

EX3DV4- SN:7370

August 22, 2017

10061-CAB	IEEE 802.11b WiFi 2.4 GHz (DSSS, 11 Mbps)	X	2.51	81.59	23.32	2.04	110.0	± 9.6 %
		Y	1.64	73.94	19.74		110.0	
		Z	1.81	75.84	20.76		110.0	
10062-CAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 6 Mbps)	X	4.62	66.52	16.57	0.49	100.0	± 9.6 %
		Y	4.41	66.84	16.39		100.0	
		Z	4.51	66.44	16.44		100.0	
10063-CAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 9 Mbps)	X	4.63	66.60	16.66	0.72	100.0	± 9.6 %
		Y	4.41	66.90	16.46		100.0	
		Z	4.52	66.52	16.53		100.0	
10064-CAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 12 Mbps)	X	4.93	66.89	16.91	0.86	100.0	± 9.6 %
		Y	4.64	67.06	16.63		100.0	
		Z	4.79	66.78	16.76		100.0	
10065-CAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 18 Mbps)	X	4.78	66.77	17.00	1.21	100.0	± 9.6 %
		Y	4.50	66.84	16.66		100.0	
		Z	4.65	66.64	16.84		100.0	
10066-CAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 24 Mbps)	X	4.79	66.78	17.16	1.46	100.0	± 9.6 %
		Y	4.49	66.79	16.77		100.0	
		Z	4.66	66.64	17.00		100.0	
10067-CAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 36 Mbps)	X	5.07	66.90	17.59	2.04	100.0	± 9.6 %
		Y	4.76	67.01	17.21		100.0	
		Z	4.95	66.86	17.46		100.0	
10068-CAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 48 Mbps)	X	5.12	66.95	17.81	2.55	100.0	± 9.6 %
		Y	4.78	66.88	17.34		100.0	
		Z	4.97	66.80	17.64		100.0	
10069-CAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 54 Mbps)	X	5.19	66.94	18.00	2.67	100.0	± 9.6 %
		Y	4.83	66.88	17.51		100.0	
		Z	5.05	66.84	17.84		100.0	
10071-CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 9 Mbps)	X	4.88	66.55	17.42	1.99	100.0	± 9.6 %
		Y	4.65	66.75	17.11		100.0	
		Z	4.78	66.50	17.30		100.0	
10072-CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 12 Mbps)	X	4.85	66.85	17.63	2.30	100.0	± 9.6 %
		Y	4.58	66.91	17.25		100.0	
		Z	4.74	66.76	17.49		100.0	
10073-CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 18 Mbps)	X	4.89	66.96	17.94	2.83	100.0	± 9.6 %
		Y	4.62	67.03	17.54		100.0	
		Z	4.79	66.88	17.80		100.0	
10074-CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 24 Mbps)	X	4.88	66.80	18.06	3.30	100.0	± 9.6 %
		Y	4.62	66.95	17.67		100.0	
		Z	4.77	66.75	17.93		100.0	
10075-CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 36 Mbps)	X	4.88	66.88	18.36	3.82	90.0	± 9.6 %
		Y	4.62	66.89	17.88		90.0	
		Z	4.78	66.78	18.19		90.0	
10076-CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 48 Mbps)	X	4.88	66.61	18.45	4.15	90.0	± 9.6 %
		Y	4.65	66.75	18.03		90.0	
		Z	4.80	66.59	18.32		90.0	
10077-CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 54 Mbps)	X	4.90	66.65	18.54	4.30	90.0	± 9.6 %
		Y	4.68	66.83	18.15		90.0	
		Z	4.83	66.66	18.42		90.0	

EX3DV4- SN:7370

August 22, 2017

10081-CAB	CDMA2000 (1xRTT, RC3)	X	0.73	65.12	11.46	0.00	150.0	± 9.6 %
		Y	0.67	65.23	10.64		150.0	
		Z	0.56	62.52	9.11		150.0	
10082-CAB	IS-54 / IS-136 FDD (TDMA/FDM, PI/4-DQPSK, Fullrate)	X	0.62	60.00	3.10	4.77	80.0	± 9.6 %
		Y	5.83	60.68	1.91		80.0	
		Z	5.32	61.77	2.59		80.0	
10090-DAC	GPRS-FDD (TDMA, GMSK, TN 0-4)	X	100.00	107.04	22.41	6.56	60.0	± 9.6 %
		Y	100.00	99.21	18.57		60.0	
		Z	100.00	105.43	21.63		60.0	
10097-CAB	UMTS-FDD (HSOPA)	X	1.78	67.86	15.72	0.00	150.0	± 9.6 %
		Y	1.89	69.69	16.21		150.0	
		Z	1.69	67.29	15.09		150.0	
10098-CAB	UMTS-FDD (HSUPA, Subtest 2)	X	1.74	67.81	15.66	0.00	150.0	± 9.6 %
		Y	1.85	69.64	16.20		150.0	
		Z	1.65	67.23	15.06		150.0	
10099-DAC	EDGE-FDD (TDMA, 8PSK, TN 0-4)	X	7.33	88.86	32.05	9.56	60.0	± 9.6 %
		Y	5.83	84.81	30.41		60.0	
		Z	6.09	84.17	30.02		60.0	
10100-CAD	LTE-FDD (SC-FDMA, 100% RB, 20 MHz, QPSK)	X	3.11	70.42	16.72	0.00	150.0	± 9.6 %
		Y	3.01	70.83	17.06		150.0	
		Z	2.92	69.60	16.30		150.0	
10101-CAD	LTE-FDD (SC-FDMA, 100% RB, 20 MHz, 16-QAM)	X	3.20	67.46	15.96	0.00	150.0	± 9.6 %
		Y	3.09	67.76	16.04		150.0	
		Z	3.07	67.04	15.69		150.0	
10102-CAD	LTE-FDD (SC-FDMA, 100% RB, 20 MHz, 64-QAM)	X	3.30	67.43	16.06	0.00	150.0	± 9.6 %
		Y	3.19	67.76	16.13		150.0	
		Z	3.18	67.06	15.81		150.0	
10103-CAD	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, QPSK)	X	5.53	74.71	20.37	3.98	65.0	± 9.6 %
		Y	4.96	73.86	19.70		65.0	
		Z	5.06	73.47	19.81		65.0	
10104-CAD	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, 16-QAM)	X	5.44	72.15	20.06	3.98	65.0	± 9.6 %
		Y	4.89	71.17	19.20		65.0	
		Z	5.05	71.07	19.49		65.0	
10105-CAD	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, 64-QAM)	X	5.18	70.94	19.81	3.98	65.0	± 9.6 %
		Y	4.80	70.57	19.23		65.0	
		Z	4.87	70.09	19.34		65.0	
10108-CAE	LTE-FDD (SC-FDMA, 100% RB, 10 MHz, QPSK)	X	2.71	69.73	16.59	0.00	150.0	± 9.6 %
		Y	2.59	70.20	16.91		150.0	
		Z	2.53	68.96	16.15		150.0	
10109-CAE	LTE-FDD (SC-FDMA, 100% RB, 10 MHz, 16-QAM)	X	2.85	67.35	15.87	0.00	150.0	± 9.6 %
		Y	2.74	67.84	15.94		150.0	
		Z	2.72	66.94	15.54		150.0	
10110-CAE	LTE-FDD (SC-FDMA, 100% RB, 5 MHz, QPSK)	X	2.19	68.90	16.20	0.00	150.0	± 9.6 %
		Y	2.08	69.59	16.45		150.0	
		Z	2.02	68.10	15.63		150.0	
10111-CAE	LTE-FDD (SC-FDMA, 100% RB, 5 MHz, 16-QAM)	X	2.58	68.31	16.20	0.00	150.0	± 9.6 %
		Y	2.54	69.49	16.34		150.0	
		Z	2.43	67.88	15.72		150.0	

EX3DV4- SN:7370

August 22, 2017

10112-CAE	LTE-FDD (SC-FDMA, 100% RB, 10 MHz, 64-QAM)	X	2.98	67.34	15.93	0.00	150.0	± 9.6 %
		Y	2.87	67.91	16.02		150.0	
		Z	2.85	66.99	15.63		150.0	
10113-CAE	LTE-FDD (SC-FDMA, 100% RB, 5 MHz, 64-QAM)	X	2.73	68.45	16.34	0.00	150.0	± 9.6 %
		Y	2.68	69.65	16.46		150.0	
		Z	2.59	68.09	15.89		150.0	
10114-CAB	IEEE 802.11n (HT Greenfield, 13.5 Mbps, BPSK)	X	5.10	67.12	16.51	0.00	150.0	± 9.6 %
		Y	4.90	67.30	16.44		150.0	
		Z	5.00	67.00	16.42		150.0	
10115-CAB	IEEE 802.11n (HT Greenfield, 61 Mbps, 16-QAM)	X	5.40	67.27	16.60	0.00	150.0	± 9.6 %
		Y	5.13	67.32	16.45		150.0	
		Z	5.27	67.10	16.48		150.0	
10116-CAB	IEEE 802.11n (HT Greenfield, 135 Mbps, 64-QAM)	X	5.20	67.33	16.54	0.00	150.0	± 9.6 %
		Y	4.97	67.46	16.45		150.0	
		Z	5.09	67.19	16.45		150.0	
10117-CAB	IEEE 802.11n (HT Mixed, 13.5 Mbps, BPSK)	X	5.05	66.95	16.45	0.00	150.0	± 9.6 %
		Y	4.89	67.23	16.42		150.0	
		Z	4.97	66.86	16.37		150.0	
10118-CAB	IEEE 802.11n (HT Mixed, 61 Mbps, 16-QAM)	X	5.50	67.53	16.74	0.00	150.0	± 9.6 %
		Y	5.19	67.48	16.53		150.0	
		Z	5.35	67.32	16.61		150.0	
10119-CAB	IEEE 802.11n (HT Mixed, 135 Mbps, 64-QAM)	X	5.18	67.28	16.53	0.00	150.0	± 9.6 %
		Y	4.97	67.47	16.46		150.0	
		Z	5.08	67.17	16.45		150.0	
10140-CAD	LTE-FDD (SC-FDMA, 100% RB, 15 MHz, 16-QAM)	X	3.33	67.42	15.97	0.00	150.0	± 9.6 %
		Y	3.21	67.79	16.05		150.0	
		Z	3.21	67.06	15.72		150.0	
10141-CAD	LTE-FDD (SC-FDMA, 100% RB, 15 MHz, 64-QAM)	X	3.46	67.52	16.15	0.00	150.0	± 9.6 %
		Y	3.34	67.96	16.24		150.0	
		Z	3.34	67.21	15.92		150.0	
10142-CAD	LTE-FDD (SC-FDMA, 100% RB, 3 MHz, QPSK)	X	1.96	68.91	15.82	0.00	150.0	± 9.6 %
		Y	1.87	69.82	15.85		150.0	
		Z	1.77	67.88	14.96		150.0	
10143-CAD	LTE-FDD (SC-FDMA, 100% RB, 3 MHz, 16-QAM)	X	2.44	69.05	15.83	0.00	150.0	± 9.6 %
		Y	2.39	70.24	15.57		150.0	
		Z	2.23	68.18	14.93		150.0	
10144-CAD	LTE-FDD (SC-FDMA, 100% RB, 3 MHz, 64-QAM)	X	2.18	66.46	14.05	0.00	150.0	± 9.6 %
		Y	1.94	66.43	13.16		150.0	
		Z	1.97	65.59	13.11		150.0	
10145-CAE	LTE-FDD (SC-FDMA, 100% RB, 1.4 MHz, QPSK)	X	1.09	64.16	10.93	0.00	150.0	± 9.6 %
		Y	0.73	61.36	7.83		150.0	
		Z	0.83	61.61	8.53		150.0	
10146-CAE	LTE-FDD (SC-FDMA, 100% RB, 1.4 MHz, 16-QAM)	X	1.75	65.34	11.16	0.00	150.0	± 9.6 %
		Y	0.85	60.00	5.99		150.0	
		Z	1.26	62.31	8.66		150.0	
10147-CAE	LTE-FDD (SC-FDMA, 100% RB, 1.4 MHz, 64-QAM)	X	2.05	67.22	12.22	0.00	150.0	± 9.6 %
		Y	0.87	60.06	6.09		150.0	
		Z	1.36	63.09	9.20		150.0	

EX3DV4- SN:7370

August 22, 2017

10149-CAD	LTE-FDD (SC-FDMA, 50% RB, 20 MHz, 16-QAM)	X	2.86	67.42	15.92	0.00	150.0	± 9.6 %
		Y	2.75	67.91	16.00		150.0	
		Z	2.73	67.01	15.59		150.0	
10150-CAD	LTE-FDD (SC-FDMA, 50% RB, 20 MHz, 64-QAM)	X	2.98	67.40	15.98	0.00	150.0	± 9.6 %
		Y	2.88	67.98	16.07		150.0	
		Z	2.86	67.05	15.67		150.0	
10151-CAD	LTE-TDD (SC-FDMA, 50% RB, 20 MHz, QPSK)	X	5.75	77.22	21.54	3.98	65.0	± 9.6 %
		Y	5.00	75.93	20.56		65.0	
		Z	5.14	75.67	20.82		65.0	
10152-CAD	LTE-TDD (SC-FDMA, 50% RB, 20 MHz, 16-QAM)	X	4.99	72.12	19.77	3.98	65.0	± 9.6 %
		Y	4.41	71.00	18.67		65.0	
		Z	4.58	70.96	19.09		65.0	
10153-CAD	LTE-TDD (SC-FDMA, 50% RB, 20 MHz, 64-QAM)	X	5.32	73.07	20.58	3.98	65.0	± 9.6 %
		Y	4.76	72.14	19.56		65.0	
		Z	4.92	72.00	19.96		65.0	
10154-CAE	LTE-FDD (SC-FDMA, 50% RB, 10 MHz, QPSK)	X	2.25	69.39	16.50	0.00	150.0	± 9.6 %
		Y	2.13	70.02	16.70		150.0	
		Z	2.06	68.53	15.90		150.0	
10155-CAE	LTE-FDD (SC-FDMA, 50% RB, 10 MHz, 16-QAM)	X	2.58	68.32	16.21	0.00	150.0	± 9.6 %
		Y	2.54	69.54	16.38		150.0	
		Z	2.44	67.91	15.74		150.0	
10156-CAE	LTE-FDD (SC-FDMA, 50% RB, 5 MHz, QPSK)	X	1.81	69.02	15.57	0.00	150.0	± 9.6 %
		Y	1.69	69.68	15.29		150.0	
		Z	1.56	67.60	14.41		150.0	
10157-CAE	LTE-FDD (SC-FDMA, 50% RB, 5 MHz, 16-QAM)	X	2.01	67.01	14.03	0.00	150.0	± 9.6 %
		Y	1.75	66.66	12.83		150.0	
		Z	1.77	65.74	12.79		150.0	
10158-CAE	LTE-FDD (SC-FDMA, 50% RB, 10 MHz, 64-QAM)	X	2.74	68.52	16.39	0.00	150.0	± 9.6 %
		Y	2.69	69.75	16.53		150.0	
		Z	2.60	68.17	15.95		150.0	
10159-CAE	LTE-FDD (SC-FDMA, 50% RB, 5 MHz, 64-QAM)	X	2.12	67.49	14.34	0.00	150.0	± 9.6 %
		Y	1.84	67.04	13.05		150.0	
		Z	1.85	66.10	13.03		150.0	
10160-CAD	LTE-FDD (SC-FDMA, 50% RB, 15 MHz, QPSK)	X	2.74	68.91	16.44	0.00	150.0	± 9.6 %
		Y	2.61	69.38	16.60		150.0	
		Z	2.60	68.46	16.10		150.0	
10161-CAD	LTE-FDD (SC-FDMA, 50% RB, 15 MHz, 16-QAM)	X	2.88	67.35	15.91	0.00	150.0	± 9.6 %
		Y	2.77	67.99	15.95		150.0	
		Z	2.75	67.00	15.56		150.0	
10162-CAD	LTE-FDD (SC-FDMA, 50% RB, 15 MHz, 64-QAM)	X	2.99	67.49	16.02	0.00	150.0	± 9.6 %
		Y	2.85	68.23	16.10		150.0	
		Z	2.86	67.20	15.71		150.0	
10166-CAE	LTE-FDD (SC-FDMA, 50% RB, 1.4 MHz, QPSK)	X	3.50	69.48	19.22	3.01	150.0	± 9.6 %
		Y	3.01	68.49	18.51		150.0	
		Z	3.30	69.22	19.17		150.0	
10167-CAE	LTE-FDD (SC-FDMA, 50% RB, 1.4 MHz, 16-QAM)	X	4.25	72.12	19.54	3.01	150.0	± 9.6 %
		Y	3.49	71.14	18.87		150.0	
		Z	3.90	71.75	19.44		150.0	

EX3DV4-- SN:7370

August 22, 2017

10168-CAE	LTE-FDD (SC-FDMA, 50% RB, 1.4 MHz, 64-QAM)	X	4.79	74.70	21.04	3.01	150.0	± 9.6 %
		Y	3.94	73.81	20.46		150.0	
		Z	4.44	74.66	21.14		150.0	
10169-CAD	LTE-FDD (SC-FDMA, 1 RB, 20 MHz, QPSK)	X	2.86	68.69	18.91	3.01	150.0	± 9.6 %
		Y	2.43	66.88	17.77		150.0	
		Z	2.60	67.58	18.49		150.0	
10170-CAD	LTE-FDD (SC-FDMA, 1 RB, 20 MHz, 16-QAM)	X	3.90	74.61	21.29	3.01	150.0	± 9.6 %
		Y	3.05	71.99	19.96		150.0	
		Z	3.37	73.11	20.84		150.0	
10171-AAD	LTE-FDD (SC-FDMA, 1 RB, 20 MHz, 64-QAM)	X	3.15	70.12	18.27	3.01	150.0	± 9.6 %
		Y	2.53	68.23	17.19		150.0	
		Z	2.75	68.76	17.77		150.0	
10172-CAD	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, QPSK)	X	6.41	88.23	28.08	6.02	65.0	± 9.6 %
		Y	3.14	76.47	23.02		65.0	
		Z	4.50	82.43	26.11		65.0	
10173-CAD	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, 16-QAM)	X	14.02	99.12	29.58	6.02	65.0	± 9.6 %
		Y	4.54	81.47	22.89		65.0	
		Z	8.57	92.06	27.56		65.0	
10174-CAD	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, 64-QAM)	X	10.59	92.63	26.90	6.02	65.0	± 9.6 %
		Y	3.79	77.85	20.94		65.0	
		Z	5.79	84.08	24.24		65.0	
10175-CAE	LTE-FDD (SC-FDMA, 1 RB, 10 MHz, QPSK)	X	2.82	68.36	18.64	3.01	150.0	± 9.6 %
		Y	2.41	66.63	17.54		150.0	
		Z	2.57	67.27	18.22		150.0	
10176-CAE	LTE-FDD (SC-FDMA, 1 RB, 10 MHz, 16-QAM)	X	3.90	74.64	21.30	3.01	150.0	± 9.6 %
		Y	3.05	72.01	19.97		150.0	
		Z	3.38	73.13	20.85		150.0	
10177-CAG	LTE-FDD (SC-FDMA, 1 RB, 5 MHz, QPSK)	X	2.84	68.52	18.74	3.01	150.0	± 9.6 %
		Y	2.42	66.73	17.61		150.0	
		Z	2.59	67.42	18.31		150.0	
10178-CAE	LTE-FDD (SC-FDMA, 1 RB, 5 MHz, 16-QAM)	X	3.86	74.38	21.16	3.01	150.0	± 9.6 %
		Y	3.03	71.88	19.90		150.0	
		Z	3.35	72.92	20.73		150.0	
10179-CAE	LTE-FDD (SC-FDMA, 1 RB, 10 MHz, 64-QAM)	X	3.48	72.20	19.62	3.01	150.0	± 9.6 %
		Y	2.76	70.01	18.45		150.0	
		Z	3.02	70.78	19.15		150.0	
10180-CAE	LTE-FDD (SC-FDMA, 1 RB, 5 MHz, 64-QAM)	X	3.14	70.04	18.22	3.01	150.0	± 9.6 %
		Y	2.53	68.20	17.16		150.0	
		Z	2.74	68.70	17.73		150.0	
10181-CAD	LTE-FDD (SC-FDMA, 1 RB, 15 MHz, QPSK)	X	2.84	68.50	18.73	3.01	150.0	± 9.6 %
		Y	2.42	66.72	17.60		150.0	
		Z	2.58	67.40	18.31		150.0	
10182-CAD	LTE-FDD (SC-FDMA, 1 RB, 15 MHz, 16-QAM)	X	3.85	74.36	21.15	3.01	150.0	± 9.6 %
		Y	3.03	71.86	19.88		150.0	
		Z	3.34	72.90	20.72		150.0	
10183-AAC	LTE-FDD (SC-FDMA, 1 RB, 15 MHz, 64-QAM)	X	3.14	70.02	18.21	3.01	150.0	± 9.6 %
		Y	2.52	68.18	17.15		150.0	
		Z	2.74	68.68	17.71		150.0	

EX30V4- SN:7370

August 22, 2017

10184-CAD	LTE-FDD (SC-FDMA, 1 RB, 3 MHz, QPSK)	X	2.85	68.55	18.76	3.01	150.0	± 9.6 %
		Y	2.43	66.76	17.62		150.0	
		Z	2.59	67.44	18.33		150.0	
10185-CAD	LTE-FDD (SC-FDMA, 1 RB, 3 MHz, 16-QAM)	X	3.87	74.44	21.19	3.01	150.0	± 9.6 %
		Y	3.04	71.93	19.92		150.0	
		Z	3.36	72.97	20.76		150.0	
10186-AAD	LTE-FDD (SC-FDMA, 1 RB, 3 MHz, 64-QAM)	X	3.15	70.09	18.24	3.01	150.0	± 9.6 %
		Y	2.53	68.24	17.18		150.0	
		Z	2.75	68.74	17.75		150.0	
10187-CAE	LTE-FDD (SC-FDMA, 1 RB, 1.4 MHz, QPSK)	X	2.86	68.60	18.82	3.01	150.0	± 9.6 %
		Y	2.44	66.83	17.70		150.0	
		Z	2.60	67.51	18.41		150.0	
10188-CAE	LTE-FDD (SC-FDMA, 1 RB, 1.4 MHz, 16-QAM)	X	4.01	75.18	21.61	3.01	150.0	± 9.6 %
		Y	3.12	72.46	20.26		150.0	
		Z	3.47	73.87	21.18		150.0	
10189-AAE	LTE-FDD (SC-FDMA, 1 RB, 1.4 MHz, 64-QAM)	X	3.23	70.53	18.54	3.01	150.0	± 9.6 %
		Y	2.58	68.59	17.44		150.0	
		Z	2.81	69.16	18.04		150.0	
10193-CAB	IEEE 802.11n (HT Greenfield, 6.5 Mbps, BPSK)	X	4.47	66.48	16.19	0.00	150.0	± 9.6 %
		Y	4.32	67.05	16.18		150.0	
		Z	4.37	66.42	16.06		150.0	
10194-CAB	IEEE 802.11n (HT Greenfield, 39 Mbps, 16-QAM)	X	4.65	66.80	16.31	0.00	150.0	± 9.6 %
		Y	4.45	67.26	16.30		150.0	
		Z	4.53	66.71	16.19		150.0	
10195-CAB	IEEE 802.11n (HT Greenfield, 65 Mbps, 64-QAM)	X	4.69	66.83	16.33	0.00	150.0	± 9.6 %
		Y	4.48	67.27	16.31		150.0	
		Z	4.57	66.74	16.21		150.0	
10196-CAB	IEEE 802.11n (HT Mixed, 6.5 Mbps, BPSK)	X	4.48	66.55	16.21	0.00	150.0	± 9.6 %
		Y	4.30	67.04	16.16		150.0	
		Z	4.36	66.46	16.06		150.0	
10197-CAB	IEEE 802.11n (HT Mixed, 39 Mbps, 16-QAM)	X	4.66	66.82	16.33	0.00	150.0	± 9.6 %
		Y	4.46	67.26	16.31		150.0	
		Z	4.54	66.72	16.20		150.0	
10198-CAB	IEEE 802.11n (HT Mixed, 65 Mbps, 64-QAM)	X	4.69	66.85	16.34	0.00	150.0	± 9.6 %
		Y	4.48	67.26	16.31		150.0	
		Z	4.56	66.75	16.22		150.0	
10219-CAB	IEEE 802.11n (HT Mixed, 7.2 Mbps, BPSK)	X	4.43	66.56	16.17	0.00	150.0	± 9.6 %
		Y	4.26	67.09	16.14		150.0	
		Z	4.31	66.48	16.02		150.0	
10220-CAB	IEEE 802.11n (HT Mixed, 43.3 Mbps, 16-QAM)	X	4.66	66.80	16.32	0.00	150.0	± 9.6 %
		Y	4.45	67.22	16.29		150.0	
		Z	4.53	66.69	16.19		150.0	
10221-CAB	IEEE 802.11n (HT Mixed, 72.2 Mbps, 64-QAM)	X	4.70	66.78	16.33	0.00	150.0	± 9.6 %
		Y	4.49	67.21	16.30		150.0	
		Z	4.58	66.68	16.21		150.0	
10222-CAB	IEEE 802.11n (HT Mixed, 15 Mbps, BPSK)	X	5.03	66.96	16.44	0.00	150.0	± 9.6 %
		Y	4.86	67.22	16.41		150.0	
		Z	4.94	66.85	16.36		150.0	

Certificate No: EX3-7370_Aug17

Page 19 of 38

EX3DV4- SN:7370

August 22, 2017

10223-CAB	IEEE 802.11n (HT Mixed, 90 Mbps, 16-QAM)	X	5.35	67.20	16.59	0.00	150.0	± 9.6 %
		Y	5.10	67.35	16.48		150.0	
		Z	5.24	67.12	16.52		150.0	
10224-CAB	IEEE 802.11n (HT Mixed, 150 Mbps, 64-QAM)	X	5.08	67.07	16.42	0.00	150.0	± 9.6 %
		Y	4.90	67.35	16.40		150.0	
		Z	4.98	66.95	16.34		150.0	
10225-CAB	UMTS-FDD (HSPA+)	X	2.74	66.05	15.33	0.00	150.0	± 9.6 %
		Y	2.63	66.72	15.04		150.0	
		Z	2.62	65.79	14.89		150.0	
10226-CAA	LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, 16-QAM)	X	15.39	100.99	30.26	6.02	65.0	± 9.6 %
		Y	4.80	82.49	23.36		65.0	
		Z	9.30	93.70	28.21		65.0	
10227-CAA	LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, 64-QAM)	X	14.79	96.48	28.78	6.02	65.0	± 9.6 %
		Y	4.67	81.06	22.12		65.0	
		Z	9.62	92.82	27.19		65.0	
10228-CAA	LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, QPSK)	X	7.81	92.74	29.77	6.02	65.0	± 9.6 %
		Y	3.36	77.94	23.65		65.0	
		Z	5.16	85.66	27.45		65.0	
10229-CAB	LTE-TDD (SC-FDMA, 1 RB, 3 MHz, 16-QAM)	X	14.15	99.25	29.63	6.02	65.0	± 9.6 %
		Y	4.58	81.56	22.93		65.0	
		Z	8.65	92.19	27.61		65.0	
10230-CAB	LTE-TDD (SC-FDMA, 1 RB, 3 MHz, 64-QAM)	X	13.54	96.81	28.18	6.02	65.0	± 9.6 %
		Y	4.41	80.09	21.69		65.0	
		Z	8.83	91.23	26.59		65.0	
10231-CAB	LTE-TDD (SC-FDMA, 1 RB, 3 MHz, QPSK)	X	7.41	91.60	29.29	6.02	65.0	± 9.6 %
		Y	3.26	77.31	23.31		65.0	
		Z	4.95	84.71	27.00		65.0	
10232-CAD	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, 16-QAM)	X	14.12	99.23	29.62	6.02	65.0	± 9.6 %
		Y	4.57	81.55	22.93		65.0	
		Z	8.62	92.16	27.60		65.0	
10233-CAD	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, 64-QAM)	X	13.50	96.78	28.17	6.02	65.0	± 9.6 %
		Y	4.40	80.06	21.69		65.0	
		Z	8.80	91.19	26.57		65.0	
10234-CAD	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, QPSK)	X	7.12	90.62	28.83	6.02	65.0	± 9.6 %
		Y	3.19	76.80	22.98		65.0	
		Z	4.79	83.94	26.59		65.0	
10235-CAD	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, 16-QAM)	X	14.14	99.28	29.64	6.02	65.0	± 9.6 %
		Y	4.57	81.56	22.93		65.0	
		Z	8.63	92.21	27.62		65.0	
10236-CAD	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, 64-QAM)	X	13.72	97.01	28.24	6.02	65.0	± 9.6 %
		Y	4.45	80.20	21.73		65.0	
		Z	8.93	91.40	26.63		65.0	
10237-CAD	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, QPSK)	X	7.43	91.68	29.32	6.02	65.0	± 9.6 %
		Y	3.26	77.32	23.32		65.0	
		Z	4.95	84.74	27.02		65.0	
10238-CAD	LTE-TDD (SC-FDMA, 1 RB, 15 MHz, 16-QAM)	X	14.08	99.20	29.62	6.02	65.0	± 9.6 %
		Y	4.55	81.52	22.91		65.0	
		Z	8.60	92.13	27.59		65.0	

EX3DV4- SN:7370

August 22, 2017

10239-CAD	LTE-TDD (SC-FDMA, 1 RB, 15 MHz, 64-QAM)	X	13.45	96.74	28.16	6.02	65.0	± 9.6 %
		Y	4.38	80.02	21.67		65.0	
		Z	8.77	91.14	26.56		65.0	
10240-CAD	LTE-TDD (SC-FDMA, 1 RB, 15 MHz, QPSK)	X	7.40	91.62	29.30	6.02	65.0	± 9.6 %
		Y	3.25	77.30	23.31		65.0	
		Z	4.93	84.70	27.00		65.0	
10241-CAA	LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, 16-QAM)	X	6.94	78.83	24.76	6.98	65.0	± 9.6 %
		Y	5.76	77.91	23.85		65.0	
		Z	6.36	78.18	24.48		65.0	
10242-CAA	LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, 64-QAM)	X	6.44	77.25	23.98	6.98	65.0	± 9.6 %
		Y	5.48	77.01	23.41		65.0	
		Z	5.95	76.81	23.80		65.0	
10243-CAA	LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, QPSK)	X	5.25	73.87	23.40	6.98	65.0	± 9.6 %
		Y	4.81	73.74	22.90		65.0	
		Z	4.95	73.50	23.22		65.0	
10244-CAB	LTE-TDD (SC-FDMA, 50% RB, 3 MHz, 16-QAM)	X	5.19	75.34	18.62	3.98	65.0	± 9.6 %
		Y	2.62	65.88	11.93		65.0	
		Z	4.09	71.93	16.48		65.0	
10245-CAB	LTE-TDD (SC-FDMA, 50% RB, 3 MHz, 64-QAM)	X	5.03	74.56	18.22	3.98	65.0	± 9.6 %
		Y	2.59	65.50	11.68		65.0	
		Z	3.96	71.16	16.07		65.0	
10246-CAB	LTE-TDD (SC-FDMA, 50% RB, 3 MHz, QPSK)	X	4.97	78.76	20.19	3.98	65.0	± 9.6 %
		Y	2.68	69.76	14.61		65.0	
		Z	3.57	73.65	17.42		65.0	
10247-CAD	LTE-TDD (SC-FDMA, 50% RB, 5 MHz, 16-QAM)	X	4.28	72.81	18.44	3.98	65.0	± 9.6 %
		Y	3.18	68.80	14.95		65.0	
		Z	3.66	70.48	16.79		65.0	
10248-CAD	LTE-TDD (SC-FDMA, 50% RB, 5 MHz, 64-QAM)	X	4.27	72.16	18.12	3.98	65.0	± 9.6 %
		Y	3.15	68.19	14.65		65.0	
		Z	3.66	69.92	16.50		65.0	
10249-CAD	LTE-TDD (SC-FDMA, 50% RB, 5 MHz, QPSK)	X	6.04	82.09	22.49	3.98	65.0	± 9.6 %
		Y	4.06	76.03	18.76		65.0	
		Z	4.77	78.33	20.57		65.0	
10250-CAD	LTE-TDD (SC-FDMA, 50% RB, 10 MHz, 16-QAM)	X	5.01	74.76	21.00	3.98	65.0	± 9.6 %
		Y	4.32	73.11	19.32		65.0	
		Z	4.54	73.37	20.11		65.0	
10251-CAD	LTE-TDD (SC-FDMA, 50% RB, 10 MHz, 64-QAM)	X	4.80	72.58	19.62	3.98	65.0	± 9.6 %
		Y	4.08	70.91	17.89		65.0	
		Z	4.35	71.25	18.71		65.0	
10252-CAD	LTE-TDD (SC-FDMA, 50% RB, 10 MHz, QPSK)	X	5.92	80.47	22.67	3.98	65.0	± 9.6 %
		Y	4.84	78.02	21.17		65.0	
		Z	5.10	78.26	21.80		65.0	
10253-CAD	LTE-TDD (SC-FDMA, 50% RB, 15 MHz, 16-QAM)	X	4.88	71.55	19.50	3.98	65.0	± 9.6 %
		Y	4.36	70.69	18.40		65.0	
		Z	4.52	70.54	18.84		65.0	
10254-CAD	LTE-TDD (SC-FDMA, 50% RB, 15 MHz, 64-QAM)	X	5.19	72.45	20.23	3.98	65.0	± 9.6 %
		Y	4.65	71.64	19.15		65.0	
		Z	4.82	71.48	19.60		65.0	

EX3DV4- SN:7370

August 22, 2017

10255-CAD	LTE-TDD (SC-FDMA, 50% RB, 15 MHz, QPSK)	X	5.41	76.29	21.39	3.98	65.0	± 9.6 %
		Y	4.76	75.22	20.42		65.0	
		Z	4.89	74.91	20.69		65.0	
10256-CAA	LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, 16-QAM)	X	3.82	70.64	15.43	3.98	65.0	± 9.6 %
		Y	1.87	62.35	8.74		65.0	
		Z	2.84	66.72	12.76		65.0	
10257-CAA	LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, 64-QAM)	X	3.69	69.74	14.90	3.98	65.0	± 9.6 %
		Y	1.86	62.06	8.48		65.0	
		Z	2.76	66.03	12.30		65.0	
10258-CAA	LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, QPSK)	X	3.48	72.93	16.85	3.98	65.0	± 9.6 %
		Y	1.77	64.22	10.61		65.0	
		Z	2.41	67.70	13.62		65.0	
10259-CAB	LTE-TDD (SC-FDMA, 100% RB, 3 MHz, 16-QAM)	X	4.58	73.61	19.39	3.98	65.0	± 9.6 %
		Y	3.64	70.63	16.65		65.0	
		Z	4.03	71.72	18.07		65.0	
10260-CAB	LTE-TDD (SC-FDMA, 100% RB, 3 MHz, 64-QAM)	X	4.61	73.30	19.26	3.98	65.0	± 9.6 %
		Y	3.67	70.36	16.51		65.0	
		Z	4.06	71.44	17.94		65.0	
10261-CAB	LTE-TDD (SC-FDMA, 100% RB, 3 MHz, QPSK)	X	5.58	80.22	22.22	3.98	65.0	± 9.6 %
		Y	4.23	76.26	19.49		65.0	
		Z	4.65	77.42	20.73		65.0	
10262-CAD	LTE-TDD (SC-FDMA, 100% RB, 5 MHz, 16-QAM)	X	5.00	74.71	20.95	3.98	65.0	± 9.6 %
		Y	4.30	73.03	19.26		65.0	
		Z	4.53	73.30	20.05		65.0	
10263-CAD	LTE-TDD (SC-FDMA, 100% RB, 5 MHz, 64-QAM)	X	4.79	72.56	19.61	3.98	65.0	± 9.6 %
		Y	4.07	70.88	17.88		65.0	
		Z	4.34	71.22	18.70		65.0	
10264-CAD	LTE-TDD (SC-FDMA, 100% RB, 5 MHz, QPSK)	X	5.85	80.24	22.78	3.98	65.0	± 9.6 %
		Y	4.79	77.80	21.06		65.0	
		Z	5.04	78.04	21.69		65.0	
10265-CAD	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, 16-QAM)	X	4.98	72.12	19.78	3.98	65.0	± 9.6 %
		Y	4.40	71.01	18.67		65.0	
		Z	4.58	70.96	19.09		65.0	
10266-CAD	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, 64-QAM)	X	5.32	73.05	20.57	3.98	65.0	± 9.6 %
		Y	4.75	72.12	19.55		65.0	
		Z	4.92	71.99	19.95		65.0	
10267-CAD	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, QPSK)	X	5.74	77.17	21.52	3.98	65.0	± 9.6 %
		Y	4.99	75.89	20.56		65.0	
		Z	5.13	75.62	20.80		65.0	
10268-CAD	LTE-TDD (SC-FDMA, 100% RB, 15 MHz, 16-QAM)	X	5.59	71.98	20.09	3.98	65.0	± 9.6 %
		Y	5.07	71.24	19.31		65.0	
		Z	5.22	71.02	19.56		65.0	
10269-CAD	LTE-TDD (SC-FDMA, 100% RB, 15 MHz, 64-QAM)	X	5.57	71.54	19.94	3.98	65.0	± 9.6 %
		Y	5.10	70.94	19.20		65.0	
		Z	5.23	70.65	19.43		65.0	
10270-CAD	LTE-TDD (SC-FDMA, 100% RB, 15 MHz, QPSK)	X	5.64	74.24	20.40	3.98	65.0	± 9.6 %
		Y	5.10	73.57	19.76		65.0	
		Z	5.20	73.15	19.88		65.0	

EX3DV4- SN:7370

August 22, 2017

10274-CAB	UMTS-FDD (HSUPA, Subtest 5, 3GPP RelB.10)	X	2.53	66.41	15.22	0.00	150.0	± 9.6 %
		Y	2.50	67.49	15.20		150.0	
		Z	2.43	66.20	14.81		150.0	
10275-CAB	UMTS-FDD (HSUPA, Subtest 5, 3GPP RelB.4)	X	1.57	68.17	15.56	0.00	150.0	± 9.6 %
		Y	1.60	69.37	16.03		150.0	
		Z	1.44	67.21	14.81		150.0	
10277-CAA	PHS (QPSK)	X	1.72	60.38	5.98	9.03	50.0	± 9.6 %
		Y	1.23	58.52	3.64		50.0	
		Z	1.65	59.86	5.41		50.0	
10278-CAA	PHS (QPSK, BW 884MHz, Rolloff 0.5)	X	4.27	71.99	14.94	9.03	50.0	± 9.6 %
		Y	2.22	63.37	8.91		50.0	
		Z	3.13	67.11	12.09		50.0	
10279-CAA	PHS (QPSK, BW 884MHz, Rolloff 0.38)	X	4.46	72.45	15.20	9.03	50.0	± 9.6 %
		Y	2.28	63.58	8.10		50.0	
		Z	3.24	67.43	12.31		50.0	
10290-AAB	CDMA2000, RC1, SO55, Full Rate	X	1.33	67.97	13.15	0.00	150.0	± 9.6 %
		Y	1.01	66.40	11.31		150.0	
		Z	0.97	64.73	10.89		150.0	
10291-AAB	CDMA2000, RC3, SO55, Full Rate	X	0.72	64.89	11.32	0.00	150.0	± 9.6 %
		Y	0.65	64.97	10.48		150.0	
		Z	0.55	62.37	9.01		150.0	
10292-AAB	CDMA2000, RC3, SO32, Full Rate	X	1.00	69.84	14.04	0.00	150.0	± 9.6 %
		Y	1.36	74.09	14.84		150.0	
		Z	0.67	65.15	10.80		150.0	
10293-AAB	CDMA2000, RC3, SO3, Full Rate	X	2.24	80.69	18.82	0.00	150.0	± 9.6 %
		Y	53.95	118.17	27.52		150.0	
		Z	1.12	71.22	14.04		150.0	
10295-AAB	CDMA2000, RC1, SO3, 1/8th Rate 25 fr.	X	11.11	89.36	25.23	9.03	50.0	± 9.6 %
		Y	12.57	87.70	22.21		50.0	
		Z	13.00	89.87	24.38		50.0	
10297-AAC	LTE-FDD (SC-FDMA, 50% RB, 20 MHz, QPSK)	X	2.73	69.85	16.66	0.00	150.0	± 9.6 %
		Y	2.61	70.33	16.98		150.0	
		Z	2.54	69.07	16.22		150.0	
10298-AAC	LTE-FDD (SC-FDMA, 50% RB, 3 MHz, QPSK)	X	1.48	67.36	13.66	0.00	150.0	± 9.6 %
		Y	1.17	65.87	11.81		150.0	
		Z	1.18	64.96	11.69		150.0	
10299-AAC	LTE-FDD (SC-FDMA, 50% RB, 3 MHz, 16-QAM)	X	2.51	69.38	14.16	0.00	150.0	± 9.6 %
		Y	1.28	62.79	8.91		150.0	
		Z	1.92	66.57	12.12		150.0	
10300-AAC	LTE-FDD (SC-FDMA, 50% RB, 3 MHz, 64-QAM)	X	1.83	64.56	11.08	0.00	150.0	± 9.6 %
		Y	1.08	60.68	7.05		150.0	
		Z	1.47	62.77	9.42		150.0	
10301-AAA	IEEE 802.16e WiMAX (29:18, 5ms, 10MHz, QPSK, PUSC)	X	4.68	65.30	17.44	4.17	50.0	± 9.6 %
		Y	4.09	64.51	16.66		50.0	
		Z	4.42	64.78	17.00		50.0	
10302-AAA	IEEE 802.16e WiMAX (29:18, 5ms, 10MHz, QPSK, PUSC, 3 CTRL symbols)	X	5.09	65.64	18.00	4.96	50.0	± 9.6 %
		Y	4.62	65.43	17.54		50.0	
		Z	4.94	65.54	17.79		50.0	

Certificate No: EX3-7370_Aug17

Page 23 of 38

EX3DV4- SN:7370

August 22, 2017

10303-AAA	IEEE 802.16e WiMAX (31:15, 5ms, 10MHz, 64QAM, PUSC)	X	4.83	65.24	17.82	4.96	50.0	± 9.6 %
		Y	4.37	65.01	17.30		50.0	
		Z	4.68	65.13	17.57		50.0	
10304-AAA	IEEE 802.16e WiMAX (29:18, 5ms, 10MHz, 64QAM, PUSC)	X	4.65	65.15	17.34	4.17	50.0	± 9.6 %
		Y	4.23	65.09	16.92		50.0	
		Z	4.50	65.07	17.11		50.0	
10305-AAA	IEEE 802.16e WiMAX (31:15, 10ms, 10MHz, 64QAM, PUSC, 15 symbols)	X	4.17	66.59	19.16	6.02	35.0	± 9.6 %
		Y	3.56	65.14	17.55		35.0	
		Z	4.10	66.82	18.84		35.0	
10306-AAA	IEEE 802.16e WiMAX (29:18, 10ms, 10MHz, 64QAM, PUSC, 18 symbols)	X	4.54	65.85	18.86	6.02	35.0	± 9.6 %
		Y	4.01	64.98	17.73		35.0	
		Z	4.44	66.01	18.63		35.0	
10307-AAA	IEEE 802.16e WiMAX (29:18, 10ms, 10MHz, QPSK, PUSC, 18 symbols)	X	4.43	65.98	18.81	6.02	35.0	± 9.6 %
		Y	3.87	64.88	17.56		35.0	
		Z	4.33	66.08	18.54		35.0	
10308-AAA	IEEE 802.16e WiMAX (29:18, 10ms, 10MHz, 16QAM, PUSC)	X	4.40	66.14	18.93	6.02	35.0	± 9.6 %
		Y	3.84	65.01	17.69		35.0	
		Z	4.30	66.27	18.68		35.0	
10309-AAA	IEEE 802.16e WiMAX (29:18, 10ms, 10MHz, 16QAM, AMC 2x3, 18 symbols)	X	4.60	66.08	19.01	6.02	35.0	± 9.6 %
		Y	4.02	65.02	17.80		35.0	
		Z	4.48	66.17	18.76		35.0	
10310-AAA	IEEE 802.16e WiMAX (29:18, 10ms, 10MHz, QPSK, AMC 2x3, 18 symbols)	X	4.49	65.89	18.83	6.02	35.0	± 9.6 %
		Y	3.95	64.98	17.69		35.0	
		Z	4.39	66.05	18.60		35.0	
10311-AAC	LTE-FDD (SC-FDMA, 100% RB, 15 MHz, QPSK)	X	3.09	69.03	16.29	0.00	150.0	± 9.6 %
		Y	2.97	69.48	16.60		150.0	
		Z	2.89	68.28	15.90		150.0	
10313-AAA	IDEN 1:3	X	2.54	71.27	15.25	6.99	70.0	± 9.6 %
		Y	2.10	69.59	14.40		70.0	
		Z	2.02	68.59	14.05		70.0	
10314-AAA	IDEN 1:6	X	5.74	84.80	23.20	10.00	30.0	± 9.6 %
		Y	3.98	79.76	21.32		30.0	
		Z	4.35	79.98	21.33		30.0	
10315-AAB	IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps, 96pc duty cycle)	X	0.99	63.55	15.20	0.17	150.0	± 9.6 %
		Y	1.05	64.16	15.35		150.0	
		Z	0.95	63.02	14.66		150.0	
10316-AAB	IEEE 802.11g WiFi 2.4 GHz (ERP-OFDM, 6 Mbps, 96pc duty cycle)	X	4.52	66.52	16.33	0.17	150.0	± 9.6 %
		Y	4.32	66.87	16.19		150.0	
		Z	4.41	66.43	16.19		150.0	
10317-AAB	IEEE 802.11a WiFi 5 GHz (OFDM, 6 Mbps, 96pc duty cycle)	X	4.52	66.52	16.33	0.17	150.0	± 9.6 %
		Y	4.32	66.87	16.19		150.0	
		Z	4.41	66.43	16.19		150.0	
10400-AAC	IEEE 802.11ac WiFi (20MHz, 64-QAM, 99pc duty cycle)	X	4.64	66.86	16.31	0.00	150.0	± 9.6 %
		Y	4.40	67.23	16.26		150.0	
		Z	4.50	66.75	16.18		150.0	
10401-AAC	IEEE 802.11ac WiFi (40MHz, 64-QAM, 99pc duty cycle)	X	5.38	67.15	16.54	0.00	150.0	± 9.6 %
		Y	5.05	66.95	16.24		150.0	
		Z	5.30	67.13	16.49		150.0	

EX3DV4- SN:7370

August 22, 2017

10402-AAC	IEEE 802.11ac WiFi (80MHz, 64-QAM, 99pc duty cycle)	X	5.60	67.33	16.48	0.00	150.0	± 9.6 %
		Y	5.42	67.55	16.43		150.0	
		Z	5.49	67.18	16.38		150.0	
10403-AAB	CDMA2000 (1xEV-DO, Rev. 0)	X	1.33	67.97	13.15	0.00	115.0	± 9.6 %
		Y	1.01	66.40	11.31		115.0	
		Z	0.97	64.73	10.69		115.0	
10404-AAB	CDMA2000 (1xEV-DO, Rev. A)	X	1.33	67.97	13.15	0.00	115.0	± 9.6 %
		Y	1.01	66.40	11.31		115.0	
		Z	0.97	64.73	10.69		115.0	
10406-AAB	CDMA2000, RC3, SO32, SCH0, Full Rate	X	100.00	124.59	31.54	0.00	100.0	± 9.6 %
		Y	100.00	115.96	26.61		100.0	
		Z	100.00	124.25	30.90		100.0	
10410-AAC	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	100.00	126.35	31.85	3.23	80.0	± 9.6 %
		Y	2.85	78.39	17.38		80.0	
		Z	100.00	128.55	32.40		80.0	
10415-AAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps, 99pc duty cycle)	X	0.93	62.89	14.66	0.00	150.0	± 9.6 %
		Y	1.01	63.77	15.03		150.0	
		Z	0.91	62.48	14.19		150.0	
10416-AAA	IEEE 802.11g WiFi 2.4 GHz (ERP-OFDM, 6 Mbps, 99pc duty cycle)	X	4.48	66.53	16.26	0.00	150.0	± 9.6 %
		Y	4.31	67.01	16.24		150.0	
		Z	4.37	66.45	16.14		150.0	
10417-AAA	IEEE 802.11a/n WiFi 5 GHz (OFDM, 6 Mbps, 99pc duty cycle)	X	4.48	66.53	16.26	0.00	150.0	± 9.6 %
		Y	4.31	67.01	16.24		150.0	
		Z	4.37	66.45	16.14		150.0	
10418-AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 6 Mbps, 99pc duty cycle, Long preamble)	X	4.47	66.69	16.28	0.00	150.0	± 9.6 %
		Y	4.31	67.24	16.31		150.0	
		Z	4.36	66.63	16.17		150.0	
10419-AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 6 Mbps, 99pc duty cycle, Short preamble)	X	4.49	66.64	16.28	0.00	150.0	± 9.6 %
		Y	4.32	67.16	16.28		150.0	
		Z	4.38	66.57	16.17		150.0	
10422-AAA	IEEE 802.11n (HT Greenfield, 7.2 Mbps, BPSK)	X	4.61	66.63	16.29	0.00	150.0	± 9.6 %
		Y	4.42	67.12	16.29		150.0	
		Z	4.49	66.56	16.18		150.0	
10423-AAA	IEEE 802.11n (HT Greenfield, 43.3 Mbps, 16-QAM)	X	4.77	66.95	16.41	0.00	150.0	± 9.6 %
		Y	4.54	67.37	16.37		150.0	
		Z	4.64	66.85	16.28		150.0	
10424-AAA	IEEE 802.11n (HT Greenfield, 72.2 Mbps, 64-QAM)	X	4.69	66.90	16.38	0.00	150.0	± 9.6 %
		Y	4.47	67.32	16.35		150.0	
		Z	4.56	66.80	16.26		150.0	
10425-AAA	IEEE 802.11n (HT Greenfield, 15 Mbps, BPSK)	X	5.32	67.28	16.60	0.00	150.0	± 9.6 %
		Y	5.08	67.39	16.48		150.0	
		Z	5.20	67.13	16.50		150.0	
10426-AAA	IEEE 802.11n (HT Greenfield, 90 Mbps, 16-QAM)	X	5.34	67.35	16.63	0.00	150.0	± 9.6 %
		Y	5.09	67.46	16.51		150.0	
		Z	5.24	67.26	16.56		150.0	

EX3DV4- SN:7370

August 22, 2017

10427-AAA	IEEE 802.11n (HT Greenfield, 150 Mbps, 64-QAM)	X	5.34	67.28	16.59	0.00	150.0	± 9.6 %
		Y	5.06	67.28	16.42		150.0	
		Z	5.22	67.12	16.46		150.0	
10430-AAB	LTE-FDD (OFDMA, 5 MHz, E-TM 3.1)	X	4.28	71.25	18.46	0.00	150.0	± 9.6 %
		Y	4.35	73.30	18.67		150.0	
		Z	4.19	71.54	18.29		150.0	
10431-AAB	LTE-FDD (OFDMA, 10 MHz, E-TM 3.1)	X	4.16	67.11	16.25	0.00	150.0	± 9.6 %
		Y	3.92	67.68	16.13		150.0	
		Z	4.01	67.00	16.03		150.0	
10432-AAB	LTE-FDD (OFDMA, 15 MHz, E-TM 3.1)	X	4.46	66.96	16.32	0.00	150.0	± 9.6 %
		Y	4.24	67.46	16.29		150.0	
		Z	4.32	66.87	16.18		150.0	
10433-AAB	LTE-FDD (OFDMA, 20 MHz, E-TM 3.1)	X	4.71	66.94	16.40	0.00	150.0	± 9.6 %
		Y	4.49	67.36	16.37		150.0	
		Z	4.58	66.83	16.28		150.0	
10434-AAA	W-CDMA (BS Test Model 1, 64 DPCH)	X	4.42	72.20	18.43	0.00	150.0	± 9.6 %
		Y	4.52	74.36	18.50		150.0	
		Z	4.29	72.38	18.12		150.0	
10435-AAC	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	100.00	126.10	31.72	3.23	80.0	± 9.6 %
		Y	2.71	77.68	17.07		80.0	
		Z	100.00	128.24	32.25		80.0	
10447-AAB	LTE-FDD (OFDMA, 5 MHz, E-TM 3.1, Clipping 44%)	X	3.44	67.11	15.50	0.00	150.0	± 9.6 %
		Y	3.17	67.54	14.96		150.0	
		Z	3.25	66.80	14.99		150.0	
10448-AAB	LTE-FDD (OFDMA, 10 MHz, E-TM 3.1, Clipping 44%)	X	4.00	66.89	16.10	0.00	150.0	± 9.6 %
		Y	3.80	67.49	16.02		150.0	
		Z	3.86	66.78	15.89		150.0	
10449-AAB	LTE-FDD (OFDMA, 15 MHz, E-TM 3.1, Clipping 44%)	X	4.27	66.79	16.22	0.00	150.0	± 9.6 %
		Y	4.09	67.30	16.20		150.0	
		Z	4.15	66.69	16.07		150.0	
10450-AAB	LTE-FDD (OFDMA, 20 MHz, E-TM 3.1, Clipping 44%)	X	4.47	66.70	16.25	0.00	150.0	± 9.6 %
		Y	4.30	67.15	16.24		150.0	
		Z	4.36	66.59	16.12		150.0	
10451-AAA	W-CDMA (BS Test Model 1, 64 DPCH, Clipping 44%)	X	3.33	67.24	15.05	0.00	150.0	± 9.6 %
		Y	2.94	67.19	14.13		150.0	
		Z	3.08	66.69	14.35		150.0	
10456-AAA	IEEE 802.11ac WiFi (160MHz, 64-QAM, 99pc duty cycle)	X	6.19	67.80	16.74	0.00	150.0	± 9.6 %
		Y	5.99	67.84	16.59		150.0	
		Z	6.15	67.81	16.74		150.0	
10457-AAA	UMTS-FDD (DC-HSDPA)	X	3.73	65.15	15.97	0.00	150.0	± 9.6 %
		Y	3.69	65.80	15.98		150.0	
		Z	3.67	65.12	15.84		150.0	
10458-AAA	CDMA2000 (1xEV-DO, Rev. B, 2 carriers)	X	4.01	71.26	17.89	0.00	150.0	± 9.6 %
		Y	3.74	71.77	16.71		150.0	
		Z	3.80	71.00	17.03		150.0	
10459-AAA	CDMA2000 (1xEV-DO, Rev. B, 3 carriers)	X	5.11	68.69	18.41	0.00	150.0	± 9.6 %
		Y	4.81	69.46	17.81		150.0	
		Z	5.00	69.07	18.28		150.0	

EX3DV4-- SN:7370

August 22, 2017

10450-AAA	UMTS-FDD (WCDMA, AMR)	X	0.67	69.33	16.40	0.00	150.0	± 9.6 %
		Y	0.97	70.81	17.36		150.0	
		Z	0.77	67.49	15.10		150.0	
10461-AAA	LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	100.00	131.42	34.24	3.29	80.0	± 9.6 %
		Y	1.43	71.47	15.97		80.0	
		Z	100.00	133.37	34.70		80.0	
10462-AAA	LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	X	2.52	70.74	13.24	3.23	80.0	± 9.6 %
		Y	0.63	60.00	6.61		80.0	
		Z	0.93	62.30	9.35		80.0	
10463-AAA	LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	X	1.06	61.91	8.98	3.23	80.0	± 9.6 %
		Y	0.67	60.00	5.90		80.0	
		Z	0.74	60.00	7.55		80.0	
10464-AAA	LTE-TDD (SC-FDMA, 1 RB, 3 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	100.00	128.08	32.52	3.23	80.0	± 9.6 %
		Y	1.05	67.69	13.71		80.0	
		Z	100.00	129.57	32.77		80.0	
10465-AAA	LTE-TDD (SC-FDMA, 1 RB, 3 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	X	1.80	67.36	11.89	3.23	80.0	± 9.6 %
		Y	0.63	60.00	6.54		80.0	
		Z	0.84	61.35	8.81		80.0	
10466-AAA	LTE-TDD (SC-FDMA, 1 RB, 3 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	X	0.99	61.21	8.59	3.23	80.0	± 9.6 %
		Y	0.67	60.00	5.86		80.0	
		Z	0.75	60.00	7.49		80.0	
10467-AAC	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	100.00	128.46	32.69	3.23	80.0	± 9.6 %
		Y	1.10	68.28	14.01		80.0	
		Z	100.00	130.03	32.97		80.0	
10468-AAC	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	X	1.94	68.15	12.21	3.23	80.0	± 9.6 %
		Y	0.63	60.00	6.56		80.0	
		Z	0.86	61.62	8.96		80.0	
10469-AAC	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	X	0.99	61.22	8.59	3.23	80.0	± 9.6 %
		Y	0.67	60.00	5.86		80.0	
		Z	0.74	60.00	7.49		80.0	
10470-AAC	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	100.00	128.50	32.70	3.23	80.0	± 9.6 %
		Y	1.10	68.28	14.00		80.0	
		Z	100.00	130.07	32.98		80.0	
10471-AAC	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	X	1.91	67.98	12.13	3.23	80.0	± 9.6 %
		Y	0.63	60.00	6.55		80.0	
		Z	0.86	61.54	8.91		80.0	
10472-AAC	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	X	0.98	61.16	8.55	3.23	80.0	± 9.6 %
		Y	0.67	60.00	5.84		80.0	
		Z	0.74	60.00	7.47		80.0	
10473-AAC	LTE-TDD (SC-FDMA, 1 RB, 15 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	100.00	128.45	32.67	3.23	80.0	± 9.6 %
		Y	1.09	68.24	13.96		80.0	
		Z	100.00	130.02	32.96		80.0	
10474-AAC	LTE-TDD (SC-FDMA, 1 RB, 15 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	X	1.89	67.90	12.10	3.23	80.0	± 9.6 %
		Y	0.63	60.00	6.54		80.0	
		Z	0.85	61.51	8.90		80.0	
10475-AAC	LTE-TDD (SC-FDMA, 1 RB, 15 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	X	0.98	61.14	8.54	3.23	80.0	± 9.6 %
		Y	0.67	60.00	5.84		80.0	
		Z	0.74	60.00	7.47		80.0	

Certificate No: EX3-7370_Aug17

Page 27 of 36

EX3DV4- SN:7370

August 22, 2017

10477-AAC	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	X	1.77	67.25	11.81	3.23	80.0	± 9.6 %
		Y	0.63	60.00	6.51		80.0	
		Z	0.83	61.28	8.76		80.0	
10478-AAC	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	X	0.97	61.09	8.50	3.23	80.0	± 9.6 %
		Y	0.67	60.00	5.83		80.0	
		Z	0.74	60.00	7.46		80.0	
10479-AAA	LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	12.57	95.95	26.42	3.23	80.0	± 9.6 %
		Y	3.30	76.74	16.48		80.0	
		Z	18.71	102.45	27.83		80.0	
10480-AAA	LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	X	10.59	86.67	21.39	3.23	80.0	± 9.6 %
		Y	1.69	65.14	11.52		80.0	
		Z	8.98	84.56	20.08		80.0	
10481-AAA	LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	X	7.09	80.52	18.99	3.23	80.0	± 9.6 %
		Y	1.34	62.42	9.82		80.0	
		Z	4.89	76.19	16.85		80.0	
10482-AAA	LTE-TDD (SC-FDMA, 50% RB, 3 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	2.81	72.63	17.12	2.23	80.0	± 9.6 %
		Y	1.34	64.00	11.67		80.0	
		Z	1.85	67.20	14.05		80.0	
10483-AAA	LTE-TDD (SC-FDMA, 50% RB, 3 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	X	4.68	75.42	17.73	2.23	80.0	± 9.6 %
		Y	1.24	60.18	8.59		80.0	
		Z	3.01	69.77	14.73		80.0	
10484-AAA	LTE-TDD (SC-FDMA, 50% RB, 3 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	X	4.20	73.72	17.10	2.23	80.0	± 9.6 %
		Y	1.25	60.00	8.48		80.0	
		Z	2.76	68.41	14.15		80.0	
10485-AAC	LTE-TDD (SC-FDMA, 50% RB, 5 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	3.15	74.18	18.86	2.23	80.0	± 9.6 %
		Y	2.07	69.10	15.59		80.0	
		Z	2.45	70.80	16.96		80.0	
10486-AAC	LTE-TDD (SC-FDMA, 50% RB, 5 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	X	2.91	69.15	16.17	2.23	80.0	± 9.6 %
		Y	1.94	64.80	12.69		80.0	
		Z	2.36	66.55	14.36		80.0	
10487-AAC	LTE-TDD (SC-FDMA, 50% RB, 5 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	X	2.90	68.68	15.94	2.23	80.0	± 9.6 %
		Y	1.94	64.44	12.48		80.0	
		Z	2.36	66.17	14.17		80.0	
10488-AAC	LTE-TDD (SC-FDMA, 50% RB, 10 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	3.30	72.58	18.98	2.23	80.0	± 9.6 %
		Y	2.54	69.73	17.23		80.0	
		Z	2.81	70.52	17.89		80.0	
10489-AAC	LTE-TDD (SC-FDMA, 50% RB, 10 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	X	3.17	68.55	17.26	2.23	80.0	± 9.6 %
		Y	2.70	67.30	15.89		80.0	
		Z	2.87	67.46	16.46		80.0	
10490-AAC	LTE-TDD (SC-FDMA, 50% RB, 10 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	X	3.26	68.36	17.18	2.23	80.0	± 9.6 %
		Y	2.77	67.17	15.83		80.0	
		Z	2.96	67.34	16.41		80.0	
10491-AAC	LTE-TDD (SC-FDMA, 50% RB, 15 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	3.49	70.70	18.31	2.23	80.0	± 9.6 %
		Y	2.86	68.77	17.08		80.0	
		Z	3.10	69.22	17.53		80.0	
10492-AAC	LTE-TDD (SC-FDMA, 50% RB, 15 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	X	3.50	67.67	17.17	2.23	80.0	± 9.6 %
		Y	3.08	66.83	16.21		80.0	
		Z	3.24	66.86	16.61		80.0	

EX3DV4-- SN:7370

August 22, 2017

10493-AAC	LTE-TDD (SC-FDMA, 50% RB, 15 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	X	3.56	67.54	17.12	2.23	80.0	± 9.6 %
		Y	3.13	66.73	16.16		80.0	
		Z	3.31	66.76	16.57		80.0	
10494-AAC	LTE-TDD (SC-FDMA, 50% RB, 20 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	3.82	72.42	18.86	2.23	80.0	± 9.6 %
		Y	3.04	69.92	17.50		80.0	
		Z	3.33	70.56	17.97		80.0	
10495-AAC	LTE-TDD (SC-FDMA, 50% RB, 20 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	X	3.53	68.07	17.38	2.23	80.0	± 9.6 %
		Y	3.09	67.04	16.43		80.0	
		Z	3.26	67.15	16.81		80.0	
10496-AAC	LTE-TDD (SC-FDMA, 50% RB, 20 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	X	3.60	67.78	17.28	2.23	80.0	± 9.6 %
		Y	3.18	66.90	16.39		80.0	
		Z	3.35	66.95	16.75		80.0	
10497-AAA	LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	1.79	66.60	13.40	2.23	80.0	± 9.6 %
		Y	0.89	60.00	8.03		80.0	
		Z	1.11	61.32	9.85		80.0	
10498-AAA	LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	X	1.35	60.67	9.32	2.23	80.0	± 9.6 %
		Y	1.07	60.00	6.71		80.0	
		Z	1.18	60.00	7.96		80.0	
10499-AAA	LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	X	1.32	60.19	8.91	2.23	80.0	± 9.6 %
		Y	1.09	60.00	6.53		80.0	
		Z	1.20	60.00	7.81		80.0	
10500-AAA	LTE-TDD (SC-FDMA, 100% RB, 3 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	3.13	73.09	18.76	2.23	80.0	± 9.6 %
		Y	2.27	69.45	16.30		80.0	
		Z	2.58	70.55	17.30		80.0	
10501-AAA	LTE-TDD (SC-FDMA, 100% RB, 3 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	X	3.04	69.01	16.63	2.23	80.0	± 9.6 %
		Y	2.31	66.30	14.16		80.0	
		Z	2.62	67.22	15.32		80.0	
10502-AAA	LTE-TDD (SC-FDMA, 100% RB, 3 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	X	3.09	68.84	16.49	2.23	80.0	± 9.6 %
		Y	2.34	66.10	13.98		80.0	
		Z	2.66	67.06	15.17		80.0	
10503-AAC	LTE-TDD (SC-FDMA, 100% RB, 5 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	3.25	72.35	18.86	2.23	80.0	± 9.6 %
		Y	2.51	69.54	17.13		80.0	
		Z	2.78	70.30	17.78		80.0	
10504-AAC	LTE-TDD (SC-FDMA, 100% RB, 5 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	X	3.15	68.45	17.19	2.23	80.0	± 9.6 %
		Y	2.68	67.19	15.82		80.0	
		Z	2.86	67.36	16.40		80.0	
10505-AAC	LTE-TDD (SC-FDMA, 100% RB, 5 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	X	3.24	68.27	17.12	2.23	80.0	± 9.6 %
		Y	2.76	67.08	15.77		80.0	
		Z	2.95	67.24	16.35		80.0	
10506-AAC	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	3.79	72.26	18.78	2.23	80.0	± 9.6 %
		Y	3.02	69.79	17.43		80.0	
		Z	3.30	70.41	17.89		80.0	
10507-AAC	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	X	3.51	68.00	17.34	2.23	80.0	± 9.6 %
		Y	3.08	66.98	16.39		80.0	
		Z	3.25	67.09	16.77		80.0	

EX3DV4- SN:7370

August 22, 2017

10508-AAC	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	X	3.59	67.71	17.24	2.23	80.0	± 9.6 %
		Y	3.17	66.83	16.34		80.0	
		Z	3.34	66.88	16.70		80.0	
10509-AAC	LTE-TDD (SC-FDMA, 100% RB, 15 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	4.09	70.75	18.13	2.23	80.0	± 9.6 %
		Y	3.47	69.12	17.18		80.0	
		Z	3.69	69.39	17.48		80.0	
10510-AAC	LTE-TDD (SC-FDMA, 100% RB, 15 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	X	3.98	67.69	17.28	2.23	80.0	± 9.6 %
		Y	3.56	66.83	16.53		80.0	
		Z	3.73	66.89	16.82		80.0	
10511-AAC	LTE-TDD (SC-FDMA, 100% RB, 15 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	X	4.04	67.42	17.20	2.23	80.0	± 9.6 %
		Y	3.64	66.70	16.50		80.0	
		Z	3.80	66.70	16.77		80.0	
10512-AAC	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	4.31	72.51	18.70	2.23	80.0	± 9.6 %
		Y	3.52	70.17	17.50		80.0	
		Z	3.79	70.69	17.88		80.0	
10513-AAC	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	X	3.87	67.97	17.40	2.23	80.0	± 9.6 %
		Y	3.45	66.91	16.57		80.0	
		Z	3.61	67.06	16.90		80.0	
10514-AAC	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	X	3.90	67.52	17.26	2.23	80.0	± 9.6 %
		Y	3.50	66.63	16.49		80.0	
		Z	3.66	66.71	16.80		80.0	
10515-AAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 2 Mbps, 99pc duty cycle)	X	0.89	63.10	14.73	0.00	150.0	± 9.6 %
		Y	0.97	64.00	15.13		150.0	
		Z	0.87	62.65	14.22		150.0	
10516-AAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 5.5 Mbps, 99pc duty cycle)	X	0.69	75.19	18.61	0.00	150.0	± 9.6 %
		Y	0.72	74.72	19.64		150.0	
		Z	0.52	70.64	16.08		150.0	
10517-AAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 11 Mbps, 99pc duty cycle)	X	0.75	65.43	15.46	0.00	150.0	± 9.6 %
		Y	0.83	66.25	16.03		150.0	
		Z	0.71	64.45	14.63		150.0	
10518-AAA	IEEE 802.11a/h WiFi 5 GHz (OFDM, 9 Mbps, 99pc duty cycle)	X	4.47	66.60	16.23	0.00	150.0	± 9.6 %
		Y	4.30	67.13	16.24		150.0	
		Z	4.36	66.54	16.12		150.0	
10519-AAA	IEEE 802.11a/h WiFi 5 GHz (OFDM, 12 Mbps, 99pc duty cycle)	X	4.65	66.84	16.36	0.00	150.0	± 9.6 %
		Y	4.44	67.28	16.31		150.0	
		Z	4.52	66.74	16.23		150.0	
10520-AAA	IEEE 802.11a/h WiFi 5 GHz (OFDM, 18 Mbps, 99pc duty cycle)	X	4.51	66.80	16.28	0.00	150.0	± 9.6 %
		Y	4.30	67.21	16.24		150.0	
		Z	4.38	66.68	16.14		150.0	
10521-AAA	IEEE 802.11a/h WiFi 5 GHz (OFDM, 24 Mbps, 99pc duty cycle)	X	4.44	66.79	16.26	0.00	150.0	± 9.6 %
		Y	4.23	67.18	16.22		150.0	
		Z	4.31	66.85	16.12		150.0	
10522-AAA	IEEE 802.11a/h WiFi 5 GHz (OFDM, 36 Mbps, 99pc duty cycle)	X	4.50	66.90	16.35	0.00	150.0	± 9.6 %
		Y	4.27	67.26	16.29		150.0	
		Z	4.37	66.80	16.23		150.0	

EX3DV4- SN:7370

August 22, 2017

10523-AAA	IEEE 802.11a/h WiFi 5 GHz (OFDM, 48 Mbps, 99pc duty cycle)	X	4.38	66.75	16.19	0.00	150.0	± 9.6 %
		Y	4.22	67.36	16.27		150.0	
		Z	4.27	66.69	16.09		150.0	
10524-AAA	IEEE 802.11a/h WiFi 5 GHz (OFDM, 54 Mbps, 99pc duty cycle)	X	4.44	66.81	16.32	0.00	150.0	± 9.6 %
		Y	4.23	67.27	16.31		150.0	
		Z	4.31	66.72	16.19		150.0	
10525-AAA	IEEE 802.11ac WiFi (20MHz, MCS0, 99pc duty cycle)	X	4.43	65.85	15.91	0.00	150.0	± 9.6 %
		Y	4.28	66.42	15.95		150.0	
		Z	4.33	65.78	15.80		150.0	
10526-AAA	IEEE 802.11ac WiFi (20MHz, MCS1, 99pc duty cycle)	X	4.60	66.22	16.05	0.00	150.0	± 9.6 %
		Y	4.39	66.67	16.05		150.0	
		Z	4.47	66.10	15.93		150.0	
10527-AAA	IEEE 802.11ac WiFi (20MHz, MCS2, 99pc duty cycle)	X	4.52	66.18	15.99	0.00	150.0	± 9.6 %
		Y	4.33	66.65	16.00		150.0	
		Z	4.40	66.06	15.86		150.0	
10528-AAA	IEEE 802.11ac WiFi (20MHz, MCS3, 99pc duty cycle)	X	4.54	66.20	16.03	0.00	150.0	± 9.6 %
		Y	4.34	66.66	16.03		150.0	
		Z	4.41	66.08	15.90		150.0	
10529-AAA	IEEE 802.11ac WiFi (20MHz, MCS4, 99pc duty cycle)	X	4.54	66.20	16.03	0.00	150.0	± 9.6 %
		Y	4.34	66.66	16.03		150.0	
		Z	4.41	66.08	15.90		150.0	
10531-AAA	IEEE 802.11ac WiFi (20MHz, MCS6, 99pc duty cycle)	X	4.53	66.30	16.04	0.00	150.0	± 9.6 %
		Y	4.30	66.67	16.00		150.0	
		Z	4.39	66.14	15.89		150.0	
10532-AAA	IEEE 802.11ac WiFi (20MHz, MCS7, 99pc duty cycle)	X	4.39	66.15	15.97	0.00	150.0	± 9.6 %
		Y	4.19	66.54	15.94		150.0	
		Z	4.26	65.99	15.82		150.0	
10533-AAA	IEEE 802.11ac WiFi (20MHz, MCS8, 99pc duty cycle)	X	4.55	66.25	16.02	0.00	150.0	± 9.6 %
		Y	4.34	66.75	16.04		150.0	
		Z	4.42	66.14	15.89		150.0	
10534-AAA	IEEE 802.11ac WiFi (40MHz, MCS0, 99pc duty cycle)	X	5.08	66.30	16.09	0.00	150.0	± 9.6 %
		Y	4.89	66.57	16.06		150.0	
		Z	4.97	66.16	15.99		150.0	
10535-AAA	IEEE 802.11ac WiFi (40MHz, MCS1, 99pc duty cycle)	X	5.16	66.50	16.19	0.00	150.0	± 9.6 %
		Y	4.92	66.66	16.11		150.0	
		Z	5.04	66.36	16.09		150.0	
10536-AAA	IEEE 802.11ac WiFi (40MHz, MCS2, 99pc duty cycle)	X	5.02	66.43	16.13	0.00	150.0	± 9.6 %
		Y	4.82	66.69	16.10		150.0	
		Z	4.92	66.31	16.04		150.0	
10537-AAA	IEEE 802.11ac WiFi (40MHz, MCS3, 99pc duty cycle)	X	5.08	66.40	16.12	0.00	150.0	± 9.6 %
		Y	4.89	66.70	16.10		150.0	
		Z	4.97	66.27	16.02		150.0	
10538-AAA	IEEE 802.11ac WiFi (40MHz, MCS4, 99pc duty cycle)	X	5.17	66.41	16.17	0.00	150.0	± 9.6 %
		Y	4.94	66.62	16.10		150.0	
		Z	5.05	66.27	16.07		150.0	
10540-AAA	IEEE 802.11ac WiFi (40MHz, MCS6, 99pc duty cycle)	X	5.11	66.46	16.20	0.00	150.0	± 9.6 %
		Y	4.88	66.59	16.11		150.0	
		Z	4.98	66.25	16.07		150.0	

Certificate No: EX3-7370_Aug17

Page 31 of 38

EX3DV4- SN:7370

August 22, 2017

10541-AAA	IEEE 802.11ac WiFi (40MHz, MCS7, 99pc duty cycle)	X	5.07	66.30	16.11	0.00	150.0	± 9.6 %
		Y	4.87	66.54	16.06		150.0	
		Z	4.95	66.13	16.00		150.0	
10542-AAA	IEEE 802.11ac WiFi (40MHz, MCS8, 99pc duty cycle)	X	5.23	66.37	16.17	0.00	150.0	± 9.6 %
		Y	5.02	66.62	16.12		150.0	
		Z	5.11	66.24	16.07		150.0	
10543-AAA	IEEE 802.11ac WiFi (40MHz, MCS9, 99pc duty cycle)	X	5.30	66.42	16.21	0.00	150.0	± 9.6 %
		Y	5.09	66.70	16.18		150.0	
		Z	5.18	66.26	16.11		150.0	
10544-AAA	IEEE 802.11ac WiFi (80MHz, MCS0, 99pc duty cycle)	X	5.39	66.39	16.08	0.00	150.0	± 9.6 %
		Y	5.24	66.62	16.04		150.0	
		Z	5.31	66.25	15.99		150.0	
10545-AAA	IEEE 802.11ac WiFi (80MHz, MCS1, 99pc duty cycle)	X	5.61	66.87	16.27	0.00	150.0	± 9.6 %
		Y	5.39	66.99	16.18		150.0	
		Z	5.51	66.76	16.20		150.0	
10546-AAA	IEEE 802.11ac WiFi (80MHz, MCS2, 99pc duty cycle)	X	5.46	66.61	16.15	0.00	150.0	± 9.6 %
		Y	5.27	66.73	16.06		150.0	
		Z	5.35	66.41	16.03		150.0	
10547-AAA	IEEE 802.11ac WiFi (80MHz, MCS3, 99pc duty cycle)	X	5.53	66.65	16.17	0.00	150.0	± 9.6 %
		Y	5.35	66.84	16.12		150.0	
		Z	5.43	66.50	16.08		150.0	
10548-AAA	IEEE 802.11ac WiFi (80MHz, MCS4, 99pc duty cycle)	X	5.85	67.79	16.70	0.00	150.0	± 9.6 %
		Y	5.44	67.33	16.34		150.0	
		Z	5.68	67.46	16.52		150.0	
10550-AAA	IEEE 802.11ac WiFi (80MHz, MCS6, 99pc duty cycle)	X	5.50	66.66	16.19	0.00	150.0	± 9.6 %
		Y	5.32	66.91	16.17		150.0	
		Z	5.42	66.59	16.14		150.0	
10551-AAA	IEEE 802.11ac WiFi (80MHz, MCS7, 99pc duty cycle)	X	5.49	66.66	16.15	0.00	150.0	± 9.6 %
		Y	5.26	66.69	16.02		150.0	
		Z	5.38	66.47	16.04		150.0	
10552-AAA	IEEE 802.11ac WiFi (80MHz, MCS8, 99pc duty cycle)	X	5.40	66.44	16.05	0.00	150.0	± 9.6 %
		Y	5.25	66.77	16.06		150.0	
		Z	5.31	66.32	15.96		150.0	
10553-AAA	IEEE 802.11ac WiFi (80MHz, MCS9, 99pc duty cycle)	X	5.48	66.48	16.10	0.00	150.0	± 9.6 %
		Y	5.30	66.68	16.04		150.0	
		Z	5.38	66.31	16.00		150.0	
10554-AAB	IEEE 802.11ac WiFi (160MHz, MCS0, 99pc duty cycle)	X	5.81	66.75	16.17	0.00	150.0	± 9.6 %
		Y	5.66	66.92	16.10		150.0	
		Z	5.73	66.62	16.08		150.0	
10555-AAB	IEEE 802.11ac WiFi (160MHz, MCS1, 99pc duty cycle)	X	5.95	67.09	16.31	0.00	150.0	± 9.6 %
		Y	5.74	67.11	16.18		150.0	
		Z	5.86	66.93	16.22		150.0	
10556-AAB	IEEE 802.11ac WiFi (160MHz, MCS2, 99pc duty cycle)	X	5.97	67.13	16.32	0.00	150.0	± 9.6 %
		Y	5.77	67.22	16.22		150.0	
		Z	5.88	66.99	16.24		150.0	
10557-AAB	IEEE 802.11ac WiFi (160MHz, MCS3, 99pc duty cycle)	X	5.92	67.01	16.29	0.00	150.0	± 9.6 %
		Y	5.74	67.12	16.19		150.0	
		Z	5.83	66.84	16.19		150.0	

EX3DV4- SN:7370

August 22, 2017

10558-AAB	IEEE 802.11ac WiFi (160MHz, MCS4, 99pc duty cycle)	X	5.98	67.18	16.39	0.00	150.0	± 9.6 %
		Y	5.73	67.14	16.22		150.0	
		Z	5.87	66.99	16.28		150.0	
10560-AAB	IEEE 802.11ac WiFi (160MHz, MCS6, 99pc duty cycle)	X	5.96	67.01	16.34	0.00	150.0	± 9.6 %
		Y	5.76	67.09	16.23		150.0	
		Z	5.87	66.84	16.24		150.0	
10561-AAB	IEEE 802.11ac WiFi (160MHz, MCS7, 99pc duty cycle)	X	5.89	67.01	16.38	0.00	150.0	± 9.6 %
		Y	5.69	67.06	16.25		150.0	
		Z	5.81	66.86	16.28		150.0	
10562-AAB	IEEE 802.11ac WiFi (160MHz, MCS8, 99pc duty cycle)	X	6.02	67.40	16.57	0.00	150.0	± 9.6 %
		Y	5.74	67.21	16.32		150.0	
		Z	5.88	67.10	16.40		150.0	
10563-AAB	IEEE 802.11ac WiFi (160MHz, MCS9, 99pc duty cycle)	X	6.23	67.65	16.65	0.00	150.0	± 9.6 %
		Y	5.84	67.19	16.28		150.0	
		Z	5.99	67.07	16.36		150.0	
10564-AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 9 Mbps, 99pc duty cycle)	X	4.79	66.65	16.37	0.46	150.0	± 9.6 %
		Y	4.60	67.08	16.33		150.0	
		Z	4.68	66.58	16.26		150.0	
10565-AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 12 Mbps, 99pc duty cycle)	X	5.02	67.12	16.71	0.46	150.0	± 9.6 %
		Y	4.79	67.49	16.64		150.0	
		Z	4.89	67.02	16.59		150.0	
10566-AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 18 Mbps, 99pc duty cycle)	X	4.86	66.96	16.52	0.46	150.0	± 9.6 %
		Y	4.63	67.29	16.44		150.0	
		Z	4.73	66.84	16.39		150.0	
10567-AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 24 Mbps, 99pc duty cycle)	X	4.89	67.38	16.90	0.46	150.0	± 9.6 %
		Y	4.67	67.72	16.84		150.0	
		Z	4.76	67.26	16.78		150.0	
10568-AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 36 Mbps, 99pc duty cycle)	X	4.77	66.72	16.28	0.46	150.0	± 9.6 %
		Y	4.50	66.95	16.13		150.0	
		Z	4.63	66.60	16.14		150.0	
10569-AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 48 Mbps, 99pc duty cycle)	X	4.84	67.47	16.96	0.46	150.0	± 9.6 %
		Y	4.67	67.99	16.99		150.0	
		Z	4.73	67.43	16.88		150.0	
10570-AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 54 Mbps, 99pc duty cycle)	X	4.88	67.32	16.89	0.46	150.0	± 9.6 %
		Y	4.65	67.73	16.86		150.0	
		Z	4.75	67.24	16.79		150.0	
10571-AAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps, 90pc duty cycle)	X	1.04	63.90	15.45	0.46	130.0	± 9.6 %
		Y	1.08	64.16	15.33		130.0	
		Z	1.00	63.25	14.85		130.0	
10572-AAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 2 Mbps, 90pc duty cycle)	X	1.05	64.51	15.84	0.46	130.0	± 9.6 %
		Y	1.09	64.71	15.69		130.0	
		Z	1.00	63.76	15.20		130.0	
10573-AAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 5.5 Mbps, 90pc duty cycle)	X	3.27	96.37	26.46	0.46	130.0	± 9.6 %
		Y	1.45	83.34	23.00		130.0	
		Z	1.32	81.49	21.07		130.0	
10574-AAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 11 Mbps, 90pc duty cycle)	X	1.17	71.23	19.29	0.46	130.0	± 9.6 %
		Y	1.14	70.12	18.67		130.0	
		Z	1.05	69.28	18.09		130.0	

Certificate No: EX3-7370_Aug17

Page 33 of 38

EX3DV4- SN:7370

August 22, 2017

10575-AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 6 Mbps, 90pc duty cycle)	X	4.57	66.43	16.43	0.46	130.0	± 9.6 %
		Y	4.36	66.76	16.27		130.0	
		Z	4.46	66.34	16.29		130.0	
10576-AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 9 Mbps, 90pc duty cycle)	X	4.59	66.60	16.50	0.46	130.0	± 9.6 %
		Y	4.39	66.99	16.38		130.0	
		Z	4.48	66.53	16.37		130.0	
10577-AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 12 Mbps, 90pc duty cycle)	X	4.80	66.91	16.67	0.46	130.0	± 9.6 %
		Y	4.55	67.20	16.51		130.0	
		Z	4.66	66.80	16.53		130.0	
10578-AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 18 Mbps, 90pc duty cycle)	X	4.70	67.07	16.78	0.46	130.0	± 9.6 %
		Y	4.46	67.37	16.63		130.0	
		Z	4.57	66.96	16.65		130.0	
10579-AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 24 Mbps, 90pc duty cycle)	X	4.45	66.30	16.05	0.46	130.0	± 9.6 %
		Y	4.20	66.47	15.84		130.0	
		Z	4.32	66.13	15.87		130.0	
10580-AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 36 Mbps, 90pc duty cycle)	X	4.50	66.35	16.07	0.46	130.0	± 9.6 %
		Y	4.22	66.49	15.84		130.0	
		Z	4.36	66.20	15.91		130.0	
10581-AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 48 Mbps, 90pc duty cycle)	X	4.59	67.11	16.72	0.46	130.0	± 9.6 %
		Y	4.37	67.47	16.62		130.0	
		Z	4.46	67.00	16.59		130.0	
10582-AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 54 Mbps, 90pc duty cycle)	X	4.40	66.06	15.83	0.46	130.0	± 9.6 %
		Y	4.12	66.22	15.60		130.0	
		Z	4.25	65.89	15.65		130.0	
10583-AAA	IEEE 802.11a/h WiFi 5 GHz (OFDM, 6 Mbps, 90pc duty cycle)	X	4.57	66.43	16.43	0.46	130.0	± 9.6 %
		Y	4.36	66.76	16.27		130.0	
		Z	4.48	66.34	16.29		130.0	
10584-AAA	IEEE 802.11a/h WiFi 5 GHz (OFDM, 9 Mbps, 90pc duty cycle)	X	4.59	66.60	16.50	0.46	130.0	± 9.6 %
		Y	4.39	66.99	16.38		130.0	
		Z	4.48	66.53	16.37		130.0	
10585-AAA	IEEE 802.11a/h WiFi 5 GHz (OFDM, 12 Mbps, 90pc duty cycle)	X	4.80	66.91	16.67	0.46	130.0	± 9.6 %
		Y	4.55	67.20	16.51		130.0	
		Z	4.66	66.80	16.53		130.0	
10586-AAA	IEEE 802.11a/h WiFi 5 GHz (OFDM, 18 Mbps, 90pc duty cycle)	X	4.70	67.07	16.78	0.46	130.0	± 9.6 %
		Y	4.46	67.37	16.63		130.0	
		Z	4.57	66.96	16.65		130.0	
10587-AAA	IEEE 802.11a/h WiFi 5 GHz (OFDM, 24 Mbps, 90pc duty cycle)	X	4.45	66.30	16.05	0.46	130.0	± 9.6 %
		Y	4.20	66.47	15.84		130.0	
		Z	4.32	66.13	15.87		130.0	
10588-AAA	IEEE 802.11a/h WiFi 5 GHz (OFDM, 36 Mbps, 90pc duty cycle)	X	4.50	66.35	16.07	0.46	130.0	± 9.6 %
		Y	4.22	66.49	15.84		130.0	
		Z	4.36	66.20	15.91		130.0	
10589-AAA	IEEE 802.11a/h WiFi 5 GHz (OFDM, 48 Mbps, 90pc duty cycle)	X	4.59	67.11	16.72	0.46	130.0	± 9.6 %
		Y	4.37	67.47	16.62		130.0	
		Z	4.46	67.00	16.59		130.0	
10590-AAA	IEEE 802.11a/h WiFi 5 GHz (OFDM, 54 Mbps, 90pc duty cycle)	X	4.40	66.06	15.83	0.46	130.0	± 9.6 %
		Y	4.12	66.22	15.60		130.0	
		Z	4.25	65.89	15.65		130.0	

EX3DV4- SN:7370

August 22, 2017

10591-AAA	IEEE 802.11n (HT Mixed, 20MHz, MCS0, 90pc duty cycle)	X	4.72	66.50	16.53	0.46	130.0	± 9.6 %
		Y	4.52	66.87	16.41		130.0	
		Z	4.61	66.43	16.42		130.0	
10592-AAA	IEEE 802.11n (HT Mixed, 20MHz, MCS1, 90pc duty cycle)	X	4.67	66.84	16.67	0.46	130.0	± 9.6 %
		Y	4.63	67.14	16.53		130.0	
		Z	4.75	66.75	16.55		130.0	
10593-AAA	IEEE 802.11n (HT Mixed, 20MHz, MCS2, 90pc duty cycle)	X	4.79	66.74	16.54	0.46	130.0	± 9.6 %
		Y	4.55	67.01	16.38		130.0	
		Z	4.66	66.62	16.40		130.0	
10594-AAA	IEEE 802.11n (HT Mixed, 20MHz, MCS3, 90pc duty cycle)	X	4.85	66.92	16.70	0.46	130.0	± 9.6 %
		Y	4.60	67.19	16.55		130.0	
		Z	4.72	66.81	16.58		130.0	
10595-AAA	IEEE 802.11n (HT Mixed, 20MHz, MCS4, 90pc duty cycle)	X	4.82	66.86	16.59	0.46	130.0	± 9.6 %
		Y	4.57	67.17	16.46		130.0	
		Z	4.88	66.76	16.47		130.0	
10596-AAA	IEEE 802.11n (HT Mixed, 20MHz, MCS5, 90pc duty cycle)	X	4.75	66.86	16.60	0.46	130.0	± 9.6 %
		Y	4.49	67.11	16.44		130.0	
		Z	4.62	66.74	16.46		130.0	
10597-AAA	IEEE 802.11n (HT Mixed, 20MHz, MCS6, 90pc duty cycle)	X	4.70	66.75	16.47	0.46	130.0	± 9.6 %
		Y	4.45	66.98	16.29		130.0	
		Z	4.57	66.61	16.32		130.0	
10598-AAA	IEEE 802.11n (HT Mixed, 20MHz, MCS7, 90pc duty cycle)	X	4.68	67.00	16.75	0.46	130.0	± 9.6 %
		Y	4.45	67.25	16.58		130.0	
		Z	4.55	66.86	16.60		130.0	
10599-AAA	IEEE 802.11n (HT Mixed, 40MHz, MCS0, 90pc duty cycle)	X	5.42	67.11	16.78	0.46	130.0	± 9.6 %
		Y	5.19	67.25	16.63		130.0	
		Z	5.32	67.02	16.71		130.0	
10600-AAA	IEEE 802.11n (HT Mixed, 40MHz, MCS1, 90pc duty cycle)	X	5.58	67.64	17.02	0.46	130.0	± 9.6 %
		Y	5.25	67.48	16.72		130.0	
		Z	5.47	67.55	16.94		130.0	
10601-AAA	IEEE 802.11n (HT Mixed, 40MHz, MCS2, 90pc duty cycle)	X	5.45	67.31	16.87	0.46	130.0	± 9.6 %
		Y	5.20	67.40	16.70		130.0	
		Z	5.34	67.20	16.78		130.0	
10602-AAA	IEEE 802.11n (HT Mixed, 40MHz, MCS3, 90pc duty cycle)	X	5.56	67.37	16.82	0.46	130.0	± 9.6 %
		Y	5.25	67.31	16.57		130.0	
		Z	5.47	67.36	16.78		130.0	
10603-AAA	IEEE 802.11n (HT Mixed, 40MHz, MCS4, 90pc duty cycle)	X	5.62	67.63	17.08	0.46	130.0	± 9.6 %
		Y	5.32	67.60	16.85		130.0	
		Z	5.54	67.64	17.06		130.0	
10604-AAA	IEEE 802.11n (HT Mixed, 40MHz, MCS5, 90pc duty cycle)	X	5.43	67.08	16.79	0.46	130.0	± 9.6 %
		Y	5.19	67.17	16.61		130.0	
		Z	5.42	67.32	16.88		130.0	
10605-AAA	IEEE 802.11n (HT Mixed, 40MHz, MCS6, 90pc duty cycle)	X	5.56	67.49	17.00	0.46	130.0	± 9.6 %
		Y	5.25	67.37	16.71		130.0	
		Z	5.46	67.41	16.92		130.0	
10606-AAA	IEEE 802.11n (HT Mixed, 40MHz, MCS7, 90pc duty cycle)	X	5.27	66.69	16.45	0.46	130.0	± 9.6 %
		Y	5.06	66.90	16.33		130.0	
		Z	5.18	66.62	16.37		130.0	

Certificate No: EX3-7370_Aug17

Page 35 of 38

EX3DV4- SN:7370

August 22, 2017

10607-AAA	IEEE 802.11ac WiFi (20MHz, MCS0, 90pc duty cycle)	X	4.57	65.83	16.16	0.46	130.0	± 9.6 %
		Y	4.38	66.25	16.08		130.0	
		Z	4.46	65.76	16.05		130.0	
10608-AAA	IEEE 802.11ac WiFi (20MHz, MCS1, 90pc duty cycle)	X	4.75	66.24	16.33	0.46	130.0	± 9.6 %
		Y	4.50	66.55	16.21		130.0	
		Z	4.62	66.13	16.21		130.0	
10609-AAA	IEEE 802.11ac WiFi (20MHz, MCS2, 90pc duty cycle)	X	4.64	66.08	16.16	0.46	130.0	± 9.6 %
		Y	4.40	66.38	16.03		130.0	
		Z	4.61	65.95	16.02		130.0	
10610-AAA	IEEE 802.11ac WiFi (20MHz, MCS3, 90pc duty cycle)	X	4.69	66.24	16.33	0.46	130.0	± 9.6 %
		Y	4.45	66.56	16.21		130.0	
		Z	4.56	66.12	16.20		130.0	
10611-AAA	IEEE 802.11ac WiFi (20MHz, MCS4, 90pc duty cycle)	X	4.60	66.04	16.17	0.46	130.0	± 9.6 %
		Y	4.36	66.34	16.04		130.0	
		Z	4.47	65.92	16.03		130.0	
10612-AAA	IEEE 802.11ac WiFi (20MHz, MCS5, 90pc duty cycle)	X	4.61	66.20	16.22	0.46	130.0	± 9.6 %
		Y	4.34	66.44	16.07		130.0	
		Z	4.47	66.06	16.07		130.0	
10613-AAA	IEEE 802.11ac WiFi (20MHz, MCS6, 90pc duty cycle)	X	4.62	66.07	16.09	0.46	130.0	± 9.6 %
		Y	4.34	66.25	15.90		130.0	
		Z	4.47	65.89	15.93		130.0	
10614-AAA	IEEE 802.11ac WiFi (20MHz, MCS7, 90pc duty cycle)	X	4.56	66.27	16.34	0.46	130.0	± 9.6 %
		Y	4.32	66.52	16.18		130.0	
		Z	4.43	66.12	16.19		130.0	
10615-AAA	IEEE 802.11ac WiFi (20MHz, MCS8, 90pc duty cycle)	X	4.60	65.86	15.94	0.46	130.0	± 9.6 %
		Y	4.35	66.16	15.80		130.0	
		Z	4.47	65.73	15.79		130.0	
10616-AAA	IEEE 802.11ac WiFi (40MHz, MCS0, 90pc duty cycle)	X	5.23	66.33	16.38	0.46	130.0	± 9.6 %
		Y	5.00	66.46	16.23		130.0	
		Z	5.12	66.19	16.27		130.0	
10617-AAA	IEEE 802.11ac WiFi (40MHz, MCS1, 90pc duty cycle)	X	5.31	66.55	16.46	0.46	130.0	± 9.6 %
		Y	5.03	66.54	16.24		130.0	
		Z	5.20	66.43	16.37		130.0	
10618-AAA	IEEE 802.11ac WiFi (40MHz, MCS2, 90pc duty cycle)	X	5.19	66.53	16.47	0.46	130.0	± 9.6 %
		Y	4.95	66.63	16.31		130.0	
		Z	5.09	66.44	16.38		130.0	
10619-AAA	IEEE 802.11ac WiFi (40MHz, MCS3, 90pc duty cycle)	X	5.21	66.35	16.31	0.46	130.0	± 9.6 %
		Y	4.97	66.48	16.16		130.0	
		Z	5.09	66.20	16.20		130.0	
10620-AAA	IEEE 802.11ac WiFi (40MHz, MCS4, 90pc duty cycle)	X	5.29	66.37	16.37	0.46	130.0	± 9.6 %
		Y	5.03	66.43	16.18		130.0	
		Z	5.18	66.24	16.27		130.0	
10621-AAA	IEEE 802.11ac WiFi (40MHz, MCS5, 90pc duty cycle)	X	5.29	66.50	16.56	0.46	130.0	± 9.6 %
		Y	5.05	66.60	16.39		130.0	
		Z	5.19	66.38	16.47		130.0	
10622-AAA	IEEE 802.11ac WiFi (40MHz, MCS6, 90pc duty cycle)	X	5.32	66.70	16.65	0.46	130.0	± 9.6 %
		Y	5.04	66.66	16.42		130.0	
		Z	5.20	66.56	16.55		130.0	

EX3DV4- SN:7370

August 22, 2017

10623-AAA	IEEE 802.11ac WiFi (40MHz, MCS7, 90pc duty cycle)	X	5.18	66.18	16.26	0.46	130.0	± 9.6 %
		Y	4.94	66.25	16.07		130.0	
		Z	5.06	65.99	16.12		130.0	
10624-AAA	IEEE 802.11ac WiFi (40MHz, MCS8, 90pc duty cycle)	X	5.38	66.39	16.43	0.46	130.0	± 9.6 %
		Y	5.12	66.48	16.25		130.0	
		Z	5.26	66.26	16.33		130.0	
10625-AAA	IEEE 802.11ac WiFi (40MHz, MCS9, 90pc duty cycle)	X	5.77	67.48	17.02	0.46	130.0	± 9.6 %
		Y	5.21	66.62	16.39		130.0	
		Z	5.49	66.84	16.67		130.0	
10626-AAA	IEEE 802.11ac WiFi (80MHz, MCS0, 90pc duty cycle)	X	5.53	66.37	16.32	0.46	130.0	± 9.6 %
		Y	5.34	66.48	16.18		130.0	
		Z	5.44	66.24	16.23		130.0	
10627-AAA	IEEE 802.11ac WiFi (80MHz, MCS1, 90pc duty cycle)	X	5.80	67.04	16.62	0.46	130.0	± 9.6 %
		Y	5.54	67.01	16.42		130.0	
		Z	5.72	66.96	16.56		130.0	
10628-AAA	IEEE 802.11ac WiFi (80MHz, MCS2, 90pc duty cycle)	X	5.57	66.48	16.27	0.46	130.0	± 9.6 %
		Y	5.32	66.43	16.06		130.0	
		Z	5.45	66.26	16.14		130.0	
10629-AAA	IEEE 802.11ac WiFi (80MHz, MCS3, 90pc duty cycle)	X	5.65	66.56	16.30	0.46	130.0	± 9.6 %
		Y	5.43	66.62	16.15		130.0	
		Z	5.55	66.41	16.21		130.0	
10630-AAA	IEEE 802.11ac WiFi (80MHz, MCS4, 90pc duty cycle)	X	6.20	68.39	17.21	0.46	130.0	± 9.6 %
		Y	5.58	67.29	16.49		130.0	
		Z	5.98	67.91	16.95		130.0	
10631-AAA	IEEE 802.11ac WiFi (80MHz, MCS5, 90pc duty cycle)	X	6.00	67.93	17.19	0.46	130.0	± 9.6 %
		Y	5.61	67.49	16.79		130.0	
		Z	5.83	67.59	17.00		130.0	
10632-AAA	IEEE 802.11ac WiFi (80MHz, MCS6, 90pc duty cycle)	X	5.76	67.10	16.79	0.46	130.0	± 9.6 %
		Y	5.55	67.23	16.67		130.0	
		Z	5.69	67.07	16.76		130.0	
10633-AAA	IEEE 802.11ac WiFi (80MHz, MCS7, 90pc duty cycle)	X	5.62	66.60	16.36	0.46	130.0	± 9.6 %
		Y	5.35	66.52	16.14		130.0	
		Z	5.52	66.47	16.28		130.0	
10634-AAA	IEEE 802.11ac WiFi (80MHz, MCS8, 90pc duty cycle)	X	5.60	66.64	16.45	0.46	130.0	± 9.6 %
		Y	5.39	66.75	16.31		130.0	
		Z	5.50	66.48	16.34		130.0	
10635-AAA	IEEE 802.11ac WiFi (80MHz, MCS9, 90pc duty cycle)	X	5.48	65.95	15.83	0.46	130.0	± 9.6 %
		Y	5.23	65.94	15.62		130.0	
		Z	5.36	65.74	15.69		130.0	
10636-AAB	IEEE 802.11ac WiFi (160MHz, MCS0, 90pc duty cycle)	X	5.96	66.76	16.42	0.46	130.0	± 9.6 %
		Y	5.77	66.81	16.25		130.0	
		Z	5.88	66.63	16.34		130.0	
10637-AAB	IEEE 802.11ac WiFi (160MHz, MCS1, 90pc duty cycle)	X	6.13	67.19	16.62	0.46	130.0	± 9.6 %
		Y	5.86	67.04	16.36		130.0	
		Z	6.04	67.05	16.53		130.0	
10638-AAB	IEEE 802.11ac WiFi (160MHz, MCS2, 90pc duty cycle)	X	6.12	67.15	16.58	0.46	130.0	± 9.6 %
		Y	5.91	67.16	16.39		130.0	
		Z	6.04	67.03	16.50		130.0	

Certificate No: EX3-7370_Aug17

Page 37 of 38

EX3DV4- SN:7370

August 22, 2017

10639-AAB	IEEE 802.11ac WiFi (160MHz, MCS3, 90pc duty cycle)	X	6.09	67.07	16.58	0.46	130.0	± 9.6 %
		Y	5.86	67.04	16.37		130.0	
		Z	6.00	66.90	16.48		130.0	
10640-AAB	IEEE 802.11ac WiFi (160MHz, MCS4, 90pc duty cycle)	X	6.10	67.08	16.53	0.46	130.0	± 9.6 %
		Y	5.80	66.87	16.23		130.0	
		Z	5.99	66.89	16.41		130.0	
10641-AAB	IEEE 802.11ac WiFi (160MHz, MCS5, 90pc duty cycle)	X	6.15	67.00	16.51	0.46	130.0	± 9.6 %
		Y	5.91	66.96	16.30		130.0	
		Z	6.08	66.93	16.45		130.0	
10642-AAB	IEEE 802.11ac WiFi (160MHz, MCS6, 90pc duty cycle)	X	6.18	67.24	16.80	0.46	130.0	± 9.6 %
		Y	5.94	67.20	16.59		130.0	
		Z	6.09	67.10	16.71		130.0	
10643-AAB	IEEE 802.11ac WiFi (160MHz, MCS7, 90pc duty cycle)	X	6.02	66.94	16.54	0.46	130.0	± 9.6 %
		Y	5.78	66.86	16.31		130.0	
		Z	5.94	66.62	16.46		130.0	
10644-AAB	IEEE 802.11ac WiFi (160MHz, MCS8, 90pc duty cycle)	X	6.18	67.44	16.81	0.46	130.0	± 9.6 %
		Y	5.83	67.03	16.41		130.0	
		Z	6.03	67.09	16.62		130.0	
10645-AAB	IEEE 802.11ac WiFi (160MHz, MCS9, 90pc duty cycle)	X	6.53	68.08	17.09	0.46	130.0	± 9.6 %
		Y	5.95	67.08	16.40		130.0	
		Z	6.22	67.32	16.70		130.0	
10646-AAB	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, QPSK, UL Subframe=2,7)	X	13.08	104.20	36.15	9.30	60.0	± 9.6 %
		Y	5.92	88.82	30.55		60.0	
		Z	8.85	96.13	33.55		60.0	
10647-AAB	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, QPSK, UL Subframe=2,7)	X	11.33	101.47	35.40	9.30	60.0	± 9.6 %
		Y	5.14	86.02	29.61		60.0	
		Z	7.75	93.61	32.81		60.0	
10648-AAB	CDMA2000 (1x Advanced)	X	0.58	62.49	9.46	0.00	150.0	± 9.6 %
		Y	0.48	61.89	8.26		150.0	
		Z	0.45	60.67	7.46		150.0	
10652-AAB	LTE-TDD (OFDMA, 5 MHz, E-TM 3.1, Clipping 44%)	X	3.36	66.28	16.43	2.23	80.0	± 9.6 %
		Y	3.09	66.24	15.72		80.0	
		Z	3.18	65.80	15.94		80.0	
10653-AAB	LTE-TDD (OFDMA, 10 MHz, E-TM 3.1, Clipping 44%)	X	3.88	65.59	16.56	2.23	80.0	± 9.6 %
		Y	3.65	65.60	16.08		80.0	
		Z	3.73	65.23	16.23		80.0	
10654-AAB	LTE-TDD (OFDMA, 15 MHz, E-TM 3.1, Clipping 44%)	X	3.86	65.21	16.55	2.23	80.0	± 9.6 %
		Y	3.68	65.22	16.13		80.0	
		Z	3.74	64.87	16.26		80.0	
10655-AAB	LTE-TDD (OFDMA, 20 MHz, E-TM 3.1, Clipping 44%)	X	3.92	65.20	16.59	2.23	80.0	± 9.6 %
		Y	3.76	65.13	16.17		80.0	
		Z	3.81	64.82	16.30		80.0	

^c Uncertainty is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

Attachment 4. – Dipole Calibration Data

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 **HCT (Dymstec)**

Certificate No: **D750V3-1014_Jul17**

CALIBRATION CERTIFICATE

Object **D750V3 - SN:1014**

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

Calibration date: **July 19, 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 B461A	SN: US37292783	07-Oct-15 (in house check Oct-16)	In house check: Oct-18
Power sensor HP B461A	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

	Name	Function	Signature
Calibrated by:	Johannes Kurikka	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: July 20, 2017

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

Certificate No: D750V3-1014_Jul17

Page 1 of 8

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**

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	41.0 $\pm$ 6 %	0.89 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	2.08 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	8.28 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	1.35 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	5.38 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	55.0 $\pm$ 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	2.22 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	8.66 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	1.45 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	$55,6 \Omega + 3,5 j\Omega$
Return Loss	- 24,1 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	$50,3 \Omega - 0,5 j\Omega$
Return Loss	- 45,1 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1,036 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	March 22, 2010

DASY5 Validation Report for Head TSL

Date: 19.07.2017

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 750 MHz; Type: D750V3; Serial: D750V3 - SN:1014

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

Medium parameters used: $f = 750$ MHz; $\sigma = 0.89$ S/m; $\epsilon_r = 41$; $\rho = 1000$ kg/m³

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=15mm/Zoom Scan (7x7x7)/Cube 0:

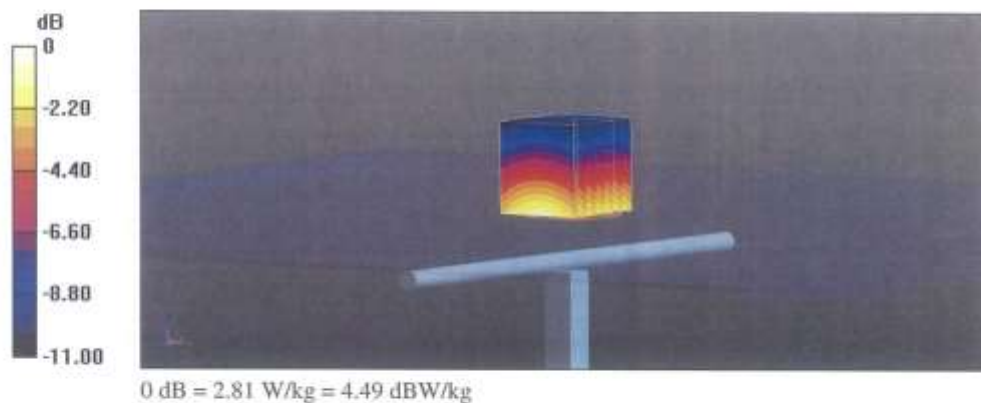
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 58.57 V/m; Power Drift = 0.02 dB

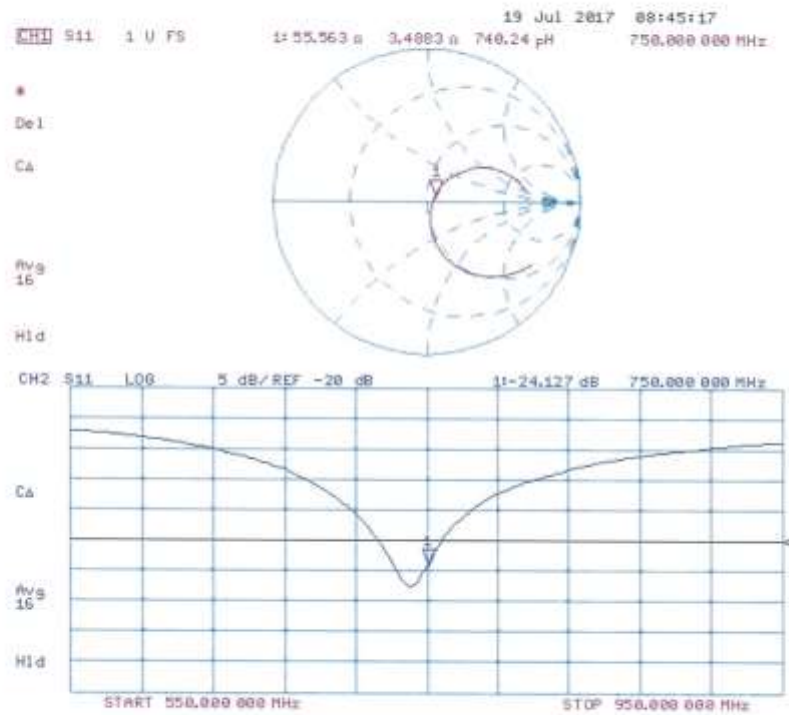
Peak SAR (extrapolated) = 3.20 W/kg

SAR(1 g) = 2.08 W/kg; SAR(10 g) = 1.35 W/kg

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



Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 19.07.2017

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 750 MHz; Type: D750V3; Serial: D750V3 - SN:1014

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

Medium parameters used: $f = 750$ MHz; $\sigma = 0.99$ S/m; $\epsilon_r = 55$; $\rho = 1000$ 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:

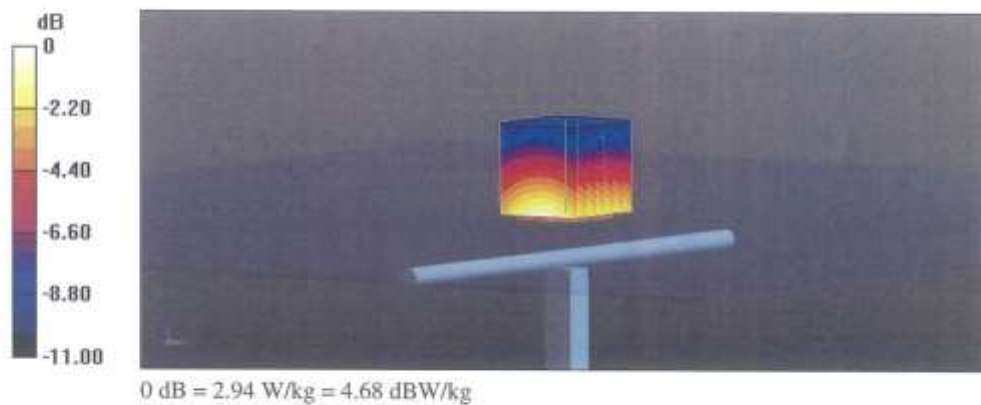
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 57.61 V/m; Power Drift = -0.02 dB

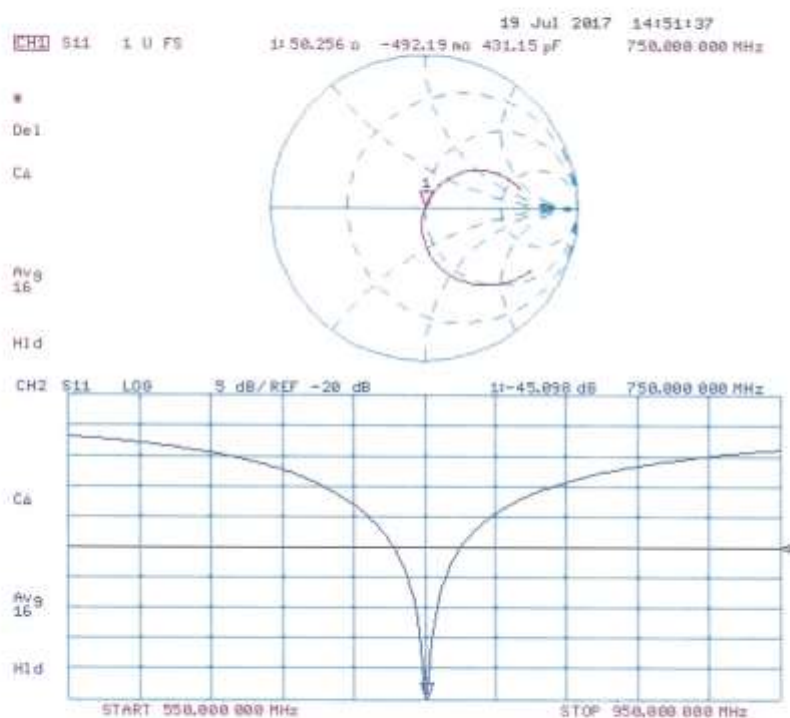
Peak SAR (extrapolated) = 3.32 W/kg

SAR(1 g) = 2.22 W/kg; SAR(10 g) = 1.45 W/kg

Maximum value of SAR (measured) = 2.94 W/kg



Impedance 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 **HCT (Dymstec)**

Certificate No: **D835V2-441_Sep17**

CALIBRATION CERTIFICATE

Object **D835V2 - SN:441**

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

Calibration date: **September 21, 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: G837480704	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	16-Oct-01 (in house check Oct-16)	In house check: Oct-17

	Name	Function	Signature
Calibrated by:	Michael Weber	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: September 21, 2017

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

Certificate No: D835V2-441_Sep17

Page 1 of 8

**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**

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	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	40.9 $\pm$ 6 %	0.93 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	2.41 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	9.38 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	1.55 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	6.07 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	55.3 $\pm$ 6 %	0.98 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	2.37 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	9.41 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	1.55 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	6.16 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	51.1 Ω - 2.3 j Ω
Return Loss	- 32.1 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	47.6 Ω - 5.0 j Ω
Return Loss	- 24.9 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.371 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	March 09, 2001

DASY5 Validation Report for Head TSL

Date: 21.09.2017

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:441

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

Medium parameters used: $f = 835$ MHz; $\sigma = 0.93$ 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(10.07, 10.07, 10.07); 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:

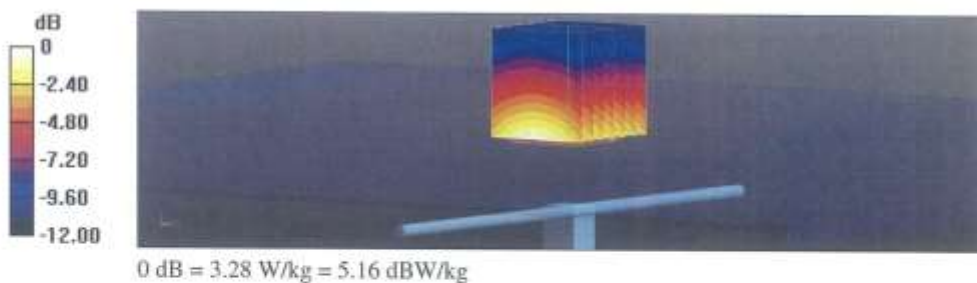
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 62.34 V/m; Power Drift = -0.08 dB

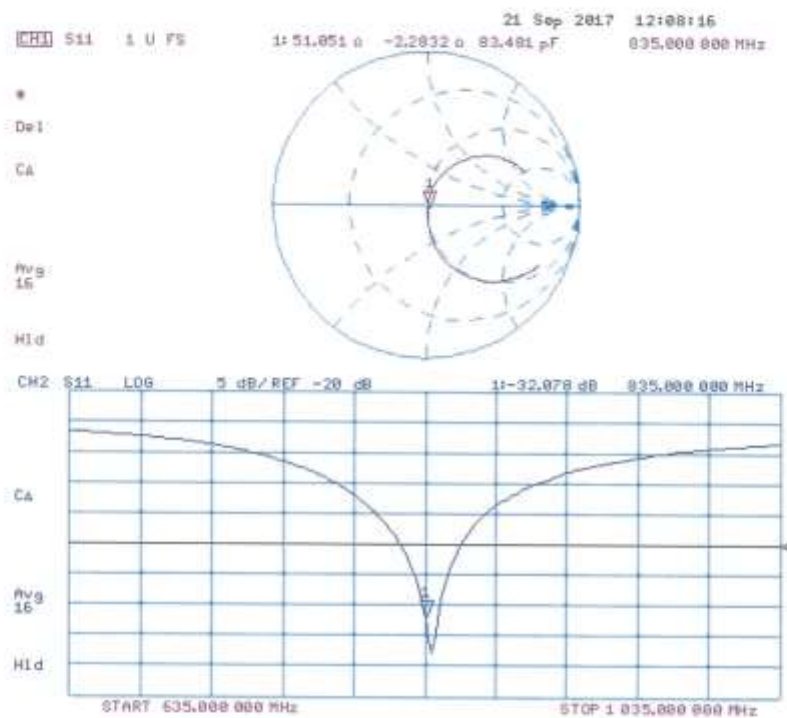
Peak SAR (extrapolated) = 3.75 W/kg

SAR(1 g) = 2.41 W/kg; SAR(10 g) = 1.55 W/kg

Maximum value of SAR (measured) = 3.28 W/kg



Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 21.09.2017

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:441

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

Medium parameters used: $f = 835$ MHz; $\sigma = 0.98$ S/m; $\epsilon_r = 55.3$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

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

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(10.2, 10.2, 10.2); 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:

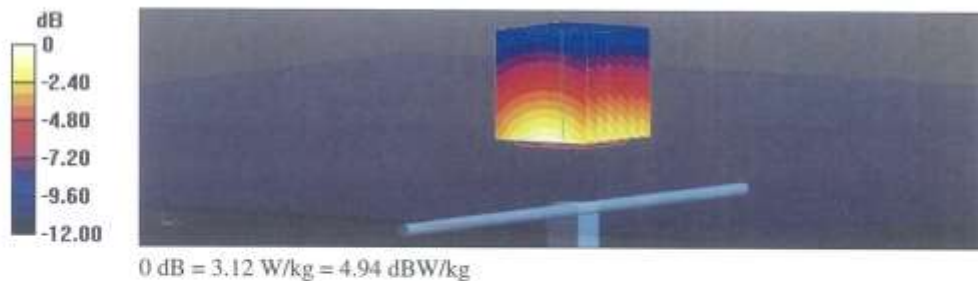
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 59.66 V/m; Power Drift = -0.09 dB

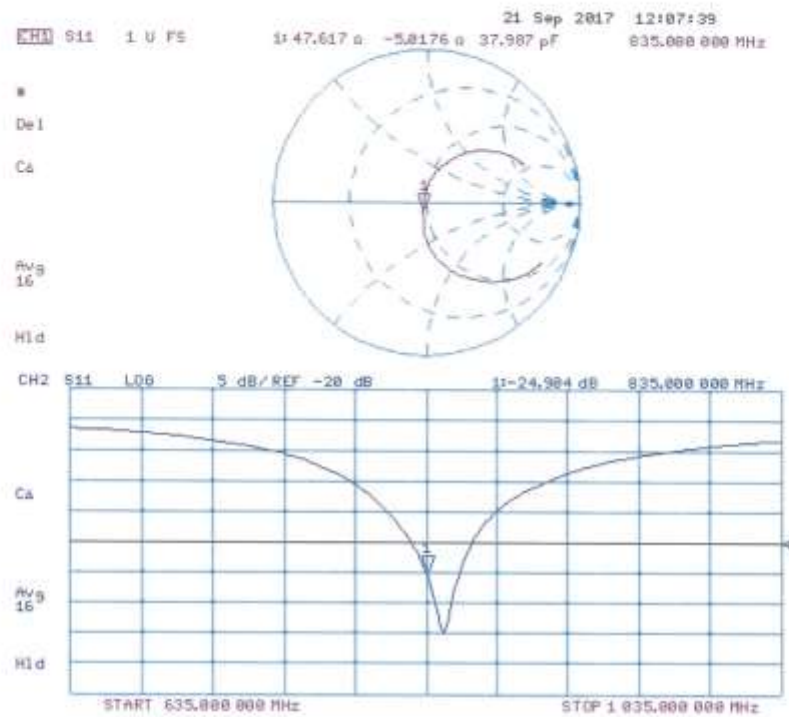
Peak SAR (extrapolated) = 3.57 W/kg

SAR(1 g) = 2.37 W/kg; SAR(10 g) = 1.55 W/kg

Maximum value of SAR (measured) = 3.12 W/kg



Impedance 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 **HCT (Dymstec)**

Certificate No: **D1900V2-5d061_Mar18**

CALIBRATION CERTIFICATE

Object **D1900V2 - SN:5d061**

Calibration procedure(s) **QA CAL-05.v10
Calibration procedure for dipole validation kits above 700 MHz**

Calibration date: **March 15, 2018**

결	담당자	확인자
재	<i>[Signature]</i>	<i>[Signature]</i>

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%.

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-291	SN: 103244	04-Apr-17 (No. 217-02521)	Apr-18
Power sensor NRP-291	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	16-Oct-01 (in house check Oct-17)	In house check: Oct-18

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

Approved by: **Katja Pokovic** Technical Manager

Issued: March 15, 2018

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

Certificate No: D1900V2-5d061_Mar18

Page 1 of 8

**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**

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	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	40.5 $\pm$ 6 %	1.37 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	9.88 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	40.1 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	5.19 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	21.0 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	53.3	1.52 mho/m
Measured Body TSL parameters	(22.0 $\pm$ 0.2) °C	55.2 $\pm$ 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 cm ³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	9.64 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	39.6 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	5.14 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	$51.4 \Omega + 8.2 j\Omega$
Return Loss	- 24.0 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	$47.7 \Omega + 4.9 j\Omega$
Return Loss	- 25.1 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1,194 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	December 10, 2004

DASY5 Validation Report for Head TSL

Date: 15.03.2018

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:5d061

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

Medium parameters used: $f = 1900$ MHz; $\sigma = 1.37$ S/m; $\epsilon_r = 40.5$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

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

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(8.18, 8.18, 8.18); 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)

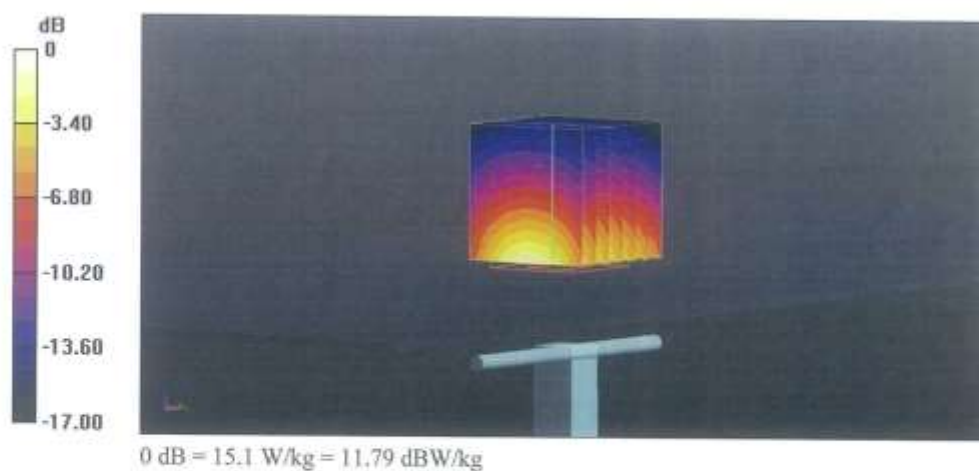
Dipole Calibration for Head Tissue/ $P_{in}=250$ mW, $d=10$ mm/Zoom Scan (7x7x7)/Cube 0:Measurement grid: $dx=5$ mm, $dy=5$ mm, $dz=5$ mm

Reference Value = 107.8 V/m; Power Drift = -0.09 dB

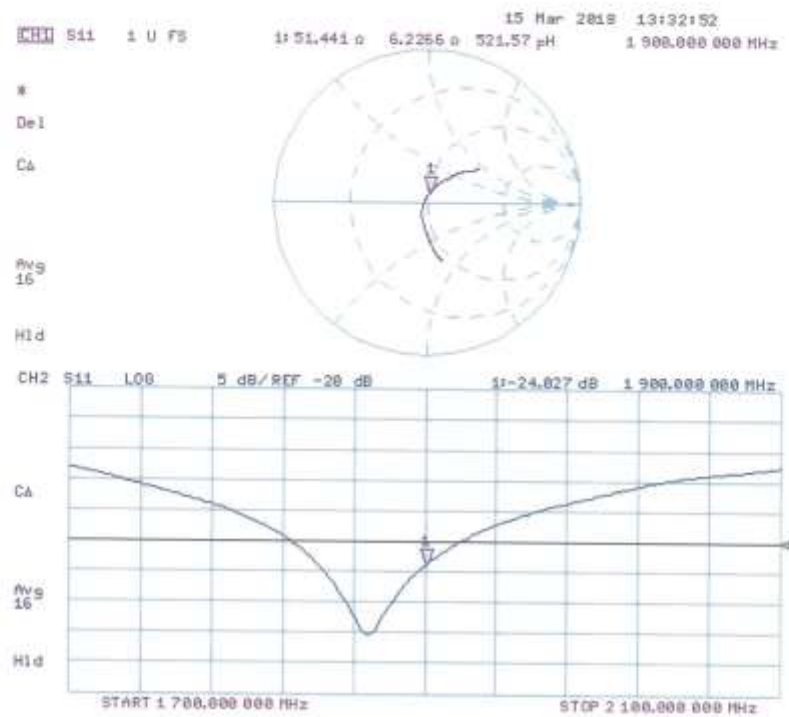
Peak SAR (extrapolated) = 18.3 W/kg

SAR(1 g) = 9.88 W/kg; SAR(10 g) = 5.19 W/kg

Maximum value of SAR (measured) = 15.1 W/kg



Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 15.03.2018

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:5d061

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

Medium parameters used: $f = 1900$ MHz; $\sigma = 1.47$ S/m; $\epsilon_r = 55.2$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

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

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(8.15, 8.15, 8.15); 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:

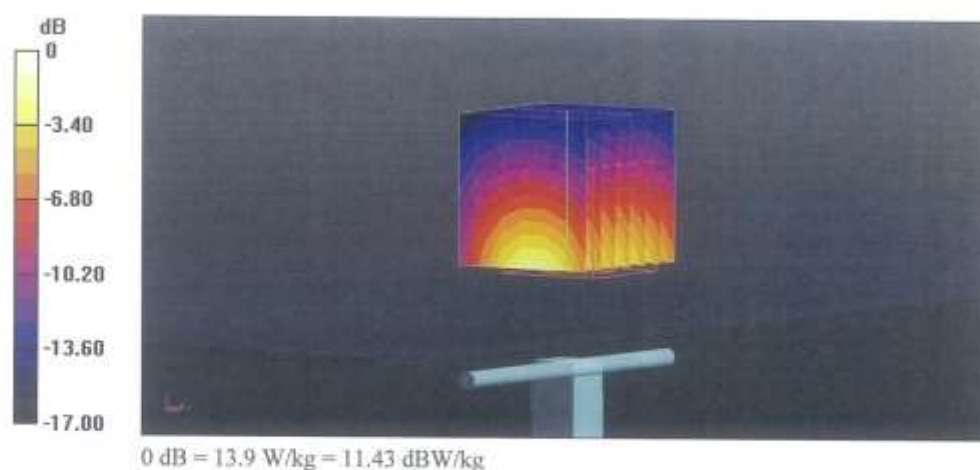
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 101.9 V/m; Power Drift = -0.04 dB

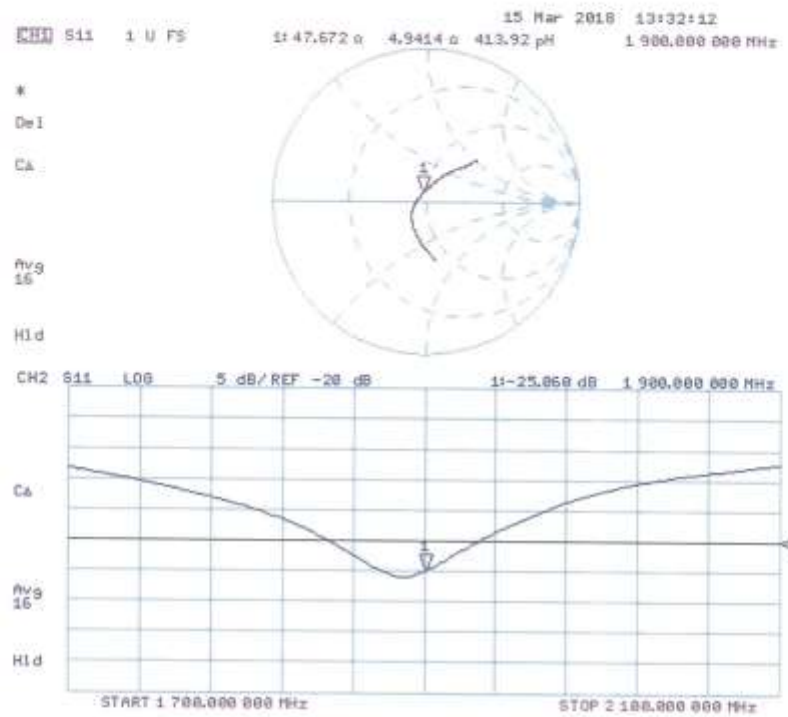
Peak SAR (extrapolated) = 17.1 W/kg

SAR(1 g) = 9.64 W/kg; SAR(10 g) = 5.14 W/kg

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



Impedance 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 **HCT (Dymstec)**

Certificate No: **D2450V2-965_Feb18**

CALIBRATION CERTIFICATE

Object **D2450V2 - SN:965**

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

Calibration date: **February 16, 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-08	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:	Michael Weber	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: February 19, 2018

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

Certificate No: D2450V2-965_Feb18

Page 1 of 8

결	담	화
제	담	인
직위/성명	6W 180430	6W 180430
일 자	2018 103.06	2018 103.06

**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**

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	2450 MHz $\pm$ 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	39.2	1.80 mho/m
Measured Head TSL parameters	(22.0 $\pm$ 0.2) °C	37.9 $\pm$ 6 %	1.87 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	13.1 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	51.1 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	6.07 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	23.9 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	52.7	1.95 mho/m
Measured Body TSL parameters	(22.0 $\pm$ 0.2) °C	51.4 $\pm$ 6 %	2.04 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	12.9 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	50.2 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	5.98 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	23.6 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	$54.9 \Omega + 4.2 j\Omega$
Return Loss	- 24.2 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	$50.9 \Omega + 6.3 j\Omega$
Return Loss	- 24.0 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.163 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 19, 2014

DASY5 Validation Report for Head TSL

Date: 16.02.2018

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN: 965

Communication System: UID 0 - CW; Frequency: 2450 MHz

Medium parameters used: $f = 2450$ MHz; $\sigma = 1.87$ S/m; $\epsilon_r = 37.9$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

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

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(7.88, 7.88, 7.88); 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:

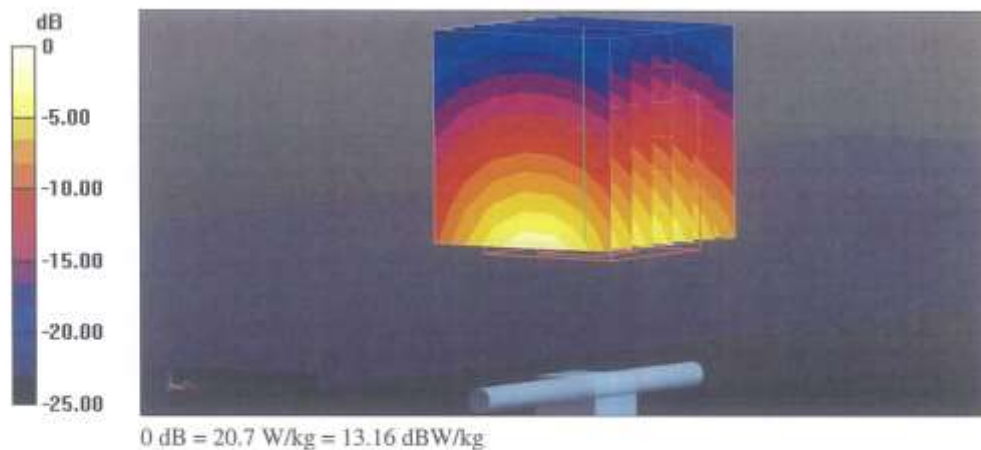
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 112.7 V/m; Power Drift = -0.05 dB

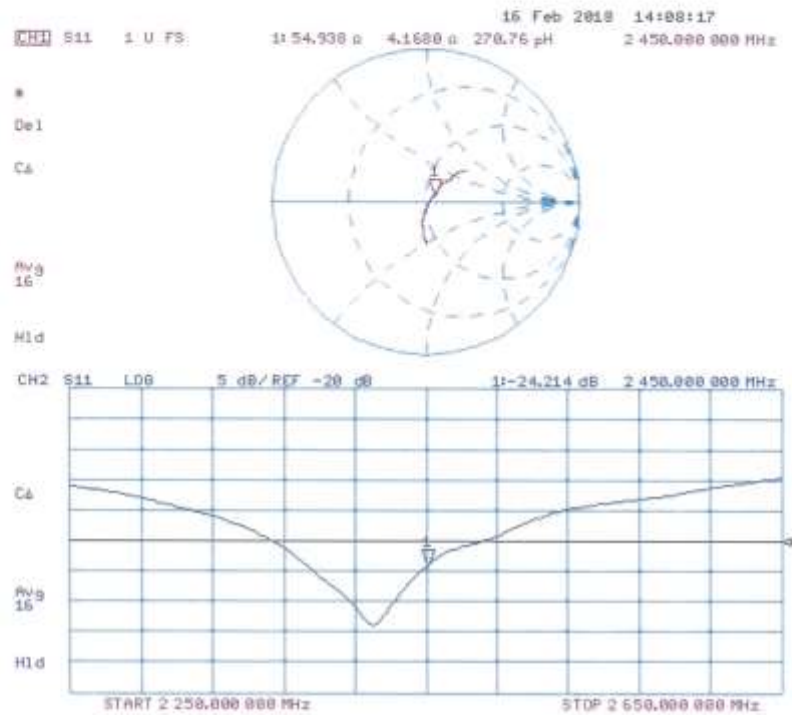
Peak SAR (extrapolated) = 26.2 W/kg

SAR(1 g) = 13.1 W/kg; SAR(10 g) = 6.07 W/kg

Maximum value of SAR (measured) = 20.7 W/kg



Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 16.02.2018

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN: 965

Communication System: UID 0 - CW; Frequency: 2450 MHz

Medium parameters used: $f = 2450$ MHz; $\sigma = 2.04$ S/m; $\epsilon_r = 51.4$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

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

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(8.01, 8.01, 8.01); 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:

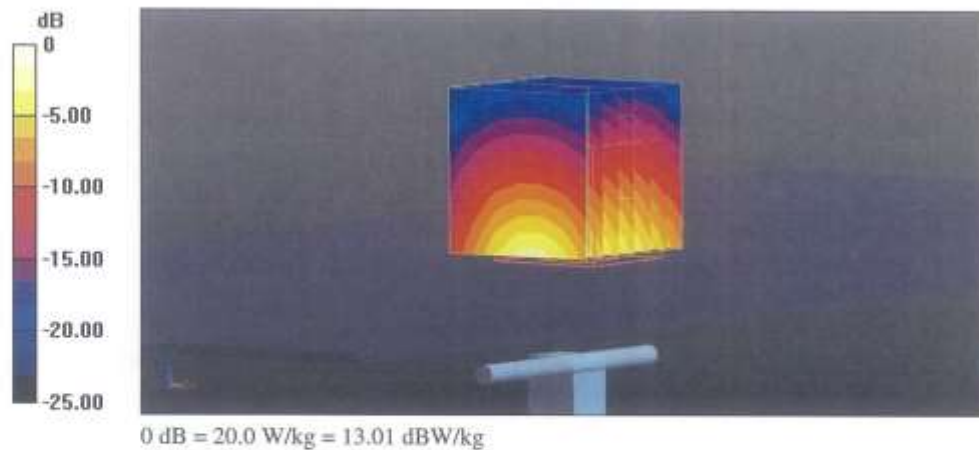
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 104.7 V/m; Power Drift = -0.03 dB

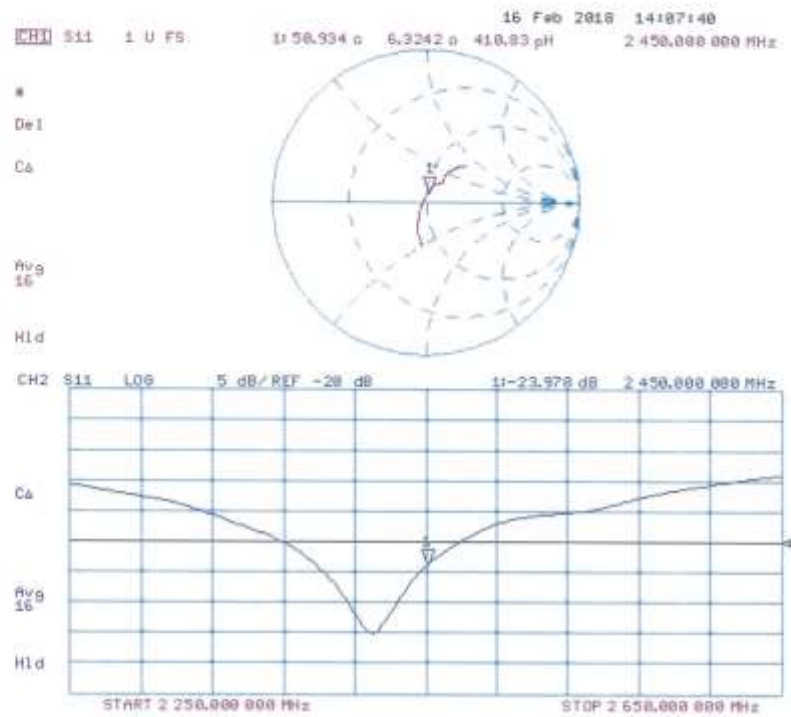
Peak SAR (extrapolated) = 25.8 W/kg

SAR(1 g) = 12.9 W/kg; SAR(10 g) = 5.98 W/kg

Maximum value of SAR (measured) = 20.0 W/kg



Impedance 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 **HCT (Dymstec)**

Certificate No: **D2600V2-1106_Dec17**

CALIBRATION CERTIFICATE

Object: **D2600V2 - SN:1106**

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

Calibration date: **December 15, 2017**

결	담당자	확인자
재	<i>[Signature]</i> 2018.01.04 2018.01.04	<i>[Signature]</i> 2018.01.04 2018.01.04

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%.

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 EX30V4	SN: 7349	31-May-17 (No. EX3-7349_May17)	May-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

	Name	Function	Signature
Calibrated by:	Leif Klysner	Laboratory Technician	<i>[Signature]</i>
Approved by:	Katja Pokovic	Technical Manager	<i>[Signature]</i>

Issued: December 18, 2017

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

Certificate No: D2600V2-1106_Dec17

Page 1 of 8

**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**

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	2600 MHz $\pm$ 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	39.0	1.96 mho/m
Measured Head TSL parameters	(22.0 $\pm$ 0.2) °C	37.1 $\pm$ 6 %	2.03 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	14.5 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	56.4 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	6.35 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	25.0 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	52.5	2.16 mho/m
Measured Body TSL parameters	(22.0 $\pm$ 0.2) °C	51.0 $\pm$ 6 %	2.22 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	13.9 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	54.6 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	6.13 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	24.2 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 - 8.3 j Ω
Return Loss	- 21.2 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	44.7 Ω - 5.9 j Ω
Return Loss	- 21.6 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.150 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	February 18, 2015

DASY5 Validation Report for Head TSL

Date: 15.12.2017

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2600 MHz; Type: D2600V2; Serial: D2600V2 - SN: 1106

Communication System: UID 0 - CW; Frequency: 2600 MHz

Medium parameters used: $f = 2600$ MHz; $\sigma = 2.03$ S/m; $\epsilon_r = 37.1$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

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

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(7.96, 7.96, 7.96); Calibrated: 31.05.2017;
- 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:

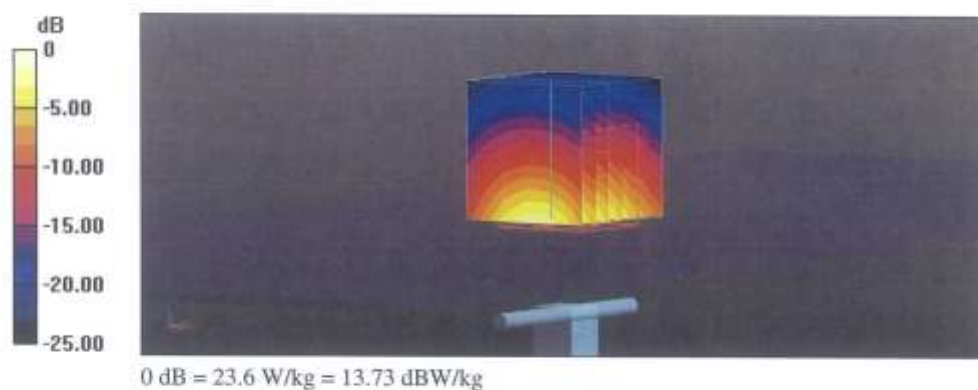
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 113.0 V/m; Power Drift = -0.07 dB

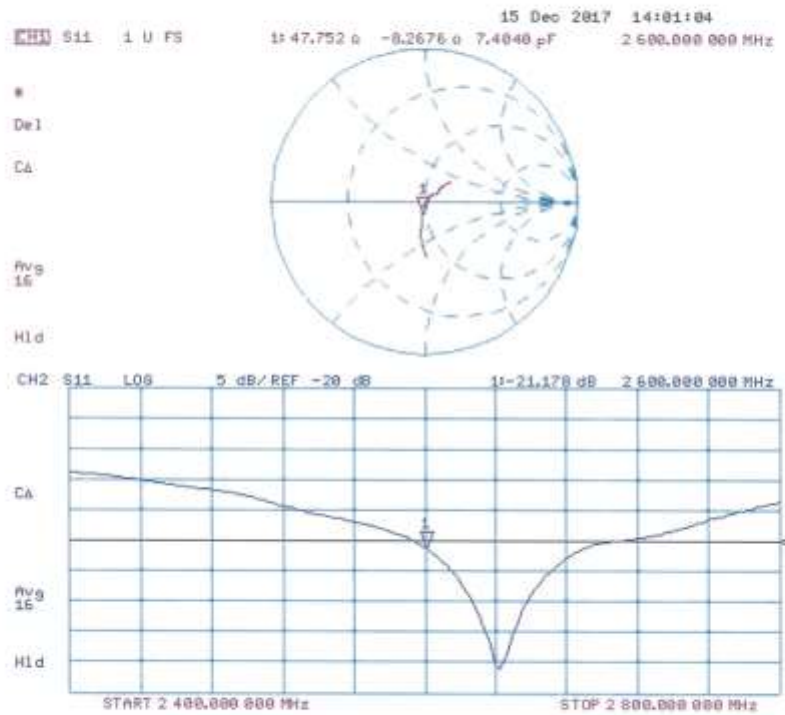
Peak SAR (extrapolated) = 32.1 W/kg

SAR(1 g) = 14.5 W/kg; SAR(10 g) = 6.35 W/kg

Maximum value of SAR (measured) = 23.6 W/kg



Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 15.12.2017

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2600 MHz; Type: D2600V2; Serial: D2600V2 - SN: 1106

Communication System: UID 0 - CW; Frequency: 2600 MHz

Medium parameters used: $f = 2600$ MHz; $\sigma = 2.22$ S/m; $\epsilon_r = 51$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

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

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(7.94, 7.94, 7.94); Calibrated: 31.05.2017;
- 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:

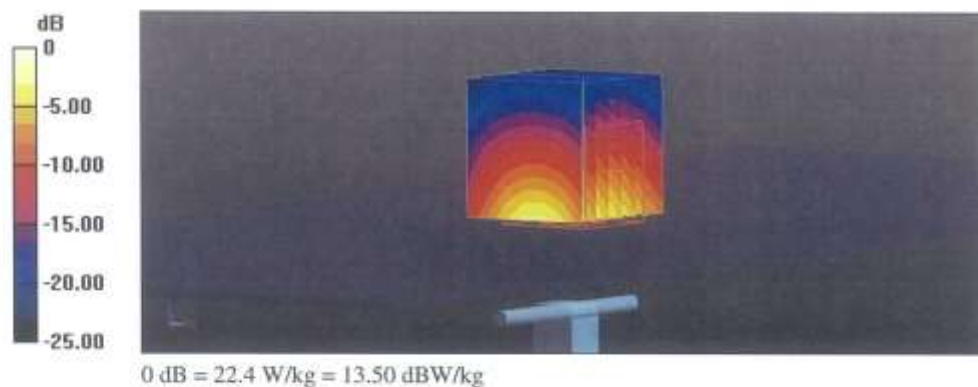
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 104.4 V/m; Power Drift = -0.08 dB

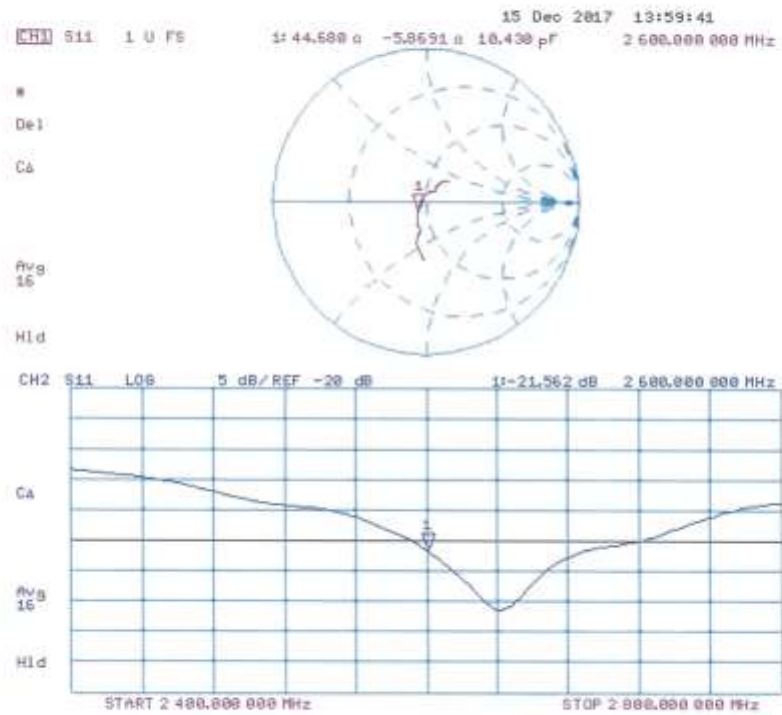
Peak SAR (extrapolated) = 29.9 W/kg

SAR(1 g) = 13.9 W/kg; SAR(10 g) = 6.13 W/kg

Maximum value of SAR (measured) = 22.4 W/kg



Impedance 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 **HCT (Dymstec)**

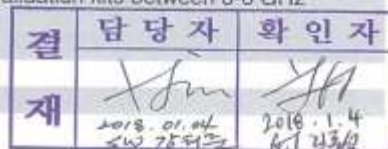
Certificate No: **D5GHzV2-1107_Dec17**

CALIBRATION CERTIFICATE

Object: **D5GHzV2 - SN:1107**

Calibration procedure(s): **QA CAL-22.v2**
Calibration procedure for dipole validation kits between 3-6 GHz

Calibration date: **December 14, 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 ± 3)°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: 3503	31-Dec-16 (No. EX3-3503_Dec16)	Dec-17
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-15)	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-15)	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

	Name	Function	Signature
Calibrated by:	Michael Weber	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: December 14, 2017

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

**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**

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 V5.0	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy = 4.0 mm, dz = 1.4 mm	Graded Ratio = 1.4 (Z direction)
Frequency	5250 MHz $\pm$ 1 MHz 5600 MHz $\pm$ 1 MHz 5750 MHz $\pm$ 1 MHz	

Head TSL parameters at 5250 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	35.9	4.71 mho/m
Measured Head TSL parameters	(22.0 $\pm$ 0.2) °C	35.7 $\pm$ 6 %	4.56 mho/m $\pm$ 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL at 5250 MHz

SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	8.15 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	81.3 W/kg $\pm$ 19.9 % (k=2)
SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.34 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	23.3 W/kg $\pm$ 19.5 % (k=2)

Head TSL parameters at 5600 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	35.5	5.07 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	35.2 ± 6 %	4.91 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	---	---

SAR result with Head TSL at 5600 MHz

SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	8.43 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	84.0 W / kg ± 19.9 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.41 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	24.0 W/kg ± 19.5 % (k=2)

Head TSL parameters at 5750 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	35.4	5.22 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	35.0 ± 6 %	5.07 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	---	---

SAR result with Head TSL at 5750 MHz

SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	8.09 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	80.6 W/kg ± 19.9 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.30 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	22.9 W/kg ± 19.5 % (k=2)

Body TSL parameters at 5250 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	48.9	5.36 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	47.1 ± 6 %	5.51 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	---	---

SAR result with Body TSL at 5250 MHz

SAR averaged over 1 cm ³ (1 g) of Body TSL	Condition	
SAR measured	100 mW input power	7.79 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	77.4 W/kg ± 19.9 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Body TSL	condition	
SAR measured	100 mW input power	2.17 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	21.5 W/kg ± 19.5 % (k=2)

Body TSL parameters at 5600 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	48.5	5.77 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	46.5 ± 6 %	5.97 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	---	---

SAR result with Body TSL at 5600 MHz

SAR averaged over 1 cm ³ (1 g) of Body TSL	Condition	
SAR measured	100 mW input power	8.09 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	80.3 W/kg ± 19.9 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Body TSL	condition	
SAR measured	100 mW input power	2.26 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	22.4 W/kg ± 19.5 % (k=2)

Body TSL parameters at 5750 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	48.3	5.94 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	46.2 ± 6 %	6.18 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL at 5750 MHz

SAR averaged over 1 cm ³ (1 g) of Body TSL	Condition	
SAR measured	100 mW input power	7.65 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	75.9 W/kg ± 19.9 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Body TSL	condition	
SAR measured	100 mW input power	2.13 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	21.1 W/kg ± 19.5 % (k=2)

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL at 5250 MHz

Impedance, transformed to feed point	49.8 Ω - 6.7 j Ω
Return Loss	- 23.5 dB

Antenna Parameters with Head TSL at 5600 MHz

Impedance, transformed to feed point	54.6 Ω - 2.4 j Ω
Return Loss	- 26.0 dB

Antenna Parameters with Head TSL at 5750 MHz

Impedance, transformed to feed point	55.6 Ω - 2.6 j Ω
Return Loss	- 24.6 dB

Antenna Parameters with Body TSL at 5250 MHz

Impedance, transformed to feed point	48.4 Ω - 5.2 j Ω
Return Loss	- 25.1 dB

Antenna Parameters with Body TSL at 5600 MHz

Impedance, transformed to feed point	55.4 Ω - 2.6 j Ω
Return Loss	- 25.0 dB

Antenna Parameters with Body TSL at 5750 MHz

Impedance, transformed to feed point	55.7 Ω - 3.1 j Ω
Return Loss	- 24.3 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.196 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	March 11, 2011

DASY5 Validation Report for Head TSL

Date: 14.12.2017

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole D5GHzV2; Type: D5GHzV2; Serial: D5GHzV2 - SN:1107

Communication System: UID 0 - CW; Frequency: 5250 MHz, Frequency: 5600 MHz, Frequency: 5750 MHz

Medium parameters used: $f = 5250$ MHz; $\sigma = 4.56$ S/m; $\epsilon_r = 35.7$; $\rho = 1000$ kg/m³,Medium parameters used: $f = 5600$ MHz; $\sigma = 4.91$ S/m; $\epsilon_r = 35.2$; $\rho = 1000$ kg/m³,Medium parameters used: $f = 5750$ MHz; $\sigma = 5.07$ S/m; $\epsilon_r = 35$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

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

DASY52 Configuration:

- Probe: EX3DV4 - SN3503; ConvF(5.58, 5.58, 5.58); Calibrated: 31.12.2016, ConvF(5.09, 5.09, 5.09); Calibrated: 31.12.2016, ConvF(5.02, 5.02, 5.02); Calibrated: 31.12.2016;
- 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=100mW, dist=10mm, f=5250 MHz/Zoom Scan,**dist=1.4mm (8x8x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 71.55 V/m; Power Drift = -0.09 dB

Peak SAR (extrapolated) = 30.5 W/kg

SAR(1 g) = 8.15 W/kg; SAR(10 g) = 2.34 W/kg

Maximum value of SAR (measured) = 19.1 W/kg

Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5600 MHz/Zoom Scan,**dist=1.4mm (8x8x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 71.65 V/m; Power Drift = -0.07 dB

Peak SAR (extrapolated) = 33.4 W/kg

SAR(1 g) = 8.43 W/kg; SAR(10 g) = 2.41 W/kg

Maximum value of SAR (measured) = 20.2 W/kg

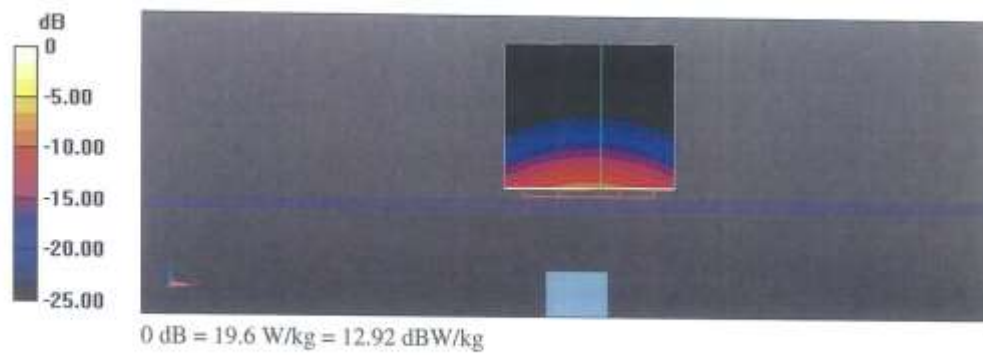
Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5750 MHz/Zoom Scan,**dist=1.4mm (8x8x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 69.75 V/m; Power Drift = -0.09 dB

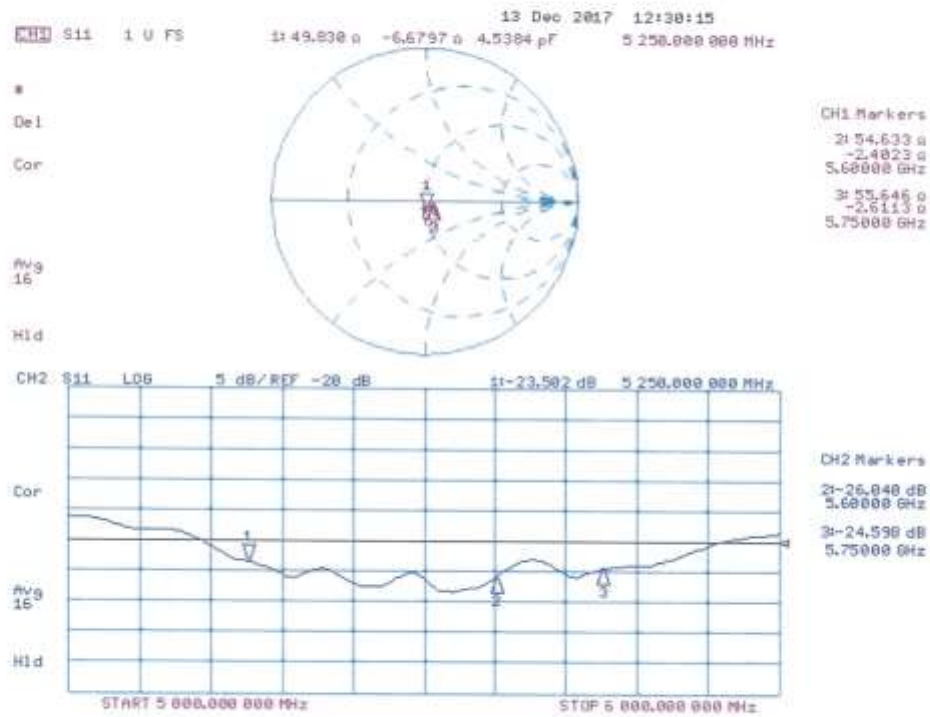
Peak SAR (extrapolated) = 32.8 W/kg

SAR(1 g) = 8.09 W/kg; SAR(10 g) = 2.3 W/kg

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



Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 13.12.2017

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole D5GHzV2; Type: D5GHzV2; Serial: D5GHzV2 - SN: 1107

Communication System: UID 0 - CW; Frequency: 5250 MHz, Frequency: 5600 MHz, Frequency: 5750 MHz

Medium parameters used: $f = 5250$ MHz; $\sigma = 5.51$ S/m; $\epsilon_r = 47.1$; $\rho = 1000$ kg/m³,Medium parameters used: $f = 5600$ MHz; $\sigma = 5.97$ S/m; $\epsilon_r = 46.5$; $\rho = 1000$ kg/m³,Medium parameters used: $f = 5750$ MHz; $\sigma = 6.18$ S/m; $\epsilon_r = 46.2$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

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

DASY52 Configuration:

- Probe: EX3DV4 - SN3503; ConvF(5.14, 5.14, 5.14); Calibrated: 31.12.2016, ConvF(4.57, 4.57, 4.57); Calibrated: 31.12.2016, ConvF(4.51, 4.51, 4.51); Calibrated: 31.12.2016;
- 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=100mW, dist=10mm, f=5250 MHz/Zoom Scan,**dist=1.4mm (8x8x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 66.06 V/m; Power Drift = -0.04 dB

Peak SAR (extrapolated) = 30.6 W/kg

SAR(1 g) = 7.79 W/kg; SAR(10 g) = 2.17 W/kg

Maximum value of SAR (measured) = 18.5 W/kg

Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5600 MHz/Zoom Scan,**dist=1.4mm (8x8x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 64.93 V/m; Power Drift = -0.07 dB

Peak SAR (extrapolated) = 34.6 W/kg

SAR(1 g) = 8.09 W/kg; SAR(10 g) = 2.26 W/kg

Maximum value of SAR (measured) = 19.9 W/kg

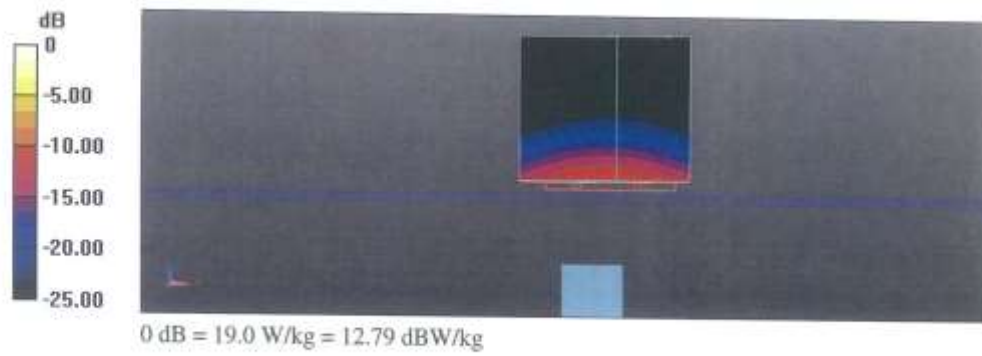
Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5750 MHz/Zoom Scan,**dist=1.4mm (8x8x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 62.90 V/m; Power Drift = -0.08 dB

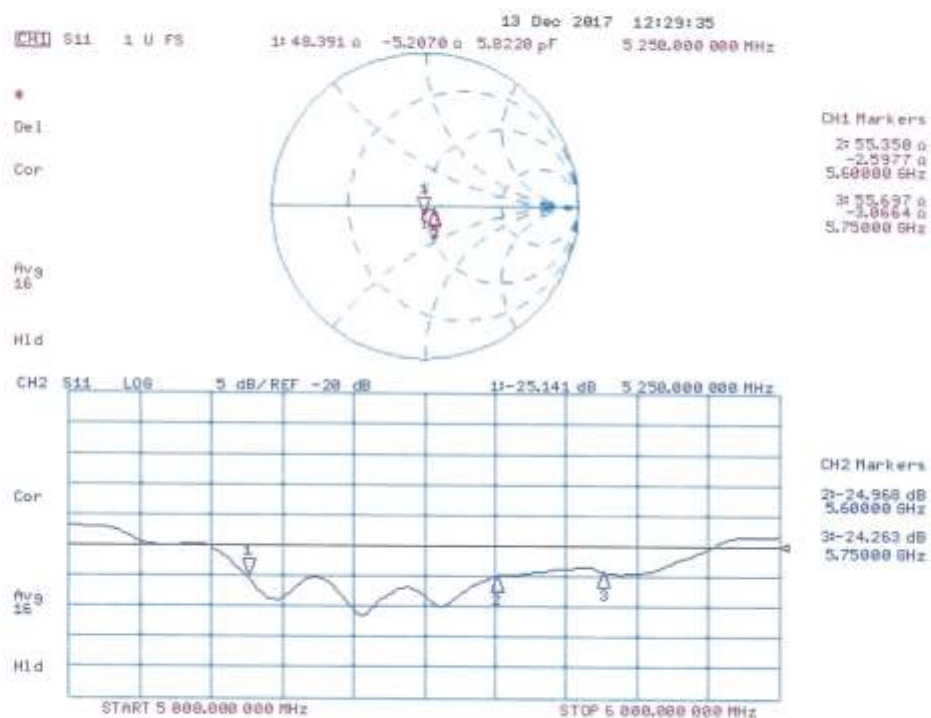
Peak SAR (extrapolated) = 34.0 W/kg

SAR(1 g) = 7.65 W/kg; SAR(10 g) = 2.13 W/kg

Maximum value of SAR (measured) = 19.0 W/kg



Impedance Measurement Plot for Body TSL



Schmid & Partner Engineering AG

s p e a g

Zeughausstrasse 43, 8004 Zurich, Switzerland
Phone +41 44 245 9700, Fax +41 44 245 9779
info@speag.com, http://www.speag.com

Certificate of conformity / First Article Inspection

Item	Triple Modular Flat Phantom V5.1
Type No	QD 000 P51 C
Series No	1100 and higher
Manufacturer / Origin	Untersee Composites Knebelstrasse 8, CH-8268 Mannenbach, Switzerland

Tests

The sub-units of item 1100 are identified with the designation 1100/1, 1100/2 and 1100/3. Tests were conducted on all 3 sub-units of this phantom.

Test	Requirement	Details	Units tested
Material thickness	Compliant with the standard requirements.	2 mm +/- 0.2 mm 30 points over the bottom area	all
Material parameters	Dielectric parameters for required frequencies	200 MHz – 6 GHz - Relative permittivity 3 - 5 Loss tangent < 0.05.	Material sample
Material resistivity	The material is compatible with the liquids defined in the standards if handled and cleaned according to the instructions.	DGBE based simulating liquids, Observe Technical Note for material compatibility.	Material Samples
Shape	Internal dimensions	Internal height: > 175 mm Bottom internal length: 280 mm Bottom internal width: 175 mm Nominal filling height: 155 mm Nominal volume: 9.2 l	Pre-series, design
Sagging	Depending on standard	No initial sagging (negative preshaped, change < 0.5 mm)	1100/2

Standards

- [1] IEEE 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
- [2] IEC 62209 – 1, "Specific Absorption Rate (SAR) in the frequency range of 300 MHz to 3 GHz – Measurement Procedure, Part 1: Hand-held mobile wireless communication devices", February 2005
- [3] IEC 62209 – 2, "Evaluation of Human Exposure to Radio Frequency Fields from Handheld and Body-Mounted Wireless Communication Devices in the Frequency Range of 30 MHz to 6 GHz: Human models, Instrumentation and Procedures, Part 2: Procedure to determine the Specific Absorption Rate (SAR) for ... including accessories and multiple transmitters", March 2010
- [4] KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Conformity

Based on the dimensions and sample tests above, we certify that this item is in compliance with the standards [1] to [4] for frequencies > 700 MHz, if operated according to the specific requirements.

Date 16.07.2015

Signature / Stamp

s p e a g

Schmid & Partner Engineering AG
Zeughausstrasse 43, 8004 Zurich, Switzerland
Phone +41 44 245 9700, Fax +41 44 245 9779
info@speag.com, http://www.speag.com

Attachment 5. – SAR Tissue Characterization

The brain and muscle mixtures consist of a viscous gel using hydrox-ethyl cellulose (HEC) gelling agent and saline solution (see Table 3.1). Preservation with a bactericide is added and visual inspection is made to make sure air bubbles are not trapped during the mixing process. The mixture is calibrated to obtain proper dielectric constant (permittivity) and conductivity of the desired tissue. The mixture characterizations used for the brain and muscle tissue simulating liquids are according to the data by C. Gabriel and G. Harts grove.

Ingredients (% by weight)	Frequency (MHz)									
	750		835		1 900		2 450 – 2 700		5 200 - 5 800	
Tissue Type	Head	Body	Head	Body	Head	Body	Head	Body	Head	Body
Water	41.1	51.7	40.45	53.06	54.9	70.17	71.88	73.2	65.52	78.66
Salt (NaCl)	1.4	0.9	1.45	0.94	0.18	0.39	0.16	0.1	0.0	0.0
Sugar	57.0	47.2	57.0	44.9	0.0	0	0.0	0.0	0.0	0.0
HEC	0.2	0	1.0	1.0	0.0	0	0.0	0.0	0.0	0.0
Bactericide	0.2	0.1	0.1	0.1	0.0	0	0.0	0.0	0.0	0.0
Triton X-100	0.0	0.0	0.0	0.0	0.0	0.0	19.97	0.0	17.24	10.67
DGBE	0.0	0.0	0.0	0.0	44.92	29.44	7.99	26.7	0.0	0.0
Diethylene glycol hexyl ether	-	-	-	-	-	-	-	-	-	-

Salt:	99 % Pure Sodium Chloride	Sugar:	98 % Pure Sucrose
Water:	De-ionized, 16M resistivity	HEC:	Hydroxyethyl Cellulose
DGBE:	99 % Di(ethylene glycol) butyl ether,[2-(2-butoxyethoxy) ethanol]		
Triton X-100(ultra-pure):	Polyethylene glycol mono[4-(1,1,3,3-tetramethylbutyl)phenyl] ether		

Composition of the Tissue Equivalent Matter

Attachment 6. – SAR SYSTEM VALIDATION

Per FCC KCB 865664 D02v01r02, SAR system validation status should be document to confirm measurement accuracy. The SAR systems (including SAR probes, system components and software versions) used for this device were validated against its performance specifications prior to the SAR measurements. Reference dipoles were used with the required tissue- equivalent media for system validation, according to the procedures outlined in IEEE 1528-2013 and FCC KDB 865664 D01v01r04. Since SAR probe calibrations are frequency dependent, each probe calibration point was validated at a frequency within the valid frequency range of the probe calibration point, using the system that normally operates with the probe for routine SAR measurements and according to the required tissue-equivalent media.

A tabulated summary of the system validation status including the validation date(s), measurement frequencies, SAR probes and tissue dielectric parameters has been included.

SAR System No.	Probe	Probe Type	Probe Calibration Point		Dipole	Date	Dielectric Parameters		CW Validation			Modulation Validation		
							Measured Permittivity	Measured Conductivity	Sensitivity	Probe Linearity	Probe Isotropy	MOD. Type	Duty Factor	PAR
3	3797	EX3DV4	Head	750	1014	2017-12-04	42.1	0.89	PASS	PASS	PASS	N/A	N/A	N/A
3	3797	EX3DV4	Body	750	1014	2017-12-04	55.9	0.98	PASS	PASS	PASS	N/A	N/A	N/A
3	3797	EX3DV4	Head	835	441	2017-12-04	41.6	0.90	PASS	PASS	PASS	N/A	N/A	N/A
3	3797	EX3DV4	Body	835	441	2017-12-04	55.1	0.99	PASS	PASS	PASS	N/A	N/A	N/A
8	3967	EX3DV4	Head	1900	5d061	2018-04-04	40.1	1.42	PASS	PASS	PASS	N/A	N/A	N/A
8	3967	EX3DV4	Head	1900	5d061	2018-04-04	40.1	1.42	PASS	PASS	PASS	GMSK	PASS	N/A
8	3967	EX3DV4	Body	1900	5d061	2018-04-05	53.3	1.53	PASS	PASS	PASS	N/A	N/A	N/A
8	3967	EX3DV4	Body	1900	5d061	2018-04-05	53.3	1.53	PASS	PASS	PASS	GMSK	PASS	N/A
9	3968	EX3DV4	Head	2450	965	2018-02-27	39.4	1.81	PASS	PASS	PASS	OFDM	N/A	PASS
9	3968	EX3DV4	Body	2450	965	2018-02-27	52.6	1.96	PASS	PASS	PASS	OFDM	N/A	PASS
12	7370	EX3DV4	Head	2600	1106	2017-12-27	39.1	1.94	PASS	PASS	PASS	TDD	PASS	NA
12	7370	EX3DV4	Body	2600	1106	2017-12-29	52.3	2.17	PASS	PASS	PASS	TDD	PASS	NA
8	3967	EX3DV4	Head	5250	1107	2018-02-08	35.7	4.70	PASS	PASS	PASS	OFDM	N/A	PASS
3	3797	EX3DV4	Body	5250	1107	2017-12-28	48.8	5.35	PASS	PASS	PASS	OFDM	N/A	PASS
8	3967	EX3DV4	Head	5600	1107	2018-02-08	35.3	5.05	PASS	PASS	PASS	OFDM	N/A	PASS
3	3797	EX3DV4	Body	5600	1107	2017-12-28	48.3	5.79	PASS	PASS	PASS	OFDM	N/A	PASS
8	3967	EX3DV4	Head	5750	1107	2018-02-08	35.6	5.24	PASS	PASS	PASS	OFDM	N/A	PASS
3	3797	EX3DV4	Body	5750	1107	2017-12-28	48.4	5.96	PASS	PASS	PASS	OFDM	N/A	PASS

SAR System Validation Summary 1g

SAR System No.	Probe	Probe Type	Probe Calibration Point		Dipole	Date	Dielectric Parameters		CW Validation			Modulation Validation		
							Measured Permittivity	Measured Conductivity	Sensitivity	Probe Linearity	Probe Isotropy	MOD. Type	Duty Factor	PAR
3	3797	EX3DV4	Body	5250	1107	2017-12-28	48.8	5.35	PASS	PASS	PASS	OFDM	N/A	PASS
3	3797	EX3DV4	Body	5600	1107	2017-12-28	48.3	5.79	PASS	PASS	PASS	OFDM	N/A	PASS
3	3797	EX3DV4	Body	5750	1107	2017-12-28	48.4	5.96	PASS	PASS	PASS	OFDM	N/A	PASS

SAR System Validation Summary – Extremity SAR Considerations

Note;

All measurement were performed using probes calibrated for CW signal only. Modulations in the table above represent test configurations for which the measurement system has been validated per FCC KDB Publication 865664 D01v01r04. SAR system were validated for modulated signals with a periodic duty cycle, such as GMSK, or with a high peak to average ratio (>5 dB), such as OFDM according to KDB 865664 D01v01r04.

Attachment 7. – The Verification of Power reduction

The Verification of WLAN Held to ear power reduction

This device uses a power reduction mechanism for SAR compliance for WLAN operations during voice or VoIP held to ear scenarios.

When a user makes or receives a WLAN voice or WLAN VOIP call, the audio of the call is sent through the earpiece at the top of the device so that the device can be used next to the ear. The IR Sensor located at the top of the device is used to detect when the device is in proximity of the user's head in order to optimize the user's device experience, for example, to dim or turn off the screen to save battery life. For this model, an auxiliary function of the IR sensor is for the purpose of RF Safety (i.e. reducing output power for Head SAR compliance)

1. Procedures for determining proximity sensor triggering distances

A reduced power level of the device is called when the IR sensor is activated while in a held-to-ear voice or VOIP call with the active audio receiver. Therefore, when the IR proximity sensor is active in a held-to-ear user scenario, the output power level is reduced. The maximum allowed output powers in all conditions are included in the maximum power document

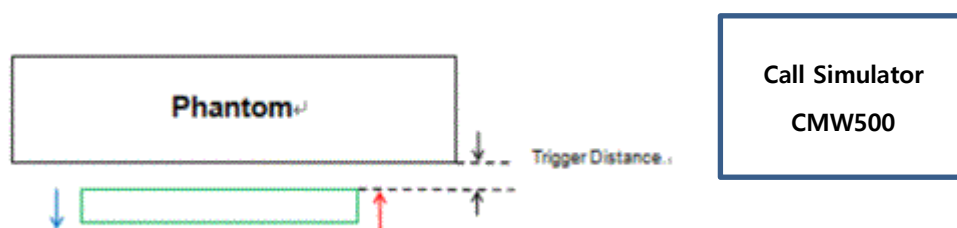
Detailed descriptions of the power reduction mechanism are included in the WLAN operational description document

We verified the power reduction function with the following procedures.

The DUT was moved toward the phantom in accordance with the steps outlined in KDB 616217 D04 §6.2 to determine the trigger distance for enabling power reduction. The DUT was moved away from the phantom to determine the trigger distance for resuming full power

- 1) Make a Voice call (VoIP) through a pre-installed VoIP application to call simulator
- 2) Per KDB616217 D04 §6.2, Measure the power while maintaining the voice call..

. For detailed measurement conducted power results, please refer to the Section .9



IR Sensor Trigger Distance Assessment KDB 616217 D04 §6.2, front side

LEGEND

- Direction of DUT travel for determination of power reduction triggering point
- Direction of DUT travel for determination of full power resumption triggering point

Tissue simulating liquid	Trigger distance – Front (mm)	
	Moving toward phantom	Moving away phantom
2450 Head	80	89
5000 Head	80	89

3) The entire Front surface of the DUT is positioned below a flat phantom filled with the required tissue-equivalent medium, and positioned at least 20 mm further than the distance that triggers power reduction
We positioned DUT 61mm away from the phantom for this Test
(101mm= 80mm(triggering distance) + 21mm)

The Front surface of DUT is moved toward the phantom in 3 mm steps until the sensor triggers.

Front side – EUT Moving toward (trigger) to the Phantom

Distance	Distance to DUT Output power (dBm)							
	101	98	95	92	89	86	83	80
2.4GHz 802.11b	17.23	17.21	17.21	17.24	17.26	17.40	17.46	13.42
2.4GHz 802.11g	15.55	15.49	15.52	15.56	15.41	15.61	15.48	13.86
2.4GHz 802.11n	14.36	14.42	14.33	14.41	14.30	14.42	14.44	13.55
5 GHz 802.11a [BW 20]	14.73	14.81	14.77	14.74	14.76	14.77	14.85	10.51
5 GHz 802.11n [BW 20]	14.40	14.32	14.47	14.41	14.49	14.41	14.4	10.67
5 GHz 802.11n [BW 40]	14.43	14.41	14.47	14.35	14.46	14.5	14.47	10.44
5 GHz 802.11ac [BW 20]	14.87	15.00	14.93	14.86	14.80	14.93	14.97	10.57
5 GHz 802.11ac [BW 40]	14.60	14.54	14.60	14.50	14.65	14.58	14.6	10.44
5 GHz 802.11ac [BW 80]	11.97	11.90	11.92	12.03	11.95	11.9	11.88	10.11

4) The Front surface of DUT is then moved back (further away) from the phantom by at least 5 mm or until maximum output power is returned to the normal maximum level.

The Front surface of DUT is again moved toward the phantom, but in 1 mm steps, until it is at least 5 mm past the triggering point or touching the phantom.

Front side – EUT Moving toward (trigger) to the Phantom

Distance	Distance to DUT Output power (dBm)										
	85	84	83	82	81	80	79	78	77	76	75
2.4GHz 802.11b	17.33	17.23	17.27	17.34	17.44	13.54	13.47	13.63	13.53	13.63	13.63
2.4GHz 802.11g	15.55	15.52	15.51	15.47	15.56	13.78	13.81	13.77	13.92	13.80	13.85
2.4GHz 802.11n	14.39	14.39	14.34	14.50	14.39	13.51	13.47	13.59	13.35	13.53	13.61
5 GHz 802.11a [BW 20]	14.76	14.80	14.78	14.71	14.71	10.50	10.49	10.49	10.51	10.36	10.44
5 GHz 802.11n [BW 20]	14.41	14.49	14.45	14.36	14.43	10.67	10.66	10.68	10.61	10.62	10.62
5 GHz 802.11n [BW 40]	14.43	14.46	14.41	14.42	14.41	10.52	10.63	10.62	10.60	10.58	10.49
5 GHz 802.11ac [BW 20]	14.85	14.92	14.95	14.95	14.91	10.56	10.67	10.61	10.56	10.73	10.66
5 GHz 802.11ac [BW 40]	14.63	14.51	14.64	14.52	14.59	10.43	10.51	10.46	10.45	10.38	10.50
5 GHz 802.11ac [BW 80]	11.88	12.03	11.85	11.92	11.91	10.10	10.01	10.05	10.19	10.14	10.17

5) If the DUT is not touching the phantom, it is moved in 3 mm steps until it touches the phantom to confirm that the sensor remains triggered and the maximum power stays reduced

Front side – EUT Moving toward (trigger) to the Phantom

Distance	Distance to DUT Output power (dBm)														
	80	77	74	71	68	65	62	59	56	53	50	47	44	41	38
2.4GHz 802.11b	13.55	13.53	13.52	13.55	13.46	13.53	13.54	13.54	13.67	13.58	13.65	13.65	13.61	13.59	13.56
2.4GHz 802.11g	13.87	13.81	13.89	13.81	13.78	13.77	13.86	13.96	13.88	13.8	13.89	13.93	13.97	13.89	13.8
2.4GHz 802.11n	13.49	13.44	13.42	13.44	13.56	13.51	13.43	13.54	13.61	13.56	13.51	13.6	13.59	13.56	13.51
5 GHz 802.11a [BW 20]	10.48	10.46	10.36	10.43	10.50	10.52	10.54	10.51	10.5	10.47	10.55	10.51	10.42	10.6	10.43
5 GHz 802.11n [BW 20]	10.68	10.67	10.70	10.81	10.67	10.83	10.64	10.73	10.67	10.64	10.72	10.65	10.81	10.71	10.65
5 GHz 802.11n [BW 40]	10.49	10.49	10.56	10.51	10.61	10.6	10.58	10.49	10.49	10.6	10.6	10.54	10.61	10.52	10.62
5 GHz 802.11ac [BW 20]	10.63	10.56	10.60	10.60	10.66	10.59	10.63	10.76	10.56	10.65	10.71	10.72	10.58	10.73	10.72
5 GHz 802.11ac [BW 40]	10.42	10.32	10.46	10.30	10.51	10.38	10.54	10.42	10.52	10.55	10.41	10.58	10.43	10.46	10.58
5 GHz 802.11ac [BW 80]	10.09	9.95	10.12	10.10	9.95	10.18	10.04	10.16	10.08	10.11	10.14	10.22	10.05	10.23	10.12

Distance	Distance to DUT Output power (dBm)												
	36	33	30	27	24	21	18	15	12	9	6	3	0
2.4GHz 802.11b	13.53	13.47	13.47	13.55	13.55	13.56	13.58	13.52	13.68	13.6	13.58	13.66	13.64
2.4GHz 802.11g	13.82	13.96	13.81	13.76	13.76	13.93	13.93	13.94	13.82	13.86	13.87	13.79	13.86
2.4GHz 802.11n	13.48	13.42	13.39	13.42	13.40	13.55	13.58	13.58	13.42	13.61	13.52	13.43	13.54
5 GHz 802.11a [BW 20]	10.42	10.53	10.50	10.33	10.43	10.56	10.54	10.55	10.59	10.48	10.45	10.53	10.52
5 GHz 802.11n [BW 20]	10.64	10.74	10.69	10.59	10.71	10.64	10.79	10.74	10.67	10.66	10.7	10.81	10.68
5 GHz 802.11n [BW 40]	10.47	10.55	10.59	10.52	10.55	10.52	10.67	10.56	10.57	10.52	10.56	10.61	10.47
5 GHz 802.11ac [BW 20]	10.65	10.66	10.74	10.53	10.54	10.72	10.6	10.67	10.57	10.74	10.67	10.76	10.64
5 GHz 802.11ac [BW 40]	10.40	10.31	10.50	10.53	10.42	10.47	10.38	10.58	10.58	10.56	10.41	10.38	10.46
5 GHz 802.11ac [BW 80]	10.11	10.06	10.07	10.10	9.97	10.22	10.18	10.08	10.08	10.04	10.21	10.21	10.09

6) The process is then reversed by moving the DUT away from the phantom according to steps KDB616217 D04 §6.3, d) to g), to determine triggering release, until it is at least 10 mm beyond the point that triggers the return of normal maximum power

The Front surface is moved away the phantom in 3 mm steps to determine triggering release

Front side – EUT Moving away (Release) from the Phantom

Distance	Distance to DUT Output power (dBm)							
	80	83	86	89	92	95	98	101
2.4GHz 802.11b	13.57	13.5	13.62	13.58	17.57	17.38	17.51	17.44
2.4GHz 802.11g	13.95	13.8	13.97	13.79	15.57	15.53	15.6	15.51
2.4GHz 802.11n	13.45	13.44	13.58	13.53	14.35	14.5	14.48	14.47
5 GHz 802.11a [BW 20]	10.61	10.45	10.56	10.6	14.81	14.79	14.68	14.75
5 GHz 802.11n [BW 20]	10.81	10.73	10.65	10.71	14.41	14.56	14.39	14.42
5 GHz 802.11n [BW 40]	10.6	10.55	10.5	10.61	14.53	14.48	14.44	14.58
5 GHz 802.11ac [BW 20]	10.56	10.56	10.62	10.6	14.94	14.91	14.94	14.87
5 GHz 802.11ac [BW 40]	10.51	10.44	10.5	10.38	14.6	14.56	14.54	14.56
5 GHz 802.11ac [BW 80]	10.2	10.08	10.08	10.05	11.99	11.96	11.94	11.88

7)The Front surface is then moved toward the phantom by at least 5 mm or until reduced output power is returned to the Maximum output power.

Front side – EUT Moving away (Release) from the Phantom

Distance	Distance to DUT Output power (dBm)									
	85	86	87	88	89	90	91	92	93	94
2.4GHz 802.11b	13.55	13.54	13.48	13.47	13.55	17.34	17.51	17.31	17.36	17.42
2.4GHz 802.11g	13.77	13.89	13.83	13.80	13.77	15.51	15.43	15.57	15.49	15.53
2.4GHz 802.11n	13.51	13.57	13.38	13.50	13.47	14.34	14.43	14.34	14.25	14.31
5 GHz 802.11a [BW 20]	10.47	10.32	10.55	10.45	10.36	14.73	14.62	14.72	14.75	14.58
5 GHz 802.11n [BW 20]	10.67	10.79	10.71	10.71	10.65	14.45	14.46	14.49	14.42	14.46
5 GHz 802.11n [BW 40]	10.52	10.48	10.52	10.41	10.41	14.46	14.48	14.37	14.43	14.38
5 GHz 802.11ac [BW 20]	10.63	10.68	10.61	10.57	10.53	14.87	14.76	14.93	14.85	14.85
5 GHz 802.11ac [BW 40]	10.44	10.46	10.36	10.42	10.46	14.57	14.61	14.49	14.61	14.59
5 GHz 802.11ac [BW 80]	10.05	10.07	10.01	10.18	9.99	11.89	11.89	11.80	11.83	11.95

8) If the DUT is touching the phantom, it is moved in 3 mm steps until it move away from phantom to confirm that the sensor remains triggered and the maximum power is returned.

Front side – EUT Moving away (Release) from the Phantom

Distance	Distance to DUT Output power (dBm)														
	0	3	6	9	12	15	18	21	24	27	30	33	36	39	42
2.4GHz 802.11b	13.51	13.50	13.50	13.54	13.55	13.61	13.62	13.69	13.5	13.63	13.69	13.49	13.67	13.69	13.55
2.4GHz 802.11g	13.85	13.85	13.84	13.89	13.87	13.96	13.78	13.8	13.86	13.89	13.84	13.96	13.8	13.85	13.86
2.4GHz 802.11n	13.50	13.56	13.47	13.42	13.44	13.59	13.57	13.53	13.55	13.57	13.58	13.57	13.44	13.45	13.55
5 GHz 802.11a [BW 20]	10.46	10.41	10.47	10.52	10.53	10.5	10.41	10.5	10.45	10.52	10.52	10.59	10.42	10.54	10.57
5 GHz 802.11n [BW 20]	10.71	10.63	10.67	10.65	10.71	10.73	10.71	10.78	10.65	10.81	10.75	10.71	10.7	10.63	10.69
5 GHz 802.11n [BW 40]	10.50	10.44	10.58	10.48	10.52	10.62	10.65	10.62	10.49	10.6	10.49	10.55	10.67	10.5	10.51
5 GHz 802.11ac [BW 20]	10.59	10.67	10.60	10.55	10.60	10.64	10.71	10.64	10.61	10.75	10.6	10.56	10.56	10.66	10.65
5 GHz 802.11ac [BW 40]	10.41	10.43	10.53	10.40	10.42	10.45	10.42	10.44	10.48	10.4	10.43	10.51	10.56	10.46	10.51
5 GHz 802.11ac [BW 80]	10.08	10.12	9.99	10.06	9.97	10.18	10.23	10.07	10.03	10.09	10.19	10.04	10.19	10.21	10.09

Distance	Distance to DUT Output power (dBm)															
	45	48	51	54	57	60	63	66	69	72	75	78	81	84	87	90
2.4GHz 802.11b	13.54	13.55	13.53	13.64	13.59	13.64	13.63	13.5	13.64	13.67	13.66	13.58	13.63	13.5	13.64	18.22
2.4GHz 802.11g	13.78	13.75	13.82	13.83	13.81	13.83	13.97	13.8	13.88	13.78	13.87	13.89	13.97	13.8	13.83	15.55
2.4GHz 802.11n	13.43	13.39	13.45	13.58	13.48	13.5	13.41	13.43	13.48	13.51	13.42	13.57	13.41	13.43	13.58	14.51
5 GHz 802.11a [BW 20]	10.45	10.40	10.43	10.33	10.44	10.45	10.42	10.57	10.43	10.41	10.51	10.52	10.42	10.57	10.33	14.76
5 GHz 802.11n [BW 20]	10.65	10.74	10.68	10.58	10.71	10.64	10.77	10.79	10.8	10.7	10.78	10.76	10.77	10.79	10.58	14.41
5 GHz 802.11n [BW 40]	10.54	10.41	10.58	10.65	10.50	10.47	10.52	10.61	10.57	10.6	10.54	10.52	10.52	10.61	10.65	14.56
5 GHz 802.11ac [BW 20]	10.58	10.70	10.65	10.62	10.73	10.61	10.76	10.7	10.57	10.58	10.58	10.62	10.76	10.7	10.62	14.98
5 GHz 802.11ac [BW 40]	10.39	10.56	10.50	10.37	10.31	10.58	10.43	10.48	10.49	10.47	10.47	10.38	10.43	10.48	10.37	14.58
5 GHz 802.11ac [BW 80]	10.06	10.01	10.15	10.03	10.02	10.03	10.23	10.14	10.03	10.03	10.21	10.14	10.23	10.14	10.03	12.08

9)The measured output power within ± 5 mm of the triggering points, or until the DUT is touching the phantom, for movements to and from the phantom should be tabulated in the SAR report.

Front side – EUT Moving toward (trigger) to the Phantom

Distance	Distance to DUT Output power (dBm)										
	85	84	83	82	81	80	79	78	77	76	75
2.4GHz 802.11b	17.33	17.23	17.27	17.34	17.44	13.54	13.47	13.63	13.53	13.63	13.63
2.4GHz 802.11g	15.55	15.52	15.51	15.47	15.56	13.78	13.81	13.77	13.92	13.80	13.85
2.4GHz 802.11n	14.39	14.39	14.34	14.50	14.39	13.51	13.47	13.59	13.35	13.53	13.61
5 GHz 802.11a [BW 20]	14.76	14.80	14.78	14.71	14.71	10.50	10.49	10.49	10.51	10.36	10.44
5 GHz 802.11n [BW 20]	14.41	14.49	14.45	14.36	14.43	10.67	10.66	10.68	10.61	10.62	10.62
5 GHz 802.11n [BW 40]	14.43	14.46	14.41	14.42	14.41	10.52	10.63	10.62	10.60	10.58	10.49
5 GHz 802.11ac [BW 20]	14.85	14.92	14.95	14.95	14.91	10.56	10.67	10.61	10.56	10.73	10.66
5 GHz 802.11ac [BW 40]	14.63	14.51	14.64	14.52	14.59	10.43	10.51	10.46	10.45	10.38	10.50
5 GHz 802.11ac [BW 80]	11.88	12.03	11.85	11.92	11.91	10.10	10.01	10.05	10.19	10.14	10.17

Front side – EUT Moving away (Release) from the Phantom

Distance	Distance to DUT Output power (dBm)											
	84	85	86	87	88	89	90	91	92	93	94	95
2.4GHz 802.11b	13.59	13.65	13.43	13.55	13.60	13.59	17.29	17.40	17.32	17.21	17.32	17.35
2.4GHz 802.11g	13.84	13.84	13.87	13.79	13.90	13.87	15.56	15.55	15.42	15.55	15.63	15.57
2.4GHz 802.11n	13.46	13.59	13.35	13.41	13.50	13.51	14.34	14.28	14.32	14.37	14.39	14.37
5 GHz 802.11a [BW 20]	10.49	10.44	10.51	10.47	10.45	10.51	14.72	14.78	14.79	14.69	14.72	14.78
5 GHz 802.11n [BW 20]	10.73	10.74	10.63	10.72	10.68	10.73	14.42	14.46	14.46	14.48	14.42	14.51
5 GHz 802.11n [BW 40]	10.51	10.65	10.45	10.51	10.55	10.57	14.38	14.32	14.45	14.44	14.49	14.43
5 GHz 802.11ac [BW 20]	10.61	10.47	10.52	10.70	10.65	10.66	14.86	14.82	14.95	14.87	15.01	14.92
5 GHz 802.11ac [BW 40]	10.46	10.31	10.49	10.42	10.42	10.48	14.65	14.56	14.56	14.67	14.55	14.57
5 GHz 802.11ac [BW 80]	10.13	9.96	10.06	10.06	10.03	10.13	11.98	11.87	12.02	11.87	12.01	12

Worst case distance for SAR is not consider for body exposure condition. Because of Power reduction is only apply voice or VOIP for WLAN. Based on the most conservative measured triggering distance of 40mm,

2 . Procedures for determining antenna and proximity sensor coverage

KDB 616217 D04 §6.3

As there is no spatial offset between the antenna and the IR sensor element, IR sensor coverage did not need to be assessed

3 Procedures for determining tablet tilt angle influences to proximity sensor triggering

KDB 616217 D04 §6.4

The DUT was positioned directly below the flat phantom at the minimum measured trigger distance with Top side parallel to the base of the flat phantom for each wireless technologies.

The EUT was rotated about Top side for angles up to $\pm 45^\circ$. If the output power increased during the rotation the DUT was moved 1mm toward the phantom and the rotation repeated. This procedure was repeated until the power remained reduced for all angles up to $\pm 45^\circ$.

The IR sensor is activated while in a held-to-ear voice or VOIP call with the active audio receiver.

Therefore tilt angle 15 degree position of Head exposure was additional verified.

Therefore, the IR proximity sensor has no influence of the tilt angle.

4 . Resulting test positions for SAR measurements

Wireless Technologies	DUT Position	§ 6.2 Triggering distance	§ 6.3 Coverage	§ 6.4 Tilt Angle	Worst case Distance fore SAR
WLAN	Front	80mm	N/A	80mm	79mm

Conclusion:

According to FCC KDB 616217 sec.6, we verified the operating distance and Tilt angle of the IR sensor for WLAN transmitter with VoIP of this product and confirmed that the IR sensor operates correctly in the VoIP (Held to ear) conditions. This IR sensor impacts only WI-FI output Power and has no impact on any other transmitter in the device.