

Full Power								
LTE Band 66			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	1777.5MHz	23.01	21.98	20.91	24.0	23.0	22.0
		1745.0MHz	22.84	21.82	20.83	24.0	23.0	22.0
		1712.5MHz	23.23	22.18	21.09	24.0	23.0	22.0
	1RB_12	1777.5MHz	22.97	21.83	20.84	24.0	23.0	22.0
		1745.0MHz	22.85	21.89	20.97	24.0	23.0	22.0
		1712.5MHz	23.09	22.01	20.88	24.0	23.0	22.0
	1RB_0	1777.5MHz	22.99	21.81	20.64	24.0	23.0	22.0
		1745.0MHz	22.92	21.61	20.38	24.0	23.0	22.0
		1712.5MHz	23.17	22.00	20.77	24.0	23.0	22.0
	12RB_13	1777.5MHz	21.94	21.00	19.90	23.0	22.0	21.0
		1745.0MHz	22.11	21.08	19.98	23.0	22.0	21.0
		1712.5MHz	22.07	21.02	20.00	23.0	22.0	21.0
	12RB_6	1777.5MHz	21.87	20.89	19.85	23.0	22.0	21.0
		1745.0MHz	21.94	20.81	19.75	23.0	22.0	21.0
		1712.5MHz	21.99	20.88	19.93	23.0	22.0	21.0
	12RB_0	1777.5MHz	21.96	20.91	19.86	23.0	22.0	21.0
		1745.0MHz	22.01	20.87	19.70	23.0	22.0	21.0
		1712.5MHz	22.09	21.01	19.86	23.0	22.0	21.0
	25RB_0	1777.5MHz	21.99	21.20	20.38	23.0	22.0	21.0
		1745.0MHz	22.02	21.17	20.40	23.0	22.0	21.0
		1712.5MHz	21.99	21.13	20.16	23.0	22.0	21.0

Full Power								
LTE Band 66			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	1775.0MHz	22.96	22.02	20.89	24.0	23.0	22.0
		1745.0MHz	22.83	21.82	20.76	24.0	23.0	22.0
		1715.0MHz	23.23	22.16	21.09	24.0	23.0	22.0
	1RB_24	1775.0MHz	23.02	21.88	20.88	24.0	23.0	22.0
		1745.0MHz	22.87	21.87	20.94	24.0	23.0	22.0
		1715.0MHz	23.06	22.03	20.93	24.0	23.0	22.0
	1RB_0	1775.0MHz	23.02	21.88	20.68	24.0	23.0	22.0
		1745.0MHz	22.96	21.64	20.39	24.0	23.0	22.0
		1715.0MHz	23.19	22.00	20.75	24.0	23.0	22.0
	25RB_25	1775.0MHz	21.97	20.98	19.84	23.0	22.0	21.0
		1745.0MHz	22.08	21.14	19.97	23.0	22.0	21.0
		1715.0MHz	22.05	20.99	20.08	23.0	22.0	21.0
	25RB_12	1775.0MHz	21.96	20.87	19.78	23.0	22.0	21.0
		1745.0MHz	21.87	20.84	19.71	23.0	22.0	21.0
		1715.0MHz	22.00	20.90	19.90	23.0	22.0	21.0
	25RB_0	1775.0MHz	21.91	20.91	19.80	23.0	22.0	21.0
		1745.0MHz	22.00	20.85	19.70	23.0	22.0	21.0
		1715.0MHz	22.04	20.98	19.82	23.0	22.0	21.0
	50RB_0	1775.0MHz	22.04	21.18	20.34	23.0	22.0	21.0
		1745.0MHz	21.97	21.20	20.38	23.0	22.0	21.0
		1715.0MHz	21.99	21.07	20.15	23.0	22.0	21.0

Full Power								
LTE Band 66			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	1772.5MHz	22.97	21.98	20.95	24.0	23.0	22.0
		1745.0MHz	22.81	21.77	20.81	24.0	23.0	22.0
		1717.5MHz	23.25	22.21	21.10	24.0	23.0	22.0
	1RB_37	1772.5MHz	22.98	21.87	20.85	24.0	23.0	22.0
		1745.0MHz	22.84	21.89	20.95	24.0	23.0	22.0
		1717.5MHz	23.09	21.99	20.90	24.0	23.0	22.0
	1RB_0	1772.5MHz	22.98	21.81	20.64	24.0	23.0	22.0
		1745.0MHz	22.97	21.64	20.35	24.0	23.0	22.0
		1717.5MHz	23.13	21.94	20.75	24.0	23.0	22.0
	36RB_38	1772.5MHz	21.95	20.94	19.84	23.0	22.0	21.0
		1745.0MHz	22.09	21.13	19.93	23.0	22.0	21.0
		1717.5MHz	22.09	20.98	20.08	23.0	22.0	21.0
	36RB_19	1772.5MHz	21.88	20.92	19.82	23.0	22.0	21.0
		1745.0MHz	21.95	20.85	19.70	23.0	22.0	21.0
		1717.5MHz	21.96	20.88	19.92	23.0	22.0	21.0
	36RB_0	1772.5MHz	21.96	20.91	19.86	23.0	22.0	21.0
		1745.0MHz	21.96	20.88	19.68	23.0	22.0	21.0
		1717.5MHz	22.09	21.00	19.86	23.0	22.0	21.0
	75RB_0	1772.5MHz	22.03	21.13	20.32	23.0	22.0	21.0
		1745.0MHz	22.00	21.18	20.32	23.0	22.0	21.0
		1717.5MHz	21.98	21.08	20.20	23.0	22.0	21.0

Full Power								
LTE Band 66			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	1770.0MHz	23.03	22.03	20.98	24.0	23.0	22.0
		1745.0MHz	22.89	21.83	20.83	24.0	23.0	22.0
		1720.0MHz	23.27	22.24	21.15	24.0	23.0	22.0
	1RB_50	1770.0MHz	23.02	21.92	20.92	24.0	23.0	22.0
		1745.0MHz	22.93	21.94	20.98	24.0	23.0	22.0
		1720.0MHz	23.12	22.08	20.94	24.0	23.0	22.0
	1RB_0	1770.0MHz	23.05	21.89	20.69	24.0	23.0	22.0
		1745.0MHz	22.98	21.71	20.45	24.0	23.0	22.0
		1720.0MHz	23.21	22.04	20.82	24.0	23.0	22.0
	50RB_50	1770.0MHz	22.03	21.01	19.92	23.0	22.0	21.0
		1745.0MHz	22.14	21.17	20.02	23.0	22.0	21.0
		1720.0MHz	22.12	21.06	20.08	23.0	22.0	21.0
	50RB_25	1770.0MHz	21.96	20.97	19.88	23.0	22.0	21.0
		1745.0MHz	21.95	20.88	19.78	23.0	22.0	21.0
		1720.0MHz	22.06	20.98	19.94	23.0	22.0	21.0
	50RB_0	1770.0MHz	22.01	20.91	19.87	23.0	22.0	21.0
		1745.0MHz	22.05	20.88	19.75	23.0	22.0	21.0
		1720.0MHz	22.10	21.03	19.89	23.0	22.0	21.0
	100RB_0	1770.0MHz	22.07	21.22	20.41	23.0	22.0	21.0
		1745.0MHz	22.05	21.21	20.41	23.0	22.0	21.0
		1720.0MHz	22.05	21.16	20.24	23.0	22.0	21.0

Reduced power level 1								
LTE Band 66			Actual output Power (dBm)			Tune up		
Band -width	RB No. / RB offset	Frequency	Modulation			Modulation		
			QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
1.4 MHz	1RB_5	1779.3MHz	17.75	17.06	16.64	19.0	18.0	17.0
		1745.0MHz	17.97	17.21	16.62	19.0	18.0	17.0
		1710.7MHz	18.59	17.95	16.40	19.0	18.0	17.0
	1RB_3	1779.3MHz	17.39	16.98	16.64	19.0	18.0	17.0
		1745.0MHz	17.39	16.97	16.46	19.0	18.0	17.0
		1710.7MHz	17.40	16.99	16.52	19.0	18.0	17.0
	1RB_0	1779.3MHz	17.56	16.93	16.47	19.0	18.0	17.0
		1745.0MHz	17.89	17.18	16.58	19.0	18.0	17.0
		1710.7MHz	17.60	16.99	16.49	19.0	18.0	17.0
	3RB_3	1779.3MHz	17.73	17.07	16.55	19.0	18.0	17.0
		1745.0MHz	17.95	17.22	16.68	19.0	18.0	17.0
		1710.7MHz	18.61	18.04	16.43	19.0	18.0	17.0
	3RB_1	1779.3MHz	17.37	17.01	16.70	19.0	18.0	17.0
		1745.0MHz	17.37	16.91	16.50	19.0	18.0	17.0
		1710.7MHz	17.40	17.04	16.56	19.0	18.0	17.0
	3RB_0	1779.3MHz	17.48	16.93	16.40	19.0	18.0	17.0
		1745.0MHz	17.92	17.19	16.55	19.0	18.0	17.0
		1710.7MHz	17.57	17.01	16.45	19.0	18.0	17.0
	6RB_0	1779.3MHz	16.43	15.46	14.49	18.0	17.0	16.0
		1745.0MHz	16.76	15.74	14.76	18.0	17.0	16.0
		1710.7MHz	16.83	15.86	14.78	18.0	17.0	16.0

Reduced power level 1								
LTE Band 66			Actual output Power (dBm)			Tune up		
Band -width	RB No. / RB offset	Frequency	Modulation			Modulation		
			QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
3 MHz	1RB_14	1778.5MHz	17.74	17.10	16.57	19.0	18.0	17.0
		1745.0MHz	17.97	17.22	16.61	19.0	18.0	17.0
		1711.5MHz	18.54	17.81	16.82	19.0	18.0	17.0
	1RB_7	1778.5MHz	17.42	16.99	16.68	19.0	18.0	17.0
		1745.0MHz	17.44	16.90	16.42	19.0	18.0	17.0
		1711.5MHz	17.41	16.99	16.52	19.0	18.0	17.0
	1RB_0	1778.5MHz	17.51	16.93	16.43	19.0	18.0	17.0
		1745.0MHz	17.87	17.17	16.56	19.0	18.0	17.0
		1711.5MHz	17.59	16.95	16.45	19.0	18.0	17.0
	8RB_7	1778.5MHz	16.86	15.87	15.04	18.0	17.0	16.0
		1745.0MHz	16.94	16.20	15.40	18.0	17.0	16.0
		1711.5MHz	17.00	16.09	15.18	18.0	17.0	16.0
	8RB_4	1778.5MHz	16.47	15.60	14.61	18.0	17.0	16.0
		1745.0MHz	16.56	15.62	14.63	18.0	17.0	16.0
		1711.5MHz	16.58	15.64	14.56	18.0	17.0	16.0
	8RB_0	1778.5MHz	16.01	15.16	14.23	18.0	17.0	16.0
		1745.0MHz	16.89	16.05	15.17	18.0	17.0	16.0
		1711.5MHz	16.47	15.57	14.73	18.0	17.0	16.0
	15RB_0	1778.5MHz	16.50	15.44	14.48	18.0	17.0	16.0
		1745.0MHz	16.79	15.73	14.75	18.0	17.0	16.0
		1711.5MHz	16.86	15.83	14.79	18.0	17.0	16.0

Reduced power level 1								
LTE Band 66			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	1777.5MHz	17.79	17.13	16.54	19.0	18.0	17.0
		1745.0MHz	17.93	17.24	16.67	19.0	18.0	17.0
		1712.5MHz	18.58	17.83	16.85	19.0	18.0	17.0
	1RB_12	1777.5MHz	17.41	17.01	16.72	19.0	18.0	17.0
		1745.0MHz	17.44	16.92	16.52	19.0	18.0	17.0
		1712.5MHz	17.44	17.02	16.49	19.0	18.0	17.0
	1RB_0	1777.5MHz	17.48	16.98	16.45	19.0	18.0	17.0
		1745.0MHz	17.89	17.18	16.58	19.0	18.0	17.0
		1712.5MHz	17.50	16.92	16.51	19.0	18.0	17.0
	12RB_13	1777.5MHz	16.81	15.94	15.04	18.0	17.0	16.0
		1745.0MHz	16.98	16.15	15.41	18.0	17.0	16.0
		1712.5MHz	16.95	16.08	15.15	18.0	17.0	16.0
	12RB_6	1777.5MHz	16.50	15.55	14.58	18.0	17.0	16.0
		1745.0MHz	16.62	15.57	14.61	18.0	17.0	16.0
		1712.5MHz	16.57	15.62	14.62	18.0	17.0	16.0
	12RB_0	1777.5MHz	16.02	15.18	14.15	18.0	17.0	16.0
		1745.0MHz	16.91	16.12	15.17	18.0	17.0	16.0
		1712.5MHz	16.47	15.65	14.66	18.0	17.0	16.0
	25RB_0	1777.5MHz	16.41	15.40	14.48	18.0	17.0	16.0
		1745.0MHz	16.82	15.78	14.69	18.0	17.0	16.0
		1712.5MHz	16.82	15.81	14.76	18.0	17.0	16.0

Reduced power level 1								
LTE Band 66			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	1775.0MHz	17.77	17.07	16.61	19.0	18.0	17.0
		1745.0MHz	17.97	17.27	16.59	19.0	18.0	17.0
		1715.0MHz	18.56	17.99	16.66	19.0	18.0	17.0
	1RB_24	1775.0MHz	17.32	17.06	16.66	19.0	18.0	17.0
		1745.0MHz	17.37	16.91	16.44	19.0	18.0	17.0
		1715.0MHz	17.45	17.01	16.55	19.0	18.0	17.0
	1RB_0	1775.0MHz	17.53	16.94	16.42	19.0	18.0	17.0
		1745.0MHz	17.89	17.20	16.57	19.0	18.0	17.0
		1715.0MHz	17.60	17.00	16.44	19.0	18.0	17.0
	25RB_25	1775.0MHz	16.87	15.92	14.98	18.0	17.0	16.0
		1745.0MHz	17.00	16.23	15.37	18.0	17.0	16.0
		1715.0MHz	16.97	16.10	15.20	18.0	17.0	16.0
	25RB_12	1775.0MHz	16.53	15.53	14.59	18.0	17.0	16.0
		1745.0MHz	16.63	15.64	14.60	18.0	17.0	16.0
		1715.0MHz	16.59	15.65	14.53	18.0	17.0	16.0
	25RB_0	1775.0MHz	16.05	15.12	14.17	18.0	17.0	16.0
		1745.0MHz	16.91	16.05	15.18	18.0	17.0	16.0
		1715.0MHz	16.46	15.57	14.67	18.0	17.0	16.0
	50RB_0	1775.0MHz	16.43	15.38	14.54	18.0	17.0	16.0
		1745.0MHz	16.76	15.75	14.70	18.0	17.0	16.0
		1715.0MHz	16.84	15.86	14.81	18.0	17.0	16.0

Reduced power level 1								
LTE Band 66			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	1772.5MHz	17.74	17.07	16.63	19.0	18.0	17.0
		1745.0MHz	17.89	17.27	16.68	19.0	18.0	17.0
		1717.5MHz	18.53	17.80	16.83	19.0	18.0	17.0
	1RB_37	1772.5MHz	17.37	17.04	16.68	19.0	18.0	17.0
		1745.0MHz	17.42	16.92	16.48	19.0	18.0	17.0
		1717.5MHz	17.39	16.97	16.56	19.0	18.0	17.0
	1RB_0	1772.5MHz	17.57	16.99	16.42	19.0	18.0	17.0
		1745.0MHz	17.90	17.22	16.54	19.0	18.0	17.0
		1717.5MHz	17.57	16.98	16.48	19.0	18.0	17.0
	36RB_38	1772.5MHz	16.87	15.86	14.97	18.0	17.0	16.0
		1745.0MHz	16.96	16.25	15.32	18.0	17.0	16.0
		1717.5MHz	16.93	16.09	15.14	18.0	17.0	16.0
	36RB_19	1772.5MHz	16.55	15.62	14.56	18.0	17.0	16.0
		1745.0MHz	16.61	15.60	14.64	18.0	17.0	16.0
		1717.5MHz	16.62	15.62	14.58	18.0	17.0	16.0
	36RB_0	1772.5MHz	16.07	15.11	14.15	18.0	17.0	16.0
		1745.0MHz	16.87	16.05	15.15	18.0	17.0	16.0
		1717.5MHz	16.47	15.65	14.69	18.0	17.0	16.0
	75RB_0	1772.5MHz	16.46	15.38	14.45	18.0	17.0	16.0
		1745.0MHz	16.76	15.78	14.74	18.0	17.0	16.0
		1717.5MHz	16.83	15.85	14.81	18.0	17.0	16.0

Reduced power level 1								
LTE Band 66			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	1770.0MHz	17.82	17.15	16.64	19.0	18.0	17.0
		1745.0MHz	17.98	17.30	16.69	19.0	18.0	17.0
		1720.0MHz	18.63	17.75	16.84	19.0	18.0	17.0
	1RB_50	1770.0MHz	17.42	17.07	16.73	19.0	18.0	17.0
		1745.0MHz	17.45	16.97	16.52	19.0	18.0	17.0
		1720.0MHz	17.48	17.05	16.57	19.0	18.0	17.0
	1RB_0	1770.0MHz	17.58	17.01	16.50	19.0	18.0	17.0
		1745.0MHz	17.92	17.26	16.62	19.0	18.0	17.0
		1720.0MHz	17.60	17.02	16.52	19.0	18.0	17.0
	50RB_50	1770.0MHz	16.90	15.96	15.06	18.0	17.0	16.0
		1745.0MHz	17.04	16.25	15.42	18.0	17.0	16.0
		1720.0MHz	17.01	16.13	15.22	18.0	17.0	16.0
	50RB_25	1770.0MHz	16.56	15.62	14.64	18.0	17.0	16.0
		1745.0MHz	16.66	15.65	14.69	18.0	17.0	16.0
		1720.0MHz	16.66	15.66	14.62	18.0	17.0	16.0
	50RB_0	1770.0MHz	16.10	15.20	14.24	18.0	17.0	16.0
		1745.0MHz	16.97	16.14	15.23	18.0	17.0	16.0
		1720.0MHz	16.55	15.67	14.74	18.0	17.0	16.0
	100RB_0	1770.0MHz	16.51	15.47	14.54	18.0	17.0	16.0
		1745.0MHz	16.84	15.79	14.77	18.0	17.0	16.0
		1720.0MHz	16.87	15.90	14.84	18.0	17.0	16.0

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 (2402MHz)	Ch.39 (2441MHz)	Ch.78 (2480MHz)
GFSK	7.0	5.60	6.38	6.64
EDR2M-4_DQPSK	7.5	6.09	6.59	6.96
EDR3M-8DPSK	8.0	6.47	6.92	7.25
/	/	Ch.0 (2402MHz)	Ch.19 (2440MHz)	Ch.39 (2480MHz)
BLE	1.5	-1.05	0.22	0.85

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

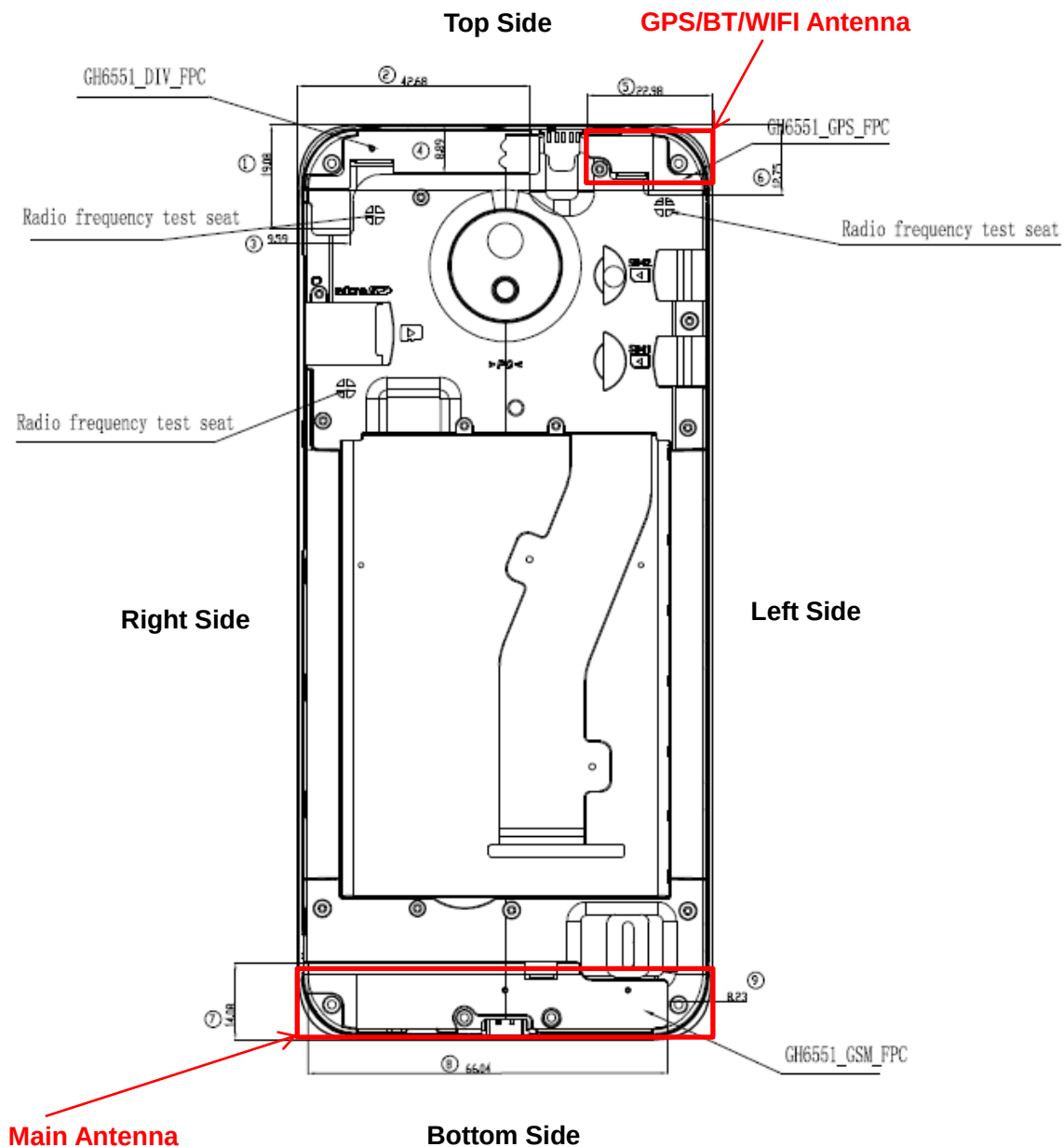
Averaged Power (dBm)		Duty Cycle: 100%		
Mode	Tune up	Ch.1 (2412MHz)	Ch.6 (2437Mhz)	Ch.11 (2462MHz)
802.11b	18.5	17.23	16.74	17.53
802.11g	17.0	15.75	15.62	16.24
802.11n(20MHz)	17.0	15.83	15.66	16.24

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 Bluetooth 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

According to the KDB941225 D06 Hot Spot SAR, the edges with less than 25mm distance to the antennas need to be tested for SAR.

SAR measurement positions						
Mode	Front	Rear	Left edge	Right edge	Top edge	Bottom edge
Main antenna	Yes	Yes	Yes	Yes	No	Yes
WLAN antenna	Yes	Yes	Yes	Yes	Yes	No

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:

$[(\text{max. power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm})] \cdot$

$[\sqrt{f(\text{GHz})}] \leq 3.0$ for 1-g SAR, where

- $f(\text{GHz})$ 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	f(GHz)	Position	SAR test exclusion threshold (mW)	RF output power		SAR test exclusion
				dBm	mW	
Bluetooth	2.441	Head	9.60	8.0	6.31	Yes
		Body	19.20	8.0	6.31	Yes
WLAN 2.4G	2.45	Head	9.58	18.5	70.79	No
		Body	19.17	18.5	70.79	No

12. Evaluation of Simultaneous

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

I	Position	Main Antenna (W/kg)	WLAN (W/kg)	Sum (W/kg)
Highest reported SAR value for Head	Right Cheek	0.32	0.74	1.06
Highest reported SAR value for Hotspot	Rear	1.16	0.21	1.37
Highest reported SAR value for Body-worn	Rear	1.16	0.21	1.37

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 Bluetooth

I	Position	Main Antenna (W/kg)	Bluetooth (W/kg)	Sum (W/kg)
Highest reported SAR value for Head	Left Cheek	0.33	0.26	0.59
Highest reported SAR value for Hotspot	Rear	1.16	0.13	1.29
Highest reported SAR value for Body-worn	Rear	1.16	0.13	1.29

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

Table 12.3: Estimated SAR for Bluetooth

Position	f (GHz)	Distance (mm)	Upper limit of power *		Estimated _{1g} (W/kg)
			dBm	mW	
Head	2.441	5	8.0	6.31	0.26
Body	2.441	10	8.0	6.31	0.13

* - Maximum possible output power declared by manufacturer

When standalone SAR test exclusion applies to an antenna that transmits simultaneously with other antennas, the standalone SAR must be estimated according to following to determine simultaneous transmission SAR test exclusion:

(max. power of channel, including tune-up tolerance, mW) / (min. test separation distance, mm) · [$\sqrt{f(\text{GHz})/x}$] W/kg for test separation distances ≤ 50 mm;

Where $x = 7.5$ for 1-g SAR.

When the minimum test separation distance is < 5 mm, a distance of 5 mm is applied to determine SAR test exclusion

Conclusion:

According to the above tables, the sum of reported SAR values is $< 1.6\text{W/kg}$. 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:

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

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

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

The device support dual SIMs, SIM1 was used for the all configuration SAR testing and SIM2 test the worst case SAR of SIM1.

Duty Cycle

Mode	Duty Cycle
Speech for GSM850/1900	1:8.3
GPRS for GSM850	1:4
GPRS for GSM1900	1:2
WCDMA Band2/4/5	1:1
FDD_LTE Band 2/4/5/7/12/17/66	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 - Head)

Ambient Temperature: 22.1°C					Liquid Temperature: 21.6°C				
Frequency		Test Mode	Test Position	Figure No. / Note	Conducte d Power (dBm)	Max. tune-up Power (dBm)	Measured SAR(1g) (W/kg)	Reported SAR(1g) (W/kg)	Power Drift(dB)
Ch.	MHz								
190	836.6	Speech	Left Cheek	1	31.89	33.0	0.229	0.30	0.09
190	836.6	Speech	Left Tilt	/	31.89	33.0	0.119	0.15	0.12
190	836.6	Speech	Right Cheek	/	31.89	33.0	0.226	0.29	0.07
190	836.6	Speech	Right Tilt	/	31.89	33.0	0.126	0.16	-0.01

Table 13.2: SAR Values (GSM 850 - Body)

Ambient Temperature: 22.1°C					Liquid Temperature: 21.6°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)
Ch.	MHz								
Hotspot / Body-Worn Test Data (10mm)									
190	836.6	GPRS	Front	/	29.84	31.0	0.149	0.19	-0.03
190	836.6	GPRS	Rear	2	29.84	31.0	0.324	0.42	0.02
190	836.6	GPRS	Left	/	29.84	31.0	0.218	0.28	0.02
190	836.6	GPRS	Right	/	29.84	31.0	0.183	0.24	0.05
190	836.6	GPRS	Bottom	/	29.84	31.0	0.060	0.08	-0.03

Table 13.3: SAR Values (GSM 1900 - Head)

Ambient Temperature: 22.6°C Liquid Temperature: 22.1°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)
Ch.	MHz								
512	1850.2	Speech	Left Cheek	/	29.05	30.0	0.025	0.03	0.02
512	1850.2	Speech	Left Tilt	/	29.05	30.0	0.024	0.03	0.02
512	1850.2	Speech	Right Cheek	3	29.05	30.0	0.032	0.04	-0.18
512	1850.2	Speech	Right Tilt	/	29.05	30.0	0.021	0.03	0.04

Table 13.4: SAR Values (GSM 1900 - Body)

Ambient Temperature: 22.6°C					Liquid Temperature: 22.1°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)
Ch.	MHz								
Hotspot / Body-Worn Test Data (10mm) - Reduced power level 1									
512	1850.2	GPRS	Front	/	23.04	23.5	0.188	0.21	0.04
512	1850.2	GPRS	Rear	4	23.04	23.5	0.546	0.61	0.01
512	1850.2	GPRS	Left	/	23.04	23.5	0.065	0.07	0.05
512	1850.2	GPRS	Right	/	23.04	23.5	0.056	0.06	0.05
512	1850.2	GPRS	Bottom	/	23.04	23.5	0.490	0.54	0.06

Table 13.5: SAR Values (WCDMA Band 2 - Head)

Ambient Temperature: 22.6°C					Liquid Temperature: 22.1°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)
Ch.	MHz								
9400	1800	RMC	Left Cheek	/	23.60	24.5	0.046	0.06	0.04
9400	1800	RMC	Left Tilt	/	23.60	24.5	0.048	0.06	0.02
9400	1800	RMC	Right Cheek	5	23.60	24.5	0.048	0.06	0.02
9400	1800	RMC	Right Tilt	/	23.60	24.5	0.027	0.03	0.04

Table 13.6: SAR Values (WCDMA Band 2 - Body)

Ambient Temperature: 22.6°C					Liquid Temperature: 22.1°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)
Ch.	MHz								
Hotspot / Body-Worn Test Data (10mm) - Reduced power level 1									
9400	1800	RMC	Front	/	19.60	20.5	0.161	0.20	-0.10
9400	1800	RMC	Rear	6	19.60	20.5	0.852	1.05	-0.04
9400	1800	RMC	Left	/	19.60	20.5	0.035	0.04	-0.18
9400	1800	RMC	Right	/	19.60	20.5	0.040	0.05	0.15
9400	1800	RMC	Bottom	/	19.60	20.5	0.404	0.50	0.01
9538	1907.6	RMC	Rear	/	19.60	20.5	0.661	0.81	-0.11
9262	1852.4	RMC	Rear	/	19.70	20.5	0.549	0.66	-0.14

Table 13.7: SAR Values (WCDMA Band 4 - Head)

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)
Ch.	MHz								
1413	1732.6	RMC	Left Cheek	/	24.60	25.0	0.189	0.21	0.08
1413	1732.6	RMC	Left Tilt	7	24.60	25.0	0.237	0.26	0.06
1413	1732.6	RMC	Right Cheek	/	24.60	25.0	0.229	0.25	0.06
1413	1732.6	RMC	Right Tilt	/	24.60	25.0	0.174	0.19	0.06

Table 13.8: SAR Values (WCDMA Band 4 - 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)
Ch.	MHz								
Hotspot / Body-Worn Test Data (10mm) - Reduced power level 1									
1413	1732.6	RMC	Front	/	22.60	23.0	0.169	0.19	0.10
1413	1732.6	RMC	Rear	8	22.60	23.0	0.390	0.43	-0.03
1413	1732.6	RMC	Left	/	22.60	23.0	0.085	0.09	0.07
1413	1732.6	RMC	Right	/	22.60	23.0	0.139	0.15	0.03
1413	1732.6	RMC	Bottom	/	22.60	23.0	0.289	0.32	0.19

Table 13.9: SAR Values (WCDMA Band 5 - Head)

Ambient Temperature: 22.1°C					Liquid Temperature: 21.6°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)
Ch.	MHz								
4182	836.4	RMC	Left Cheek	9	23.40	24.5	0.253	0.33	0.09
4182	836.4	RMC	Left Tilt	/	23.40	24.5	0.123	0.16	0.08
4182	836.4	RMC	Right Cheek	/	23.40	24.5	0.251	0.32	0.09
4182	836.4	RMC	Right Tilt	/	23.40	24.5	0.124	0.16	0.02
4182	836.4	RMC	Left Cheek	SIM2	23.40	24.5	0.244	0.31	0.02

Table 13.10: SAR Values (WCDMA Band 5 - Body)

Ambient Temperature: 22.1°C					Liquid Temperature: 21.6°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)
Ch.	MHz								
Hotspot / Body-Worn Test Data (10mm)									
4182	836.4	RMC	Front	/	23.40	24.5	0.192	0.25	0.01
4182	836.4	RMC	Rear	10	23.40	24.5	0.286	0.37	-0.03
4182	836.4	RMC	Left	/	23.40	24.5	0.281	0.36	0.01
4182	836.4	RMC	Right	/	23.40	24.5	0.281	0.36	0.09
4182	836.4	RMC	Bottom	/	23.40	24.5	0.052	0.07	-0.04

Table 13.11: SAR Values (LTE Band 2 - Head)

Ambient Temperature: 22.6°C					Liquid Temperature: 22.1°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)
Ch.	MHz								
18900	1880	1RB0	Left Cheek	/	23.17	24.0	0.052	0.06	0.08
18900	1880	50RB50	Left Cheek	/	22.62	23.0	0.037	0.04	0.01
18900	1880	1RB0	Left Tilt	/	23.17	24.0	0.062	0.08	0.09
18900	1880	50RB50	Left Tilt	/	22.62	23.0	0.043	0.05	0.05
18900	1880	1RB0	Right Cheek	11	23.17	24.0	0.085	0.10	0.04
18900	1880	50RB50	Right Cheek	/	22.62	23.0	0.060	0.07	0.06
18900	1880	1RB0	Right Tilt	/	23.17	24.0	0.048	0.06	-0.04
18900	1880	50RB50	Right Tilt	/	22.62	23.0	0.027	0.03	0.02

Table 13.12: SAR Values (LTE Band 2 - Body)

Ambient Temperature: 22.6°C					Liquid Temperature: 22.1°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)
Ch.	MHz								
Hotspot / Body-Worn Test Data (10mm) - Reduced power level 1									
18900	1880	1RB0	Front	/	19.98	21.0	0.148	0.19	0.19
18900	1880	50RB50	Front	/	19.08	20.0	0.137	0.17	0.10
18900	1880	1RB0	Rear	12	19.98	21.0	0.886	1.12	-0.10
18900	1880	50RB50	Rear	/	19.08	20.0	0.728	0.90	0.05
18900	1880	1RB0	Left	/	19.98	21.0	0.058	0.07	-0.11
18900	1880	50RB50	Left	/	19.08	20.0	0.042	0.05	0.06
18900	1880	1RB0	Right	/	19.98	21.0	0.053	0.07	0.05
18900	1880	50RB50	Right	/	19.08	20.0	0.034	0.04	0.04
18900	1880	1RB0	Bottom	/	19.98	21.0	0.413	0.52	0.02
18900	1880	50RB50	Bottom	/	19.08	20.0	0.354	0.44	0.11
19100	1900	1RB99	Rear	/	19.89	21.0	0.625	0.81	0.03
18700	1860	1RB99	Rear	/	19.83	21.0	0.851	1.11	0.16
19100	1900	50RB50	Rear	/	19.07	20.0	0.597	0.74	0.05
18700	1860	50RB50	Rear	/	19.04	20.0	0.809	1.01	0.18
18900	1880	100RB	Rear	/	19.06	20.0	0.480	0.60	0.03

Table 13.13: SAR Values (LTE Band 5 - Head)

Ambient Temperature: 22.1°C					Liquid Temperature: 21.6°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)
Ch.	MHz								
20525	836.5	1RB49	Left Cheek	13	23.23	24.0	0.193	0.23	0.02
20525	836.5	25RB25	Left Cheek	/	22.02	23.0	0.135	0.17	0.04
20525	836.5	1RB49	Left Tilt	/	23.23	24.0	0.105	0.13	0.08
20525	836.5	25RB25	Left Tilt	/	22.02	23.0	0.084	0.11	0.03
20525	836.5	1RB49	Right Cheek	/	23.23	24.0	0.178	0.21	0.02
20525	836.5	25RB25	Right Cheek	/	22.02	23.0	0.143	0.18	0.02
20525	836.5	1RB49	Right Tilt	/	23.23	24.0	0.093	0.11	0.03
20525	836.5	25RB25	Right Tilt	/	22.02	23.0	0.075	0.09	0.03

Table 13.14: SAR Values (LTE Band 5 - Body)

Ambient Temperature: 22.1°C					Liquid Temperature: 21.6°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)
Ch.	MHz								
Hotspot / Body-Worn Test Data (10mm)									
20525	836.5	1RB49	Front	/	23.23	24.0	0.145	0.17	0.02
20525	836.5	25RB25	Front	/	22.02	23.0	0.120	0.15	0.03
20525	836.5	1RB49	Rear	/	23.23	24.0	0.235	0.28	0.07
20525	836.5	25RB25	Rear	/	22.02	23.0	0.188	0.24	0.09
20525	836.5	1RB49	Left	/	23.23	24.0	0.151	0.18	0.15
20525	836.5	25RB25	Left	/	22.02	23.0	0.129	0.16	0.18
20525	836.5	1RB49	Right	14	23.23	24.0	0.242	0.29	0.11
20525	836.5	25RB25	Right	/	22.02	23.0	0.195	0.24	0.13
20525	836.5	1RB49	Bottom	/	23.23	24.0	0.047	0.06	-0.14
20525	836.5	25RB25	Bottom	/	22.02	23.0	0.038	0.05	0.01

Table 13.15: SAR Values (LTE Band 7 - Head)

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)
Ch.	MHz								
20850	2510	1RB99	Left Cheek	15	21.87	22.5	0.116	0.13	0.03
20850	2510	50RB50	Left Cheek	/	21.33	22.0	0.101	0.12	0.07
20850	2510	1RB99	Left Tilt	/	21.87	22.5	0.069	0.08	0.02
20850	2510	50RB50	Left Tilt	/	21.33	22.0	0.061	0.07	0.07
20850	2510	1RB99	Right Cheek	/	21.87	22.5	0.102	0.12	0.06
20850	2510	50RB50	Right Cheek	/	21.33	22.0	0.094	0.11	0.07
20850	2510	1RB99	Right Tilt	/	21.87	22.5	0.103	0.12	0.07
20850	2510	50RB50	Right Tilt	/	21.33	22.0	0.102	0.12	0.09

Table 13.16: SAR Values (LTE Band 7 - 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)
Ch.	MHz								
Hotspot / Body-Worn Test Data (10mm)									
20850	2510	1RB99	Front	/	21.87	22.5	0.437	0.51	0.07
20850	2510	50RB50	Front	/	21.33	22.0	0.392	0.46	-0.16
20850	2510	1RB99	Rear	/	21.87	22.5	0.908	1.05	0.02
20850	2510	50RB50	Rear	/	21.33	22.0	0.784	0.91	-0.09
20850	2510	1RB99	Left	/	21.87	22.5	0.169	0.20	0.04
20850	2510	50RB50	Left	/	21.33	22.0	0.146	0.17	0.10
20850	2510	1RB99	Right	/	21.87	22.5	0.158	0.18	0.15
20850	2510	50RB50	Right	/	21.33	22.0	0.142	0.17	0.03
20850	2510	1RB99	Bottom	/	21.87	22.5	0.687	0.79	0.19
20850	2510	50RB50	Bottom	/	21.33	22.0	0.622	0.73	0.14
21350	2560	1RB99	Rear	16	21.85	22.5	0.999	1.16	0.03
21100	2535	1RB99	Rear	/	21.83	22.5	0.892	1.04	0.04
21350	2560	50RB50	Rear	/	21.15	22.0	0.892	1.08	0.07
21100	2535	50RB50	Rear	/	21.31	22.0	0.804	0.94	0.09
20850	2510	100RB	Rear	/	21.23	22.0	0.702	0.84	0.07
21350	2560	1RB99	Rear	SIM2	21.85	22.5	0.983	1.14	0.05

Table 13.17: SAR Values (LTE Band 12 - Head)

Ambient Temperature: 22.3°C					Liquid Temperature: 21.8°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)
Ch.	MHz								
23095	707.5	1RB49	Left Cheek	17	23.21	24.0	0.056	0.07	0.14
23095	707.5	25RB25	Left Cheek	/	22.45	23.0	0.046	0.05	0.04
23095	707.5	1RB49	Left Tilt	/	23.21	24.0	0.023	0.03	-0.05
23095	707.5	25RB25	Left Tilt	/	22.45	23.0	0.019	0.02	-0.05
23095	707.5	1RB49	Right Cheek	/	23.21	24.0	0.047	0.06	0.01
23095	707.5	25RB25	Right Cheek	/	22.45	23.0	0.040	0.05	0.03
23095	707.5	1RB49	Right Tilt	/	23.21	24.0	0.021	0.03	0.08
23095	707.5	25RB25	Right Tilt	/	22.45	23.0	0.018	0.02	0.11

Table 13.18: SAR Values (LTE Band 12 - Body)

Ambient Temperature: 22.3°C					Liquid Temperature: 21.8°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)
Ch.	MHz								
Hotspot / Body-Worn Test Data (10mm)									
23095	707.5	1RB49	Front	/	23.21	24.0	0.061	0.07	0.04
23095	707.5	25RB25	Front	/	22.45	23.0	0.054	0.06	0.12
23095	707.5	1RB49	Rear	18	23.21	24.0	0.127	0.15	0.00
23095	707.5	25RB25	Rear	/	22.45	23.0	0.109	0.12	0.03
23095	707.5	1RB49	Left	/	23.21	24.0	0.100	0.12	0.02
23095	707.5	25RB25	Left	/	22.45	23.0	0.079	0.09	0.17
23095	707.5	1RB49	Right	/	23.21	24.0	0.089	0.11	0.17
23095	707.5	25RB25	Right	/	22.45	23.0	0.077	0.09	0.19
23095	707.5	1RB49	Bottom	/	23.21	24.0	0.063	0.08	0.05
23095	707.5	25RB25	Bottom	/	22.45	23.0	0.056	0.06	-0.05

Note: SAR for LTE Band 17 is covered by LTE Band 12 due to similar frequency range, same maximum tune-up limit and same channel bandwidth.

Table 13.19: SAR Values (LTE Band 28 - Head)

Ambient Temperature: 22.3°C					Liquid Temperature: 21.8°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)
Ch.	MHz								
27460	728	1RB99	Left Cheek	19	22.98	24.0	0.100	0.13	0.06
27460	728	50RB50	Left Cheek	/	22.54	23.0	0.075	0.08	0.08
27460	728	1RB99	Left Tilt	/	22.98	24.0	0.044	0.06	0.10
27460	728	50RB50	Left Tilt	/	22.54	23.0	0.035	0.04	0.03
27460	728	1RB99	Right Cheek	/	22.98	24.0	0.079	0.10	0.01
27460	728	50RB50	Right Cheek	/	22.54	23.0	0.062	0.07	0.04
27460	728	1RB99	Right Tilt	/	22.98	24.0	0.039	0.05	0.08
27460	728	50RB50	Right Tilt	/	22.54	23.0	0.031	0.03	0.05

Table 13.20: SAR Values (LTE Band 28 - Body)

Ambient Temperature: 22.3°C					Liquid Temperature: 21.8°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)
Ch.	MHz								
Hotspot / Body-Worn Test Data (10mm)									
27460	728	1RB99	Front	/	22.98	24.0	0.123	0.16	-0.01
27460	728	50RB50	Front	/	22.54	23.0	0.104	0.12	0.05
27460	728	1RB99	Rear	20	22.98	24.0	0.199	0.25	0.06
27460	728	50RB50	Rear	/	22.54	23.0	0.164	0.18	0.05
27460	728	1RB99	Left	/	22.98	24.0	0.174	0.22	0.17
27460	728	50RB50	Left	/	22.54	23.0	0.145	0.16	0.16
27460	728	1RB99	Right	/	22.98	24.0	0.055	0.07	0.08
27460	728	50RB50	Right	/	22.54	23.0	0.037	0.04	0.02
27460	728	1RB99	Bottom	/	22.98	24.0	0.035	0.04	0.02
27460	728	50RB50	Bottom	/	22.54	23.0	0.029	0.03	-0.06

Table 13.21: SAR Values (LTE Band 66 - Head)

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)
Ch.	MHz								
132072	1720	1RB99	Left Cheek	/	23.27	24.0	0.115	0.14	0.09
132322	1745	50RB50	Left Cheek	/	22.14	23.0	0.121	0.15	0.18
132072	1720	1RB99	Left Tilt	/	23.27	24.0	0.125	0.15	-0.18
132322	1745	50RB50	Left Tilt	/	22.14	23.0	0.124	0.15	0.01
132072	1720	1RB99	Right Cheek	21	23.27	24.0	0.150	0.18	0.04
132322	1745	50RB50	Right Cheek	/	22.14	23.0	0.144	0.18	-0.02
132072	1720	1RB99	Right Tilt	/	23.27	24.0	0.091	0.11	0.04
132322	1745	50RB50	Right Tilt	/	22.14	23.0	0.084	0.10	0.12

Table 13.22: SAR Values (LTE Band 66 - 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)
Ch.	MHz								
Hotspot / Body-Worn Test Data (10mm) - Reduced power level 1									
132072	1720	1RB99	Front	/	18.63	19.0	0.175	0.19	-0.05
132322	1745	50RB50	Front	/	17.04	18.0	0.180	0.22	-0.11
132072	1720	1RB99	Rear	22	18.63	19.0	0.870	0.95	0.05
132322	1745	50RB50	Rear	/	17.04	18.0	0.689	0.86	0.01
132072	1720	1RB99	Left	/	18.63	19.0	0.073	0.08	0.11
132322	1745	50RB50	Left	/	17.04	18.0	0.066	0.08	0.02
132072	1720	1RB99	Right	/	18.63	19.0	0.071	0.08	0.12
132322	1745	50RB50	Right	/	17.04	18.0	0.065	0.08	0.08
132072	1720	1RB99	Bottom	/	18.63	19.0	0.461	0.50	0.15
132322	1745	50RB50	Bottom	/	17.04	18.0	0.339	0.42	0.13
132572	1770	1RB99	Rear	/	17.82	19.0	0.725	0.95	0.13
132322	1745	1RB99	Rear	/	17.98	19.0	0.866	1.10	-0.07
132572	1770	50RB50	Rear	/	16.90	18.0	0.574	0.74	0.07
132322	1745	50RB50	Rear	/	17.01	18.0	0.672	0.84	-0.04
132072	1720	100RB	Rear	/	16.87	18.0	0.704	0.91	0.06

Note: SAR for LTE Band 4 is covered by LTE Band 66 due to similar frequency range, same maximum tune-up limit and same channel bandwidth.

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 13.23: SAR Values (WLAN 2.4G - Head)

Ambient Temperature: 22.2°C					Liquid Temperature: 21.7°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)
Ch.	MHz								
11	2462	802.11b	Left Cheek	/	17.53	18.5	0.268	0.34	0.04
11	2462	802.11b	Left Tilt	/	17.53	18.5	0.216	0.27	0.09
11	2462	802.11b	Right Cheek	23	17.53	18.5	0.594	0.74	0.06
11	2462	802.11b	Right Tilt	/	17.53	18.5	0.414	0.52	0.08

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 13.24: SAR Values (WLAN - Head) – 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)
Ch.	MHz					
11	2462	Right Cheek	100%	100%	0.74	0.74

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

Table 13.25: SAR Values (WLAN 2.4G - Body)

Ambient Temperature: 22.2°C					Liquid Temperature: 21.7°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)
Ch.	MHz								
Test Data (10mm)									
11	2462	802.11b	Front	/	17.53	18.5	0.141	0.18	0.15
11	2462	802.11b	Rear	24	17.53	18.5	0.170	0.21	0.05
11	2462	802.11b	Left	/	17.53	18.5	0.139	0.17	0.01
11	2462	802.11b	Right	/	17.53	18.5	0.016	0.02	-0.16
11	2462	802.11b	Top	/	17.53	18.5	0.093	0.12	0.03

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 13.26: 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)
Ch.	MHz					
11	2462	Rear	100%	100%	0.21	0.21

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

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 ($\sim 10\%$ 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 – WCDMA Band 2

Frequency		Test Position	Original	1 st Repeated	Ratio	2 nd Repeated
Ch.	MHz		SAR (W/kg)	SAR (W/kg)		SAR (W/kg)
9400	1800	Rear	0.852	0.843	1.01	/

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

Frequency		Test Position	Original	1 st Repeated	Ratio	2 nd Repeated
Ch.	MHz		SAR (W/kg)	SAR (W/kg)		SAR (W/kg)
18900	1880	Rear	0.886	0.869	1.02	/

Table 14.3: SAR Measurement Variability for Body – LTE Band 7

Frequency		Test Position	Original	1 st Repeated	Ratio	2 nd Repeated
Ch.	MHz		SAR (W/kg)	SAR (W/kg)		SAR (W/kg)
21350	2560	Rear	0.999	0.975	1.02	/

Table 14.4: SAR Measurement Variability for Body – LTE Band 66

Frequency		Test Position	Original	1 st Repeated	Ratio	2 nd Repeated
Ch.	MHz		SAR (W/kg)	SAR (W/kg)		SAR (W/kg)
132072	1720	Rear	0.870	0.854	1.02	/

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	$\sqrt{3}$	$\sqrt{0.5}$	$\sqrt{0.5}$	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	

16. Main Test Instruments

Table 16.1: List of Main Instruments

No.	Name	Type	Serial Number	Calibration Date	Valid Period
01	Network analyzer	E5071C	MY46103759	2020-11-15	One year
02	Dielectric probe	85070E	MY44300317	/	/
03	Power meter	E4418B	MY50000366	2020-12-13	One year
04	Power sensor	E9304A	MY50000188		
05	Power meter	NRP	101460	2021-01-15	One year
06	Power sensor	NRP-Z91	100553		
07	Signal Generator	E8257D	MY47461211	2021-01-15	One year
08	Amplifier	VTL5400	0404	/	/
09	E-field Probe	EX3DV4	3633	2020-04-01	One year
10	DAE	DAE4	1527	2020-11-06	One year
11	Dipole Validation Kit	D750V3	1163	2019-09-03	Three year
12	Dipole Validation Kit	D835V2	4d057	2018-10-09	Three year
13	Dipole Validation Kit	D1750V2	1152	2019-08-30	Three 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	1010	2018-08-24	Three year
17	BTS	CMW500	158344	2020-07-17	One year
18	BTS	E5515C	GB46110722	2021-01-15	One year
19	BTS	MT8820C	6201341853	2021-01-15	One year
20	Software	DASY5	52.8.8.1222	/	/

ANNEX A: Graph Results

GSM850 Head

Date: 2021-3-4

Electronics: DAE4 Sn1527

Medium: Head 835MHz

Medium parameters used (interpolated): $f = 836.6$ MHz; $\sigma = 0.919$ S/m; $\epsilon_r = 40.714$; $\rho = 1000$ kg/m³

Communication System: UID 0, GSM (0) Frequency: 836.6 MHz Duty Cycle: 1:8.3

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

Left Cheek Middle/Area Scan (61x61x1): Interpolated grid: $dx=1.500$ mm, $dy=1.500$ mm

Maximum value of SAR (interpolated) = 0.252 W/kg

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

Reference Value = 5.612 V/m; Power Drift = 0.09 dB

Peak SAR (extrapolated) = 0.297 W/kg

SAR(1 g) = 0.229 W/kg; SAR(10 g) = 0.175 W/kg

Maximum value of SAR (measured) = 0.255 W/kg

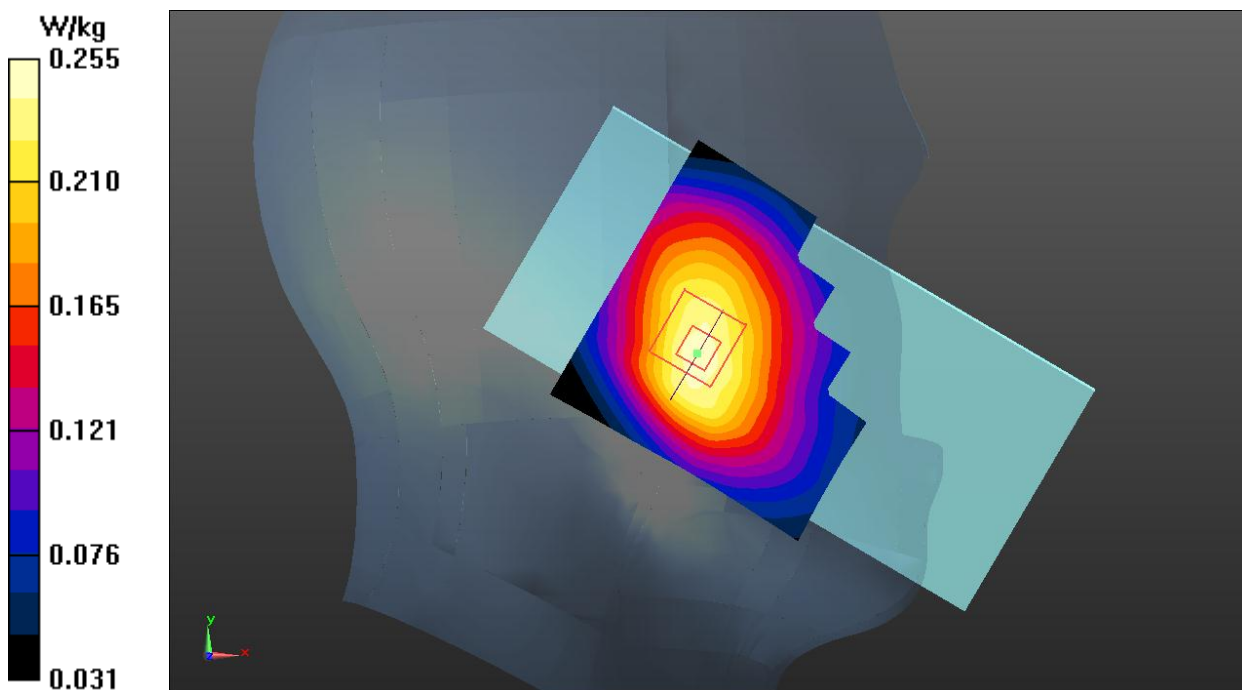


Fig.1 GSM 850 Head

GSM850 Body

Date: 2021-3-4

Electronics: DAE4 Sn1527

Medium: Head 835MHz

Medium parameters used (interpolated): $f = 836.6$ MHz; $\sigma = 0.919$ S/m; $\epsilon_r = 40.714$; $\rho = 1000$ kg/m³

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

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

Rear Side Middle/Area Scan (61x71x1): Interpolated grid: $dx=1.500$ mm, $dy=1.500$ mm

Maximum value of SAR (interpolated) = 0.357 W/kg

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

Reference Value = 17.65 V/m; Power Drift = 0.02 dB

Peak SAR (extrapolated) = 0.417 W/kg

SAR(1 g) = 0.324 W/kg; SAR(10 g) = 0.246 W/kg

Maximum value of SAR (measured) = 0.357 W/kg

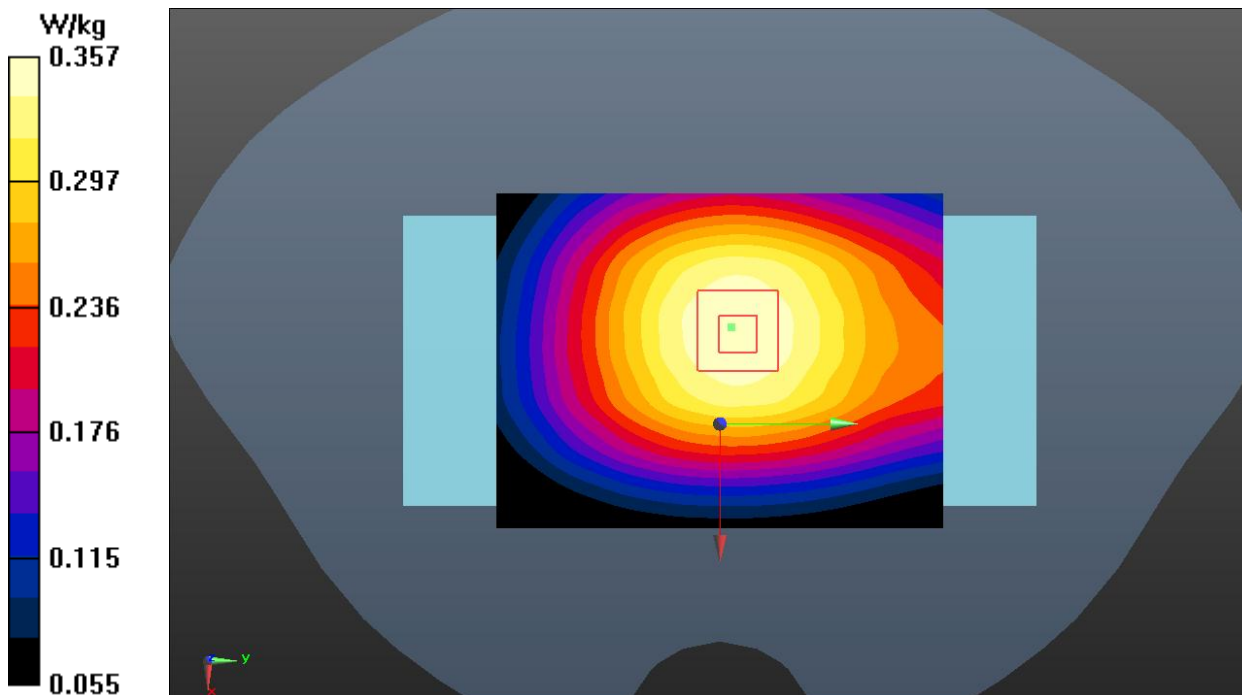


Fig.2 GSM 850 Body

GSM1900 Head

Date: 2021-3-25

Electronics: DAE4 Sn1527

Medium: Head 1900MHz

Medium parameters used (interpolated): $f = 1850.2$ MHz; $\sigma = 1.38$ S/m; $\epsilon_r = 39.611$; $\rho = 1000$ kg/m³

Communication System: UID 0, GSM (0) Frequency: 1850.2 MHz Duty Cycle: 1:8.3

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

Right Cheek Low/Area Scan (61x61x1): Interpolated grid: $dx=1.500$ mm, $dy=1.500$ mm

Maximum value of SAR (interpolated) = 0.0367 W/kg

Right Cheek Low/Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8$ mm, $dy=8$ mm, $dz=5$ mm

Reference Value = 2.509 V/m; Power Drift = -0.18 dB

Peak SAR (extrapolated) = 0.0500 W/kg

SAR(1 g) = 0.032 W/kg; SAR(10 g) = 0.020 W/kg

Maximum value of SAR (measured) = 0.0373 W/kg

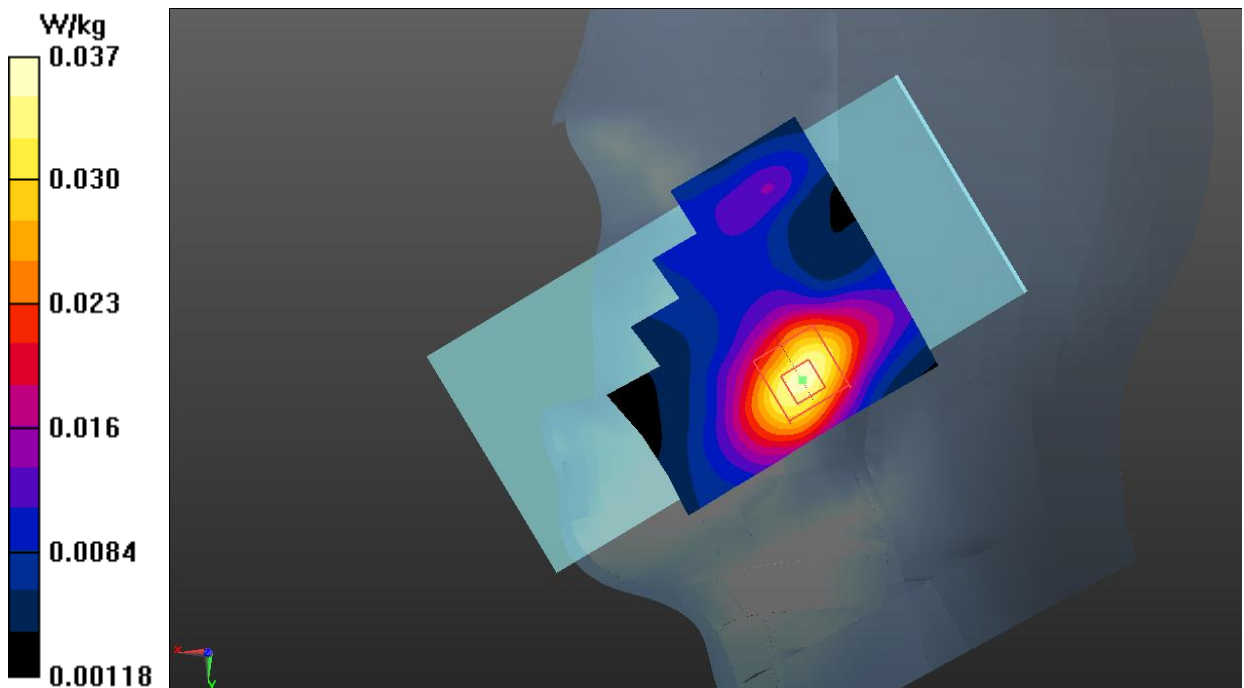


Fig.3 GSM 1900 Head

GSM1900 Body

Date: 2021-3-25

Electronics: DAE4 Sn1527

Medium: Head 1900MHz

Medium parameters used (interpolated): $f = 1850.2$ MHz; $\sigma = 1.38$ S/m; $\epsilon_r = 39.611$; $\rho = 1000$ kg/m³

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) = 0.674 W/kg

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

Reference Value = 3.923 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 0.991 W/kg

SAR(1 g) = 0.546 W/kg; SAR(10 g) = 0.275 W/kg

Maximum value of SAR (measured) = 0.735 W/kg

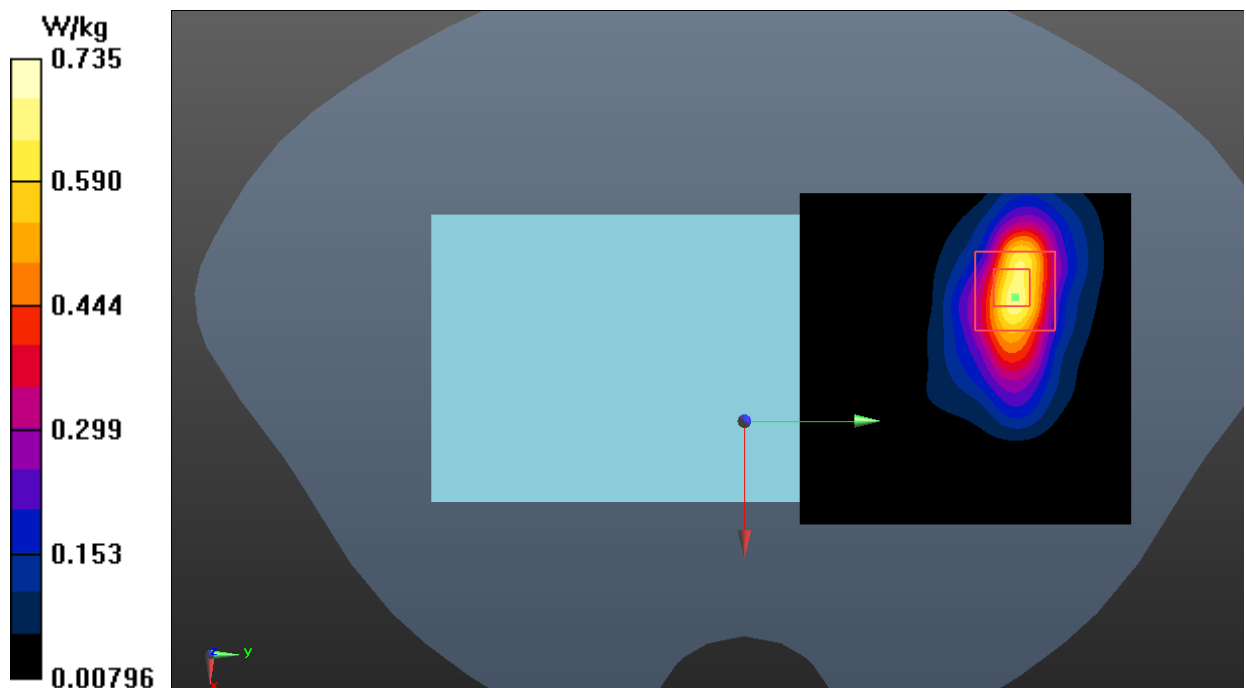


Fig.4 GSM 1900 Body

WCDMA Band 2 Head

Date: 2021-3-25

Electronics: DAE4 Sn1527

Medium: Head 1900MHz

Medium parameters used: $f = 1880$ MHz; $\sigma = 1.406$ S/m; $\epsilon_r = 39.495$; $\rho = 1000$ kg/m³

Communication System: UID 0, WCDMA (0) Frequency: 1880 MHz Duty Cycle: 1:1

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

Right Cheek Middle/Area Scan (61x61x1): Interpolated grid: $dx=1.500$ mm, $dy=1.500$ mm

Maximum value of SAR (interpolated) = 0.065 W/kg

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

Reference Value = 2.159 V/m; Power Drift = 0.02 dB

Peak SAR (extrapolated) = 0.076 W/kg

SAR(1 g) = 0.048 W/kg; SAR(10 g) = 0.030 W/kg

Maximum value of SAR (measured) = 0.059 W/kg

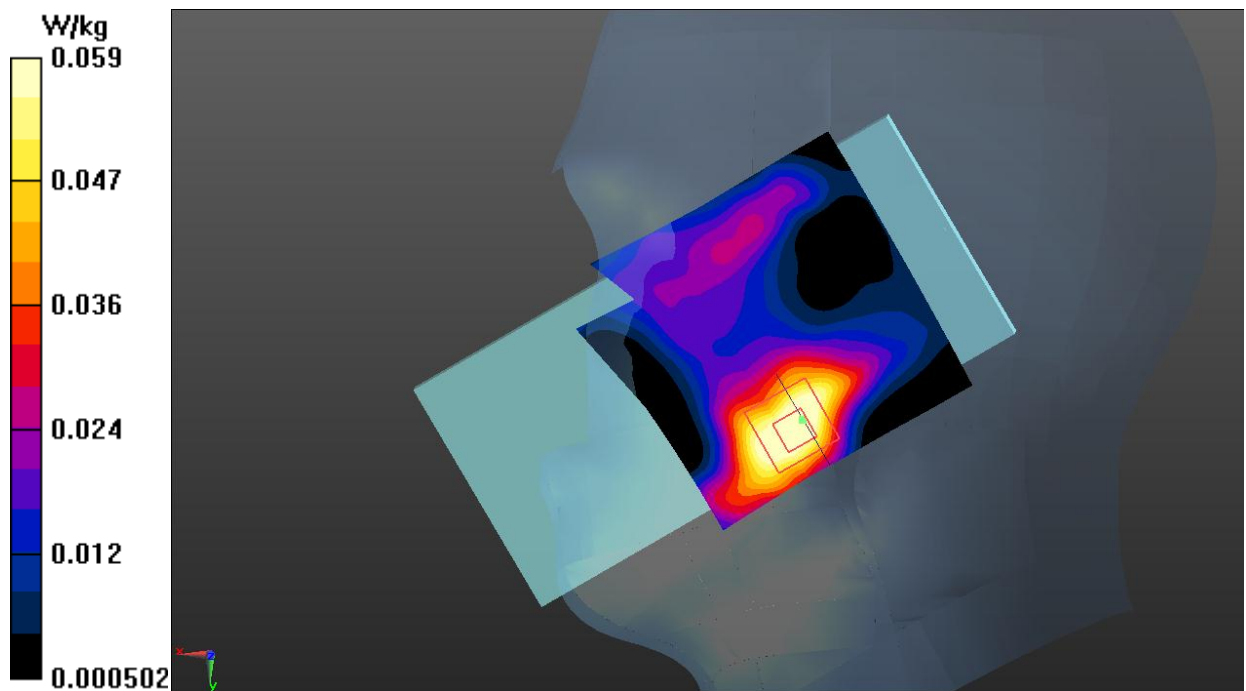


Fig.5 WCDMA Band 2 Head

WCDMA Band 2 Body

Date: 2021-3-25

Electronics: DAE4 Sn1527

Medium: Head 1900MHz

Medium parameters used: $f = 1880$ MHz; $\sigma = 1.406$ S/m; $\epsilon_r = 39.495$; $\rho = 1000$ kg/m³

Communication System: UID 0, WCDMA (0) Frequency: 1907.6 MHz Duty Cycle: 1:1

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

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

Maximum value of SAR (interpolated) = 1.02 W/kg

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

Reference Value = 4.049 V/m; Power Drift = -0.04 dB

Peak SAR (extrapolated) = 1.70 W/kg

SAR(1 g) = 0.852 W/kg; SAR(10 g) = 0.420 W/kg

Maximum value of SAR (measured) = 1.10 W/kg

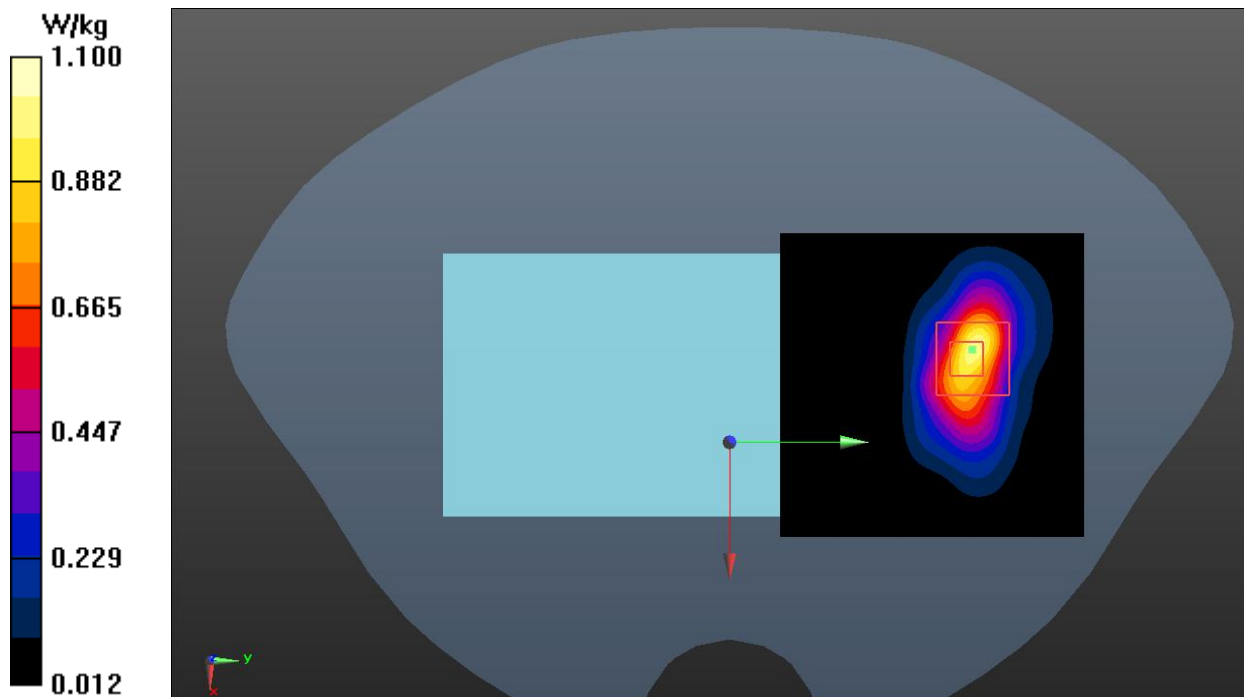


Fig.6 WCDMA Band 2 Body

WCDMA Band 4 Head

Date: 2021-3-17

Electronics: DAE4 Sn1527

Medium: Head 1750MHz

Medium parameters used: $f = 1733$ MHz; $\sigma = 1.344$ S/m; $\epsilon_r = 40.604$; $\rho = 1000$ kg/m³

Communication System: UID 0, WCDMA (0) Frequency: 1732.6 MHz Duty Cycle: 1:1

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

Left Tilt Middle/Area Scan (61x61x1): Interpolated grid: $dx=1.500$ mm, $dy=1.500$ mm

Maximum value of SAR (interpolated) = 0.307 W/kg

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

Reference Value = 6.887 V/m; Power Drift = 0.06 dB

Peak SAR (extrapolated) = 0.345 W/kg

SAR(1 g) = 0.237 W/kg; SAR(10 g) = 0.146 W/kg

Maximum value of SAR (measured) = 0.296 W/kg

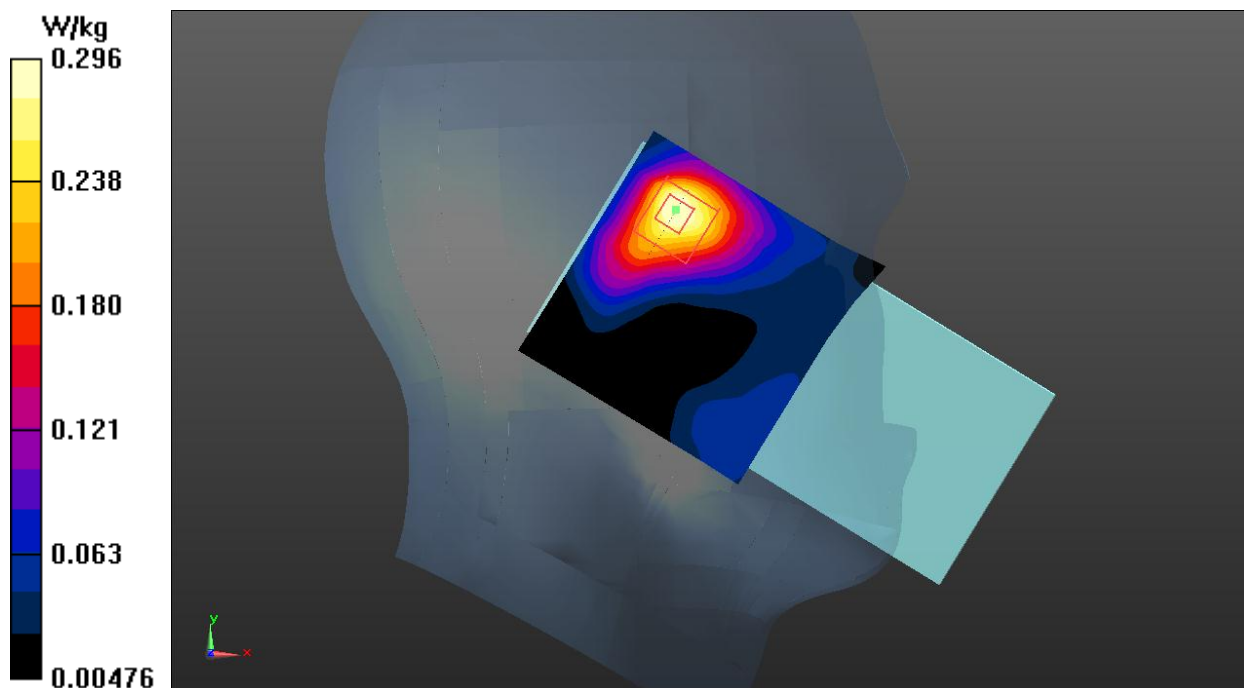


Fig.7 WCDMA Band 4 Head

WCDMA Band 4 Body

Date: 2021-3-17

Electronics: DAE4 Sn1527

Medium: Head 1750MHz

Medium parameters used: $f = 1733 \text{ MHz}$; $\sigma = 1.344 \text{ S/m}$; $\epsilon_r = 40.604$; $\rho = 1000 \text{ kg/m}^3$

Communication System: UID 0, WCDMA (0) Frequency: 1732.6 MHz Duty Cycle: 1:1

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

Rear Side Middle/Area Scan (61x61x1): Interpolated grid: $dx=1.500 \text{ mm}$, $dy=1.500 \text{ mm}$

Maximum value of SAR (interpolated) = 0.476 W/kg

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

Reference Value = 7.863 V/m ; Power Drift = -0.03 dB

Peak SAR (extrapolated) = 0.738 W/kg

SAR(1 g) = 0.390 W/kg ; SAR(10 g) = 0.208 W/kg

Maximum value of SAR (measured) = 0.483 W/kg

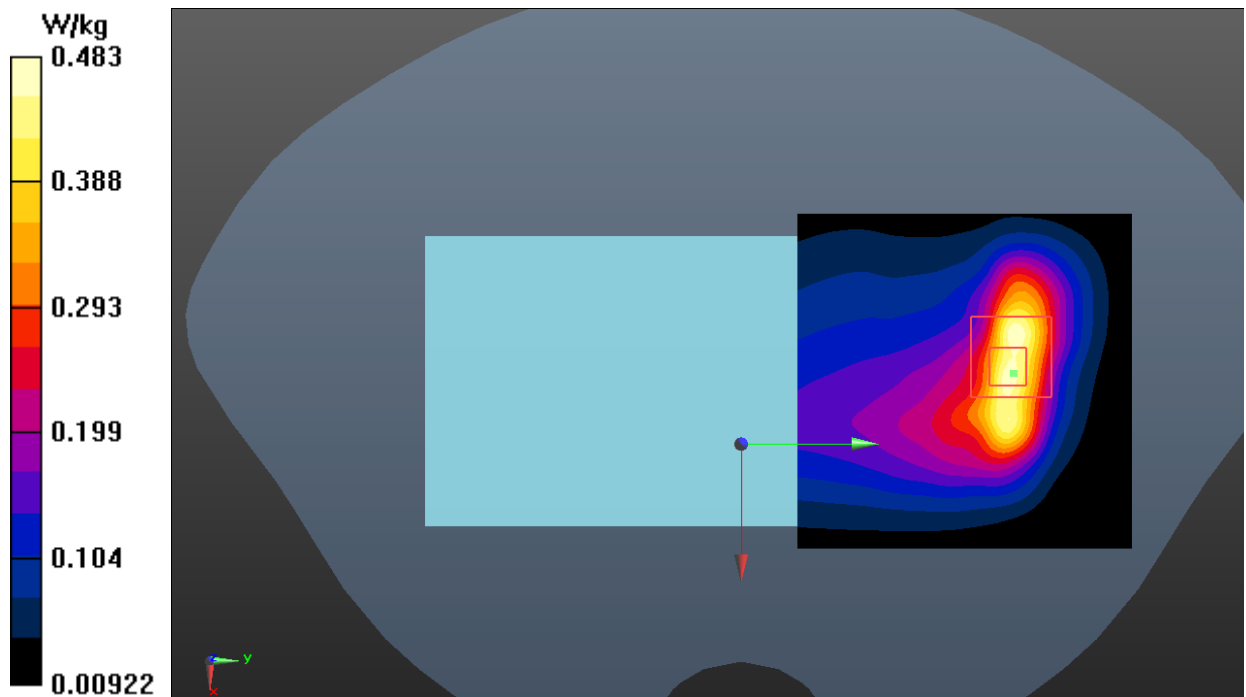


Fig.8 WCDMA Band 4 Body

WCDMA Band 5 Head

Date: 2021-3-4

Electronics: DAE4 Sn1527

Medium: Head 835MHz

Medium parameters used (interpolated): $f = 836.4$ MHz; $\sigma = 0.919$ S/m; $\epsilon_r = 40.716$; $\rho = 1000$ kg/m³

Communication System: UID 0, WCDMA (0) Frequency: 836.4 MHz Duty Cycle: 1:1

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

Left Cheek Middle/Area Scan (61x61x1): Interpolated grid: $dx=1.500$ mm, $dy=1.500$ mm

Maximum value of SAR (interpolated) = 0.293 W/kg

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

Reference Value = 3.052 V/m; Power Drift = 0.09 dB

Peak SAR (extrapolated) = 0.324 W/kg

SAR(1 g) = 0.253 W/kg; SAR(10 g) = 0.194 W/kg

Maximum value of SAR (measured) = 0.292 W/kg

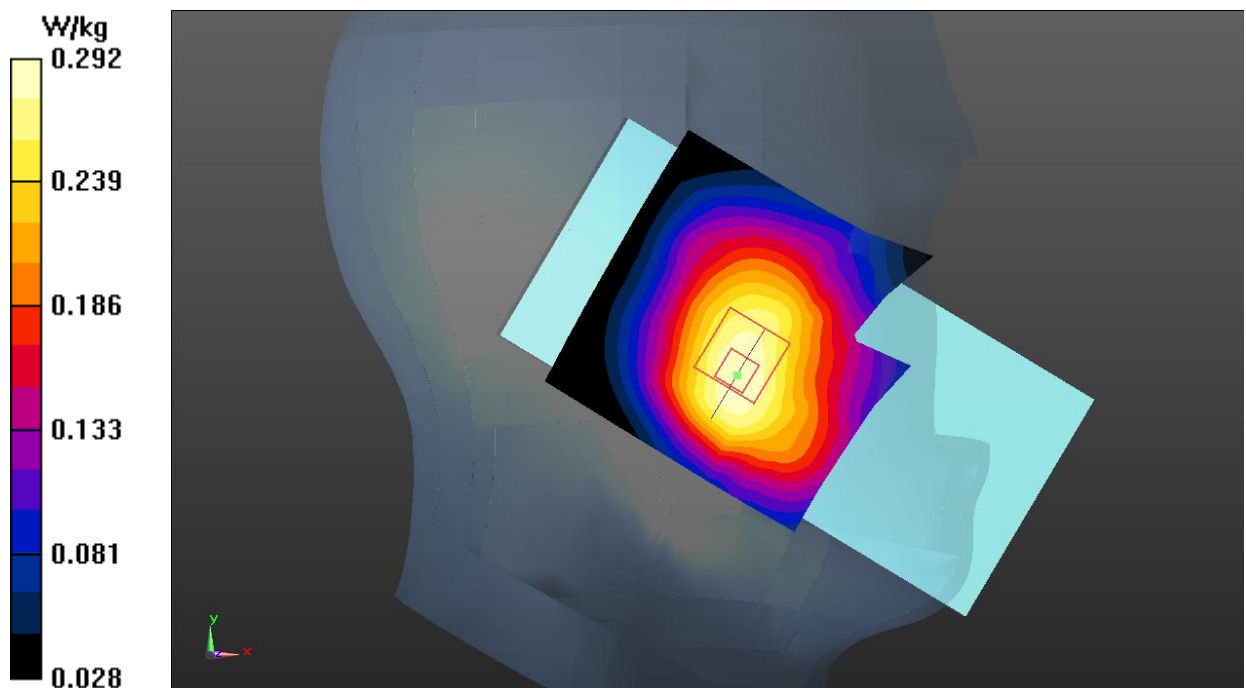


Fig.9 WCDMA Band 5 Head

WCDMA Band 5 Body

Date: 2021-3-4

Electronics: DAE4 Sn1527

Medium: Head 835MHz

Medium parameters used (interpolated): $f = 836.4$ MHz; $\sigma = 0.919$ S/m; $\epsilon_r = 40.716$; $\rho = 1000$ kg/m³

Communication System: UID 0, WCDMA (0) Frequency: 836.4 MHz Duty Cycle: 1:1

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

Rear Side Middle/Area Scan (61x111x1): Interpolated grid: $dx=1.500$ mm, $dy=1.500$ mm

Maximum value of SAR (interpolated) = 0.310 W/kg

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

Reference Value = 17.29 V/m; Power Drift = -0.03 dB

Peak SAR (extrapolated) = 0.364 W/kg

SAR(1 g) = 0.286 W/kg; SAR(10 g) = 0.221 W/kg

Maximum value of SAR (measured) = 0.313 W/kg

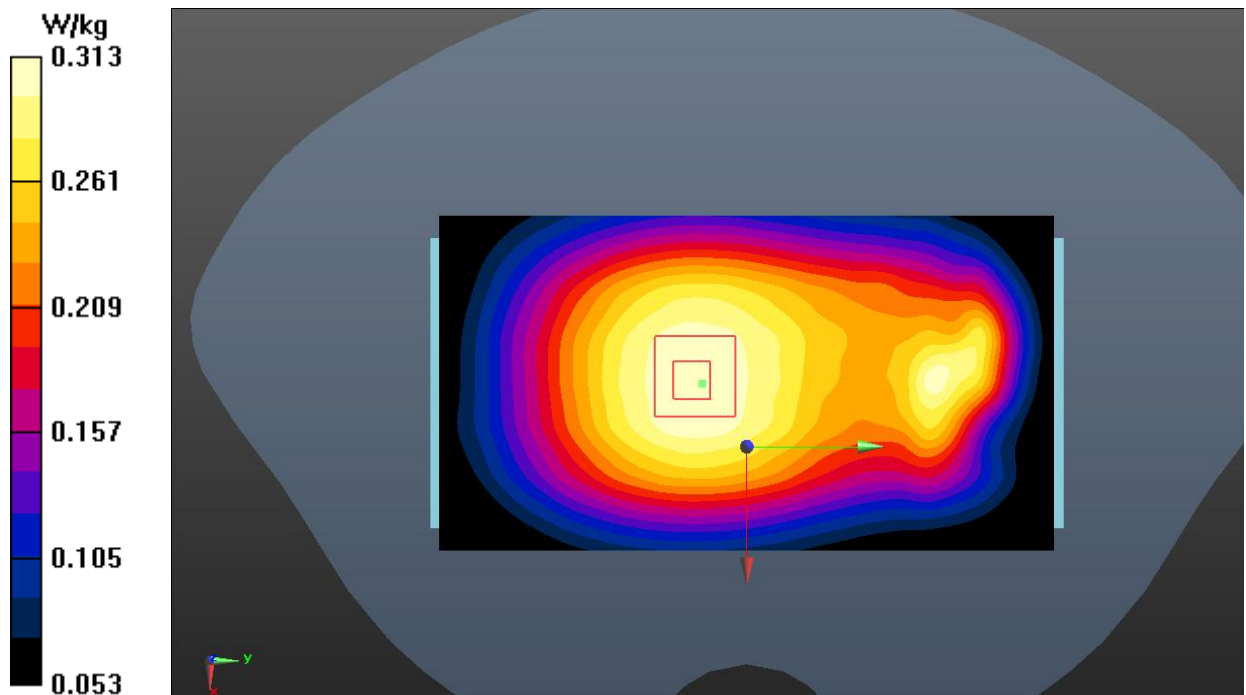


Fig.10 WCDMA Band 5 Body

LTE Band 2 Head

Date: 2021-3-25

Electronics: DAE4 Sn1527

Medium: Head 1900MHz

Medium parameters used: $f = 1880$ MHz; $\sigma = 1.406$ S/m; $\epsilon_r = 39.495$; $\rho = 1000$ kg/m³

Communication System: UID 0, LTE_FDD (0) Frequency: 1880 MHz Duty Cycle: 1:1

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

Right Cheek Middle 1RB0/Area Scan (61x61x1): Interpolated grid: $dx=1.500$ mm, $dy=1.500$ mm
Maximum value of SAR (interpolated) = 0.105 W/kg

Right Cheek Middle 1RB0/Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8$ mm, $dy=8$ mm, $dz=5$ mm

Reference Value = 2.739 V/m; Power Drift = 0.04 dB

Peak SAR (extrapolated) = 0.206 W/kg

SAR(1 g) = 0.085 W/kg; SAR(10 g) = 0.047 W/kg

Maximum value of SAR (interpolated) = 0.121 W/kg

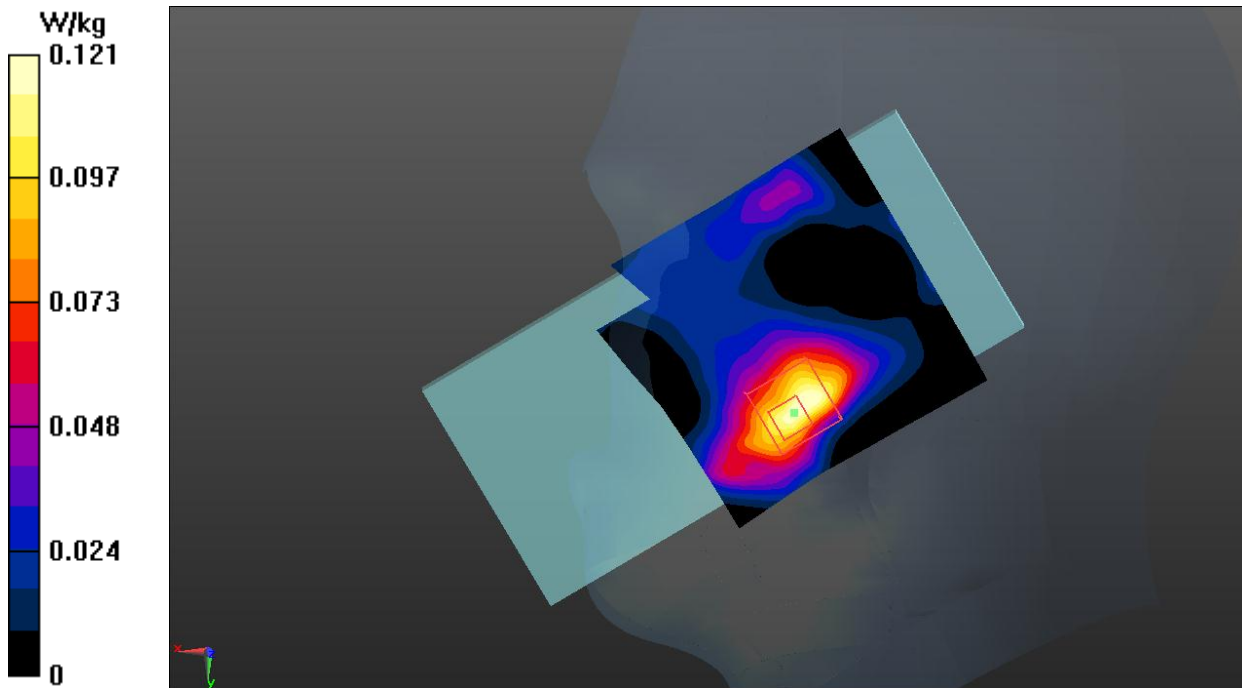


Fig.11 LTE Band 2 Head

LTE Band 2 Body

Date: 2021-3-25

Electronics: DAE4 Sn1527

Medium: Head 1900MHz

Medium parameters used: $f = 1880$ MHz; $\sigma = 1.406$ S/m; $\epsilon_r = 39.495$; $\rho = 1000$ kg/m³

Communication System: UID 0, LTE_FDD (0) Frequency: 1880 MHz Duty Cycle: 1:1

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

Rear Side Middle 1RB0/Area Scan (61x61x1): Interpolated grid: $dx=1.500$ mm, $dy=1.500$ mm

Maximum value of SAR (interpolated) = 1.04 W/kg

Rear Side Middle 1RB0/Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8$ mm, $dy=8$ mm, $dz=5$ mm

Reference Value = 4.438 V/m; Power Drift = -0.10 dB

Peak SAR (extrapolated) = 1.69 W/kg

SAR(1 g) = 0.886 W/kg; SAR(10 g) = 0.440 W/kg

Maximum value of SAR (measured) = 1.06 W/kg

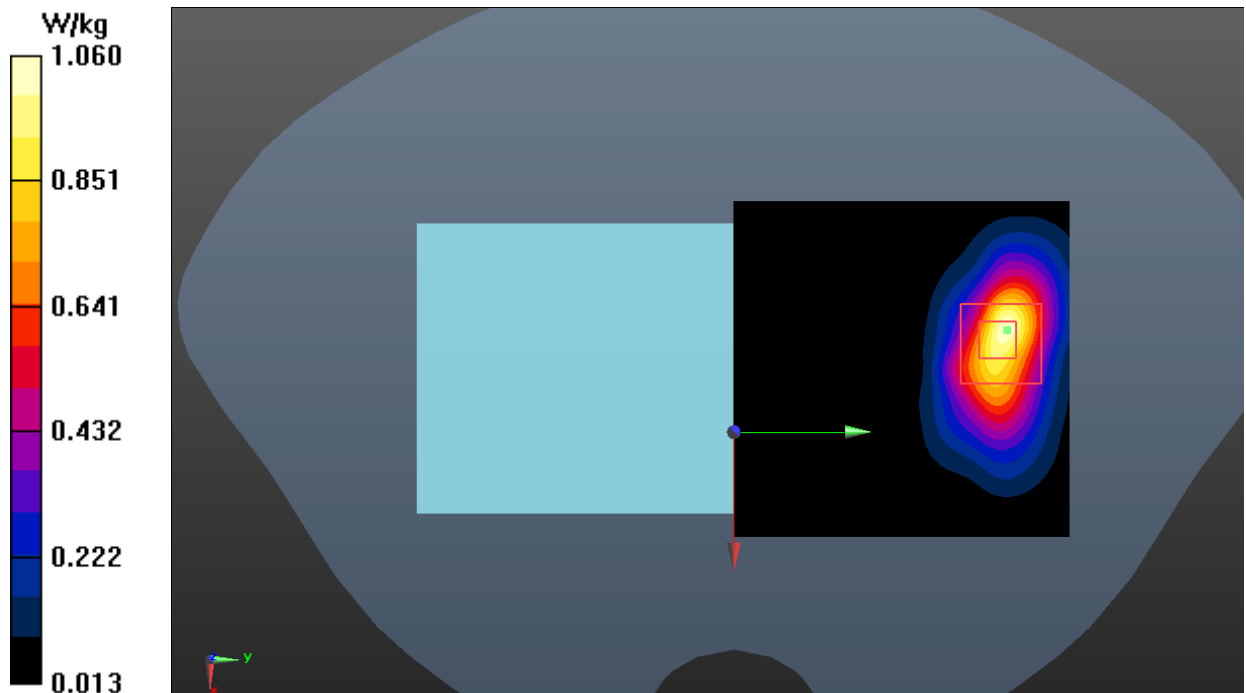


Fig.12 LTE Band 2 Body

LTE Band 5 Head

Date: 2021-3-4

Electronics: DAE4 Sn1527

Medium: Head 835MHz

Medium parameters used (interpolated): $f = 836.5$ MHz; $\sigma = 0.919$ S/m; $\epsilon_r = 40.715$; $\rho = 1000$ kg/m³

Communication System: UID 0, LTE_FDD (0) Frequency: 836.5 MHz Duty Cycle: 1:1

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

Left Cheek Middle 1RB49/Area Scan (61x61x1): Interpolated grid: $dx=1.500$ mm, $dy=1.500$ mm
Maximum value of SAR (interpolated) = 0.220 W/kg

Left Cheek Middle 1RB49/Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8$ mm, $dy=8$ mm, $dz=5$ mm

Reference Value = 2.184 V/m; Power Drift = 0.02 dB

Peak SAR (extrapolated) = 0.249 W/kg

SAR(1 g) = 0.193 W/kg; SAR(10 g) = 0.146 W/kg

Maximum value of SAR (measured) = 0.224 W/kg

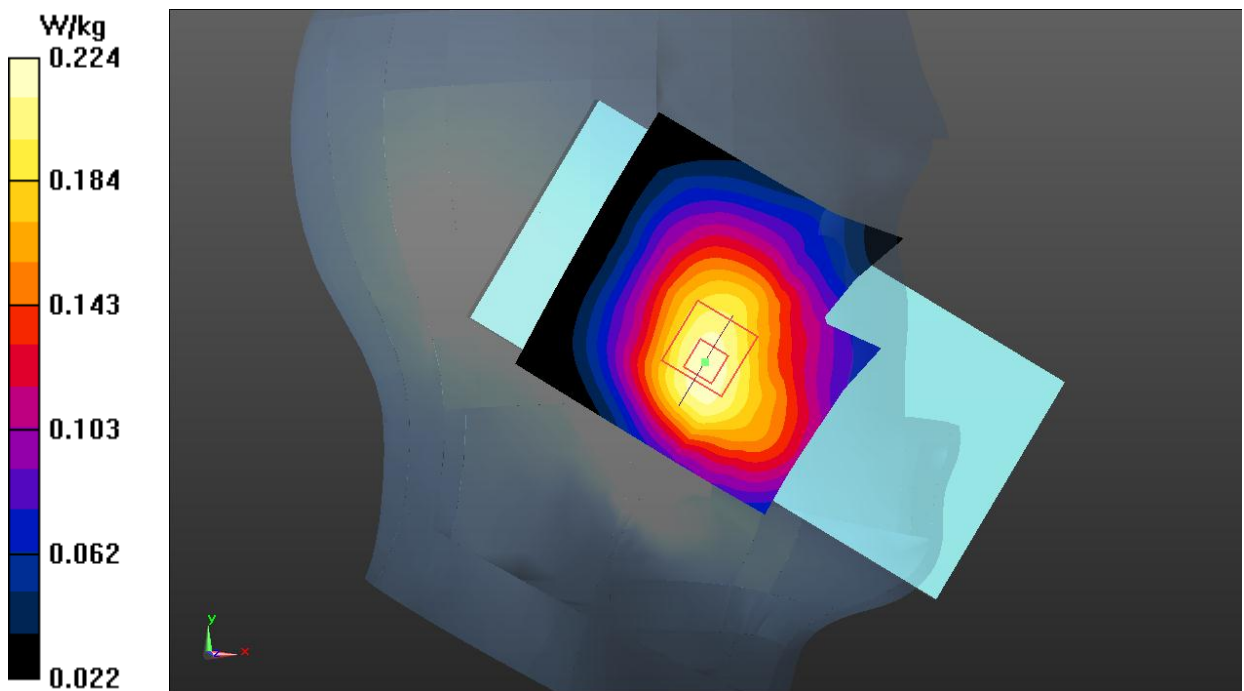


Fig.13 LTE Band 5 Head

LTE Band 5 Body

Date: 2021-3-4

Electronics: DAE4 Sn1527

Medium: Head 835MHz

Medium parameters used (interpolated): $f = 836.5$ MHz; $\sigma = 0.919$ S/m; $\epsilon_r = 40.715$; $\rho = 1000$ kg/m³

Communication System: UID 0, LTE_FDD (0) Frequency: 836.5 MHz Duty Cycle: 1:1

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

Right Side Middle 1RB49/Area Scan (41x71x1): Interpolated grid: $dx=1.500$ mm, $dy=1.500$ mm
Maximum value of SAR (interpolated) = 0.259 W/kg

Right Side Middle 1RB49/Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8$ mm, $dy=8$ mm, $dz=5$ mm

Reference Value = 15.62 V/m; Power Drift = 0.11 dB

Peak SAR (extrapolated) = 0.302 W/kg

SAR(1 g) = 0.242 W/kg; SAR(10 g) = 0.164 W/kg

Maximum value of SAR (measured) = 0.259 W/kg

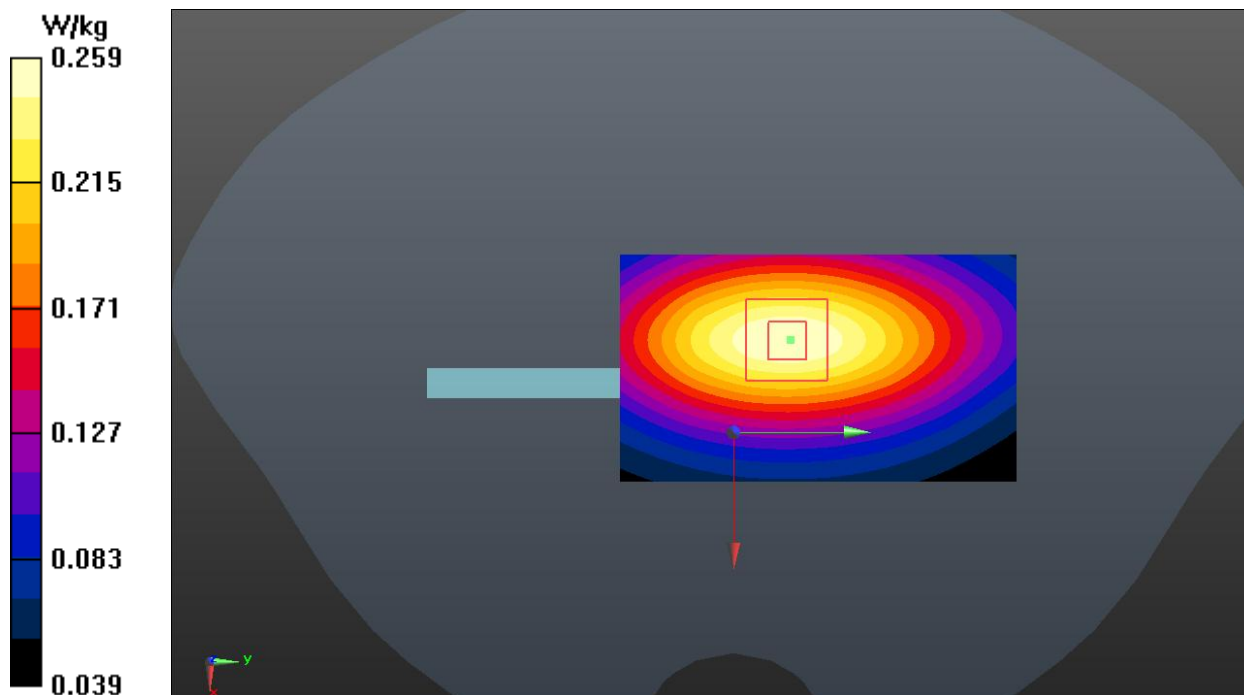


Fig.14 LTE Band 5 Body

LTE Band 7 Head

Date: 2021-3-8

Electronics: DAE4 Sn1527

Medium: Head 2550MHz

Medium parameters used: $f = 2510$ MHz; $\sigma = 1.894$ S/m; $\epsilon_r = 38.608$; $\rho = 1000$ kg/m³

Communication System: UID 0, LTE_FDD (0) Frequency: 2510 MHz Duty Cycle: 1:1

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

Left Cheek Low 1RB99/Area Scan (91x101x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 0.187 W/kg

Left Cheek Low 1RB99/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 1.211 V/m; Power Drift = 0.03 dB

Peak SAR (extrapolated) = 0.207 W/kg

SAR(1 g) = 0.116 W/kg; SAR(10 g) = 0.063 W/kg

Maximum value of SAR (measured) = 0.155 W/kg

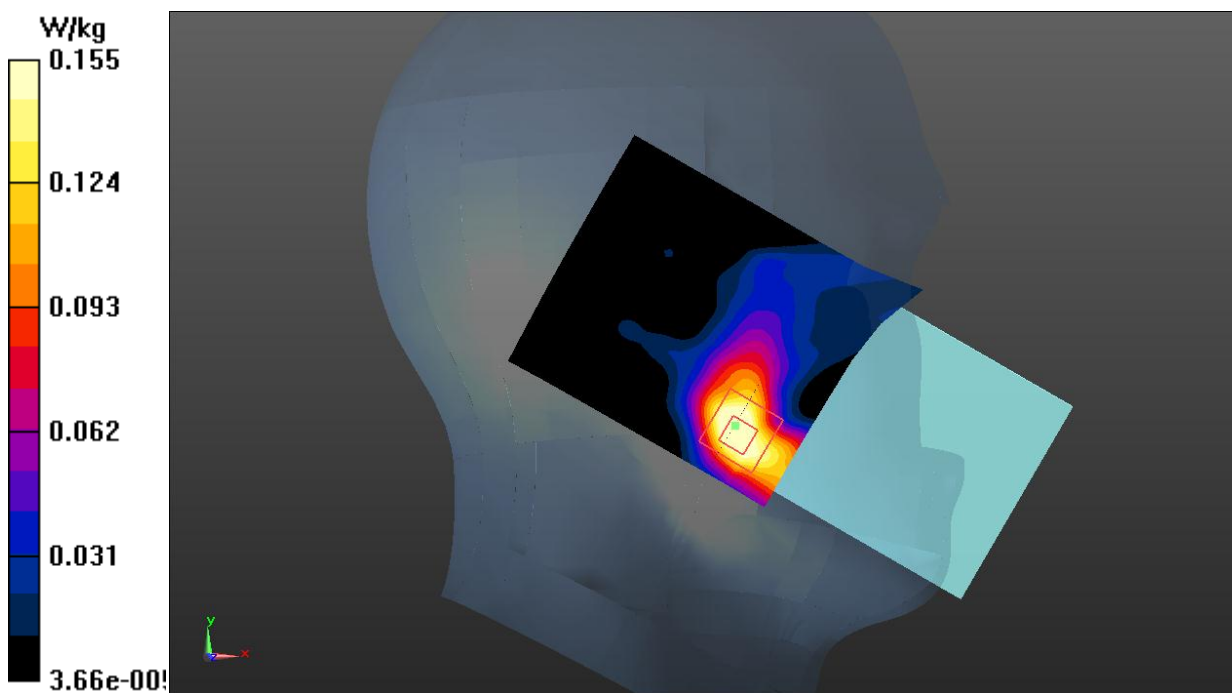


Fig.15 LTE Band 7 Head

LTE Band 7 Body

Date: 2021-3-8

Electronics: DAE4 Sn1527

Medium: Head 2550MHz

Medium parameters used: $f = 2560$ MHz; $\sigma = 1.953$ S/m; $\epsilon_r = 38.443$; $\rho = 1000$ kg/m³

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

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

Rear Side High 1RB99/Area Scan (91x91x1): Interpolated grid: $dx=1.000$ mm, $dy=1.000$ mm

Maximum value of SAR (interpolated) = 1.47 W/kg

Rear Side High 1RB99/Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5$ mm, $dy=5$ mm, $dz=5$ mm

Reference Value = 2.740 V/m; Power Drift = 0.03 dB

Peak SAR (extrapolated) = 2.05 W/kg

SAR(1 g) = 0.999 W/kg; SAR(10 g) = 0.477 W/kg

Maximum value of SAR (measured) = 1.49 W/kg

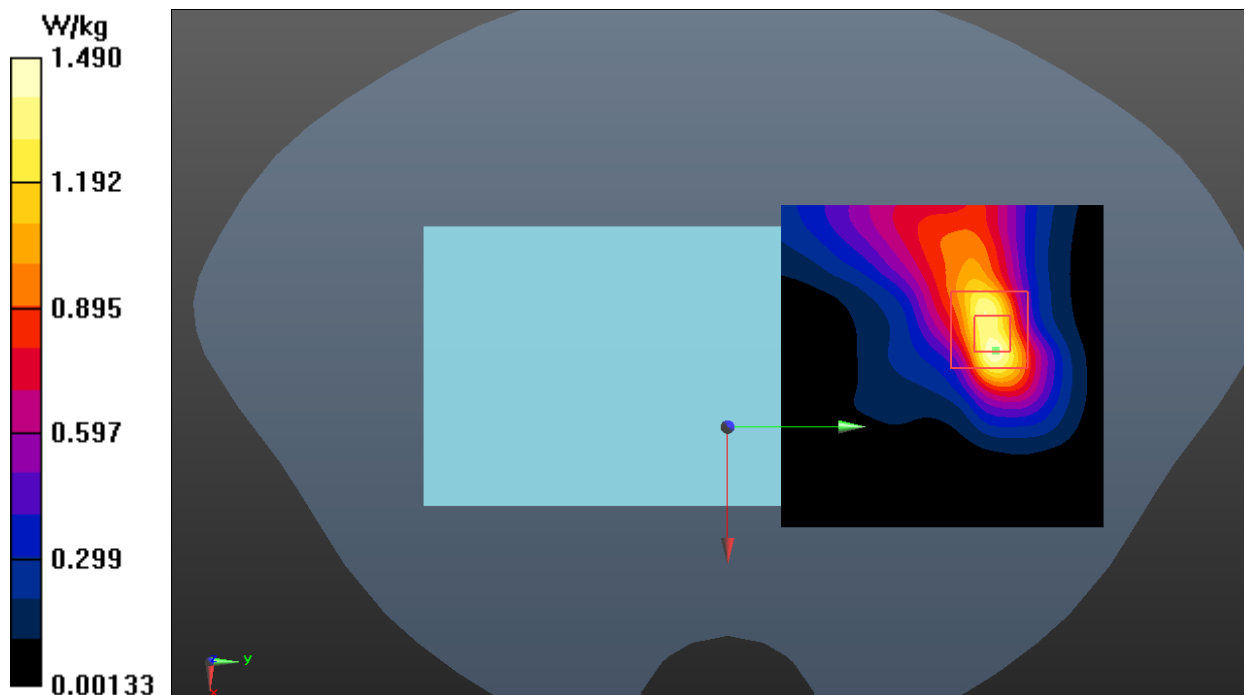


Fig.16 LTE Band 7 Body

LTE Band 12 Head

Date: 2021-3-5

Electronics: DAE4 Sn1527

Medium: Head 750MHz

Medium parameters used: $f = 708 \text{ MHz}$; $\sigma = 0.869 \text{ S/m}$; $\epsilon_r = 41.456$; $\rho = 1000 \text{ kg/m}^3$

Communication System: UID 0, LTE_FDD (0) Frequency: 707.5 MHz Duty Cycle: 1:1

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

Left Cheek Middle 1RB49/Area Scan (61x71x1): Interpolated grid: $dx=1.500 \text{ mm}$, $dy=1.500 \text{ mm}$
Maximum value of SAR (interpolated) = 0.0650 W/kg

Left Cheek Middle 1RB49/Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Reference Value = 1.064 V/m; Power Drift = 0.14 dB

Peak SAR (extrapolated) = 0.0730 W/kg

SAR(1 g) = 0.056 W/kg; SAR(10 g) = 0.043 W/kg

Maximum value of SAR (measured) = 0.0641 W/kg

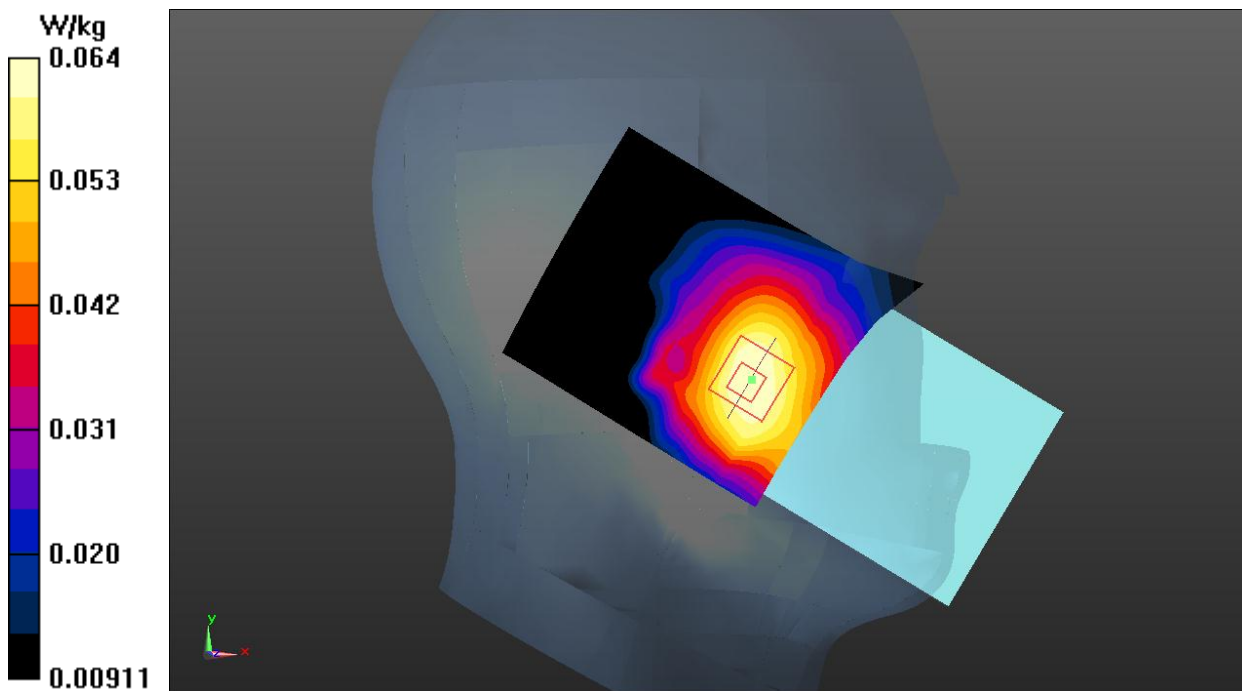


Fig.17 LTE Band 12 Head

LTE Band 12 Body

Date: 2021-3-5

Electronics: DAE4 Sn1527

Medium: Head 750MHz

Medium parameters used: $f = 708 \text{ MHz}$; $\sigma = 0.869 \text{ S/m}$; $\epsilon_r = 41.456$; $\rho = 1000 \text{ kg/m}^3$

Communication System: UID 0, LTE_FDD (0) Frequency: 707.5 MHz Duty Cycle: 1:1

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

Rear Side Middle 1RB49/Area Scan (61x81x1): Interpolated grid: $dx=1.500 \text{ mm}$, $dy=1.500 \text{ mm}$

Maximum value of SAR (interpolated) = 0.139 W/kg

Rear Side Middle 1RB49/Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Reference Value = 12.03 V/m ; Power Drift = 0.00 dB

Peak SAR (extrapolated) = 0.162 W/kg

SAR(1 g) = 0.127 W/kg ; SAR(10 g) = 0.097 W/kg

Maximum value of SAR (measured) = 0.139 W/kg

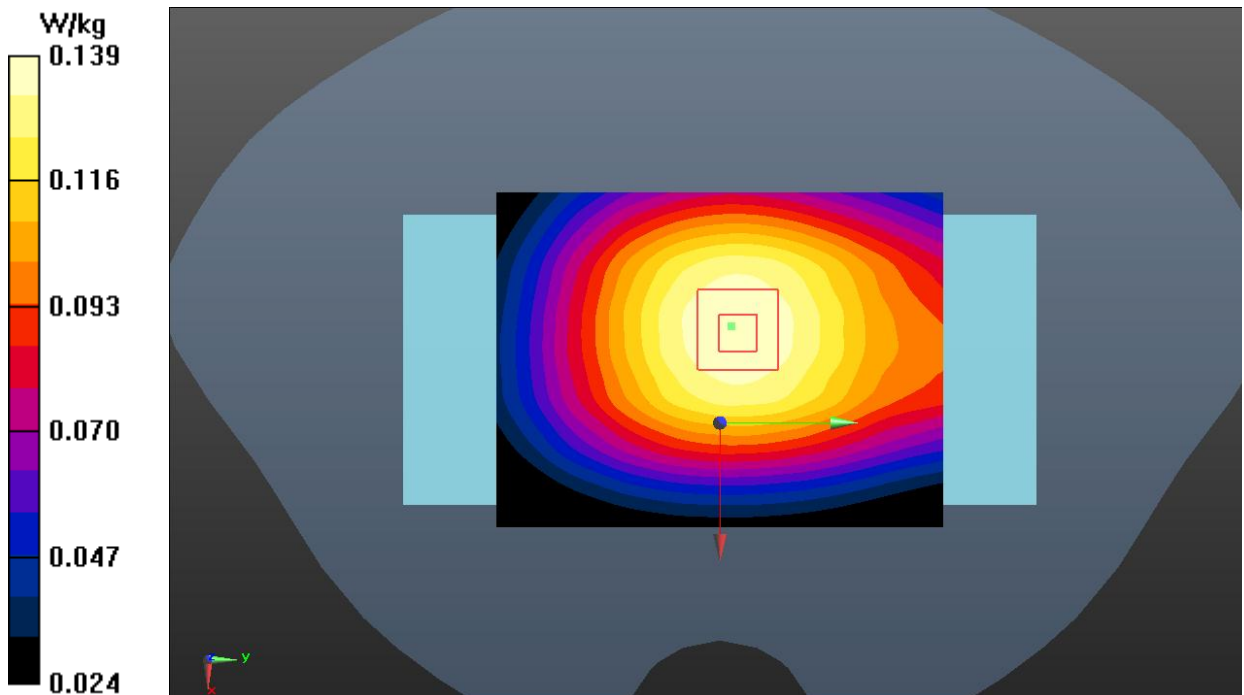


Fig.18 LTE Band 12 Body

LTE Band 28 Head

Date: 2021-3-5

Electronics: DAE4 Sn1527

Medium: Head 750MHz

Medium parameters used: $f = 728 \text{ MHz}$; $\sigma = 0.882 \text{ S/m}$; $\epsilon_r = 41.215$; $\rho = 1000 \text{ kg/m}^3$

Communication System: UID 0, LTE_FDD (0) Frequency: 728 MHz Duty Cycle: 1:1

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

Left Cheek Middle 1RB99/Area Scan (61x71x1): Interpolated grid: $dx=1.500 \text{ mm}$, $dy=1.500 \text{ mm}$

Maximum value of SAR (interpolated) = 0.116 W/kg

Left Cheek Middle 1RB99/Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Reference Value = 1.969 V/m ; Power Drift = 0.06 dB

Peak SAR (extrapolated) = 0.131 W/kg

SAR(1 g) = 0.100 W/kg ; SAR(10 g) = 0.077 W/kg

Maximum value of SAR (measured) = 0.116 W/kg

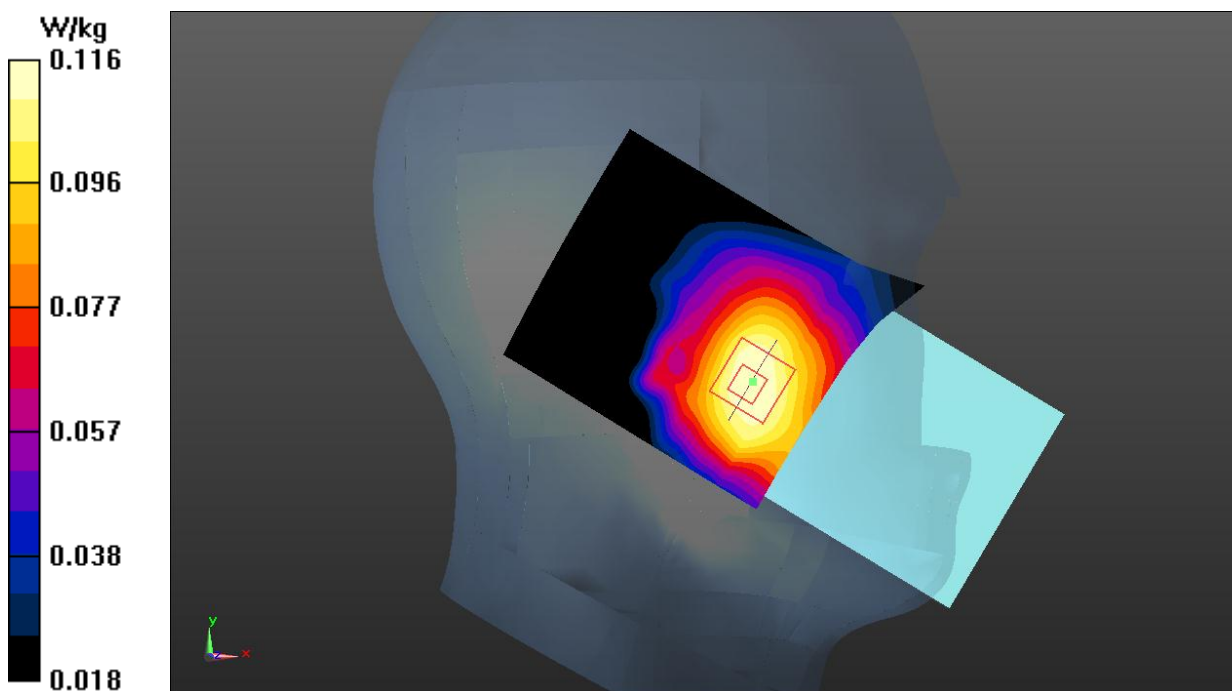


Fig.19 LTE Band 28 Head

LTE Band 28 Body

Date: 2021-3-5

Electronics: DAE4 Sn1527

Medium: Head 750MHz

Medium parameters used: $f = 728 \text{ MHz}$; $\sigma = 0.882 \text{ S/m}$; $\epsilon_r = 41.215$; $\rho = 1000 \text{ kg/m}^3$

Communication System: UID 0, LTE_FDD (0) Frequency: 728 MHz Duty Cycle: 1:1

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

Rear Side Middle 1RB99/Area Scan (61x61x1): Interpolated grid: $dx=1.500 \text{ mm}$, $dy=1.500 \text{ mm}$

Maximum value of SAR (interpolated) = 0.231 W/kg

Rear Side Middle 1RB99/Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Reference Value = 14.85 V/m ; Power Drift = 0.06 dB

Peak SAR (extrapolated) = 0.258 W/kg

SAR(1 g) = 0.199 W/kg ; SAR(10 g) = 0.150 W/kg

Maximum value of SAR (measured) = 0.230 W/kg

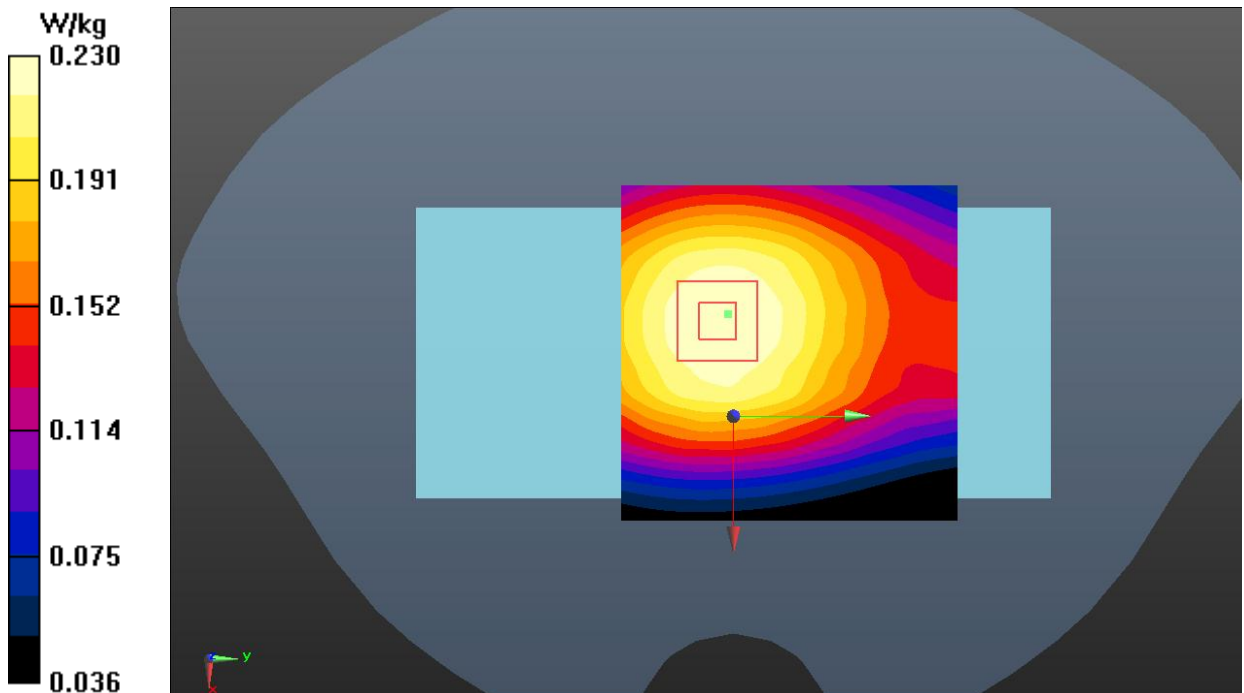


Fig.20 LTE Band 28 Body

LTE Band 66 Head

Date: 2021-3-17

Electronics: DAE4 Sn1527

Medium: Head 1750MHz

Medium parameters used: $f = 1720$ MHz; $\sigma = 1.333$ S/m; $\epsilon_r = 40.655$; $\rho = 1000$ kg/m³

Communication System: UID 0, LTE_FDD (0) Frequency: 1720 MHz Duty Cycle: 1:1

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

Right Cheek Low 1RB99/Area Scan (61x61x1): Interpolated grid: $dx=1.500$ mm, $dy=1.500$ mm
Maximum value of SAR (interpolated) = 0.202 W/kg

Right Cheek Low 1RB99/Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8$ mm, $dy=8$ mm, $dz=5$ mm

Reference Value = 5.269 V/m; Power Drift = 0.04 dB

Peak SAR (extrapolated) = 0.225 W/kg

SAR(1 g) = 0.150 W/kg; SAR(10 g) = 0.095 W/kg

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

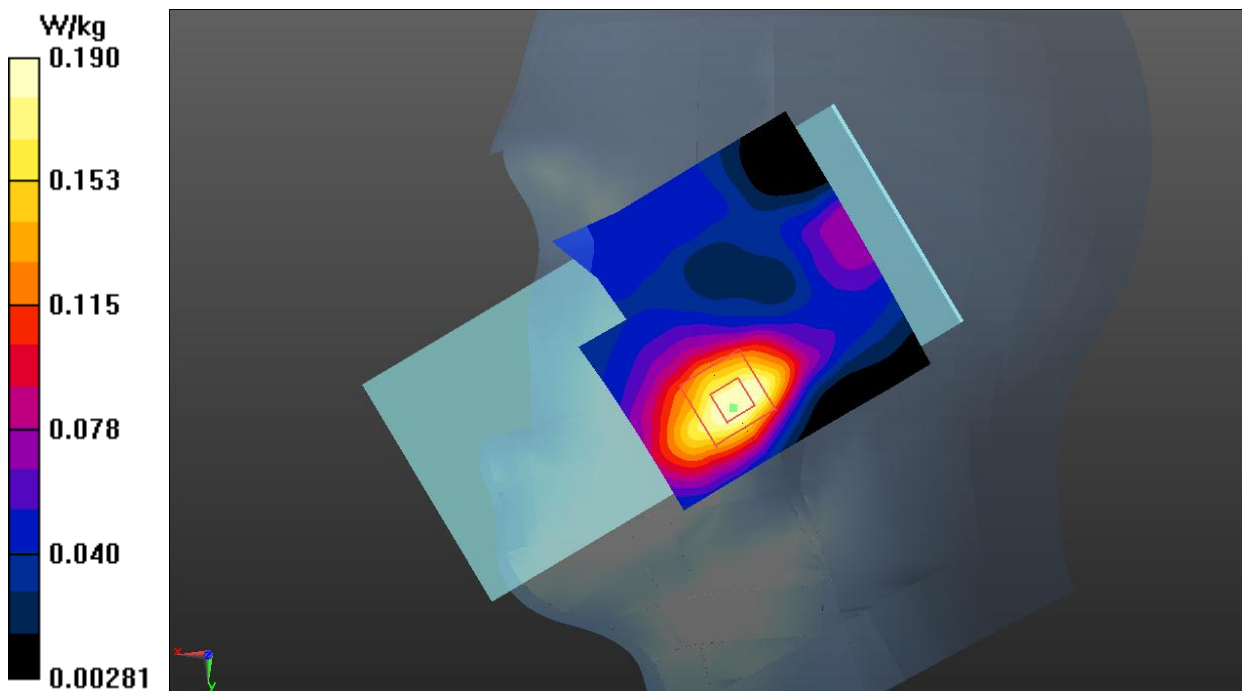


Fig.21 LTE Band 66 Head

LTE Band 66 Body

Date: 2021-3-17

Electronics: DAE4 Sn1527

Medium: Head 1750MHz

Medium parameters used: $f = 1720$ MHz; $\sigma = 1.333$ S/m; $\epsilon_r = 40.655$; $\rho = 1000$ kg/m³

Communication System: UID 0, LTE_FDD (0) Frequency: 1720 MHz Duty Cycle: 1:1

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

Rear Side Low 1RB99/Area Scan (61x61x1): Interpolated grid: $dx=1.500$ mm, $dy=1.500$ mm

Maximum value of SAR (interpolated) = 1.08 W/kg

Rear Side Low 1RB99/Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8$ mm, $dy=8$ mm, $dz=5$ mm

Reference Value = 5.032 V/m; Power Drift = 0.05 dB

Peak SAR (extrapolated) = 1.63 W/kg

SAR(1 g) = 0.870 W/kg; SAR(10 g) = 0.436 W/kg

Maximum value of SAR (measured) = 1.09 W/kg

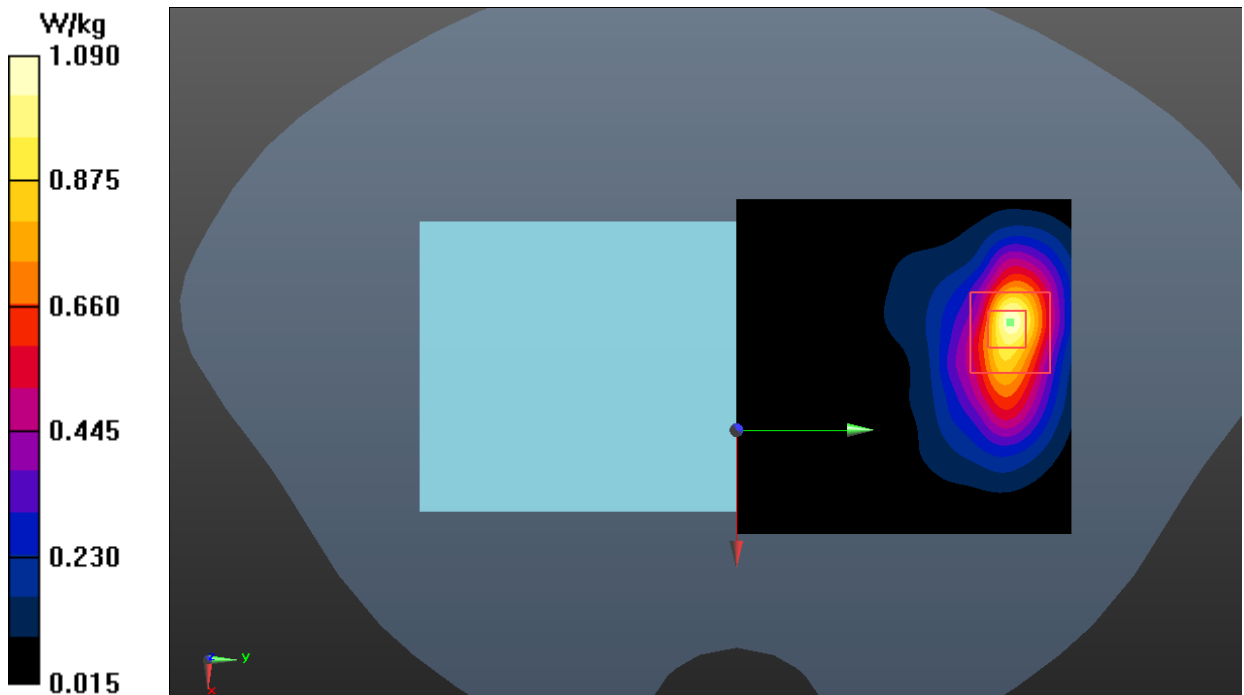


Fig.22 LTE Band 66 Body

WLAN 2.4G Head

Date: 2021-3-6

Electronics: DAE4 Sn1527

Medium: Head 2450MHz

Medium parameters used: $f = 2462$ MHz; $\sigma = 1.834$ S/m; $\epsilon_r = 38.591$; $\rho = 1000$ kg/m³

Communication System: UID 0, WiFi (0) Frequency: 2462 MHz Duty Cycle: 1:1

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

Right Cheek High/Area Scan (91x91x1): Interpolated grid: $dx=1.000$ mm, $dy=1.000$ mm

Maximum value of SAR (interpolated) = 1.03 W/kg

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

Reference Value = 7.128 V/m; Power Drift = 0.06 dB

Peak SAR (extrapolated) = 1.23 W/kg

SAR(1 g) = 0.594 W/kg; SAR(10 g) = 0.295 W/kg

Maximum value of SAR (measured) = 0.838 W/kg

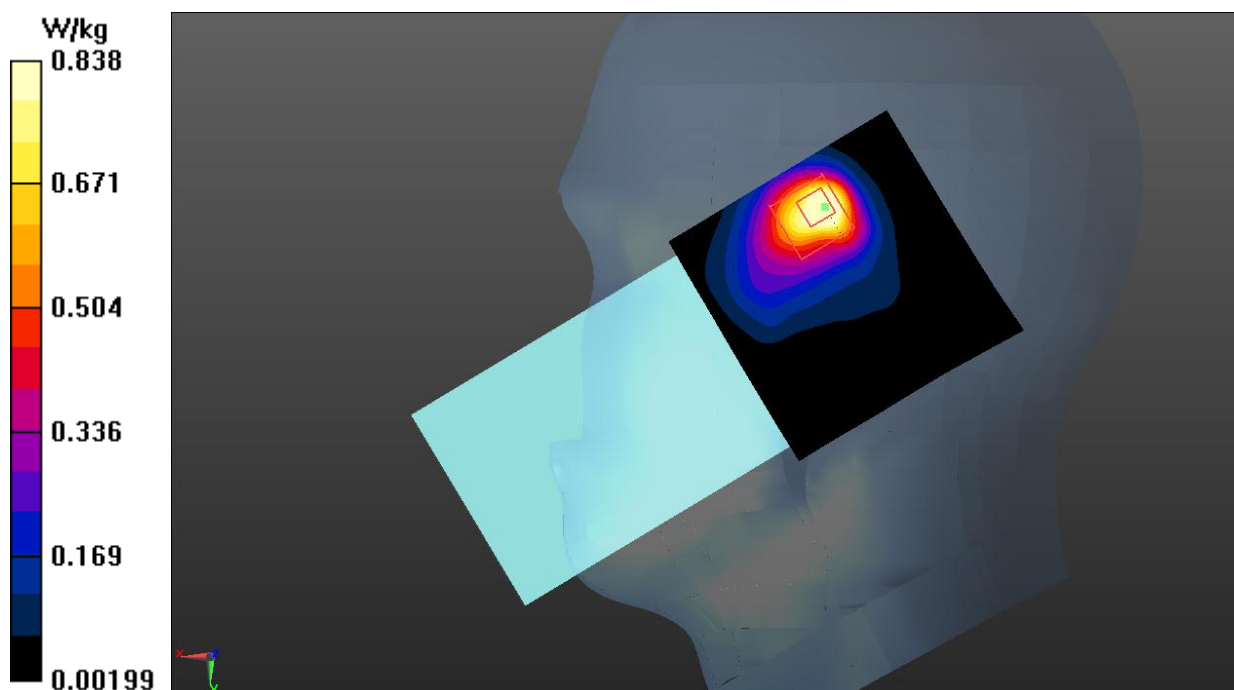


Fig.23 WLAN 2.4G Head

WLAN 2.4G Body

Date: 2021-3-6

Electronics: DAE4 Sn1527

Medium: Head 2450MHz

Medium parameters used: $f = 2462$ MHz; $\sigma = 1.834$ S/m; $\epsilon_r = 38.591$; $\rho = 1000$ kg/m³

Communication System: UID 0, WiFi (0) Frequency: 2462 MHz Duty Cycle: 1:1

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

Rear Side High/Area Scan (91x91x1): Interpolated grid: $dx=1.000$ mm, $dy=1.000$ mm

Maximum value of SAR (interpolated) = 0.260 W/kg

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

Reference Value = 3.450 V/m; Power Drift = 0.05 dB

Peak SAR (extrapolated) = 0.365 W/kg

SAR(1 g) = 0.170 W/kg; SAR(10 g) = 0.084 W/kg

Maximum value of SAR (measured) = 0.248 W/kg

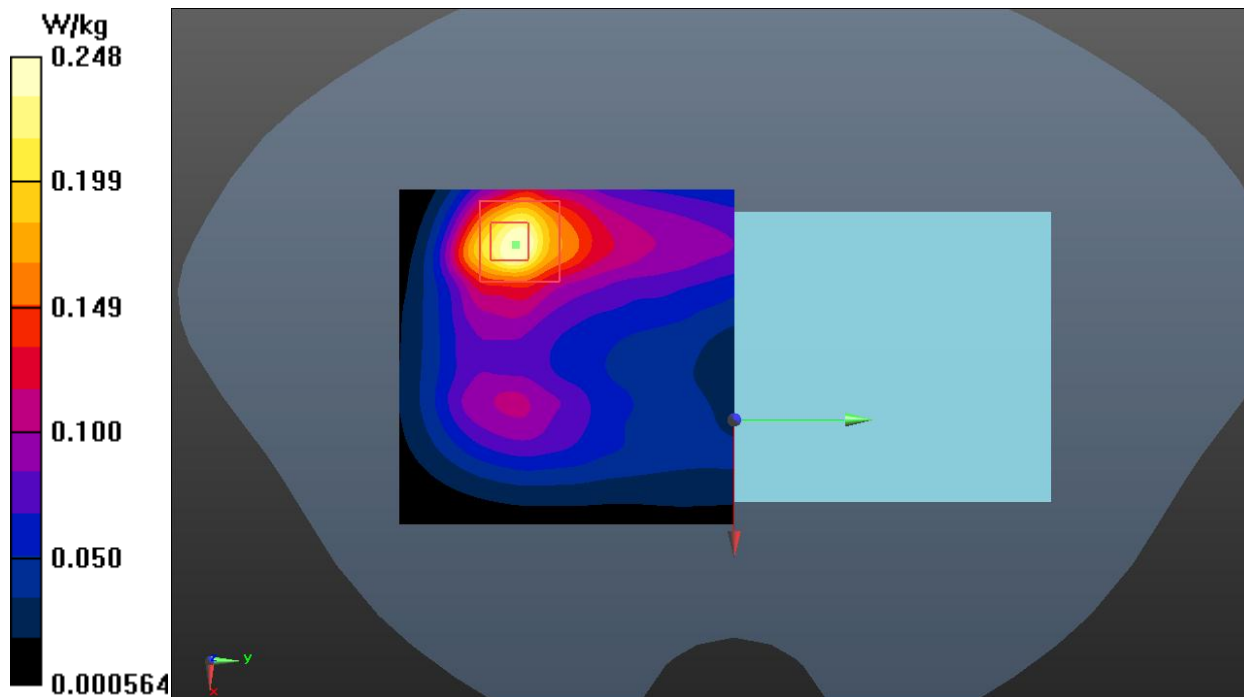


Fig.24 WLAN 2.4G Body

ANNEX B: SystemVerification Results

750MHz

Date: 2021-3-5

Electronics: DAE4 Sn1527

Medium: Head 750MHz

Medium parameters used: $f = 750 \text{ MHz}$; $\sigma = 0.896 \text{ S/m}$; $\epsilon_r = 40.952$; $\rho = 1000 \text{ kg/m}^3$

Communication System: CW_TMC Frequency: 750 MHz Duty Cycle: 1:1

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

System Validation/Area Scan (81x161x1): Interpolated grid: $dx=1.000 \text{ mm}$, $dy=1.000 \text{ mm}$

Reference Value = 61.225 V/m; Power Drift = -0.07 dB

SAR(1 g) = 2.22 W/kg; SAR(10 g) = 1.46 W/kg

Maximum value of SAR (interpolated) = 2.82 W/kg

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

Reference Value = 61.225 V/m; Power Drift = -0.07 dB

Peak SAR (extrapolated) = 3.16 W/kg

SAR(1 g) = 2.18 W/kg; SAR(10 g) = 1.44 W/kg

Maximum value of SAR (measured) = 2.79 W/kg

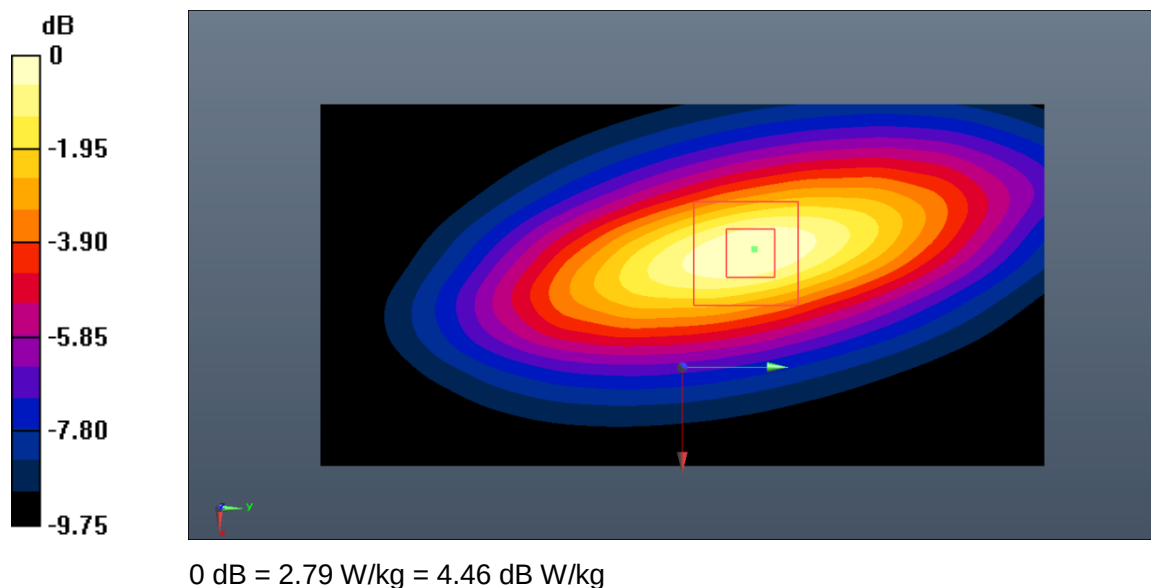


Fig.B.1. Validation 750MHz 250mW

835MHz

Date: 2021-3-4

Electronics: DAE4 Sn1527

Medium: Head 835MHz

Medium parameters used: $f = 835 \text{ MHz}$; $\sigma = 0.918 \text{ S/m}$; $\epsilon_r = 40.733$; $\rho = 1000 \text{ kg/m}^3$

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: $dx=1.000 \text{ mm}$, $dy=1.000 \text{ mm}$

Reference Value = 64.178 V/m; Power Drift = 0.10 dB

SAR(1 g) = 2.43 W/kg; SAR(10 g) = 1.58 W/kg

Maximum value of SAR (interpolated) = 3.45 W/kg

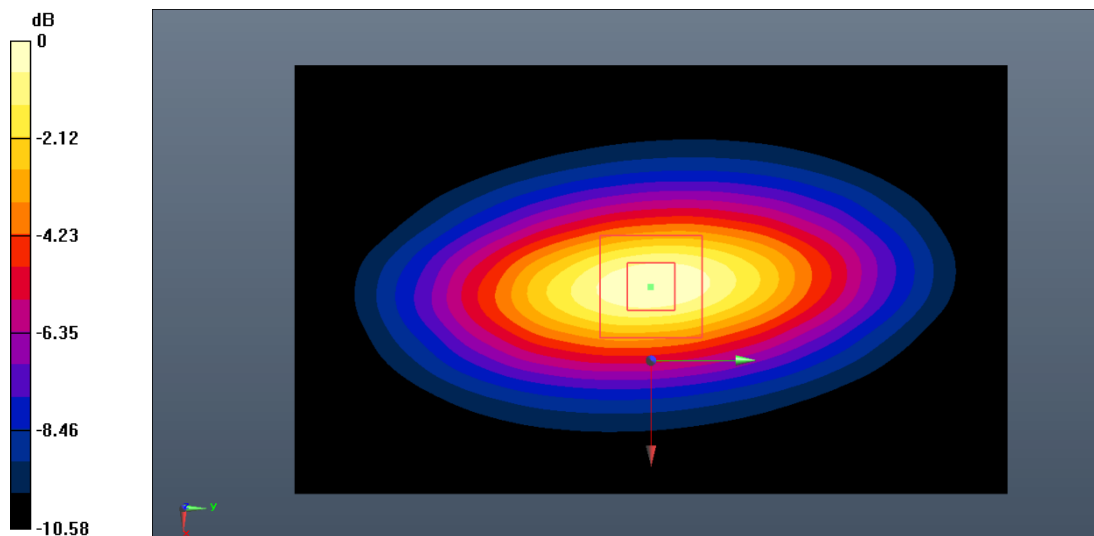
System Validation/Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 64.178 V/m; Power Drift = 0.10 dB

Peak SAR (extrapolated) = 4.12 W/kg

SAR(1 g) = 2.49 W/kg; SAR(10 g) = 1.61 W/kg

Maximum value of SAR (measured) = 3.49 W/kg



0 dB = 3.49 W/kg = 5.43 dB W/kg

Fig.B.2. Validation 835MHz 250mW

1750MHz

Date: 2021-3-17

Electronics: DAE4 Sn1527

Medium: Head 1750MHz

Medium parameters used: $f = 1750$ MHz; $\sigma = 1.359$ S/m; $\epsilon_r = 40.538$; $\rho = 1000$ kg/m³

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 = 79.246 V/m; Power Drift = -0.05 dB

SAR(1 g) = 9.11 W/kg; SAR(10 g) = 4.85 W/kg

Maximum value of SAR (interpolated) = 10.7 W/kg

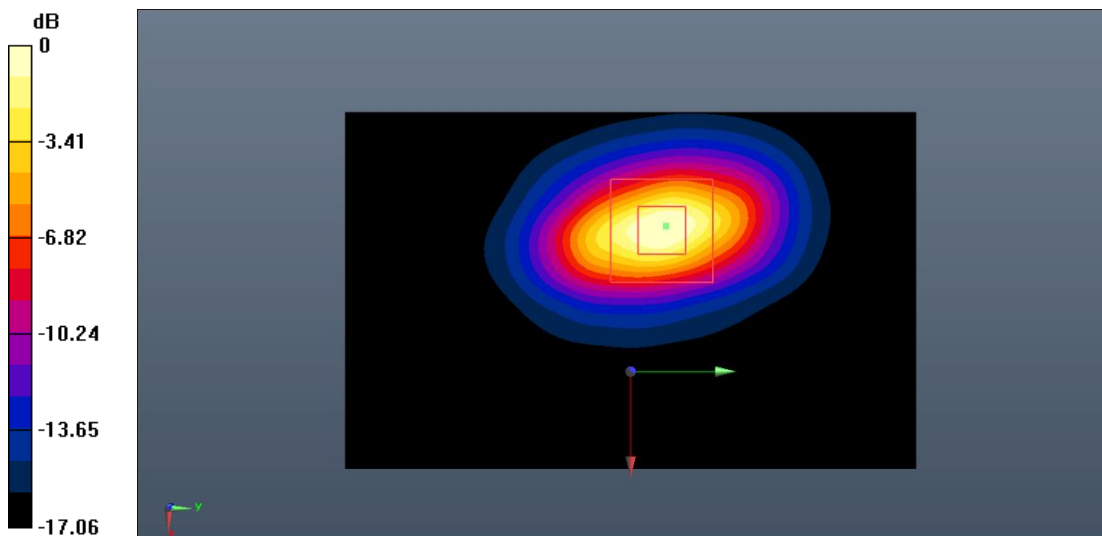
System Validation/Zoom Scan (7x7x7)/Cube0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 79.246 V/m; Power Drift = -0.05 dB

Peak SAR (extrapolated) = 20.6 W/kg

SAR(1 g) = 8.92 W/kg; SAR(10 g) = 4.78 W/kg

Maximum value of SAR (measured) = 10.5 W/kg



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

Fig.B.3. Validation 1750MHz 250mW

1900MHz

Date: 2021-3-25

Electronics: DAE4 Sn1527

Medium: Head 1900MHz

Medium parameters used: $f = 1900 \text{ MHz}$; $\sigma = 1.424 \text{ S/m}$; $\epsilon_r = 39.417$; $\rho = 1000 \text{ kg/m}^3$

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: $dx=1.000 \text{ mm}$, $dy=1.000 \text{ mm}$

Reference Value = 85.013 V/m; Power Drift = 0.12 dB

SAR(1 g) = 10.3 W/kg; SAR(10 g) = 5.21 W/kg

Maximum value of SAR (interpolated) = 12.4 W/kg

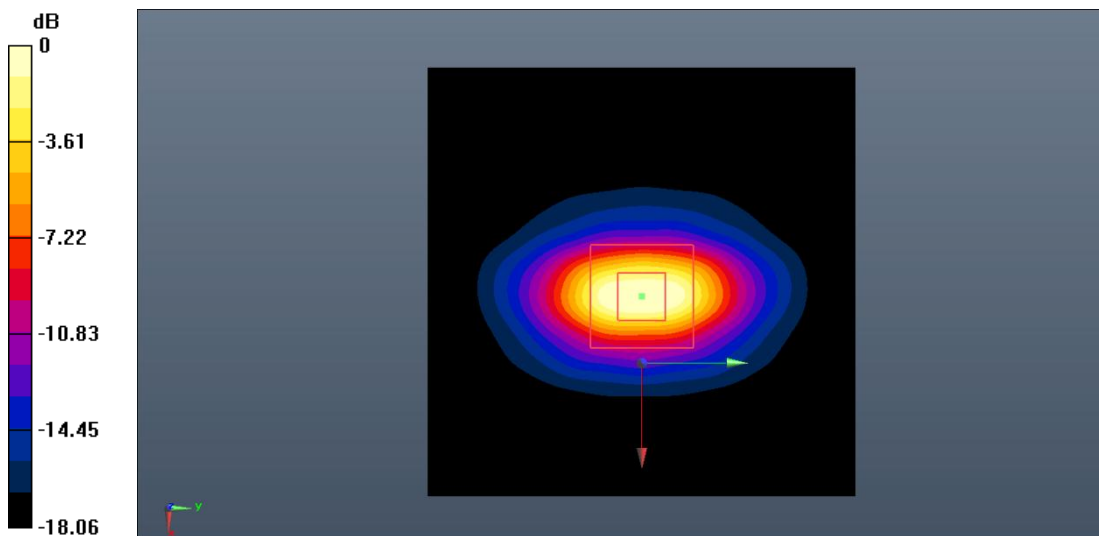
System Validation/Zoom Scan (7x7x7)/Cube0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 85.013 V/m; Power Drift = 0.12 dB

Peak SAR (extrapolated) = 25.8 W/kg

SAR(1 g) = 10.5 W/kg; SAR(10 g) = 5.33 W/kg

Maximum value of SAR (measured) = 12.6 W/kg



0 dB = 12.6 W/kg = 11.00 dB W/kg

Fig.B.4. Validation 1900MHz 250mW

2450MHz

Date: 2021-3-6

Electronics: DAE4 Sn1527

Medium: Head 2450MHz

Medium parameters used: $f = 2450$ MHz; $\sigma = 1.82$ S/m; $\epsilon_r = 38.631$; $\rho = 1000$ kg/m³

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 = 89.452 V/m; Power Drift = 0.08 dB

SAR(1 g) = 13.2 W/kg; SAR(10 g) = 6.02 W/kg

Maximum value of SAR (interpolated) = 15.5 W/kg

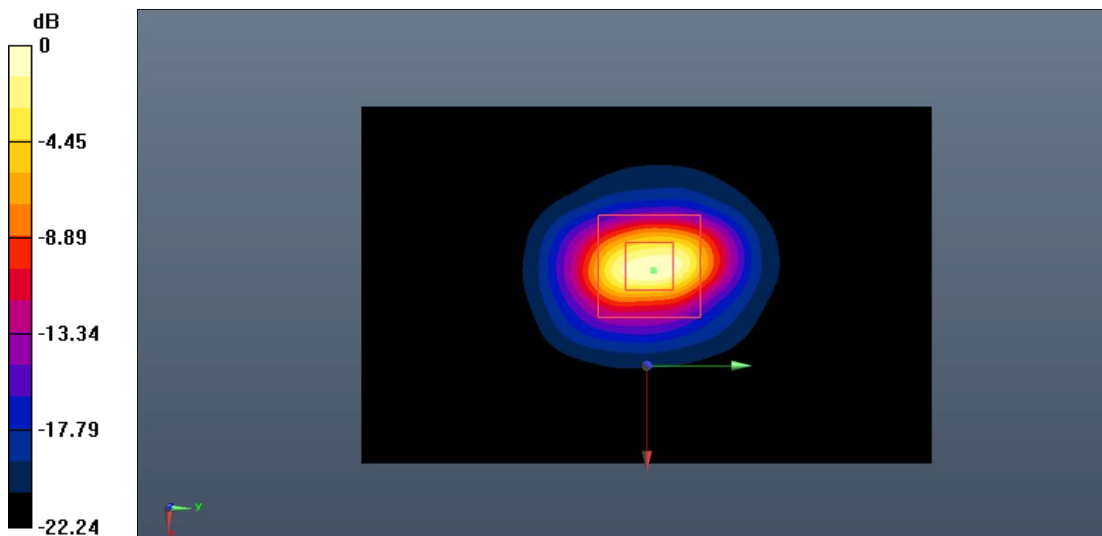
System Validation/Zoom Scan (7x7x7)/Cube0: Measurement grid: $dx=5$ mm, $dy=5$ mm, $dz=5$ mm

Reference Value = 89.452 V/m; Power Drift = 0.08 dB

Peak SAR (extrapolated) = 28.7 W/kg

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

Maximum value of SAR (measured) = 15.8 W/kg



0 dB = 15.8 W/kg = 11.99 dB W/kg

Fig.B.5. Validation 2450MHz 250mW

2550MHz

Date: 2021-3-8

Electronics: DAE4 Sn1527

Medium: Head 2550MHz

Medium parameters used: $f = 2550 \text{ MHz}$; $\sigma = 1.941 \text{ S/m}$; $\epsilon_r = 38.476$; $\rho = 1000 \text{ kg/m}^3$

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: $dx=1.000 \text{ mm}$, $dy=1.000 \text{ mm}$

Reference Value = 94.036 V/m; Power Drift = 0.03 dB

SAR(1 g) = 14.9 W/kg; SAR(10 g) = 6.65 W/kg

Maximum value of SAR (interpolated) = 16.8 W/kg

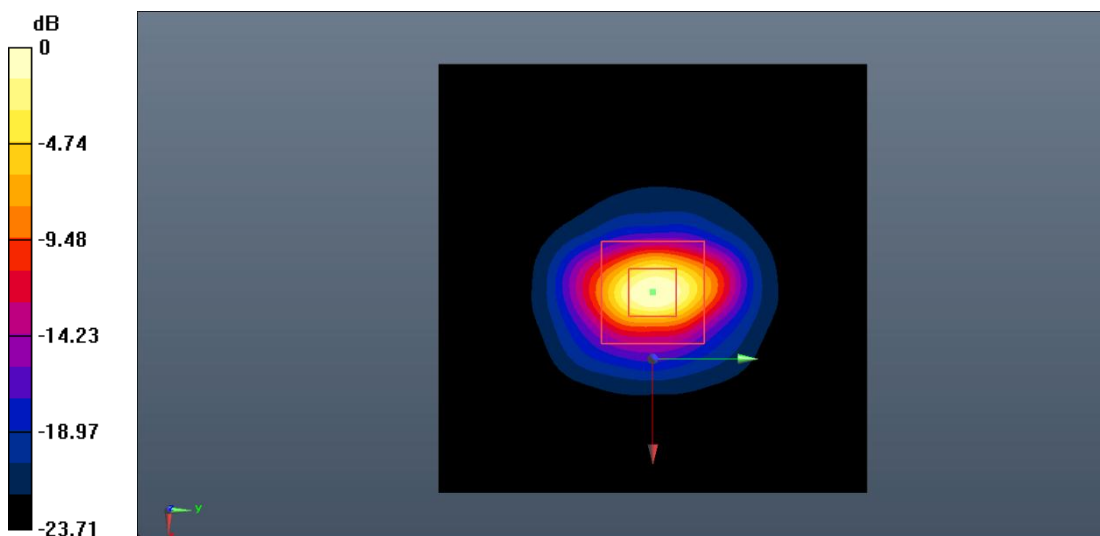
System Validation/Zoom Scan (7x7x7)/Cube0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 94.036 V/m; Power Drift = 0.03 dB

Peak SAR (extrapolated) = 36.1 W/kg

SAR(1 g) = 15.1 W/kg; SAR(10 g) = 6.81 W/kg

Maximum value of SAR (measured) = 17.0 W/kg



0 dB = 17.0 W/kg = 12.30 dB W/kg

Fig.B.6. Validation 2550MHz 250mW

C.1. Measurement Set-up

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 during a software approach and looks for the maximum using 2nd order curve fitting. The approach is stopped at reaching the maximum.

Probe Specifications:

Model:	ES3DV3, EX3DV4
Frequency	10MHz — 6.0GHz(EX3DV4)
Range:	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/cm²) 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 in 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 equate to 1 mW/cm².

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/m³).

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 board 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 board, which is directly connected to the PC/104 bus of the CPU board.

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 $\pm 0.5\text{mm}$ would produce a SAR uncertainty of $\pm 20\%$. 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 $\epsilon = 3$ and loss tangent $\delta = 0.02$. 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).

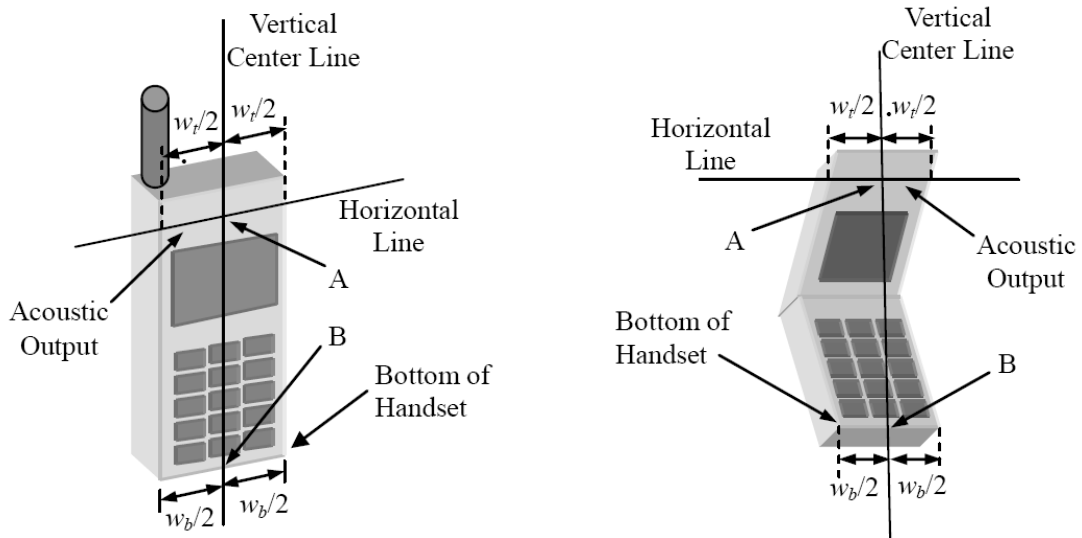
Shell Thickness: 2 ± 0.2 mm
Filling Volume: Approx. 25 liters
Dimensions: 810 x 1000 x 500 mm (H x L x W)
Available: Special

**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.



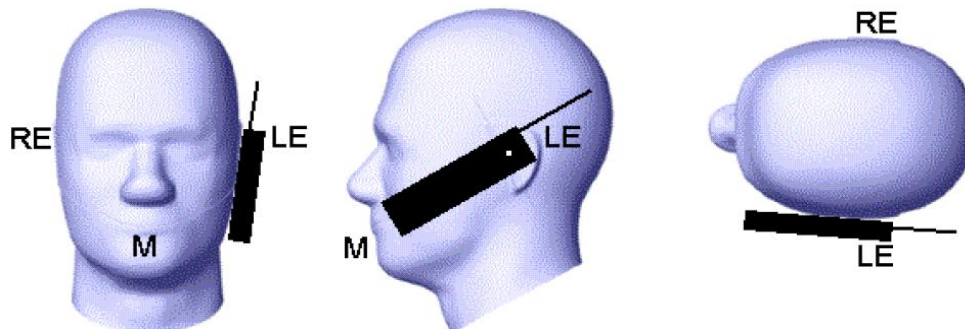
w_t Width of the handset at the level of the acoustic

w_b Width of the bottom of the handset

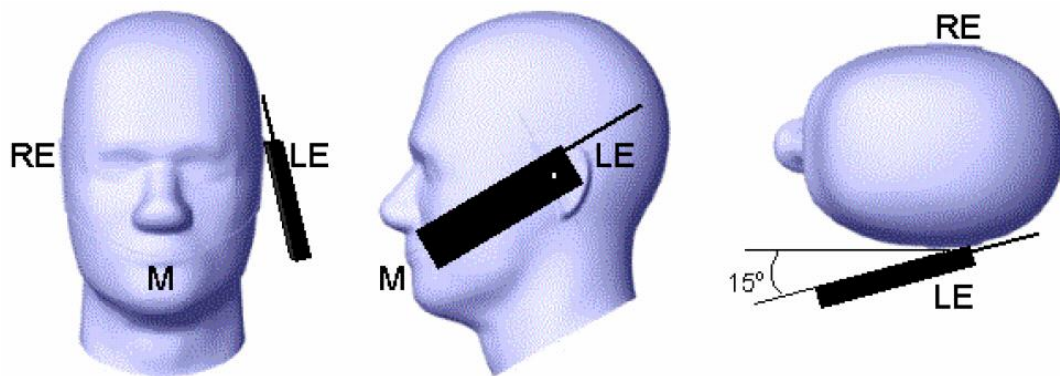
A Midpoint of the width w_t of the handset at the level of the acoustic output

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



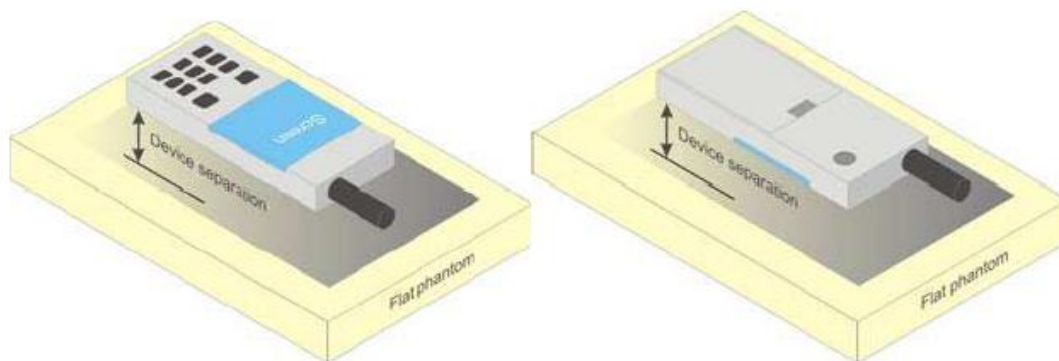
Picture D.2 Cheek position of the wireless device on the left side of SAM



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.

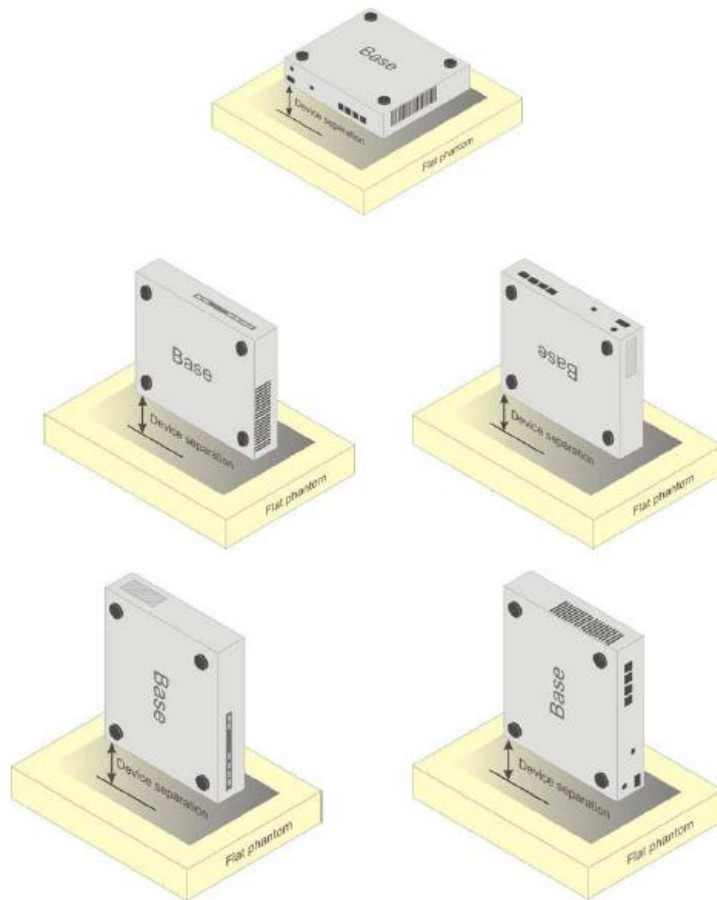


Picture D.4 Test positions for body-worn devices

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	\	\
Diethyleneglycol monohexylether	\	\	\	\	\	\	17.24	17.24
Triton X-100	\	\	\	\	\	\	17.24	17.24
Dielectric Parameters Target Value	$\epsilon=41.5$ $\sigma=0.90$	$\epsilon=55.2$ $\sigma=0.97$	$\epsilon=40.0$ $\sigma=1.40$	$\epsilon=53.3$ $\sigma=1.52$	$\epsilon=39.2$ $\sigma=1.80$	$\epsilon=52.7$ $\sigma=1.95$	$\epsilon=35.3$ $\sigma=5.27$	$\epsilon=48.2$ $\sigma=6.00$

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