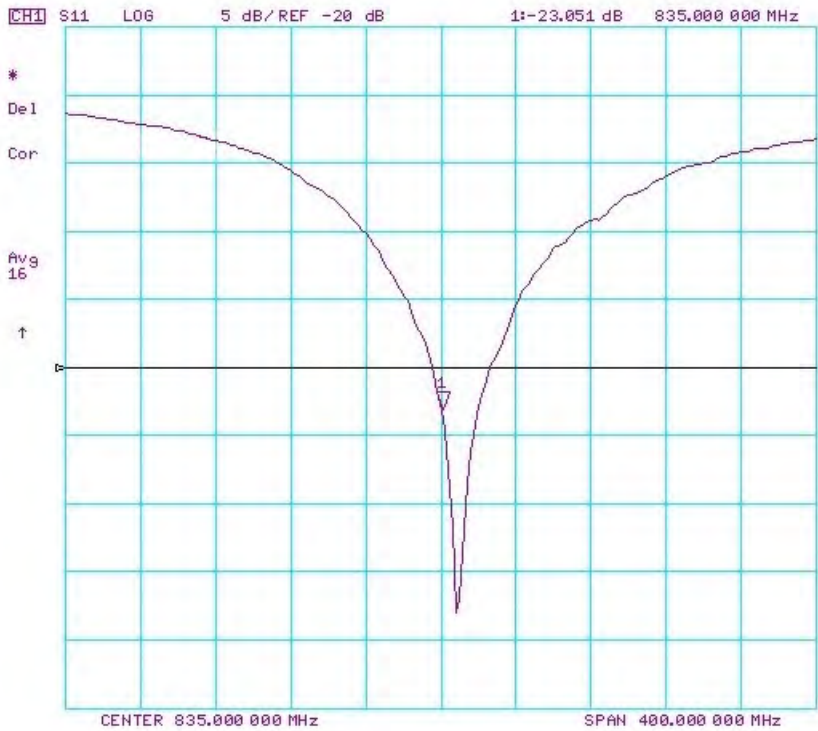
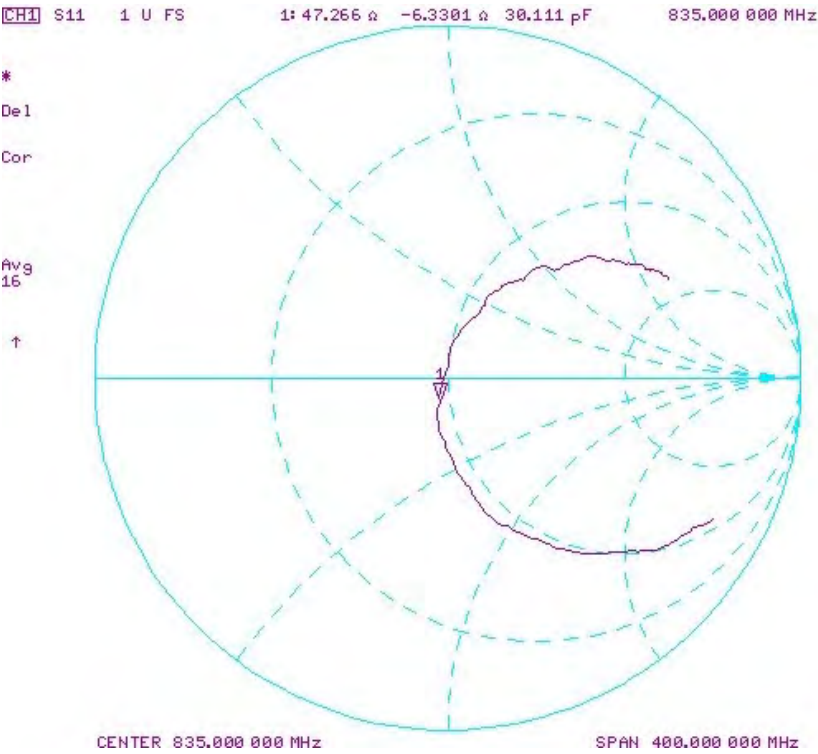
The following dipole was checked to pass the above 3 requirements to have 2-year calibration period from the calibration date:

Calibration Date	Extension Date	Certificate Electrical Delay (ns)	Certificate SAR Target Head (1g) W/kg @ 23.0 dBm	Measured Head SAR (1g) W/kg @ 23.0 dBm	Deviation 1g (%)	Certificate SAR Target Body (10g) W/kg @ 23.0 dBm	Measured Body SAR (10g) W/kg @ 23.0 dBm	Deviation 10g (%)	Certificate Impedance Head (Ohm) Real	Measured Impedance Head (Ohm) Real	Difference (Ohm) Real	Certificate Impedance Head (Ohm) Imaginary	Measured Impedance Head (Ohm) Imaginary	Difference (Ohm) Imaginary	Certificate Return Loss Head (dB)	Measured Return Loss Head (dB)	Deviation (%)	PASS/FAIL
5/18/2018	5/16/2019	1.396	1.92	1.89	3.65%	1.244	1.3	4.50%	50.7	49.8	0.9	-5.1	-6.5	1.4	-25.9	-25.2	2.60%	PASS
Calibration Date	Extension Date	Certificate Electrical Delay (ns)	Certificate SAR Target Body (1g) W/kg @ 23.0 dBm	Measured Body SAR (1g) W/kg @ 23.0 dBm	Deviation 1g (%)	Certificate SAR Target Body (10g) W/kg @ 23.0 dBm	Measured Body SAR (10g) W/kg @ 23.0 dBm	Deviation 10g (%)	Certificate Impedance Body (Ohm) Real	Measured Impedance Body (Ohm) Real	Difference (Ohm) Real	Certificate Impedance Body (Ohm) Imaginary	Measured Impedance Body (Ohm) Imaginary	Difference (Ohm) Imaginary	Certificate Return Loss Body (dB)	Measured Return Loss Body (dB)	Deviation (%)	PASS/FAIL
5/18/2018	5/16/2019	1.396	1.918	2.05	6.88%	1.262	1.34	6.18%	47.2	47.3	0.1	-8.2	-6.3	1.9	-21.1	-23.1	-9.20%	PASS

Impedance & Return-Loss Measurement Plot for Head TSL



Impedance & Return-Loss Measurement Plot for Body TSL



Certification of Calibration

Object: D835V2 – SN: 4d180

Calibration procedure(s): Procedure for Calibration Extension for SAR Dipoles.

Extended Calibration date: May 18, 2020

Description: SAR Validation Dipole at 835 MHz.

Calibration Equipment used:

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
Agilent	8753ES	S-Parameter Network Analyzer	1/16/2020	Annual	1/16/2021	US39170118
Agilent	N5182A	MXG Vector Signal Generator	8/19/2019	Annual	8/19/2020	MY47420837
Amplifier Research	15S1G6	Amplifier	CBT	N/A	CBT	343972
Anritsu	MA2411B	Pulse Power Sensor	1/21/2020	Annual	1/21/2021	1207470
Anritsu	MA2411B	Pulse Power Sensor	1/21/2020	Annual	1/21/2021	1339007
Anritsu	ML2495A	Power Meter	1/15/2020	Annual	1/15/2021	1328004
Control Company	62344-734	Therm./ Clock/ Humidity Monitor	3/18/2019	Biennial	3/18/2021	192038436
Control Company	4352	Ultra Long Stem Thermometer	8/2/2018	Biennial	8/2/2020	181292000
Keysight Technologies	85033E	Standard Mechanical Calibration Kit (DC to 9GHz, 3.5mm)	7/2/2019	Annual	7/2/2020	MY53401181
MiniCircuits	VLF-6000+	Low Pass Filter	CBT	N/A	CBT	N/A
Mini-Circuits	BW-N20W5+	DC to 18 GHz Precision Fixed 20 dB Attenuator	CBT	N/A	CBT	N/A
Narda	4772-3	Attenuator (3dB)	CBT	N/A	CBT	9406
Pasternack	PE2208-6	Bidirectional Coupler	CBT	N/A	CBT	N/A
Pasternack	NC-100	Torque Wrench	5/23/2018	Biennial	5/23/2020	N/A
SPEAG	DAE4	Dasy Data Acquisition Electronics	8/12/2019	Annual	8/12/2020	1408
SPEAG	DAE4	Dasy Data Acquisition Electronics	3/19/2020	Annual	3/19/2021	604
SPEAG	DAK-3.5	Dielectric Assessment Kit	5/12/2020	Annual	5/12/2021	1070
SPEAG	EX3DV4	SAR Probe	8/29/2019	Annual	8/29/2020	3949
SPEAG	EX3DV4	SAR Probe	3/20/2020	Annual	3/20/2021	7421

Measurement Uncertainty = $\pm 23\%$ (k=2)

	Name	Function	Signature
Calibrated By:	Parker Jones	Team Lead Engineer	<i>Parker Jones</i>
Approved By:	Kaitlin O'Keefe	Managing Director	<i>KOK</i>

DIPOLE CALIBRATION EXTENSION

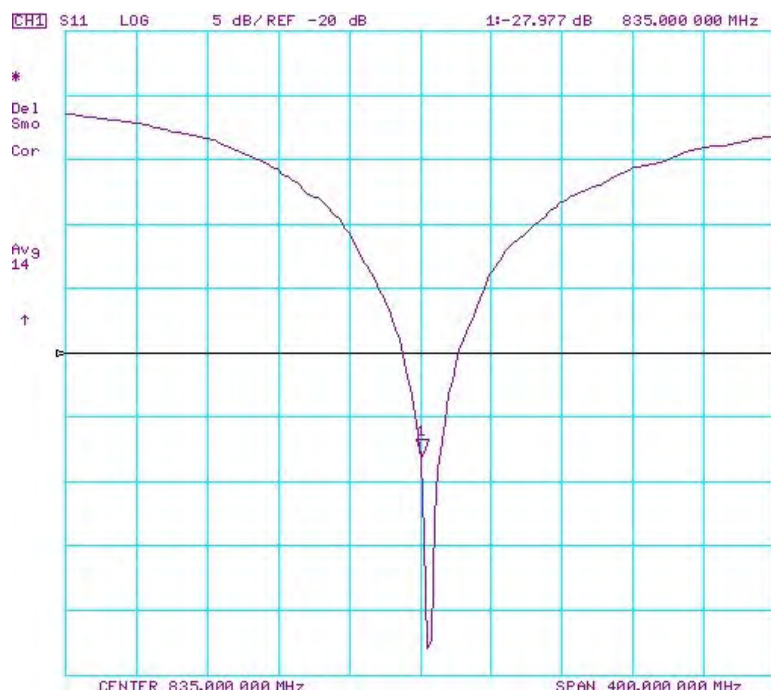
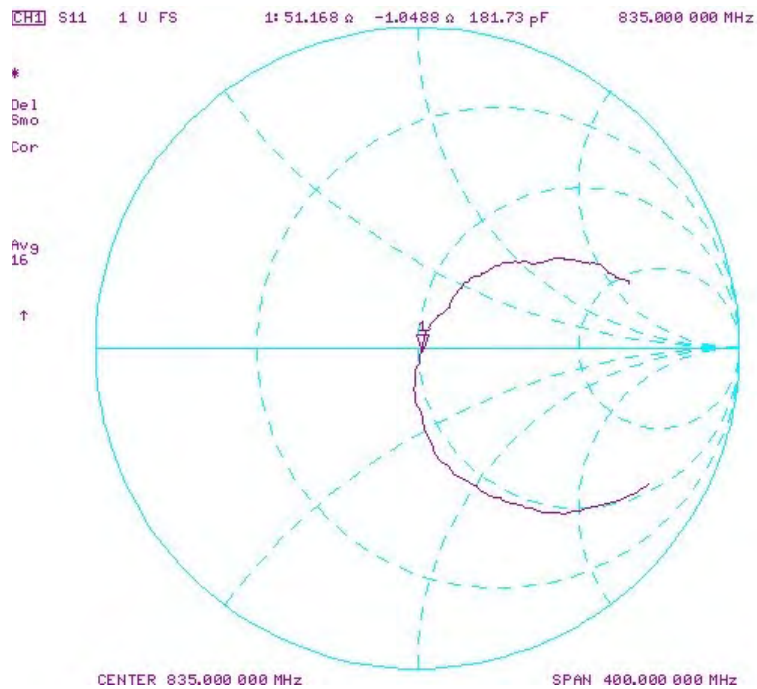
Per KDB 865664 D01, calibration intervals of up to three years may be considered for reference dipoles when it is demonstrated that the SAR target, impedance and return loss of a dipole have remained stable according to the following requirements:

1. The measured SAR does not deviate more than 10% from the target on the calibration certificate.
2. The return-loss does not deviate more than 20% from the previous measurement and meets the required 20dB minimum return-loss requirement.
3. The measurement of real or imaginary parts of impedance does not deviate more than 5Ω from the previous measurement.

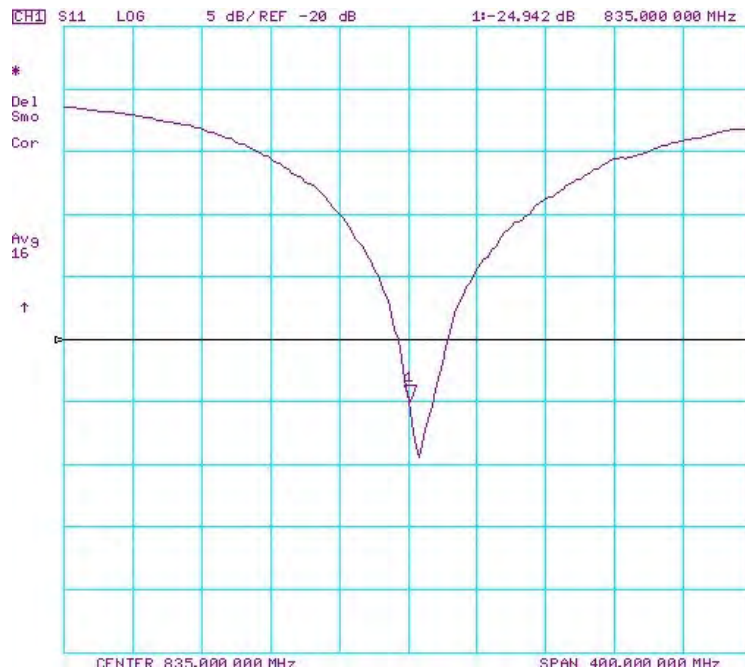
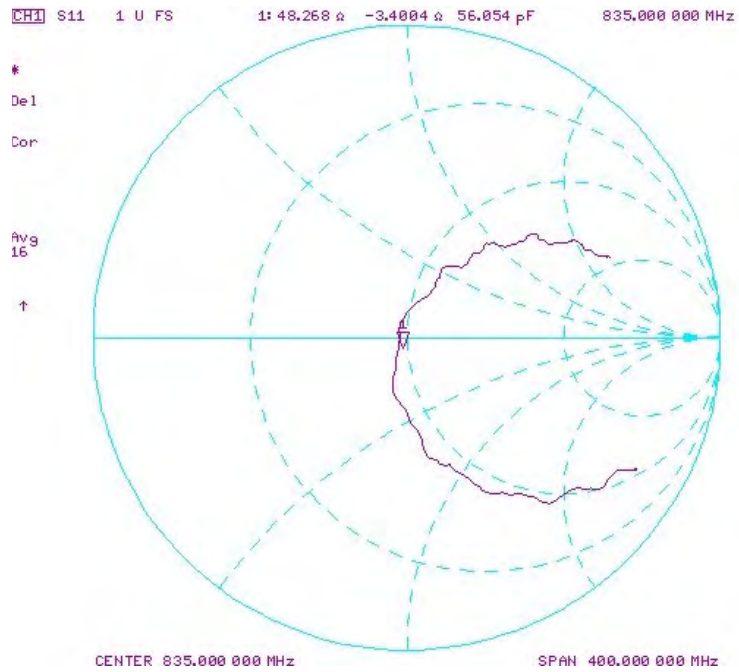
The following dipole was checked to pass the above 3 requirements to have 3-year calibration period from the calibration date:

Calibration Date	Extension Date	Certificate Electrical Delay (ns)	Certificate SAR Target Head (1g) W/kg @ 23.0 dBm	Measured Head SAR (1g) W/kg @ 23.0 dBm	Deviation 1g (%)	Certificate SAR Target Body (10g) W/kg @ 23.0 dBm	Measured Body SAR (10g) W/kg @ 23.0 dBm	Deviation 10g (%)	Certificate Impedance Head (Ohm) Real	Measured Impedance Head (Ohm) Real	Difference (Ohm) Real	Certificate Impedance Head (Ohm) Imaginary	Measured Impedance Head (Ohm) Imaginary	Difference (Ohm) Imaginary	Certificate Return Loss Head (dB)	Measured Return Loss Head (dB)	Deviation (%)	PASS/FAIL
5/18/2018	5/18/2020	1.396	1.92	2	4.17%	1.244	1.32	6.11%	50.7	51.2	0.5	-5.1	-1	4.1	-25.9	-28	-8.10%	PASS
Calibration Date	Extension Date	Certificate Electrical Delay (ns)	Certificate SAR Target Body (1g) W/kg @ 23.0 dBm	Measured Body SAR (1g) W/kg @ 23.0 dBm	Deviation 1g (%)	Certificate SAR Target Body (10g) W/kg @ 23.0 dBm	Measured Body SAR (10g) W/kg @ 23.0 dBm	Deviation 10g (%)	Certificate Impedance Body (Ohm) Real	Measured Impedance Body (Ohm) Real	Difference (Ohm) Real	Certificate Impedance Body (Ohm) Imaginary	Measured Impedance Body (Ohm) Imaginary	Difference (Ohm) Imaginary	Certificate Return Loss Body (dB)	Measured Return Loss Body (dB)	Deviation (%)	PASS/FAIL
5/18/2018	5/18/2020	1.396	1.918	2	4.28%	1.262	1.31	3.80%	47.2	46.3	1.1	-8.2	-3.4	4.8	-21.1	-24.9	-18.00%	PASS

Impedance & Return-Loss Measurement Plot for Head TSL



Impedance & Return-Loss Measurement Plot for Body TSL



**Calibration Laboratory of
Schmid & Partner
Engineering AG**
Zeughausstrasse 43, 8004 Zurich, Switzerland



S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
S Servizio svizzero di taratura
S Swiss Calibration Service

Accredited by the Swiss Accreditation Service (SAS)
The Swiss Accreditation Service is one of the signatories to the EA
Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 0108**

Client: **PC Test**

Certificate No: **D850V2-1010_Sep17**

CALIBRATION CERTIFICATE

Object: **D850V2 - SN:1010**

Calibration procedure(s): **QACAL-05.v9**
Calibration procedure for dipole validation kits above 700 MHz

Calibration date: **September 08, 2017**

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature $(22 \pm 3)^\circ\text{C}$ and humidity $< 70\%$.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter NRP	SN: 104778	04-Apr-17 (No. 217-02521/02522)	Apr-18
Power sensor NRP-Z91	SN: 103244	04-Apr-17 (No. 217-02521)	Apr-18
Power sensor NRP-Z91	SN: 103245	04-Apr-17 (No. 217-02522)	Apr-18
Reference 20 dB Attenuator	SN: 5058 (20k)	07-Apr-17 (No. 217-02528)	Apr-18
Type-N mismatch combination	SN: 5047.2 / 06327	07-Apr-17 (No. 217-02529)	Apr-18
Reference Probe EX3DV4	SN: 7349	31-May-17 (No. EX3-7349_May17)	May-18
DAE4	SN: 601	28-Mar-17 (No. DAE4-601_Mer17)	Mar-18

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter EPM-442A	SN: GB37480704	07-Oct-15 (in house check Oct-16)	In house check: Oct-18
Power sensor HP 8481A	SN: US37292783	07-Oct-15 (in house check Oct-16)	In house check: Oct-18
Power sensor HP 8481A	SN: MY41092317	07-Oct-15 (in house check Oct-16)	In house check: Oct-18
RF generator R&S SMT-06	SN: 100972	15-Jun-15 (in house check Oct-16)	In house check: Oct-18
Network Analyzer HP 8753E	SN: US37390585	18-Oct-01 (in house check Oct-16)	In house check: Oct-17

Calibrated by: **Claudio Leubler** **Laboratory Technician**

Approved by: **Katja Pokovic** **Technical Manager**

Signature:

Signature:

Issued: September 8, 2017

This calibration certificate shall not be reproduced except in full without written approval of the laboratory.



Accredited by the Swiss Accreditation Service (SAS)
The Swiss Accreditation Service is one of the signatories to the EA
Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 0108**

Glossary:

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORM x,y,z
N/A	not applicable or not measured

Calibration is Performed According to the Following Standards:

- a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
- b) IEC 62209-1, "Measurement procedure for the assessment of Specific Absorption Rate (SAR) from hand-held and body-mounted devices used next to the ear (frequency range of 300 MHz to 6 GHz)", July 2016
- c) IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010
- d) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

- e) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

- *Measurement Conditions:* Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- *Antenna Parameters with TSL:* The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- *Feed Point Impedance and Return Loss:* These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- *Electrical Delay:* One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- *SAR measured:* SAR measured at the stated antenna input power.
- *SAR normalized:* SAR as measured, normalized to an input power of 1 W at the antenna connector.
- *SAR for nominal TSL parameters:* The measured TSL parameters are used to calculate the nominal SAR result.

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k=2$, which for a normal distribution corresponds to a coverage probability of approximately 95%.

Measurement Conditions

DASY system configuration, as far as not given on page 1.

DASY Version	DASY5	V52.10.0
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	850 MHz $\pm$ 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	41.5	0.92 mho/m
Measured Head TSL parameters	(22.0 $\pm$ 0.2) °C	40.9 $\pm$ 6 %	0.94 mho/m $\pm$ 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.53 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	9.93 W/kg $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.63 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	6.42 W/kg $\pm$ 16.5 % (k=2)

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	55.2	0.99 mho/m
Measured Body TSL parameters	(22.0 $\pm$ 0.2) °C	55.3 $\pm$ 6 %	0.99 mho/m $\pm$ 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm ³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	2.55 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	10.2 W/kg $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	1.67 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	6.68 W/kg $\pm$ 16.5 % (k=2)

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	50.2 Ω - 3.1 j Ω
Return Loss	- 30.2 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	46.6 Ω - 5.8 j Ω
Return Loss	- 23.2 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.432 ns
----------------------------------	----------

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.

No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	September 04, 2012

DASY5 Validation Report for Head TSL

Date: 08.09.2017

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 850 MHz; Type: D850V2; Serial: D850V2 - SN:1010

Communication System: UID 0 - CW; Frequency: 850 MHz

Medium parameters used: $f = 850$ MHz; $\sigma = 0.94$ S/m; $\epsilon_r = 40.9$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(9.93, 9.93, 9.93); Calibrated: 31.05.2017;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 28.03.2017
- Phantom: Flat Phantom 4.9 (front); Type: QD 00L P49 AA; Serial: 1001
- DASY52 52.10.0(1446); SEMCAD X 14.6.10(7417)

Dipole Calibration for Head Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

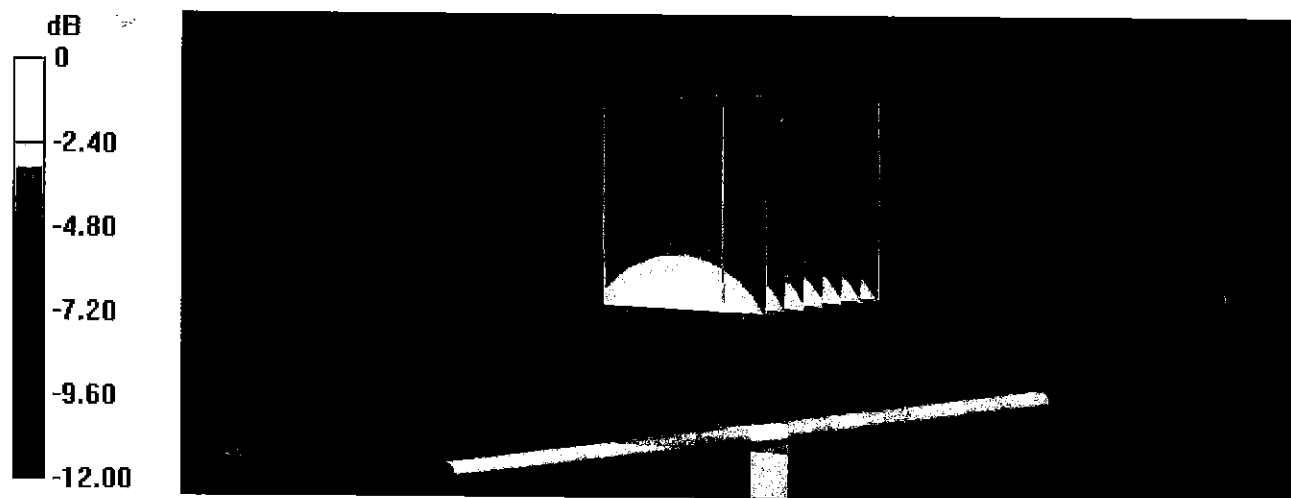
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 63.32 V/m; Power Drift = -0.01 dB

Peak SAR (extrapolated) = 3.85 W/kg

SAR(1 g) = 2.53 W/kg; SAR(10 g) = 1.63 W/kg

Maximum value of SAR (measured) = 3.41 W/kg



0 dB = 3.41 W/kg = 5.33 dBW/kg

Impedance Measurement Plot for Head TSL

8 Sep 2017 13:24:25
 CH1 S11 1 U FS 1: 50.227 Ω -3.0996 Ω 60.408 pF 850.000 000 MHz

*

De1

CA

Avg
16

H1d

CH2 S11 LOG 5 dB/REF -20 dB 1: -30.173 dB 850.000 000 MHz

CA

Avg
16

H1d

START 650.000 000 MHz

STOP 1 850.000 000 MHz

DASY5 Validation Report for Body TSL

Date: 08.09.2017

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 850 MHz; Type: D850V2; Serial: D850V2 - SN:1010

Communication System: UID 0 - CW; Frequency: 850 MHz

Medium parameters used: $f = 850 \text{ MHz}$; $\sigma = 0.99 \text{ S/m}$; $\epsilon_r = 55.3$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(10.11, 10.11, 10.11); Calibrated: 31.05.2017;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 28.03.2017
- Phantom: Flat Phantom 4.9 (Back); Type: QD 00R P49 AA; Serial: 1005
- DASY52 52.10.0(1446); SEMCAD X 14.6.10(7417)

Dipole Calibration for Body Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

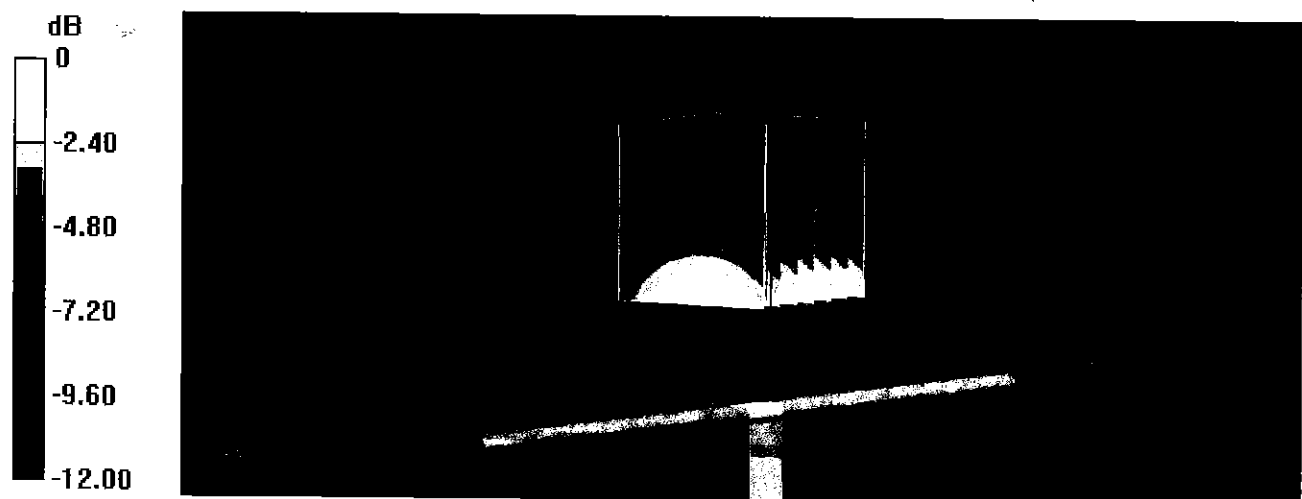
Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 61.09 V/m; Power Drift = -0.02 dB

Peak SAR (extrapolated) = 3.79 W/kg

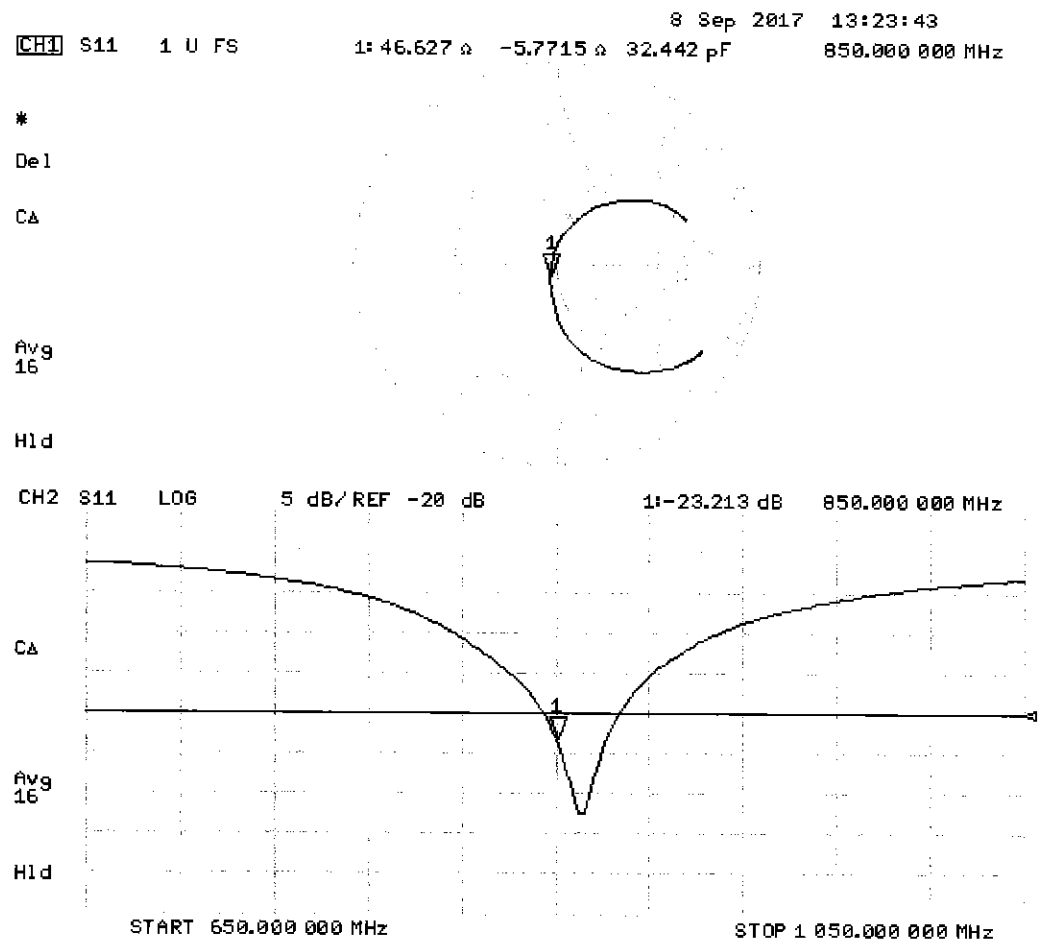
SAR(1 g) = 2.55 W/kg; SAR(10 g) = 1.67 W/kg

Maximum value of SAR (measured) = 3.36 W/kg



0 dB = 3.36 W/kg = 5.26 dBW/kg

Impedance Measurement Plot for Body TSL



Certification of Calibration

Object D850V2 – SN: 1010

Calibration procedure(s) Procedure for Calibration Extension for SAR Dipoles.

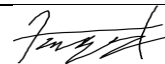
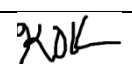
Extended Calibration date: September 08, 2018

Description: SAR Validation Dipole at 850 MHz.

Calibration Equipment used:

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
Agilent	8753ES	S-Parameter Network Analyzer	9/14/2017	Annual	9/14/2018	US39170118
Agilent	N5182A	MXG Vector Signal Generator	3/19/2018	Annual	3/19/2019	US46240505
Amplifier Research	15S1G6	Amplifier	CBT	N/A	CBT	343972
Anritsu	ML2496A	Power Meter	10/9/2017	Annual	10/9/2018	1138001
Anritsu	MA2411B	Pulse Power Sensor	11/15/2017	Annual	11/15/2018	1339007
Anritsu	MA2411B	Pulse Power Sensor	11/22/2017	Annual	11/22/2018	1339008
Control Company	4040	Temperature / Humidity Monitor	2/28/2018	Biennial	2/28/2020	150761911
Control Company	4352	Ultra Long Stem Thermometer	2/14/2017	Biennial	2/14/2019	170112507
Keysight	772D	Dual Directional Coupler	CBT	N/A	CBT	MY52180215
Keysight Technologies	85033E	Standard Mechanical Calibration Kit (DC to 9GHz, 3.5mm)	6/4/2018	Annual	6/4/2019	MY53401181
Mini-Circuits	BW-N20W5+	DC to 18 GHz Precision Fixed 20 dB Attenuator	CBT	N/A	CBT	N/A
Mini-Circuits	NLP-2950+	Low Pass Filter DC to 2700 MHz	CBT	N/A	CBT	N/A
Narda	4772-3	Attenuator (3dB)	CBT	N/A	CBT	9406
Pasternack	PE2209-10	Bidirectional Coupler	CBT	N/A	CBT	N/A
Pasternack	PE5011-1	Torque Wrench	7/19/2017	Biennial	7/19/2019	N/A
SPEAG	DAK-3.5	Dielectric Assessment Kit	5/15/2018	Annual	5/15/2019	1070
SPEAG	ES3DV3	SAR Probe	9/18/2017	Annual	9/18/2018	3287
SPEAG	DAE4	Data Acquisition Electronics	1/26/2018	Annual	1/26/2019	1533
SPEAG	EX3DV4	SAR Probe	1/26/2018	Annual	1/26/2019	7490
SPEAG	DAE4	Data Acquisition Electronics	1/26/2018	Annual	1/26/2019	1532

Measurement Uncertainty = $\pm 23\%$ (k=2)

	Name	Function	Signature
Calibrated By:	Sangmin Cha	Team Lead Engineer	
Approved By:	Kaitlin O'Keefe	Senior Technical Manager	

DIPOLE CALIBRATION EXTENSION

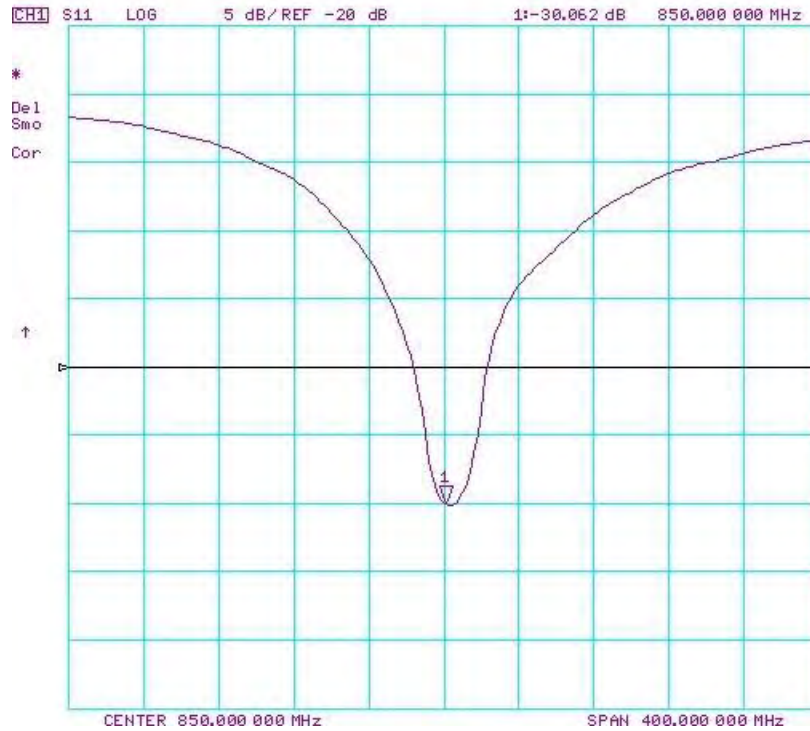
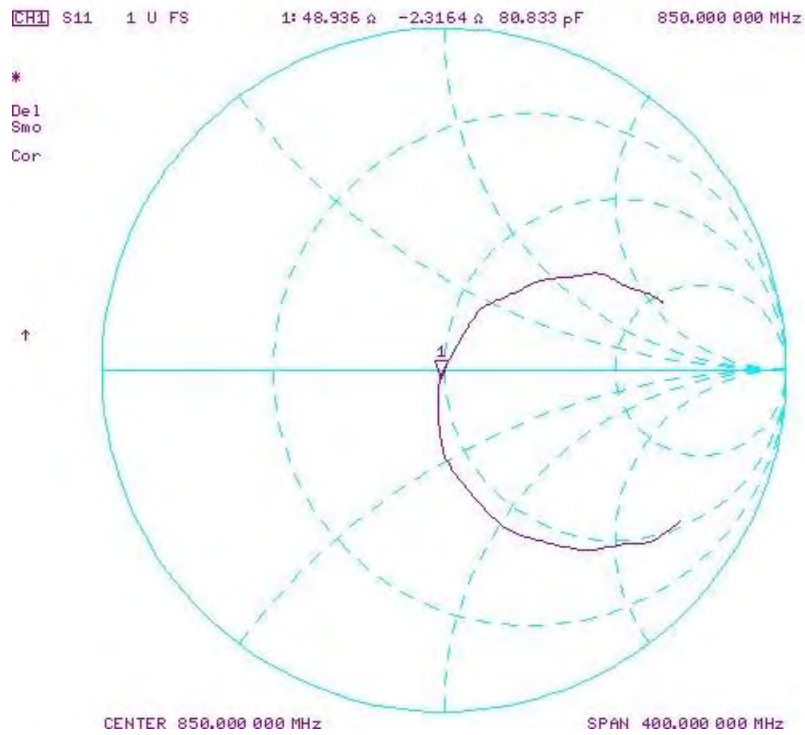
Per KDB 865664 D01, calibration intervals of up to three years may be considered for reference dipoles when it is demonstrated that the SAR target, impedance and return loss of a dipole have remained stable according to the following requirements:

1. The measured SAR does not deviate more than 10% from the target on the calibration certificate.
2. The return-loss does not deviate more than 20% from the previous measurement and meets the required 20dB minimum return-loss requirement.
3. The measurement of real or imaginary parts of impedance does not deviate more than 5Ω from the previous measurement.

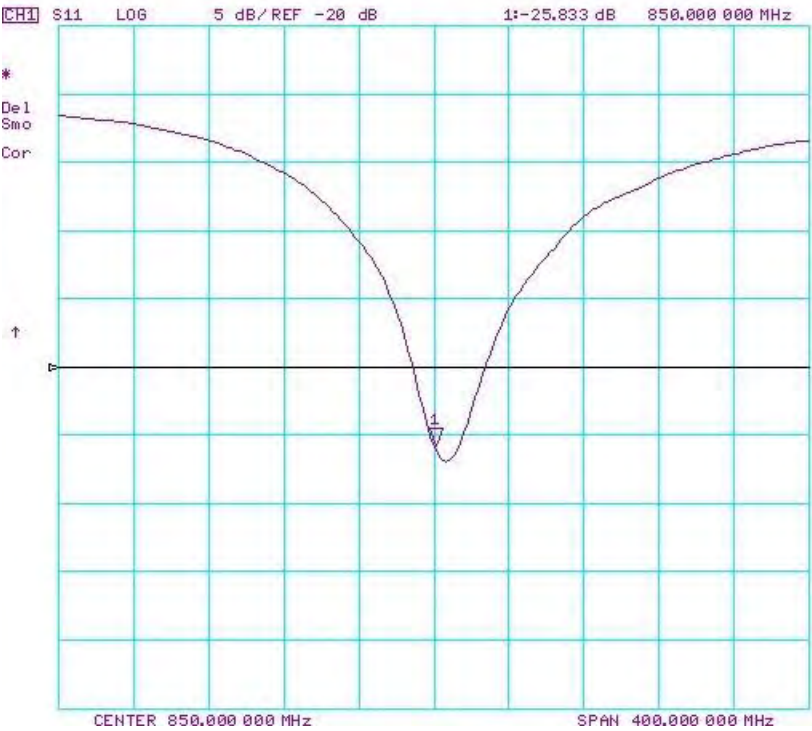
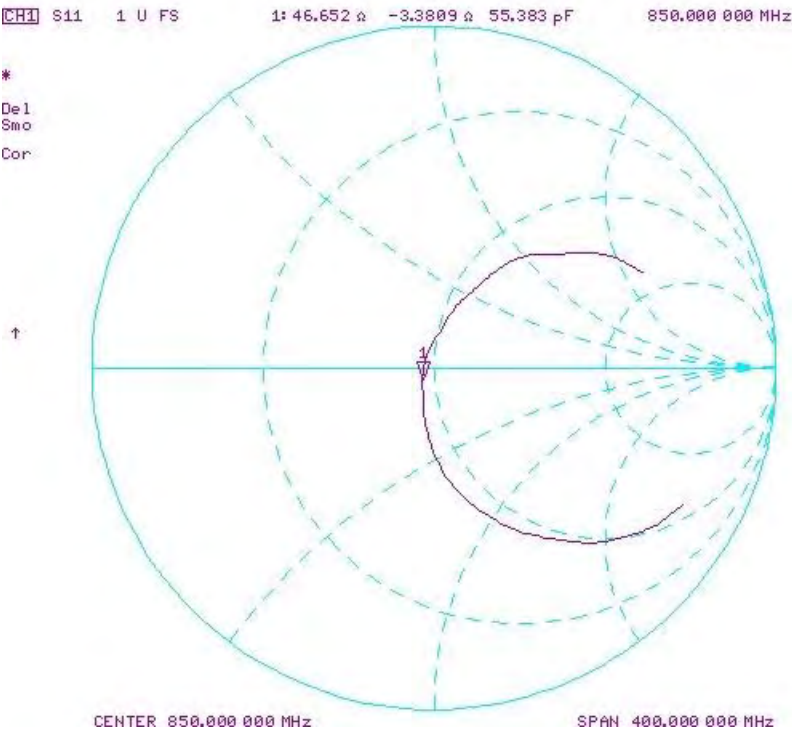
The following dipole was checked to pass the above 3 requirements to have 2-year calibration period from the calibration date:

Calibration Date	Extension Date	Certificate Electrical Delay (ns)	Certificate SAR Target Head (1g) W/kg @ 23.0 dBm	Measured Head SAR (1g) W/kg @ 23.0 dBm	Deviation 1g (%)	Certificate SAR Target Body (10g) W/kg @ 23.0 dBm	Measured Body SAR (10g) W/kg @ 23.0 dBm	Deviation 10g (%)	Certificate Impedance Head (Ohm) Real	Measured Impedance Head (Ohm) Real	Difference (Ohm) Real	Certificate Impedance Head (Ohm) Imaginary	Measured Impedance Head (Ohm) Imaginary	Difference (Ohm) Imaginary	Certificate Return Loss Head (dB)	Measured Return Loss Head (dB)	Deviation (%)	PASS/FAIL
9/8/2017	9/8/2018	1.432	1.986	2.01	1.21%	1.284	1.31	2.02%	50.2	48.9	1.3	-3.1	-2.3	0.8	-30.2	-30.1	0.30%	PASS
Calibration Date	Extension Date	Certificate Electrical Delay (ns)	Certificate SAR Target Body (1g) W/kg @ 23.0 dBm	Measured Body SAR (1g) W/kg @ 23.0 dBm	Deviation 1g (%)	Certificate SAR Target Body (10g) W/kg @ 23.0 dBm	Measured Body SAR (10g) W/kg @ 23.0 dBm	Deviation 10g (%)	Certificate Impedance Body (Ohm) Real	Measured Impedance Body (Ohm) Real	Difference (Ohm) Real	Certificate Impedance Body (Ohm) Imaginary	Measured Impedance Body (Ohm) Imaginary	Difference (Ohm) Imaginary	Certificate Return Loss Body (dB)	Measured Return Loss Body (dB)	Deviation (%)	PASS/FAIL
9/8/2017	9/8/2017	1.432	2.04	2.01	-1.47%	1.336	1.32	-1.20%	46.6	46.7	0.1	-5.8	-3.4	2.4	-23.2	-25.8	-11.20%	PASS

Impedance & Return-Loss Measurement Plot for Head TSL



Impedance & Return-Loss Measurement Plot for Body TSL



Certification of Calibration

Object D850V2 – SN: 1010

Calibration procedure(s) Procedure for Calibration Extension for SAR Dipoles.

Extended Calibration date: September 8, 2019

Description: SAR Validation Dipole at 850 MHz.

Calibration Equipment used:

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
Agilent	8753ES	S-Parameter Network Analyzer	10/2/2018	Annual	10/2/2019	US39170118
Agilent	E4438C	ESG Vector Signal Generator	6/27/2019	Annual	6/27/2020	MY45093852
Amplifier Research	15S1G6	Amplifier	CBT	N/A	CBT	343972
Anritsu	ML2495A	Power Meter	10/21/2018	Annual	10/21/2019	941001
Anritsu	MA2411B	Pulse Power Sensor	10/30/2018	Annual	10/30/2019	1207470
Anritsu	MA2411B	Pulse Power Sensor	11/20/2018	Annual	11/20/2019	1339007
Control Company	4040	Temperature / Humidity Monitor	2/28/2018	Biennial	2/28/2020	150761911
Control Company	4352	Ultra Long Stem Thermometer	2/28/2018	Biennial	2/28/2020	170330160
Keysight Technologies	85033E	Standard Mechanical Calibration Kit (DC to 9GHz, 3.5mm)	7/2/2019	Annual	7/2/2020	MY53401181
Keysight	772D	Dual Directional Coupler	CBT	N/A	CBT	MY52180215
Mini-Circuits	BW-N20W5+	DC to 18 GHz Precision Fixed 20 dB Attenuator	CBT	N/A	CBT	N/A
Mini-Circuits	NLP-2950+	Low Pass Filter DC to 2700 MHz	CBT	N/A	CBT	N/A
Narda	4772-3	Attenuator (3dB)	CBT	N/A	CBT	9406
Pasternack	PE2208-6	Bidirectional Coupler	CBT	N/A	CBT	N/A
Pasternack	NC-100	Torque Wrench	11/1/2017	Biennial	11/1/2019	N/A
SPEAG	DAK-3.5	Dielectric Assessment Kit	5/7/2019	Annual	5/7/2020	1070
SPEAG	EX3DV4	SAR Probe	1/24/2019	Annual	1/24/2020	7490
SPEAG	DAE4	Data Acquisition Electronics	1/15/2019	Annual	1/15/2020	1532

Measurement Uncertainty = $\pm 23\%$ (k=2)

	Name	Function	Signature
Calibrated By:	Parker Jones	Team Lead Engineer	<i>Parker Jones</i>
Approved By:	Kaitlin O'Keefe	Senior Technical Manager	<i>KOK</i>

DIPOLE CALIBRATION EXTENSION

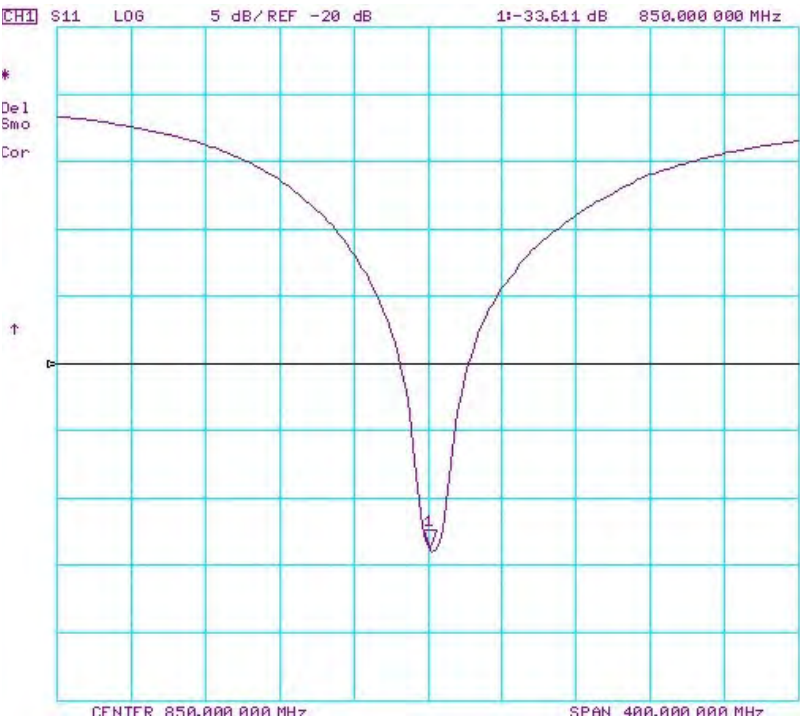
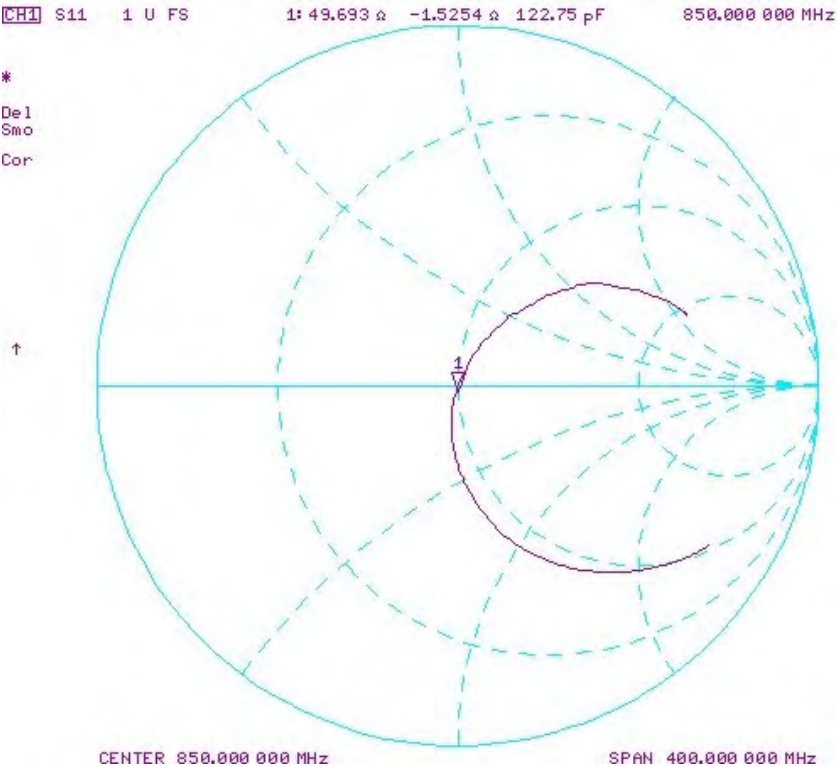
Per KDB 865664 D01, calibration intervals of up to three years may be considered for reference dipoles when it is demonstrated that the SAR target, impedance and return loss of a dipole have remained stable according to the following requirements:

1. The measured SAR does not deviate more than 10% from the target on the calibration certificate.
2. The return-loss does not deviate more than 20% from the previous measurement and meets the required 20dB minimum return-loss requirement.
3. The measurement of real or imaginary parts of impedance does not deviate more than 5Ω from the previous measurement.

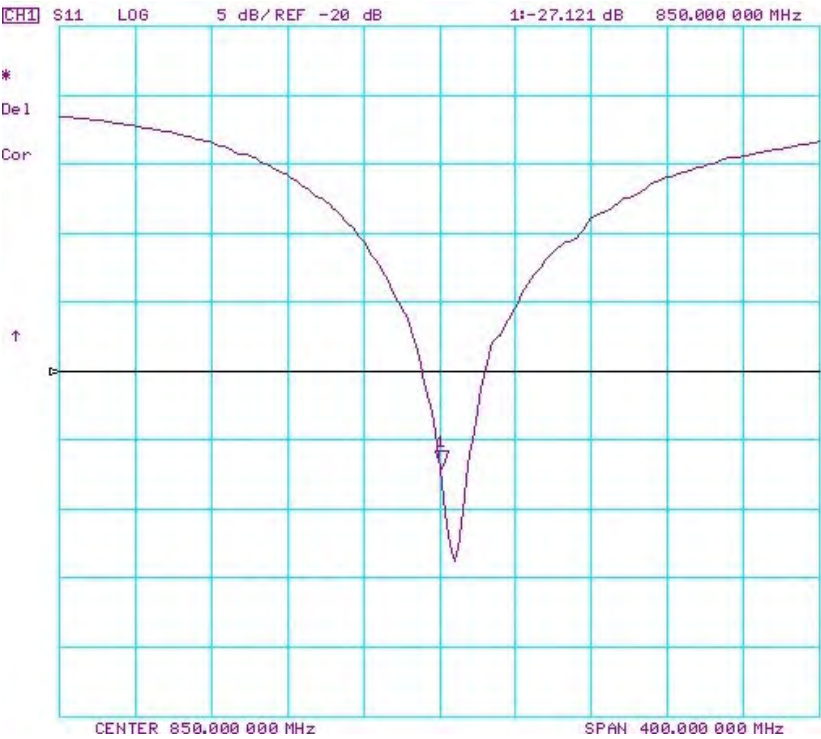
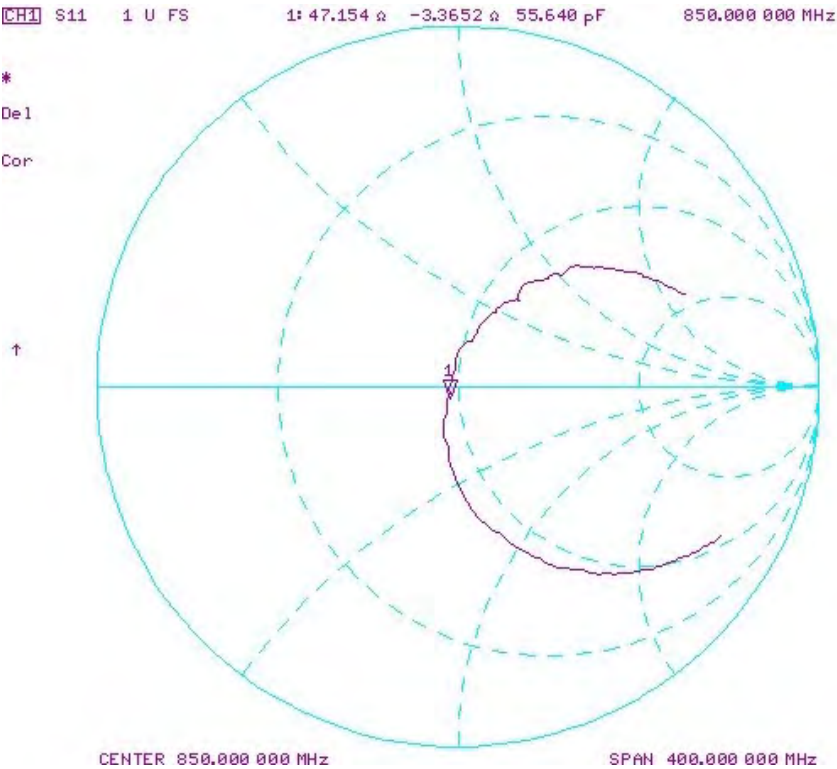
The following dipole was checked to pass the above 3 requirements to have 3-year calibration period from the calibration date:

Calibration Date	Extension Date	Certificate Electrical Delay (ns)	Certificate SAR Target Head (1g) W/kg @ 23.0 dBm	Measured Head SAR (1g) W/kg @ 23.0 dBm	Deviation 1g (%)	Certificate SAR Target Head (10g) W/kg @ 23.0 dBm	Measured Head SAR (10g) W/kg @ 23.0 dBm	Deviation 10g (%)	Certificate Impedance Head (Ohm) Real	Measured Impedance Head (Ohm) Real	Difference (Ohm) Real	Certificate Impedance Head (Ohm) Imaginary	Measured Impedance Head (Ohm) Imaginary	Difference (Ohm) Imaginary	Certificate Return Loss Head (dB)	Measured Return Loss Head (dB)	Deviation (%)	PASS/FAIL
9/8/2017	9/8/2019	1.432	1.986	2.03	2.22%	1.284	1.33	3.55%	50.2	49.7	0.5	-3.1	-1.5	1.6	-30.2	-33.6	-11.30%	PASS
Calibration Date	Extension Date	Certificate Electrical Delay (ns)	Certificate SAR Target Body (1g) W/kg @ 23.0 dBm	Measured Body SAR (1g) W/kg @ 23.0 dBm	Deviation 1g (%)	Certificate SAR Target Body (10g) W/kg @ 23.0 dBm	Measured Body SAR (10g) W/kg @ 23.0 dBm	Deviation 10g (%)	Certificate Impedance Body (Ohm) Real	Measured Impedance Body (Ohm) Real	Difference (Ohm) Real	Certificate Impedance Body (Ohm) Imaginary	Measured Impedance Body (Ohm) Imaginary	Difference (Ohm) Imaginary	Certificate Return Loss Body (dB)	Measured Return Loss Body (dB)	Deviation (%)	PASS/FAIL
9/8/2017	9/8/2019	1.432	2.04	2.05	0.49%	1.336	1.36	1.80%	46.6	47.2	0.6	-5.8	-3.4	2.4	-23.2	-27.1	-16.80%	PASS

Impedance & Return-Loss Measurement Plot for Head TSL



Impedance & Return-Loss Measurement Plot for Body TSL



Calibration Laboratory of
Schmid & Partner
Engineering AG
 Zeughausstrasse 43, 8004 Zurich, Switzerland



S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
S Servizio svizzero di taratura
S Swiss Calibration Service

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 Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 0108**

Client **PC Test**

Certificate No: **D1750V2-1104_Sep17**

CALIBRATION CERTIFICATE

Object **D1750V2 - SN:1104**

Calibration procedure(s) **QA CAL-05.v9**
 Calibration procedure for dipole validation kits above 700 MHz

Calibration date: **September 07, 2017**

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
 The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature $(22 \pm 3)^{\circ}\text{C}$ and humidity $< 70\%$.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter NRP	SN: 104778	04-Apr-17 (No. 217-02521/02522)	Apr-18
Power sensor NRP-Z91	SN: 103244	04-Apr-17 (No. 217-02521)	Apr-18
Power sensor NRP-Z91	SN: 103245	04-Apr-17 (No. 217-02522)	Apr-18
Reference 20 dB Attenuator	SN: 5058 (20k)	07-Apr-17 (No. 217-02528)	Apr-18
Type-N mismatch combination	SN: 5047.2 / 06327	07-Apr-17 (No. 217-02529)	Apr-18
Reference Probe EX3DV4	SN: 7349	31-May-17 (No. EX3-7349_May17)	May-18
DAE4	SN: 601	28-Mar-17 (No. DAE4-601_Mar17)	Mar-18

Secondary Standards	ID #	Check Date (In house)	Scheduled Check
Power meter EPM-442A	SN: GB37480704	07-Oct-15 (In house check Oct-16)	In house check: Oct-18
Power sensor HP 8481A	SN: US37292783	07-Oct-15 (In house check Oct-16)	In house check: Oct-18
Power sensor HP 8481A	SN: MY41092317	07-Oct-15 (In house check Oct-16)	In house check: Oct-18
RF generator R&S SMT-06	SN: 100972	16-Jun-15 (In house check Oct-16)	In house check: Oct-18
Network Analyzer HP 8753E	SN: US37390585	18-Oct-01 (In house check Oct-16)	In house check: Oct-17

Calibrated by: **Michael Weber** Name: **Michael Weber** Function: **Laboratory Technician**

Approved by: **Katja Pokovic** Name: **Katja Pokovic** Technical Manager

Signature

[Signature]

[Signature]

Issued: September 7, 2017

This calibration certificate shall not be reproduced except in full without written approval of the laboratory.



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Accreditation No.: **SCS 0108**

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Multilateral Agreement for the recognition of calibration certificates

Glossary:

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORM x,y,z
N/A	not applicable or not measured

Calibration is Performed According to the Following Standards:

- IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
- IEC 62209-1, "Measurement procedure for the assessment of Specific Absorption Rate (SAR) from hand-held and body-mounted devices used next to the ear (frequency range of 300 MHz to 6 GHz)", July 2016
- IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010
- KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

- DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

- Measurement Conditions:** Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- Antenna Parameters with TSL:** The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- Feed Point Impedance and Return Loss:** These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- Electrical Delay:** One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- SAR measured:** SAR measured at the stated antenna input power.
- SAR normalized:** SAR as measured, normalized to an input power of 1 W at the antenna connector.
- SAR for nominal TSL parameters:** The measured TSL parameters are used to calculate the nominal SAR result.

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k=2$, which for a normal distribution corresponds to a coverage probability of approximately 95%.

Measurement Conditions

DASY system configuration, as far as not given on page 1.

DASY Version	DASY5	V52.10.0
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	1750 MHz $\pm$ 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	40.1	1.37 mho/m
Measured Head TSL parameters	(22.0 $\pm$ 0.2) °C	39.1 $\pm$ 6 %	1.36 mho/m $\pm$ 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	9.11 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	36.4 W/kg $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	4.81 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	19.2 W/kg $\pm$ 16.5 % (k=2)

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	53.4	1.49 mho/m
Measured Body TSL parameters	(22.0 $\pm$ 0.2) °C	53.8 $\pm$ 6 %	1.46 mho/m $\pm$ 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	9.03 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	36.6 W/kg $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	4.85 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	19.6 W/kg $\pm$ 16.5 % (k=2)

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	50.8 Ω - 0.2 j Ω
Return Loss	- 41.5 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	46.5 Ω - 0.7 j Ω
Return Loss	- 28.7 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.217 ns
----------------------------------	----------

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.

No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	May 16, 2013

DASY5 Validation Report for Head TSL

Date: 07.09.2017

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1750 MHz; Type: D1750V2; Serial: D1750V2 - SN:1104

Communication System: UID 0 - CW; Frequency: 1750 MHz

Medium parameters used: $f = 1750 \text{ MHz}$; $\sigma = 1.36 \text{ S/m}$; $\epsilon_r = 39.1$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(8.73, 8.73, 8.73); Calibrated: 31.05.2017;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 28.03.2017
- Phantom: Flat Phantom 5.0 (front); Type: QD 000 P50 AA; Serial: 1001
- DASY52 52.10.0(1446); SEMCAD X 14.6.10(7417)

Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

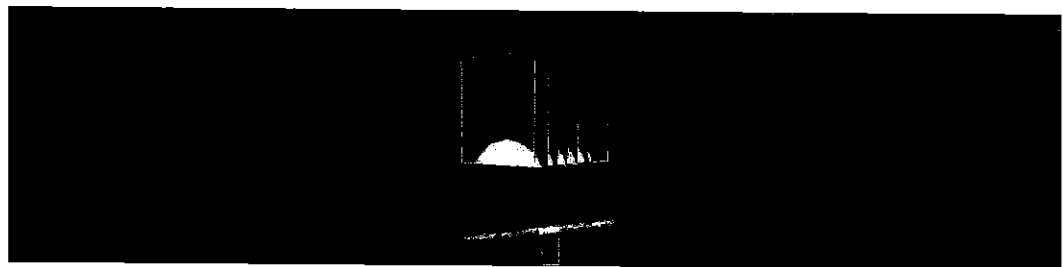
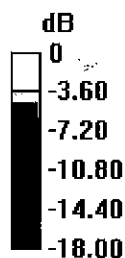
Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 104.9 V/m; Power Drift = -0.04 dB

Peak SAR (extrapolated) = 17.0 W/kg

SAR(1 g) = 9.11 W/kg; SAR(10 g) = 4.81 W/kg

Maximum value of SAR (measured) = 13.9 W/kg

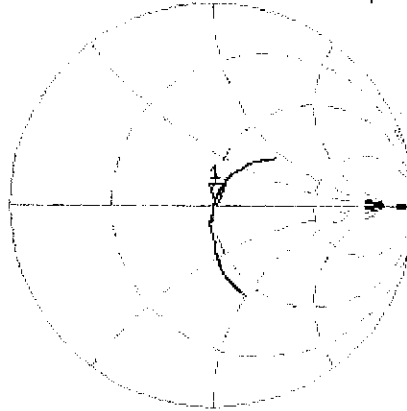


0 dB = 13.9 W/kg = 11.43 dBW/kg

Impedance Measurement Plot for Head TSL

7 Sep 2017 12:19:31
 CH1 S11 1 U FS 1: 50.834 Ω -150.39 m Ω 604.73 pF 1 750.000 000 MHz

*
 Del
 CA



Avg
 16

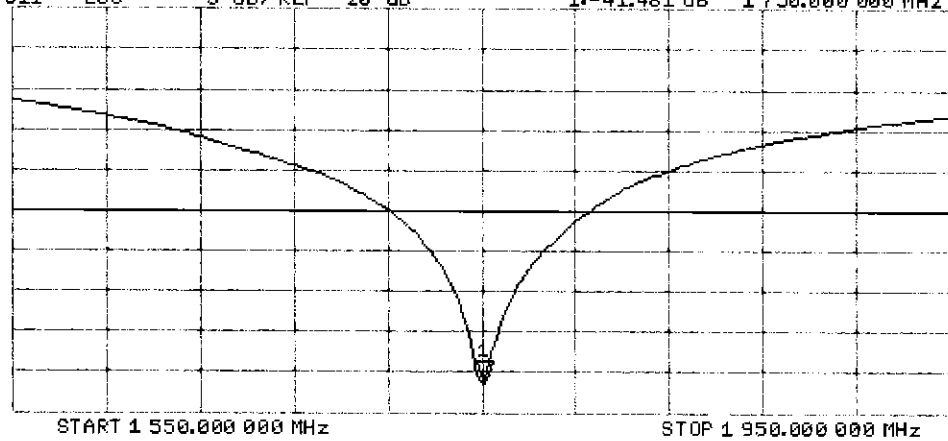
H1d

CH2 S11 LOG 5 dB/REF -20 dB 1: -41.481 dB 1 750.000 000 MHz

CA

Avg
 16

H1d



DASY5 Validation Report for Body TSL

Date: 07.09.2017

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1750 MHz; Type: D1750V2; Serial: D1750V2 - SN:1104

Communication System: UID 0 - CW; Frequency: 1750 MHz

Medium parameters used: $f = 1750$ MHz; $\sigma = 1.46$ S/m; $\epsilon_r = 53.8$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(8.46, 8.46, 8.46); Calibrated: 31.05.2017;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 28.03.2017
- Phantom: Flat Phantom 5.0 (back); Type: QD 000 P50 AA; Serial: 1002
- DASY52 52.10.0(1446); SEMCAD X 14.6.10(7417)

Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

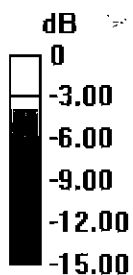
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 99.30 V/m; Power Drift = -0.07 dB

Peak SAR (extrapolated) = 15.6 W/kg

SAR(1 g) = 9.03 W/kg; SAR(10 g) = 4.85 W/kg

Maximum value of SAR (measured) = 12.9 W/kg

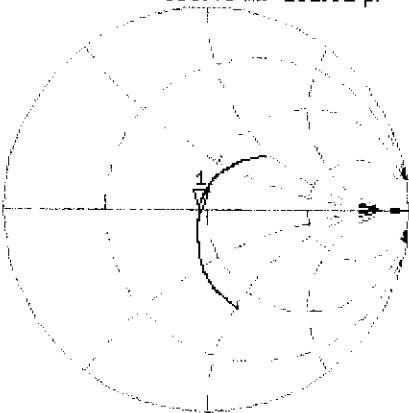


0 dB = 12.9 W/kg = 11.11 dBW/kg

Impedance Measurement Plot for Body TSL

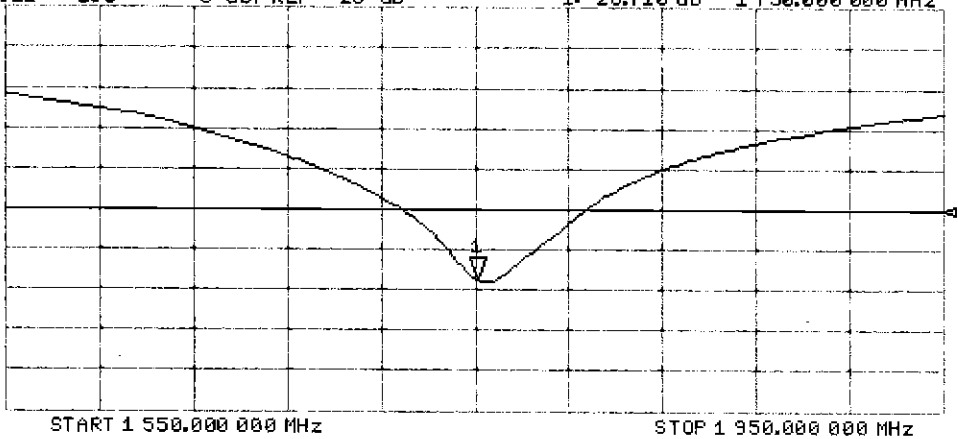
7 Sep 2017 12:18:38
CH1 S11 1 U FS 1: 46.527 Ω -689.45 m Ω 131.91 pF 1 750.000 000 MHz

*
Del
CA
Avg
16
H1d



CH2 S11 LOG 5 dB/REF -20 dB 1: -28.710 dB 1 750.000 000 MHz

CA
Avg
16
H1d



Certification of Calibration

Object D1750V2 – SN: 1104

Calibration procedure(s) Procedure for Calibration Extension for SAR Dipoles.

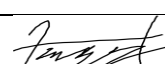
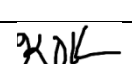
Extended Calibration date: September 07, 2018

Description: SAR Validation Dipole at 1750 MHz.

Calibration Equipment used:

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
Agilent	8753ES	S-Parameter Network Analyzer	9/14/2017	Annual	9/14/2018	US39170118
Agilent	N5182A	MXG Vector Signal Generator	3/19/2018	Annual	3/19/2019	US46240505
Amplifier Research	15S1G6	Amplifier	CBT	N/A	CBT	343972
Anritsu	ML2496A	Power Meter	10/9/2017	Annual	10/9/2018	1138001
Anritsu	MA2411B	Pulse Power Sensor	11/15/2017	Annual	11/15/2018	1339007
Anritsu	MA2411B	Pulse Power Sensor	11/22/2017	Annual	11/22/2018	1339008
Control Company	4040	Temperature / Humidity Monitor	2/28/2018	Biennial	2/28/2020	150761911
Control Company	4352	Ultra Long Stem Thermometer	2/14/2017	Biennial	2/14/2019	170112507
Keysight	772D	Dual Directional Coupler	CBT	N/A	CBT	MY52180215
Keysight Technologies	85033E	Standard Mechanical Calibration Kit (DC to 9GHz, 3.5mm)	6/4/2018	Annual	6/4/2019	MY53401181
Mini-Circuits	BW-N20W5+	DC to 18 GHz Precision Fixed 20 dB Attenuator	CBT	N/A	CBT	N/A
Mini-Circuits	NLP-2950+	Low Pass Filter DC to 2700 MHz	CBT	N/A	CBT	N/A
Narda	4772-3	Attenuator (3dB)	CBT	N/A	CBT	9406
Pasternack	PE2209-10	Bidirectional Coupler	CBT	N/A	CBT	N/A
Pasternack	PE5011-1	Torque Wrench	7/19/2017	Biennial	7/19/2019	N/A
SPEAG	DAK-3.5	Dielectric Assessment Kit	5/15/2018	Annual	5/15/2019	1070
SPEAG	ES3DV3	SAR Probe	9/18/2017	Annual	9/18/2018	3287
SPEAG	DAE4	Data Acquisition Electronics	1/26/2018	Annual	1/26/2019	1533

Measurement Uncertainty = $\pm 23\%$ (k=2)

	Name	Function	Signature
Calibrated By:	Sangmin Cha	Team Lead Engineer	
Approved By:	Kaitlin O'Keefe	Senior Technical Manager	

DIPOLE CALIBRATION EXTENSION

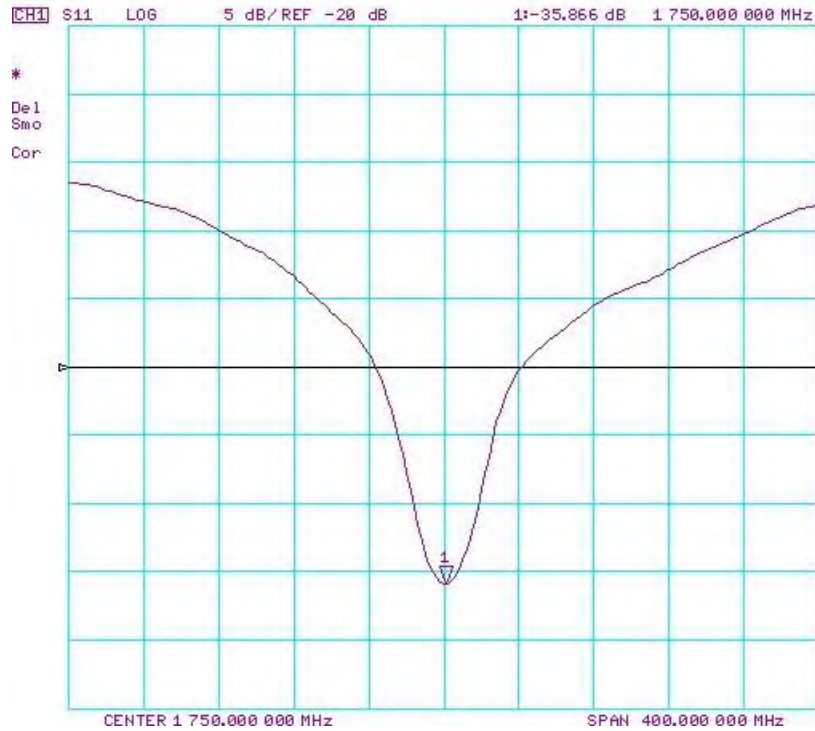
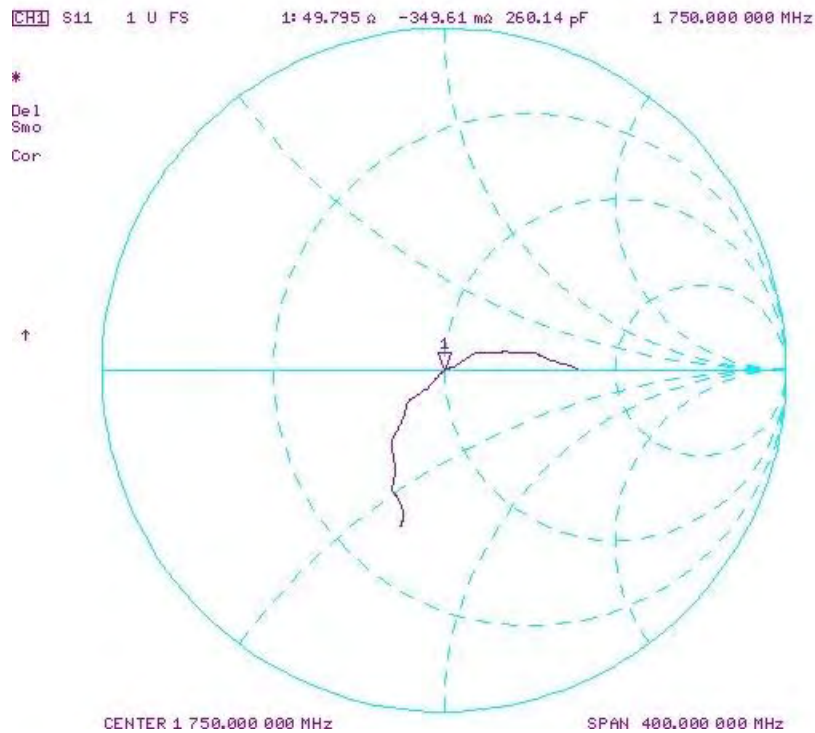
Per KDB 865664 D01, calibration intervals of up to three years may be considered for reference dipoles when it is demonstrated that the SAR target, impedance and return loss of a dipole have remained stable according to the following requirements:

1. The measured SAR does not deviate more than 10% from the target on the calibration certificate.
2. The return-loss does not deviate more than 20% from the previous measurement and meets the required 20dB minimum return-loss requirement.
3. The measurement of real or imaginary parts of impedance does not deviate more than 5Ω from the previous measurement.

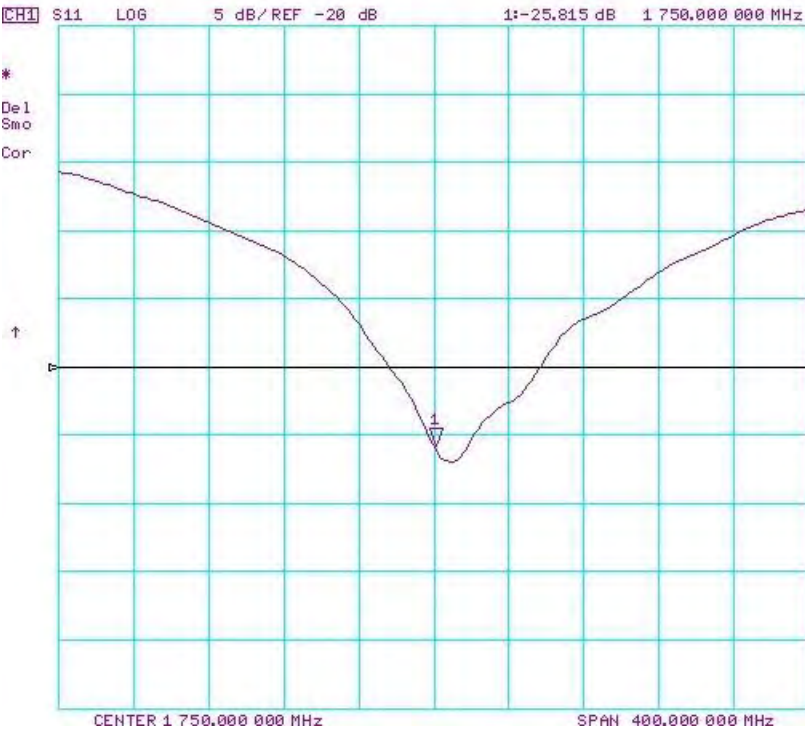
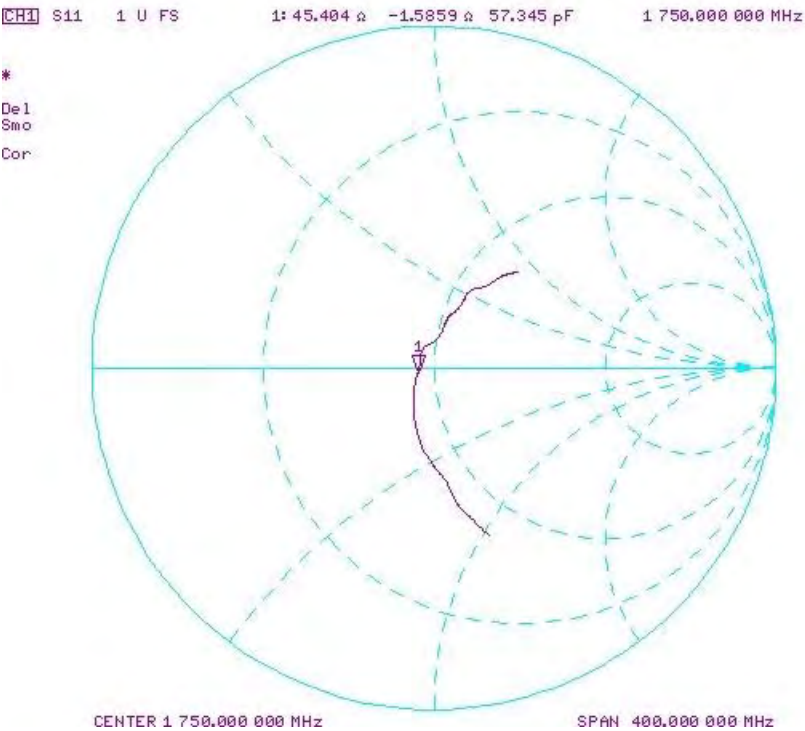
The following dipole was checked to pass the above 3 requirements to have 2-year calibration period from the calibration date:

Calibration Date	Extension Date	Certificate Electrical Delay (ns)	Certificate SAR Target Head (1g) W/kg @ 20.0 dBm	Measured Head SAR (1g) W/kg @ 20.0 dBm	Deviation 1g (%)	Certificate SAR Target Body (10g) W/kg @ 20.0 dBm	Measured Body SAR (10g) W/kg @ 20.0 dBm	Deviation 10g (%)	Certificate Impedance Head (Ohm) Real	Measured Impedance Head (Ohm) Real	Difference (Ohm) Real	Certificate Impedance Head (Ohm) Imaginary	Measured Impedance Head (Ohm) Imaginary	Difference (Ohm) Imaginary	Certificate Return Loss Head (dB)	Measured Return Loss Head (dB)	Deviation (%)	PASS/FAIL
9/7/2017	9/7/2018	1.217	3.64	3.62	-0.55%	1.92	1.94	1.04%	50.8	49.8	1	-0.2	-0.3	0.1	-41.5	-35.9	13.50%	PASS
Calibration Date	Extension Date	Certificate Electrical Delay (ns)	Certificate SAR Target Body (1g) W/kg @ 20.0 dBm	Measured Body SAR (1g) W/kg @ 20.0 dBm	Deviation 1g (%)	Certificate SAR Target Body (10g) W/kg @ 20.0 dBm	Measured Body SAR (10g) W/kg @ 20.0 dBm	Deviation 10g (%)	Certificate Impedance Body (Ohm) Real	Measured Impedance Body (Ohm) Real	Difference (Ohm) Real	Certificate Impedance Body (Ohm) Imaginary	Measured Impedance Body (Ohm) Imaginary	Difference (Ohm) Imaginary	Certificate Return Loss Body (dB)	Measured Return Loss Body (dB)	Deviation (%)	PASS/FAIL
9/7/2017	9/7/2018	1.217	3.66	3.84	4.92%	1.96	2.07	5.61%	46.527	45.4	1.1	-0.69	-1.6	0.9	-28.7	-25.8	10.10%	PASS

Impedance & Return-Loss Measurement Plot for Head TSL



Impedance & Return-Loss Measurement Plot for Body TSL



Certification of Calibration

Object D1750V2 – SN: 1104

Calibration procedure(s) Procedure for Calibration Extension for SAR Dipoles.

Extended Calibration date: September 7, 2019

Description: SAR Validation Dipole at 1750 MHz.

Calibration Equipment used:

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
Agilent	8753ES	S-Parameter Network Analyzer	10/2/2018	Annual	10/2/2019	US39170118
Agilent	E4438C	ESG Vector Signal Generator	6/27/2019	Annual	6/27/2020	MY45093852
Amplifier Research	15S1G6	Amplifier	CBT	N/A	CBT	343972
Anritsu	ML2495A	Power Meter	10/21/2018	Annual	10/21/2019	941001
Anritsu	MA2411B	Pulse Power Sensor	10/30/2018	Annual	10/30/2019	1207470
Anritsu	MA2411B	Pulse Power Sensor	11/20/2018	Annual	11/20/2019	1339007
Control Company	4040	Temperature / Humidity Monitor	2/28/2018	Biennial	2/28/2020	150761911
Control Company	4352	Ultra Long Stem Thermometer	2/28/2018	Biennial	2/28/2020	170330160
Keysight Technologies	85033E	Standard Mechanical Calibration Kit (DC to 9GHz, 3.5mm)	7/2/2019	Annual	7/2/2020	MY53401181
Keysight	772D	Dual Directional Coupler	CBT	N/A	CBT	MY52180215
Mini-Circuits	BW-N20W5+	DC to 18 GHz Precision Fixed 20 dB Attenuator	CBT	N/A	CBT	N/A
Mini-Circuits	NLP-2950+	Low Pass Filter DC to 2700 MHz	CBT	N/A	CBT	N/A
Narda	4772-3	Attenuator (3dB)	CBT	N/A	CBT	9406
Pasternack	PE2208-6	Bidirectional Coupler	CBT	N/A	CBT	N/A
Pasternack	NC-100	Torque Wrench	11/1/2017	Biennial	11/1/2019	N/A
SPEAG	DAK-3.5	Dielectric Assessment Kit	5/7/2019	Annual	5/7/2020	1070
SPEAG	EX3DV4	SAR Probe	1/24/2019	Annual	1/24/2020	7490
SPEAG	DAE4	Data Acquisition Electronics	1/15/2019	Annual	1/15/2020	1532

Measurement Uncertainty = $\pm 23\%$ (k=2)

	Name	Function	Signature
Calibrated By:	Parker Jones	Team Lead Engineer	<i>Parker Jones</i>
Approved By:	Kaitlin O'Keefe	Senior Technical Manager	<i>KOK</i>

DIPOLE CALIBRATION EXTENSION

Per KDB 865664 D01, calibration intervals of up to three years may be considered for reference dipoles when it is demonstrated that the SAR target, impedance and return loss of a dipole have remained stable according to the following requirements:

1. The measured SAR does not deviate more than 10% from the target on the calibration certificate.
2. The return-loss does not deviate more than 20% from the previous measurement and meets the required 20dB minimum return-loss requirement.
3. The measurement of real or imaginary parts of impedance does not deviate more than 5Ω from the previous measurement.

The following dipole was checked to pass the above 3 requirements to have 3-year calibration period from the calibration date:

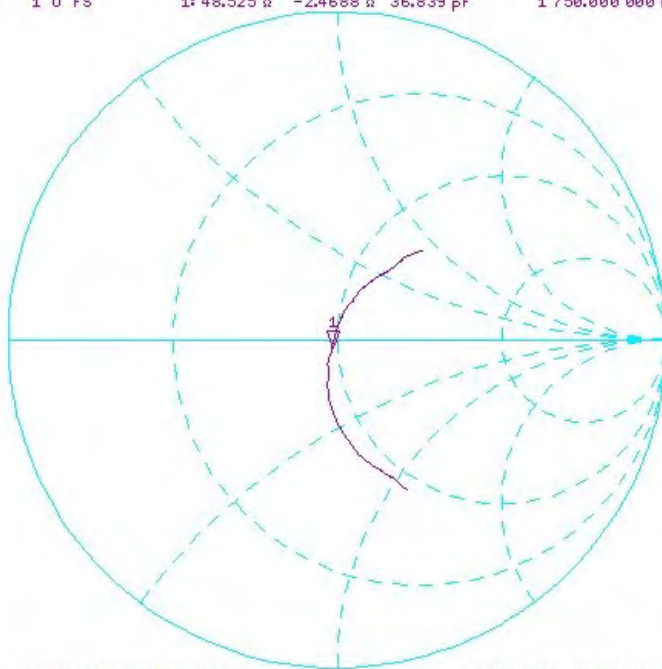
Calibration Date	Extension Date	Certificate Electrical Delay (ns)	Certificate SAR Target Head (1g) W/kg @ 20.0 dBm	Measured Head SAR (1g) W/kg @ 20.0 dBm	Deviation 1g (%)	Certificate SAR Target Body (10g) W/kg @ 20.0 dBm	Measured Body SAR (10g) W/kg @ 20.0 dBm	Deviation 10g (%)	Certificate Impedance Head (Ohm) Real	Measured Impedance Head (Ohm) Real	Difference (Ohm) Real	Certificate Impedance Head (Ohm) Imaginary	Measured Impedance Head (Ohm) Imaginary	Difference (Ohm) Imaginary	Certificate Return Loss Head (dB)	Measured Return Loss Head (dB)	Deviation (%)	PASS/FAIL
9/7/2017	9/7/2019	1.217	3.64	3.54	-2.75%	1.92	1.88	-2.08%	50.8	48.5	-2.3	-0.2	-2.5	2.3	-41.5	-41.7	-0.50%	PASS
Calibration Date	Extension Date	Certificate Electrical Delay (ns)	Certificate SAR Target Body (1g) W/kg @ 20.0 dBm	Measured Body SAR (1g) W/kg @ 20.0 dBm	Deviation 1g (%)	Certificate SAR Target Body (10g) W/kg @ 20.0 dBm	Measured Body SAR (10g) W/kg @ 20.0 dBm	Deviation 10g (%)	Certificate Impedance Body (Ohm) Real	Measured Impedance Body (Ohm) Real	Difference (Ohm) Real	Certificate Impedance Body (Ohm) Imaginary	Measured Impedance Body (Ohm) Imaginary	Difference (Ohm) Imaginary	Certificate Return Loss Body (dB)	Measured Return Loss Body (dB)	Deviation (%)	PASS/FAIL
9/7/2017	9/7/2019	1.217	3.66	3.67	0.27%	1.96	1.96	0.00%	46.5	45.5	-1	-0.7	-2.3	1.6	-28.7	-25.5	11.10%	PASS

Impedance & Return-Loss Measurement Plot for Head TSL

CH1 S11 1 U FS 1: 48.525 Ω -2.4688 Ω 36.839 pF 1 750.000 000 MHz

*
De1
Smo
Cor

↑



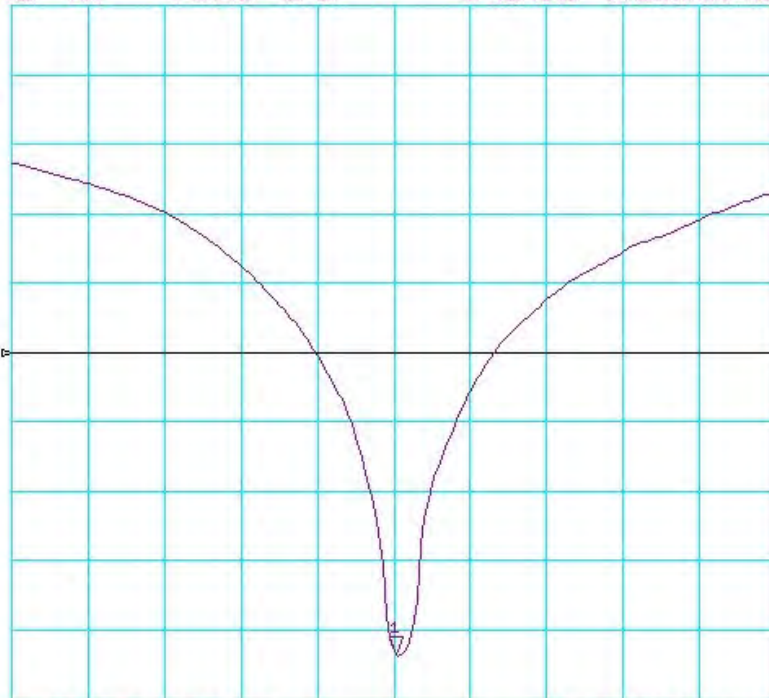
CENTER 1 750.000 000 MHz

SPAN 400.000 000 MHz

CH1 S11 LOG 5 dB/REF -20 dB 1:-41.741 dB 1 750.000 000 MHz

*
De1
Smo
Cor

↑



CENTER 1 750.000 000 MHz

SPAN 400.000 000 MHz

Object:

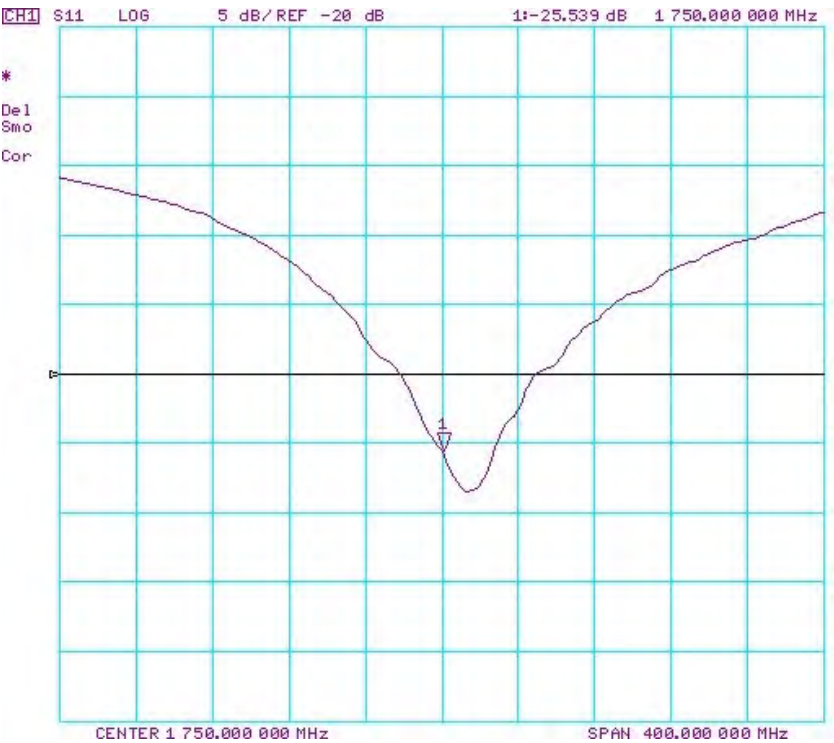
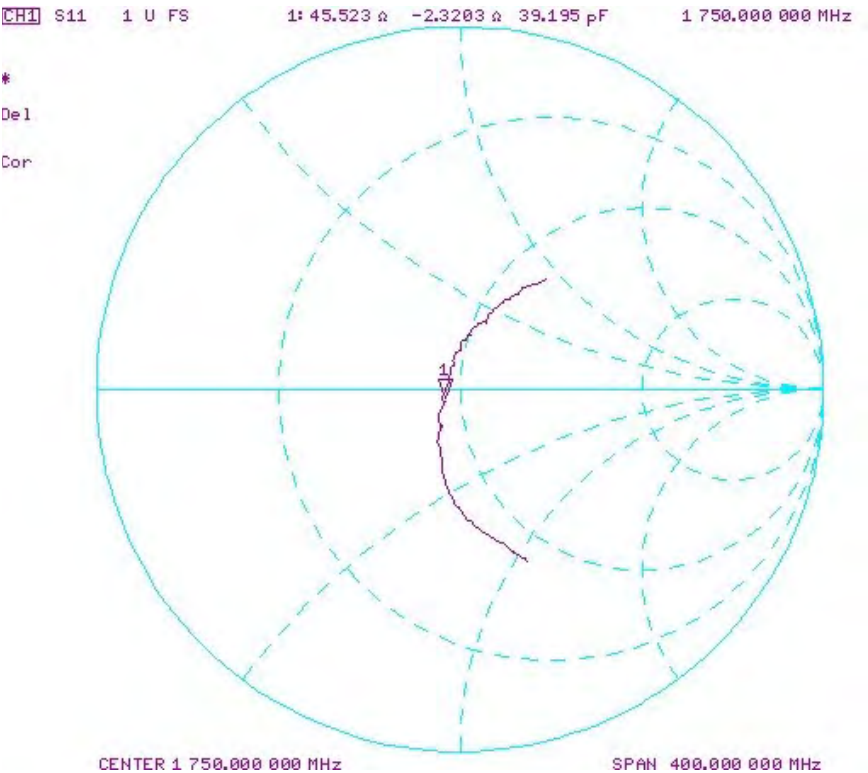
D1750V2 – SN: 1104

Date Issued:

09/07/2019

Page 3 of 4

Impedance & Return-Loss Measurement Plot for Body TSL





Accredited by the Swiss Accreditation Service (SAS)
The Swiss Accreditation Service is one of the signatories to the EA
Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 0108**

Client: **PC Test**

Certificate No.: **D1750V2-1092_May18**

CALIBRATION CERTIFICATE

Object: **D1750V2-SN:1092**

Calibration procedure(s):

GA-GAL-05-V10
Calibration procedure for dipole validation kits above 700 MHz

SC ✓
5/31/2018

Calibration date:

May 15, 2018

BSN ✓
06/01/2019

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.

ATM ✓
06/11/2020

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter NRP	SN: 104778	04-Apr-18 (No. 217-02672/02673)	Apr-19
Power sensor NRP-Z91	SN: 103244	04-Apr-18 (No. 217-02672)	Apr-19
Power sensor NRP-Z91	SN: 103245	04-Apr-18 (No. 217-02673)	Apr-19
Reference 20 dB Attenuator	SN: 5058 (20k)	04-Apr-18 (No. 217-02682)	Apr-19
Type-N mismatch combination	SN: 5047.2 / 06327	04-Apr-18 (No. 217-02683)	Apr-19
Reference Probe EX3DV4	SN: 7349	30-Dec-17 (No. EX3-7349_Dec17)	Dec-18
DAE4	SN: 601	26-Oct-17 (No. DAE4-601_Oct17)	Oct-18
Secondary Standards	ID #	Check Date (In house)	Scheduled Check
Power meter EPM-442A	SN: GB37480704	07-Oct-15 (In house check Oct-16)	In house check: Oct-18
Power sensor HP 8481A	SN: US37292783	07-Oct-15 (In house check Oct-16)	In house check: Oct-18
Power sensor HP 8481A	SN: MY41092317	07-Oct-15 (In house check Oct-16)	In house check: Oct-18
RF generator R&S SMT-05	SN: 100972	15-Jun-15 (In house check Oct-16)	In house check: Oct-18
Network Analyzer HP 8753E	SN: US37390585	18-Oct-01 (In house check Oct-17)	In house check: Oct-18

	Name	Function	Signature
Calibrated by:	Manu Saitz	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: May 17, 2018

This calibration certificate shall not be reproduced except in full without written approval of the laboratory.



Accredited by the Swiss Accreditation Service (SAS)

Accreditation No.: **SCS 0108**

The Swiss Accreditation Service is one of the signatories to the EA
Multilateral Agreement for the recognition of calibration certificates

Glossary:

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORM x,y,z
N/A	not applicable or not measured

Calibration is Performed According to the Following Standards:

- IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
- IEC 62209-1, "Measurement procedure for the assessment of Specific Absorption Rate (SAR) from hand-held and body-mounted devices used next to the ear (frequency range of 300 MHz to 6 GHz)", July 2016
- IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010
- KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

- DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

- Measurement Conditions:** Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- Antenna Parameters with TSL:** The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- Feed Point Impedance and Return Loss:** These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- Electrical Delay:** One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- SAR measured:** SAR measured at the stated antenna input power.
- SAR normalized:** SAR as measured, normalized to an input power of 1 W at the antenna connector.
- SAR for nominal TSL parameters:** The measured TSL parameters are used to calculate the nominal SAR result.

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k=2$, which for a normal distribution corresponds to a coverage probability of approximately 95%.

Measurement Conditions

DASY system configuration, as far as not given on page 1.

DASY Version	DASY5	V52.10.1
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	1750 MHz $\pm$ 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	40.1	1.37 mho/m
Measured Head TSL parameters	(22.0 $\pm$ 0.2) °C	39.0 $\pm$ 6 %	1.34 mho/m $\pm$ 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	8.95 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	36.1 W/kg $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	4.73 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	19.0 W/kg $\pm$ 16.5 % (k=2)

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	53.4	1.49 mho/m
Measured Body TSL parameters	(22.0 $\pm$ 0.2) °C	53.2 $\pm$ 6 %	1.46 mho/m $\pm$ 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	8.99 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	36.4 W/kg $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	4.81 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	19.4 W/kg $\pm$ 16.5 % (k=2)

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	49.2 Ω - 1.0 j Ω
Return Loss	- 37.8 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	44.8 Ω - 0.6 j Ω
Return Loss	- 25.2 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.217 ns
----------------------------------	----------

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.

No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	November 07, 2012

DASY5 Validation Report for Head TSL

Date: 15.05.2018

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1750 MHz; Type: D1750V2; Serial: D1750V2 - SN:1092

Communication System: UID 0 - CW; Frequency: 1750 MHz

Medium parameters used: $f = 1750$ MHz; $\sigma = 1.34$ S/m; $\epsilon_r = 39$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(8.5, 8.5, 8.5) @ 1750 MHz; Calibrated: 30.12.2017
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 26.10.2017
- Phantom: Flat Phantom 5.0 (front); Type: QD 000 P50 AA; Serial: 1001
- DASY52 52.10.1(1476); SEMCAD X 14.6.11(7439)

Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

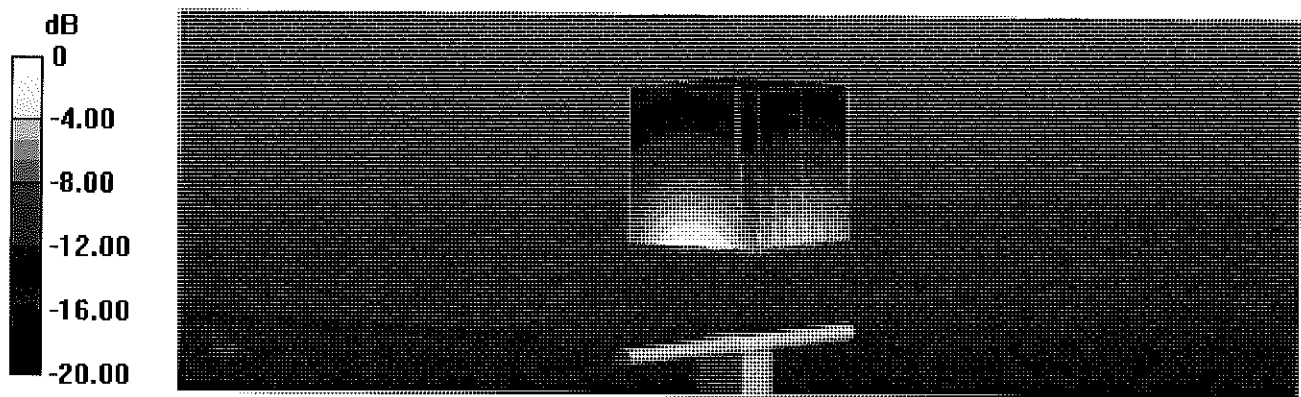
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 106.8 V/m; Power Drift = -0.09 dB

Peak SAR (extrapolated) = 16.3 W/kg

SAR(1 g) = 8.95 W/kg; SAR(10 g) = 4.73 W/kg

Maximum value of SAR (measured) = 13.8 W/kg



0 dB = 13.8 W/kg = 11.40 dBW/kg

Impedance Measurement Plot for Head TSL

15 May 2018 11:09:26
 [CH1] S11 1 U FS 1: 49.203 Ω -1.0117 Ω 89.892 pF 1 750.000 000 MHz

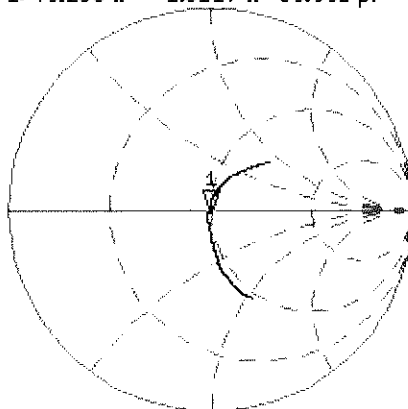
*

Del

CA

Avg
16

H1d

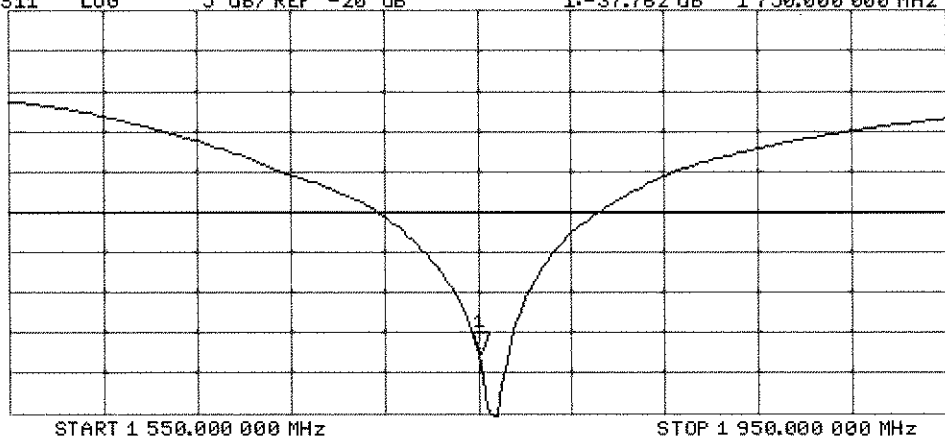


CH2 S11 LOG 5 dB/REF -20 dB 1: -37.762 dB 1 750.000 000 MHz

CA

Avg
16

H1d



DASY5 Validation Report for Body TSL

Date: 15.05.2018

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1750 MHz; Type: D1750V2; Serial: D1750V2 - SN:1092

Communication System: UID 0 - CW; Frequency: 1750 MHz

Medium parameters used: $f = 1750$ MHz; $\sigma = 1.46$ S/m; $\epsilon_r = 53.2$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(8.35, 8.35, 8.35) @ 1750 MHz; Calibrated: 30.12.2017
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 26.10.2017
- Phantom: Flat Phantom 5.0 (back); Type: QD 000 P50 AA; Serial: 1002
- DASY52 52.10.1(1476); SEMCAD X 14.6.11(7439)

Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

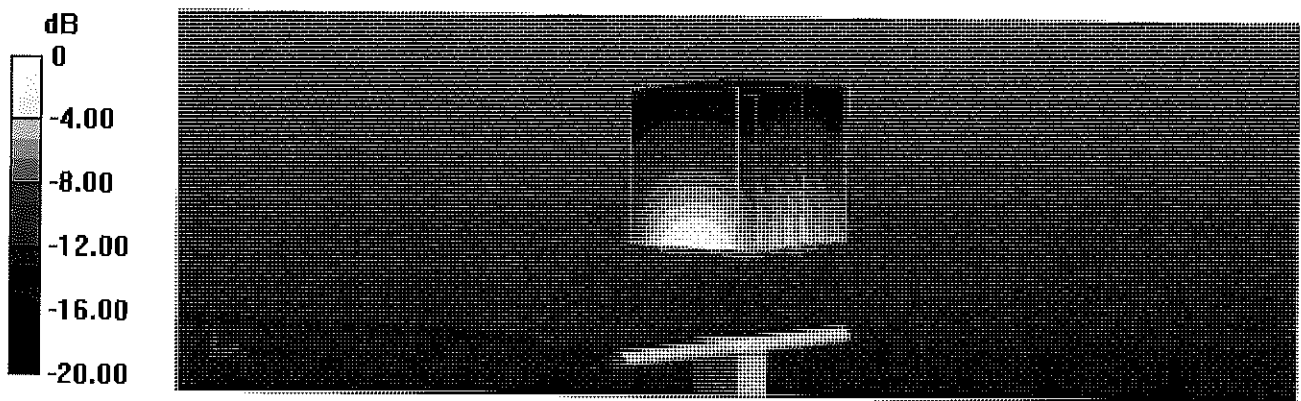
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 101.4 V/m; Power Drift = -0.06 dB

Peak SAR (extrapolated) = 15.8 W/kg

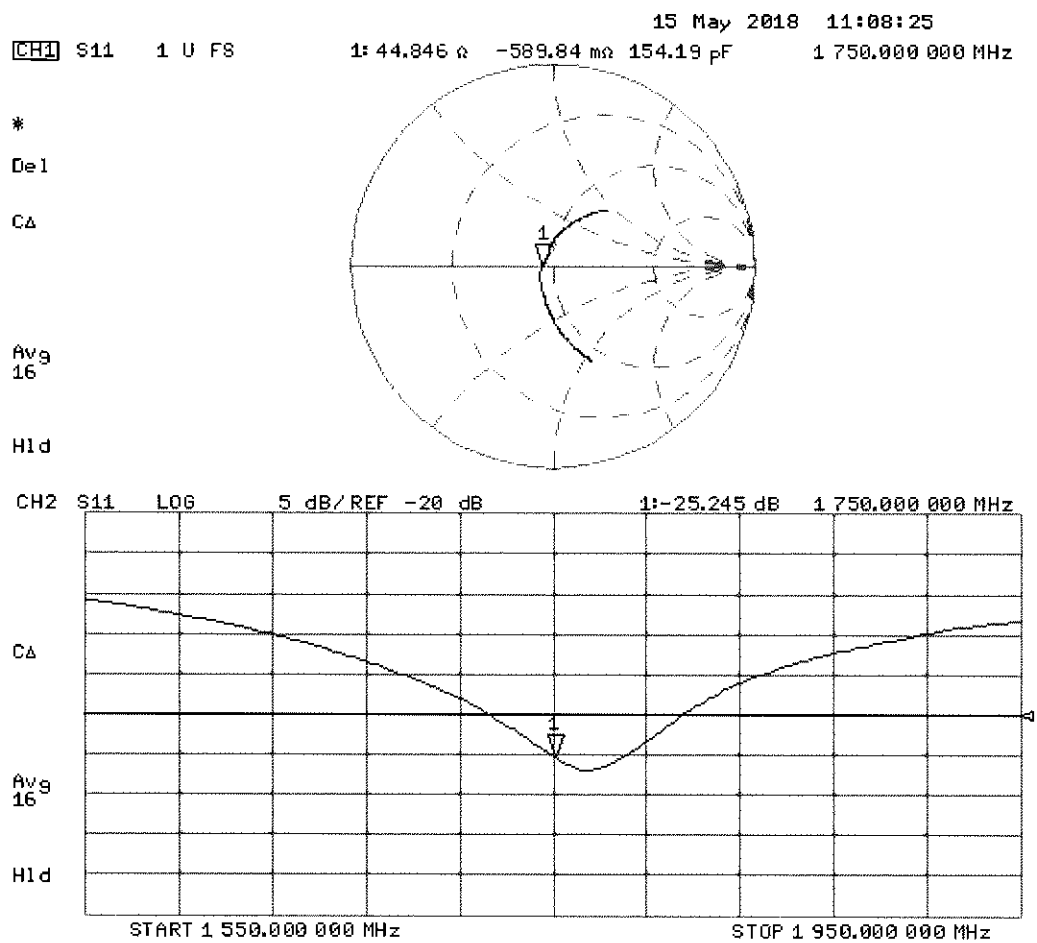
SAR(1 g) = 8.99 W/kg; SAR(10 g) = 4.81 W/kg

Maximum value of SAR (measured) = 13.4 W/kg



0 dB = 13.4 W/kg = 11.27 dBW/kg

Impedance Measurement Plot for Body TSL



Certification of Calibration

Object D1750V2 – SN: 1092

Calibration procedure(s) Procedure for Calibration Extension for SAR Dipoles.

Extended Calibration date: May 15, 2019

Description: SAR Validation Dipole at 1750 MHz.

Calibration Equipment used:

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
Agilent	8753ES	S-Parameter Network Analyzer	10/2/2018	Annual	10/2/2019	US39170118
Agilent	N5182A	MXG Vector Signal Generator	6/15/2018	Annual	6/15/2019	MY47420837
Amplifier Research	15S1G6	Amplifier	CBT	N/A	CBT	343972
Anritsu	ML2495A	Power Meter	10/21/2018	Annual	10/21/2019	941001
Anritsu	MA2411B	Pulse Power Sensor	10/30/2018	Annual	10/30/2019	1207470
Anritsu	MA2411B	Pulse Power Sensor	11/20/2018	Annual	11/20/2019	1339007
Control Company	4040	Temperature / Humidity Monitor	2/28/2018	Biennial	2/28/2020	150761911
Control Company	4352	Ultra Long Stem Thermometer	2/28/2018	Biennial	2/28/2020	170330160
Keysight	772D	Dual Directional Coupler	CBT	N/A	CBT	MY52180215
Keysight Technologies	85033E	Standard Mechanical Calibration Kit (DC to 9GHz, 3.5mm)	6/4/2018	Annual	6/4/2019	MY53401181
Mini-Circuits	BW-N20W5+	DC to 18 GHz Precision Fixed 20 dB Attenuator	CBT	N/A	CBT	N/A
Mini-Circuits	NLP-2950+	Low Pass Filter DC to 2700 MHz	CBT	N/A	CBT	N/A
Narda	4772-3	Attenuator (3dB)	CBT	N/A	CBT	9406
Pasternack	PE2209-10	Bidirectional Coupler	CBT	N/A	CBT	N/A
Pasternack	PE5011-1	Torque Wrench	7/19/2017	Biennial	7/19/2019	N/A
SPEAG	DAKS-3.5	Portable DAK	9/11/2018	Annual	9/11/2019	1045
SPEAG	EX3DV4	SAR Probe	7/20/2018	Annual	7/20/2019	7416
SPEAG	DAE4	Dasy Data Acquisition Electronics	7/10/2018	Annual	7/10/2019	1402

Measurement Uncertainty = $\pm 23\%$ (k=2)

	Name	Function	Signature
Calibrated By:	Parker Jones	Team Lead Engineer	<i>Parker Jones</i>
Approved By:	Kaitlin O'Keefe	Senior Technical Manager	<i>KOK</i>

DIPOLE CALIBRATION EXTENSION

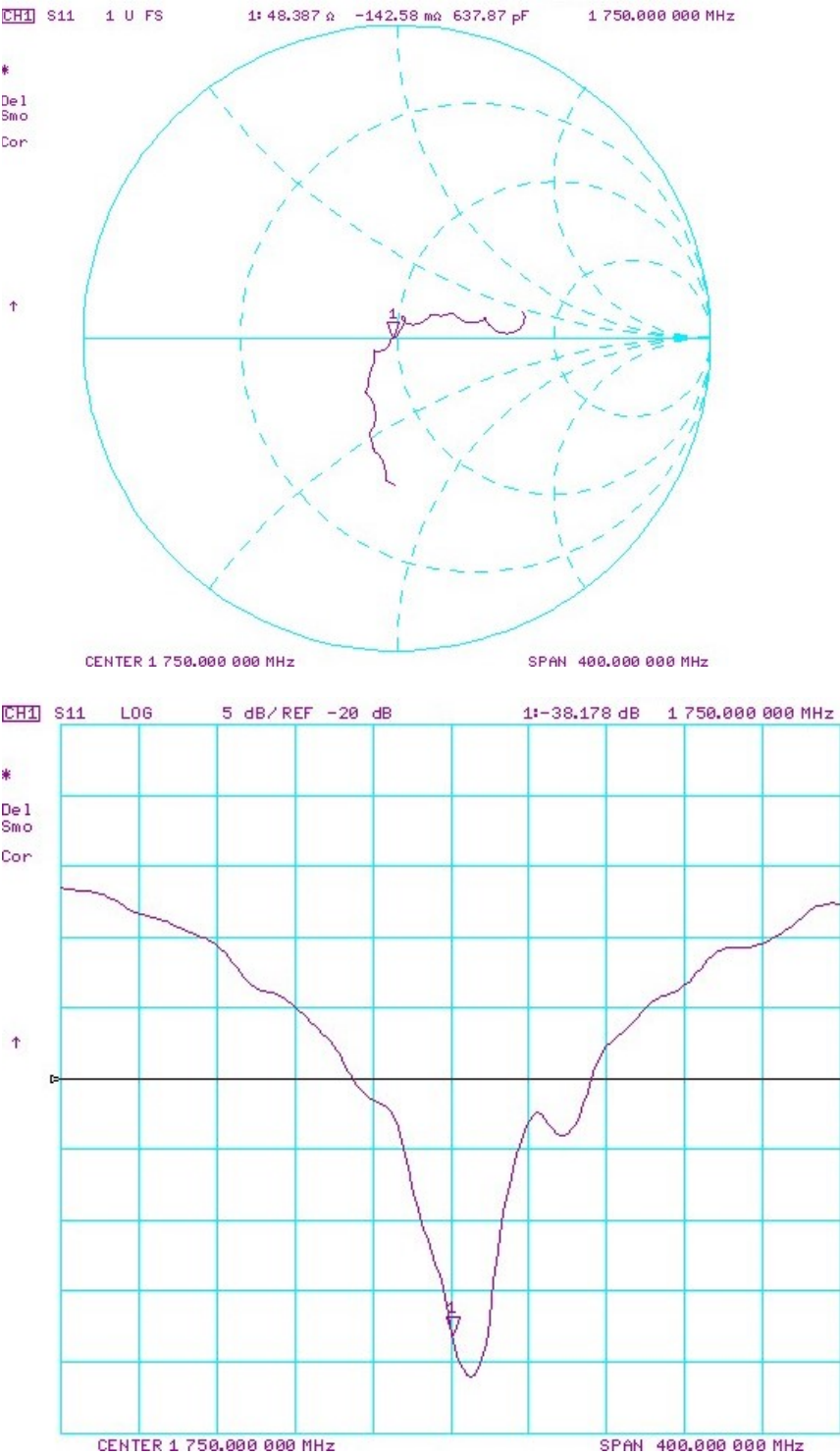
Per KDB 865664 D01, calibration intervals of up to three years may be considered for reference dipoles when it is demonstrated that the SAR target, impedance and return loss of a dipole have remained stable according to the following requirements:

1. The measured SAR does not deviate more than 10% from the target on the calibration certificate.
2. The return-loss does not deviate more than 20% from the previous measurement and meets the required 20dB minimum return-loss requirement.
3. The measurement of real or imaginary parts of impedance does not deviate more than 5Ω from the previous measurement.

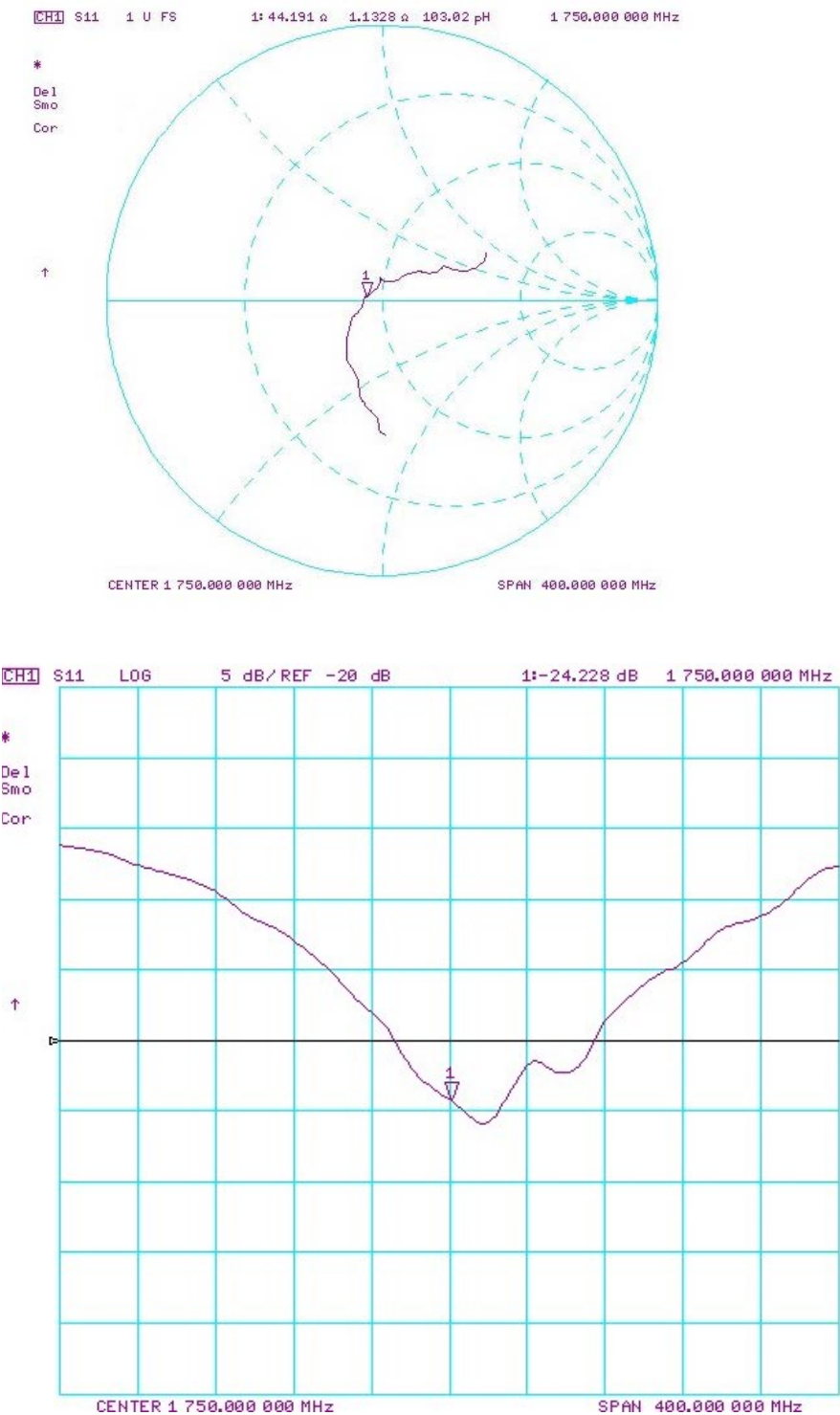
The following dipole was checked to pass the above 3 requirements to have 2-year calibration period from the calibration date:

Calibration Date	Extension Date	Certificate Electrical Delay (ns)	Certificate SAR Target Head (1g) W/kg @ 20.0 dBm	Measured Head SAR (1g) W/kg @ 20.0 dBm	Deviation 1g (%)	Certificate SAR Target Body (10g) W/kg @ 20.0 dBm	Measured Body SAR (10g) W/kg @ 20.0 dBm	Deviation 10g (%)	Certificate Impedance Head (Ohm) Real	Measured Impedance Head (Ohm) Real	Difference (Ohm) Real	Certificate Impedance Head (Ohm) Imaginary	Measured Impedance Head (Ohm) Imaginary	Difference (Ohm) Imaginary	Certificate Return Loss Head (dB)	Measured Return Loss Head (dB)	Deviation (%)	PASS/FAIL
5/15/2018	5/15/2019	1.217	3.61	3.59	-0.55%	1.9	1.89	-0.53%	49.2	48.4	0.8	-1	-0.1	0.9	-37.8	-38.2	-1.00%	PASS
Calibration Date	Extension Date	Certificate Electrical Delay (ns)	Certificate SAR Target Body (1g) W/kg @ 20.0 dBm	Measured Body SAR (1g) W/kg @ 20.0 dBm	Deviation 1g (%)	Certificate SAR Target Body (10g) W/kg @ 20.0 dBm	Measured Body SAR (10g) W/kg @ 20.0 dBm	Deviation 10g (%)	Certificate Impedance Body (Ohm) Real	Measured Impedance Body (Ohm) Real	Difference (Ohm) Real	Certificate Impedance Body (Ohm) Imaginary	Measured Impedance Body (Ohm) Imaginary	Difference (Ohm) Imaginary	Certificate Return Loss Body (dB)	Measured Return Loss Body (dB)	Deviation (%)	PASS/FAIL
5/15/2018	5/15/2019	1.217	3.64	3.62	-0.55%	1.94	1.91	-1.59%	44.8	44.2	0.6	-0.6	1.1	1.7	-25.2	-24.2	3.90%	PASS

Impedance & Return-Loss Measurement Plot for Head TSL



Impedance & Return-Loss Measurement Plot for Body TSL



Certification of Calibration

Object: D1750V2 – SN: 1092

Calibration procedure(s): Procedure for Calibration Extension for SAR Dipoles.

Extended Calibration date: May 15, 2020

Description: SAR Validation Dipole at 1750 MHz.

Calibration Equipment used:

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
Agilent	8753ES	S-Parameter Network Analyzer	1/16/2020	Annual	1/16/2021	US39170118
Agilent	N5182A	MXG Vector Signal Generator	8/19/2019	Annual	8/19/2020	MY47420837
Amplifier Research	15S1G6	Amplifier	CBT	N/A	CBT	343972
Anritsu	MA2411B	Pulse Power Sensor	1/21/2020	Annual	1/21/2021	1207470
Anritsu	MA2411B	Pulse Power Sensor	1/21/2020	Annual	1/21/2021	1339007
Anritsu	ML2495A	Power Meter	1/15/2020	Annual	1/15/2021	1328004
Control Company	62344-734	Therm./ Clock/ Humidity Monitor	3/18/2019	Biennial	3/18/2021	192038436
Control Company	4352	Ultra Long Stem Thermometer	8/2/2018	Biennial	8/2/2020	181292000
Keysight Technologies	85033E	Standard Mechanical Calibration Kit (DC to 9GHz, 3.5mm)	7/2/2019	Annual	7/2/2020	MY53401181
MiniCircuits	VLF-6000+	Low Pass Filter	CBT	N/A	CBT	N/A
Mini-Circuits	BW-N20W5+	DC to 18 GHz Precision Fixed 20 dB Attenuator	CBT	N/A	CBT	N/A
Narda	4772-3	Attenuator (3dB)	CBT	N/A	CBT	9406
Pasternack	PE2208-6	Bidirectional Coupler	CBT	N/A	CBT	N/A
Pasternack	NC-100	Torque Wrench	5/23/2018	Biennial	5/23/2020	N/A
SPEAG	DAE4	Dasy Data Acquisition Electronics	2/13/2020	Annual	2/13/2021	1403
SPEAG	DAE4	Dasy Data Acquisition Electronics	3/19/2020	Annual	3/19/2021	604
SPEAG	DAK-3.5	Dielectric Assessment Kit	5/12/2020	Annual	5/12/2021	1070
SPEAG	EX3DV4	SAR Probe	2/19/2020	Annual	2/19/2021	7427
SPEAG	EX3DV4	SAR Probe	3/20/2020	Annual	3/20/2021	7421

Measurement Uncertainty = $\pm 23\%$ (k=2)

	Name	Function	Signature
Calibrated By:	Parker Jones	Team Lead Engineer	<i>Parker Jones</i>
Approved By:	Kaitlin O'Keefe	Managing Director	<i>KOK</i>

DIPOLE CALIBRATION EXTENSION

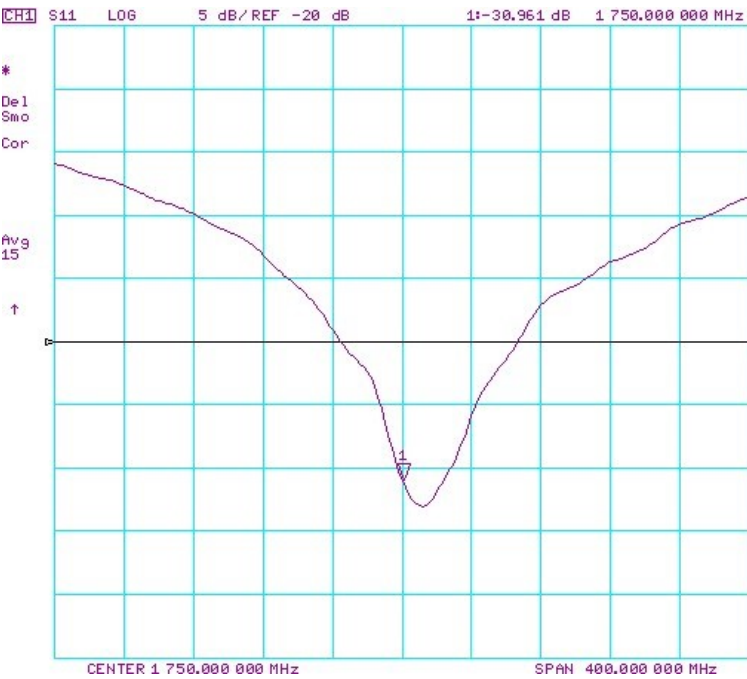
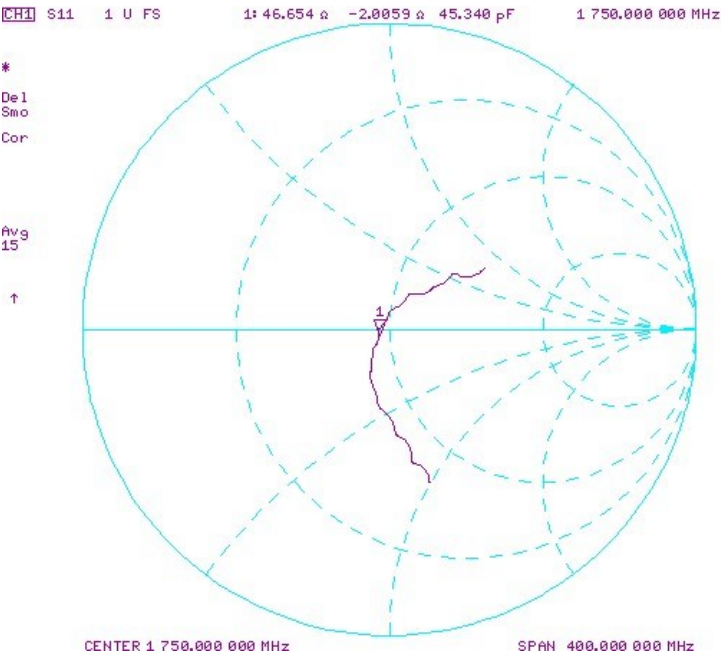
Per KDB 865664 D01, calibration intervals of up to three years may be considered for reference dipoles when it is demonstrated that the SAR target, impedance and return loss of a dipole have remained stable according to the following requirements:

1. The measured SAR does not deviate more than 10% from the target on the calibration certificate.
2. The return-loss does not deviate more than 20% from the previous measurement and meets the required 20dB minimum return-loss requirement.
3. The measurement of real or imaginary parts of impedance does not deviate more than 5Ω from the previous measurement.

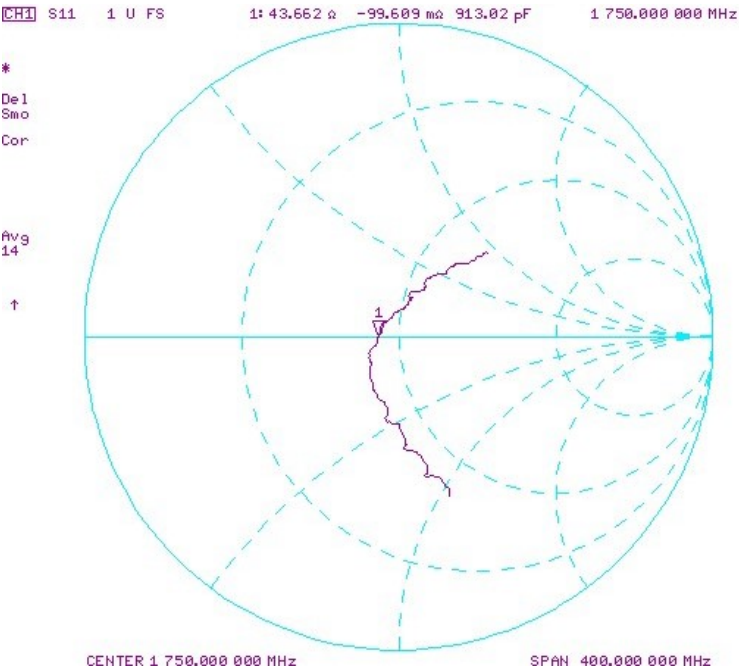
The following dipole was checked to pass the above 3 requirements to have 3-year calibration period from the calibration date:

Calibration Date	Extension Date	Certificate Electrical Delay (ns)	Certificate SAR Target Head (1g) W/kg @ 20.0 dBm	Measured Head SAR (1g) W/kg @ 20.0 dBm	Deviation 1g (%)	Certificate SAR Target Body (10g) W/kg @ 20.0 dBm	Measured Body SAR (10g) W/kg @ 20.0 dBm	Deviation 10g (%)	Certificate Impedance Head (Ohm) Real	Measured Impedance Head (Ohm) Real	Difference (Ohm) Real	Certificate Impedance Head (Ohm) Imaginary	Measured Impedance Head (Ohm) Imaginary	Difference (Ohm) Imaginary	Certificate Return Loss Head (dB)	Measured Return Loss Head (dB)	Deviation (%)	PASS/FAIL
5/15/2018	5/15/2020	1.217	3.61	3.7	2.49%	1.9	1.97	3.68%	49.2	46.7	2.5	-1	-2	1	-37.8	-31	18.00%	PASS
Calibration Date	Extension Date	Certificate Electrical Delay (ns)	Certificate SAR Target Body (1g) W/kg @ 20.0 dBm	Measured Body SAR (1g) W/kg @ 20.0 dBm	Deviation 1g (%)	Certificate SAR Target Body (10g) W/kg @ 20.0 dBm	Measured Body SAR (10g) W/kg @ 20.0 dBm	Deviation 10g (%)	Certificate Impedance Body (Ohm) Real	Measured Impedance Body (Ohm) Real	Difference (Ohm) Real	Certificate Impedance Body (Ohm) Imaginary	Measured Impedance Body (Ohm) Imaginary	Difference (Ohm) Imaginary	Certificate Return Loss Body (dB)	Measured Return Loss Body (dB)	Deviation (%)	PASS/FAIL
5/15/2018	5/15/2020	1.217	3.64	3.77	3.57%	1.94	2	3.09%	44.8	43.7	1.1	-0.6	-0.1	0.5	-25.2	-23.6	6.30%	PASS

Impedance & Return-Loss Measurement Plot for Head TSL



Impedance & Return-Loss Measurement Plot for Body TSL



**Calibration Laboratory of
Schmid & Partner
Engineering AG**
Zeughausstrasse 43, 8004 Zurich, Switzerland



S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
S Servizio svizzero di taratura
S Swiss Calibration Service

Accredited by the Swiss Accreditation Service (SAS)
The Swiss Accreditation Service is one of the signatories to the EA
Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: SCS 0108

Client **PC Test**

Certificate No: **D1900V2-5d181_Sep17**

CALIBRATION CERTIFICATE

Object **D1900V2 - SN:5d181**

Calibration procedure(s) **QA CAL-05.v9**
Calibration procedure for dipole validation kits above 700 MHz

Calibration date: **September 07, 2017**

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature $(22 \pm 3)^\circ\text{C}$ and humidity $< 70\%$.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter NRP	SN: 104778	04-Apr-17 (No. 217-02521/02522)	Apr-18
Power sensor NRP-Z91	SN: 103244	04-Apr-17 (No. 217-02521)	Apr-18
Power sensor NRP-Z91	SN: 103245	04-Apr-17 (No. 217-02522)	Apr-18
Reference 20 dB Attenuator	SN: 5058 (20k)	07-Apr-17 (No. 217-02526)	Apr-18
Type-N mismatch combination	SN: 5047.2 / 06327	07-Apr-17 (No. 217-02529)	Apr-18
Reference Probe EX3DV4	SN: 7349	31-May-17 (No. EX3-7349_May17)	May-18
DAE4	SN: 601	28-Mar-17 (No. DAE4-601_Mar17)	Mar-18
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter EPM-442A	SN: GB37480704	07-Oct-15 (in house check Oct-16)	In house check: Oct-18
Power sensor HP 8481A	SN: US37292783	07-Oct-15 (in house check Oct-16)	In house check: Oct-18
Power sensor HP 8481A	SN: MY41092317	07-Oct-15 (in house check Oct-16)	In house check: Oct-18
RF generator R&S SMT-06	SN: 100972	15-Jun-15 (in house check Oct-16)	In house check: Oct-18
Network Analyzer HP 8753E	SN: US37390585	18-Oct-01 (in house check Oct-16)	In house check: Oct-17

Calibrated by: **Jeton Kastrali** Function: **Laboratory Technician**

Approved by: **Katja Pokovic** Technical Manager

Signature

Issued: September 7, 2017

This calibration certificate shall not be reproduced except in full without written approval of the laboratory.



Accredited by the Swiss Accreditation Service (SAS)

Accreditation No.: **SCS 0108**

The Swiss Accreditation Service is one of the signatories to the EA
Multilateral Agreement for the recognition of calibration certificates

Glossary:

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORM x,y,z
N/A	not applicable or not measured

Calibration is Performed According to the Following Standards:

- a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
- b) IEC 62209-1, "Measurement procedure for the assessment of Specific Absorption Rate (SAR) from hand-held and body-mounted devices used next to the ear (frequency range of 300 MHz to 6 GHz)", July 2016
- c) IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010
- d) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

- e) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

- *Measurement Conditions:* Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- *Antenna Parameters with TSL:* The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- *Feed Point Impedance and Return Loss:* These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- *Electrical Delay:* One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- *SAR measured:* SAR measured at the stated antenna input power.
- *SAR normalized:* SAR as measured, normalized to an input power of 1 W at the antenna connector.
- *SAR for nominal TSL parameters:* The measured TSL parameters are used to calculate the nominal SAR result.

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k=2$, which for a normal distribution corresponds to a coverage probability of approximately 95%.

Measurement Conditions

DASY system configuration, as far as not given on page 1.

DASY Version	DASY5	V52.10.0
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	1900 MHz $\pm$ 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	40.0	1.40 mho/m
Measured Head TSL parameters	(22.0 $\pm$ 0.2) °C	39.0 $\pm$ 6 %	1.38 mho/m $\pm$ 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	9.85 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	39.5 W/kg $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	5.15 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	20.6 W/kg $\pm$ 16.5 % (k=2)

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	53.3	1.52 mho/m
Measured Body TSL parameters	(22.0 $\pm$ 0.2) °C	54.3 $\pm$ 6 %	1.47 mho/m $\pm$ 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	9.65 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	39.5 W/kg $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	5.14 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	20.9 W/kg $\pm$ 16.5 % (k=2)

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	$53.7 \Omega + 4.6 j\Omega$
Return Loss	- 24.9 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	$49.2 \Omega + 5.6 j\Omega$
Return Loss	- 24.8 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.200 ns
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After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.

No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	August 23, 2013

DASY5 Validation Report for Head TSL

Date: 07.09.2017

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:5d181

Communication System: UID 0 - CW; Frequency: 1900 MHz

Medium parameters used: $f = 1900$ MHz; $\sigma = 1.38$ S/m; $\epsilon_r = 39$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(8.43, 8.43, 8.43); Calibrated: 31.05.2017;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 28.03.2017
- Phantom: Flat Phantom 5.0 (front); Type: QD 000 P50 AA; Serial: 1001
- DASY52 52.10.0(1446); SEMCAD X 14.6.10(7417)

Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 106.8 V/m; Power Drift = -0.06 dB

Peak SAR (extrapolated) = 18.5 W/kg

SAR(1 g) = 9.85 W/kg; SAR(10 g) = 5.15 W/kg

Maximum value of SAR (measured) = 14.8 W/kg



0 dB = 14.8 W/kg = 11.70 dBW/kg

Impedance Measurement Plot for Head TSL

7 Sep 2017 09:10:32
 CH1 S11 1 U FS 3: 53.668 Ω 4.5957 Ω 384.96 μH 1 900.000 000 MHz

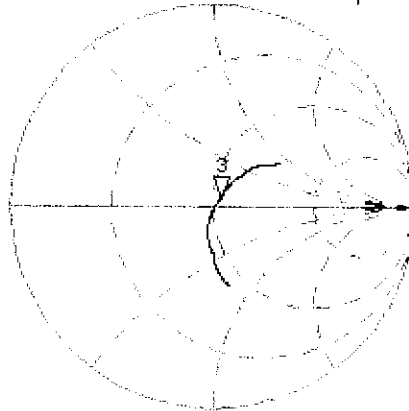
*

De1

CA

Avg
16

H1d

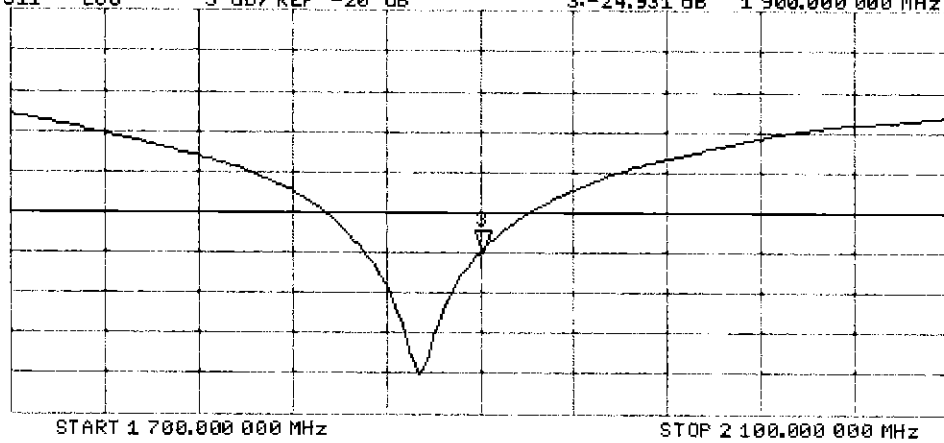


CH2 S11 LOG 5 dB/REF -20 dB 3:-24.931 dB 1 900.000 000 MHz

CA

Avg
16

H1d



DASY5 Validation Report for Body TSL

Date: 07.09.2017

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:5d181

Communication System: UID 0 - CW; Frequency: 1900 MHz

Medium parameters used: $f = 1900$ MHz; $\sigma = 1.47$ S/m; $\epsilon_r = 54.3$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(8.2, 8.2, 8.2); Calibrated: 31.05.2017;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 28.03.2017
- Phantom: Flat Phantom 5.0 (back); Type: QD 000 P50 AA; Serial: 1002
- DASY52 52.10.0(1446); SEMCAD X 14.6.10(7417)

Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

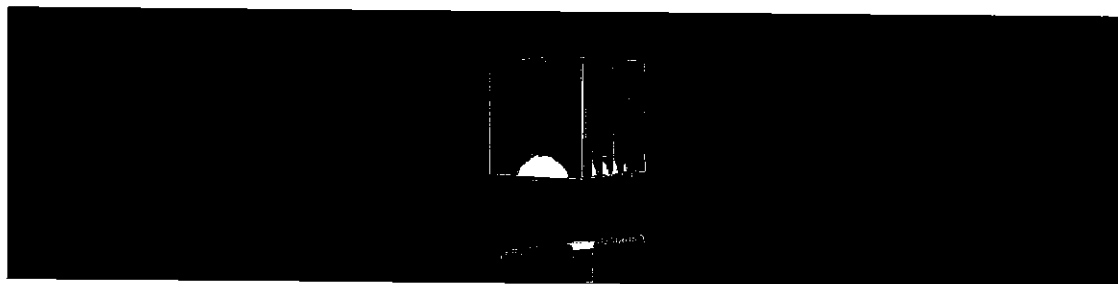
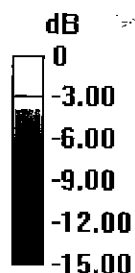
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 101.4 V/m; Power Drift = -0.04 dB

Peak SAR (extrapolated) = 17.0 W/kg

SAR(1 g) = 9.65 W/kg; SAR(10 g) = 5.14 W/kg

Maximum value of SAR (measured) = 13.8 W/kg

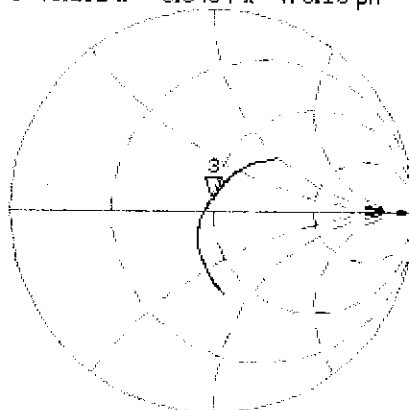


0 dB = 13.8 W/kg = 11.40 dBW/kg

Impedance Measurement Plot for Body TSL

7 Sep 2017 09:09:41
 CH1 S11 1 U FS 3: 49.201 Ω 5.6484 Ω 473.15 pF 1 900.000 000 MHz

*
 Del
 CA



Avg
 16

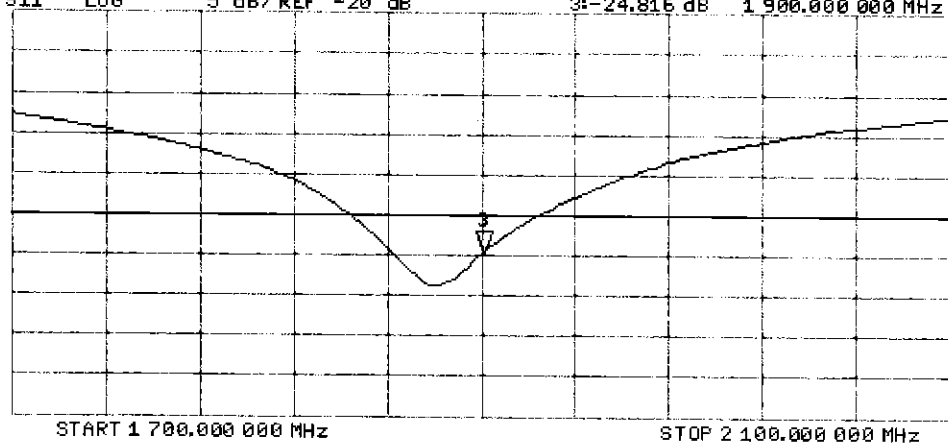
H1d

CH2 S11 LOG 5 dB/REF -20 dB 3: -24.816 dB 1 900.000 000 MHz

CA

Avg
 16

H1d



Certification of Calibration

Object: D1900V2 – SN: 5d181

Calibration procedure(s): Procedure for Calibration Extension for SAR Dipoles.

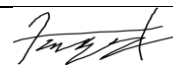
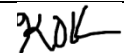
Extended Calibration date: September 07, 2018

Description: SAR Validation Dipole at 1900 MHz.

Calibration Equipment used:

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
Agilent	8753ES	S-Parameter Network Analyzer	9/14/2017	Annual	9/14/2018	US39170118
Agilent	N5182A	MXG Vector Signal Generator	3/19/2018	Annual	3/19/2019	US46240505
Amplifier Research	15S1G6	Amplifier	CBT	N/A	CBT	343972
Anritsu	ML2496A	Power Meter	10/9/2017	Annual	10/9/2018	1138001
Anritsu	MA2411B	Pulse Power Sensor	11/15/2017	Annual	11/15/2018	1339007
Anritsu	MA2411B	Pulse Power Sensor	11/22/2017	Annual	11/22/2018	1339008
Control Company	4040	Temperature / Humidity Monitor	2/28/2018	Biennial	2/28/2020	150761911
Control Company	4352	Ultra Long Stem Thermometer	2/14/2017	Biennial	2/14/2019	170112507
Keysight	772D	Dual Directional Coupler	CBT	N/A	CBT	MY52180215
Keysight Technologies	85033E	Standard Mechanical Calibration Kit (DC to 9GHz, 3.5mm)	6/4/2018	Annual	6/4/2019	MY53401181
Mini-Circuits	BW-N20W5+	DC to 18 GHz Precision Fixed 20 dB Attenuator	CBT	N/A	CBT	N/A
Mini-Circuits	NLP-2950+	Low Pass Filter DC to 2700 MHz	CBT	N/A	CBT	N/A
Narda	4772-3	Attenuator (3dB)	CBT	N/A	CBT	9406
Pasternack	PE2209-10	Bidirectional Coupler	CBT	N/A	CBT	N/A
Pasternack	PE5011-1	Torque Wrench	7/19/2017	Biennial	7/19/2019	N/A
SPEAG	DAK-3.5	Dielectric Assessment Kit	5/15/2018	Annual	5/15/2019	1070
SPEAG	ES3DV3	SAR Probe	9/18/2017	Annual	9/18/2018	3287
SPEAG	DAE4	Data Acquisition Electronics	1/26/2018	Annual	1/26/2019	1533
SPEAG	ES3DV3	SAR Probe	3/13/2018	Annual	3/13/2019	3131
SPEAG	DAE4	Dasy Data Acquisition Electronics	3/7/2018	Annual	3/7/2019	604

Measurement Uncertainty = $\pm 23\%$ (k=2)

	Name	Function	Signature
Calibrated By:	Sangmin Cha	Team Lead Engineer	
Approved By:	Kaitlin O'Keefe	Senior Technical Manager	

DIPOLE CALIBRATION EXTENSION

Per KDB 865664 D01, calibration intervals of up to three years may be considered for reference dipoles when it is demonstrated that the SAR target, impedance and return loss of a dipole have remained stable according to the following requirements:

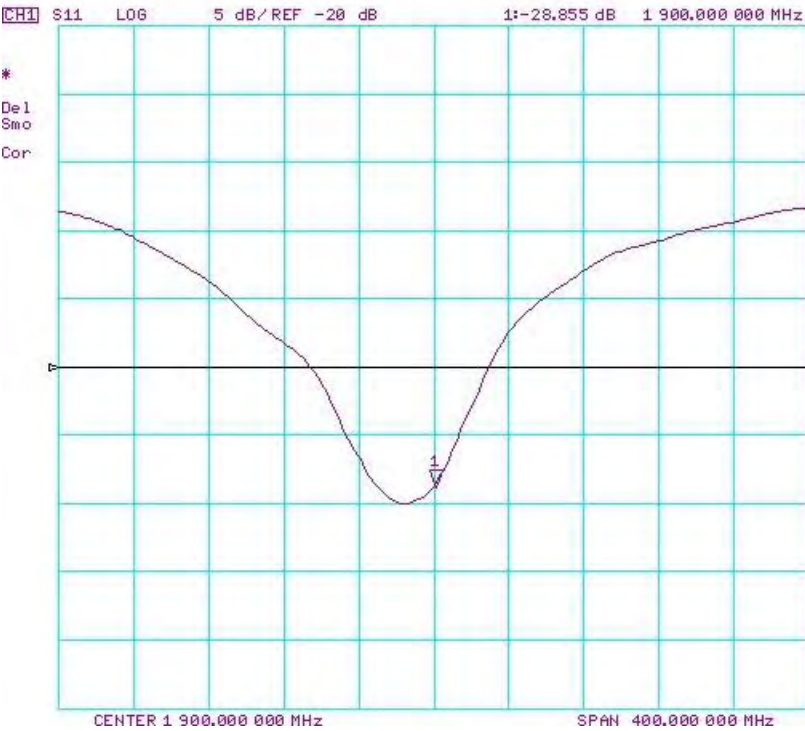
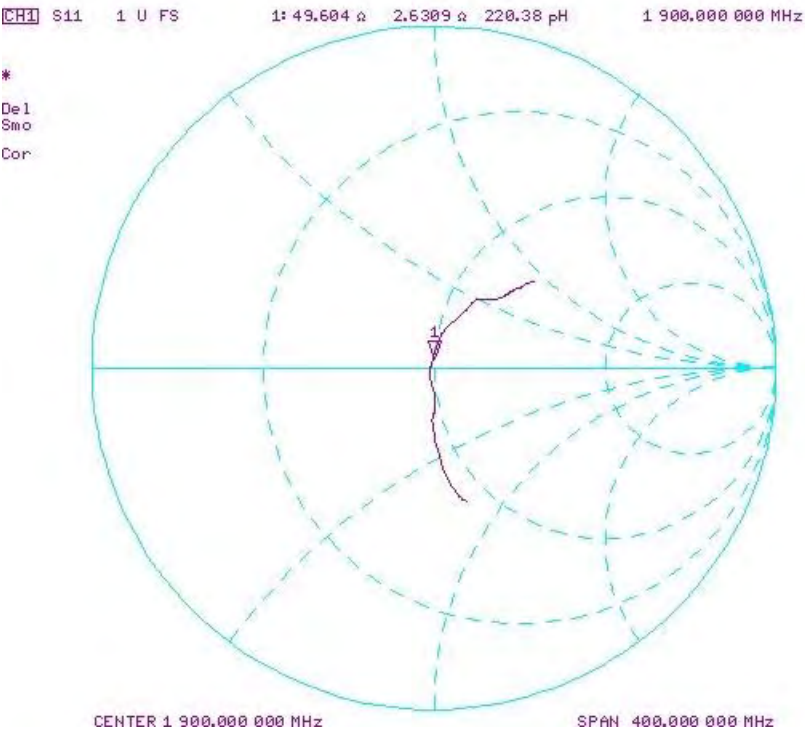
1. The measured SAR does not deviate more than 10% from the target on the calibration certificate.
2. The return-loss does not deviate more than 20% from the previous measurement and meets the required 20dB minimum return-loss requirement.
3. The measurement of real or imaginary parts of impedance does not deviate more than 5Ω from the previous measurement.

The following dipole was checked to pass the above 3 requirements to have 2-year calibration period from the calibration date:

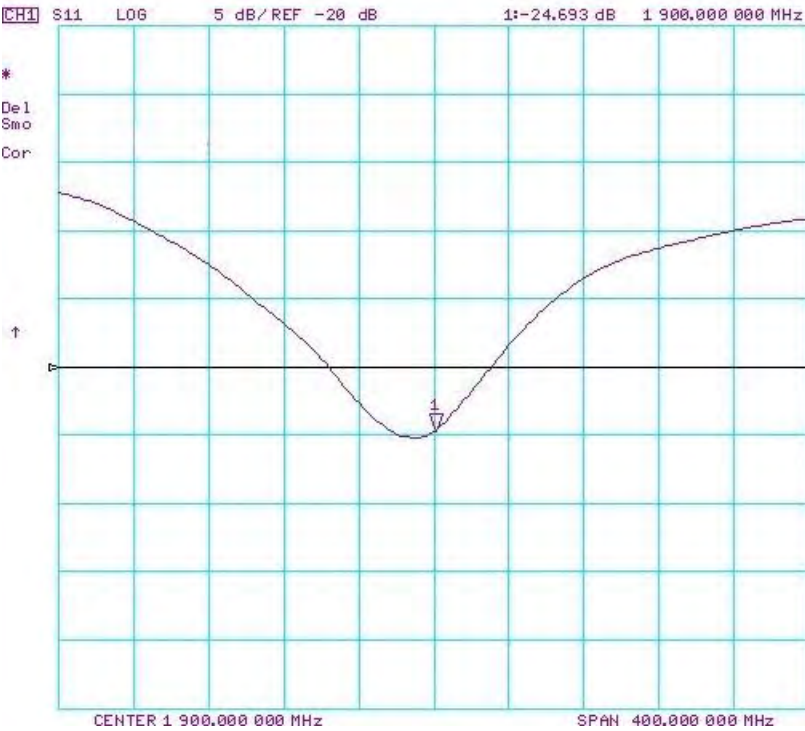
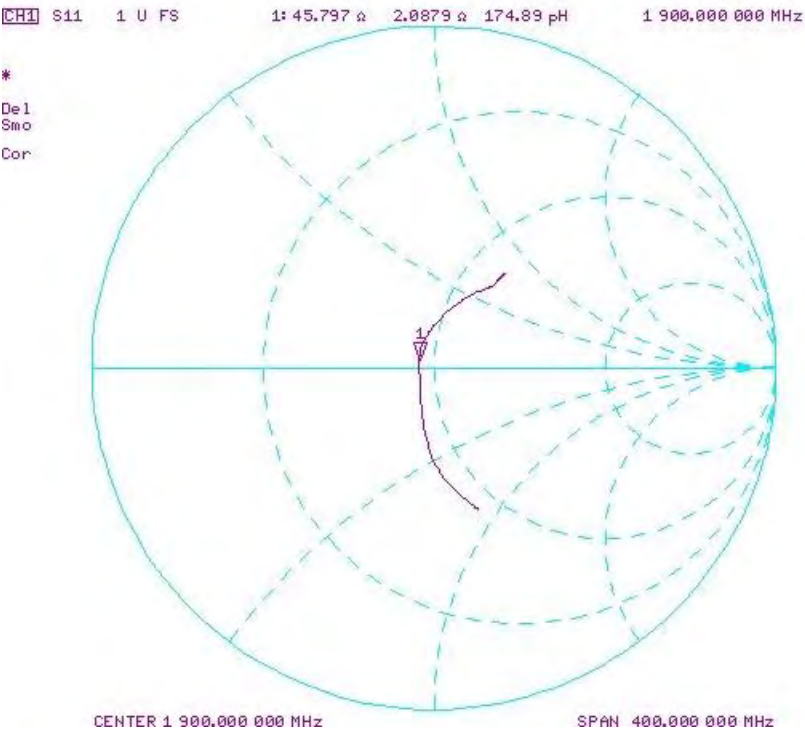
Calibration Date	Extension Date	Certificate Electrical Delay (ns)	Certificate SAR Target Head (1g) W/kg @ 20.0 dBm	Measured Head SAR (1g) W/kg @ 20.0 dBm	Deviation 1g (%)	Certificate SAR Target Head (10g) W/kg @ 20.0 dBm	Measured Head SAR (10g) W/kg @ 20.0 dBm	Deviation 10g (%)	Certificate Impedance Head (Ohm) Real	Measured Impedance Head (Ohm) Real	Difference (Ohm) Real	Certificate Impedance Head (Ohm) Imaginary	Measured Impedance Head (Ohm) Imaginary	Difference (Ohm) Imaginary	Certificate Return Loss Head (dB)	Measured Return Loss Head (dB)	Deviation (%)	PASS/FAIL
9/7/2017	9/7/2018	1.2	3.95	3.99	1.01%	2.06	2.07	0.49%	53.7	49.6	4.1	4.6	2.6	2	-24.9	-28.9	-16.10%	PASS

Calibration Date	Extension Date	Certificate Electrical Delay (ns)	Certificate SAR Target Body (1g) W/kg @ 20.0 dBm	Measured Body SAR (1g) W/kg @ 20.0 dBm	Deviation 1g (%)	Certificate SAR Target Body (10g) W/kg @ 20.0 dBm	Measured Body SAR (10g) W/kg @ 20.0 dBm	Deviation 10g (%)	Certificate Impedance Body (Ohm) Real	Measured Impedance Body (Ohm) Real	Difference (Ohm) Real	Certificate Impedance Body (Ohm) Imaginary	Measured Impedance Body (Ohm) Imaginary	Difference (Ohm) Imaginary	Certificate Return Loss Body (dB)	Measured Return Loss Body (dB)	Deviation (%)	PASS/FAIL
9/7/2017	9/7/2018	1.2	3.95	4.13	4.56%	2.09	2.14	2.39%	49.2	45.8	3.4	5.6	2.1	3.5	-24.8	-24.7	0.40%	PASS

Impedance & Return-Loss Measurement Plot for Head TSL



Impedance & Return-Loss Measurement Plot for Body TSL



Certification of Calibration

Object D1900V2 – SN: 5d181

Calibration procedure(s) Procedure for Calibration Extension for SAR Dipoles.

Extended Calibration date: September 7, 2019

Description: SAR Validation Dipole at 1900 MHz.

Calibration Equipment used:

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
Agilent	8753ES	S-Parameter Network Analyzer	10/2/2018	Annual	10/2/2019	US39170118
Agilent	E4438C	ESG Vector Signal Generator	6/27/2019	Annual	6/27/2020	MY45093852
Amplifier Research	15S1G6	Amplifier	CBT	N/A	CBT	343972
Anritsu	ML2495A	Power Meter	10/21/2018	Annual	10/21/2019	941001
Anritsu	MA2411B	Pulse Power Sensor	10/30/2018	Annual	10/30/2019	1207470
Anritsu	MA2411B	Pulse Power Sensor	11/20/2018	Annual	11/20/2019	1339007
Control Company	4040	Temperature / Humidity Monitor	2/28/2018	Biennial	2/28/2020	150761911
Control Company	4352	Ultra Long Stem Thermometer	2/28/2018	Biennial	2/28/2020	170330160
Keysight Technologies	85033E	Standard Mechanical Calibration Kit (DC to 9GHz, 3.5mm)	7/2/2019	Annual	7/2/2020	MY53401181
Keysight	772D	Dual Directional Coupler	CBT	N/A	CBT	MY52180215
Mini-Circuits	BW-N20W5+	DC to 18 GHz Precision Fixed 20 dB Attenuator	CBT	N/A	CBT	N/A
Mini-Circuits	NLP-2950+	Low Pass Filter DC to 2700 MHz	CBT	N/A	CBT	N/A
Narda	4772-3	Attenuator (3dB)	CBT	N/A	CBT	9406
Pasternack	PE2208-6	Bidirectional Coupler	CBT	N/A	CBT	N/A
Pasternack	NC-100	Torque Wrench	11/1/2017	Biennial	11/1/2019	N/A
SPEAG	DAK-3.5	Dielectric Assessment Kit	5/7/2019	Annual	5/7/2020	1070
SPEAG	EX3DV4	SAR Probe	1/24/2019	Annual	1/24/2020	7490
SPEAG	DAE4	Data Acquisition Electronics	1/15/2019	Annual	1/15/2020	1532

Measurement Uncertainty = $\pm 23\%$ (k=2)

	Name	Function	Signature
Calibrated By:	Parker Jones	Team Lead Engineer	<i>Parker Jones</i>
Approved By:	Kaitlin O'Keefe	Senior Technical Manager	<i>KOK</i>

DIPOLE CALIBRATION EXTENSION

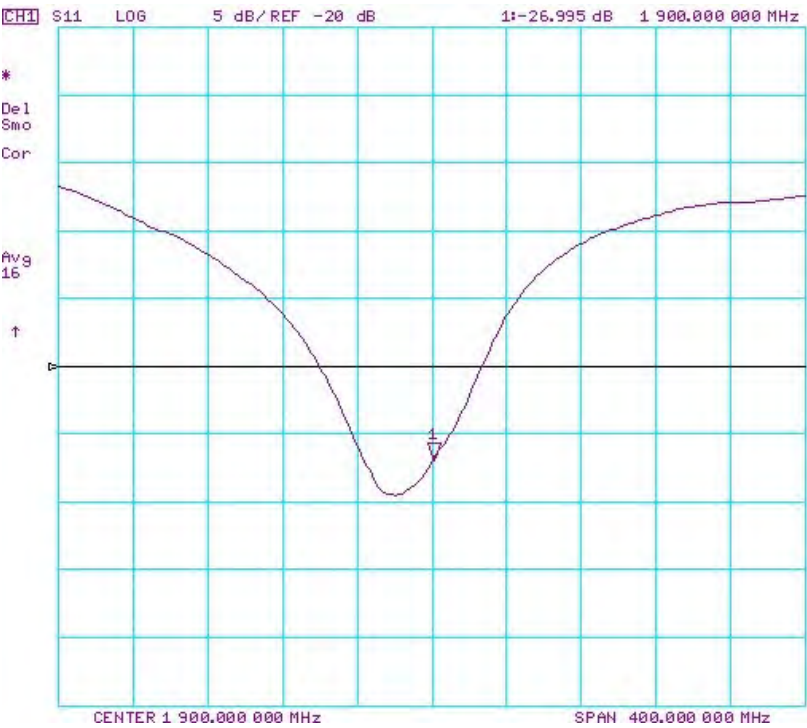
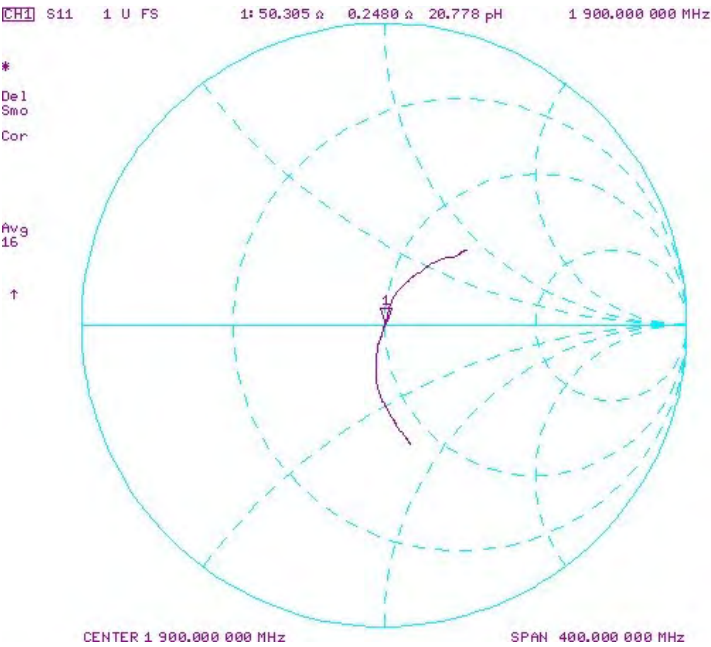
Per KDB 865664 D01, calibration intervals of up to three years may be considered for reference dipoles when it is demonstrated that the SAR target, impedance and return loss of a dipole have remained stable according to the following requirements:

1. The measured SAR does not deviate more than 10% from the target on the calibration certificate.
2. The return-loss does not deviate more than 20% from the previous measurement and meets the required 20dB minimum return-loss requirement.
3. The measurement of real or imaginary parts of impedance does not deviate more than 5Ω from the previous measurement.

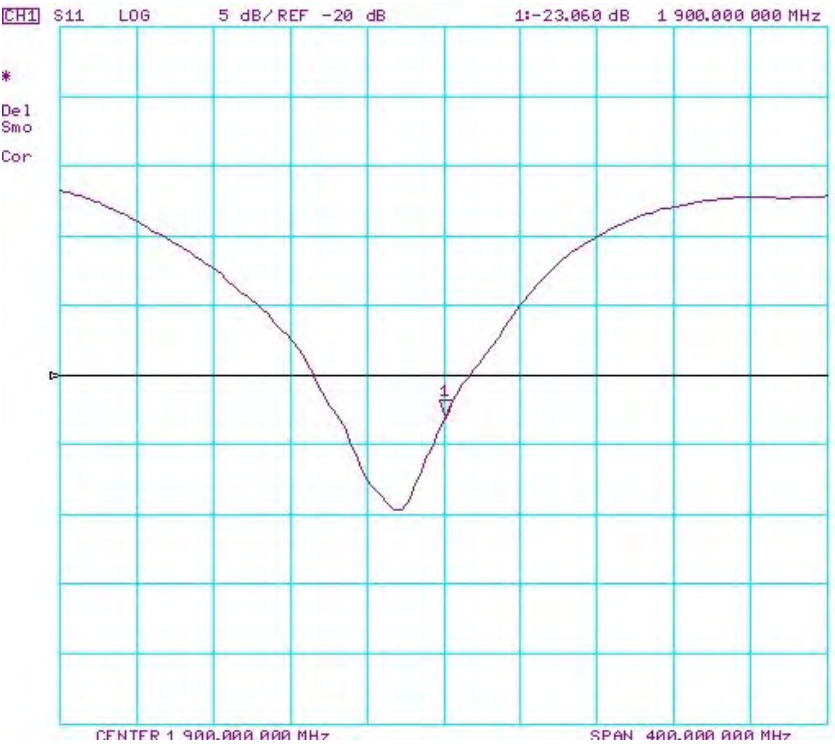
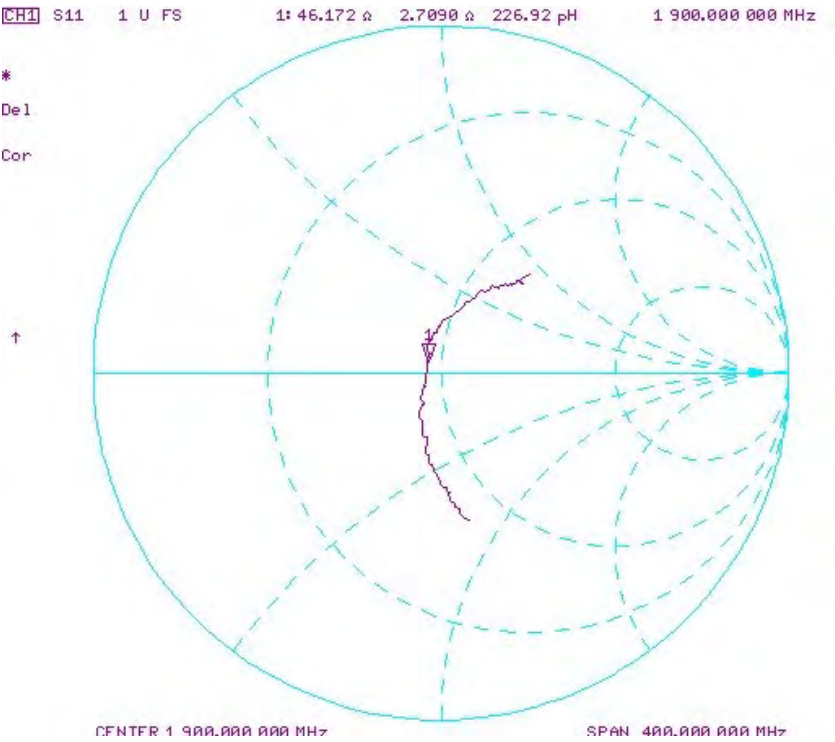
The following dipole was checked to pass the above 3 requirements to have 3-year calibration period from the calibration date:

Calibration Date	Extension Date	Certificate Electrical Delay (ns)	Certificate SAR Target Head (1g) W/kg @ 20.0 dBm	Measured Head SAR (1g) W/kg @ 20.0 dBm	Deviation 1g (%)	Certificate SAR Target Body (10g) W/kg @ 20.0 dBm	Measured Body SAR (10g) W/kg @ 20.0 dBm	Deviation 10g (%)	Certificate Impedance Head (Ohm) Real	Measured Impedance Head (Ohm) Real	Difference (Ohm) Real	Certificate Impedance Head (Ohm) Imaginary	Measured Impedance Head (Ohm) Imaginary	Difference (Ohm) Imaginary	Certificate Return Loss Head (dB)	Measured Return Loss Head (dB)	Deviation (%)	PASS/FAIL
9/7/2017	9/7/2019	1.2	3.95	3.92	-0.76%	2.06	2.04	-0.97%	53.7	50.3	-3.4	4.6	0.2	-4.4	-24.9	-27	-8.40%	PASS
Calibration Date	Extension Date	Certificate Electrical Delay (ns)	Certificate SAR Target Body (1g) W/kg @ 20.0 dBm	Measured Body SAR (1g) W/kg @ 20.0 dBm	Deviation 1g (%)	Certificate SAR Target Body (10g) W/kg @ 20.0 dBm	Measured Body SAR (10g) W/kg @ 20.0 dBm	Deviation 10g (%)	Certificate Impedance Body (Ohm) Real	Measured Impedance Body (Ohm) Real	Difference (Ohm) Real	Certificate Impedance Body (Ohm) Imaginary	Measured Impedance Body (Ohm) Imaginary	Difference (Ohm) Imaginary	Certificate Return Loss Body (dB)	Measured Return Loss Body (dB)	Deviation (%)	PASS/FAIL
9/7/2017	9/7/2019	1.2	3.95	4.05	2.53%	2.09	2.1	0.48%	49.2	46.2	-3	5.6	2.7	-2.9	-24.8	-23.1	6.90%	PASS

Impedance & Return-Loss Measurement Plot for Head TSL



Impedance & Return-Loss Measurement Plot for Body TSL





Accredited by the Swiss Accreditation Service (SAS)
 The Swiss Accreditation Service is one of the signatories to the EA
 Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 0108**

Client **PC Test**

Certificate No: **D1900V2-5d030_Jun19**

CALIBRATION CERTIFICATE

Object **D1900V2 - SN:5d030**

Calibration procedure(s) **QA CAL-05.v11**
Calibration Procedure for SAR Validation Sources between 0.7-3 GHz

Calibration date: **June 19, 2019**

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
 The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature $(22 \pm 3)^{\circ}\text{C}$ and humidity $< 70\%$.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter NRP	SN: 104778	03-Apr-19 (No. 217-02892/02893)	Apr-20
Power sensor NRP-Z91	SN: 103244	03-Apr-19 (No. 217-02892)	Apr-20
Power sensor NRP-Z91	SN: 103245	03-Apr-19 (No. 217-02893)	Apr-20
Reference 20 dB Attenuator	SN: 5058 (20k)	04-Apr-19 (No. 217-02894)	Apr-20
Type-N mismatch combination	SN: 5047.2 / 06327	04-Apr-19 (No. 217-02895)	Apr-20
Reference Probe EX3DV4	SN: 7349	29-May-19 (No. EX3-7349_May19)	May-20
DAE4	SN: 601	30-Apr-19 (No. DAE4-601_Apr19)	Apr-20

Secondary Standards	ID #	Check Date (In house)	Scheduled Check
Power meter E4419B	SN: GB39512476	30-Oct-14 (In house check Feb-19)	In house check: Oct-20
Power sensor HP 8481A	SN: US37292783	07-Oct-15 (In house check Oct-18)	In house check: Oct-20
Power sensor HP 8481A	SN: MY41092317	07-Oct-15 (In house check Oct-18)	In house check: Oct-20
RF generator R&S SMT-06	SN: 100972	15-Jun-15 (In house check Oct-18)	In house check: Oct-20
Network Analyzer Agilent E8358A	SN: US41080477	31-Mar-14 (In house check Oct-18)	In house check: Oct-19

Calibrated by: **Gaudio Leubler** **Laboratory Technician**

Approved by: **Katja Pokovic** **Technical Manager**

Signature

Issued: June 20, 2019

This calibration certificate shall not be reproduced except in full without written approval of the laboratory.



Accredited by the Swiss Accreditation Service (SAS)

Accreditation No.: **SCS 0108**

The Swiss Accreditation Service is one of the signatories to the EA
Multilateral Agreement for the recognition of calibration certificates

Glossary:

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORM x,y,z
N/A	not applicable or not measured

Calibration is Performed According to the Following Standards:

- IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
- IEC 62209-1, "Measurement procedure for the assessment of Specific Absorption Rate (SAR) from hand-held and body-mounted devices used next to the ear (frequency range of 300 MHz to 6 GHz)", July 2016
- IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010
- KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

- DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

- Measurement Conditions:** Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- Antenna Parameters with TSL:** The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- Feed Point Impedance and Return Loss:** These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- Electrical Delay:** One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- SAR measured:** SAR measured at the stated antenna input power.
- SAR normalized:** SAR as measured, normalized to an input power of 1 W at the antenna connector.
- SAR for nominal TSL parameters:** The measured TSL parameters are used to calculate the nominal SAR result.

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k=2$, which for a normal distribution corresponds to a coverage probability of approximately 95%.

Measurement Conditions

DASY system configuration, as far as not given on page 1.

DASY Version	DASY5	V52.10.2
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	1900 MHz $\pm$ 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	40.0	1.40 mho/m
Measured Head TSL parameters	(22.0 $\pm$ 0.2) °C	41.4 $\pm$ 6 %	1.39 mho/m $\pm$ 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	9.85 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	39.9 W/kg $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	5.19 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	20.9 W/kg $\pm$ 16.5 % (k=2)

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	53.3	1.52 mho/m
Measured Body TSL parameters	(22.0 $\pm$ 0.2) °C	54.2 $\pm$ 6 %	1.50 mho/m $\pm$ 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	9.86 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	39.9 W/kg $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	5.24 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	21.1 W/kg $\pm$ 16.5 % (k=2)

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	$50.0\ \Omega + 4.2\ j\Omega$
Return Loss	- 27.6 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	$47.0\ \Omega + 5.4\ j\Omega$
Return Loss	- 24.0 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.191 ns
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After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.

No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
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DASY5 Validation Report for Head TSL

Date: 19.06.2019

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:5d030

Communication System: UID 0 - CW; Frequency: 1900 MHz

Medium parameters used: $f = 1900$ MHz; $\sigma = 1.39$ S/m; $\epsilon_r = 41.4$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(8.44, 8.44, 8.44) @ 1900 MHz; Calibrated: 29.05.2019
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 30.04.2019
- Phantom: Flat Phantom 5.0 (front); Type: QD 000 P50 AA; Serial: 1001
- DASY52 52.10.2(1504); SEMCAD X 14.6.12(7470)

Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

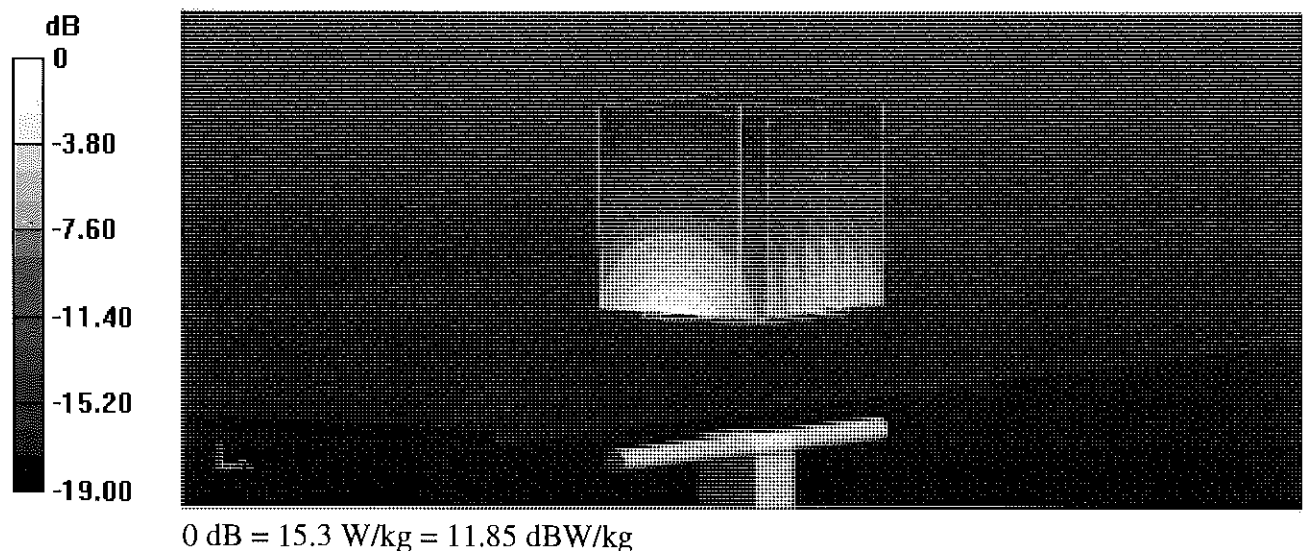
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 109.2 V/m; Power Drift = 0.03 dB

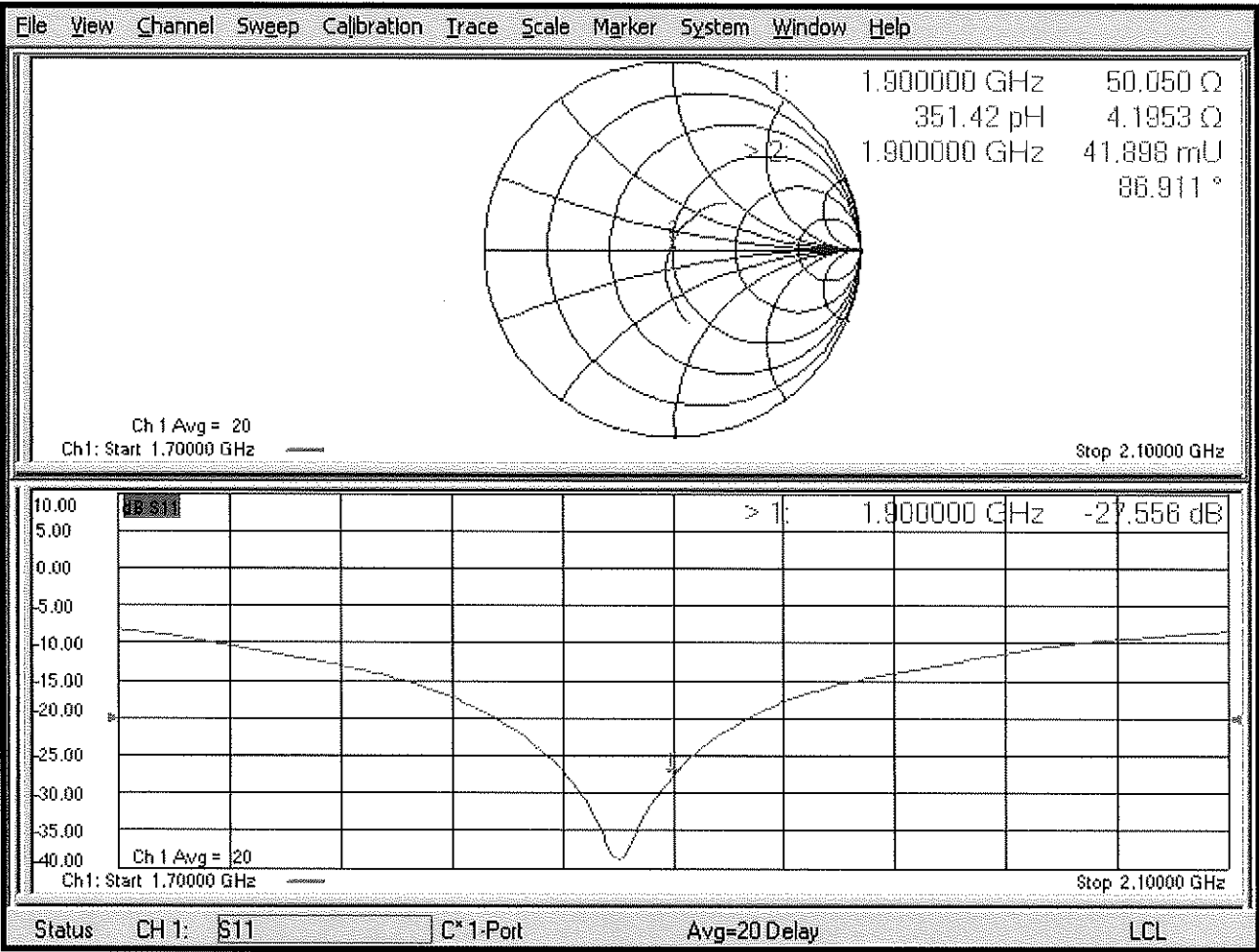
Peak SAR (extrapolated) = 18.2 W/kg

SAR(1 g) = 9.85 W/kg; SAR(10 g) = 5.19 W/kg

Maximum value of SAR (measured) = 15.3 W/kg



Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 19.06.2019

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:5d030

Communication System: UID 0 - CW; Frequency: 1900 MHz

Medium parameters used: $f = 1900$ MHz; $\sigma = 1.5$ S/m; $\epsilon_r = 54.2$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(8.42, 8.42, 8.42) @ 1900 MHz; Calibrated: 29.05.2019
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 30.04.2019
- Phantom: Flat Phantom 5.0 (back); Type: QD 000 P50 AA; Serial: 1002
- DASY52 52.10.2(1504); SEMCAD X 14.6.12(7470)

Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

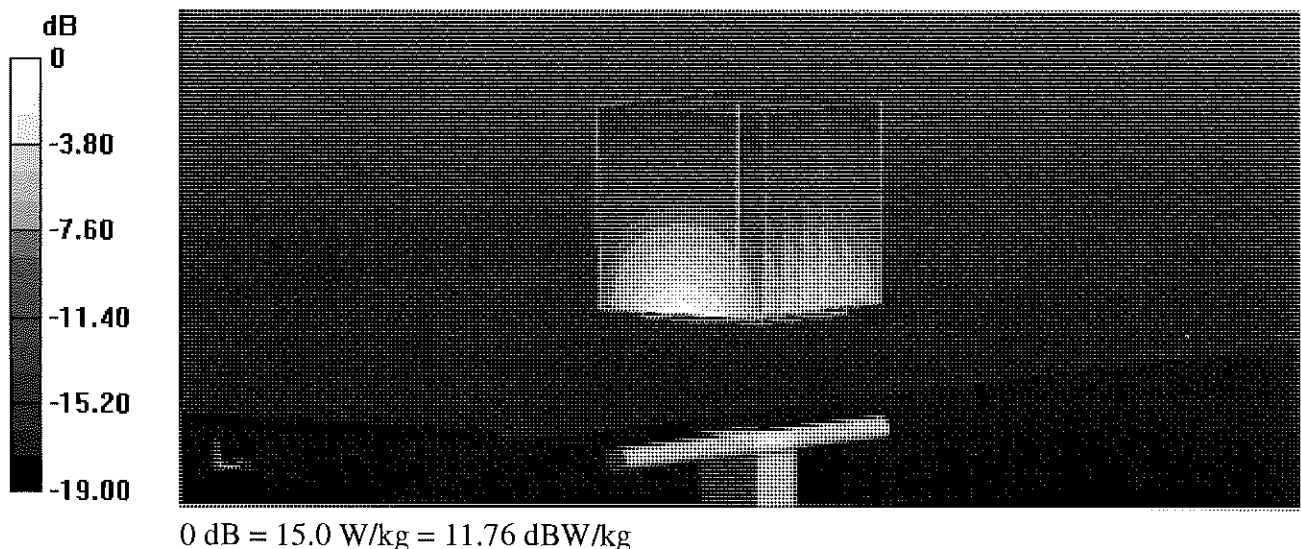
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 104.1 V/m; Power Drift = -0.06 dB

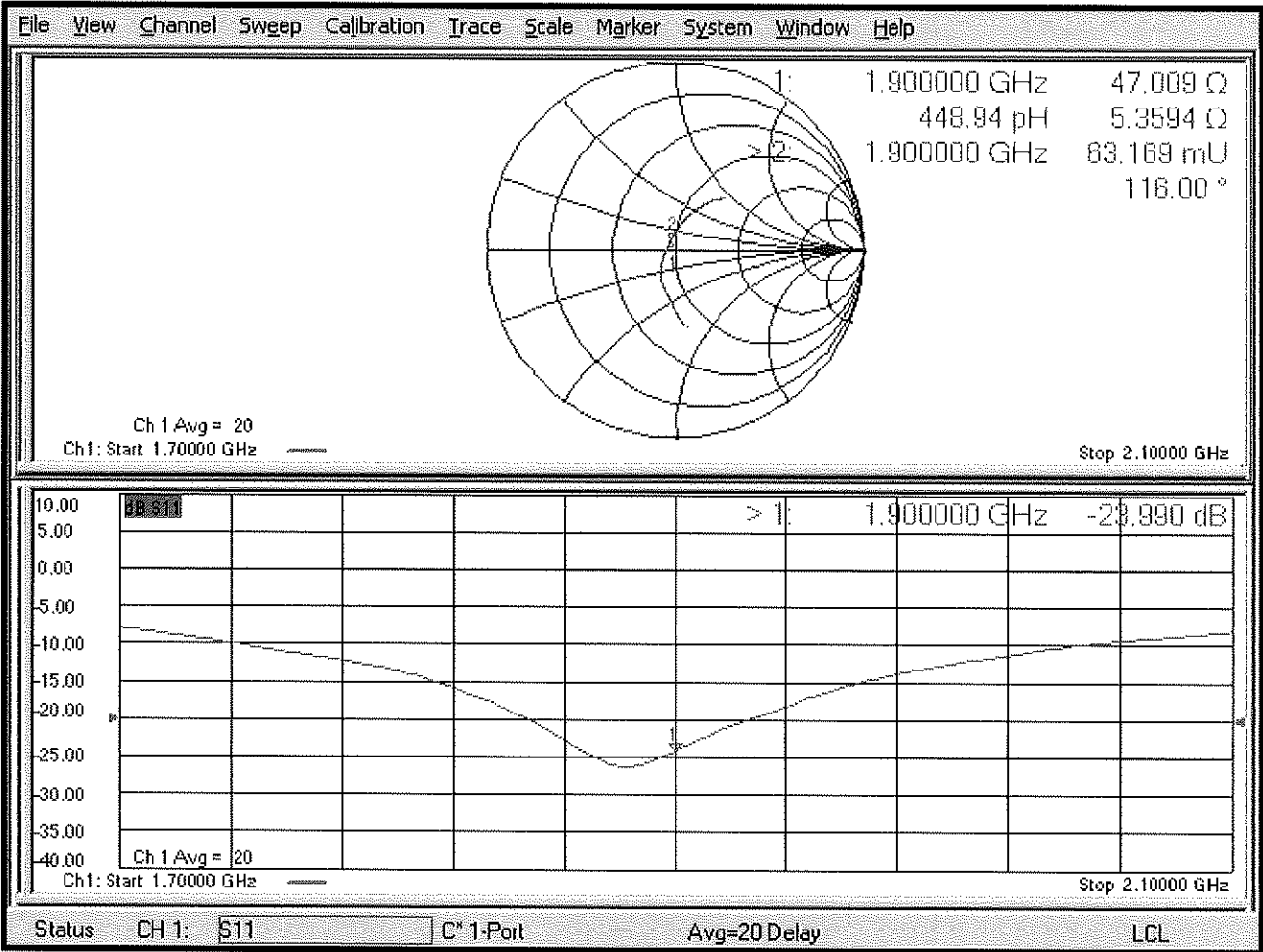
Peak SAR (extrapolated) = 17.6 W/kg

SAR(1 g) = 9.86 W/kg; SAR(10 g) = 5.24 W/kg

Maximum value of SAR (measured) = 15.0 W/kg



Impedance Measurement Plot for Body TSL



Certification of Calibration

Object D1900V2 – SN: 5d030

Calibration procedure(s) Procedure for Calibration Extension for SAR Dipoles.

Extended Calibration date: June 19, 2020

Description: SAR Validation Dipole at 1900 MHz.

Calibration Equipment used:

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
Agilent	8753ES	S-Parameter Network Analyzer	1/16/2020	Annual	1/16/2021	US39170118
Agilent	N5182A	MXG Vector Signal Generator	8/19/2019	Annual	8/19/2020	MY47420837
Amplifier Research	15S1G6	Amplifier	CBT	N/A	CBT	343972
Anritsu	MA2411B	Pulse Power Sensor	1/21/2020	Annual	1/21/2021	1207470
Anritsu	MA2411B	Pulse Power Sensor	1/21/2020	Annual	1/21/2021	1339007
Anritsu	ML2495A	Power Meter	1/15/2020	Annual	1/15/2021	1328004
Control Company	62344-734	Therm./ Clock/ Humidity Monitor	3/18/2019	Biennial	3/18/2021	192038436
Control Company	4352	Ultra Long Stem Thermometer	8/2/2018	Biennial	8/2/2020	181292000
Keysight Technologies	85033E	Standard Mechanical Calibration Kit (DC to 9GHz, 3.5mm)	7/2/2019	Annual	7/2/2020	MY53401181
MiniCircuits	VLF-6000+	Low Pass Filter	CBT	N/A	CBT	N/A
Mini-Circuits	BW-N20W5+	DC to 18 GHz Precision Fixed 20 dB Attenuator	CBT	N/A	CBT	N/A
Narda	4772-3	Attenuator (3dB)	CBT	N/A	CBT	9406
Pasternack	PE2208-6	Bidirectional Coupler	CBT	N/A	CBT	N/A
Seekonk	NC-100	Torque Wrench	7/18/2019	Annual	7/18/2020	N/A
SPEAG	DAE4	Dasy Data Acquisition Electronics	1/14/2020	Annual	1/14/2021	793
SPEAG	DAK-3.5	Dielectric Assessment Kit	5/12/2020	Annual	5/12/2021	1070
SPEAG	EX3DV4	SAR Probe	1/20/2020	Annual	1/20/2021	3837

Measurement Uncertainty = $\pm 23\%$ (k=2)

	Name	Function	Signature
Calibrated By:	Parker Jones	Team Lead Engineer	<i>Parker Jones</i>
Approved By:	Kaitlin O'Keefe	Managing Director	<i>KOK</i>

DIPOLE CALIBRATION EXTENSION

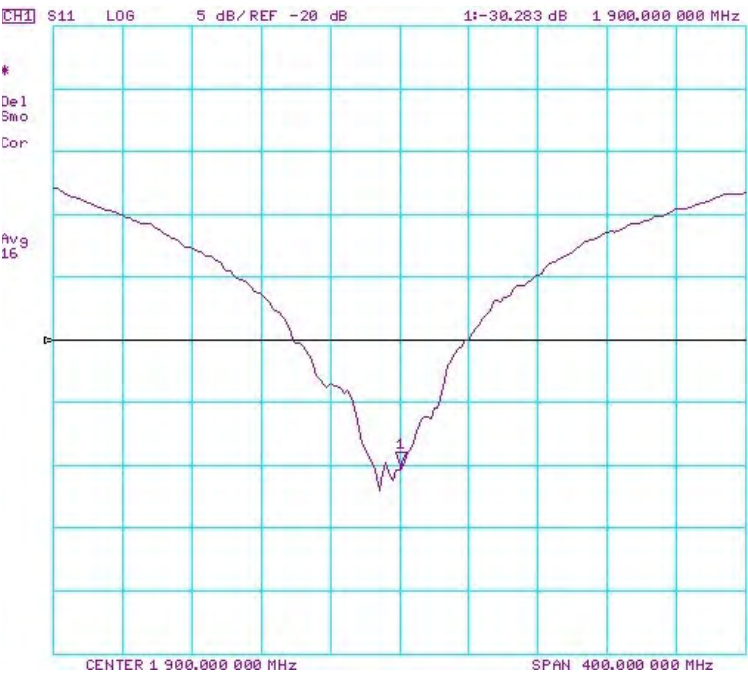
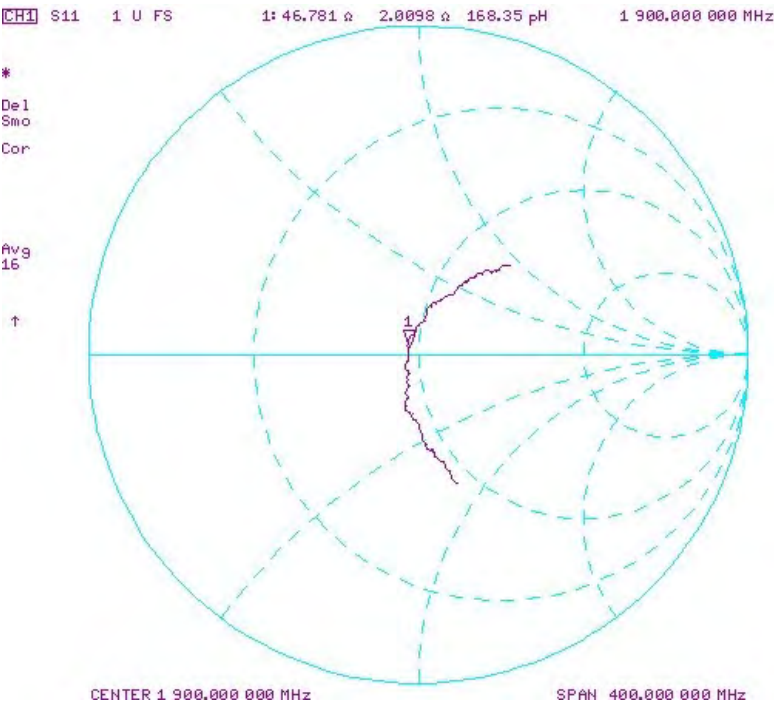
Per KDB 865664 D01, calibration intervals of up to three years may be considered for reference dipoles when it is demonstrated that the SAR target, impedance and return loss of a dipole have remained stable according to the following requirements:

1. The measured SAR does not deviate more than 10% from the target on the calibration certificate.
2. The return-loss does not deviate more than 20% from the previous measurement and meets the required 20dB minimum return-loss requirement.
3. The measurement of real or imaginary parts of impedance does not deviate more than 5Ω from the previous measurement.

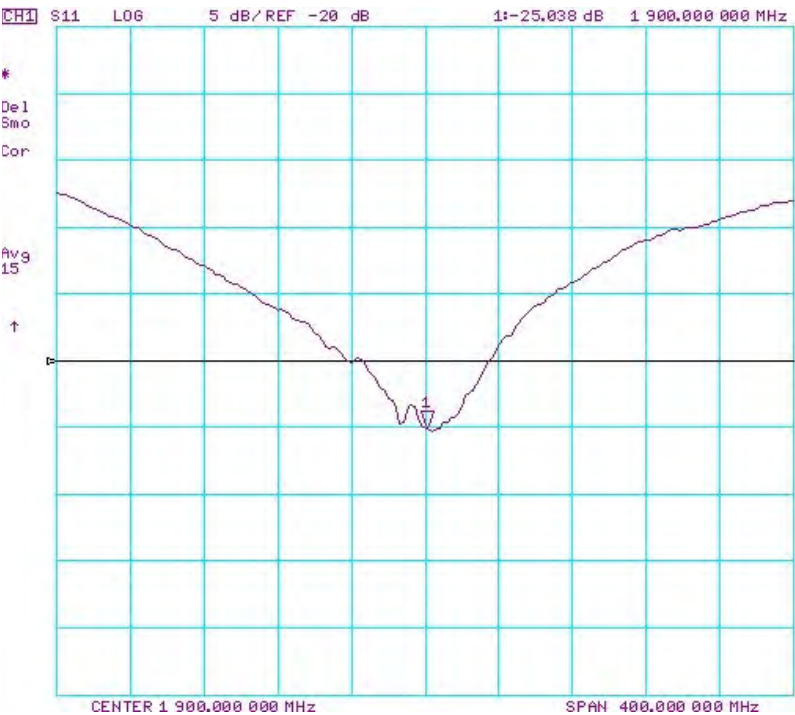
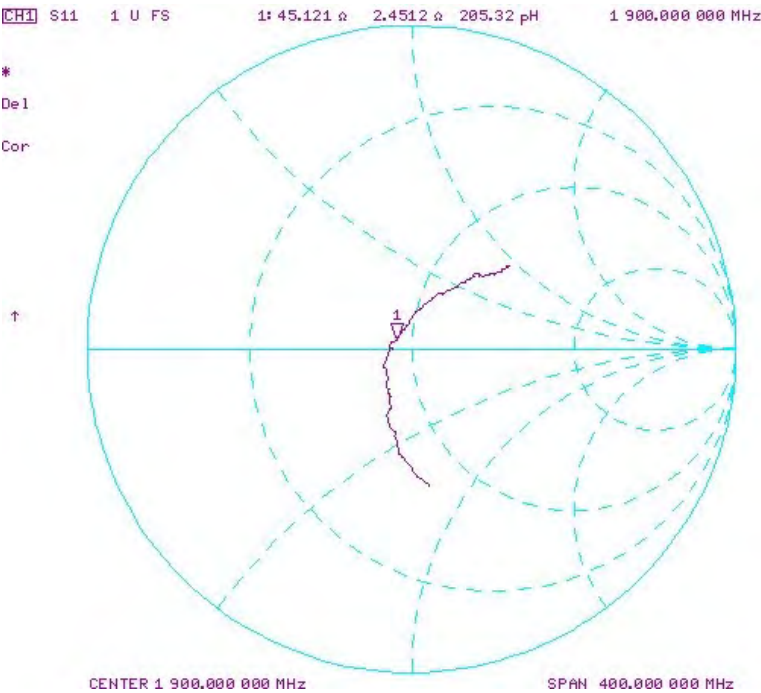
The following dipole was checked to pass the above 3 requirements to have 2-year calibration period from the calibration date:

Calibration Date	Extension Date	Certificate Electrical Delay (ns)	Certificate SAR Target Head (1g) W/kg @ 20.0 dBm	Measured Head SAR (1g) W/kg @ 20.0 dBm	Deviation 1g (%)	Certificate SAR Target Body (10g) W/kg @ 20.0 dBm	Measured Body SAR (10g) W/kg @ 20.0 dBm	Deviation 10g (%)	Certificate Impedance Head (Ohm) Real	Measured Impedance Head (Ohm) Real	Difference (Ohm) Real	Certificate Impedance Head (Ohm) Imaginary	Measured Impedance Head (Ohm) Imaginary	Difference (Ohm) Imaginary	Certificate Return Loss Head (dB)	Measured Return Loss Head (dB)	Deviation (%)	PASS/FAIL
6/19/2019	6/19/2020	1.191	3.99	4.3	7.77%	2.09	2.2	5.25%	50	46.8	3.2	4.2	2	2.2	-27.6	-30.3	-9.80%	PASS
Calibration Date	Extension Date	Certificate Electrical Delay (ns)	Certificate SAR Target Body (1g) W/kg @ 20.0 dBm	Measured Body SAR (1g) W/kg @ 20.0 dBm	Deviation 1g (%)	Certificate SAR Target Body (10g) W/kg @ 20.0 dBm	Measured Body SAR (10g) W/kg @ 20.0 dBm	Deviation 10g (%)	Certificate Impedance Body (Ohm) Real	Measured Impedance Body (Ohm) Real	Difference (Ohm) Real	Certificate Impedance Body (Ohm) Imaginary	Measured Impedance Body (Ohm) Imaginary	Difference (Ohm) Imaginary	Certificate Return Loss Body (dB)	Measured Return Loss Body (dB)	Deviation (%)	PASS/FAIL
6/19/2019	6/19/2020	1.191	3.99	4.29	7.52%	2.11	2.2	4.27%	47	45.1	1.9	5.4	2.5	2.9	-24	-25	-4.20%	PASS

Impedance & Return-Loss Measurement Plot for Head TSL



Impedance & Return-Loss Measurement Plot for Body TSL



Calibration Laboratory of
Schmid & Partner
Engineering AG
 Zeughausstrasse 43, 8004 Zurich, Switzerland



S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
S Servizio svizzero di taratura
S Swiss Calibration Service

Accredited by the Swiss Accreditation Service (SAS)
 The Swiss Accreditation Service is one of the signatories to the EA
 Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 0108**

Client **PC Test**

Certificate No. **D2300V2-1038 Mar18**

CALIBRATION CERTIFICATE

Object **D2300V2 - SN:1038**

Calibration procedure(s) **GA-CAL-05-V10
 Calibration procedure for dipole validation kits above 700 MHz**

Calibration date: **March 07, 2018**

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
 The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature $(22 \pm 3)^\circ\text{C}$ and humidity $< 70\%$.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter NRP	SN: 104778	04-Apr-17 (No. 217-02521/02522)	Apr-18
Power sensor NRP-Z91	SN: 103244	04-Apr-17 (No. 217-02521)	Apr-18
Power sensor NRP-Z91	SN: 103245	04-Apr-17 (No. 217-02522)	Apr-18
Reference 20 dB Attenuator	SN: 5058 (20k)	07-Apr-17 (No. 217-02528)	Apr-18
Type-N mismatch combination	SN: 5047.2 / 06327	07-Apr-17 (No. 217-02529)	Apr-18
Reference Probe EX3DV4	SN: 7349	30-Dec-17 (No. EX3-7349_Dec17)	Dec-18
DAE4	SN: 601	26-Oct-17 (No. DAE4-601_Oct17)	Oct-18

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter EPM-442A	SN: GB37480704	07-Oct-15 (in house check Oct-16)	In house check: Oct-18
Power sensor HP 8481A	SN: US37292783	07-Oct-15 (in house check Oct-16)	In house check: Oct-18
Power sensor HP 8481A	SN: MY41092317	07-Oct-15 (in house check Oct-16)	In house check: Oct-18
RF generator R&S SMT-06	SN: 100972	15-Jun-15 (in house check Oct-16)	In house check: Oct-18
Network Analyzer HP 8753E	SN: US37390585	18-Oct-01 (in house check Oct-17)	In house check: Oct-18

Calibrated by: **Claudio Leubler** **Laboratory Technician**

Approved by: **Katja Pokovic** **Technical Manager**

Issued: March 9, 2018

This calibration certificate shall not be reproduced except in full without written approval of the laboratory.



Accredited by the Swiss Accreditation Service (SAS)
The Swiss Accreditation Service is one of the signatories to the EA
Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 0108**

Glossary:

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORM x,y,z
N/A	not applicable or not measured

Calibration is Performed According to the Following Standards:

- IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
- IEC 62209-1, "Measurement procedure for the assessment of Specific Absorption Rate (SAR) from hand-held and body-mounted devices used next to the ear (frequency range of 300 MHz to 6 GHz)", July 2016
- IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010
- KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

- DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

- Measurement Conditions:** Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- Antenna Parameters with TSL:** The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- Feed Point Impedance and Return Loss:** These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- Electrical Delay:** One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- SAR measured:** SAR measured at the stated antenna input power.
- SAR normalized:** SAR as measured, normalized to an input power of 1 W at the antenna connector.
- SAR for nominal TSL parameters:** The measured TSL parameters are used to calculate the nominal SAR result.

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k=2$, which for a normal distribution corresponds to a coverage probability of approximately 95%.

Measurement Conditions

DASY system configuration, as far as not given on page 1.

DASY Version	DASY5	V52.10.0
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	2300 MHz $\pm$ 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	39.5	1.67 mho/m
Measured Head TSL parameters	(22.0 $\pm$ 0.2) °C	38.6 $\pm$ 6 %	1.70 mho/m $\pm$ 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	12.5 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	49.3 W/kg $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	5.94 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	23.6 W/kg $\pm$ 16.5 % (k=2)

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	52.9	1.81 mho/m
Measured Body TSL parameters	(22.0 $\pm$ 0.2) °C	51.6 $\pm$ 6 %	1.86 mho/m $\pm$ 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm ³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	11.9 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	46.7 W/kg $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	5.69 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	22.5 W/kg $\pm$ 16.5 % (k=2)

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	47.8 Ω - 4.9 j Ω
Return Loss	- 25.2 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	45.9 Ω - 3.4 j Ω
Return Loss	- 25.0 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.170 ns
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After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.

No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	July 02, 2013

DASY5 Validation Report for Head TSL

Date: 07.03.2018

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2300 MHz; Type: D2300V2; Serial: D2300V2 - SN:1038

Communication System: UID 0 - CW; Frequency: 2300 MHz

Medium parameters used: $f = 2300$ MHz; $\sigma = 1.7$ S/m; $\epsilon_r = 38.6$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(8.08, 8.08, 8.08); Calibrated: 30.12.2017;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 26.10.2017
- Phantom: Flat Phantom 5.0 (front); Type: QD 000 P50 AA; Serial: 1001
- DASY52 52.10.0(1446); SEMCAD X 14.6.10(7417)

Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

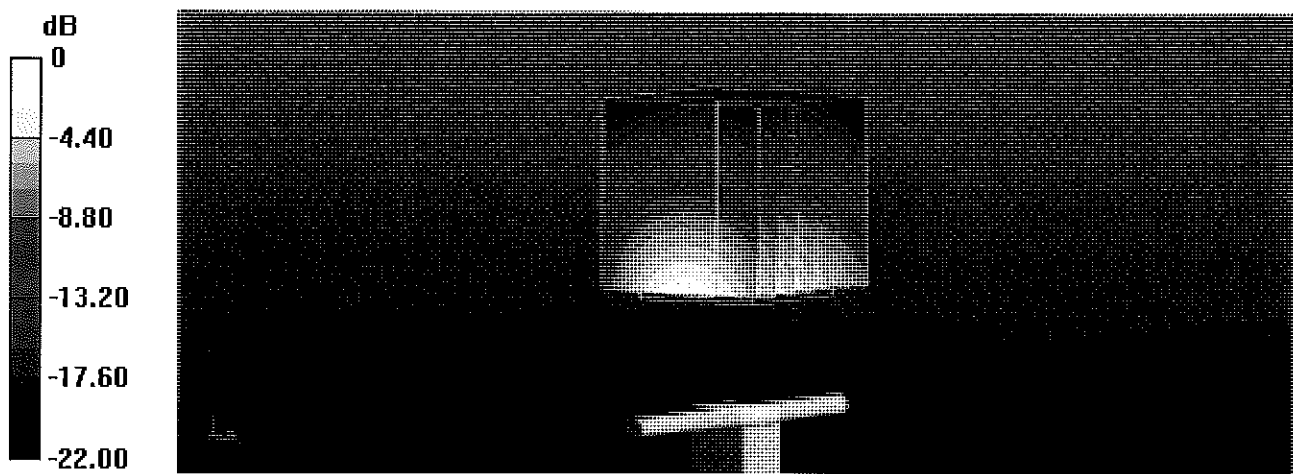
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 112.4 V/m; Power Drift = -0.07 dB

Peak SAR (extrapolated) = 24.5 W/kg

SAR(1 g) = 12.5 W/kg; SAR(10 g) = 5.94 W/kg

Maximum value of SAR (measured) = 19.6 W/kg

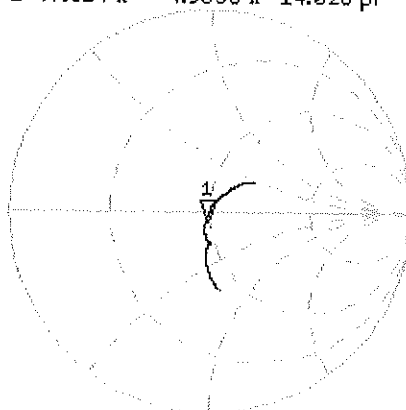


0 dB = 19.6 W/kg = 12.92 dBW/kg

Impedance Measurement Plot for Head TSL

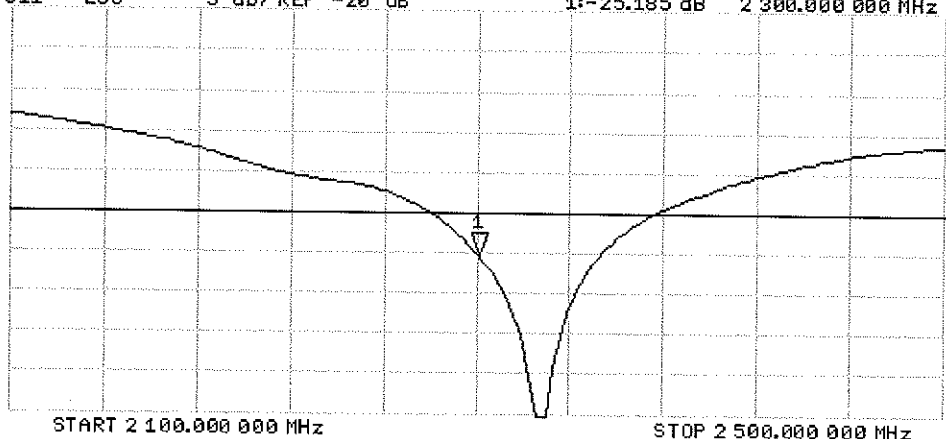
7 Mar 2018 13:16:07
 CH1 S11 1 U FS 1: 47.824 Ω -4.9336 Ω 14.026 pF 2 300.000 000 MHz

*
 Del
 Cor
 Avg
 16
 H1d



CH2 S11 LOG 5 dB/REF -20 dB 1:-25.185 dB 2 300.000 000 MHz

Cor
 Avg
 16
 H1d



DASY5 Validation Report for Body TSL

Date: 07.03.2018

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2300 MHz; Type: D2300V2; Serial: D2300V2 - SN:1038

Communication System: UID 0 - CW; Frequency: 2300 MHz

Medium parameters used: $f = 2300$ MHz; $\sigma = 1.86$ S/m; $\epsilon_r = 51.6$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(8.08, 8.08, 8.08); Calibrated: 30.12.2017;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 26.10.2017
- Phantom: Flat Phantom 5.0 (back); Type: QD 000 P50 AA; Serial: 1002
- DASY52 52.10.0(1446); SEMCAD X 14.6.10(7417)

Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

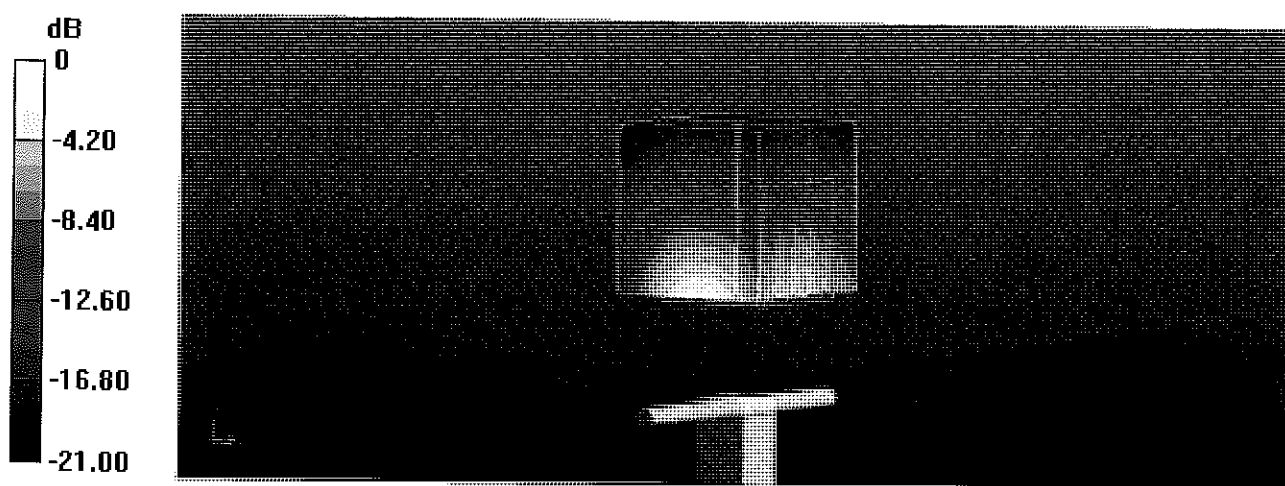
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 104.5 V/m; Power Drift = 0.06 dB

Peak SAR (extrapolated) = 23.0 W/kg

SAR(1 g) = 11.9 W/kg; SAR(10 g) = 5.69 W/kg

Maximum value of SAR (measured) = 18.2 W/kg

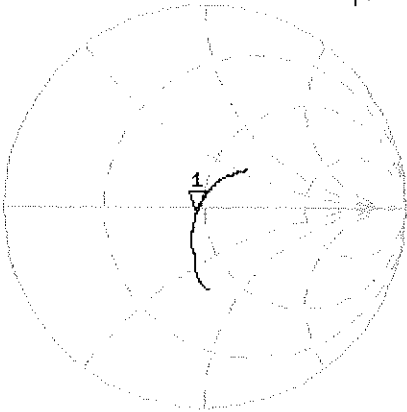


0 dB = 18.2 W/kg = 12.60 dBW/kg

Impedance Measurement Plot for Body TSL

7 Mar 2018 13:11:08
CH1 S11 1 U FS 1: 45.861 Ω -3.4160 Ω 20.257 pF 2 300.000 000 MHz

*
De1
Cor



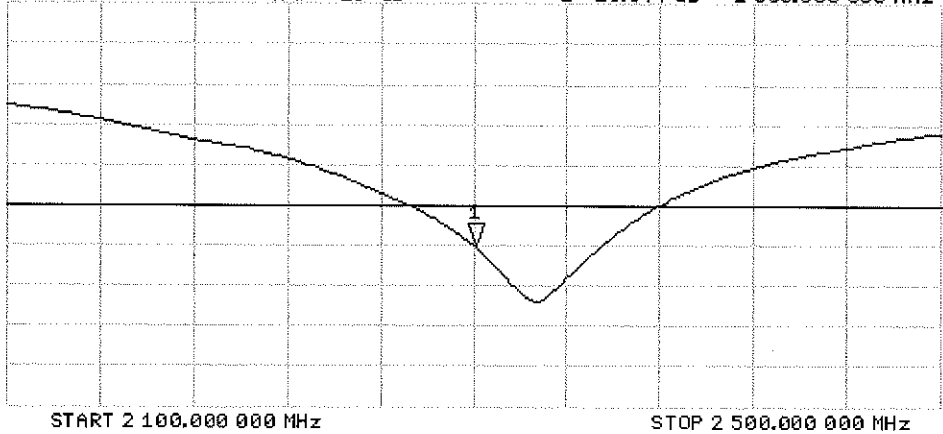
Avg
16
H1d

CH2 S11 LOG 5 dB/REF -20 dB 1:-25.044 dB 2 300.000 000 MHz

Cor

Avg
16

H1d



Certification of Calibration

Object D2300V2 – SN: 1038

Calibration procedure(s) Procedure for Calibration Extension for SAR Dipoles.

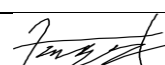
Extended Calibration date: February 25, 2019

Description: SAR Validation Dipole at 2300 MHz.

Calibration Equipment used:

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
Agilent	8753ES	S-Parameter Network Analyzer	10/2/2018	Annual	10/2/2019	US39170118
Agilent	N5182A	MXG Vector Signal Generator	6/15/2018	Annual	6/15/2019	MY47420837
Amplifier Research	15S1G6	Amplifier	CBT	N/A	CBT	343972
Anritsu	MA2411B	Pulse Power Sensor	10/30/2018	Annual	10/30/2019	1207470
Anritsu	MA2411B	Pulse Power Sensor	11/20/2018	Annual	11/20/2019	1339007
Anritsu	ML2496A	Power Meter	10/21/2018	Annual	10/21/2019	1138001
Control Company	4040	Therm./Clock/Humidity Monitor	3/31/2017	Biennial	3/31/2019	170232394
Control Company	4352	Ultra Long Stem Thermometer	5/2/2017	Biennial	5/2/2019	170330156
Keysight	772D	Dual Directional Coupler	CBT	N/A	CBT	MY52180215
Agilent	85033E	3.5mm Standard Calibration Kit	8/13/2018	Annual	8/13/2019	MY53402352
MiniCircuits	VLF-6000+	Low Pass Filter	CBT	N/A	CBT	N/A
Mini-Circuits	BW-N20W5+	DC to 18 GHz Precision Fixed 20 dB Attenuator	CBT	N/A	CBT	N/A
Narda	4772-3	Attenuator (3dB)	CBT	N/A	CBT	9406
Seekonk	NC-100	Torque Wrench	7/11/2018	Annual	7/11/2019	N/A
SPEAG	DAE4	Dasy Data Acquisition Electronics	4/12/2018	Annual	4/12/2019	501
SPEAG	DAE4	Dasy Data Acquisition Electronics	10/18/2018	Annual	10/18/2019	1364
SPEAG	DAK-3.5	Dielectric Assessment Kit	5/15/2018	Annual	5/15/2019	1070
SPEAG	ES3DV3	SAR Probe	4/12/2018	Annual	4/12/2019	3275
SPEAG	EX3DV4	SAR Probe	7/20/2018	Annual	7/20/2019	7491

Measurement Uncertainty = $\pm 23\%$ (k=2)

	Name	Function	Signature
Calibrated By:	Sangmin Cha	Team Lead Engineer	
Approved By:	Kaitlin O'Keefe	Managing Director	