Sensor on								
LTE Band 7			Actual output Power (dBm)			Tune up		
Band -width	RB No. / RB offset	Frequency	Modulation			Modulation		
			QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
10 MHz	1RB_49	2565MHz	15.91	16.10	16.04	**16.5**	**16.5**	**16.5**
		2535MHz	15.68	16.04	15.86	**16.5**	**16.5**	**16.5**
		2505MHz	15.63	15.86	15.82	**16.5**	**16.5**	**16.5**
	1RB_24	2565MHz	15.95	16.21	16.09	**16.5**	**16.5**	**16.5**
		2535MHz	15.81	16.10	16.03	**16.5**	**16.5**	**16.5**
		2505MHz	15.62	15.98	15.88	**16.5**	**16.5**	**16.5**
	1RB_0	2565MHz	15.82	15.99	15.96	**16.5**	**16.5**	**16.5**
		2535MHz	15.64	15.91	15.77	**16.5**	**16.5**	**16.5**
		2505MHz	15.50	15.74	15.75	**16.5**	**16.5**	**16.5**
	25RB_25	2565MHz	15.99	15.98	16.04	**16.5**	**16.5**	**16.5**
		2535MHz	15.87	15.84	15.90	**16.5**	**16.5**	**16.5**
		2505MHz	15.69	15.66	15.75	**16.5**	**16.5**	**16.5**
	25RB_12	2565MHz	16.02	15.99	16.04	**16.5**	**16.5**	**16.5**
		2535MHz	15.88	15.88	15.90	**16.5**	**16.5**	**16.5**
		2505MHz	15.73	15.72	15.74	**16.5**	**16.5**	**16.5**
	25RB_0	2565MHz	16.01	15.98	16.02	**16.5**	**16.5**	**16.5**
		2535MHz	15.85	15.87	15.87	**16.5**	**16.5**	**16.5**
		2505MHz	15.72	15.67	15.75	**16.5**	**16.5**	**16.5**
	50RB_0	2565MHz	16.03	15.96	16.03	**16.5**	**16.5**	**16.5**
		2535MHz	15.92	15.85	15.90	**16.5**	**16.5**	**16.5**
		2505MHz	15.77	15.68	15.73	**16.5**	**16.5**	**16.5**

Sensor on								
LTE Band 7			Actual output Power (dBm)			Tune up		
Band -width	RB No. / RB offset	Frequency	Modulation			Modulation		
			QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
15 MHz	1RB_74	2562.5MHz	15.91	16.20	16.13	16.5	16.5	16.5
		2535MHz	15.75	16.03	16.00	16.5	16.5	16.5
		2507.5MHz	15.66	15.97	15.90	16.5	16.5	16.5
	1RB_37	2562.5MHz	15.91	16.12	16.16	16.5	16.5	16.5
		2535MHz	15.75	16.03	16.04	16.5	16.5	16.5
		2507.5MHz	15.63	15.80	15.77	16.5	16.5	16.5
	1RB_0	2562.5MHz	15.76	16.03	16.01	16.5	16.5	16.5
		2535MHz	15.65	15.91	15.77	16.5	16.5	16.5
		2507.5MHz	15.50	15.64	15.58	16.5	16.5	16.5
	36RB_38	2562.5MHz	16.04	15.98	16.03	16.5	16.5	16.5
		2535MHz	15.84	15.81	15.84	16.5	16.5	16.5
		2507.5MHz	15.72	15.69	15.74	16.5	16.5	16.5
	36RB_19	2562.5MHz	16.02	15.99	16.03	16.5	16.5	16.5
		2535MHz	15.85	15.81	15.88	16.5	16.5	16.5
		2507.5MHz	15.73	15.68	15.77	16.5	16.5	16.5
	36RB_0	2562.5MHz	15.92	15.90	15.93	16.5	16.5	16.5
		2535MHz	15.81	15.76	15.83	16.5	16.5	16.5
		2507.5MHz	15.69	15.67	15.68	16.5	16.5	16.5
	75RB_0	2562.5MHz	16.04	15.93	15.98	16.5	16.5	16.5
		2535MHz	15.86	15.82	15.79	16.5	16.5	16.5
		2507.5MHz	15.75	15.74	15.75	16.5	16.5	16.5

Sensor on								
LTE Band 7			Actual output Power (dBm)			Tune up		
Band -width	RB No. / RB offset	Frequency	Modulation			Modulation		
			QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
20 MHz	1RB_99	2560MHz	15.85	16.13	16.01	**16.5**	**16.5**	**16.5**
		2535MHz	15.76	15.99	15.99	**16.5**	**16.5**	**16.5**
		2510MHz	15.61	15.99	15.92	**16.5**	**16.5**	**16.5**
	1RB_50	2560MHz	**15.93**	16.21	16.05	**16.5**	**16.5**	**16.5**
		2535MHz	15.78	16.06	16.12	**16.5**	**16.5**	**16.5**
		2510MHz	15.70	15.93	15.94	**16.5**	**16.5**	**16.5**
	1RB_0	2560MHz	15.65	15.94	15.75	**16.5**	**16.5**	**16.5**
		2535MHz	15.58	15.81	15.80	**16.5**	**16.5**	**16.5**
		2510MHz	15.45	15.68	15.68	**16.5**	**16.5**	**16.5**
	50RB_50	2560MHz	15.95	15.92	15.98	**16.5**	**16.5**	**16.5**
		2535MHz	15.76	15.73	15.79	**16.5**	**16.5**	**16.5**
		2510MHz	15.79	15.82	15.79	**16.5**	**16.5**	**16.5**
	50RB_25	2560MHz	**16.02**	15.98	16.04	**16.5**	**16.5**	**16.5**
		2535MHz	16.02	15.85	15.87	**16.5**	**16.5**	**16.5**
		2510MHz	15.77	15.76	15.80	**16.5**	**16.5**	**16.5**
	50RB_0	2560MHz	15.92	15.88	15.96	**16.5**	**16.5**	**16.5**
		2535MHz	15.76	15.73	15.79	**16.5**	**16.5**	**16.5**
		2510MHz	15.77	15.80	15.78	**16.5**	**16.5**	**16.5**
	100RB_0	2560MHz	15.93	15.92	15.97	**16.5**	**16.5**	**16.5**
		2535MHz	15.74	15.73	15.77	**16.5**	**16.5**	**16.5**
		2510MHz	15.74	15.77	15.82	**16.5**	**16.5**	**16.5**

Full Power								
LTE Band 38			Actual output Power (dBm)			Tune up		
Band -width	RB No. / RB offset	Frequency	Modulation			Modulation		
			QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
5 MHz	1RB_24	2617.5 MHz	24.43	23.52	22.26	25.5	24.5	23.5
		2595MHz	24.75	23.61	22.35	25.5	24.5	23.5
		2572.5MHz	24.75	23.61	22.30	25.5	24.5	23.5
	1RB_12	2617.5 MHz	24.48	23.67	22.42	25.5	24.5	23.5
		2595MHz	24.90	23.74	22.45	25.5	24.5	23.5
		2572.5MHz	24.87	23.68	22.40	25.5	24.5	23.5
	1RB_0	2617.5 MHz	24.52	23.54	22.31	25.5	24.5	23.5
		2595MHz	24.76	23.64	22.37	25.5	24.5	23.5
		2572.5MHz	24.76	23.58	22.32	25.5	24.5	23.5
	12RB_13	2617.5 MHz	23.92	22.67	21.71	24.5	23.5	22.5
		2595MHz	23.95	22.81	21.76	24.5	23.5	22.5
		2572.5MHz	23.94	22.73	21.71	24.5	23.5	22.5
	12RB_6	2617.5 MHz	24.02	22.73	21.76	24.5	23.5	22.5
		2595MHz	24.00	22.86	21.81	24.5	23.5	22.5
		2572.5MHz	24.00	22.81	21.78	24.5	23.5	22.5
	12RB_0	2617.5 MHz	23.94	22.68	21.66	24.5	23.5	22.5
		2595MHz	23.98	22.86	21.80	24.5	23.5	22.5
		2572.5MHz	23.96	22.75	21.72	24.5	23.5	22.5
	25RB_0	2617.5 MHz	23.87	22.66	21.61	24.5	23.5	22.5
		2595MHz	23.86	22.78	21.75	24.5	23.5	22.5
		2572.5MHz	23.82	22.70	21.65	24.5	23.5	22.5

Full Power								
LTE Band 38			Actual output Power (dBm)			Tune up		
Band -width	RB No. / RB offset	Frequency	Modulation			Modulation		
			QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
10 MHz	1RB_49	2615MHz	24.46	23.63	22.38	**25.5**	**24.5**	**23.5**
		2595MHz	24.85	23.70	22.40	**25.5**	**24.5**	**23.5**
		2575MHz	24.85	23.71	22.50	**25.5**	**24.5**	**23.5**
	1RB_24	2615MHz	24.54	23.73	22.54	**25.5**	**24.5**	**23.5**
		2595MHz	24.97	23.83	22.56	**25.5**	**24.5**	**23.5**
		2575MHz	24.94	23.80	22.54	**25.5**	**24.5**	**23.5**
	1RB_0	2615MHz	24.74	23.62	22.40	**25.5**	**24.5**	**23.5**
		2595MHz	24.85	23.74	22.50	**25.5**	**24.5**	**23.5**
		2575MHz	24.84	23.69	22.41	**25.5**	**24.5**	**23.5**
	25RB_25	2615MHz	23.96	22.78	21.70	**24.5**	**23.5**	**22.5**
		2595MHz	23.95	22.83	21.79	**24.5**	**23.5**	**22.5**
		2575MHz	23.89	22.73	21.73	**24.5**	**23.5**	**22.5**
	25RB_12	2615MHz	23.98	22.75	21.69	**24.5**	**23.5**	**22.5**
		2595MHz	23.94	22.82	21.81	**24.5**	**23.5**	**22.5**
		2575MHz	23.92	22.78	21.77	**24.5**	**23.5**	**22.5**
	25RB_0	2615MHz	24.00	22.81	21.75	**24.5**	**23.5**	**22.5**
		2595MHz	23.99	22.87	21.86	**24.5**	**23.5**	**22.5**
		2575MHz	23.97	22.79	21.76	**24.5**	**23.5**	**22.5**
	50RB_0	2615MHz	24.02	22.77	21.57	**24.5**	**23.5**	**22.5**
		2595MHz	23.89	22.67	21.63	**24.5**	**23.5**	**22.5**
		2575MHz	23.90	22.69	21.63	**24.5**	**23.5**	**22.5**

Full Power								
LTE Band 38			Actual output Power (dBm)			Tune up		
Band -width	RB No. / RB offset	Frequency	Modulation			Modulation		
			QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
15 MHz	1RB_74	2612.5MHz	24.49	23.55	22.30	25.5	24.5	23.5
		2595MHz	24.81	23.60	22.34	25.5	24.5	23.5
		2577.5MHz	24.79	23.66	22.42	25.5	24.5	23.5
	1RB_37	2612.5MHz	24.65	23.66	22.43	25.5	24.5	23.5
		2595MHz	24.87	23.72	22.44	25.5	24.5	23.5
		2577.5MHz	24.84	23.69	22.42	25.5	24.5	23.5
	1RB_0	2612.5MHz	24.81	23.59	22.39	25.5	24.5	23.5
		2595MHz	24.78	23.66	22.41	25.5	24.5	23.5
		2577.5MHz	24.79	23.62	22.36	25.5	24.5	23.5
	36RB_38	2612.5MHz	23.97	22.82	21.69	24.5	23.5	22.5
		2595MHz	24.07	22.84	21.76	24.5	23.5	22.5
		2577.5MHz	24.00	22.76	21.75	24.5	23.5	22.5
	36RB_19	2612.5MHz	24.01	22.87	21.76	24.5	23.5	22.5
		2595MHz	24.10	22.83	21.66	24.5	23.5	22.5
		2577.5MHz	24.05	22.84	21.74	24.5	23.5	22.5
	36RB_0	2612.5MHz	23.97	22.89	21.72	24.5	23.5	22.5
		2595MHz	24.08	22.90	21.86	24.5	23.5	22.5
		2577.5MHz	24.07	22.87	21.78	24.5	23.5	22.5
	75RB_0	2612.5MHz	24.02	22.78	21.65	24.5	23.5	22.5
		2595MHz	23.94	22.72	21.65	24.5	23.5	22.5
		2577.5MHz	23.95	22.74	21.64	24.5	23.5	22.5

Full Power								
LTE Band 38			Actual output Power (dBm)			Tune up		
Band -width	RB No. / RB offset	Frequency	Modulation			Modulation		
			QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
20 MHz	1RB_99	2610MHz	24.26	23.50	22.25	**25.5**	**24.5**	**23.5**
		2595MHz	24.74	23.50	22.30	**25.5**	**24.5**	**23.5**
		2580MHz	24.69	23.60	22.32	**25.5**	**24.5**	**23.5**
	1RB_50	2610MHz	24.61	23.69	22.50	**25.5**	**24.5**	**23.5**
		2595MHz	**24.92**	23.78	22.51	**25.5**	**24.5**	**23.5**
		2580MHz	24.91	23.76	22.50	**25.5**	**24.5**	**23.5**
	1RB_0	2610MHz	24.75	23.55	22.31	**25.5**	**24.5**	**23.5**
		2595MHz	24.72	23.62	22.33	**25.5**	**24.5**	**23.5**
		2580MHz	24.73	23.55	22.29	**25.5**	**24.5**	**23.5**
	50RB_50	2610MHz	23.88	22.75	21.58	**24.5**	**23.5**	**22.5**
		2595MHz	23.81	22.60	21.54	**24.5**	**23.5**	**22.5**
		2580MHz	23.71	22.59	21.56	**24.5**	**23.5**	**22.5**
	50RB_25	2610MHz	23.91	22.72	21.57	**24.5**	**23.5**	**22.5**
		2595MHz	23.90	22.65	21.58	**24.5**	**23.5**	**22.5**
		2580MHz	23.89	22.64	21.59	**24.5**	**23.5**	**22.5**
	50RB_0	2610MHz	23.90	22.65	21.59	**24.5**	**23.5**	**22.5**
		2595MHz	23.87	22.65	21.63	**24.5**	**23.5**	**22.5**
		2580MHz	**23.92**	22.66	21.63	**24.5**	**23.5**	**22.5**
	100RB_0	2610MHz	24.06	22.91	21.73	**24.5**	**23.5**	**22.5**
		2595MHz	24.05	22.90	21.74	**24.5**	**23.5**	**22.5**
		2580MHz	24.06	22.86	21.66	**24.5**	**23.5**	**22.5**

Sensor on								
LTE Band 38			Actual output Power (dBm)			Tune up		
Band -width	RB No. / RB offset	Frequency	Modulation			Modulation		
			QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
5 MHz	1RB_24	2617.5 MHz	17.42	17.41	17.15	**18.0**	**18.0**	**18.0**
		2595MHz	17.33	17.38	17.13	**18.0**	**18.0**	**18.0**
		2572.5MHz	17.28	17.38	17.09	**18.0**	**18.0**	**18.0**
	1RB_12	2617.5 MHz	17.44	17.48	17.24	**18.0**	**18.0**	**18.0**
		2595MHz	17.55	17.58	17.30	**18.0**	**18.0**	**18.0**
		2572.5MHz	17.46	17.55	17.27	**18.0**	**18.0**	**18.0**
	1RB_0	2617.5 MHz	17.40	17.39	17.16	**18.0**	**18.0**	**18.0**
		2595MHz	17.33	17.43	17.14	**18.0**	**18.0**	**18.0**
		2572.5MHz	17.34	17.34	17.07	**18.0**	**18.0**	**18.0**
	12RB_13	2617.5 MHz	17.55	17.43	17.48	**18.0**	**18.0**	**18.0**
		2595MHz	17.44	17.37	17.46	**18.0**	**18.0**	**18.0**
		2572.5MHz	17.41	17.33	17.46	**18.0**	**18.0**	**18.0**
	12RB_6	2617.5 MHz	17.60	17.51	17.53	**18.0**	**18.0**	**18.0**
		2595MHz	17.47	17.48	17.54	**18.0**	**18.0**	**18.0**
		2572.5MHz	17.53	17.38	17.44	**18.0**	**18.0**	**18.0**
	12RB_0	2617.5 MHz	17.54	17.45	17.47	**18.0**	**18.0**	**18.0**
		2595MHz	17.46	17.44	17.49	**18.0**	**18.0**	**18.0**
		2572.5MHz	17.48	17.36	17.45	**18.0**	**18.0**	**18.0**
	25RB_0	2617.5 MHz	17.49	17.44	17.46	**18.0**	**18.0**	**18.0**
		2595MHz	17.44	17.45	17.48	**18.0**	**18.0**	**18.0**
		2572.5MHz	17.38	17.48	17.46	**18.0**	**18.0**	**18.0**

Sensor on								
LTE Band 38			Actual output Power (dBm)			Tune up		
Band -width	RB No. / RB offset	Frequency	Modulation			Modulation		
			QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
10 MHz	1RB_49	2615MHz	17.48	17.49	17.17	**18.0**	**18.0**	**18.0**
		2595MHz	17.43	17.46	17.18	**18.0**	**18.0**	**18.0**
		2575MHz	17.41	17.46	17.19	**18.0**	**18.0**	**18.0**
	1RB_24	2615MHz	17.61	17.56	17.26	**18.0**	**18.0**	**18.0**
		2595MHz	17.50	17.58	17.28	**18.0**	**18.0**	**18.0**
		2575MHz	17.46	17.49	17.12	**18.0**	**18.0**	**18.0**
	1RB_0	2615MHz	17.47	17.51	17.22	**18.0**	**18.0**	**18.0**
		2595MHz	17.37	17.51	17.20	**18.0**	**18.0**	**18.0**
		2575MHz	17.44	17.43	17.15	**18.0**	**18.0**	**18.0**
	25RB_25	2615MHz	17.50	17.49	17.48	**18.0**	**18.0**	**18.0**
		2595MHz	17.49	17.47	17.55	**18.0**	**18.0**	**18.0**
		2575MHz	17.46	17.43	17.42	**18.0**	**18.0**	**18.0**
	25RB_12	2615MHz	17.53	17.47	17.52	**18.0**	**18.0**	**18.0**
		2595MHz	17.49	17.56	17.56	**18.0**	**18.0**	**18.0**
		2575MHz	17.44	17.48	17.49	**18.0**	**18.0**	**18.0**
	25RB_0	2615MHz	17.54	17.53	17.53	**18.0**	**18.0**	**18.0**
		2595MHz	17.49	17.57	17.59	**18.0**	**18.0**	**18.0**
		2575MHz	17.43	17.51	17.55	**18.0**	**18.0**	**18.0**
	50RB_0	2615MHz	17.40	17.35	17.35	**18.0**	**18.0**	**18.0**
		2595MHz	17.44	17.46	17.44	**18.0**	**18.0**	**18.0**
		2575MHz	17.30	17.35	17.34	**18.0**	**18.0**	**18.0**

Sensor on								
LTE Band 38			Actual output Power (dBm)			Tune up		
Band -width	RB No. / RB offset	Frequency	Modulation			Modulation		
			QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
15 MHz	1RB_74	2612.5MHz	17.42	17.36	17.14	**18.0**	**18.0**	**18.0**
		2595MHz	17.37	17.43	17.16	**18.0**	**18.0**	**18.0**
		2577.5MHz	17.35	17.41	17.15	**18.0**	**18.0**	**18.0**
	1RB_37	2612.5MHz	17.50	17.51	17.23	**18.0**	**18.0**	**18.0**
		2595MHz	17.37	17.48	17.18	**18.0**	**18.0**	**18.0**
		2577.5MHz	17.41	17.41	17.16	**18.0**	**18.0**	**18.0**
	1RB_0	2612.5MHz	17.38	17.45	17.18	**18.0**	**18.0**	**18.0**
		2595MHz	17.31	17.42	17.14	**18.0**	**18.0**	**18.0**
		2577.5MHz	17.27	17.28	17.13	**18.0**	**18.0**	**18.0**
	36RB_38	2612.5MHz	17.58	17.38	17.48	**18.0**	**18.0**	**18.0**
		2595MHz	17.41	17.38	17.42	**18.0**	**18.0**	**18.0**
		2577.5MHz	17.43	17.37	17.39	**18.0**	**18.0**	**18.0**
	36RB_19	2612.5MHz	17.57	17.43	17.47	**18.0**	**18.0**	**18.0**
		2595MHz	17.48	17.47	17.50	**18.0**	**18.0**	**18.0**
		2577.5MHz	17.48	17.41	17.41	**18.0**	**18.0**	**18.0**
	36RB_0	2612.5MHz	17.56	17.38	17.42	**18.0**	**18.0**	**18.0**
		2595MHz	17.49	17.36	17.46	**18.0**	**18.0**	**18.0**
		2577.5MHz	17.46	17.40	17.43	**18.0**	**18.0**	**18.0**
	75RB_0	2612.5MHz	17.42	17.35	17.37	**18.0**	**18.0**	**18.0**
		2595MHz	17.38	17.40	17.39	**18.0**	**18.0**	**18.0**
		2577.5MHz	17.34	17.33	17.34	**18.0**	**18.0**	**18.0**

Sensor on								
LTE Band 38			Actual output Power (dBm)			Tune up		
Band -width	RB No. / RB offset	Frequency	Modulation			Modulation		
			QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
20 MHz	1RB_99	2610MHz	17.34	17.34	17.07	18.0	18.0	18.0
		2595MHz	17.28	17.32	17.10	18.0	18.0	18.0
		2580MHz	17.24	17.33	17.04	18.0	18.0	18.0
	1RB_50	2610MHz	17.51	17.51	17.22	18.0	18.0	18.0
		2595MHz	**17.65**	17.54	17.28	18.0	18.0	18.0
		2580MHz	17.48	17.48	17.23	18.0	18.0	18.0
	1RB_0	2610MHz	17.23	17.36	17.09	18.0	18.0	18.0
		2595MHz	17.26	17.34	17.11	18.0	18.0	18.0
		2580MHz	17.23	17.22	17.04	18.0	18.0	18.0
	50RB_50	2610MHz	17.31	17.30	17.30	18.0	18.0	18.0
		2595MHz	17.30	17.36	17.35	18.0	18.0	18.0
		2580MHz	17.24	17.26	17.30	18.0	18.0	18.0
	50RB_25	2610MHz	17.36	17.31	17.35	18.0	18.0	18.0
		2595MHz	17.33	17.39	17.38	18.0	18.0	18.0
		2580MHz	17.29	17.31	17.32	18.0	18.0	18.0
	50RB_0	2610MHz	17.37	17.36	17.36	18.0	18.0	18.0
		2595MHz	17.36	17.40	17.40	18.0	18.0	18.0
		2580MHz	**17.39**	17.34	17.33	18.0	18.0	18.0
	100RB_0	2610MHz	17.43	17.40	17.40	18.0	18.0	18.0
		2595MHz	17.37	17.42	17.40	18.0	18.0	18.0
		2580MHz	17.32	17.33	17.40	18.0	18.0	18.0

10.4. Bluetooth and WLAN Measurement result

Table 10.5: The conducted Power measurement results for Bluetooth

Bluetooth	Tune up	Averaged Power (dBm)		
Mode		Ch.0 (2402 MHz)	Ch39 (2441 MHz)	Ch78 (2480 MHz)
GFSK	**10.0**	8.31	9.71	9.28
EDR2M-4_DQPSK	**9.0**	7.49	8.85	8.47
EDR3M-8DPSK	**9.0**	7.50	8.89	8.49
/	**/**	Ch0（2402MHz）	Ch19（2440MHz）	Ch39（2480MHz）
BLE	**-2.0**	-4.00	-2.41	-3.15

Table 10.6: The conducted Power measurement results for WLAN 2.4G

WLAN 2.4GHz	Tune up	Averaged Power (dBm) Duty Cycle: **100%**		
Mode		Ch.1(2412 MHz)	Ch.6(2437Mhz)	Ch.11(2462MHz)
802.11b	**17.5**	16.20	16.89	16.25
802.11g	**14.5**	13.42	13.83	13.10
802.11n(20MHz)	**13.5**	13.07	13.27	11.60
/	**/**	Ch.3(2422 MHz)	Ch.6(2437Mhz)	Ch.9(2452MHz)
802.11n(40MHz)	**13.5**	12.84	13.17	11.69

Table 10.7: The conducted Power measurement results for WLAN 5G

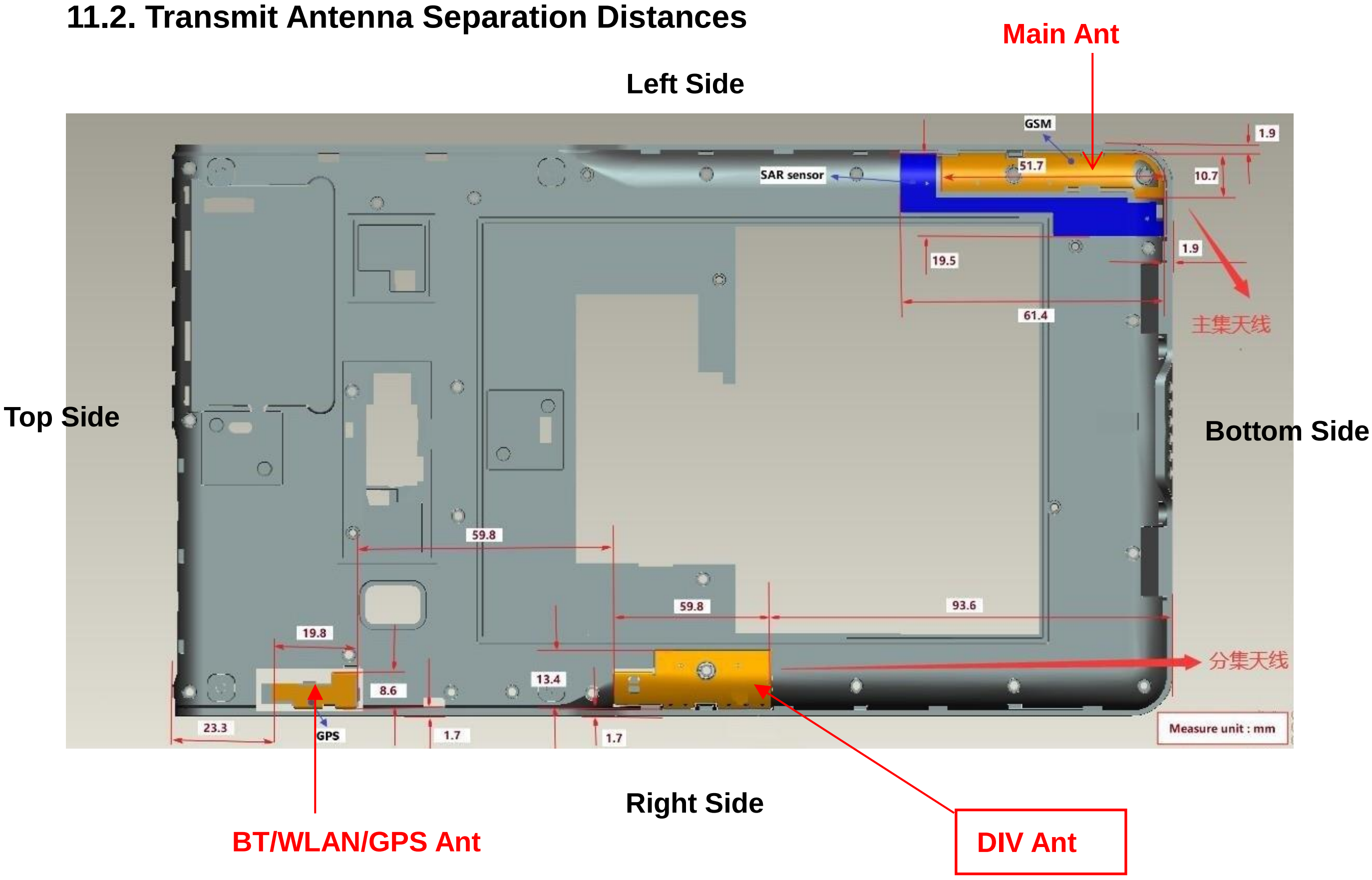
Averaged Power (dBm) Duty Cycle: **100%**								
Mode	802.11a	802.11n -20MHz	802.11ac -20MHz	Mode	802.11n -40MHz	802.11ac -40MHz	Mode	802.11ac -80MHz
Channel	6Mbps	MCS0	MCS0	Channel	MCS0	MCS0	Channel	MCS0
<U-NII-1>								
Tune up	**13.5**	**13.0**	**13.0**	/	**13.0**	**13.0**	/	**13.0**
36(5180MHz)	12.67	12.43	12.63	38(5190MHz)	12.44	12.51	42(5210MHz)	11.90
40(5200MHz)	12.64	12.60	12.51	46(5230MHz)	12.39	12.33	/	/
44(5240MHz)	12.58	12.27	12.50	/	/	/	/	/
<U-NII-2A>								
Tune up	**13.5**	**13.0**	**13.0**	/	**13.0**	**13.0**	/	**13.0**
52(5260MHz)	**12.46**	12.31	12.32	54(5270MHz)	12.29	12.24	58(5290MHz)	11.66
56(5280MHz)	12.46	12.27	12.29	62(5310MHz)	11.67	12.29	/	/
64(5320MHz)	12.42	12.26	12.25	/	/	/	/	/
<U-NII-2C>								
Tune up	**13.0**	**12.5**	**12.5**	/	**12.5**	**12.5**	/	**12.5**
100(5500MHz)	**12.29**	12.14	12.13	102(5510MHz)	11.67	11.57	106(5530MHz)	11.92
116(5580MHz)	11.89	11.86	11.86	110(5550MHz)	11.43	11.41	122(5610MHz)	11.26
140(5700MHz)	11.76	11.38	11.48	134(5670MHz)	11.35	11.32	/	/
<U-NII-3>								
Tune up	**12.5**	**12.0**	**12.0**	/	**12.0**	**12.0**	/	**12.0**
149(5745MHz)	**11.63**	11.58	11.56	151(5755MHz)	11.28	11.25	155(5775MHz)	10.90
157(5785MHz)	11.55	11.41	11.43	159(5795MHz)	11.27	11.18	/	/
165(5825MHz)	11.48	11.40	11.32	/	/	/	/	/

11. Simultaneous TX SAR Considerations

11.1. Introduction

The following procedures adopted from "FCC SAR Considerations for Cell Phones with Multiple Transmitters" are applicable to handsets with built-in unlicensed transmitters such as 802.11 a/b/g and Bluetooth devices which may simultaneously transmit with the licensed transmitter.
For this device, the BT and WLAN can transmit simultaneous with other transmitters.

11.2. Transmit Antenna Separation Distances



Picture 11.1 Antenna Locations (Back View)

11.3 SAR Measurement Positions

SAR measurement positions					
Antenna	Rear	Left edge	Right edge	Top edge	Bottom edge
WWAN	Yes	Yes	No	No	Yes
WLAN	Yes	No	Yes	Yes	No

Note:

1. Per KDB 447498 D01v06, the 1-g SAR test exclusion thresholds for 100 MHz to 6 GHz at *test separation distances* ≤ 50 mm are determined by:

[(*max. power of channel, including tune-up tolerance, mW*) / (*min. test separation distance, mm*)] · [√f(GHz)] ≤ 3.0 for 1-g SAR, where

f(GHz) is the RF channel transmit frequency in GHz

Power and distance are rounded to the nearest mW and mm before calculation

2. Per KDB 447498 D01v06, For 100 MHz to 6 GHz and *test separation distances* > 50 mm, the 1-g and 10-g *SAR test exclusion thresholds* are determined by the following

1) {[Power allowed at *numeric threshold* for 50 mm in step a)] + [(test separation distance – 50 mm)·(f(MHz)/150)]} mW, for 100 MHz to 1500 MHz

2) {[Power allowed at *numeric threshold* for 50 mm in step a)] + [(test separation distance – 50 mm)·10]} mW, for > 1500 MHz and ≤ 6 GHz

11.4. Standalone SAR Test Exclusion Considerations

Standalone 1-g head or body SAR evaluation by measurement or numerical simulation is not required when the corresponding SAR Exclusion Threshold condition, listed below, is satisfied. The 1-g SAR test exclusion threshold for 100 MHz to 6 GHz at test separation distances ≤ 50 mm are determined by:

[(max. power of channel, including tune-up tolerance, mW) / (min. test separation distance, mm)] · [√f(GHz)] ≤ 3.0 for 1-g SAR, where

- f(GHz) is the RF channel transmit frequency in GHz
- Power and distance are rounded to the nearest mW and mm before calculation
- The result is rounded to one decimal place for comparison

Table 11.1: Standalone SAR test exclusion considerations

Band/Mode	f(GHz)	Position	SAR test exclusion threshold (mW)	RF output power		SAR test exclusion
				dBm	mW	
Bluetooth	2.4	Body	9.60	10.0	10.00	No
WLAN 2.4GHz	2.4	Body	9.58	17.5	56.23	No
WLAN 5GHz	5.2	Body	6.58	13.5	22.39	No
	5.3	Body	6.52	13.5	22.39	No
	5.6	Body	6.34	13.0	19.95	No
	5.8	Body	6.23	12.5	17.78	No

12. Evaluation of Simultaneous

Table 12.1: The sum of reported SAR values for main antenna and WLAN 2.4G

/	Position	Main Antenna (W/kg)	WLAN 2.4G (W/kg)	Sum (W/kg)
Highest reported SAR value for Body	Rear (0mm)	1.30	0.11	1.41

Note: the test positions of above tables are for the worse case that has been evaluated.

Table 12.2: The sum of reported SAR values for main antenna and WLAN 5G

/	Position	Main Antenna (W/kg)	WLAN 5G (W/kg)	Sum (W/kg)
Highest reported SAR value for Body	Rear (0mm)	0.98	0.53	1.51

Note: the test positions of above tables are for the worse case that has been evaluated.

Table 12.3: The sum of reported SAR values for main antenna and Bluetooth

/	Position	Main Antenna (W/kg)	Bluetooth (W/kg)	Sum (W/kg)
Highest reported SAR value for Body	Rear (0mm)	1.30	0.02	1.32

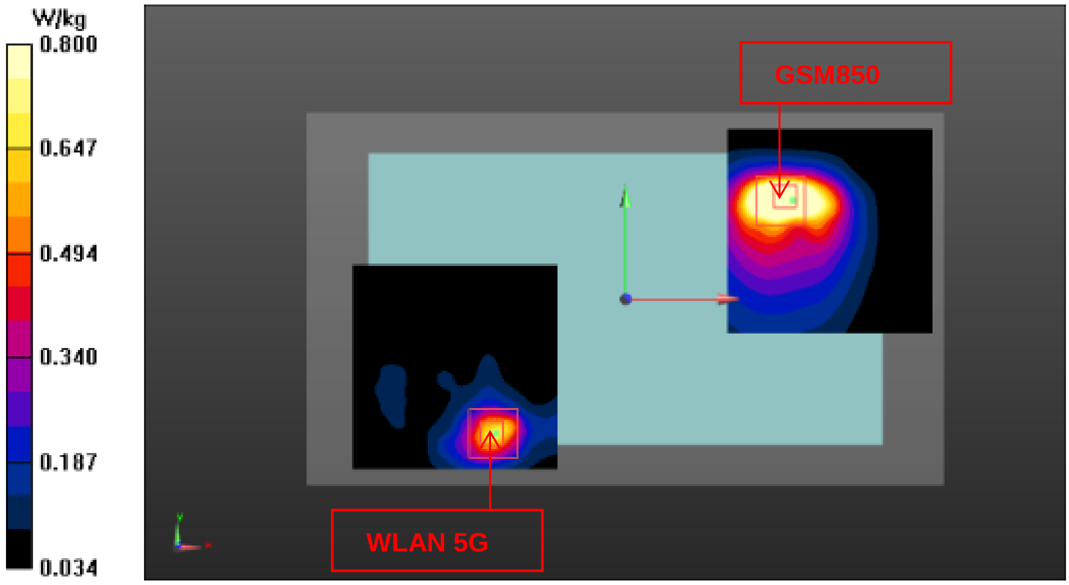
Note: the test positions of above tables are for the worse case that has been evaluated.

According to the KDB 447498 D01, when the sum of SAR is larger than the limit, SAR test exclusion is determined by the SAR to peak location separation ratio. The ratio is determined by $(SAR1 + SAR2)^{1.5}/Ri$, rounded to two decimal digits, and must be ≤ 0.04 for all antenna pairs in the configuration to qualify for 1-g SAR test exclusion.

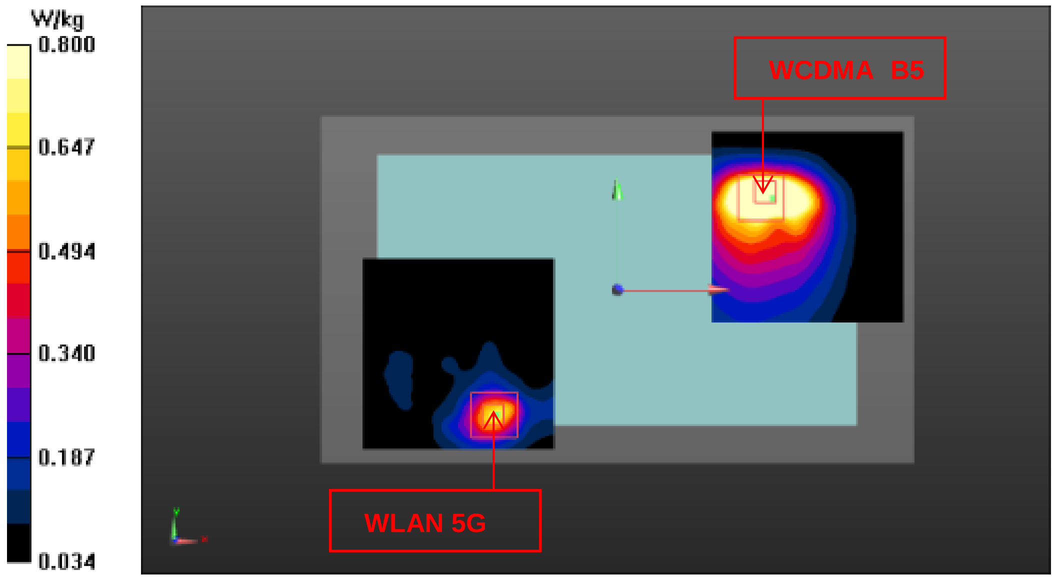
The sum of SAR values for Main Antenna and WLAN 5G

Position	Main Antenna (W/kg)		WLAN 5G (W/kg)	Sum (W/kg)	SPLSR
Rear (0mm)	GSM850	1.08	0.53	1.61	Yes
	WCDMA B5	1.15	0.53	1.68	Yes
	LTE B4	1.17	0.53	1.70	Yes
	LTE B5	1.30	0.53	1.83	Yes

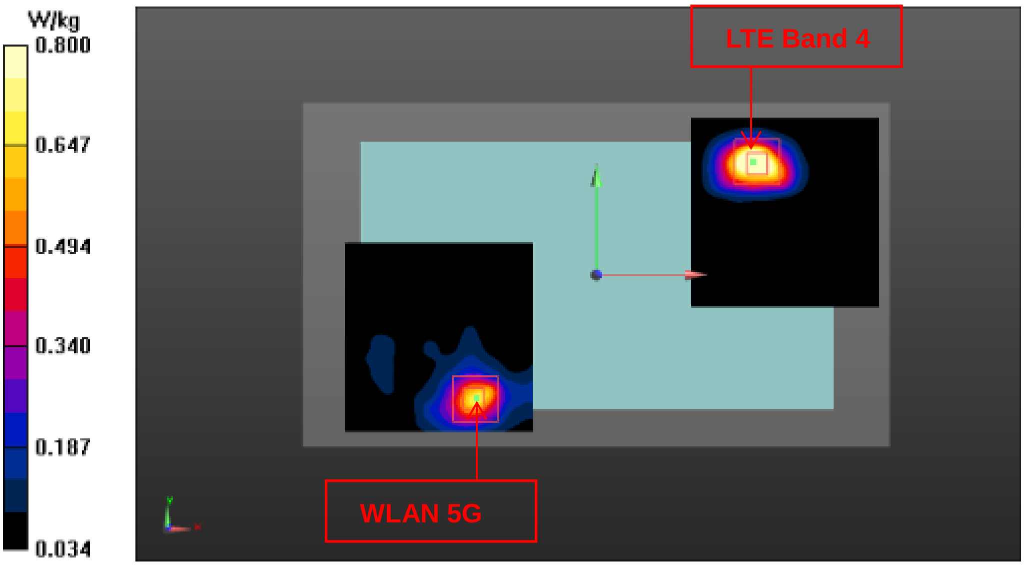
Band	Position	SAR (W/kg)	Gap (cm)	SAR peak location (m)			3D distance(mm)	sum SAR	SPLSR	Simultaneous SAR
				X	Y	Z				
GSM850	Rear	1.08	0	0.0655	0.0435	-0.171	159.7	1.61	0.01	**Not required**
WLAN 5G		0.53	0	-0.057	-0.059	-0.170				



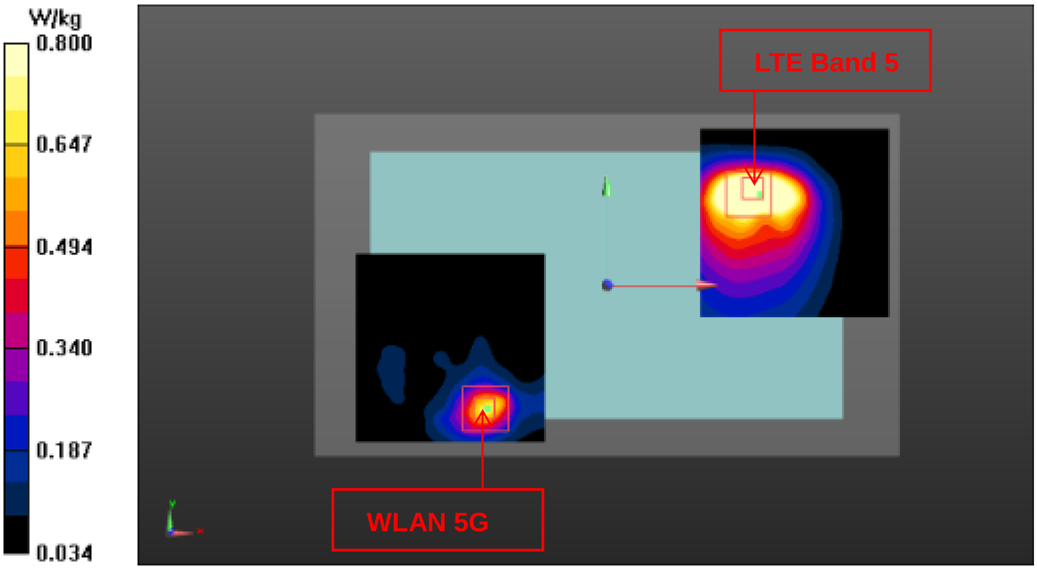
Band	Position	SAR (W/kg)	Gap (cm)	SAR peak location (m)			3D distance(mm)	sum SAR	SPLSR	Simultaneous SAR
				X	Y	Z				
WCDMA B5	Rear	1.15	0	0.0655	0.0435	-0.171	159.7	1.68	0.01	**Not required**
WLAN 5G		0.53	0	-0.057	-0.059	-0.170				



Band	Position	SAR (W/kg)	Gap (cm)	SAR peak location (m)			3D distance(mm)	sum SAR	SPLSR	Simultaneous SAR
				X	Y	Z				
LTE B4	Rear	1.17	0	0.0750	0.0540	-0.171	173.8	1.70	0.01	**Not required**
WLAN 5G		0.53	0	-0.057	-0.059	-0.170				



Band	Position	SAR (W/kg)	Gap (cm)	SAR peak location (m)			3D distance(mm)	sum SAR	SPLSR	Simultaneous SAR
				X	Y	Z				
LTE B5	Rear	1.30	0	0.0845	0.0570	-0.171	183.0	1.83	0.01	**Not required**
WLAN 5G		0.53	0	-0.057	-0.059	-0.170				



Conclusion:

According to the above tables, the sum of reported SAR values is 1.51W/kg. So the simultaneous transmission SAR with volume scans is not required.

13. Summary of Test Results

According to the client's decision rule in the test registration form, which is "based on the measurement results as the basis of the conformity statement", the test conclusion of this report meets the limit requirements.

The calculated SAR is obtained by the following formula:

$$\text{Reported SAR} = \text{Measured SAR} \times 10^{(P_{Target} - P_{Measured})/10}$$

Where P_{Target} is the power of manufacturing upper limit;

$P_{Measured}$ is the measured power in chapter 10.

Note:

C2 (Config1): Non-IRIS SIM (32GB)

C3 (Config2): NIRIS SIM (16GB)

C4 (Config3): NIRIS SIM (32GB)

Duty Cycle

Mode	**Duty Cycle**
GPRS for GSM850/1900	1:2
WCDMA Band 2/5	1:1
FDD_LTE Band 2/4/5/7	1:1
TDD_LTE Band 38	1:1.58
Bluetooth	1:1

13.1. Testing Environment

Temperature:	18°C~25°C
Relative humidity:	30%~70%
Ground system resistance:	<4Ω
Ambient noise & Reflection:	< 0.012 W/kg

13.2. SAR results

Table 13.1: SAR Values (GSM 850 -Body)

Ambient Temperature: 22.4°C Liquid Temperature: 22.0°C									
Frequency		Test Mode	Test Position	Figure No. / Note	Conducted Power (dBm)	Max. tune-up Power (dBm)	Measured SAR(1g) (W/kg)	Reported SAR(1g) (W/kg)	Power Drift(dB)
MHz	Ch.								
0mm Test Data									
836.6	190	GPRS	Rear	/	24.98	26.0	0.765	0.97	0.05
836.6	190	GPRS	Left	/	24.98	26.0	0.412	0.52	-0.04
836.6	190	GPRS	Bottom	/	24.98	26.0	0.333	0.42	0.11
848.8	251	GPRS	Rear	/	25.06	26.0	0.694	0.86	0.14
824.2	128	GPRS	Rear	/	25.02	26.0	0.643	0.81	0.03
Sensor off Test Data									
836.6	190	GPRS	Rear	14mm	28.99	30.0	0.150	0.19	0.05
836.6	190	GPRS	Left	14mm	28.99	30.0	0.100	0.13	0.01
836.6	190	GPRS	Bottom	4mm	28.99	30.0	0.623	0.79	-0.02
The worst case with Config2&3&4									
836.6	190	GPRS	Rear	**1**/ C2	24.98	26.0	**0.854**	**1.08**	-0.03
836.6	190	GPRS	Rear	C3	24.98	26.0	0.813	1.03	0.09
836.6	190	GPRS	Rear	C4	24.98	26.0	0.790	1.00	0.18

Table 13.2: SAR Values (GSM 1900 - Body)

Ambient Temperature: 22.6°C Liquid Temperature: 22.2°C									
Frequency		Test Mode	Test Position	Figure No. / Note	Conducted Power (dBm)	Max. tune-up Power (dBm)	Measured SAR(1g) (W/kg)	Reported SAR(1g) (W/kg)	Power Drift(dB)
MHz	Ch.								
0mm Test Data									
1880	661	GPRS	Rear	/	19.73	20.5	0.703	0.84	0.01
1880	661	GPRS	Left	/	19.73	20.5	0.545	0.65	0.10
1880	661	GPRS	Bottom	/	19.73	20.5	0.473	0.56	0.01
1909.8	810	GPRS	Rear	/	19.94	20.5	0.537	0.61	0.05
1850.2	512	GPRS	Rear	/	19.64	20.5	0.754	**0.92**	0.02
Sensor off Test Data									
1850.2	512	GPRS	Rear	14mm	26.47	27.5	0.082	0.10	0.09
1880	661	GPRS	Left	14mm	26.67	27.5	0.111	0.13	0.01
1880	661	GPRS	Bottom	4mm	26.67	27.5	0.501	0.61	0.05
The worst case with Config2&3&4									
1850.2	512	GPRS	Rear	C2	19.64	20.5	0.663	0.81	0.04
1850.2	512	GPRS	Rear	C3	19.64	20.5	0.748	0.91	0.06
1850.2	512	GPRS	Rear	**2**/ C4	19.64	20.5	**0.758**	**0.92**	0.09

Table 13.3: SAR Values (WCDMA Band 2 - Body)

Ambient Temperature: 22.6°C Liquid Temperature: 22.2°C									
Frequency		Test Mode	Test Position	Figure No. / Note	Conducted Power (dBm)	Max. tune-up Power (dBm)	Measured SAR(1g) (W/kg)	Reported SAR(1g) (W/kg)	Power Drift(dB)
MHz	Ch.								
0mm Test Data									
1880	9400	RMC	Rear	/	16.05	16.5	0.739	0.82	0.06
1880	9400	RMC	Left	/	16.05	16.5	0.449	0.50	0.05
1880	9400	RMC	Bottom	/	16.05	16.5	0.039	0.04	0.01
1907.6	9538	RMC	Rear	/	16.08	16.5	0.575	0.63	0.06
1852.4	9262	RMC	Rear	/	16.01	16.5	0.805	0.90	0.01
Sensor off Test Data									
1852.4	9262	RMC	Rear	14mm	23.55	24.0	1.080	1.20	0.05
1880	9400	RMC	Left	14mm	23.60	24.0	1.030	1.13	0.03
1907.6	9538	RMC	Left	14mm	23.58	24.0	0.778	0.86	0.03
1852.4	9262	RMC	Left	14mm	23.55	24.0	1.030	1.14	0.04
1880	9400	RMC	Bottom	4mm	23.60	24.0	0.428	0.47	0.05
The worst case with Config2&3&4									
1852.4	9262	RMC	Rear	C2	23.55	24.0	0.878	0.97	0.00
1852.4	9262	RMC	Rear	C3	23.55	24.0	0.949	1.05	0.09
1852.4	9262	RMC	Rear	**3**/ C4	23.55	24.0	**1.130**	**1.25**	0.03

Table 13.4: SAR Values (WCDMA Band 5 -Body)

Frequency		Test Mode	Test Position	Figure No. / Note	Conducted Power (dBm)	Max. tune-up Power (dBm)	Measured SAR(1g) (W/kg)	Reported SAR(1g) (W/kg)	Power Drift(dB)
Ambient Temperature: 22.4°C Liquid Temperature: 22.0°C									
MHz	Ch.								
0mm Test Data									
836.4	4182	RMC	Rear	/	22.13	22.5	0.917	1.00	0.12
836.4	4182	RMC	Left	/	22.13	22.5	0.604	0.66	0.08
836.4	4182	RMC	Bottom	/	22.13	22.5	0.493	0.54	0.08
846.6	4233	RMC	Rear	/	22.05	22.5	0.857	0.95	0.12
826.4	4132	RMC	Rear	/	22.03	22.5	0.952	1.06	0.12
Sensor off Test Data									
826.4	4132	RMC	Rear	14mm	23.05	23.5	0.265	0.29	0.06
836.4	4182	RMC	Left	14mm	23.10	23.5	0.164	0.18	-0.03
836.4	4182	RMC	Bottom	4mm	23.10	23.5	0.415	0.46	-0.12
The worst case with Config2&3&4									
826.4	4132	RMC	Rear	**4**/ C2	22.03	22.5	**1.030**	**1.15**	-0.12
826.4	4132	RMC	Rear	C3	22.03	22.5	0.906	1.01	0.12
826.4	4132	RMC	Rear	C4	22.03	22.5	0.975	1.09	0.01

Table 13.5: SAR Values (LTE Band 2 - Body)

Ambient Temperature: 22.6°C Liquid Temperature: 22.2°C									
Frequency		Test Mode	Test Position	Figure No. / Note	Conducted Power (dBm)	Max. tune-up Power (dBm)	Measured SAR(1g) (W/kg)	Reported SAR(1g) (W/kg)	Power Drift(dB)
MHz	Ch.								
0mm Test Data									
1880	18900	1RB_50	Rear	/	16.22	16.5	0.781	0.83	0.06
1860	18700	50RB_0	Rear	/	16.19	16.5	0.789	0.85	0.04
1880	18900	1RB_50	Left	/	16.22	16.5	0.585	0.62	-0.06
1860	18700	50RB_0	Left	/	16.19	16.5	0.627	0.67	0.09
1880	18900	1RB_50	Bottom	/	16.22	16.5	0.070	0.07	0.01
1860	18700	50RB_0	Bottom	/	16.19	16.5	0.067	0.07	0.02
1900	19100	1RB_50	Rear	/	16.21	16.5	0.634	0.68	0.01
1860	18700	1RB_50	Rear	/	16.16	16.5	0.788	0.85	0.08
1900	19100	50RB_0	Rear	/	16.10	16.5	0.692	0.76	0.01
1880	18900	50RB_0	Rear	/	16.15	16.5	0.809	0.88	0.08
1860	18700	100RB	Rear	/	16.10	16.5	0.663	0.73	0.06
Sensor off Test Data									
1880	18900	1RB_50	Rear	14mm	23.76	24.0	1.140	1.20	0.02
1860	18700	50RB_0	Rear	14mm	22.78	23.0	0.903	0.95	0.03
1880	18900	1RB_50	Left	14mm	23.76	24.0	1.010	1.07	0.15
1860	18700	50RB_0	Left	14mm	22.78	23.0	0.825	0.87	0.03
1880	18900	1RB_50	Bottom	4mm	23.76	24.0	0.410	0.43	0.02
1860	18700	50RB_0	Bottom	4mm	22.78	23.0	0.455	0.48	0.17
1900	19100	1RB_50	Rear	14mm	23.65	24.0	0.975	1.06	0.02
1860	18700	1RB_50	Rear	**5**/ 14mm	23.73	24.0	**1.170**	**1.25**	0.01
1900	19100	50RB_0	Rear	14mm	22.75	23.0	0.817	0.87	0.18
1880	18900	50RB_0	Rear	14mm	22.76	23.0	0.907	0.96	0.05
1880	18900	100RB	Rear	14mm	22.71	23.0	0.947	1.01	0.09
1900	19100	100RB	Rear	14mm	22.66	23.0	0.823	0.89	0.08
1860	18700	100RB	Rear	14mm	22.65	23.0	0.966	1.05	0.03
1900	19100	1RB_50	Left	14mm	23.65	24.0	0.844	0.91	0.02
1860	18700	1RB_50	Left	14mm	23.73	24.0	1.040	1.11	0.02
1900	19100	50RB_0	Left	14mm	22.75	23.0	0.731	0.77	0.03
1880	18900	50RB_0	Left	14mm	22.76	23.0	0.815	0.86	0.04
The worst case with Config2&3&4									
1860	18700	1RB_50	Rear	C2	23.73	24.0	1.150	1.22	0.02
1860	18700	1RB_50	Rear	C3	23.73	24.0	0.943	1.00	0.15
1860	18700	1RB_50	Rear	C4	23.73	24.0	0.990	1.05	-0.09

Table 13.6: SAR Values (LTE Band 4 - Body)

Ambient Temperature: 22.8°C Liquid Temperature: 22.3°C									
Frequency		Test Mode	Test Position	Figure No. / Note	Conducted Power (dBm)	Max. tune-up Power (dBm)	Measured SAR(1g) (W/kg)	Reported SAR(1g) (W/kg)	Power Drift(dB)
MHz	Ch.								
0mm Test Data									
1720	20050	1RB_50	Rear	/	16.49	17.0	0.867	0.98	0.07
1720	20050	50RB_0	Rear	/	16.57	17.0	0.830	0.92	0.08
1720	20050	1RB_50	Left	/	16.49	17.0	0.580	0.65	-0.08
1720	20050	50RB_0	Left	/	16.57	17.0	0.650	0.72	0.03
1720	20050	1RB_50	Bottom	/	16.49	17.0	0.178	0.20	0.08
1720	20050	50RB_0	Bottom	/	16.57	17.0	0.171	0.19	0.01
1745	20300	1RB_50	Rear	/	16.48	17.0	0.933	1.05	0.01
1732.5	20175	1RB_50	Rear	/	16.49	17.0	0.966	1.09	0.07
1745	20300	50RB_0	Rear	/	16.51	17.0	0.931	1.04	0.09
1732.5	20175	50RB_0	Rear	/	16.55	17.0	0.958	1.06	0.06
1720	20050	100RB	Rear	/	16.49	17.0	0.937	1.05	0.08
1745	20300	100RB	Rear	/	16.40	17.0	1.010	1.16	0.09
1732.5	20175	100RB	Rear	/	16.39	17.0	1.020	1.17	-0.05
Sensor off Test Data									
1720	20050	1RB_50	Rear	14mm	23.52	24.0	0.784	0.88	0.03
1720	20050	50RB_0	Rear	14mm	22.58	23.0	0.556	0.61	0.02
1720	20050	1RB_50	Left	14mm	23.52	24.0	0.718	0.80	0.01
1720	20050	50RB_0	Left	14mm	22.58	23.0	0.523	0.58	0.02
1720	20050	1RB_50	Bottom	4mm	23.52	24.0	0.498	0.56	0.13
1720	20050	50RB_0	Bottom	4mm	22.58	23.0	0.422	0.46	0.12
1745	20300	1RB_50	Rear	14mm	23.51	24.0	1.050	1.18	0.04
1732.5	20175	1RB_50	Rear	14mm	23.50	24.0	0.925	1.04	0.07
1720	20050	100RB	Rear	14mm	22.55	23.0	0.622	0.69	0.08
The worst case with Config2&3&4									
1745	20300	1RB_50	Rear	**6**/ C2	23.51	24.0	**1.080**	**1.21**	0.09
1745	20300	1RB_50	Rear	C3	23.51	24.0	0.828	0.93	0.03
1745	20300	1RB_50	Rear	C4	23.51	24.0	0.842	0.94	0.11

Table 13.7: SAR Values (LTE Band 5 - Body)

Ambient Temperature: 22.4°C Liquid Temperature: 22.0°C									
Frequency		Test Mode	Test Position	Figure No. / Note	Conducted Power (dBm)	Max. tune-up Power (dBm)	Measured SAR(1g) (W/kg)	Reported SAR(1g) (W/kg)	Power Drift(dB)
MHz	Ch.								
0mm Test Data									
836.5	20525	1RB_24	Rear	/	22.27	23.0	0.802	0.95	0.13
836.5	20525	25RB_12	Rear	/	22.32	23.0	0.765	0.89	0.07
836.5	20525	1RB_24	Left	/	22.27	23.0	0.677	0.80	0.02
836.5	20525	25RB_12	Left	/	22.32	23.0	0.565	0.66	0.08
836.5	20525	1RB_24	Bottom	/	22.27	23.0	0.615	0.73	0.01
836.5	20525	25RB_12	Bottom	/	22.32	23.0	0.511	0.60	0.06
844	20600	1RB_24	Rear	/	22.23	23.0	0.733	0.88	0.10
829	20450	1RB_24	Rear	/	22.25	23.0	0.836	0.99	0.08
844	20600	25RB_12	Rear	/	22.20	23.0	0.763	0.92	-0.06
829	20450	25RB_12	Rear	/	22.19	23.0	0.817	0.98	0.07
836.5	20525	50RB	Rear	/	22.26	23.0	0.739	0.88	0.06
844	20600	50RB	Rear	/	22.14	23.0	0.724	0.88	0.01
829	20450	50RB	Rear	/	22.11	23.0	0.712	0.87	0.09
Sensor off Test Data									
836.5	20525	1RB_24	Rear	14mm	23.36	24.0	0.206	0.24	0.05
836.5	20525	25RB_12	Rear	14mm	22.35	23.0	0.205	0.24	0.03
836.5	20525	1RB_24	Left	14mm	23.36	24.0	0.186	0.22	0.01
836.5	20525	25RB_12	Left	14mm	22.35	23.0	0.157	0.18	0.06
836.5	20525	1RB_24	Bottom	4mm	23.36	24.0	0.524	0.61	0.07
836.5	20525	25RB_12	Bottom	4mm	22.35	23.0	0.468	0.54	-0.05
The worst case with Config2&3&4									
829	20450	1RB_24	Rear	C2	22.25	23.0	0.999	1.19	0.09
829	20450	1RB_24	Rear	**7**/ C3	22.25	23.0	**1.090**	**1.30**	0.03
829	20450	1RB_24	Rear	C4	22.25	23.0	0.869	1.03	0.09

Table 13.8: SAR Values (LTE Band 7 - Body)

Ambient Temperature: 22.4°C Liquid Temperature: 22.0°C									
Frequency		Test Mode	Test Position	Figure No. / Note	Conducted Power (dBm)	Max. tune-up Power (dBm)	Measured SAR(1g) (W/kg)	Reported SAR(1g) (W/kg)	Power Drift(dB)
MHz	Ch.								
0mm Test Data									
2560	21350	1RB_50	Rear	/	15.93	16.5	0.856	0.98	0.10
2560	21350	50RB_25	Rear	/	16.02	16.5	0.727	0.81	0.05
2560	21350	1RB_50	Left	/	15.93	16.5	0.907	1.03	0.11
2560	21350	50RB_25	Left	/	16.02	16.5	0.840	0.94	0.07
2560	21350	1RB_50	Bottom	/	15.93	16.5	0.132	0.15	-0.07
2560	21350	50RB_25	Bottom	/	16.02	16.5	0.126	0.14	-0.03
2535	21100	1RB_50	Rear	/	15.78	16.5	0.591	0.70	0.04
2510	20850	1RB_50	Rear	/	15.70	16.5	0.562	0.68	0.08
2535	21100	50RB_25	Rear	/	16.02	16.5	0.502	0.56	-0.05
2510	20850	50RB_25	Rear	/	15.77	16.5	0.477	0.56	0.08
2535	21100	1RB_50	Left	/	15.78	16.5	0.763	0.90	0.09
2510	20850	1RB_50	Left	/	15.70	16.5	0.630	0.76	0.08
2535	21100	50RB_25	Left	/	16.02	16.5	0.684	0.76	0.03
2510	20850	50RB_25	Left	/	15.77	16.5	0.579	0.68	0.10
2560	21350	100RB	Left	/	15.93	16.5	0.824	0.94	0.05
2535	21100	100RB	Left	/	15.74	16.5	0.693	0.83	0.08
2510	20850	100RB	Left	/	15.74	16.5	0.572	0.68	-0.07
Sensor off Test Data									
2560	21350	1RB_50	Rear	14mm	23.91	25.0	0.478	0.61	0.11
2560	21350	50RB_25	Rear	14mm	23.08	24.0	0.396	0.49	0.10
2560	21350	1RB_50	Left	14mm	23.91	25.0	0.502	0.65	0.04
2560	21350	50RB_25	Left	14mm	23.08	24.0	0.404	0.50	0.04
2560	21350	1RB_50	Bottom	4mm	23.91	25.0	0.385	0.49	0.07
2560	21350	50RB_25	Bottom	4mm	23.08	24.0	0.309	0.38	0.05
The worst case with Config2&3&4									
2560	21350	1RB_50	Left	C2	15.93	16.5	0.907	1.03	0.11
2560	21350	1RB_50	Left	**8**/ C3	15.93	16.5	**1.090**	**1.24**	0.09
2560	21350	1RB_50	Left	C4	15.93	16.5	0.737	0.84	0.02

Table 13.9: SAR Values (LTE Band 38 - Body)

Frequency		Test Mode	Test Position	Figure No. / Note	Conducted Power (dBm)	Max. tune-up Power (dBm)	Measured SAR(1g) (W/kg)	Reported SAR(1g) (W/kg)	Power Drift(dB)
Ambient Temperature: 22.4°C Liquid Temperature: 22.0°C									
MHz	Ch.								
0mm Test Data									
2595	38000	1RB_50	Rear	/	17.65	18.0	0.652	0.71	0.08
2580	37850	50RB_0	Rear	/	17.39	18.0	0.648	0.75	0.09
2595	38000	1RB_50	Left	/	17.65	18.0	0.647	0.70	-0.12
2580	37850	50RB_0	Left	/	17.39	18.0	0.769	0.88	0.02
2595	38000	1RB_50	Bottom	/	17.65	18.0	0.409	0.44	-0.13
2580	37850	50RB_0	Bottom	/	17.39	18.0	0.344	0.40	-0.08
2610	38150	50RB_0	Left	/	17.37	18.0	0.718	0.83	-0.09
2595	38000	50RB_0	Left	/	17.36	18.0	0.741	0.86	0.08
2610	38150	100RB	Left	/	17.43	18.0	0.705	0.80	-0.02
Sensor off Test Data									
2595	38000	1RB_50	Rear	14mm	24.92	25.5	0.411	0.47	0.05
2580	37850	50RB_0	Rear	14mm	23.92	24.5	0.308	0.35	0.03
2595	38000	1RB_50	Left	14mm	24.92	25.5	0.423	0.48	0.08
2580	37850	50RB_0	Left	14mm	23.92	24.5	0.345	0.39	0.05
2595	38000	1RB_50	Bottom	4mm	24.92	25.5	0.289	0.33	0.03
2580	37850	50RB_0	Bottom	4mm	23.92	24.5	0.242	0.28	0.04
The worst case with Config2&3&4									
2580	37850	50RB_0	Left	C2	17.39	18.0	0.532	0.61	0.01
2580	37850	50RB_0	Left	**9**/ C3	17.39	18.0	**0.795**	**0.91**	0.03
2580	37850	50RB_0	Left	C4	17.39	18.0	0.478	0.55	0.01

Table 13.10: SAR Values (Bluetooth 2.4G - Body)

Ambient Temperature: 22.5°C Liquid Temperature: 22.0°C									
Frequency		Test Mode	Test Position	Figure No. / Note	Conducted Power (dBm)	Max. tune-up Power (dBm)	Measured SAR(1g) (W/kg)	Reported SAR(1g) (W/kg)	Power Drift(dB)
MHz	Ch.								
0mm Test Data									
2441	39	GFSK	Rear	/	9.71	10.0	0.017	0.02	0.07
2441	39	GFSK	Right	/	9.71	10.0	0.009	0.01	0.07
2441	39	GFSK	Top	/	9.71	10.0	0.010	0.01	0.08
The worst case with Config2&3&4									
2441	39	GFSK	Rear	C2	9.71	10.0	0.015	0.02	0.02
2441	39	GFSK	Rear	C3	9.71	10.0	0.017	0.02	0.04
2441	39	GFSK	Rear	**10**/ C4	9.71	10.0	**0.021**	**0.02**	0.03

13.3. WLAN Evaluation for 2.4G

According to the KDB248227 D01, SAR is measured for 2.4GHz 802.11b DSSS using the initial test position procedure.

Table 13.11: SAR Values (WLAN 2.4G - Body)

Ambient Temperature: 22.5°C Liquid Temperature: 22.0°C									
Frequency		Test Mode	Test Position	Figure No. / Note	Conducted Power (dBm)	Max. tune-up Power (dBm)	Measured SAR(1g) (W/kg)	Reported SAR(1g) (W/kg)	Power Drift(dB)
MHz	Ch.								
0mm Test Data									
2437	6	802.11b	Rear	/	16.89	17.5	0.098	0.11	0.03
2437	6	802.11b	Right	**11**	16.89	17.5	**0.100**	**0.12**	0.05
2437	6	802.11b	Top	/	16.89	17.5	0.002	<0.01	0.03
The worst case with Config2&3&4									
2437	6	802.11b	Right	C2	16.89	17.5	0.097	0.11	0.05
2437	6	802.11b	Right	C3	16.89	17.5	0.091	0.10	0.01
2437	6	802.11b	Right	C4	16.89	17.5	0.066	0.08	0.09

Note1: For all positions/configurations tested using the initial test position and subsequent test positions, when the reported SAR is > 0.8 W/kg, SAR is measured for these test positions/configurations on the subsequent next highest measured output power channel until the reported SAR is ≤ 1.2 W/kg or all required channels are tested.

According to the KDB248227 D01, The reported SAR must be scaled to 100% transmission duty factor to determine compliance at the maximum tune-up tolerance limit.

Table 13.12: SAR Values (WLAN - Body) – 802.11b (Scaled Reported SAR)

Frequency		Test Position	Actual duty factor	maximum duty factor	Reported SAR (1g)(W/kg)	Scaled reported SAR (1g)(W/kg)
MHz	Ch.					
2437	6	Right	100%	100%	0.12	**0.12**

SAR is not required for OFDM because the 802.11b adjusted SAR ≤ 1.2 W/kg.

13.4. WLAN Evaluation for 5G

Table 13.13: SAR Values (WLAN 5G - Body)

Ambient Temperature: 22.7°C Liquid Temperature: 22.2°C									
Frequency		Test Mode	Test Position	Figure No.	Conducted Power (dBm)	Max. tune-up Power (dBm)	Measured SAR(1g) (W/kg)	Reported SAR(1g) (W/kg)	Power Drift(dB)
MHz	Ch.								
U-NII-2A - 0mm Test Data									
5260	52	802.11a	Rear	/	12.46	13.5	0.241	0.31	-0.08
5260	52	802.11a	Right	/	12.46	13.5	**0.377**	0.48	-0.14
5260	52	802.11a	Top	/	12.46	13.5	0.047	0.06	0.04
U-NII-2C - 0mm Test Data									
5500	100	802.11a	Rear	/	12.29	13.0	0.317	0.37	0.07
5500	100	802.11a	Right	/	12.29	13.0	**0.548**	0.65	0.05
5500	100	802.11a	Top	/	12.29	13.0	0.100	0.12	0.04
U-NII-3 - 0mm Test Data									
5745	149	802.11a	Rear	/	11.63	12.5	0.431	0.53	0.04
5745	149	802.11a	Right	**12**	11.63	12.5	**0.572**	**0.70**	0.07
5745	149	802.11a	Top	/	11.63	12.5	0.047	0.06	0.02
The worst case with Config2&3&4									
5745	149	802.11a	Right	/	11.63	12.5	0.566	0.69	0.06
5745	149	802.11a	Right	/	11.63	12.5	0.396	0.48	0.04
5745	149	802.11a	Right	/	11.63	12.5	0.364	0.44	0.04
5745	149	802.11a	Rear	14mm	11.63	12.5	0.047	0.06	-0.02

Note1: U-NII-1 and U-NII-2A bands have the same specified maximum output and tolerance; SAR is measured for U-NII-2A band first. Adjusted SAR of U-NII-2A band is ≤ 1.2W/kg, SAR is not required for U-NII-1 band.

Note2: For all positions/configurations tested using the initial test position and subsequent test positions, when the reported SAR is > 0.8 W/kg, SAR is measured for these test positions/configurations on the subsequent next highest measured output power channel until the reported SAR is ≤ 1.2 W/kg or all required channels are tested.

According to the KDB248227 D01, The reported SAR must be scaled to 100% transmission duty factor to determine compliance at the maximum tune-up tolerance limit.

Table 13.14: SAR Values (WLAN - Body) – 802.11a (Scaled Reported SAR)

Frequency		Test Position	Actual duty factor	maximum duty factor	Reported SAR (1g)(W/kg)	Scaled reported SAR (1g)(W/kg)
MHz	Ch.					
5745	149	Right	100%	100%	0.70	**0.70**

14. SAR Measurement Variability

SAR measurement variability must be assessed for each frequency band, which is determined by the SAR probe calibration point and tissue-equivalent medium used for the device measurements. When both head and body tissue-equivalent media are required for SAR measurements in a frequency band, the variability measurement procedures should be applied to the tissue medium with the highest measured SAR, using the highest measured SAR configuration for that tissue-equivalent medium.

The following procedures are applied to determine if repeated measurements are required.

1) Repeated measurement is not required when the original highest measured SAR is < 0.80 W/kg; steps 2) through 4) do not apply.

2) When the original highest measured SAR is ≥ 0.80 W/kg, repeat that measurement once.

3) Perform a second repeated measurement only if the ratio of largest to smallest SAR for the original and first repeated measurements is > 1.20 or when the original or repeated measurement is ≥ 1.45 W/kg (~ 10% from the 1-g SAR limit).

4) Perform a third repeated measurement only if the original, first or second repeated measurement is ≥ 1.5 W/kg and the ratio of largest to smallest SAR for the original, first and second repeated measurements is > 1.20.

Table 14.1: SAR Measurement Variability for Body – GSM850

Frequency		Test Position	Original	1st Repeated	Ratio	2nd Repeated
MHz	Ch.		SAR (W/kg)	SAR (W/kg)		SAR (W/kg)
836.6	190	Rear	0.854	0.839	1.02	/

Table 14.2: SAR Measurement Variability for Body – WCDMA Band 2

Frequency		Test Position	Original	1st Repeated	Ratio	2nd Repeated
MHz	Ch.		SAR (W/kg)	SAR (W/kg)		SAR (W/kg)
1852.4	9262	Rear	1.130	1.080	1.05	/

Table 14.3: SAR Measurement Variability for Body – WCDMA Band 5

Frequency		Test Position	Original	1st Repeated	Ratio	2nd Repeated
MHz	Ch.		SAR (W/kg)	SAR (W/kg)		SAR (W/kg)
824.4	4132	Rear	1.030	1.000	1.03	/

Table 14.4: SAR Measurement Variability for Body – LTE Band 2

Frequency		Test Position	Original	1st Repeated	Ratio	2nd Repeated
MHz	Ch.		SAR (W/kg)	SAR (W/kg)		SAR (W/kg)
1860	18700	Rear	1.030	1.000	1.03	/

Table 14.5: SAR Measurement Variability for Body – LTE Band 4

Frequency		Test Position	Original	1st Repeated	Ratio	2nd Repeated
MHz	Ch.		SAR (W/kg)	SAR (W/kg)		SAR (W/kg)
1745	20300	Rear	1.080	1.040	1.04	/

Table 14.6: SAR Measurement Variability for Body – LTE Band 5

Frequency		Test Position	Original	1st Repeated	Ratio	2nd Repeated
MHz	Ch.		SAR (W/kg)	SAR (W/kg)		SAR (W/kg)
829	20450	Rear	1.090	1.070	1.02	/

Table 14.7: SAR Measurement Variability for Body – LTE Band 7

Frequency		Test Position	Original	1st Repeated	Ratio	2nd Repeated
MHz	Ch.		SAR (W/kg)	SAR (W/kg)		SAR (W/kg)
2560	21350	Rear	1.090	1.060	1.03	/

15. Measurement Uncertainty

15.1. Measurement Uncertainty for Normal SAR Tests (300MHz~3GHz)

No.	Error Description	Type	Uncertainty value	Probably Distribution	Div.	(Ci) 1g	(Ci) 10g	Std. Unc. (1g)	Std. Unc. (10g)	Degree of freedom
Measurement system										
1	Probe calibration	B	12	N	2	1	1	6.0	6.0	∞
2	Axial isotropy	B	4.7	R	$\sqrt{3}$	√0.5	√0.5	4.3	4.3	∞
3	Hemispherical isotropy	B	9.6	R	$\sqrt{3}$	1	1	4.8	4.8	∞
4	Boundary effect	B	1.1	R	$\sqrt{3}$	1	1	0.6	0.6	∞
5	Linearity	B	4.7	R	$\sqrt{3}$	1	1	2.7	2.7	∞
6	Detection limit	B	1.0	R	$\sqrt{3}$	1	1	0.6	0.6	∞
7	Modulation response	B	4.0	R	$\sqrt{3}$	1	1	2.3	2.3	∞
8	Readout electronics	B	1.0	N	1	1	1	1.0	1.0	∞
9	Response time	B	0.8	R	$\sqrt{3}$	1	1	0.5	0.5	∞
10	Integration time	B	1.7	R	$\sqrt{3}$	1	1	1.0	1.0	∞
11	RF ambient conditions-noise	B	3.0	R	$\sqrt{3}$	1	1	1.7	1.7	∞
12	RF ambient conditions-reflection	B	3.0	R	$\sqrt{3}$	1	1	1.7	1.7	∞
13	Probe positioned mech. restrictions	B	0.35	R	$\sqrt{3}$	1	1	0.2	0.2	∞
14	Probe positioning with respect to phantom shell	B	2.9	R	$\sqrt{3}$	1	1	1.7	1.7	∞
15	Post-processing	B	1.0	R	$\sqrt{3}$	1	1	0.6	0.6	∞
Test sample related										
16	Test sample positioning	A	3.3	N	1	1	1	3.3	3.3	5
17	Device holder uncertainty	A	3.4	N	1	1	1	3.4	3.4	5
18	Drift of output power	B	5.0	R	$\sqrt{3}$	1	1	2.9	2.9	∞
Phantom and set-up										
19	Phantom uncertainty	B	1.0	R	$\sqrt{3}$	1	1	0.6	0.6	∞
20	Liquid conductivity (target)	B	5.0	R	$\sqrt{3}$	0.64	0.43	1.8	1.2	∞
21	Liquid conductivity (meas.)	A	1.3	N	1	0.64	0.43	0.83	0.56	9
22	Liquid permittivity (target)	B	5.0	R	$\sqrt{3}$	0.6	0.49	1.7	1.4	∞
23	Liquid permittivity (meas.)	A	1.6	N	1	0.6	0.49	0.96	0.78	9
Combined standard uncertainty		$u_c' = \sqrt{\sum_{i=1}^{23} c_i^2 u_i^2}$						11.3	11.2	95.5
Expanded uncertainty (Confidence interval of 95 %)		$u_e = 2u_c$						22.6	22.4	

15.2. Measurement Uncertainty for Normal SAR Tests (3GHz~6GHz)

No.	Error Description	Type	Uncertainty value	Probably Distribution	Div.	(Ci) 1g	(Ci) 10g	Std. Unc. (1g)	Std. Unc. (10g)	Degree of freedom
Measurement system										
1	Probe calibration	B	13	N	2	1	1	6.5	6.5	∞
2	Axial isotropy	B	4.7	R	$\sqrt{3}$	√0.5	√0.5	4.3	4.3	∞
3	Hemispherical isotropy	B	9.6	R	$\sqrt{3}$	1	1	4.8	4.8	∞
4	Boundary effect	B	2.3	R	$\sqrt{3}$	1	1	1.3	1.3	∞
5	Linearity	B	4.7	R	$\sqrt{3}$	1	1	2.7	2.7	∞
6	Detection limit	B	1.0	R	$\sqrt{3}$	1	1	0.6	0.6	∞
7	Modulation response	B	4.0	R	$\sqrt{3}$	1	1	2.3	2.3	∞
8	Readout electronics	B	1.0	N	1	1	1	1.0	1.0	∞
9	Response time	B	0.8	R	$\sqrt{3}$	1	1	0.5	0.5	∞
10	Integration time	B	1.7	R	$\sqrt{3}$	1	1	1.0	1.0	∞
11	RF ambient conditions-noise	B	3.0	R	$\sqrt{3}$	1	1	1.7	1.7	∞
12	RF ambient conditions-reflection	B	3.0	R	$\sqrt{3}$	1	1	1.7	1.7	∞
13	Probe positioned mech. restrictions	B	0.71	R	$\sqrt{3}$	1	1	0.4	0.4	∞
14	Probe positioning with respect to phantom shell	B	5.7	R	$\sqrt{3}$	1	1	3.3	3.3	∞
15	Post-processing	B	4.0	R	$\sqrt{3}$	1	1	2.3	2.3	∞
Test sample related										
16	Test sample positioning	A	3.3	N	1	1	1	3.3	3.3	5
17	Device holder uncertainty	A	3.4	N	1	1	1	3.4	3.4	5
18	Drift of output power	B	5.0	R	$\sqrt{3}$	1	1	2.9	2.9	∞
Phantom and set-up										
19	Phantom uncertainty	B	1.0	R	$\sqrt{3}$	1	1	0.6	0.6	∞
20	Liquid conductivity (target)	B	5.0	R	$\sqrt{3}$	0.64	0.43	1.8	1.2	∞
21	Liquid conductivity (meas.)	A	1.3	N	1	0.64	0.43	0.83	0.56	9
22	Liquid permittivity (target)	B	5.0	R	$\sqrt{3}$	0.6	0.49	1.7	1.4	∞
23	Liquid permittivity (meas.)	A	1.6	N	1	0.6	0.49	0.96	0.78	9
Combined standard uncertainty		$u_c^{'} = \sqrt{\sum_{i=1}^{23} c_i^2 u_i^2}$						12.2	12.1	95.5
Expanded uncertainty (Confidence interval of 95 %)		$u_e = 2u_c$						24.4	24.2	

16. Main Test Instruments

Table 16.1: List of Main Instruments

No.	Name	Type	Serial Number	Calibration Date	Valid Period
01	Network analyzer	Agilent E5071C	MY46103759	2019-11-15	One year
02	Dielectric probe	85070E	MY44300317	/	/
03	Power meter	E4418B	MY50000366	2019-12-14	One year
04	Power sensor	E9304A	MY50000188		
05	Power meter	NRP	101460	2020-01-15	One year
06	Power sensor	NRP-Z91	100553		
07	Signal Generator	E8257D	MY47461211	2019-06-03	One year
08	Amplifier	VTL5400	0404	/	/
09	E-field Probe	EX3DV4	3633	2020-04-01	One year
11	DAE	DAE4	786	2020-03-03	One year
12	Dipole Validation Kit	D835V2	4d057	2018-10-09	Three year
13	Dipole Validation Kit	D1750V2	1152	2019-08-30	One year
14	Dipole Validation Kit	D1900V2	5d088	2018-10-24	Three year
15	Dipole Validation Kit	D2450V2	873	2018-10-26	Three year
16	Dipole Validation Kit	D2550V2	1058	2018-08-24	Three year
17	Dipole Validation Kit	D5GHzV2	1238	2019-08-29	One year
18	Radio Communication Analyzer	Anristu MT8820C	6201341853	2020-01-15	One year
19	BTS	E5515C	GB46110722	2020-01-05	One year
20	Software	DASY5	52.8.8.1222	/	/

ANNEX A: Graph Results

GSM850 Body

Date: 2020-6-16

Electronics: DAE4 Sn786

Medium: Head 835MHz

Medium parameters used (interpolated): f = 836.6 MHz; σ = 0.885 S/m; ε_r = 41.833; ρ = 1000 kg/m^3

Ambient Temperature: 22.0^{o}C Liquid Temperature: 21.5^{o}C

Communication System: UID 0, GPRS 4Txslot (0) Frequency: 836.6 MHz Duty Cycle: 1:2

Probe: EX3DV4 – SN3633 ConvF (9.59, 9.59, 9.59);

Rear Side Middle/Area Scan (61x61x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 1.42 W/kg

Rear Side Middle/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 6.532 V/m; Power Drift = -0.03 dB

Peak SAR (extrapolated) = 1.94 W/kg

SAR(1 g) = 0.854 W/kg; SAR(10 g) = 0.426 W/kg

Maximum value of SAR (measured) = 1.27 W/kg

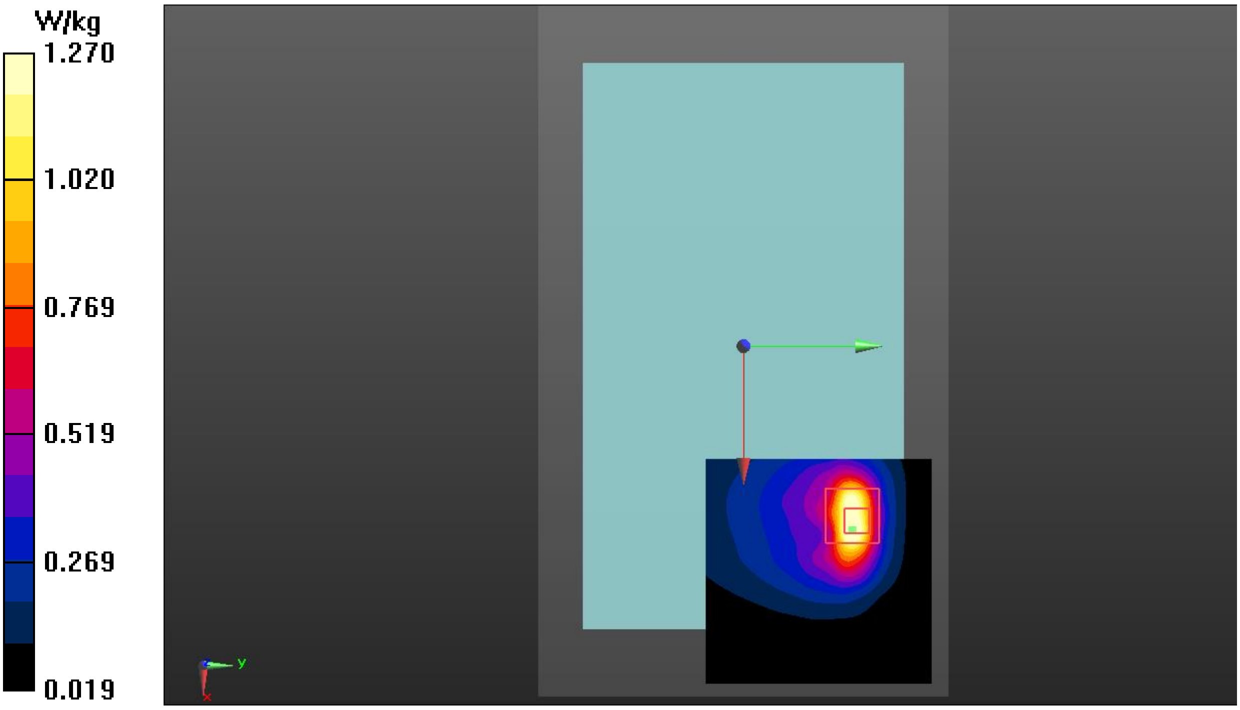


Fig.1 GSM 850 Body

GSM1900 Body
Date: 2020-6-18
Electronics: DAE4 Sn786
Medium: Head 1900MHz
Medium parameters used (interpolated): f = 1850.2 MHz; σ = 1.379 S/m; ε_r = 39.468; ρ = 1000 kg/m^3
Ambient Temperature: 22.0°C   Liquid Temperature: 21.5°C
Communication System: UID 0, GPRS 4Txslot (0) Frequency: 1850.2 MHz Duty Cycle: 1:2
Probe: EX3DV4 – SN3633 ConvF (7.76, 7.76, 7.76);

Rear Side Low/Area Scan (61x61x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 1.17 W/kg

Rear Side Low/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 1.862 V/m; Power Drift = 0.09 dB
Peak SAR (extrapolated) = 1.80 W/kg
SAR(1 g) = 0.758 W/kg; SAR(10 g) = 0.313 W/kg
Maximum value of SAR (measured) = 1.25 W/kg

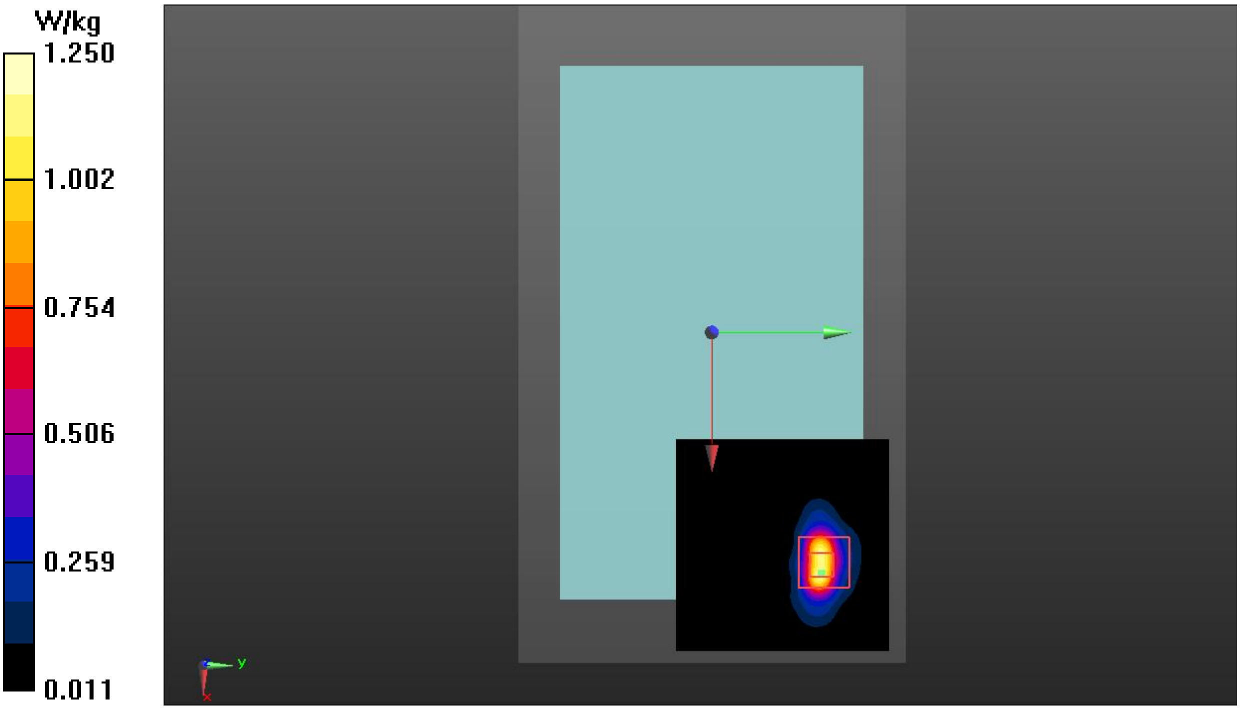


Fig.2 GSM 1900 Body

WCDMA Band 2 Body
Date: 2020-6-18
Electronics: DAE4 Sn786
Medium: Head 1900MHz
Medium parameters used (interpolated): f = 1852.4 MHz; σ = 1.381 S/m; ε_r = 39.46; ρ = 1000 kg/m^3
Ambient Temperature: 22.0^{o}C   Liquid Temperature: 21.5^{o}C
Communication System: UID 0, WCDMA (0) Frequency: 1852.4 MHz Duty Cycle: 1:1
Probe: EX3DV4 – SN3633 ConvF (7.76, 7.76, 7.76);

Rear Side Low/Area Scan (61x61x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 1.35 W/kg

Rear Side Low/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 1.785 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 1.94 W/kg
SAR(1 g) = 1.13 W/kg; SAR(10 g) = 0.504 W/kg
Maximum value of SAR (measured) = 1.52 W/kg

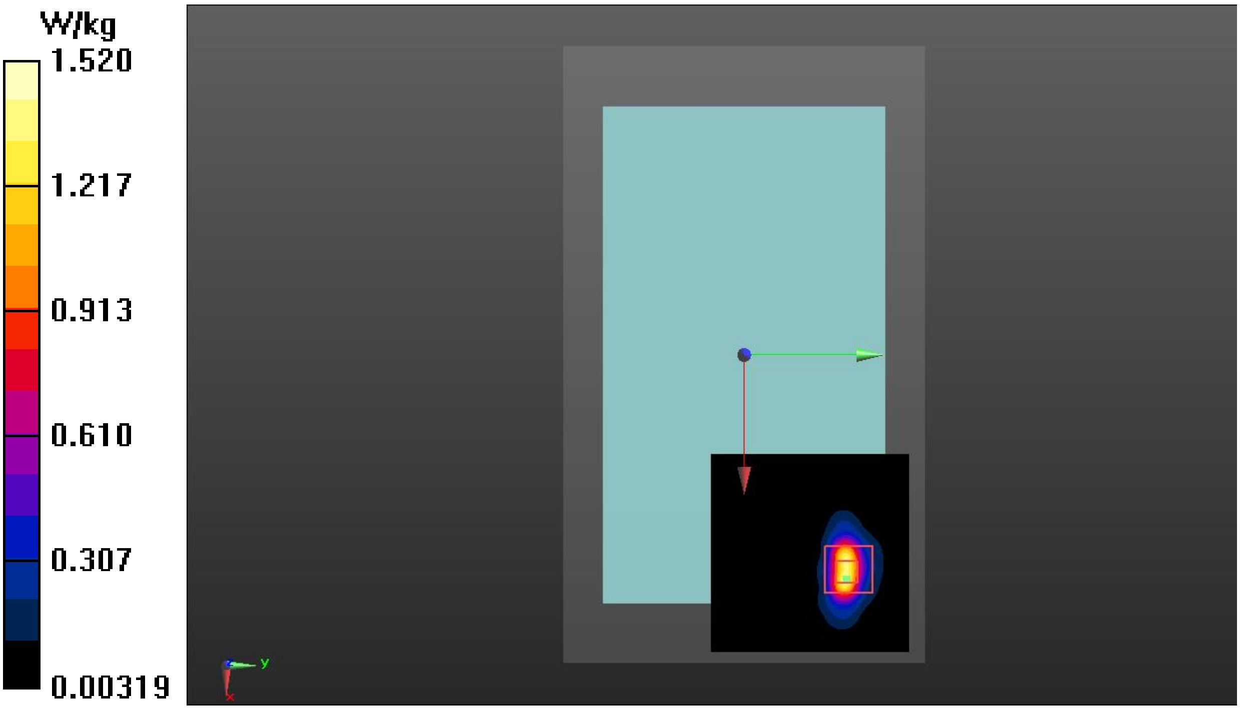


Fig.3 WCDMA Band 2 Body

WCDMA Band 5 Body
Date: 2020-6-16
Electronics: DAE4 Sn786
Medium: Head 835MHz
Medium parameters used (interpolated): f = 826.4 MHz; σ = 0.876 S/m; ε_r = 41.955; ρ = 1000 kg/m^3
Ambient Temperature: 22.0°C   Liquid Temperature: 21.5°C
Communication System: UID 0, WCDMA (0) Frequency: 826.4 MHz Duty Cycle: 1:1
Probe: EX3DV4 – SN3633 ConvF (9.59, 9.59, 9.59);

Rear Side Low/Area Scan (61x61x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 1.73 W/kg

Rear Side Low/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 7.184 V/m; Power Drift = -0.12 dB
Peak SAR (extrapolated) = 2.35 W/kg
SAR(1 g) = 1.03 W/kg; SAR(10 g) = 0.515 W/kg
Maximum value of SAR (measured) = 1.50 W/kg

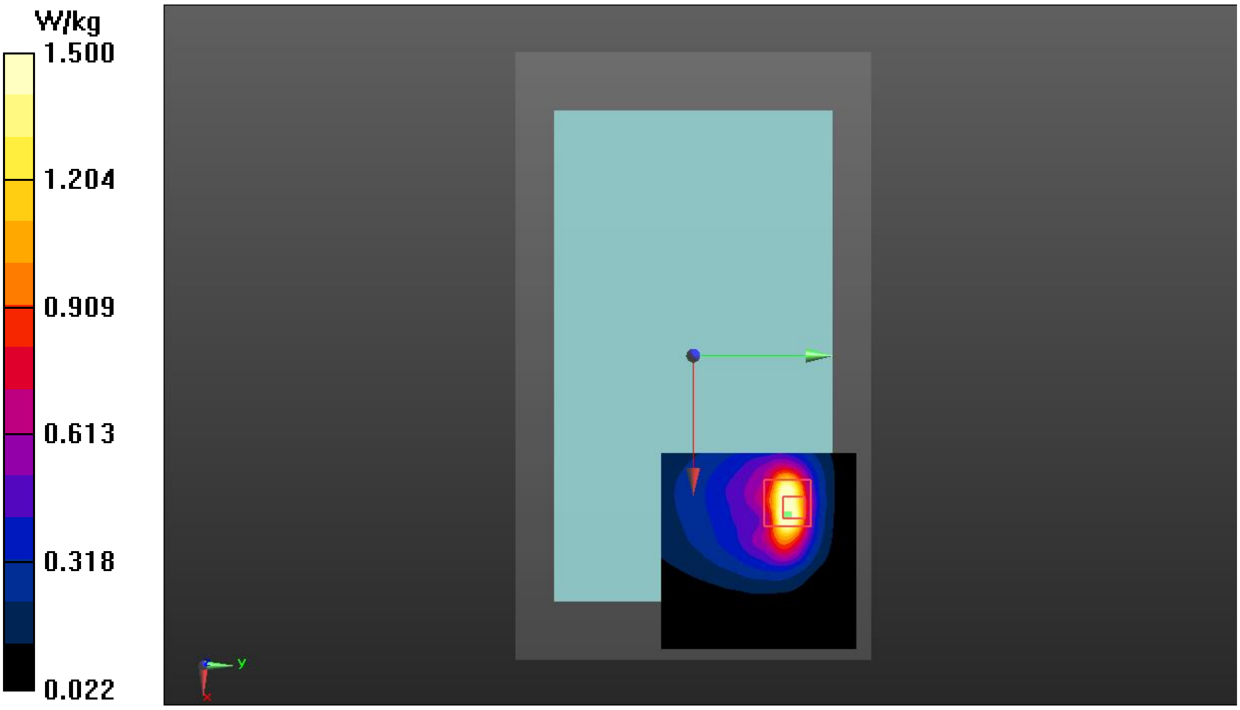


Fig.4 WCDMA Band 5 Body

LTE Band 2 Body
Date: 2020-6-18
Electronics: DAE4 Sn786
Medium: Head 1900MHz
Medium parameters used: f = 1860 MHz; σ = 1.388 S/m; ε_r = 39.429; ρ = 1000 kg/m^3
Ambient Temperature: 22.0°C Liquid Temperature: 21.5°C
Communication System: UID 0, LTE_FDD (0) Frequency: 1860 MHz Duty Cycle: 1:1
Probe: EX3DV4 – SN3633 ConvF (7.76, 7.76, 7.76);

Rear Side Low 1RB_50/Area Scan (71x61x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 1.60 W/kg

Rear Side Low 1RB_50/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 5.576 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 1.91 W/kg
SAR(1 g) = 1.17 W/kg; SAR(10 g) = 0.619 W/kg
Maximum value of SAR (measured) = 1.53 W/kg

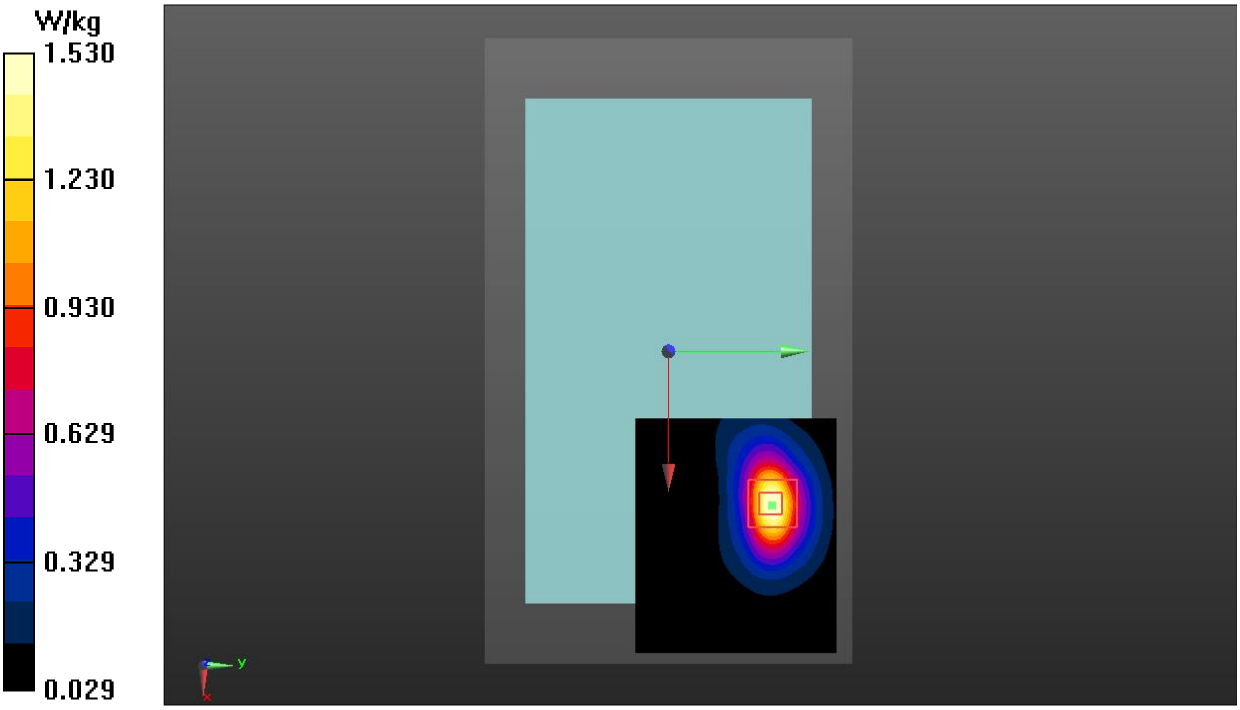


Fig.5 LTE Band 2 Body

LTE Band 4 Body

Date: 2020-6-11

Electronics: DAE4 Sn786

Medium: Head 1750MHz

Medium parameters used: f = 1745 MHz; σ = 1.382 S/m; ε_r = 39.579; ρ = 1000 kg/m^3

Ambient Temperature: 22.0°C Liquid Temperature: 21.5°C

Communication System: UID 0, LTE_FDD (0) Frequency: 1745 MHz Duty Cycle: 1:1

Probe: EX3DV4 – SN3633 ConvF (8.09, 8.09, 8.09);

Rear Side High 1RB_50/Area Scan (61x61x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 1.29 W/kg

Rear Side High 1RB_50/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 2.089 V/m; Power Drift = 0.09 dB

Peak SAR (extrapolated) = 1.93 W/kg

SAR(1 g) = 1.08 W/kg; SAR(10 g) = 0.372 W/kg

Maximum value of SAR (measured) = 1.40 W/kg

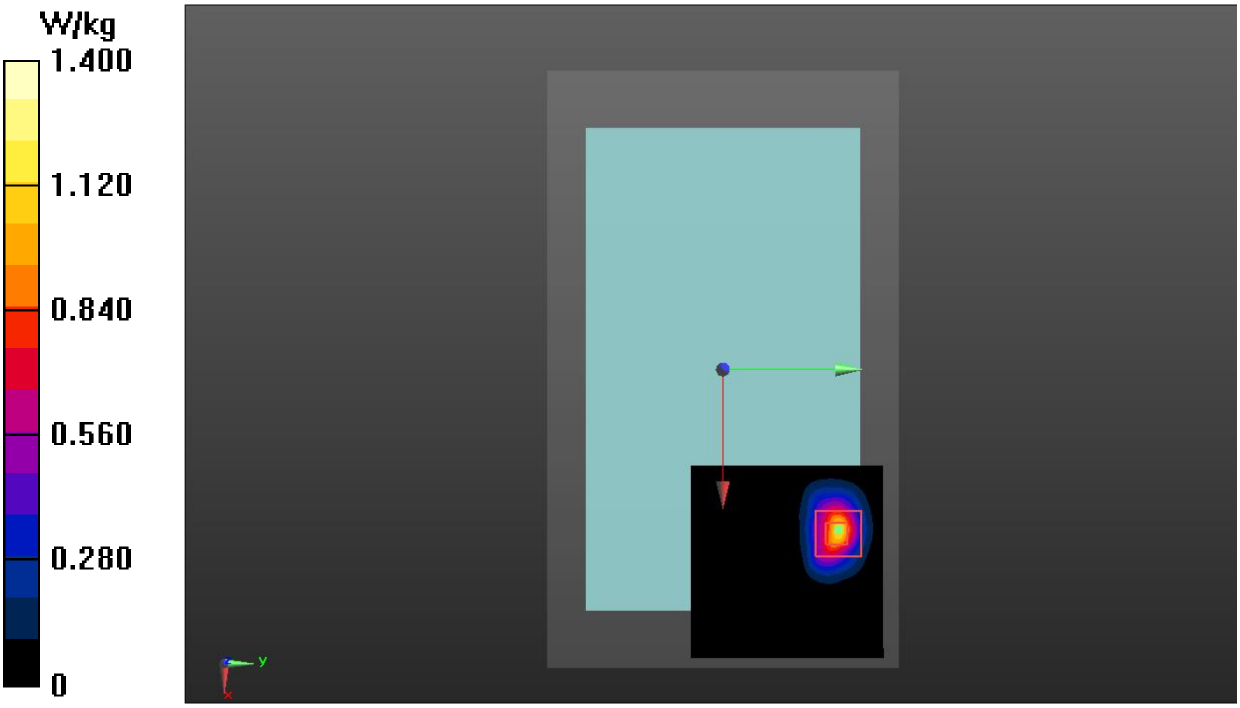


Fig.6 LTE Band 4 Body

LTE Band 5 Body

Date: 2020-6-16

Electronics: DAE4 Sn786

Medium: Head 1750MHz

Medium parameters used (interpolated): f = 829 MHz; σ = 0.879 S/m; ε_r = 41.924; ρ = 1000 kg/m^3

Ambient Temperature: 22.0°C   Liquid Temperature: 21.5°C

Communication System: UID 0, LTE_FDD (0) Frequency: 829 MHz Duty Cycle: 1:1

Probe: EX3DV4 – SN3633 ConvF (9.59, 9.59, 9.59);

Rear Side Low 1RB_25/Area Scan (61x61x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 1.74 W/kg

Rear Side Low 1RB_25/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 4.967 V/m; Power Drift = 0.03 dB

Peak SAR (extrapolated) = 2.72 W/kg

SAR(1 g) = 1.09 W/kg; SAR(10 g) = 0.536 W/kg

Maximum value of SAR (measured) = 1.93 W/kg

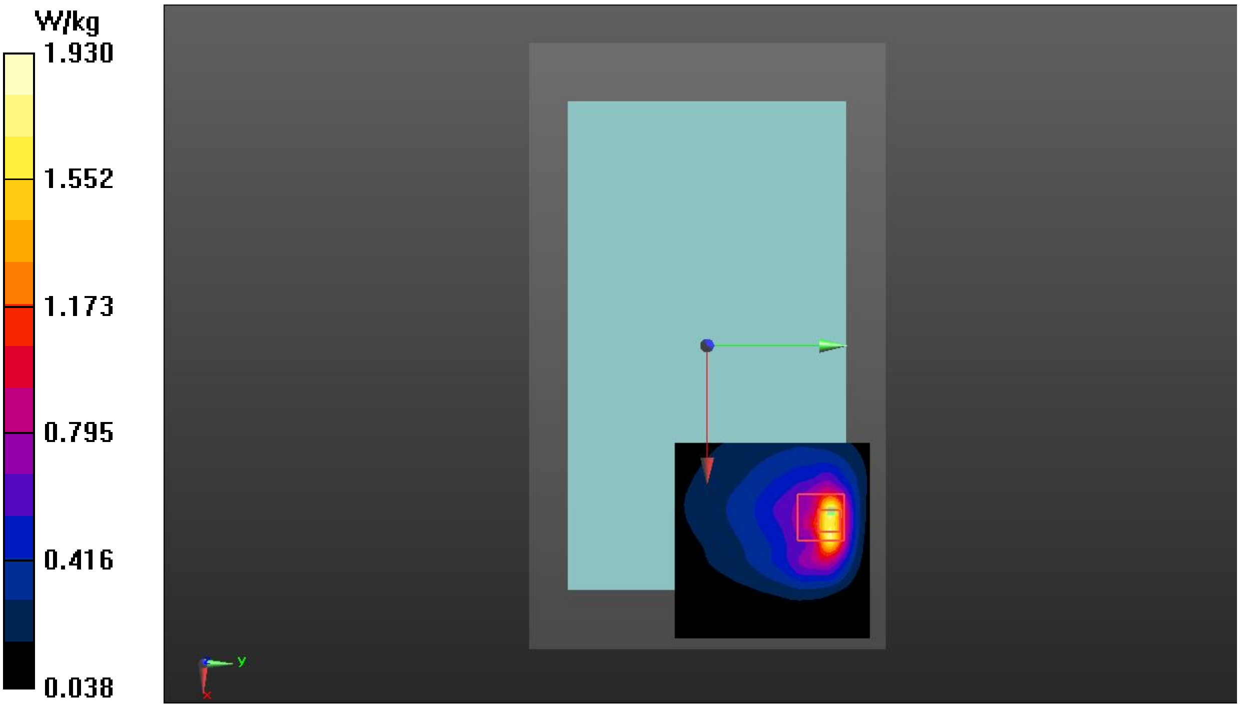


Fig.7 LTE Band 5 Body

LTE Band 7 Body

Date: 2020-6-15

Electronics: DAE4 Sn786

Medium: Head 2550MHz

Medium parameters used: f = 2560 MHz; σ = 1.954 S/m; ε_r = 37.999; ρ = 1000 kg/m^3

Ambient Temperature: 22.0°C   Liquid Temperature: 21.5°C

Communication System: UID 0, LTE_FDD (0) Frequency: 2560 MHz Duty Cycle: 1:1

Probe: EX3DV4 – SN3633 ConvF (7.20, 7.20, 7.20);

Left Side High 1RB_50/Area Scan (121x61x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 1.52 W/kg

Left Side High 1RB_50/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 3.087 V/m; Power Drift = 0.09 dB

Peak SAR (extrapolated) = 2.71 W/kg

SAR(1 g) = 1.09 W/kg; SAR(10 g) = 0.414 W/kg

Maximum value of SAR (measured) = 1.91 W/kg

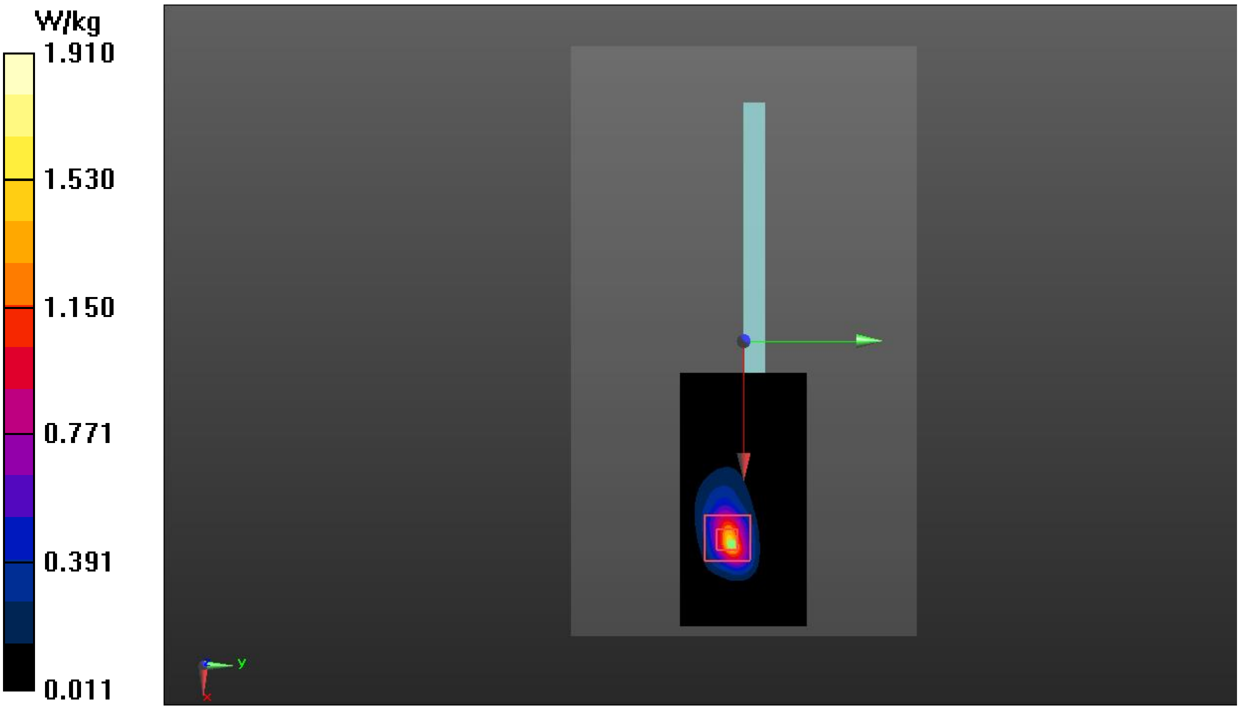


Fig.8 LTE Band 7 Body

LTE Band 38 Body
Date: 2020-6-15
Electronics: DAE4 Sn786
Medium: Head 2550MHz
Medium parameters used: f = 2580 MHz; σ = 1.977 S/m; ε_r = 39.934; ρ = 1000 kg/m^3
Ambient Temperature: 22.0^{o}C   Liquid Temperature: 21.5^{o}C
Communication System: UID 0, LTE_TDD (0) Frequency: 2580 MHz Duty Cycle: 1:1.58
Probe: EX3DV4 – SN3633 ConvF (7.20, 7.20, 7.20);

Left Side Low 50RB_0 /Area Scan (121x61x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 1.01 W/kg

Left Side Low 50RB_0/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 3.752 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 2.08 W/kg
SAR(1 g) = 0.795 W/kg; SAR(10 g) = 0.306 W/kg
Maximum value of SAR (measured) = 1.05 W/kg

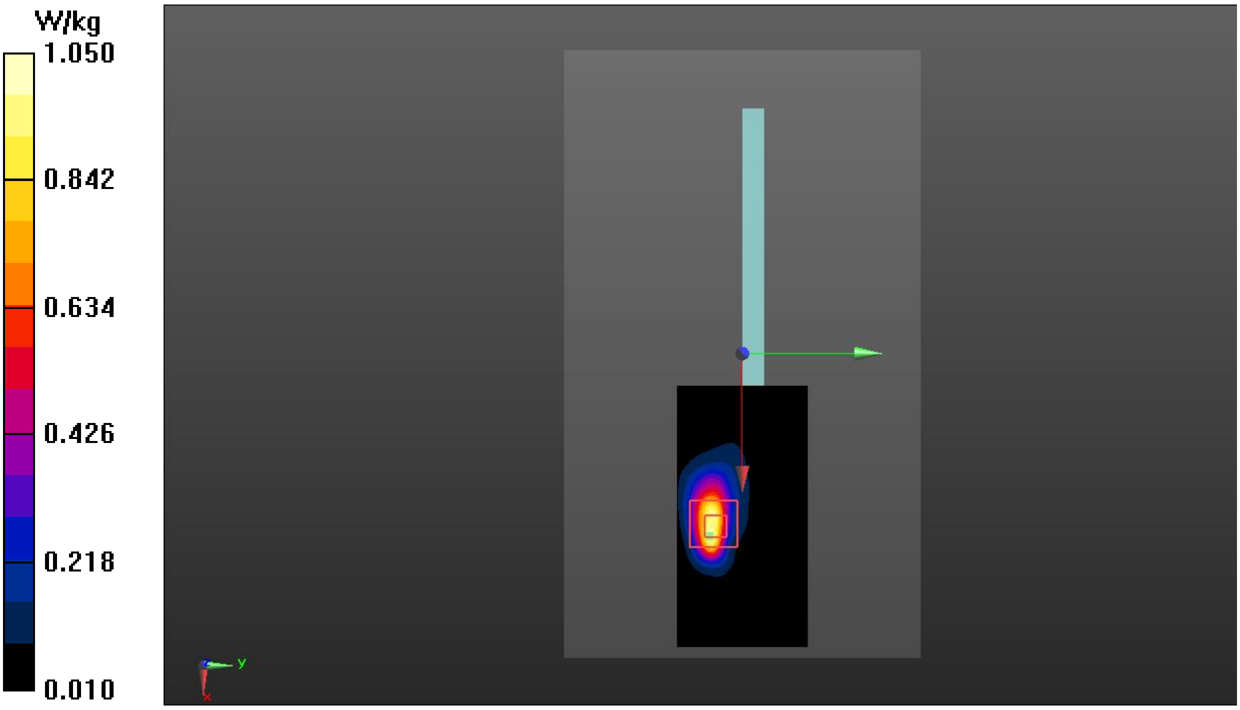


Fig.9 LTE Band 38 Body

Bluetooth 2.4G Body
Date: 2020-6-23
Electronics: DAE4 Sn786
Medium: Head 2450MHz
Medium parameters used (interpolated): f = 2441 MHz; σ = 1.824 S/m; ε_r = 38.506; ρ = 1000 kg/m^3
Ambient Temperature: 22.0°C Liquid Temperature: 21.5°C
Communication System: UID 0, BT (0) Frequency: 2441 MHz Duty Cycle: 1:1
Probe: EX3DV4 - SN3633 ConvF (7.43, 7.43, 7.43)

Rear Side Middle /Area Scan (91x91x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.022 W/kg

Rear Side Middle /Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 1.872 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 0.040 W/kg
SAR(1 g) = 0.021 W/kg; SAR(10 g) = 0.014 W/kg
Maximum value of SAR (measured) = 0.029 W/kg

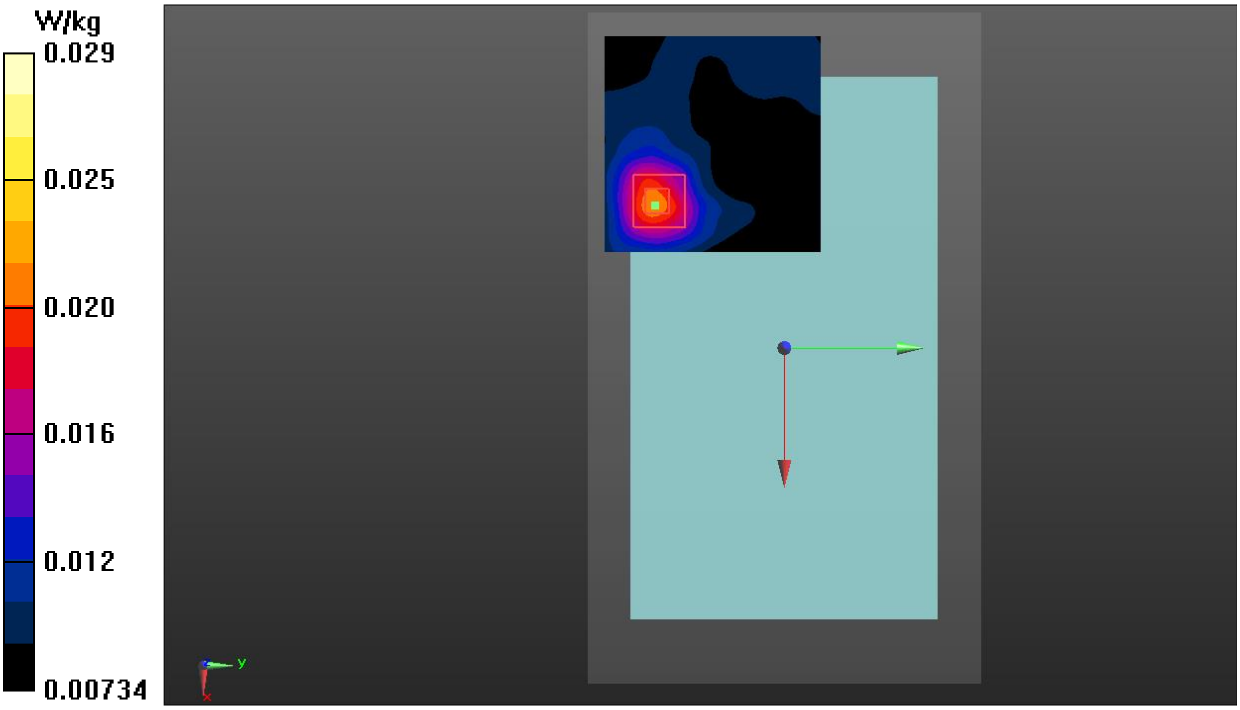


Fig.10 Bluetooth 2.4G Body

WLAN 2.4G Body

Date: 2020-6-23

Electronics: DAE4 Sn786

Medium: Head 2450MHz

Medium parameters used (interpolated): f = 2437 MHz; σ = 1.82 S/m; ε_r = 38.519; ρ = 1000 kg/m^3

Ambient Temperature: 22.0°C Liquid Temperature: 21.5°C

Communication System: UID 0, WiFi (0) Frequency: 2437 MHz Duty Cycle: 1:1

Probe: EX3DV4 - SN3633 ConvF (7.43, 7.43, 7.43)

Right Side Middle/Area Scan (91x61x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 0.188 W/kg

Right Side Middle/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 1.974 V/m; Power Drift = 0.05 dB

Peak SAR (extrapolated) = 0.290 W/kg

SAR(1 g) = 0.100 W/kg; SAR(10 g) = 0.034 W/kg

Maximum value of SAR (measured) = 0.190 W/kg

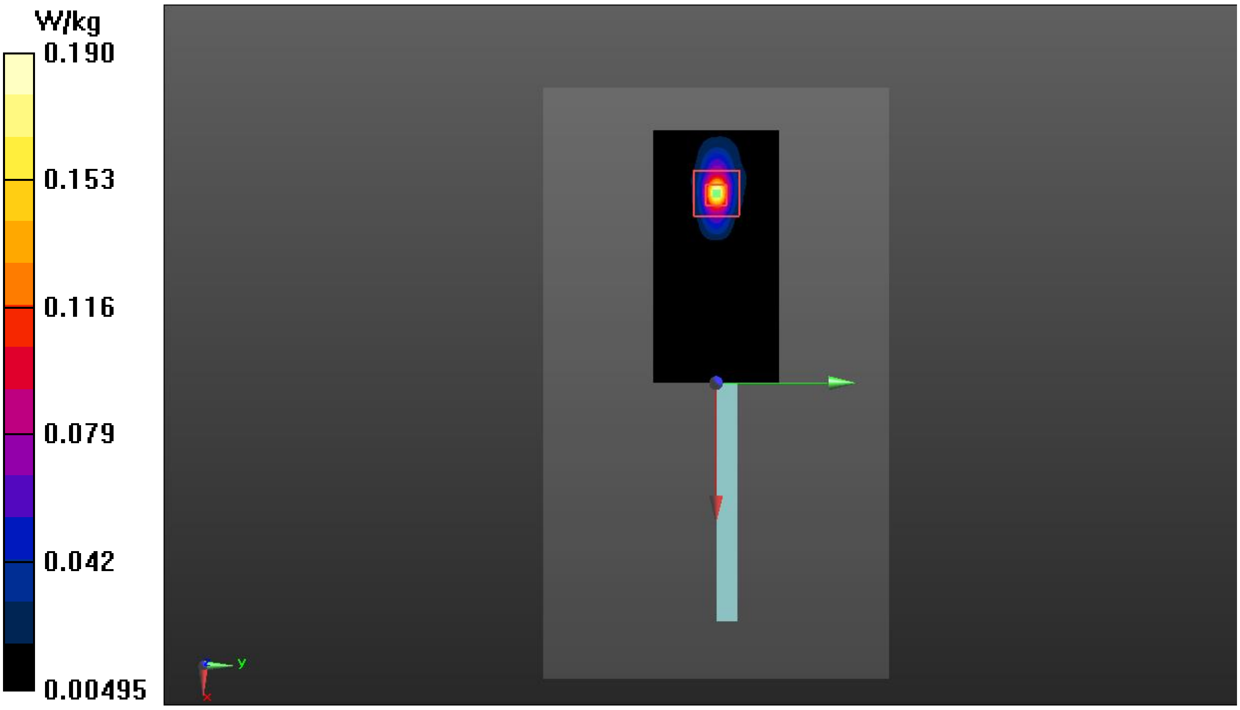


Fig.11 WLAN 2.4G Body

WLAN 5G Body
Date: 2020-6-20
Electronics: DAE4 Sn786
Medium: Head 5750MHz
Medium parameters used (interpolated): f = 5745 MHz; σ = 5.148 S/m; ε_r = 35.972; ρ = 1000 kg/m^3
Ambient Temperature: 22.0^{o}C Liquid Temperature: 21.5^{o}C
Communication System: UID 0, WiFi (0) Frequency: 5745 MHz Duty Cycle: 1:1
Probe: EX3DV4 – SN3633 ConvF (4.73, 4.73, 4.73);

Right Side Ch149/Area Scan (91x61x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 1.15 W/kg

Right Side Ch149 /Zoom Scan (8x8x21)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 2.532 V/m; Power Drift = 0.07 dB
Peak SAR (extrapolated) = 2.93 W/kg
SAR(1 g) = 0.572 W/kg; SAR(10 g) = 0.146 W/kg
Maximum value of SAR (measured) = 0.956 W/kg

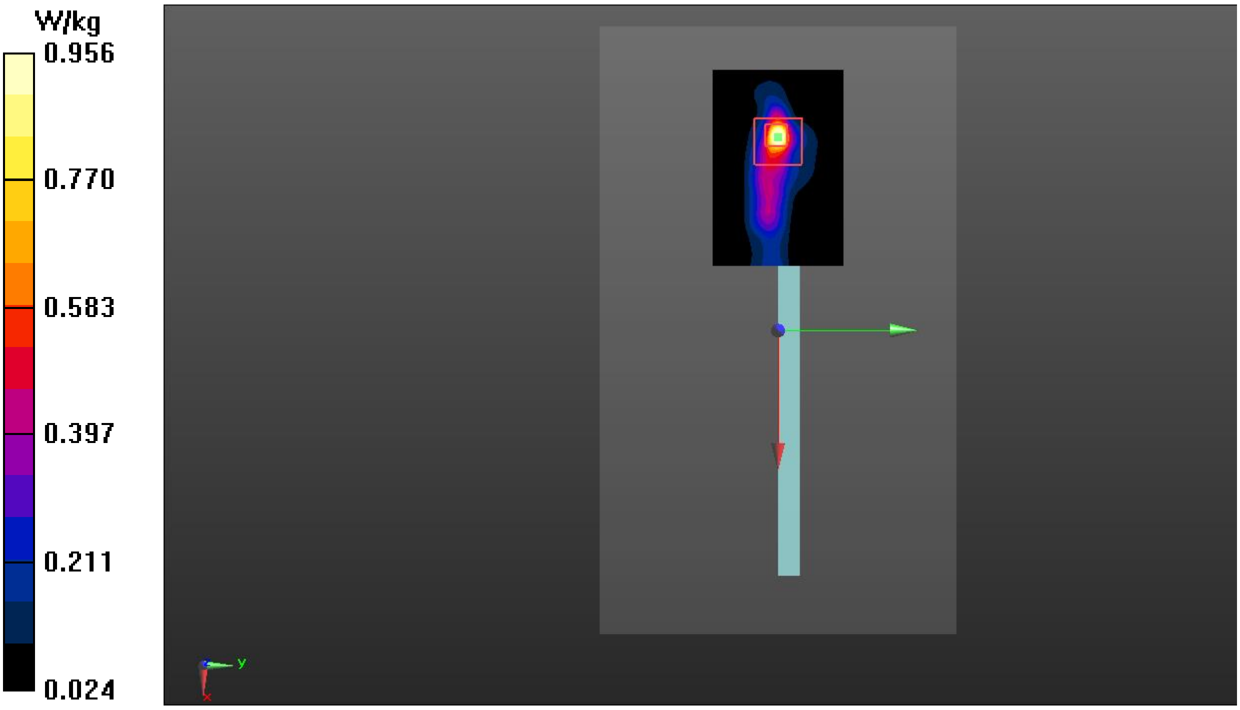


Fig.12 WLAN 5G Body

ANNEX B: SystemVerification Results

835MHz

Date: 2020-6-16

Electronics: DAE4 Sn786

Medium: Head 835MHz

Medium parameters used: f = 835 MHz; σ = 0.884 S/m; εr = 41.852; ρ = 1000 kg/m^3

Ambient Temperature: 22.5^{o}C Liquid Temperature: 22.0^{o}C

Communication System: CW Frequency: 835 MHz Duty Cycle: 1:1

Probe: EX3DV4 – SN3633 ConvF (9.59, 9.59, 9.59);

System Validation /Area Scan (91x161x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Reference Value = 59.424 V/m; Power Drift = -0.03 dB

SAR(1 g) = 2.35 W/kg; SAR(10 g) = 1.57 W/kg

Maximum value of SAR (interpolated) = 3.14 W/kg

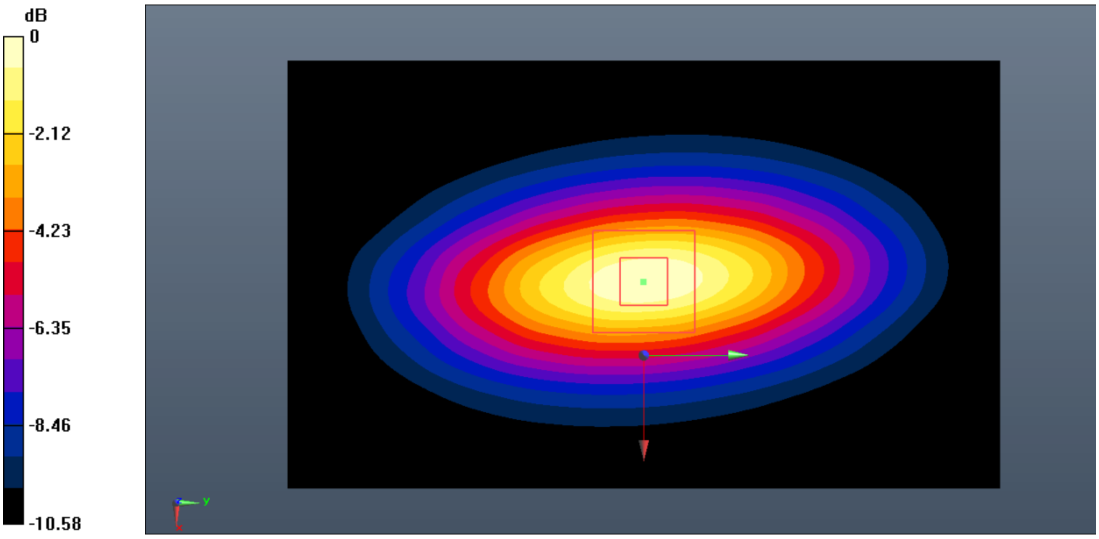
System Validation /Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 59.424 V/m; Power Drift = -0.03 dB

Peak SAR (extrapolated) = 3.59 W/kg

SAR(1 g) = 2.31 W/kg; SAR(10 g) = 1.55 W/kg

Maximum value of SAR (measured) = 3.11 W/kg



0 dB = 3.11 W/kg = 4.93 dB W/kg

Fig.B.1. Validation 835MHz 250mW

1750MHz

Date: 2020-6-11

Electronics: DAE4 Sn786

Medium: Head 1750MHz

Medium parameters used: f = 1750 MHz; σ = 1.386 S/m; ε_r = 39.559; ρ = 1000 kg/m^3

Ambient Temperature: 22.2^{o}C Liquid Temperature: 21.7^{o}C

Communication System: CW_TMC Frequency: 1750 MHz Duty Cycle: 1:1

Probe: EX3DV4 – SN3633 ConvF (8.09, 8.09, 8.09);

System Validation/Area Scan (81x121x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Reference Value = 78.895 V/m; Power Drift = 0.08 dB

SAR(1 g) = 9.22 W/kg; SAR(10 g) = 4.84 W/kg

Maximum value of SAR (interpolated) = 10.1 W/kg

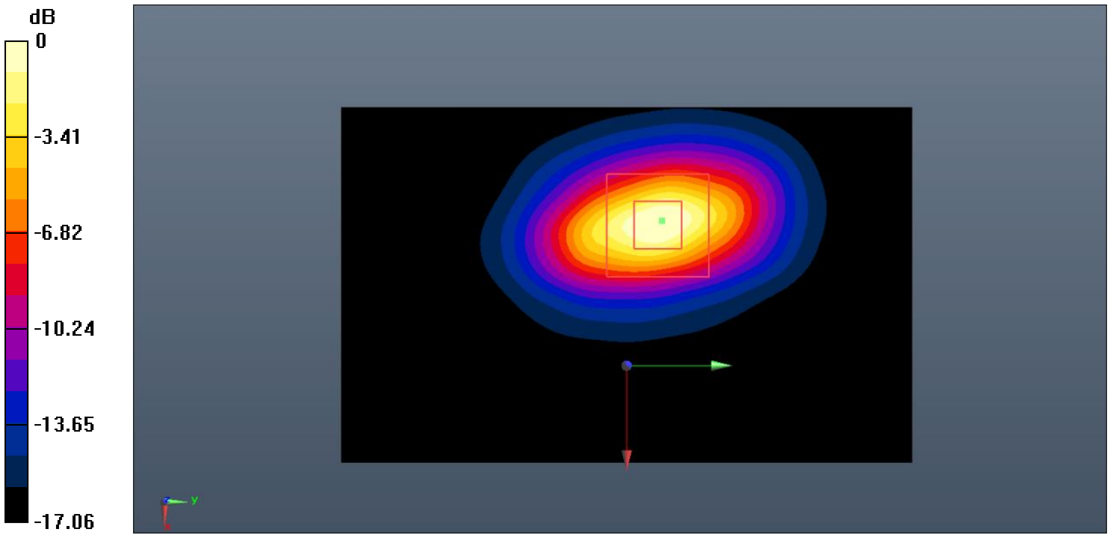
System Validation/Zoom Scan (7x7x7)/Cube0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 78.895 V/m; Power Drift = 0.08 dB

Peak SAR (extrapolated) = 19.5 W/kg

SAR(1 g) = 9.36 W/kg; SAR(10 g) = 4.92 W/kg

Maximum value of SAR (measured) = 10.3 W/kg



0 dB = 10.3 W/kg = 10.13 dB W/kg

Fig.B.2. Validation 1750MHz 250mW

1900MHz

Date: 2020-6-18

Electronics: DAE4 Sn786

Medium: Head 1900MHz

Medium parameters used: f = 1900 MHz; σ = 1.423 S/m; ε_r = 39.274; ρ = 1000 kg/m^3

Ambient Temperature: 22.5°C Liquid Temperature: 22.0°C

Communication System: CW_TMC Frequency: 1900 MHz Duty Cycle: 1:1

Probe: EX3DV4 – SN3633 ConvF (7.76, 7.76, 7.76);

System Validation/Area Scan (91x91x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Reference Value = 81.123 V/m; Power Drift = 0.10 dB

SAR(1 g) = 10.2 W/kg; SAR(10 g) = 5.24 W/kg

Maximum value of SAR (interpolated) = 11.1 W/kg

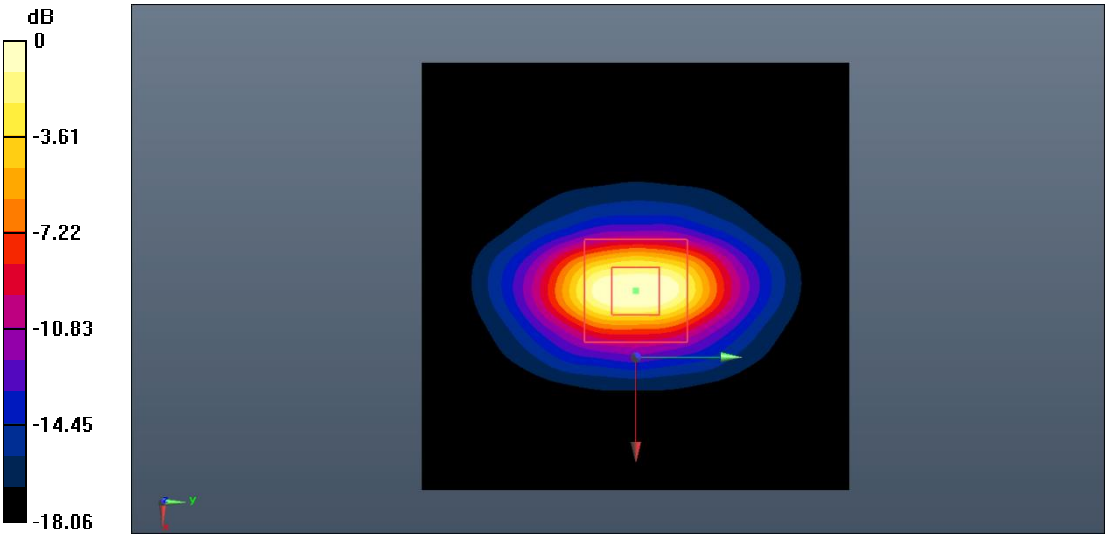
System Validation/Zoom Scan (7x7x7)/Cube0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 81.123 V/m; Power Drift = 0.10 dB

Peak SAR (extrapolated) = 21.1 W/kg

SAR(1 g) = 10.4 W/kg; SAR(10 g) = 5.33 W/kg

Maximum value of SAR (measured) = 11.5 W/kg



0 dB = 11.5 W/kg = 10.61 dB W/kg

Fig.B.3. Validation 1900MHz 250mW

2450MHz

Date: 2020-6-23

Electronics: DAE4 Sn786

Medium: Head 2450MHz

Medium parameters used: f = 2450 MHz; σ = 1.835 S/m; ε_r = 38.476; ρ = 1000 kg/m^3

Ambient Temperature: 22.3°C   Liquid Temperature: 21.8°C

Communication System: CW_TMC Frequency: 2450 MHz Duty Cycle: 1:1

Probe: EX3DV4 – SN3633 ConvF (7.43, 7.43, 7.43);

System Validation /Area Scan (81x121x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Reference Value = 88.124 V/m; Power Drift = -0.06 dB

SAR(1 g) = 13.5 W/kg; SAR(10 g) = 6.15 W/kg

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

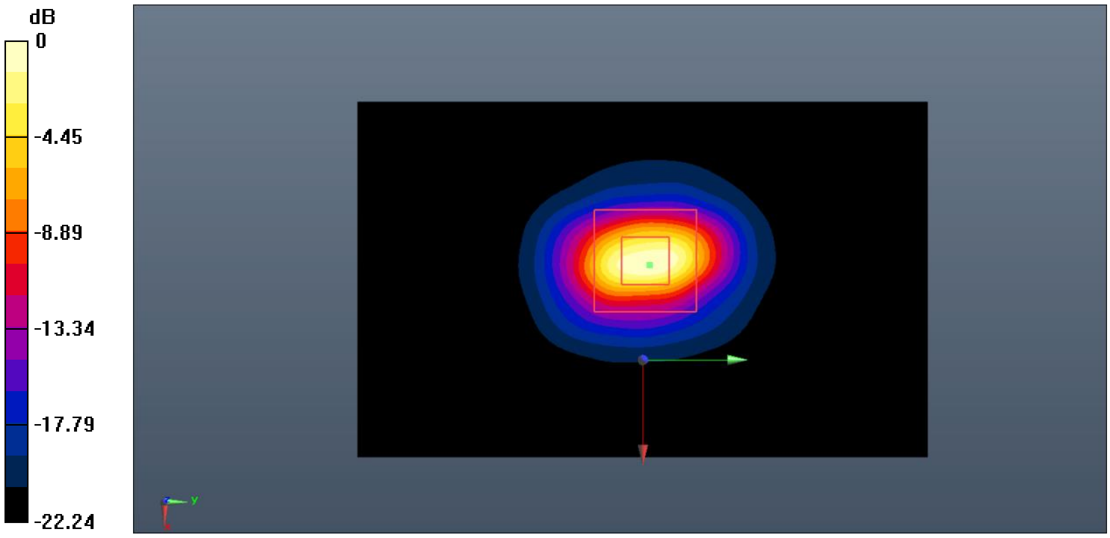
System Validation/Zoom Scan (7x7x7)/Cube0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 88.124 V/m; Power Drift = -0.06 dB

Peak SAR (extrapolated) = 28.2 W/kg

SAR(1 g) = 13.4 W/kg; SAR(10 g) = 6.12 W/kg

Maximum value of SAR (measured) = 14.6 W/kg



0 dB = 14.6 W/kg = 11.64 dB W/kg

Fig.B.4. Validation 2450MHz 250mW

2550MHz

Date: 2020-6-15

Electronics: DAE4 Sn786

Medium: Head 2550MHz

Medium parameters used: f = 2550 MHz; σ = 1.942 S/m; ε_r = 38.032; ρ = 1000 kg/m^3

Ambient Temperature: 22.5°C   Liquid Temperature: 22.0°C

Communication System: CW_TMC Frequency: 2550 MHz Duty Cycle: 1:1

Probe: EX3DV4 – SN3633 ConvF (7.20, 7.20, 7.20);

System Validation/Area Scan (91x91x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Reference Value = 92.539 V/m; Power Drift = 0.11 dB

SAR(1 g) = 14.7 W/kg; SAR(10 g) = 6.65 W/kg

Maximum value of SAR (interpolated) = 16.2 W/kg

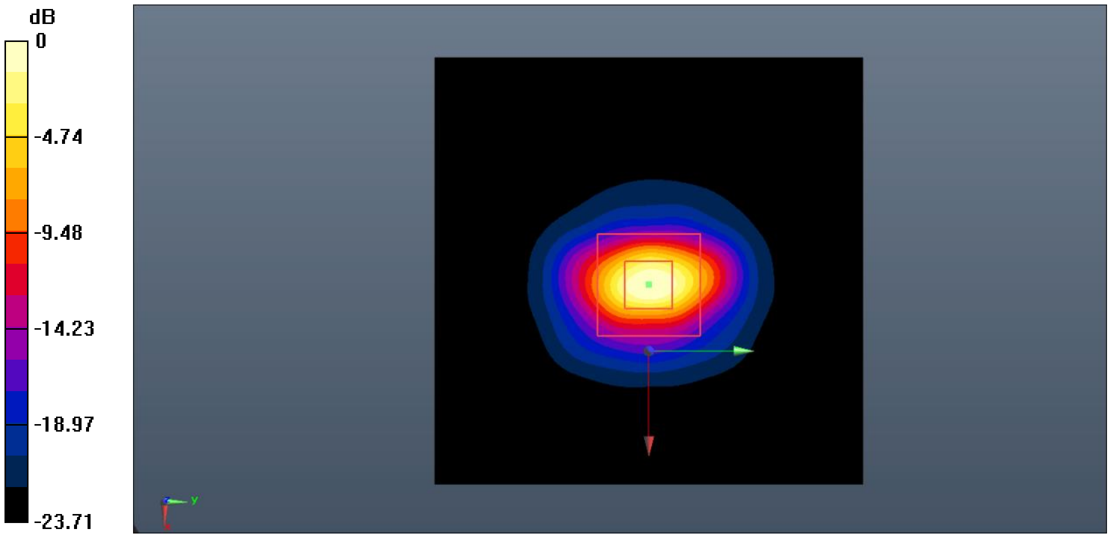
System Validation/Zoom Scan (7x7x7)/Cube0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 92.539 V/m; Power Drift = 0.11 dB

Peak SAR (extrapolated) = 33.8 W/kg

SAR(1 g) = 14.9 W/kg; SAR(10 g) = 6.77 W/kg

Maximum value of SAR (measured) = 16.5 W/kg



0 dB = 16.5 W/kg = 12.17 dB W/kg

Fig.B.5. Validation 2550MHz 250mW

5250MHz

Date: 2020-6-20

Electronics: DAE4 Sn786

Medium: Head 5250MHz

Medium parameters used: f = 5250 MHz; σ = 4.654 S/m; ε_r = 36.715; ρ = 1000 kg/m^3

Ambient Temperature: 23.0°C Liquid Temperature: 22.5°C

Communication System: CW Frequency: 5250 MHz Duty Cycle: 1:1

Probe: EX3DV4 – SN3633 ConvF (5.47, 5.47, 5.47);

System Validation/Area Scan (61x91x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Reference Value = 61.712 V/m; Power Drift = -0.08 dB

SAR(1 g) = 7.65 W/kg; SAR(10 g) = 2.23 W/kg

Maximum value of SAR (interpolated) = 9.33 W/kg

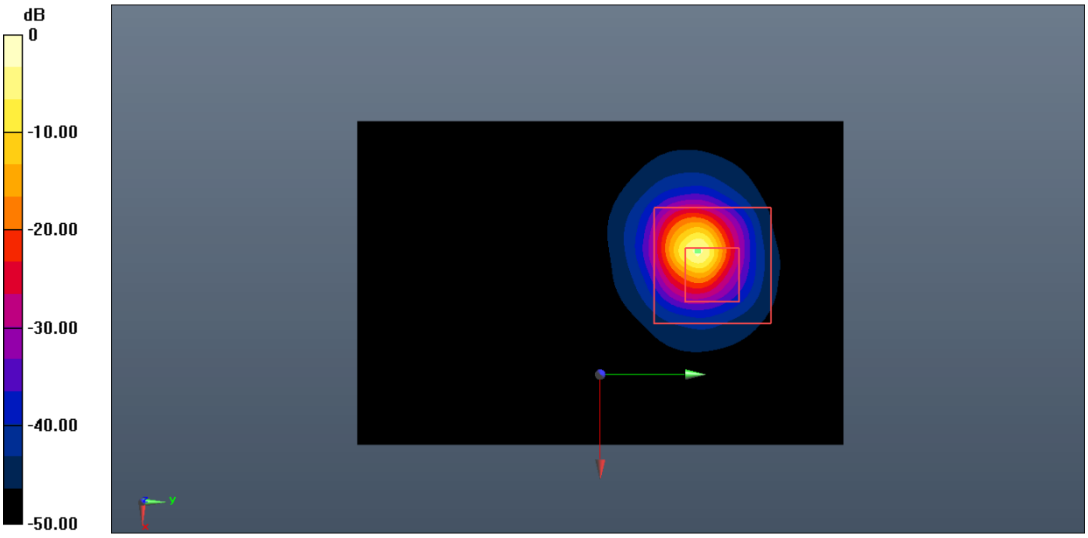
System Validation/Zoom Scan (8x8x21)/Cube0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 61.712 V/m; Power Drift = -0.08 dB

Peak SAR (extrapolated) = 24.2 W/kg

SAR(1 g) = 7.54 W/kg; SAR(10 g) = 2.18 W/kg

Maximum value of SAR (measured) = 9.27 W/kg



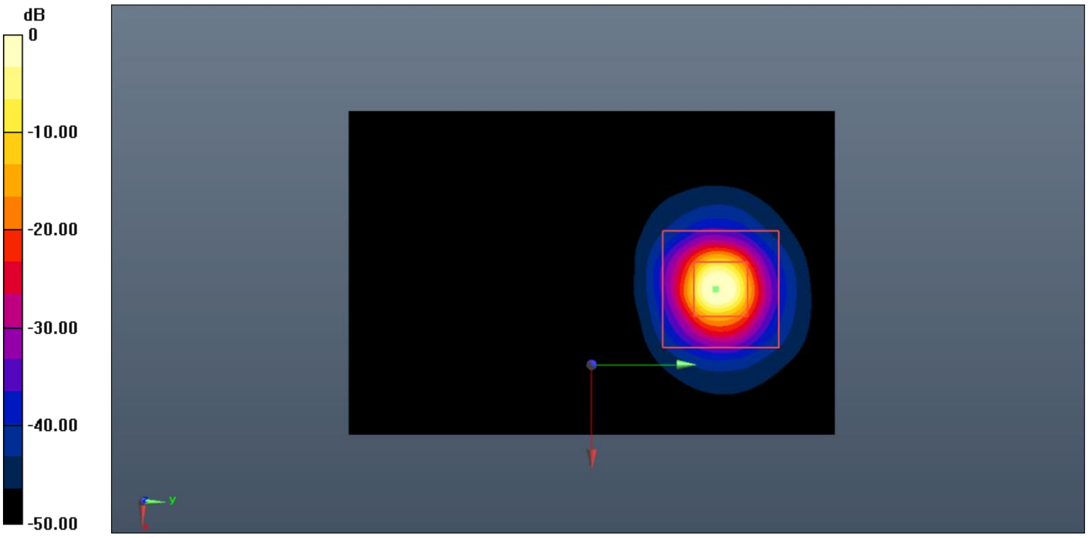
0 dB = 9.27 W/kg = 9.67 dB W/kg

Fig.B.6. Validation 5250MHz 100mW

5600MHz
Date: 2020-6-20
Electronics: DAE4 Sn786
Medium: Head 5600MHz
Medium parameters used: f = 5600 MHz; σ = 5.123 S/m; ε_r = 34.844; ρ = 1000 kg/m^3
Ambient Temperature: 23.0°C Liquid Temperature: 22.5°C
Communication System: CW Frequency: 5600 MHz Duty Cycle: 1:1
Probe: EX3DV4 – SN3633 ConvF (4.72, 4.72, 4.72);

System Validation/Area Scan (61x91x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Reference Value = 60.965 V/m; Power Drift = 0.13 dB
SAR(1 g) = 8.16 W/kg; SAR(10 g) = 2.30 W/kg
Maximum value of SAR (interpolated) = 10.2 W/kg

System Validation/Zoom Scan (8x8x21)/Cube0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 60.965 V/m; Power Drift = 0.13 dB
Peak SAR (extrapolated) = 29.1 W/kg
SAR(1 g) = 8.29 W/kg; SAR(10 g) = 2.33 W/kg
Maximum value of SAR (measured) = 10.5 W/kg



0 dB = 10.5 W/kg = 10.21 dB W/kg

Fig.B.7. Validation 5600MHz 100mW

5750MHz

Date: 2020-6-20

Electronics: DAE4 Sn786

Medium: Head 5750 MHz

Medium parameters used: f = 5750 MHz; σ = 5.155 S/m; ε_r = 35.958; ρ = 1000 kg/m^3

Ambient Temperature: 23.0^{o}C   Liquid Temperature: 22.5^{o}C

Communication System: CW Frequency: 5750 MHz Duty Cycle: 1:1

Probe: EX3DV4 – SN3633 ConvF (4.73, 4.73, 4.73);

System Validation/Area Scan (61x91x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Reference Value = 62.864 V/m; Power Drift = -0.12 dB

SAR(1 g) = 7.55 W/kg; SAR(10 g) = 2.21 W/kg

Maximum value of SAR (interpolated) = 9.16 W/kg

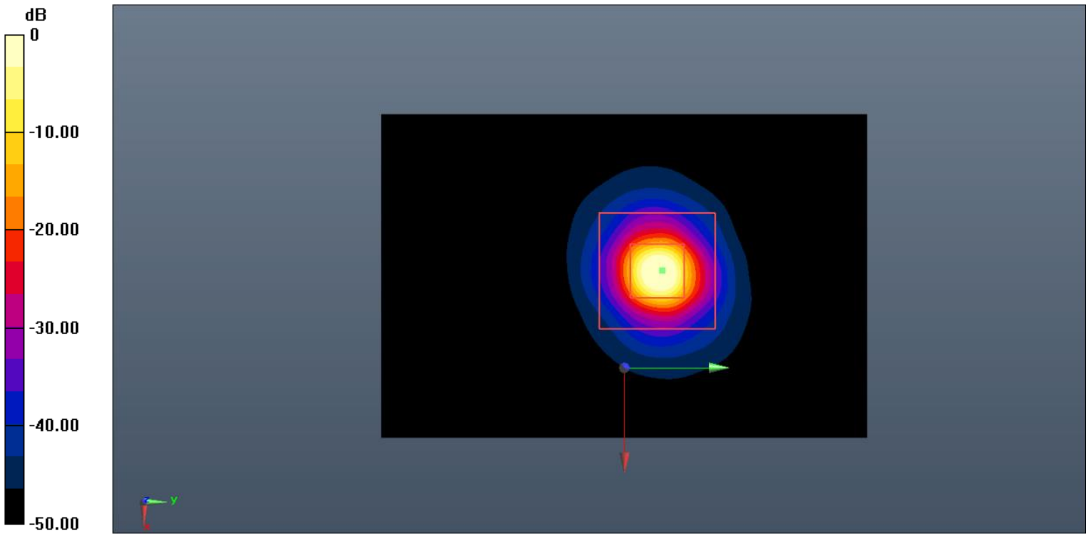
System Validation/Zoom Scan (8x8x21)/Cube0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 62.864 V/m; Power Drift = 0.09 dB

Peak SAR (extrapolated) = 24.8 W/kg

SAR(1 g) = 7.48 W/kg; SAR(10 g) = 2.16 W/kg

Maximum value of SAR (measured) = 9.11 W/kg



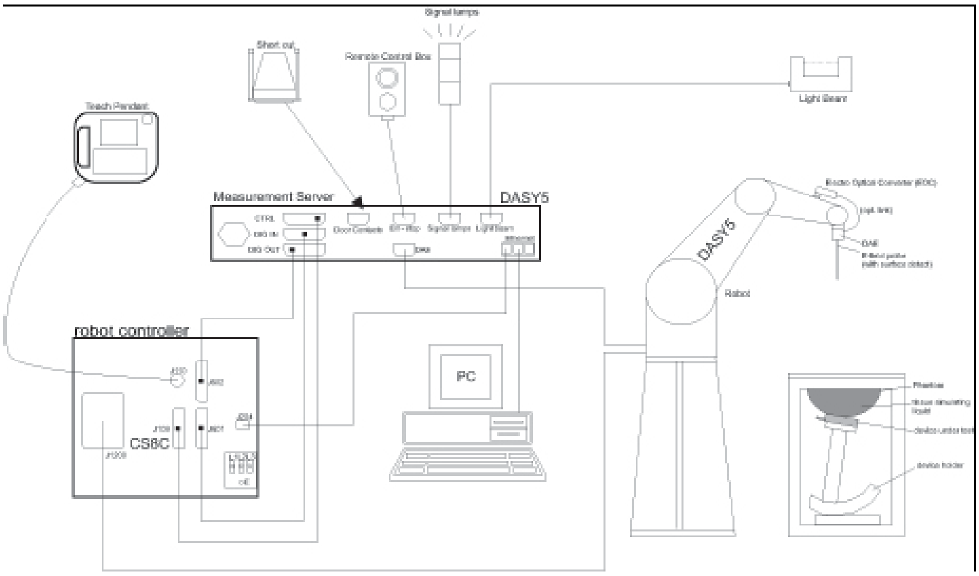
0 dB = 9.11 W/kg = 9.60 dB W/kg

Fig.B.8. Validation 5750MHz 100mW

ANNEX C: SAR Measurement Setup

C.1. Measurement Set-up

DASY5 system for performing compliance tests is illustrated above graphically. This system consists of the following items:



Picture C.1 SAR Lab Test Measurement Set-up

- A standard high precision 6-axis robot (Stäubli TX=RX family) with controller, teach pendant and software. An arm extension for accommodating the data acquisition electronics (DAE).
- An isotropic field probe optimized and calibrated for the targeted measurement.
- A data acquisition electronics (DAE) which performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. The unit is battery powered with standard or rechargeable batteries. The signal is optically transmitted to the EOC.
- The Electro-optical converter (EOC) performs the conversion from optical to electrical signals for the digital communication to the DAE. To use optical surface detection, a special version of the EOC is required. The EOC signal is transmitted to the measurement server.
- The function of the measurement server is to perform the time critical tasks such as signal filtering, control of the robot operation and fast movement interrupts.
- The Light Beam used is for probe alignment. This improves the (absolute) accuracy of the probe positioning.
- A computer running WinXP and the DASY5 software.
- Remote control and teach pendant as well as additional circuitry for robot safety such as
- warning lamps, etc.
- The phantom, the device holder and other accessories according to the targeted measurement.

C.2. DASY5 E-field Probe System

The SAR measurements were conducted with the dosimetric probe designed in the classical triangular configuration and optimized for dosimetric evaluation. The probe is constructed using the thick film technique; with printed resistive lines on ceramic substrates. The probe is equipped with an optical multifiber line ending at the front of the probe tip. It is connected to the EOC box on the robot arm and provides an automatic detection of the phantom surface. Half of the fibers are connected to a pulsed infrared transmitter, the other half to a synchronized receiver. As the probe approaches the surface, the reflection from the surface produces a coupling from the transmitting to the receiving fibers. This reflection increases first during the approach, reaches maximum and then decreases. If the probe is flatly touching the surface, the coupling is zero. The distance of the coupling maximum to the surface is independent of the surface reflectivity and largely independent of the surface to probe angle. The DASY5 software reads the reflection durning a software approach and looks for the maximum using 2ndord curve fitting. The approach is stopped at reaching the maximum.

Probe Specifications:

Model: ES3DV3, EX3DV4

Frequency Range: 10MHz — 6.0GHz(EX3DV4)
10MHz — 4GHz(ES3DV3)

Calibration: In head and body simulating tissue at Frequencies from 835 up to 5800MHz

Linearity: ± 0.2 dB(30 MHz to 6 GHz) for EX3DV4
± 0.2 dB(30 MHz to 4 GHz) for ES3DV3

Dynamic Range: 10 mW/kg — 100W/kg

Probe Length: 330 mm

Probe Tip Length: 20 mm

Body Diameter: 12 mm

Tip Diameter: 2.5 mm (3.9 mm for ES3DV3)

Tip-Center: 1 mm (2.0mm for ES3DV3)

Application: SAR Dosimetry Testing
Compliance tests of mobile phones
Dosimetry in strong gradient fields

Picture C.2 Near-field Probe

Picture C.3 E-field Probe

C.3. E-field Probe Calibration

Each E-Probe/Probe Amplifier combination has unique calibration parameters. A TEM cell calibration procedure is conducted to determine the proper amplifier settings to enter in the probe parameters. The amplifier settings are determined for a given frequency by subjecting the probe to a known E-field density (1 mW/cm^2) using an RF Signal generator, TEM cell, and RF Power Meter.

The free space E-field from amplified probe outputs is determined in a test chamber. This calibration can be performed in a TEM cell if the frequency is below 1 GHz and inn a waveguide or other methodologies above 1 GHz for free space. For the free space calibration, the probe is placed in the volumetric center of the cavity and at the proper orientation with the field. The probe is then rotated 360 degrees until the three channels show the maximum reading. The power density readings equates to 1 mW/ cm^2.

E-field temperature correlation calibration is performed in a flat phantom filled with the appropriate simulated brain tissue. The E-field in the medium correlates with the temperature rise in the dielectric medium. For temperature correlation calibration a RF transparent thermistor-based temperature probe is used in conjunction with the E-field probe.

$$SAR = C\frac{\Delta T}{\Delta t}$$

Where:

Δt = Exposure time (30 seconds),

C = Heat capacity of tissue (brain or muscle),

ΔT = Temperature increase due to RF exposure.

$$SAR = \frac{|E|^2 \cdot \sigma}{\rho}$$

Where:

σ = Simulated tissue conductivity,

ρ = Tissue density (kg/m^3).

C.4. Other Test Equipment

C.4.1. Data Acquisition Electronics (DAE)

The data acquisition electronics consist of a highly sensitive electrometer-grade preamplifier with auto-zeroing, a channel and gain-switching multiplexer, a fast 16 bit AD-converter and a command decoder with a control logic unit. Transmission to the measurement server is accomplished through an optical downlink for data and status information, as well as an optical uplink for commands and the clock.

The mechanical probe mounting device includes two different sensor systems for frontal and sideways probe contacts. They are used for mechanical surface detection and probe collision detection.

The input impedance of the DAE is 200 MOhm; the inputs are symmetrical and floating. Common mode rejection is above 80 dB.

PictureC.4: DAE

C.4.2. Robot

The SPEAG DASY system uses the high precision robots (DASY5: RX160L) type from Stäubli SA (France). For the 6-axis controller system, the robot controller version from Stäubli is used. The Stäubli robot series have many features that are important for our application:

- High precision (repeatability 0.02mm)
- High reliability (industrial design)
- Low maintenance costs (virtually maintenance free due to direct drive gears; no belt drives)
- Jerk-free straight movements (brushless synchron motors; no stepper motors)
- Low ELF interference (motor control fields shielded via the closed metallic construction shields)

Picture C.5 DASY 5

C.4.3. Measurement Server

The Measurement server is based on a PC/104 CPU broad with CPU (DASY5: 400 MHz, Intel Celeron), chipdisk (DASY5:128MB), RAM (DASY5:128MB). The necessary circuits for communication with the DAE electronic box, as well as the 16 bit AD converter system for optical detection and digital I/O interface are contained on the DASY I/O broad, which is directly connected to the PC/104 bus of the CPU broad.

The measurement server performs all real-time data evaluation of field measurements and surface detection, controls robot movements and handles safety operation. The PC operating system cannot interfere with these time critical processes. All connections are supervised by a watchdog, and disconnection of any of the cables to the measurement server will automatically disarm the robot and disable all program-controlled robot movements. Furthermore, the measurement server is equipped with an expansion port which is reserved for future applications. Please note that this expansion port does not have a standardized pinout, and therefore only devices provided by SPEAG can be connected. Devices from any other supplier could seriously damage the measurement server.

Picture C.6 Server for DASY 5

C.4.4. Device Holder for Phantom

The SAR in the phantom is approximately inversely proportional to the square of the distance between the source and the liquid surface. For a source at 5mm distance, a positioning uncertainty of ±0.5mm would produce a SAR uncertainty of ±20%. Accurate device positioning is therefore crucial for accurate and repeatable measurements. The positions in which the devices must be measured are defined by the standards.

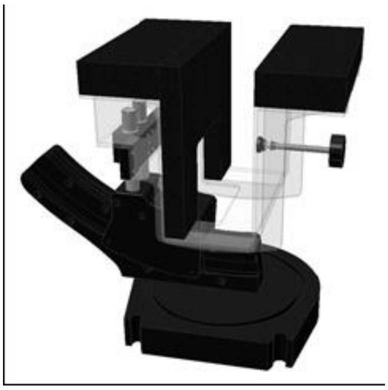
The DASY device holder is designed to cope with the different positions given in the standard. It has two scales for device rotation (with respect to the body axis) and device inclination (with respect to the line between the ear reference points). The rotation centers for both scales is the ear reference point (ERP). Thus the device needs no repositioning when changing the angles.

The DASY device holder is constructed of low-loss POM material having the following dielectric parameters: relative permittivity ε =3 and loss tangent δ =0.02. The amount of dielectric material has been reduced in the closest vicinity of the device, since measurements have suggested that the influence of the clamp on the test results could thus be lowered.

<Laptop Extension Kit>

The extension is lightweight and made of POM, acrylic glass and foam. It fits easily on the upper part of the Mounting Device in place of the phone positioner. The extension is fully compatible with the Twin-SAM and ELI phantoms.

Picture C.7-1: Device Holder



Picture C.7-2: Laptop Extension Kit

C.4.5. Phantom

The SAM Twin Phantom V4.0 is constructed of a fiberglass shell integrated in a table. The shape of the shell is based on data from an anatomical study designed to Represent the 90th percentile of the population. The phantom enables the dissymmetric evaluation of SAR for both left and right handed handset usage, as well as body-worn usage using the flat phantom region. Reference markings on the Phantom allow the complete setup of all predefined phantom positions and measurement grids by manually teaching three points in the robot. The shell phantom has a 2mm shell thickness (except the ear region where shell thickness increases to 6 mm).

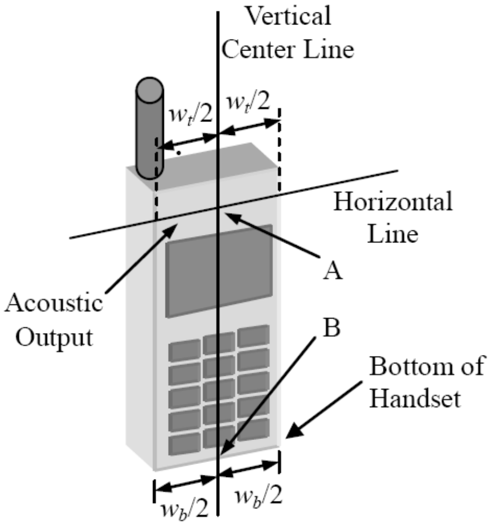
Shell Thickness:	2 ± 0. 2 mm
Filling Volume:	Approx. 25 liters
Dimensions:	810 x l000 x 500 mm (H x L x W)
Available:	Special

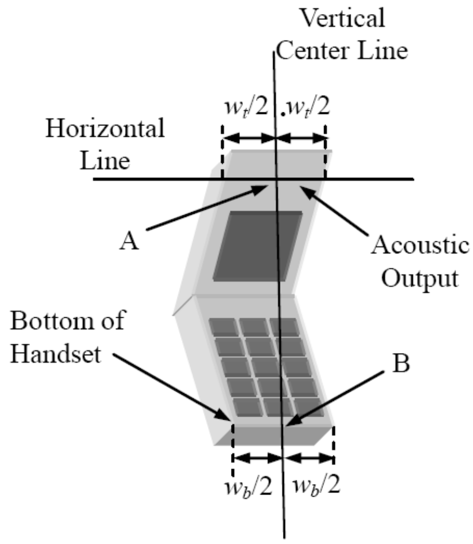
Picture C.8: SAM Twin Phantom

ANNEX D: Position of the wireless device in relation to the phantom

D.1. General considerations

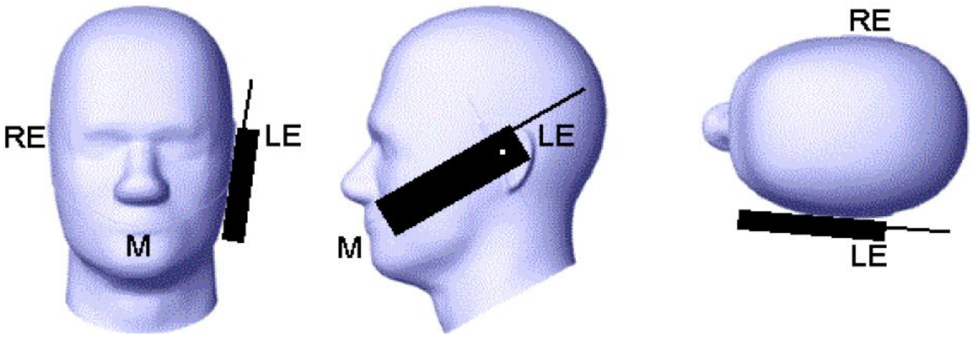
This standard specifies two handset test positions against the head phantom – the “cheek” position and the “tilt” position.



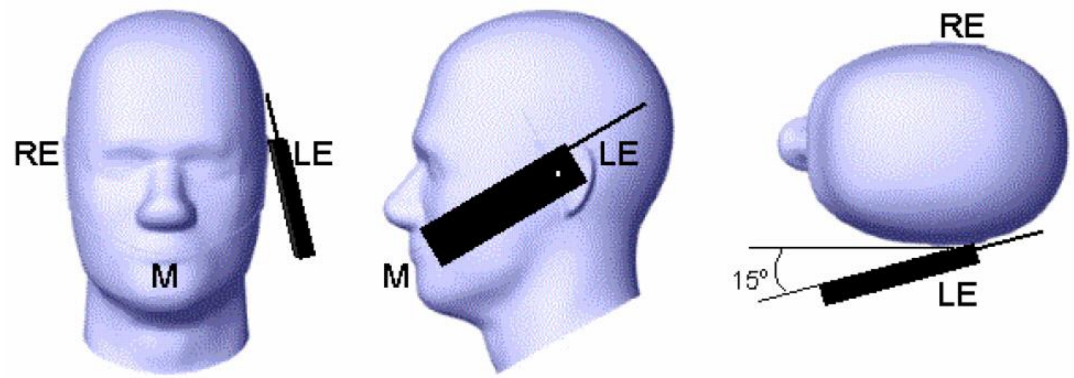


w_t	Width of the handset at the level of the acoustic
w_b	Width of the bottom of the handset
A	Midpoint of the width w_t of the handset at the level of the acoustic output
B	Midpoint of the width w_b of the bottom of the handset

Picture D.1-a Typical “fixed” case handset **Picture D.1-b Typical “clam-shell” case handset**



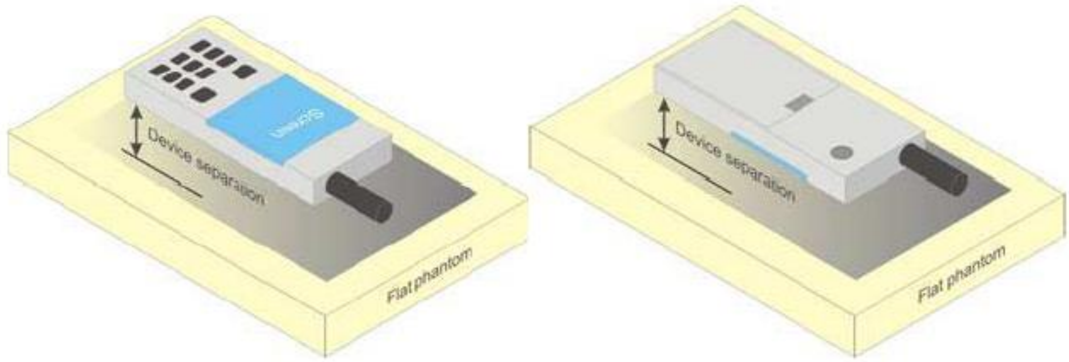
Picture D.2 Cheek position of the wireless device on the left side of SAM



Picture D.3 Tilt position of the wireless device on the left side of SAM

D.2. Body-worn device

A typical example of a body-worn device is a mobile phone, wireless enabled PDA or other battery operated wireless device with the ability to transmit while mounted on a person's body using a carry accessory approved by the wireless device manufacturer.

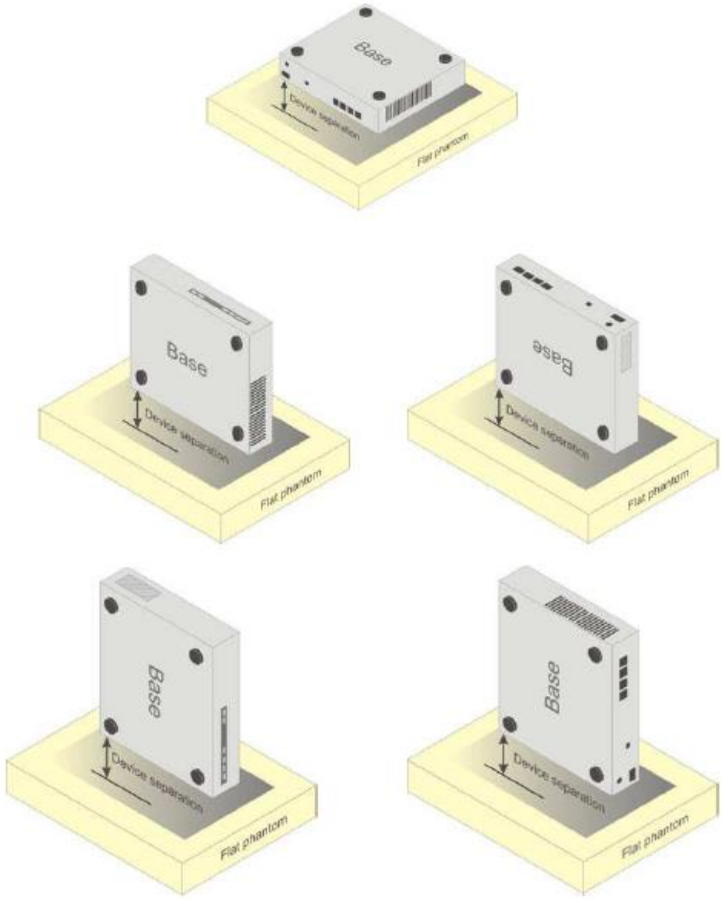


Picture D.4 Test positions for body-worn devices

D.3. Desktop device

A typical example of a desktop device is a wireless enabled desktop computer placed on a table or desk when used.

The DUT shall be positioned at the distance and in the orientation to the phantom that corresponds to the intended use as specified by the manufacturer in the user instructions. For devices that employ an external antenna with variable positions, tests shall be performed for all antenna positions specified. Picture 8.5 show positions for desktop device SAR tests. If the intended use is not specified, the device shall be tested directly against the flat phantom.



Picture D.5 Test positions for desktop devices

D.4. DUT Setup Photos

Picture D.6

ANNEX E: Equivalent Media Recipes

The liquid used for the frequency range of 700-6000 MHz consisted of water, sugar, salt, preventol, glycol monobutyl and Cellulose. The liquid has been previously proven to be suited for worst-case. The Table E.1 shows the detail solution. It's satisfying the latest tissue dielectric parameters requirements proposed by the IEEE 1528 and IEC 62209.

Table E.1: Composition of the Tissue Equivalent Matter

Frequency (MHz)	835 Head	835 Body	1900 Head	1900 Body	2450 Head	2450 Body	5800 Head	5800 Body
Ingredients (% by weight)								
Water	41.45	52.5	55.242	69.91	58.79	72.60	65.53	65.53
Sugar	56.0	45.0	\	\	\	\	\	\
Salt	1.45	1.4	0.306	0.13	0.06	0.18	\	\
Preventol	0.1	0.1	\	\	\	\	\	\
Cellulose	1.0	1.0	\	\	\	\	\	\
Glycol Monobutyl	\	\	44.452	29.96	41.15	27.22	\	\
Diethylenglycol monohexylether	\	\	\	\	\	\	17.24	17.24
Triton X-100	\	\	\	\	\	\	17.24	17.24
Dielectric Parameters Target Value	ε=41.5 σ=0.90	ε=55.2 σ=0.97	ε=40.0 σ=1.40	ε=53.3 σ=1.52	ε=39.2 σ=1.80	ε=52.7 σ=1.95	ε=35.3 σ=5.27	ε=48.2 σ=6.00

Note: There is a little adjustment respectively for 750, 1800, 2600, 5200, 5300, and 5600, based on the recipe of closest frequency in table E.1

ANNEX F: System Validation

The SAR system must be validated against its performance specifications before it is deployed. When SAR probes, system components or software are changed, upgraded or recalibrated, these must be validated with the SAR system(s) that operates with such components.

Table F.1: System Validation

Probe SN.	Liquid name	Validation date	Frequency point	Status (OK or Not)
3633	Head 750MHz	2020-04-03	750 MHz	OK
3633	Head 900MHz	2020-04-03	900 MHz	OK
3633	Head 1750MHz	2020-04-03	1750 MHz	OK
3633	Head 1900MHz	2020-04-03	1900 MHz	OK
3633	Head 2300MHz	2020-04-04	2300 MHz	OK
3633	Head 2450MHz	2020-04-04	2450 MHz	OK
3633	Head 2550MHz	2020-04-04	2550 MHz	OK
3633	Head 5200MHz	2020-04-05	5250 MHz	OK
3633	Head 5600MHz	2020-04-05	5600 MHz	OK
3633	Head 5750MHz	2020-04-05	5750 MHz	OK

ANNEX G: DAE Calibration Certificate

DAE4 SN: 786 Calibration Certificate

In Collaboration with s p e a g CALIBRATION LABORATORY

Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China
Tel: +86-10-62304633-2512 Fax: +86-10-62304633-2504
E-mail: cttl@chinattl.com Http://www.chinattl.cn

中国认可 国际互认 校准 CALIBRATION CNAS L0570

Client : CTTL(South Branch) Certificate No: Z20-60101

CALIBRATION CERTIFICATE

Object	DAE4 - SN: 786
Calibration Procedure(s)	FF-Z11-002-01 Calibration Procedure for the Data Acquisition Electronics (DAEx)
Calibration date:	March 03, 2020

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)℃ and humidity<70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
Process Calibrator 753	1971018	24-Jun-19 (CTTL, No.J19X05126)	Jun-20

	Name	Function	Signature
Calibrated by:	Yu Zongying	SAR Test Engineer	
Reviewed by:	Lin Hao	SAR Test Engineer	
Approved by:	Qi Dianyuan	SAR Project Leader	

Issued: March 05, 2020

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

Certificate No: Z20-60101 Page 1 of 3

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Glossary:

DAE	data acquisition electronics
Connector angle	information used in DASY system to align probe sensor X to the robot coordinate system.

Methods Applied and Interpretation of Parameters:

- *DC Voltage Measurement*: Calibration Factor assessed for use in DASY system by comparison with a calibrated instrument traceable to national standards. The figure given corresponds to the full scale range of the voltmeter in the respective range.
- *Connector angle*: The angle of the connector is assessed measuring the angle mechanically by a tool inserted. Uncertainty is not required.
- The report provide only calibration results for DAE, it does not contain other performance test results.