Table 13.15: SAR Values (LTE Band 12 - Head)

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.								
707.5	23095	1RB_24	Left Cheek	/	23.34	24.0	0.252	0.29	-0.16
707.5	23095	1RB_24	Left Tilt	/	23.34	24.0	0.159	0.19	-0.04
707.5	23095	1RB_24	Right Cheek	**Fig.15**	23.34	24.0	**0.261**	**0.30**	0.01
707.5	23095	1RB_24	Right Tilt	/	23.34	24.0	0.183	0.21	-0.17
704	23060	25RB_12	Left Cheek	/	22.37	23.0	0.239	0.28	0.03
704	23060	25RB_12	Left Tilt	/	22.37	23.0	0.155	0.18	-0.18
704	23060	25RB_12	Right Cheek	/	22.37	23.0	0.250	0.29	-0.11
704	23060	25RB_12	Right Tilt	/	22.37	23.0	0.176	0.20	-0.11

Table 13.16: SAR Values (LTE Band 12 - Body)

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.								
Hotspot / Body-Worn Test Data (10mm)									
707.5	23095	1RB_24	Front	**Fig.16**	23.34	24.0	**0.259**	**0.30**	-0.15
707.5	23095	1RB_24	Rear	/	23.34	24.0	0.169	0.20	-0.03
707.5	23095	1RB_24	Right	/	23.34	24.0	0.223	0.26	-0.16
707.5	23095	1RB_24	Bottom	/	23.34	24.0	0.079	0.09	-0.14
704	23060	25RB_12	Front	/	22.37	23.0	0.253	0.29	0.00
704	23060	25RB_12	Rear	/	22.37	23.0	0.177	0.20	-0.02
704	23060	25RB_12	Right	/	22.37	23.0	0.219	0.25	0.00
704	23060	25RB_12	Bottom	/	22.37	23.0	0.071	0.08	-0.07

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 13.17: SAR Values (LTE Band 13 - Head)

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.								
782	23230	1RB_49	Left Cheek	**Fig.17**	23.16	24.0	**0.385**	**0.47**	-0.05
782	23230	1RB_49	Left Tilt	/	23.16	24.0	0.239	0.29	-0.03
782	23230	1RB_49	Right Cheek	/	23.16	24.0	0.338	0.41	-0.15
782	23230	1RB_49	Right Tilt	/	23.16	24.0	0.234	0.28	-0.07
782	23230	25RB_25	Left Cheek	/	22.18	23.0	0.287	0.35	0.02
782	23230	25RB_25	Left Tilt	/	22.18	23.0	0.216	0.26	-0.04
782	23230	25RB_25	Right Cheek	/	22.18	23.0	0.289	0.35	-0.13
782	23230	25RB_25	Right Tilt	/	22.18	23.0	0.205	0.25	-0.19

Table 13.18: SAR Values (LTE Band 13 - Body)

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.								
Hotspot / Body-Worn Test Data (10mm)									
782	23230	1RB_49	Front	**Fig.18**	23.16	24.0	**0.349**	**0.42**	0.02
782	23230	1RB_49	Rear	/	23.16	24.0	0.297	0.36	-0.02
782	23230	1RB_49	Right	/	23.16	24.0	0.269	0.33	-0.04
782	23230	1RB_49	Bottom	/	23.16	24.0	0.100	0.12	-0.08
782	23230	25RB_25	Front	/	22.18	23.0	0.301	0.36	-0.18
782	23230	25RB_25	Rear	/	22.18	23.0	0.270	0.33	-0.16
782	23230	25RB_25	Right	/	22.18	23.0	0.251	0.30	-0.06
782	23230	25RB_25	Bottom	/	22.18	23.0	0.087	0.11	-0.09

Table 13.19: SAR Values (LTE Band 14 - Head)

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.								
793	23330	1RB_24	Left Cheek	**Fig.19**	23.13	24.0	**0.411**	**0.50**	-0.03
793	23330	1RB_24	Left Tilt	/	23.13	24.0	0.268	0.33	-0.04
793	23330	1RB_24	Right Cheek	/	23.13	24.0	0.383	0.47	-0.04
793	23330	1RB_24	Right Tilt	/	23.13	24.0	0.265	0.32	-0.05
793	23330	25RB_25	Left Cheek	/	22.25	23.0	0.375	0.45	-0.12
793	23330	25RB_25	Left Tilt	/	22.25	23.0	0.235	0.28	-0.11
793	23330	25RB_25	Right Cheek	/	22.25	23.0	0.369	0.44	-0.12
793	23330	25RB_25	Right Tilt	/	22.25	23.0	0.242	0.29	-0.17

Table 13.20: SAR Values (LTE Band 14 - Body)

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.								
Hotspot / Body-Worn Test Data (10mm)									
793	23330	1RB_24	Front	**Fig.20**	23.13	24.0	**0.411**	**0.50**	-0.01
793	23330	1RB_24	Rear	/	23.13	24.0	0.336	0.41	-0.14
793	23330	1RB_24	Right	/	23.13	24.0	0.304	0.37	-0.09
793	23330	1RB_24	Bottom	/	23.13	24.0	0.072	0.09	-0.10
793	23330	25RB_25	Front	/	22.25	23.0	0.363	0.43	-0.03
793	23330	25RB_25	Rear	/	22.25	23.0	0.300	0.36	-0.15
793	23330	25RB_25	Right	/	22.25	23.0	0.263	0.31	-0.08
793	23330	25RB_25	Bottom	/	22.25	23.0	0.063	0.07	-0.13

Table 13.21: SAR Values (LTE Band 25 - Head)

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.								
1882.5	26365	1RB_0	Left Cheek	/	22.66	23.5	0.324	0.39	0.06
1882.5	26365	1RB_0	Left Tilt	/	22.66	23.5	0.099	0.12	0.01
1882.5	26365	1RB_0	Right Cheek	**Fig.21**	22.66	23.5	**0.648**	**0.79**	0.17
1882.5	26365	1RB_0	Right Tilt	/	22.66	23.5	0.144	0.17	0.18
1905	26590	50RB_0	Left Cheek	/	21.91	22.5	0.230	0.26	0.09
1905	26590	50RB_0	Left Tilt	/	21.91	22.5	0.073	0.08	-0.02
1905	26590	50RB_0	Right Cheek	/	21.91	22.5	0.444	0.51	0.04
1905	26590	50RB_0	Right Tilt	/	21.91	22.5	0.104	0.12	0.07

Table 13.22: SAR Values (LTE Band 25 - Body)

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.								
Hotspot / Body-Worn Test Data (10mm)									
1882.5	26365	1RB_0	Front	/	22.66	23.5	0.270	0.33	-0.09
1882.5	26365	1RB_0	Rear	**Fig.22**	22.66	23.5	**0.279**	**0.34**	0.03
1882.5	26365	1RB_0	Right	/	22.66	23.5	0.221	0.27	-0.07
1882.5	26365	1RB_0	Bottom	/	22.66	23.5	0.128	0.16	-0.06
1905	26590	50RB_0	Front	/	21.91	22.5	0.180	0.21	-0.03
1905	26590	50RB_0	Rear	/	21.91	22.5	0.211	0.24	-0.06
1905	26590	50RB_0	Right	/	21.91	22.5	0.166	0.19	-0.12
1905	26590	50RB_0	Bottom	/	21.91	22.5	0.092	0.11	-0.09

Note: SAR for LTE Band 2 is covered by LTE Band 25 due to similar frequency range, same maximum tune-up limit and same channel bandwidth.

Table 13.23: SAR Values (LTE Band 26 - Head)

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.								
841.5	26965	1RB_74	Left Cheek	/	23.24	24.0	0.415	0.49	-0.05
841.5	26965	1RB_74	Left Tilt	/	23.24	24.0	0.233	0.28	-0.04
841.5	26965	1RB_74	Right Cheek	**Fig.23**	23.24	24.0	**0.462**	**0.55**	-0.03
841.5	26965	1RB_74	Right Tilt	/	23.24	24.0	0.270	0.32	-0.10
841.5	26965	36RB_0	Left Cheek	/	22.25	23.0	0.357	0.42	-0.02
841.5	26965	36RB_0	Left Tilt	/	22.25	23.0	0.173	0.21	-0.05
841.5	26965	36RB_0	Right Cheek	/	22.25	23.0	0.351	0.42	-0.09
841.5	26965	36RB_0	Right Tilt	/	22.25	23.0	0.201	0.24	-0.15

Table 13.24: SAR Values (LTE Band 26 - Body)

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.								
Hotspot / Body-Worn Test Data (10mm)									
841.5	26965	1RB_74	Front	**Fig.24**	23.24	24.0	**0.384**	**0.46**	-0.10
841.5	26965	1RB_74	Rear	/	23.24	24.0	0.294	0.35	-0.18
841.5	26965	1RB_74	Right	/	23.24	24.0	0.187	0.22	-0.11
841.5	26965	1RB_74	Bottom	/	23.24	24.0	0.108	0.13	-0.18
841.5	26965	36RB_0	Front	/	22.25	23.0	0.283	0.34	0.12
841.5	26965	36RB_0	Rear	/	22.25	23.0	0.246	0.29	-0.02
841.5	26965	36RB_0	Right	/	22.25	23.0	0.134	0.16	-0.16
841.5	26965	36RB_0	Bottom	/	22.25	23.0	0.087	0.10	-0.11

Table 13.25: SAR Values (LTE Band 30 - Head)

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.								
2310	27710	1RB_24	Left Cheek	**Fig.25**	22.76	23.5	**0.414**	**0.49**	0.01
2310	27710	1RB_24	Left Tilt	/	22.76	23.5	0.324	0.38	-0.12
2310	27710	1RB_24	Right Cheek	/	22.76	23.5	0.393	0.47	-0.09
2310	27710	1RB_24	Right Tilt	/	22.76	23.5	0.332	0.39	-0.18
2310	27710	25RB_12	Left Cheek	/	21.92	22.5	0.385	0.44	0.13
2310	27710	25RB_12	Left Tilt	/	21.92	22.5	0.291	0.33	-0.11
2310	27710	25RB_12	Right Cheek	/	21.92	22.5	0.351	0.40	0.12
2310	27710	25RB_12	Right Tilt	/	21.92	22.5	0.319	0.36	-0.07

Table 13.26: SAR Values (LTE Band 30 - Body)

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.								
Hotspot / Body-Worn Test Data (10mm)									
2310	27710	1RB_24	Front	/	22.76	23.5	0.616	0.73	0.02
2310	27710	1RB_24	Rear	/	22.76	23.5	0.468	0.55	-0.04
2310	27710	1RB_24	Right	/	22.76	23.5	0.209	0.25	0.05
2310	27710	1RB_24	Bottom	**Fig.26**	22.76	23.5	**0.627**	**0.74**	-0.01
2310	27710	25RB_12	Front	/	21.92	22.5	0.604	0.69	-0.07
2310	27710	25RB_12	Rear	/	21.92	22.5	0.434	0.50	-0.14
2310	27710	25RB_12	Right	/	21.92	22.5	0.192	0.22	0.00
2310	27710	25RB_12	Bottom	/	21.92	22.5	0.602	0.69	-0.13

Table 13.27: SAR Values (LTE Band 41 - Head)

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.								
2680	41490	1RB_99	Left Cheek	/	22.89	23.5	0.276	0.32	0.11
2680	41490	1RB_99	Left Tilt	/	22.89	23.5	0.111	0.13	0.05
2680	41490	1RB_99	Right Cheek	**Fig.27**	22.89	23.5	**0.520**	**0.60**	0.04
2680	41490	1RB_99	Right Tilt	/	22.89	23.5	0.139	0.16	0.02
2680	41490	50RB_0	Left Cheek	/	21.86	22.5	0.261	0.30	0.08
2680	41490	50RB_0	Left Tilt	/	21.86	22.5	0.095	0.11	0.02
2680	41490	50RB_0	Right Cheek	/	21.86	22.5	0.458	0.53	0.03
2680	41490	50RB_0	Right Tilt	/	21.86	22.5	0.128	0.15	0.03
The worst case with CA									
2680	41490	1RB_99	Right Cheek	/	22.76	23.5	0.501	0.59	0.04

Table 13.28: SAR Values (LTE Band 41 - Body)

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.								
Hotspot Test Data (10mm)									
2680	41490	1RB_99	Front	/	20.36	21.0	0.383	0.39	0.02
2680	41490	1RB_99	Rear	**Fig.28**	20.36	21.0	**0.565**	**0.57**	0.03
2680	41490	1RB_99	Right	/	20.36	21.0	0.331	0.33	0.03
2680	41490	1RB_99	Bottom	/	20.36	21.0	0.199	0.20	-0.10
2680	41490	50RB_50	Front	/	20.16	21.0	0.257	0.26	0.10
2680	41490	50RB_50	Rear	/	20.16	21.0	0.446	0.45	0.06
2680	41490	50RB_50	Right	/	20.16	21.0	0.225	0.23	0.08
2680	41490	50RB_50	Bottom	/	20.16	21.0	0.138	0.14	-0.05
Body-Worn Test Data (15mm)									
2680	41490	1RB_99	Front	/	22.89	23.5	0.346	0.35	0.01
2680	41490	1RB_99	Rear	/	22.89	23.5	0.481	**0.49**	0.07
2680	41490	50RB_0	Front	/	21.86	22.5	0.295	0.30	0.06
2680	41490	50RB_0	Rear	/	21.86	22.5	0.369	0.37	0.12
The worst case with CA									
2680	41490	1RB_99	Rear	/	20.28	21.0	0.544	0.55	0.08

Note: SAR for LTE Band 38 is covered by LTE Band 41 due to similar frequency range, same maximum tune-up limit and same channel bandwidth.

Table 13.29: SAR Values (LTE Band 66 - Head)

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.								
1720	132072	1RB_99	Left Cheek	/	22.32	23.0	0.423	0.49	-0.03
1720	132072	1RB_99	Left Tilt	/	22.32	23.0	0.432	0.51	-0.06
1720	132072	1RB_99	Right Cheek	**Fig.29**	22.32	23.0	**0.650**	**0.76**	-0.06
1720	132072	1RB_99	Right Tilt	/	22.32	23.0	0.452	0.53	-0.16
1720	132072	50RB_50	Left Cheek	/	21.44	22.0	0.348	0.40	-0.04
1720	132072	50RB_50	Left Tilt	/	21.44	22.0	0.334	0.38	-0.13
1720	132072	50RB_50	Right Cheek	/	21.44	22.0	0.537	0.61	-0.10
1720	132072	50RB_50	Right Tilt	/	21.44	22.0	0.360	0.41	-0.15

Table 13.30: SAR Values (LTE Band 66 - 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)
MHz	Ch.								
Hotspot / Body-Worn Test Data (10mm)									
1720	132072	1RB_99	Front	**Fig.30**	22.32	23.0	**0.538**	**0.63**	-0.05
1720	132072	1RB_99	Rear	/	22.32	23.0	0.291	0.34	-0.04
1720	132072	1RB_99	Right	/	22.32	23.0	0.440	0.51	-0.07
1720	132072	1RB_99	Bottom	/	22.32	23.0	0.225	0.26	-0.07
1720	132072	50RB_50	Front	/	21.44	22.0	0.444	0.51	-0.09
1720	132072	50RB_50	Rear	/	21.44	22.0	0.237	0.27	-0.09
1720	132072	50RB_50	Right	/	21.44	22.0	0.363	0.41	-0.01
1720	132072	50RB_50	Bottom	/	21.44	22.0	0.180	0.20	-0.05

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 2.4GHz

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

Table 13.31: SAR Values (WLAN 2.4GHz - Head)

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.								
2412	1	802.11b	Left Cheek	/	16.14	16.5	0.974	1.06	-0.08
2412	1	802.11b	Left Tilt	/	16.14	16.5	0.681	0.74	0.02
2412	1	802.11b	Right Cheek	/	16.14	16.5	0.537	0.58	-0.18
2412	1	802.11b	Right Tilt	/	16.14	16.5	0.497	0.54	-0.03
2462	11	802.11b	Left Cheek	**Fig.31**	16.11	16.5	**0.985**	**1.08**	-0.07

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 13.32: 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)
MHz	Ch.					
2462	11	Left Cheek	100%	100%	1.08	**1.08**

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

Table 13.33: SAR Values (WLAN 2.4GHz - Body)

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.								
Test Data (10mm)									
2412	1	802.11b	Front	**Fig.32**	16.14	16.5	**0.267**	**0.29**	0.03
2412	1	802.11b	Rear	/	16.14	16.5	0.154	0.17	0.06
2412	1	802.11b	Right	/	16.14	16.5	0.125	0.14	-0.01
2412	1	802.11b	Top	/	16.14	16.5	0.220	0.24	0.12

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 13.34: 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.					
2412	1	Front	100%	100%	0.29	**0.29**

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

13.4. WLAN Evaluation for 5GHz

Table 13.35: SAR Values (WLAN 5GHz - Head)

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-1									
5190	38	802.11n	Left Cheek	/	15.39	16.0	0.194	0.22	0.01
5190	38	802.11n	Left Tilt	/	15.39	16.0	0.217	0.25	0.08
5190	38	802.11n	Right Cheek	/	15.39	16.0	0.178	0.20	-0.08
5190	38	802.11n	Right Tilt	/	15.39	16.0	0.181	0.21	0.01
U-NII-2C									
5510	102	802.11n	Left Cheek	/	15.22	16.0	0.386	0.46	0.02
5510	102	802.11n	Left Tilt	/	15.22	16.0	0.426	0.51	-0.07
5510	102	802.11n	Right Cheek	/	15.22	16.0	0.285	0.34	0.06
5510	102	802.11n	Right Tilt	/	15.22	16.0	0.276	0.33	0.08
U-NII-3									
5755	151	802.11n	Left Cheek	/	14.50	15.0	0.496	0.56	0.01
5755	151	802.11n	Left Tilt	**Fig.33**	14.50	15.0	**0.548**	**0.61**	-0.06
5755	151	802.11n	Right Cheek	/	14.50	15.0	0.366	0.41	0.03
5755	151	802.11n	Right Tilt	/	14.50	15.0	0.355	0.40	0.05

Note1: U-NII-1 and U-NII-2A bands, When different maximum output power is specified for the bands, begin SAR measurement in the band with higher specified maximum output power. SAR is measured for U-NII-1 band first. Adjusted SAR of U-NII-1 band is ≤ 1.2W/kg, SAR is not required for U-NII-2A 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 13.36: SAR Values (WLAN - Head) – 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.					
5755	151	Right Cheek	100%	100%	0.61	**0.61**

Table 13.37: SAR Values (WLAN 5GHz - Body)

Frequency MHz	Ch.	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)
U-NII-1 - Test Data (10mm)									
5190	38	802.11n	Front	/	15.39	16.0	0.049	0.06	0.06
5190	38	802.11n	Rear	/	15.39	16.0	0.091	0.10	-0.04
5190	38	802.11n	Right	/	15.39	16.0	**0.149**	0.17	0.04
5190	38	802.11n	Top	/	15.39	16.0	0.053	0.06	-0.03
U-NII-2C - Test Data (10mm)									
5510	102	802.11n	Front	/	15.22	16.0	0.124	0.15	0.06
5510	102	802.11n	Rear	/	15.22	16.0	0.168	0.20	0.02
5510	102	802.11n	Right	/	15.22	16.0	**0.287**	**0.34**	0.05
5510	102	802.11n	Top	/	15.22	16.0	0.110	0.13	0.09
U-NII-3 - Test Data (10mm)									
5755	151	802.11n	Front	/	14.50	15.0	0.125	0.14	0.03
5755	151	802.11n	Rear	/	14.50	15.0	0.210	0.24	0.03
5755	151	802.11n	Right	**Fig.34**	14.50	15.0	**0.289**	0.32	0.04
5755	151	802.11n	Top	/	14.50	15.0	0.095	0.11	-0.03

Note1: U-NII-1 and U-NII-2A bands, When different maximum output power is specified for the bands, begin SAR measurement in the band with higher specified maximum output power. SAR is measured for U-NII-1 band first. Adjusted SAR of U-NII-1 band is ≤ 1.2W/kg, SAR is not required for U-NII-2A 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 13.38: SAR Values (WLAN - Body) –Scaled Reported SAR

Frequency MHz	Ch.	Test Position	Actual duty factor	maximum duty factor	Reported SAR (1g)(W/kg)	Scaled reported SAR (1g)(W/kg)
5510	102	Right	100%	100%	0.34	**0.34**

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 Head - WLAN 2.4GHz

Frequency		Test Position	Original	1st Repeated	Ratio	2nd Repeated
MHz	Ch.		SAR (W/kg)	SAR (W/kg)		SAR (W/kg)
2462	11	Left Cheek	0.985	0.966	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	$\sqrt{3}$	√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	13.1	N	2	1	1	6.65	6.65	∞
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	0.0	R	$\sqrt{3}$	1	1	0.0	0.0	∞
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	43
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	521
Combined standard uncertainty		$u_c' = \sqrt{\sum_{i=1}^{22} c_i^2 u_i^2}$						11.6	11.5	257
Expanded uncertainty (Confidence interval of 95 %)		$u_e = 2u_c$						23.2	23.0	

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	2021-11-15	One year
02	Dielectric probe	85070E	MY44300317	/	/
03	Power meter	E4418B	MY50000366	2021-12-13	One year
04	Power sensor	E9304A	MY50000188	2021-12-13	One year
05	Power meter	NRP	102603	2021-12-30	One year
06	Power sensor	NRP-Z51	102211	2021-12-30	One year
07	Signal Generator	E8257D	MY47461211	2022-01-14	One year
08	Amplifier	VTL5400	0404	/	/
09	E-field Probe	EX3DV4	7621	2022-05-06	One year
10	DAE	DAE4	1527	2022-06-21	One year
11	Dipole Validation Kit	D750V3	1163	2022-08-22	Three years
12	Dipole Validation Kit	D835V2	4d057	2021-10-18	Three years
13	Dipole Validation Kit	D1750V2	1152	2022-08-22	Three years
14	Dipole Validation Kit	D1900V2	5d088	2021-10-18	Three years
15	Dipole Validation Kit	D2300V2	1059	2021-09-22	Three years
16	Dipole Validation Kit	D2450V2	873	2021-10-21	Three years
17	Dipole Validation Kit	D2550V2	1058	2021-05-21	Three years
18	Dipole Validation Kit	D5GHzV2	1238	2022-08-17	Three years
19	BTS	MT8820C	6201341853	2022-01-14	One year
20	BTS	E5515C	GB46110722	2022-01-14	One year
21	Software	DASY5	/	/	/

ANNEX A: Graph Results

GSM850 Head - Right Cheek High

Date: 2020-4-23

Electronics: DAE4 Sn1527

Medium: Head 835MHz

Medium parameters used (interpolated): f = 848.8 MHz; σ = 0.904 S/m; ε_r = 41.802; ρ = 1000 kg/m^3

Communication System: UID 0, GPRS 2Txslot (0) Frequency: 848.8 MHz Duty Cycle: 1:4

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

Area Scan (81x101x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.762 W/kg

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

Reference Value = 11.20 V/m; Power Drift = -0.05 dB

Peak SAR (extrapolated) = 0.839 W/kg

SAR(1 g) = 0.728 W/kg; SAR(10 g) = 0.520 W/kg

Maximum value of SAR (measured) = 0.750 W/kg

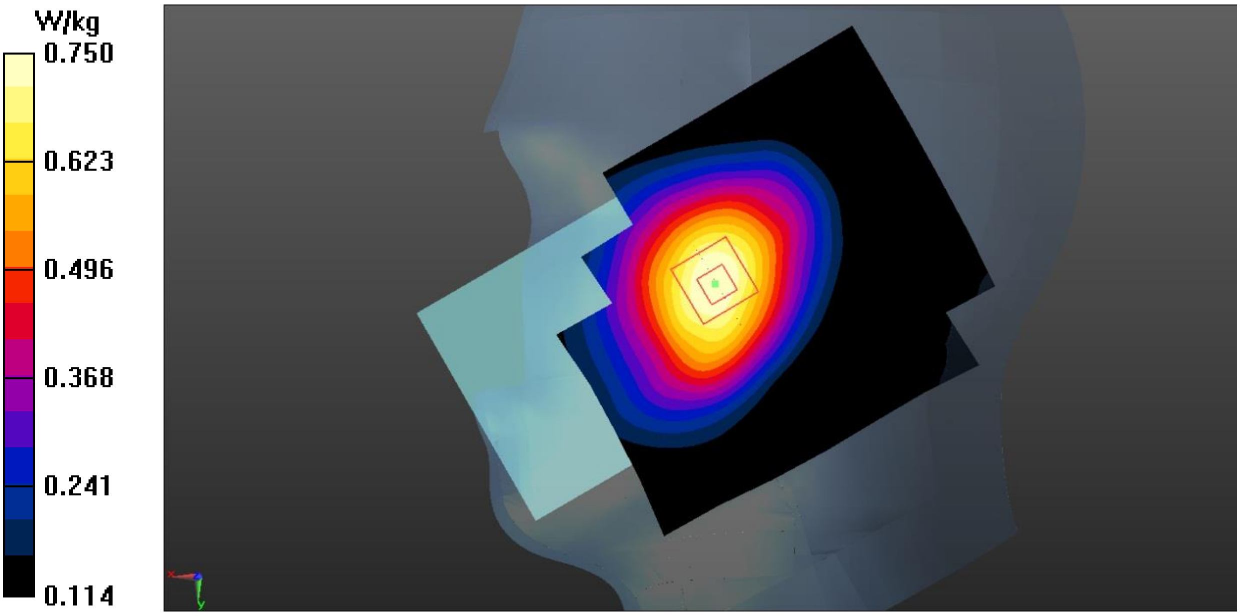


Fig.1 GSM 850 Head

GSM850 Body - Front Side High

Date: 2020-4-23

Electronics: DAE4 Sn1527

Medium: Head 835MHz

Medium parameters used (interpolated): f = 848.8 MHz; σ = 0.904 S/m; ε_r = 41.802; ρ = 1000 kg/m^3

Communication System: UID 0, GPRS 2Txslot (0) Frequency: 848.8 MHz Duty Cycle: 1:4

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

Area Scan (81x101x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.632 W/kg

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

Reference Value = 23.82 V/m; Power Drift = -0.13 dB

Peak SAR (extrapolated) = 0.659 W/kg

SAR(1 g) = 0.554 W/kg; SAR(10 g) = 0.425 W/kg

Maximum value of SAR (measured) = 0.597 W/kg

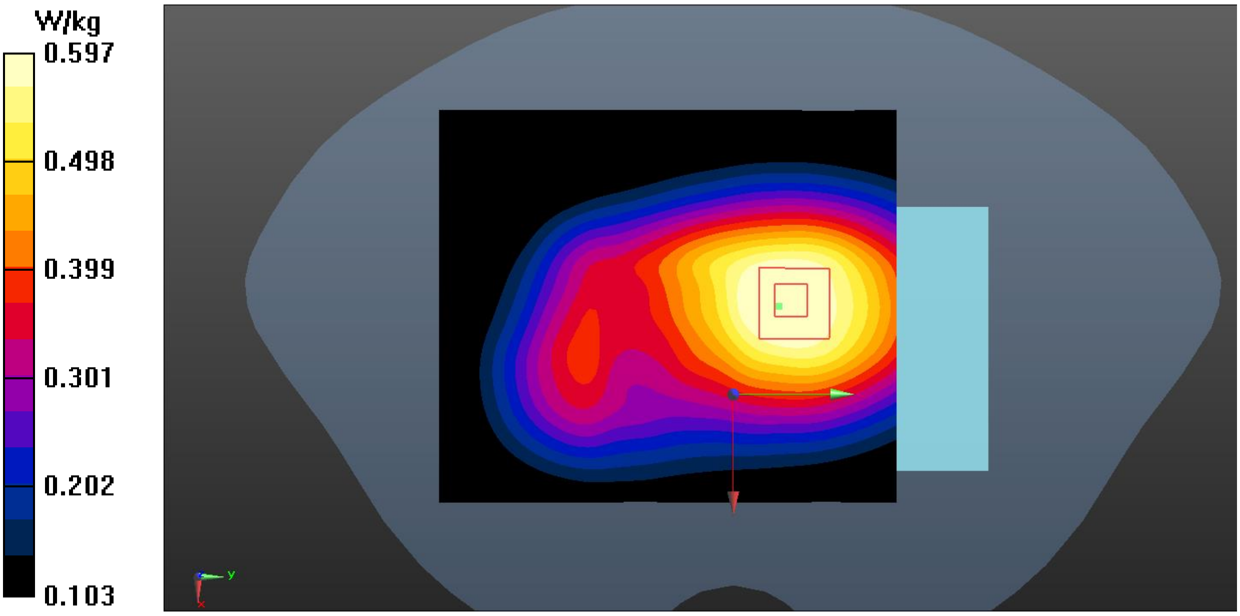


Fig.2 GSM 850 Body

GSM1900 Head - Right Cheek High
Date: 2020-5-1
Electronics: DAE4 Sn1527
Medium: Head 1900MHz
Medium parameters used: f = 1910 MHz; σ = 1.431 S/m; ε_r = 38.979; ρ = 1000 kg/m^3
Communication System: UID 0, GPRS 3Txslot (0) Frequency: 1909.8 MHz Duty Cycle: 1:2.67
Probe: EX3DV4 – SN3633 ConvF (7.76, 7.76, 7.76);

Area Scan (81x101x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.587 W/kg

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 5.977 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 0.940 W/kg
SAR(1 g) = 0.498 W/kg; SAR(10 g) = 0.256 W/kg
Maximum value of SAR (measured) = 0.560 W/kg

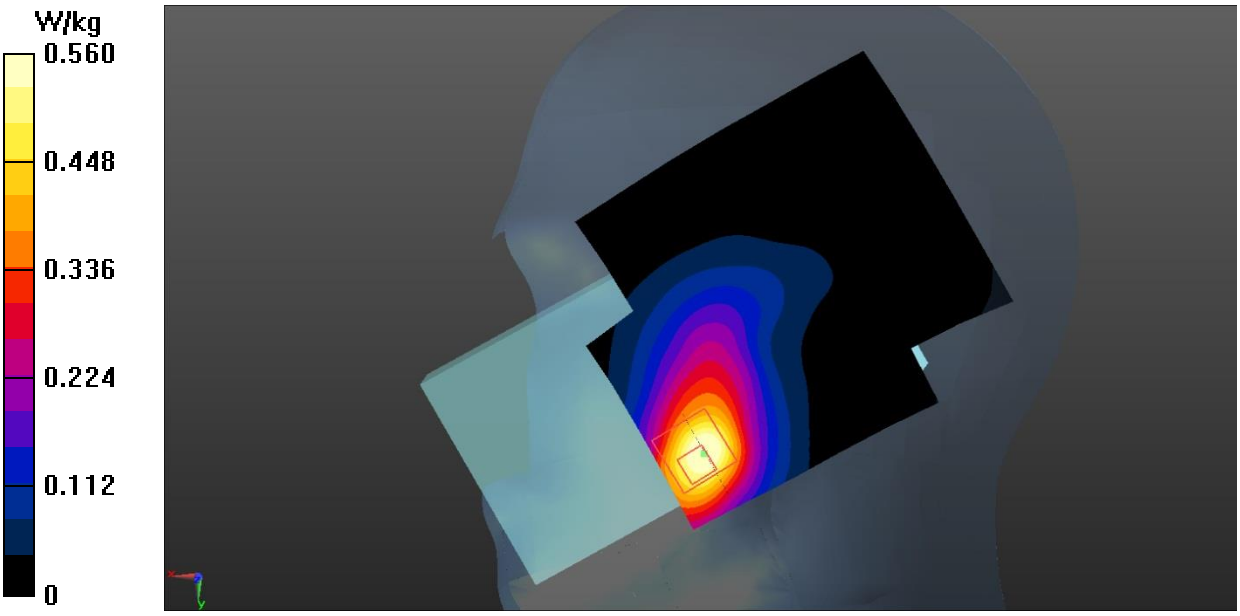


Fig.3 GSM 1900 Head

GSM1900 Body - Front Side High

Date: 2020-5-1

Electronics: DAE4 Sn1527

Medium: Head 1900MHz

Medium parameters used: f = 1910 MHz; σ = 1.431 S/m; ε_r = 38.979; ρ = 1000 kg/m^3

Communication System: UID 0, GPRS 3Txslot (0) Frequency: 1909.8 MHz Duty Cycle: 1:2.67

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

Area Scan (81x101x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.386 W/kg

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

Reference Value = 12.15 V/m; Power Drift = -0.12 dB

Peak SAR (extrapolated) = 0.669 W/kg

SAR(1 g) = 0.332 W/kg; SAR(10 g) = 0.194 W/kg

Maximum value of SAR (measured) = 0.356 W/kg

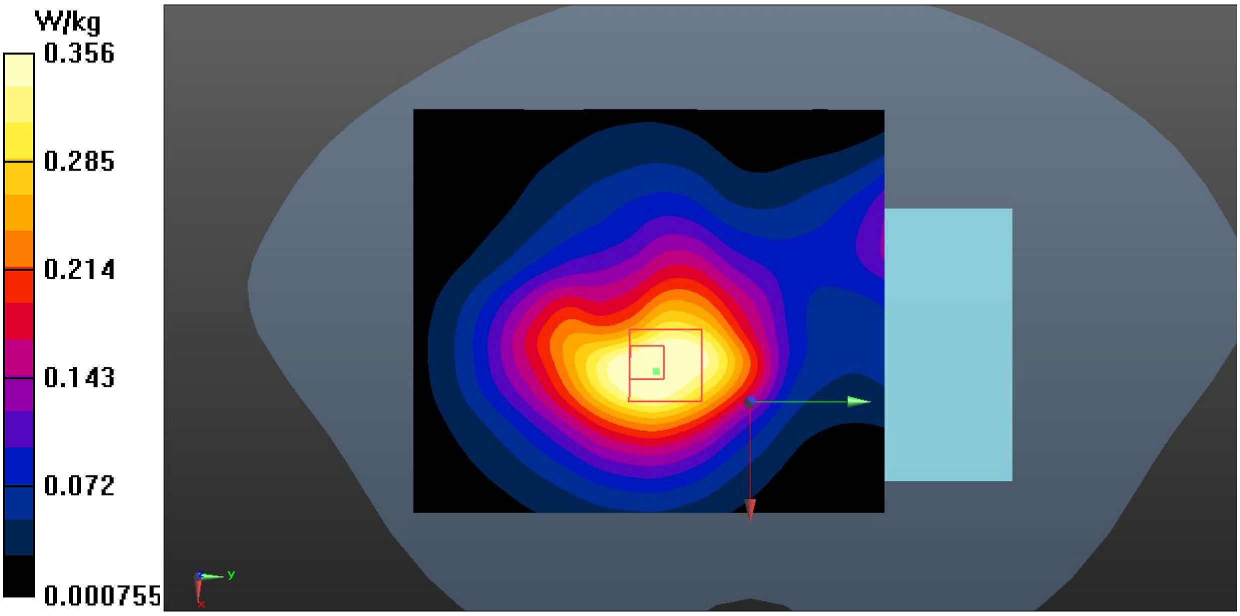


Fig.4 GSM 1900 Body

WCDMA Band 2 Head - Right Cheek High

Date: 2020-5-1

Electronics: DAE4 Sn1527

Medium: Head 1900MHz

Medium parameters used: f = 1908 MHz; σ = 1.429 S/m; ε_r = 38.987; ρ = 1000 kg/m^3

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

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

Area Scan (81x71x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.822 W/kg

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

Reference Value = 6.563 V/m; Power Drift = -0.09 dB

Peak SAR (extrapolated) = 1.13 W/kg

SAR(1 g) = 0.671 W/kg; SAR(10 g) = 0.383 W/kg

Maximum value of SAR (measured) = 0.777 W/kg

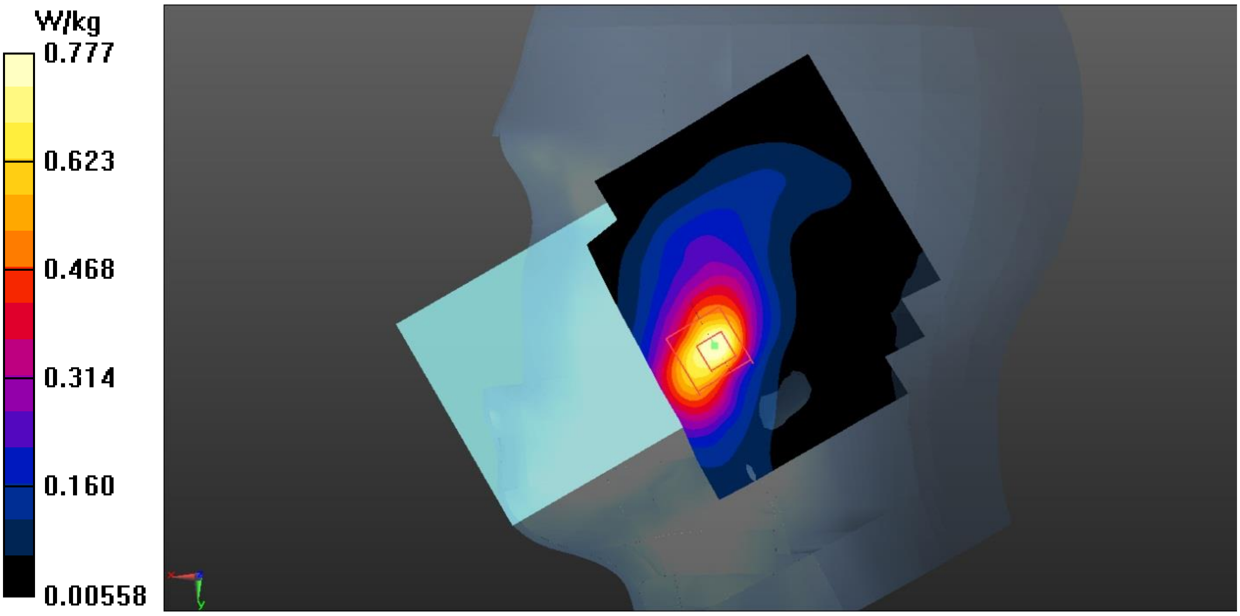


Fig.5 WCDMA Band 2 Head

WCDMA Band 2 Body - Front Side High

Date: 2020-5-1

Electronics: DAE4 Sn1527

Medium: Head 1900MHz

Medium parameters used: f = 1908 MHz; σ = 1.429 S/m; ε_r = 38.987; ρ = 1000 kg/m^3

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

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

Area Scan (81x71x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.649 W/kg

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

Reference Value = 15.82 V/m; Power Drift = -0.06 dB

Peak SAR (extrapolated) = 0.893 W/kg

SAR(1 g) = 0.588 W/kg; SAR(10 g) = 0.362 W/kg

Maximum value of SAR (measured) = 0.627 W/kg

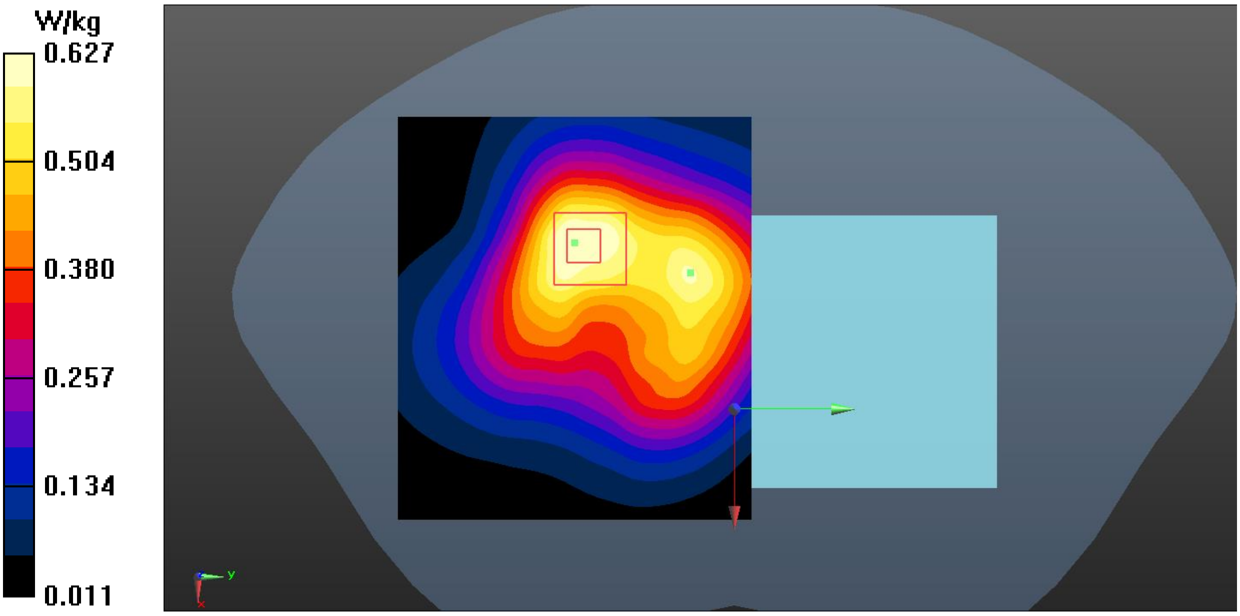


Fig.6 WCDMA Band 2 Body

WCDMA Band 4 Head - Right Cheek Low

Date: 2020-4-29

Electronics: DAE4 Sn1527

Medium: Head 1750MHz

Medium parameters used (interpolated): f = 1712.4 MHz; σ = 1.353 S/m; ε_r = 39.479; ρ = 1000 kg/m^3

Communication System: UID 0, WCDMA (0) Frequency: 1712.4 MHz Duty Cycle: 1:1

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

Area Scan (81x101x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.746 W/kg

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

Reference Value = 15.74 V/m; Power Drift = -0.06 dB

Peak SAR (extrapolated) = 0.983 W/kg

SAR(1 g) = 0.515 W/kg; SAR(10 g) = 0.378 W/kg

Maximum value of SAR (measured) = 0.741 W/kg

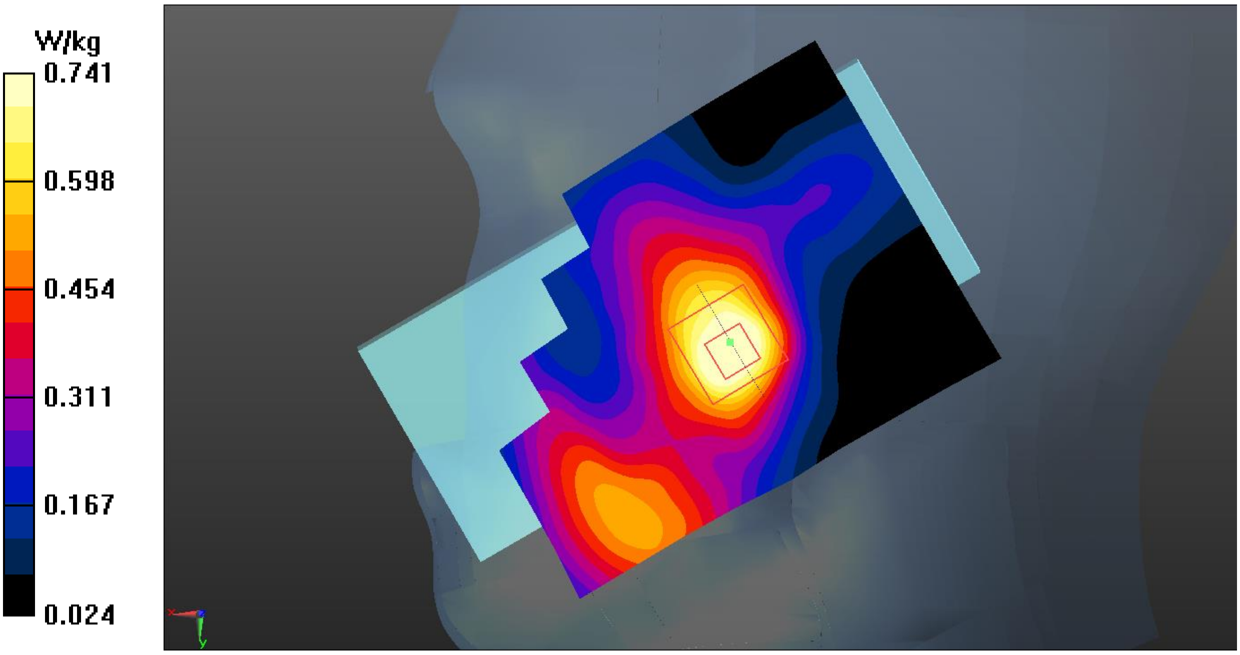


Fig.7 WCDMA Band 4 Head

WCDMA Band 4 Body - Front Side Low

Date: 2020-4-29

Electronics: DAE4 Sn1527

Medium: Head 1750MHz

Medium parameters used (interpolated): f = 1712.4 MHz; σ = 1.353 S/m; εr = 39.479; ρ = 1000 kg/m3

Communication System: UID 0, WCDMA (0) Frequency: 1712.4 MHz Duty Cycle: 1:1

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

Area Scan (81x71x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.731 W/kg

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

Reference Value = 18.33 V/m; Power Drift = -0.08 dB

Peak SAR (extrapolated) = 0.894 W/kg

SAR(1 g) = 0.648 W/kg; SAR(10 g) = 0.412 W/kg

Maximum value of SAR (measured) = 0.718 W/kg

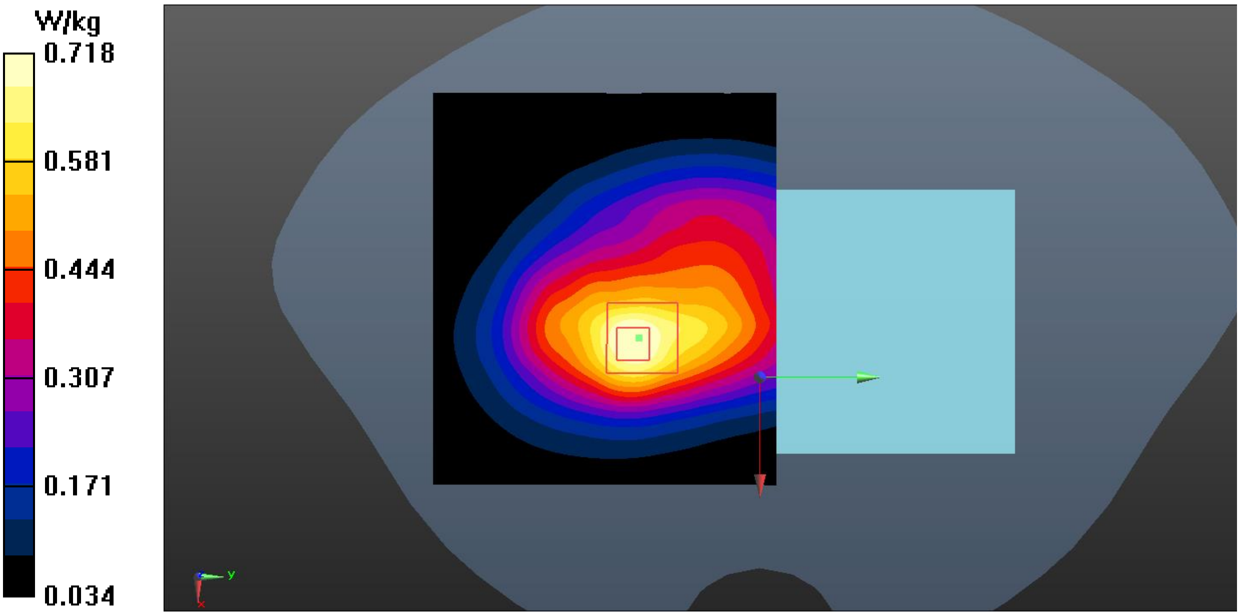


Fig.8 WCDMA Band 4 Body

WCDMA Band 5 Head - Right Cheek High

Date: 2020-4-23

Electronics: DAE4 Sn1527

Medium: Head 835MHz

Medium parameters used (interpolated): f = 846.6 MHz; σ = 0.902 S/m; ε_r = 41.829; ρ = 1000 kg/m^3

Communication System: UID 0, WCDMA (0) Frequency: 846.6 MHz Duty Cycle: 1:1

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

Area Scan (81x71x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.466 W/kg

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

Reference Value = 10.22 V/m; Power Drift = 0.05 dB

Peak SAR (extrapolated) = 0.504 W/kg

SAR(1 g) = 0.423 W/kg; SAR(10 g) = 0.324 W/kg

Maximum value of SAR (measured) = 0.458 W/kg

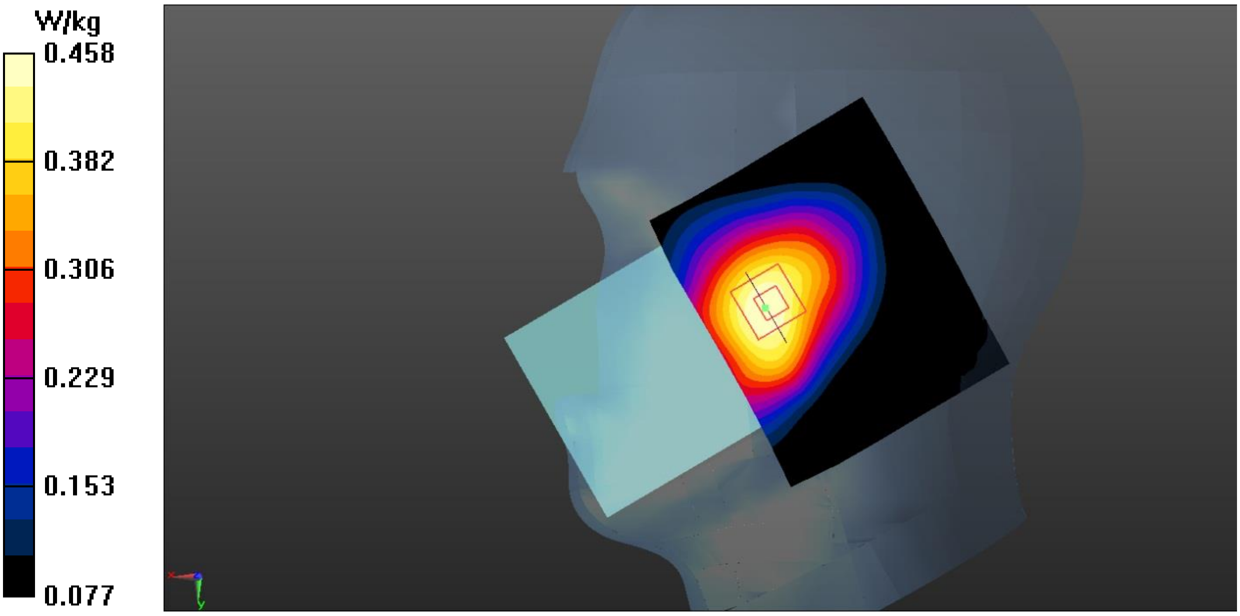


Fig.9 WCDMA Band 5 Head

WCDMA Band 5 Body - Front Side High

Date: 2020-4-23

Electronics: DAE4 Sn1527

Medium: Head 835MHz

Medium parameters used (interpolated): f = 846.6 MHz; σ = 0.902 S/m; ε_r = 41.829; ρ = 1000 kg/m^3

Communication System: UID 0, WCDMA (0) Frequency: 846.6 MHz Duty Cycle: 1:1

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

Area Scan (81x101x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.394 W/kg

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

Reference Value = 19.70 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 0.436 W/kg

SAR(1 g) = 0.356 W/kg; SAR(10 g) = 0.273 W/kg

Maximum value of SAR (measured) = 0.394 W/kg

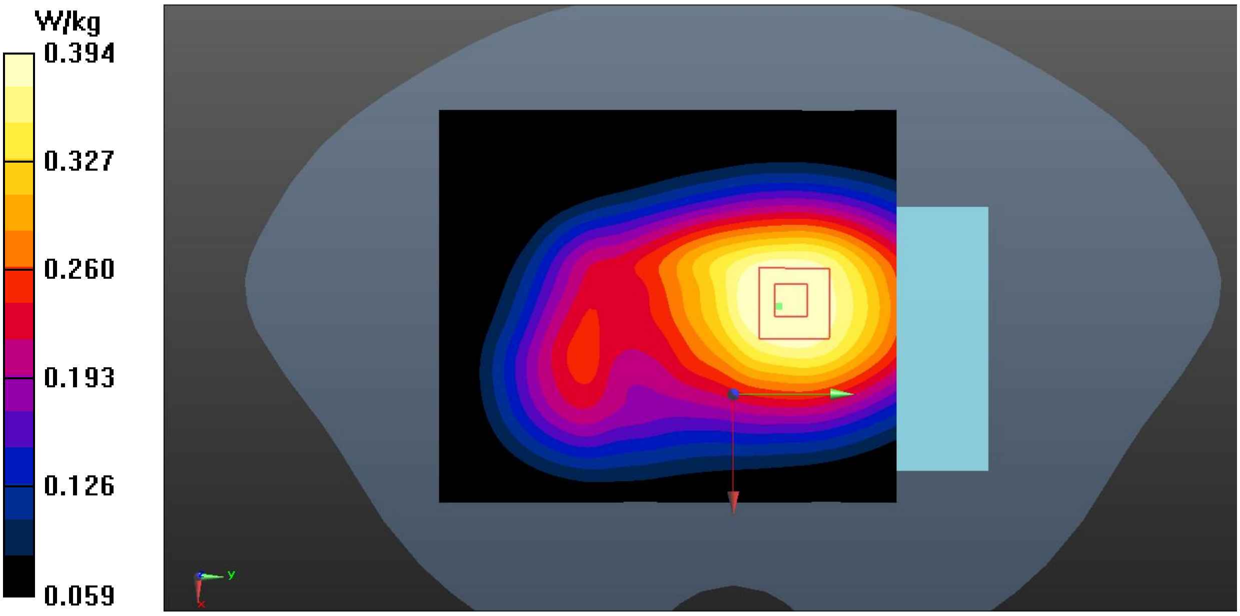


Fig.10 WCDMA Band 5 Body

LTE Band 5 Head - Right Cheek Middle 1RB_49

Date: 2020-4-23

Electronics: DAE4 Sn1527

Medium: Head 835MHz

Medium parameters used (interpolated): f = 836.5 MHz; σ = 0.892 S/m; ε_r = 41.95; ρ = 1000 kg/m^3

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);

Area Scan (81x101x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.555 W/kg

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

Reference Value = 10.71 V/m; Power Drift = -0.05 dB

Peak SAR (extrapolated) = 0.641 W/kg

SAR(1 g) = 0.513 W/kg; SAR(10 g) = 0.384 W/kg

Maximum value of SAR (measured) = 0.562 W/kg

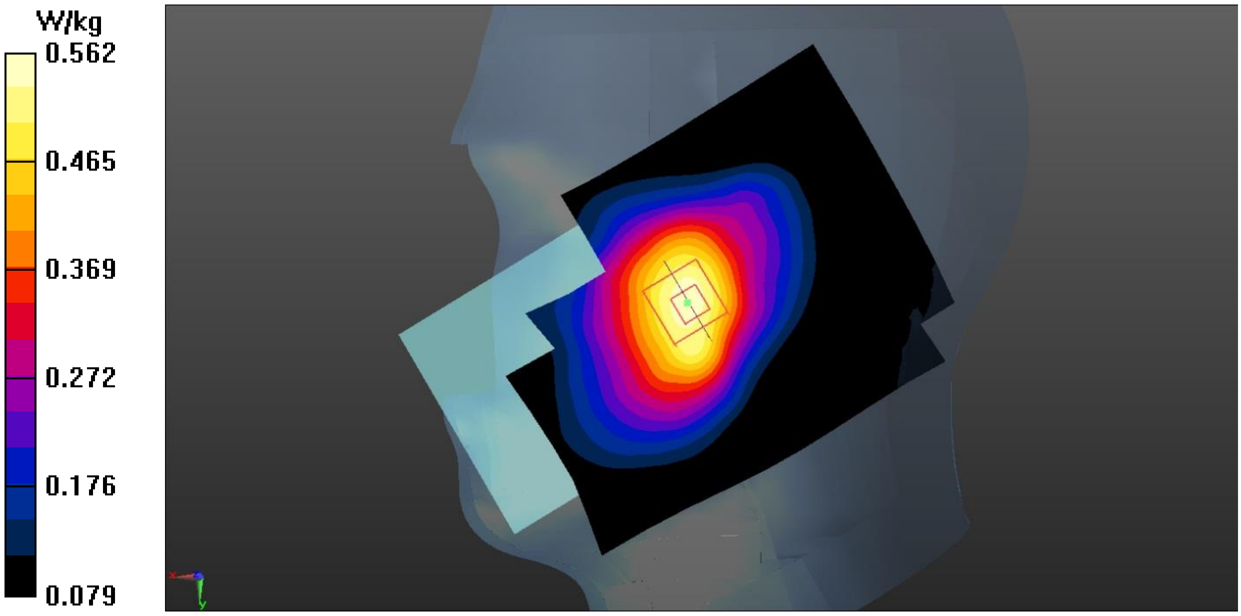


Fig.11 LTE Band 5 Head

LTE Band 5 Body - Rear Side Middle 1RB_49
Date: 2020-4-23
Electronics: DAE4 Sn1527
Medium: Head 835MHz
Medium parameters used (interpolated): f = 836.5 MHz; σ = 0.892 S/m; ε_r = 41.95; ρ = 1000 kg/m^3
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);

Area Scan (81x101x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.387 W/kg

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 15.02 V/m; Power Drift = -0.11 dB
Peak SAR (extrapolated) = 0.538 W/kg
SAR(1 g) = 0.308 W/kg; SAR(10 g) = 0.180 W/kg
Maximum value of SAR (measured) = 0.379 W/kg

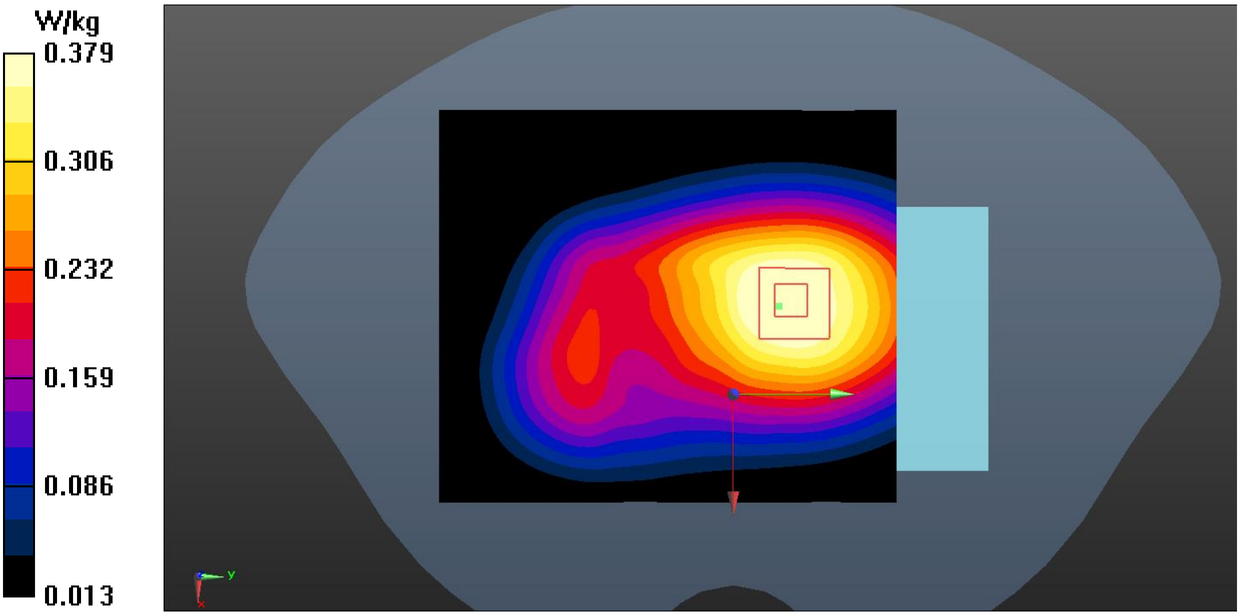


Fig.12 LTE Band 5 Body

LTE Band 7 Head - Left Cheek Middle 1RB_50

Date: 2020-6-1

Electronics: DAE4 Sn1527

Medium: Head 2550MHz

Medium parameters used (interpolated): f = 2535 MHz; σ = 1.921 S/m; ε_r = 38.134; ρ = 1000 kg/m^3

Communication System: UID 0, LTE_FDD (0) Frequency: 2535 MHz Duty Cycle: 1:1

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

Area Scan (91x141x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

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

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

Reference Value = 3.245 V/m; Power Drift = 0.06 dB

Peak SAR (extrapolated) = 1.28 W/kg

SAR(1 g) = 0.409 W/kg; SAR(10 g) = 0.343 W/kg

Maximum value of SAR (measured) = 0.971 W/kg

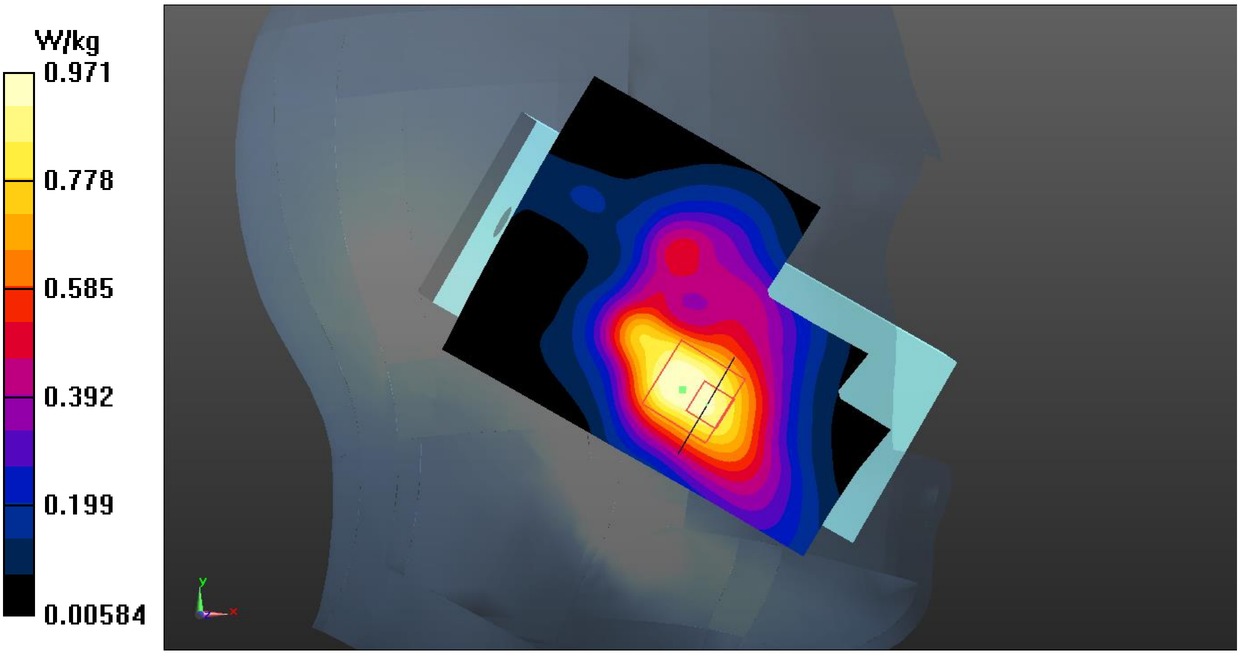


Fig.13 LTE Band 7 Head

LTE Band 7 Body - Rear Side Middle 1RB_50

Date: 2020-6-1

Electronics: DAE4 Sn1527

Medium: Head 2550MHz

Medium parameters used (interpolated): f = 2535 MHz; σ = 1.921 S/m; ε_r = 38.134; ρ = 1000 kg/m^3

Communication System: UID 0, LTE_FDD (0) Frequency: 2535 MHz Duty Cycle: 1:1

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

Area Scan (81x81x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 0.651 W/kg

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

Reference Value = 5.773 V/m; Power Drift = 0.07 dB

Peak SAR (extrapolated) = 0.890 W/kg

SAR(1 g) = 0.481 W/kg; SAR(10 g) = 0.250 W/kg

Maximum value of SAR (measured) = 0.674 W/kg

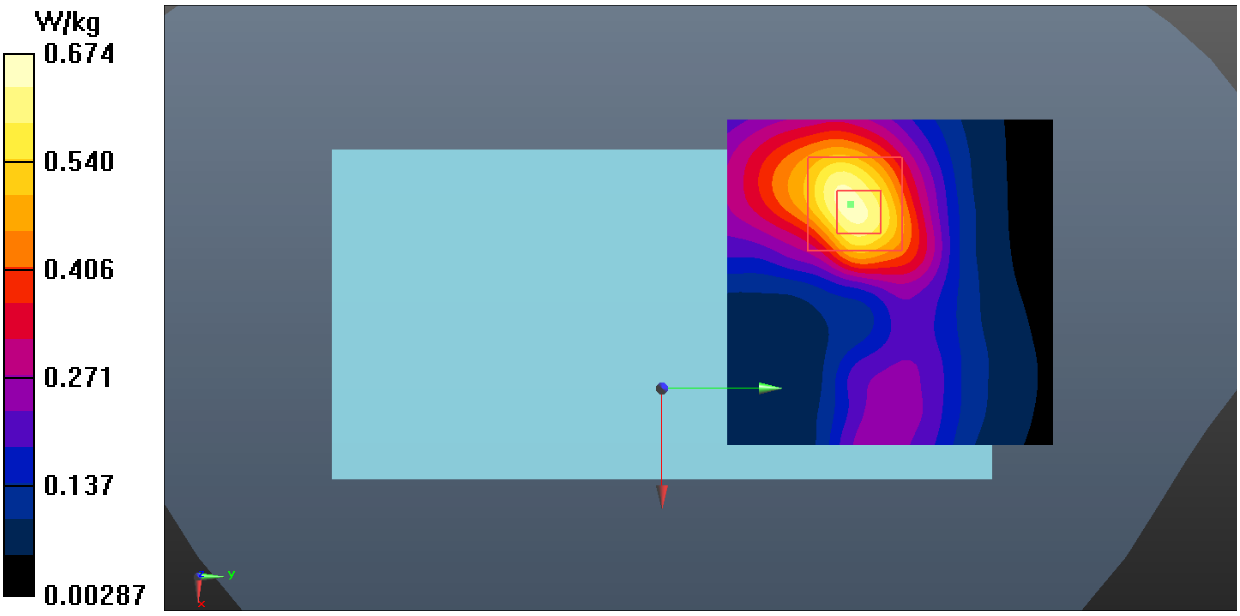


Fig.14 LTE Band 7 Body

LTE Band 12 Head - Right Cheek Middle 1RB_24
Date: 2020-4-25
Electronics: DAE4 Sn1527
Medium: Head 750MHz
Medium parameters used (interpolated): f = 707.5 MHz; σ = 0.857 S/m; ε_r = 43.134; ρ = 1000 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);

Area Scan (81x101x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.280 W/kg

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 8.491 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 0.334 W/kg
SAR(1 g) = 0.261 W/kg; SAR(10 g) = 0.192 W/kg
Maximum value of SAR (measured) = 0.284 W/kg

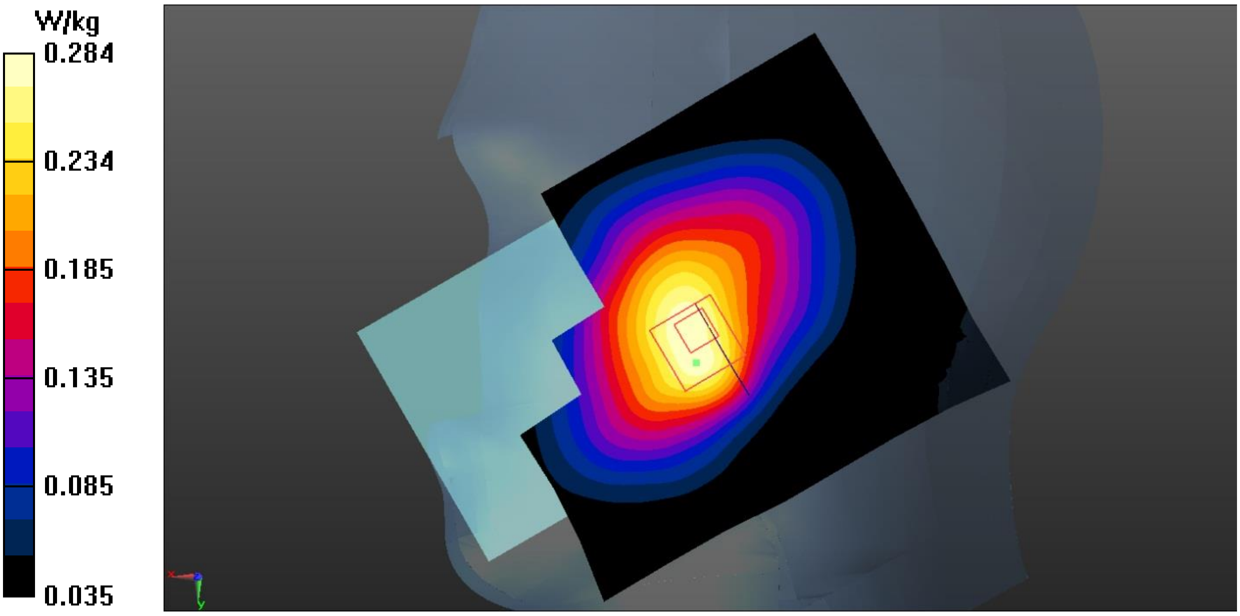


Fig.15 LTE Band 12 Head

LTE Band 12 Body - Front Side Middle 1RB_24
Date: 2020-4-25
Electronics: DAE4 Sn1527
Medium: Head 750MHz
Medium parameters used (interpolated): f = 707.5 MHz; σ = 0.857 S/m; ε_r = 43.134; ρ = 1000 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);

Area Scan (81x101x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.294 W/kg

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 15.53 V/m; Power Drift = -0.15 dB
Peak SAR (extrapolated) = 0.357 W/kg
SAR(1 g) = 0.259 W/kg; SAR(10 g) = 0.205 W/kg
Maximum value of SAR (measured) = 0.320 W/kg

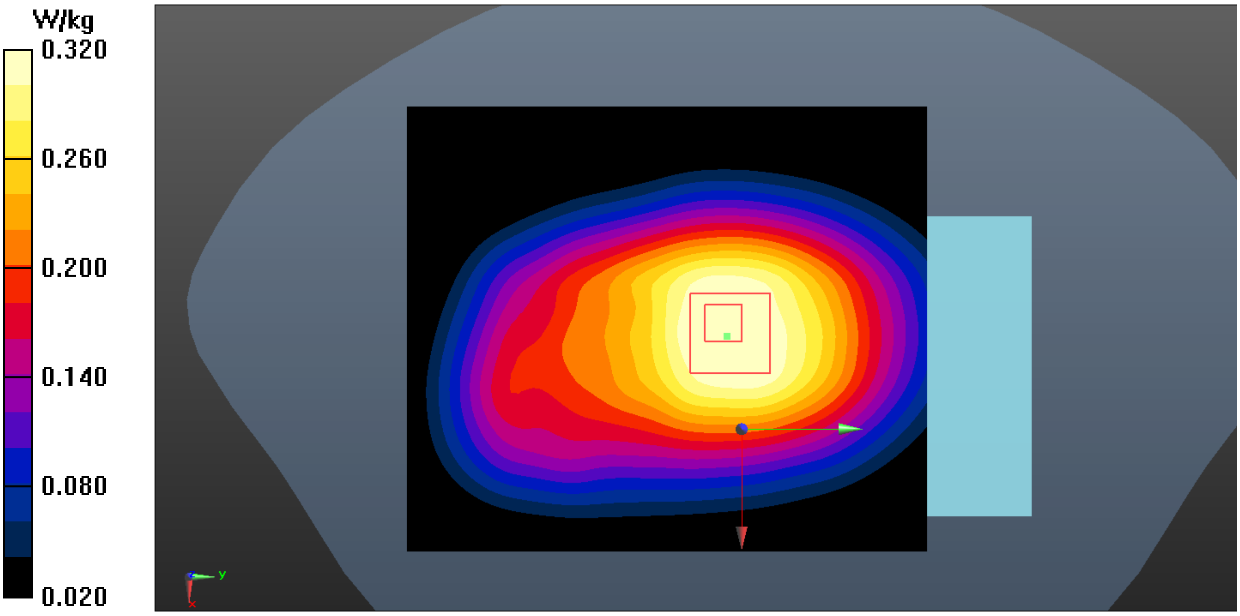


Fig.16 LTE Band 12 Body

LTE Band 13 Head - Left Cheek Middle 1RB_49
Date: 2020-4-25
Electronics: DAE4 Sn1527
Medium: Head 750MHz
Medium parameters used: f = 782 MHz; σ = 0.904 S/m; ε_r =42.24; ρ = 1000 kg/m^3
Communication System: UID 0, LTE_FDD (0) Frequency: 782 MHz Duty Cycle: 1:1
Probe: EX3DV4 – SN3633 ConvF (9.59, 9.59, 9.59);

Area Scan (81x101x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.431 W/kg

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 9.236 V/m; Power Drift = -0.05 dB
Peak SAR (extrapolated) = 0.488 W/kg
SAR(1 g) = 0.385 W/kg; SAR(10 g) = 0.288 W/kg
Maximum value of SAR (measured) = 0.416 W/kg

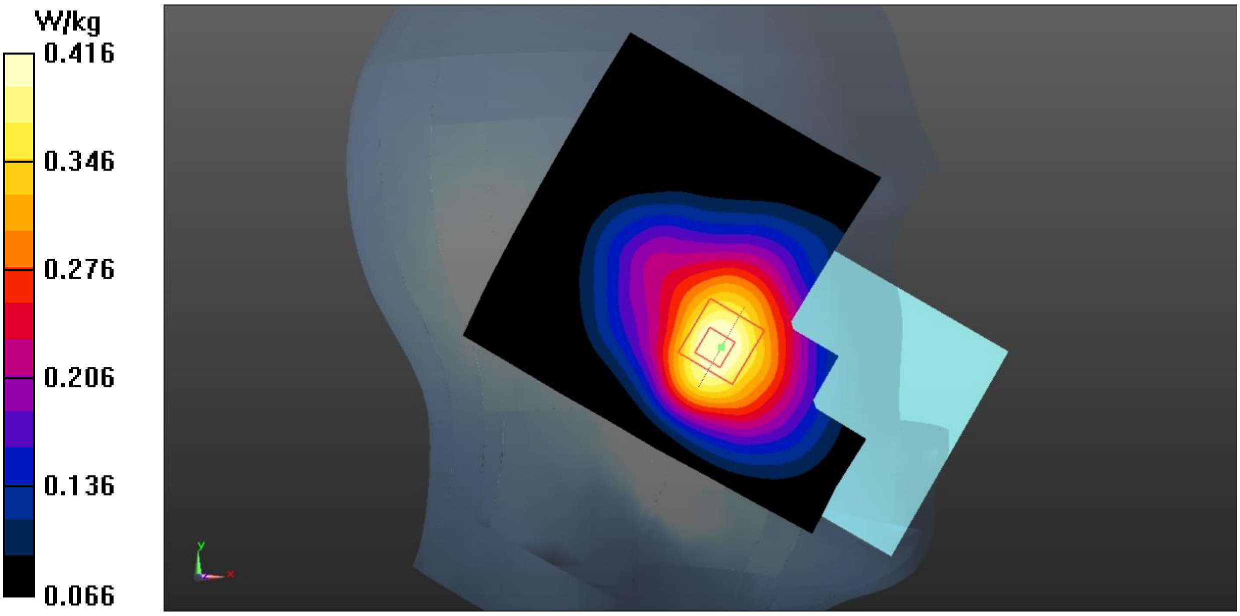


Fig.17 LTE Band 13 Head

LTE Band 13 Body - Front Side Middle 1RB_49
Date: 2020-4-25
Electronics: DAE4 Sn1527
Medium: Head 750MHz
Medium parameters used: f = 782 MHz; σ = 0.904 S/m; ε_r =42.24; ρ = 1000 kg/m^3
Communication System: UID 0, LTE_FDD (0) Frequency: 782 MHz Duty Cycle: 1:1
Probe: EX3DV4 – SN3633 ConvF (9.59, 9.59, 9.59);

Area Scan (81x101x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.391 W/kg

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 20.69 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 0.429 W/kg
SAR(1 g) = 0.349 W/kg; SAR(10 g) = 0.270 W/kg
Maximum value of SAR (measured) = 0.378 W/kg

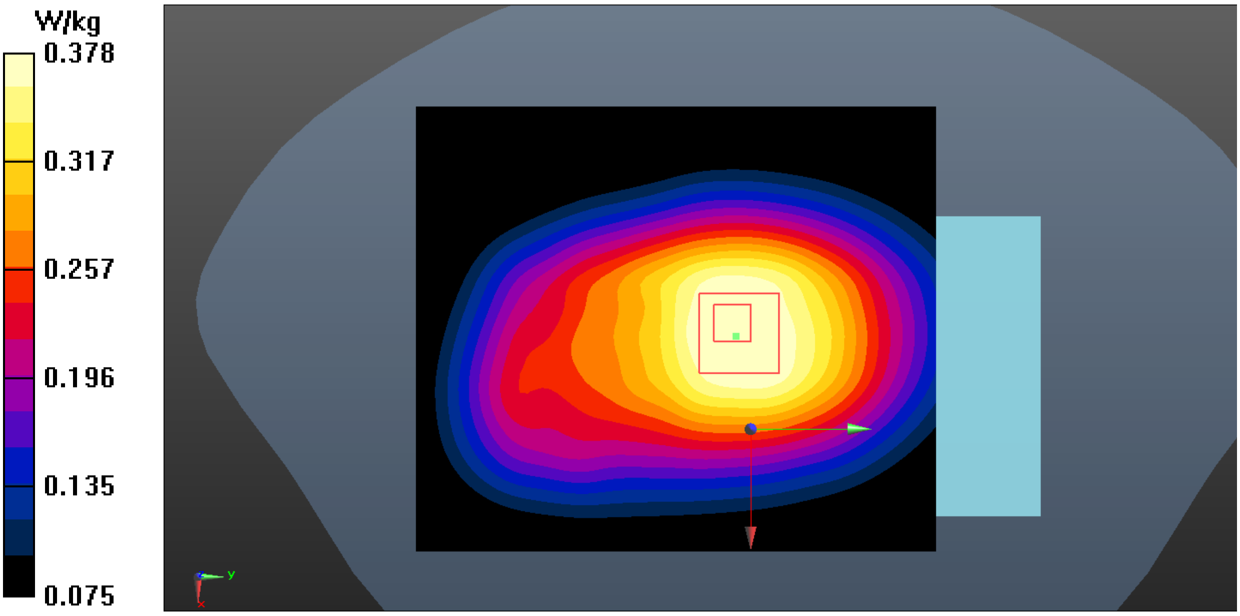


Fig.18 LTE Band 13 Body

LTE Band 14 Head - Left Cheek Middle 1RB_24
Date: 2020-4-25
Electronics: DAE4 Sn1527
Medium: Head 750MHz
Medium parameters used (interpolated): f = 793 MHz; σ = 0.911 S/m; ε_r =42.108; ρ = 1000 kg/m^3
Communication System: UID 0, LTE_FDD (0) Frequency: 793 MHz Duty Cycle: 1:1
Probe: EX3DV4 – SN3633 ConvF (9.59, 9.59, 9.59);

Area Scan (81x101x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.517 W/kg

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 11.56 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 0.575 W/kg
SAR(1 g) = 0.411 W/kg; SAR(10 g) = 0.346 W/kg
Maximum value of SAR (measured) = 0.505 W/kg

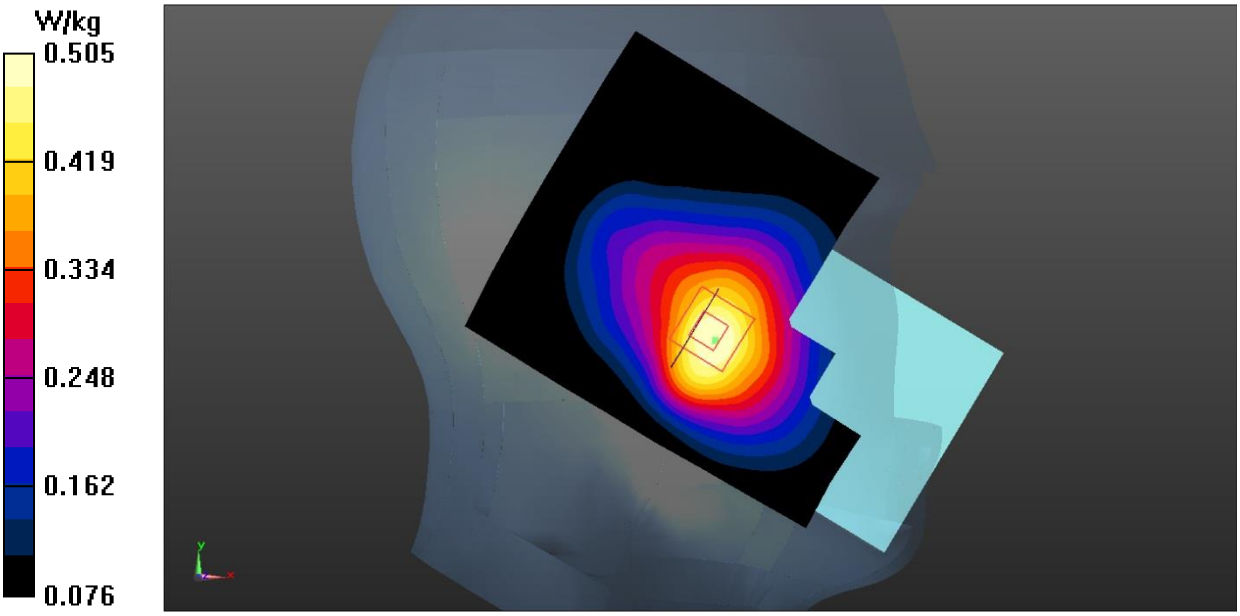


Fig.19 LTE Band 14 Head

LTE Band 14 Body - Front Side Middle 1RB_24

Date: 2020-4-25

Electronics: DAE4 Sn1527

Medium: Head 750MHz

Medium parameters used (interpolated): f = 793 MHz; σ = 0.911 S/m; ε_r =42.108; ρ = 1000 kg/m^3

Communication System: UID 0, LTE_FDD (0) Frequency: 793 MHz Duty Cycle: 1:1

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

Area Scan (81x101x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.454 W/kg

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

Reference Value = 22.35 V/m; Power Drift = -0.01 dB

Peak SAR (extrapolated) = 0.498 W/kg

SAR(1 g) = 0.411 W/kg; SAR(10 g) = 0.319 W/kg

Maximum value of SAR (measured) = 0.445 W/kg

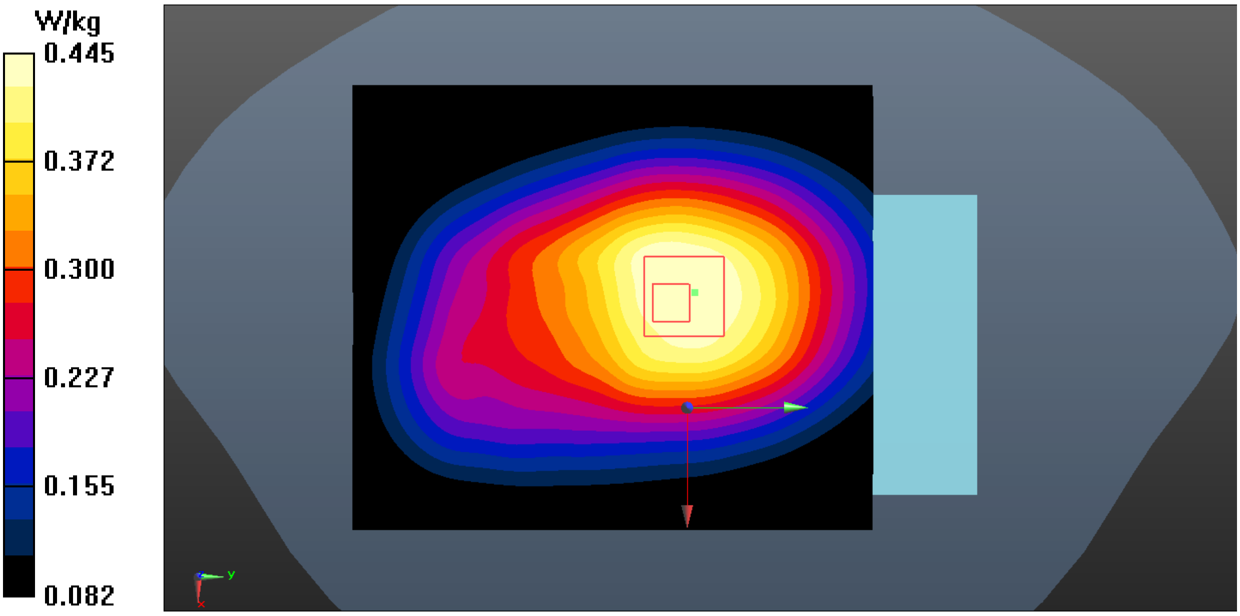


Fig.20 LTE Band 14 Body

LTE Band 25 Head - Right Cheek Middle 1RB_0
Date: 2020-5-1
Electronics: DAE4 Sn1527
Medium: Head 1900MHz
Medium parameters used (interpolated): f = 1882.5 MHz; σ = 1.407 S/m; ε_r = 39.085; ρ = 1000 kg/m^3
Communication System: UID 0, LTE_FDD (0) Frequency: 1882.5 MHz Duty Cycle: 1:1
Probe: EX3DV4 – SN3633 ConvF (7.76, 7.76, 7.76);

Area Scan (81x101x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.844 W/kg

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 6.996 V/m; Power Drift = 0.17 dB
Peak SAR (extrapolated) = 1.05 W/kg
SAR(1 g) = 0.648 W/kg; SAR(10 g) = 0.379 W/kg
Maximum value of SAR (measured) = 0.770 W/kg

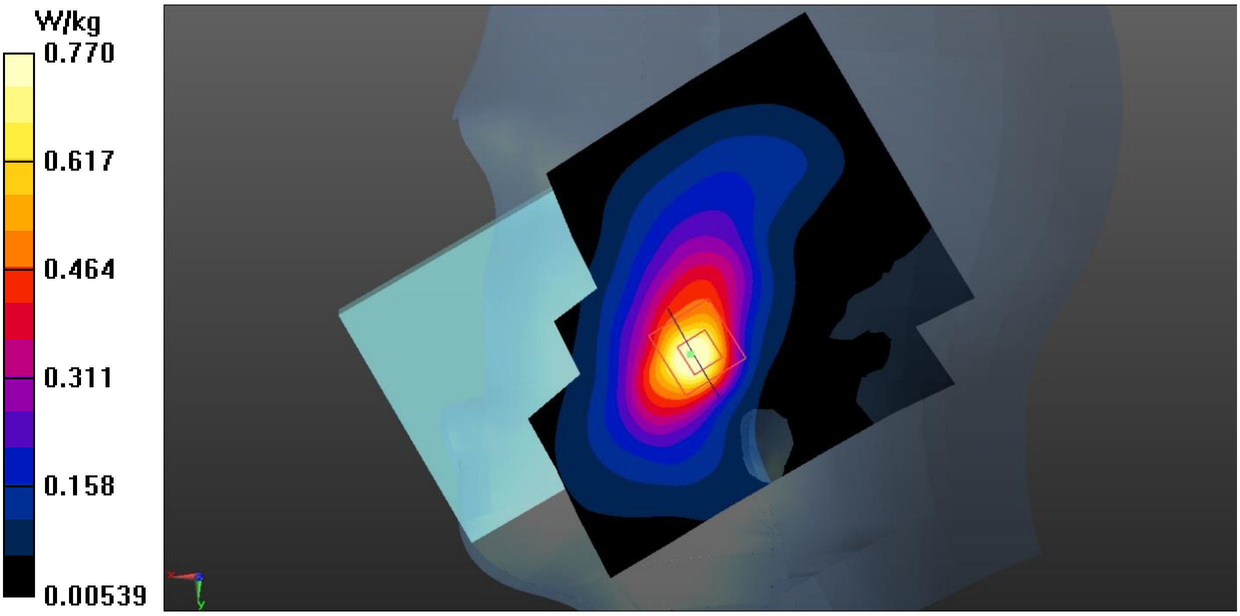


Fig.21 LTE Band 25 Head

LTE Band 25 Body - Rear Side Middle 1RB_0
Date: 2020-5-1
Electronics: DAE4 Sn1527
Medium: Head 1900MHz
Medium parameters used (interpolated): f = 1882.5 MHz; σ = 1.407 S/m; ε_r = 39.085; ρ = 1000 kg/m^3
Communication System: UID 0, LTE_FDD (0) Frequency: 1882.5 MHz Duty Cycle: 1:1
Probe: EX3DV4 – SN3633 ConvF (7.76, 7.76, 7.76);

Area Scan (81x71x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.333 W/kg

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 13.27 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 0.414 W/kg
SAR(1 g) = 0.279 W/kg; SAR(10 g) = 0.181 W/kg
Maximum value of SAR (measured) = 0.324 W/kg

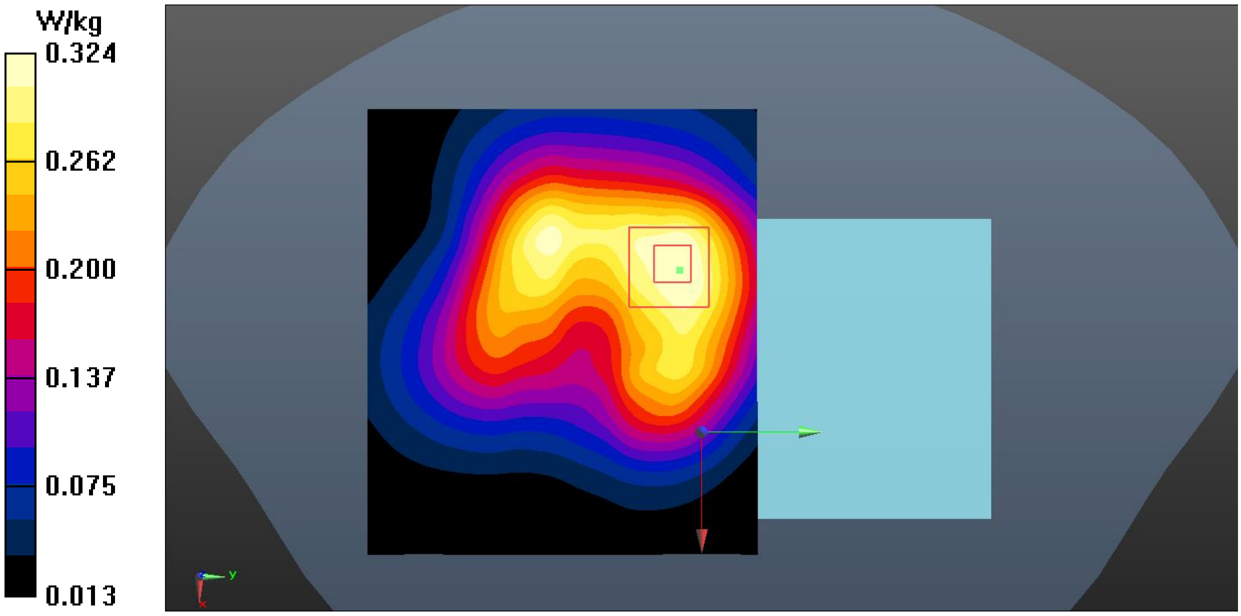


Fig.22 LTE Band 25 Body

LTE Band 26 Head - Right Cheek High 1RB_74
Date: 2020-4-23
Electronics: DAE4 Sn1527
Medium: Head 835MHz
Medium parameters used (interpolated): f = 841.5 MHz; σ = 0.897 S/m; ε_r = 41.889; ρ = 1000 kg/m^3
Communication System: UID 0, LTE_FDD (0) Frequency: 841.5 MHz Duty Cycle: 1:1
Probe: EX3DV4 – SN3633 ConvF (9.59, 9.59, 9.59);

Area Scan (81x61x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.497 W/kg

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 11.40 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 0.576 W/kg
SAR(1 g) = 0.462 W/kg; SAR(10 g) = 0.352 W/kg
Maximum value of SAR (measured) = 0.513 W/kg

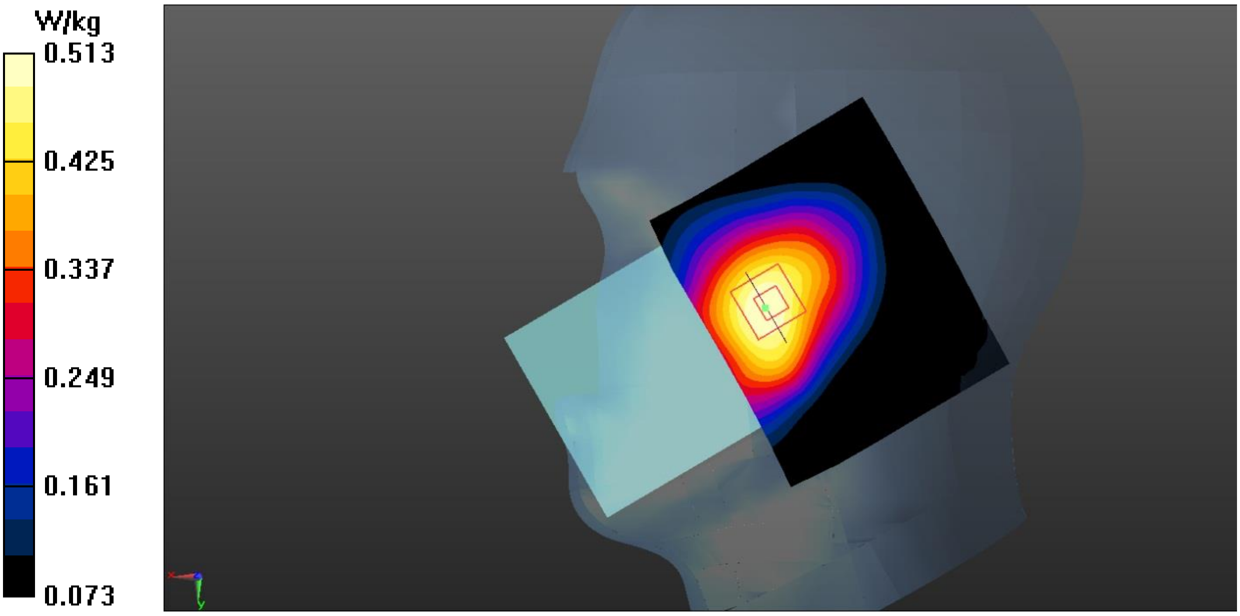


Fig.23 LTE Band 26 Head

LTE Band 26 Body - Front Side High 1RB_74

Date: 2020-4-23

Electronics: DAE4 Sn1527

Medium: Head 835MHz

Medium parameters used (interpolated): f = 841.5 MHz; σ = 0.897 S/m; ε_r = 41.889; ρ = 1000 kg/m^3

Communication System: UID 0, LTE_FDD (0) Frequency: 841.5 MHz Duty Cycle: 1:1

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

Area Scan (81x101x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.437 W/kg

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

Reference Value = 20.43 V/m; Power Drift = -0.10 dB

Peak SAR (extrapolated) = 0.462 W/kg

SAR(1 g) = 0.384 W/kg; SAR(10 g) = 0.296 W/kg

Maximum value of SAR (measured) = 0.423 W/kg

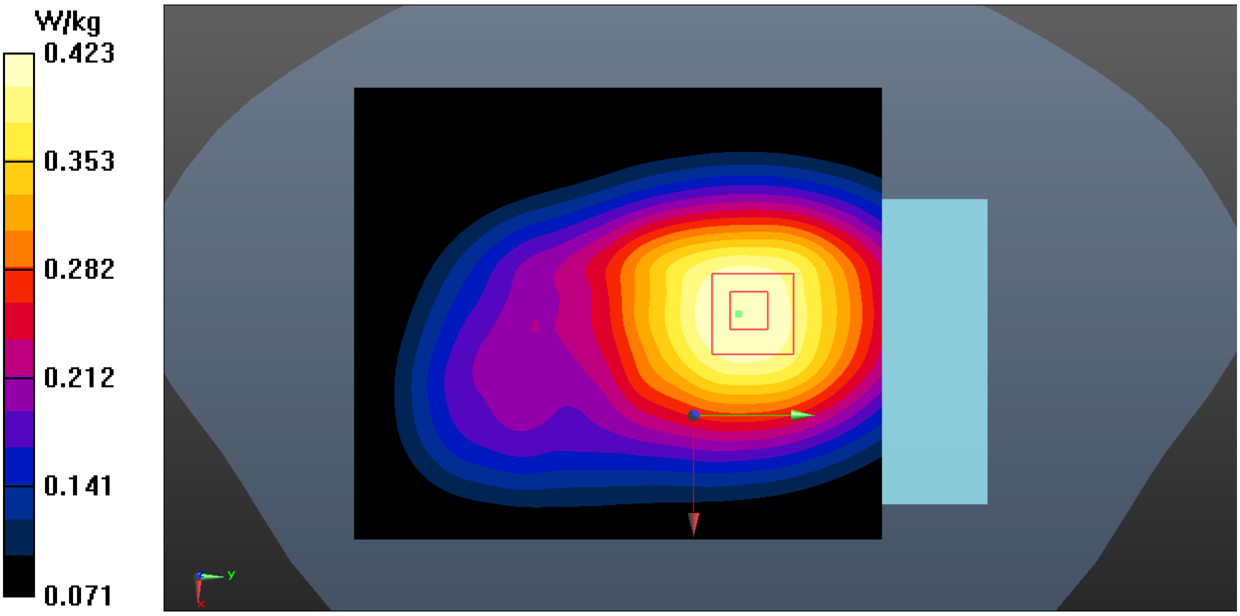


Fig.24 LTE Band 26 Body

LTE Band 30 Head - Left Cheek Middle 1RB_24
Date: 2020-5-2
Electronics: DAE4 Sn1527
Medium: Head 2300MHz
Medium parameters used: f = 2310 MHz; σ = 1.66 S/m; ε_r = 39.906; ρ = 1000 kg/m^3
Communication System: UID 0, LTE_FDD (0) Frequency: 2310 MHz Duty Cycle: 1:1
Probe: EX3DV4 – SN3633 ConvF (7.69, 7.69, 7.69);

Area Scan (91x141x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.677 W/kg

Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 7.555 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 0.969 W/kg
SAR(1 g) = 0.414 W/kg; SAR(10 g) = 0.350 W/kg
Maximum value of SAR (measured) = 0.615 W/kg

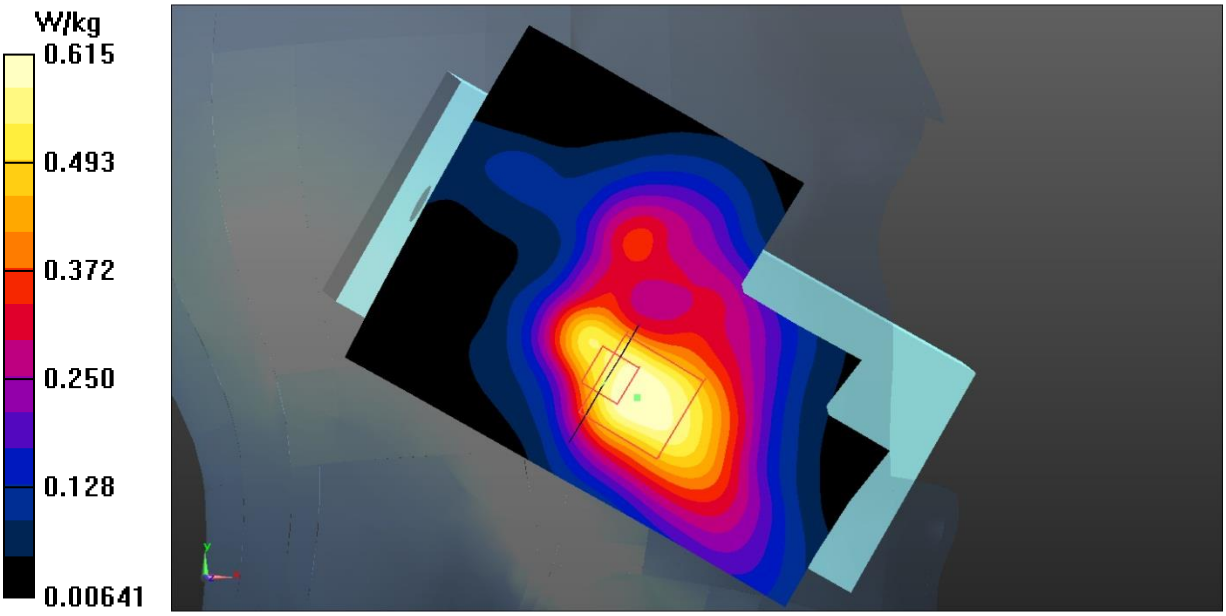


Fig.25 LTE Band 30 Head

LTE Band 30 Body - Bottom Side Middle 1RB_24
Date: 2020-5-2
Electronics: DAE4 Sn1527
Medium: Head 2300MHz
Medium parameters used: f = 2310 MHz; σ = 1.66 S/m; ε_r = 39.906; ρ = 1000 kg/m^3
Communication System: UID 0, LTE_FDD (0) Frequency: 2310 MHz Duty Cycle: 1:1
Probe: EX3DV4 – SN3633 ConvF (7.69, 7.69, 7.69);

Area Scan (111x91x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.821 W/kg

Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 19.13 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 1.18 W/kg
SAR(1 g) = 0.627 W/kg; SAR(10 g) = 0.336 W/kg
Maximum value of SAR (measured) = 0.790 W/kg

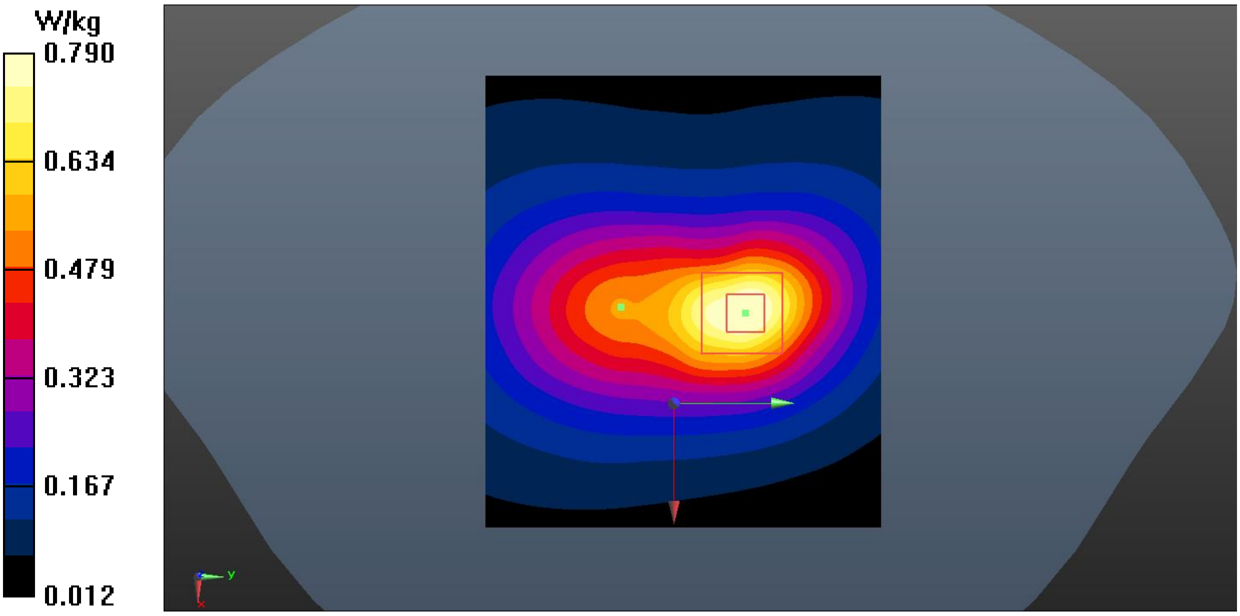


Fig.26 LTE Band 30 Body

LTE Band 41 Head - Right Cheek High 1RB_99

Date: 2020-6-1

Electronics: DAE4 Sn1527

Medium: Head 2550MHz

Medium parameters used: f = 2680 MHz; σ = 2.092 S/m; ε_r = 37.655; ρ = 1000 kg/m^3

Communication System: UID 0, LTE_TDD (0) Frequency: 2680 MHz Duty Cycle: 1:1.58

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

Area Scan (121x101x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 0.623 W/kg

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

Reference Value = 3.785 V/m; Power Drift = 0.04 dB

Peak SAR (extrapolated) = 1.08 W/kg

SAR(1 g) = 0.520 W/kg; SAR(10 g) = 0.262 W/kg

Maximum value of SAR (measured) = 0.695 W/kg

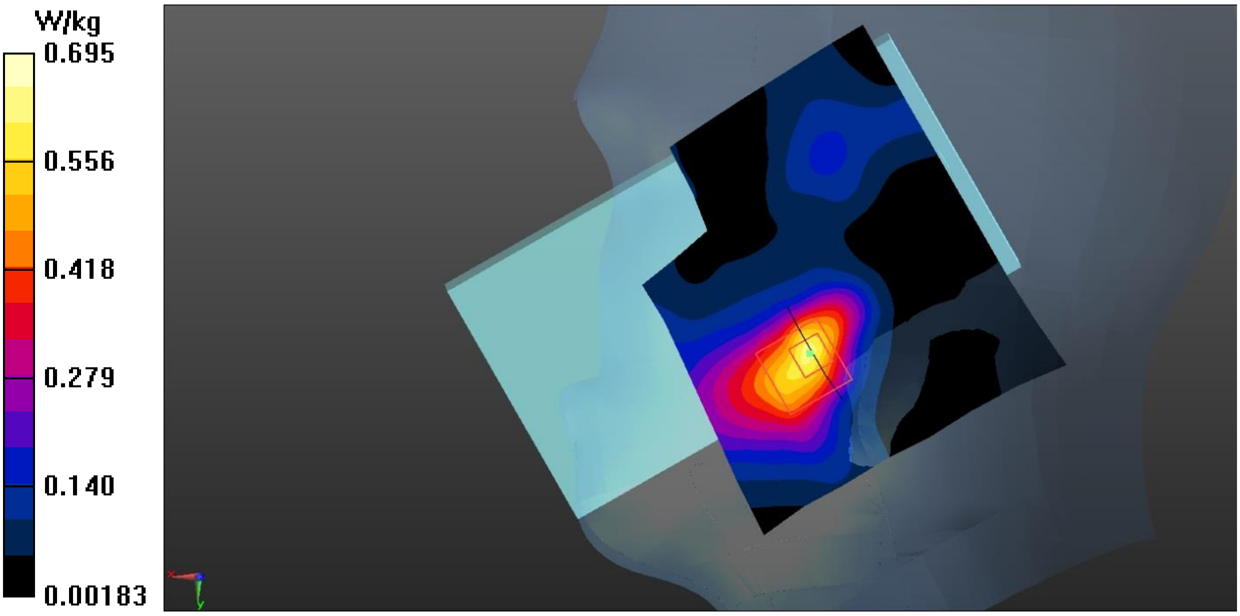


Fig.27 LTE Band 41 Head

LTE Band 41 Body - Rear Side High 1RB_99
Date: 2020-6-1
Electronics: DAE4 Sn1527
Medium: Head 2550MHz
Medium parameters used: f = 2680 MHz; σ = 2.092 S/m; ε_r = 37.655; ρ = 1000 kg/m^3
Communication System: UID 0, LTE_TDD (0) Frequency: 2680 MHz Duty Cycle: 1:1.58
Probe: EX3DV4 – SN3633 ConvF (7.20, 7.20, 7.20);

Area Scan (81x81x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.877 W/kg

Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 5.811 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 1.17 W/kg
SAR(1 g) = 0.565 W/kg; SAR(10 g) = 0.263 W/kg
Maximum value of SAR (measured) = 0.839 W/kg

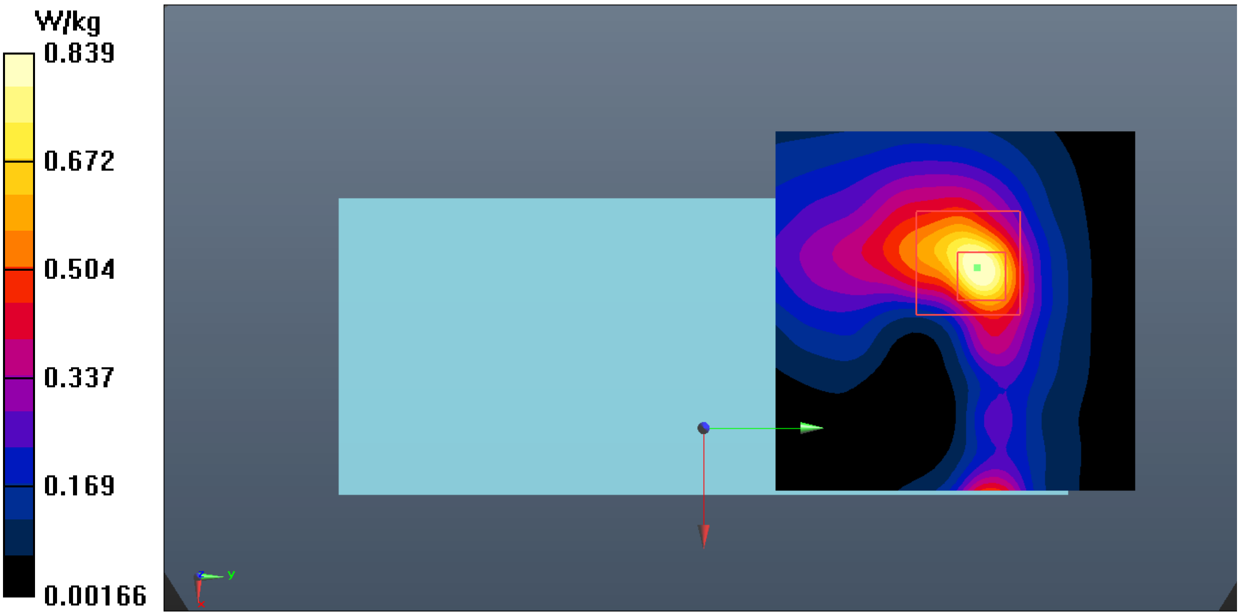


Fig.28 LTE Band 41 Body

LTE Band 66 Head - Right Cheek Low 1RB_99

Date: 2020-4-29

Electronics: DAE4 Sn1527

Medium: Head 1750MHz

Medium parameters used: f = 1720 MHz; σ = 1.36 S/m; ε_r = 39.448; ρ = 1000 kg/m^3

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

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

Area Scan (81x71x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.746 W/kg

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

Reference Value = 15.74 V/m; Power Drift = -0.06 dB

Peak SAR (extrapolated) = 0.983 W/kg

SAR(1 g) = 0.650 W/kg; SAR(10 g) = 0.405 W/kg

Maximum value of SAR (measured) = 0.741 W/kg

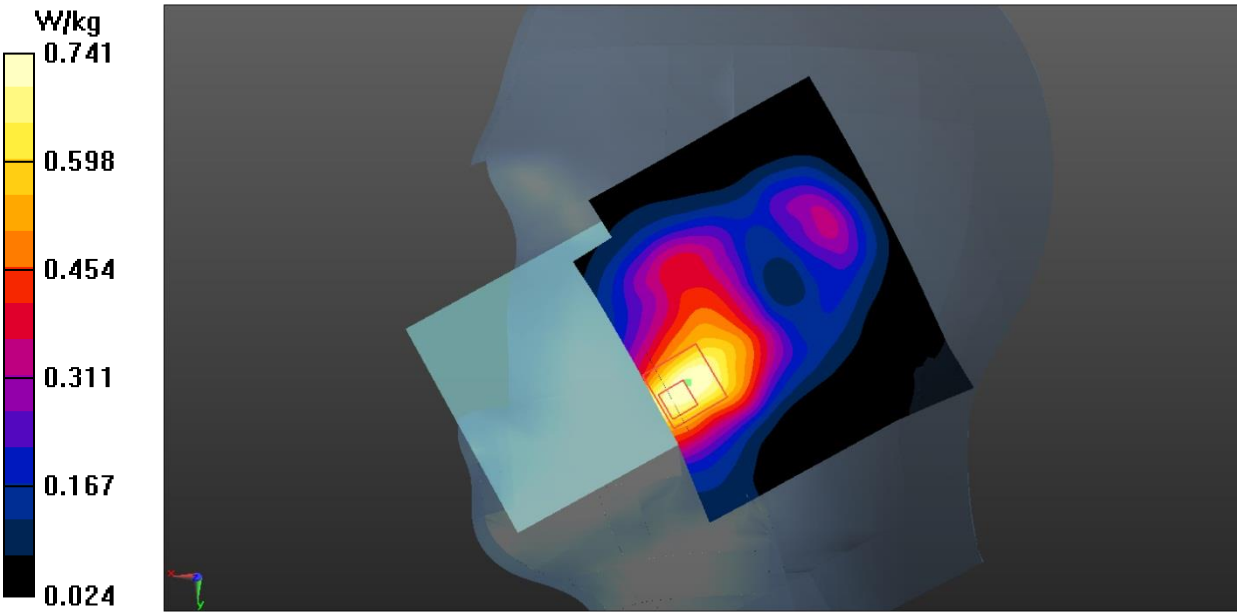


Fig.29 LTE Band 66 Head

LTE Band 66 Body - Front Side Low 1RB_99

Date: 2020-4-29

Electronics: DAE4 Sn1527

Medium: Head 1750MHz

Medium parameters used: f = 1720 MHz; σ = 1.36 S/m; ε_r = 39.448; ρ = 1000 kg/m^3

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

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

Area Scan (81x101x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.821 W/kg

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

Reference Value = 16.07 V/m; Power Drift = -0.05 dB

Peak SAR (extrapolated) = 1.07 W/kg

SAR(1 g) = 0.538 W/kg; SAR(10 g) = 0.345 W/kg

Maximum value of SAR (measured) = 0.833 W/kg

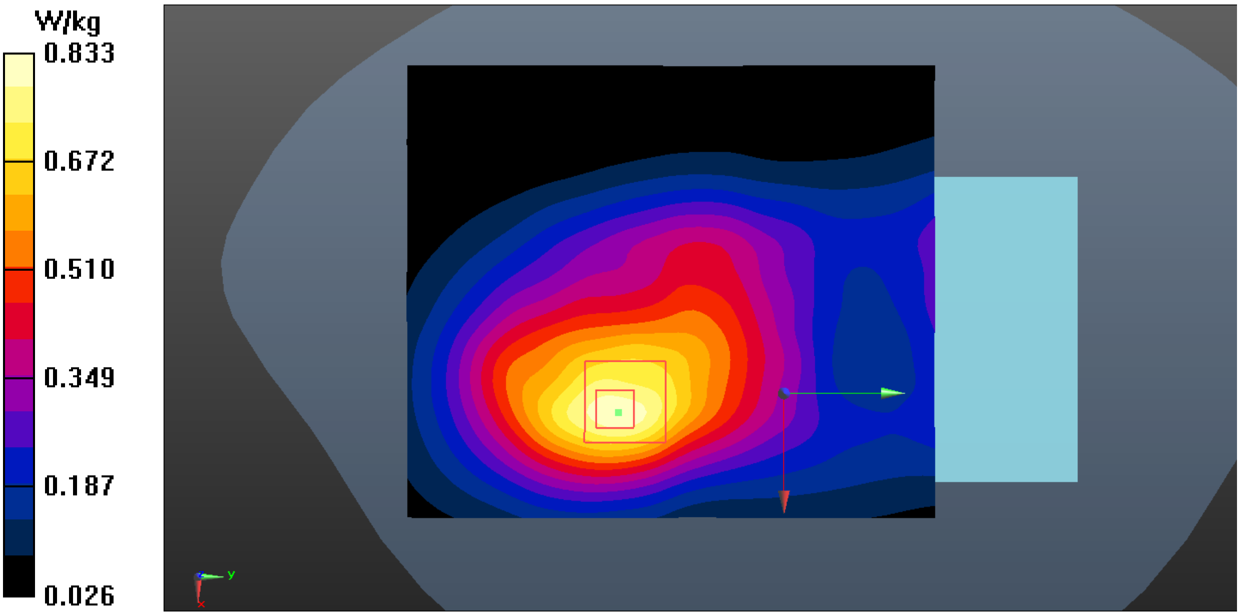


Fig.30 LTE Band 66 Body

WLAN 2.4GHz Head - Left Cheek High
Date: 2020-5-5
Electronics: DAE4 Sn1527
Medium: Head 2450MHz
Medium parameters used: f = 2462 MHz; σ = 1.859 S/m; ε_r = 38.713; ρ = 1000 kg/m^3
Communication System: UID 0, WiFi (0) Frequency: 2462 MHz Duty Cycle: 1:1
Probe: EX3DV4 – SN3633 ConvF (7.43, 7.43, 7.43);

Area Scan (111x131x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 1.24 W/kg

Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 11.75 V/m; Power Drift = -0.07 dB
Peak SAR (extrapolated) = 2.53 W/kg
SAR(1 g) = 0.985 W/kg; SAR(10 g) = 0.485 W/kg
Maximum value of SAR (measured) = 1.46 W/kg

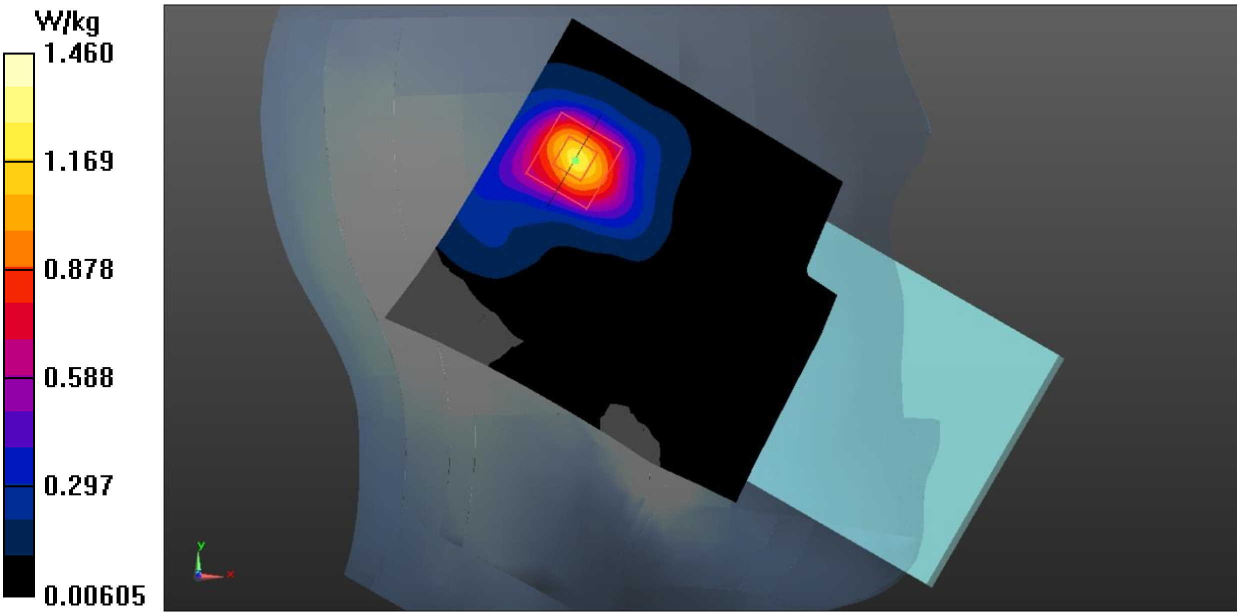


Fig.31 WLAN 2.4GHz Head

WLAN 2.4GHz Body - Front Side Low

Date: 2020-5-5

Electronics: DAE4 Sn1527

Medium: Head 2450MHz

Medium parameters used: f = 2412 MHz; σ = 1.801 S/m; ε_r = 38.878; ρ = 1000 kg/m^3

Communication System: UID 0, WiFi (0) Frequency: 2412 MHz Duty Cycle: 1:1

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

Area Scan (91x151x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 0.324 W/kg

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

Reference Value = 4.417 V/m; Power Drift = 0.03 dB

Peak SAR (extrapolated) = 0.533 W/kg

SAR(1 g) = 0.267 W/kg; SAR(10 g) = 0.131 W/kg

Maximum value of SAR (measured) = 0.344 W/kg

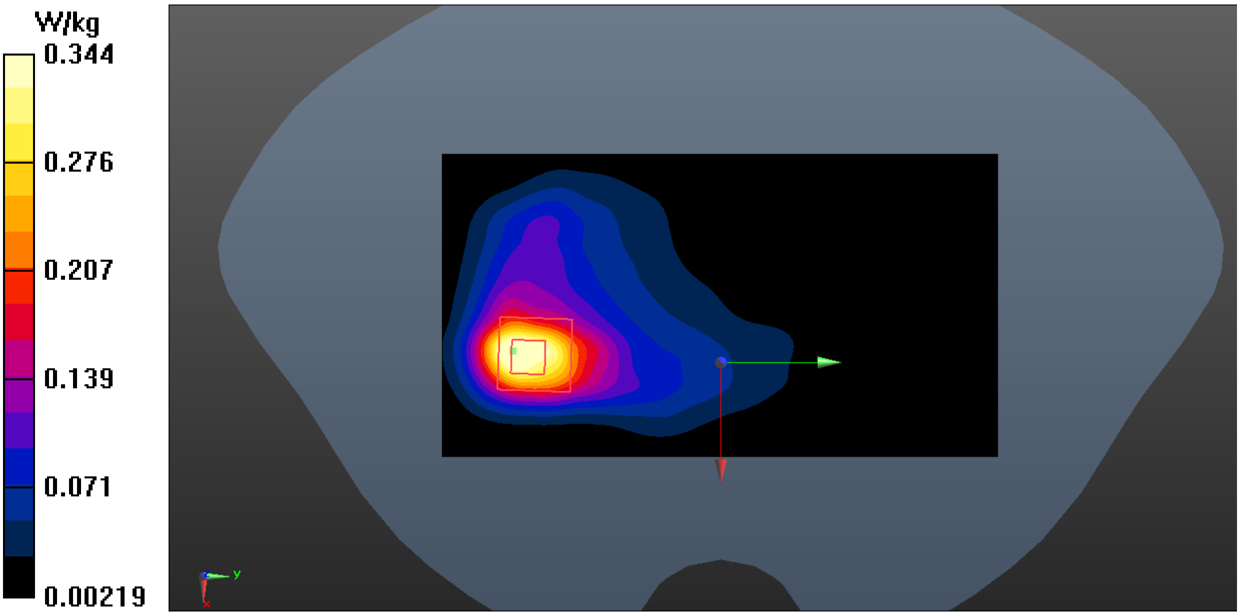


Fig.32 WLAN 2.4GHz Body

WLAN 5GHz Head - Left Tilt CH151
Date: 2020-5-6
Electronics: DAE4 Sn1527
Medium: Head 5750MHz
Medium parameters used (interpolated): f = 5755 MHz; σ = 5.164 S/m; ε_r = 36.404; ρ = 1000 kg/m^3
Communication System: UID 0, WiFi 5G (0) Frequency: 5755 MHz Duty Cycle: 1:1
Probe: EX3DV4 – SN3633 ConvF (4.73, 4.73, 4.73);

Area Scan (91x171x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 1.02 W/kg

Zoom Scan (7x7x11)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 3.671 V/m; Power Drift = -0.06 dB
Peak SAR (extrapolated) = 1.25 W/kg
SAR(1 g) = 0.548 W/kg; SAR(10 g) = 0.169 W/kg
Maximum value of SAR (measured) = 0.966 W/kg

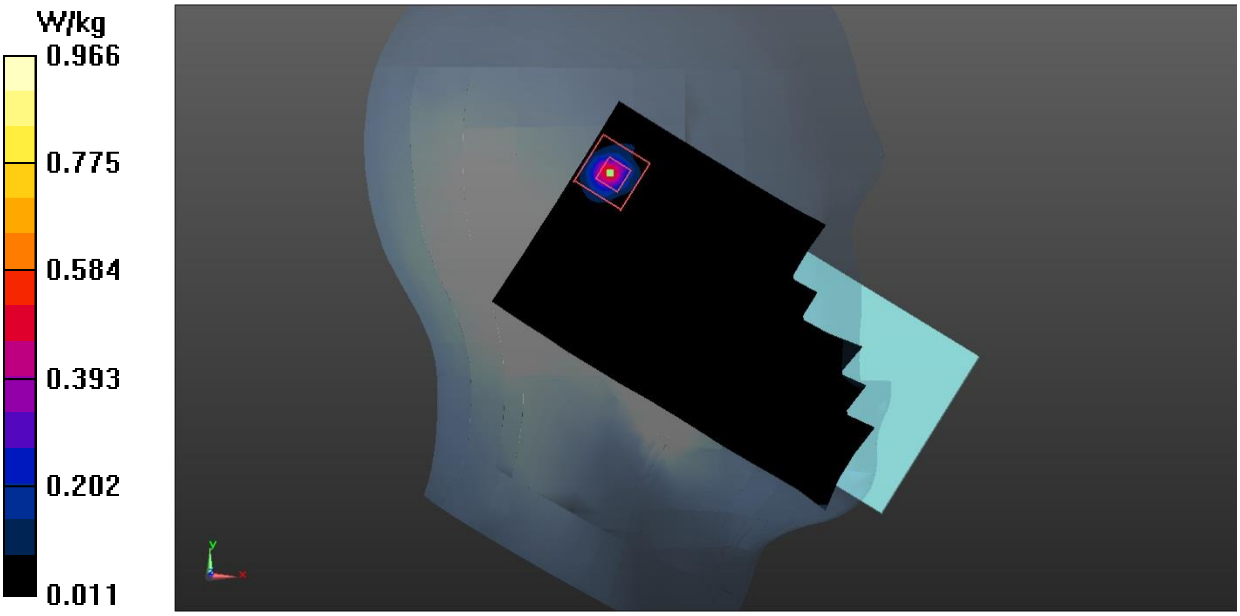


Fig.33 WLAN 5GHz Head

WLAN 5GHz Body - Right Side CH151

Date: 2020-5-6

Electronics: DAE4 Sn1527

Medium: Head 5750MHz

Medium parameters used (interpolated): f = 5755 MHz; σ = 5.164 S/m; ε_r = 36.404; ρ = 1000 kg/m^3

Communication System: UID 0, WiFi 5G (0) Frequency: 5755 MHz Duty Cycle: 1:1

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

Area Scan (81x81x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 0.953 W/kg

Zoom Scan (7x7x11)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm

Reference Value = 8.676 V/m; Power Drift = 0.04 dB

Peak SAR (extrapolated) = 1.14 W/kg

SAR(1 g) = 0.289 W/kg; SAR(10 g) = 0.114 W/kg.

Maximum value of SAR (measured) = 0.936 W/kg

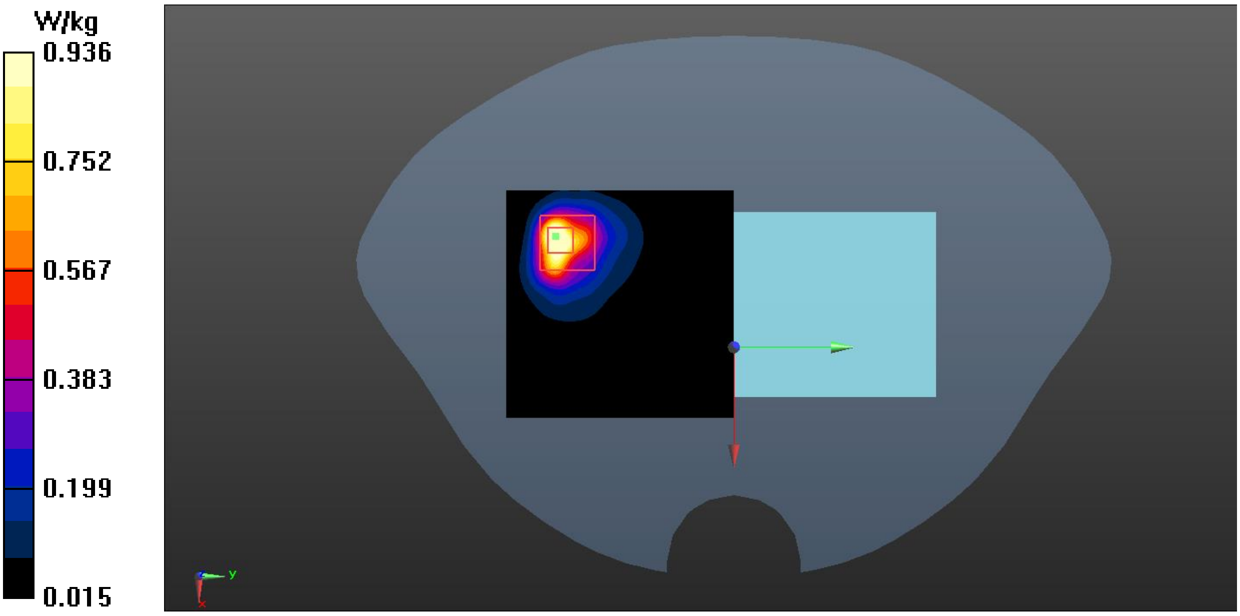


Fig.34 WLANB 5GHz Body

ANNEX B: SystemVerification Results

750MHz

Date: 2020-4-25

Electronics: DAE4 Sn1527

Medium: Head 750MHz

Medium parameters used: f = 750 MHz; σ = 0.884 S/m; εr = 42.464.; ρ = 1000 kg/m3

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

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

System Validation /Area Scan (81x191x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Reference Value = 58.772 V/m; Power Drift = -0.03 dB

SAR(1 g) = 2.15 W/kg; SAR(10 g) = 1.43 W/kg

Maximum value of SAR (interpolated) = 2.35 W/kg

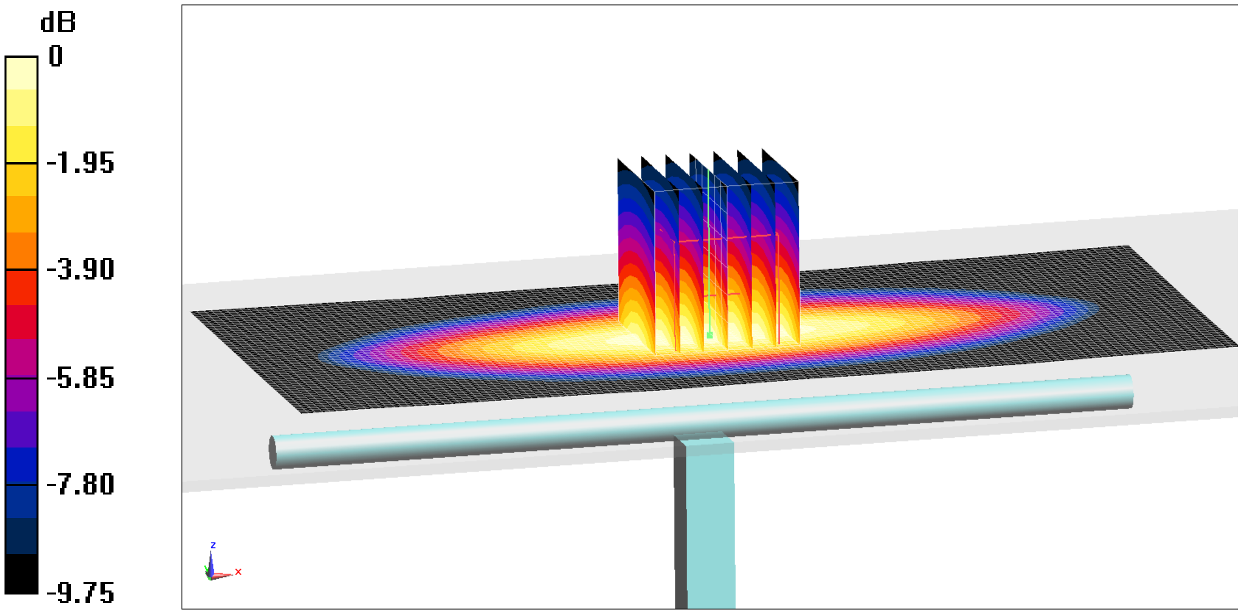
System Validation /Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 58.772 V/m; Power Drift = -0.03 dB

Peak SAR (extrapolated) = 2.65 W/kg

SAR(1 g) = 2.07 W/kg; SAR(10 g) = 1.41 W/kg

Maximum value of SAR (measured) = 2.32 W/kg



0 dB = 2.32 W/kg = 3.65 dB W/kg

Fig.B.1. Validation 750MHz 250mW

835MHz

Date: 2020-4-23

Electronics: DAE4 Sn1527

Medium: Head 835MHz

Medium parameters used: f = 835 MHz; σ = 0.891 S/m; εr = 41.968; ρ = 1000 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 (81x161x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Reference Value = 61.428 V/m; Power Drift = -0.11 dB

SAR(1 g) = 2.40 W/kg; SAR(10 g) = 1.58 W/kg

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

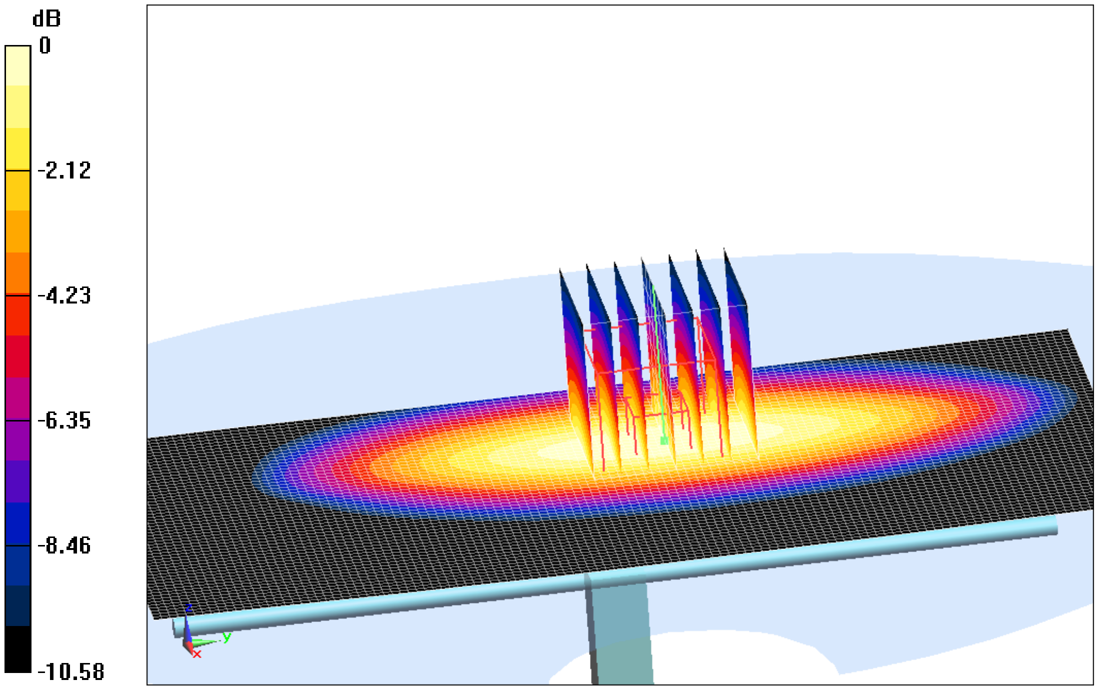
System Validation /Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 61.428 V/m; Power Drift = -0.11 dB

Peak SAR (extrapolated) = 3.46 W/kg

SAR(1 g) = 2.33 W/kg; SAR(10 g) = 1.55 W/kg

Maximum value of SAR (measured) = 2.75 W/kg



0 dB = 2.75 W/kg = 4.39 dB W/kg

Fig.B.2. Validation 835MHz 250mW

1750MHz

Date: 2020-4-29

Electronics: DAE4 Sn1527

Medium: Head 1750MHz

Medium parameters used: f = 1750 MHz; σ = 1.386 S/m; ε_r = 39.332; ρ = 1000 kg/m^3

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

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

System Validation/Area Scan (61x121x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Reference Value = 78.515 V/m; Power Drift = 0.08 dB

SAR(1 g) = 9.26 W/kg; SAR(10 g) = 4.84 W/kg

Maximum value of SAR (interpolated) = 11.0 W/kg

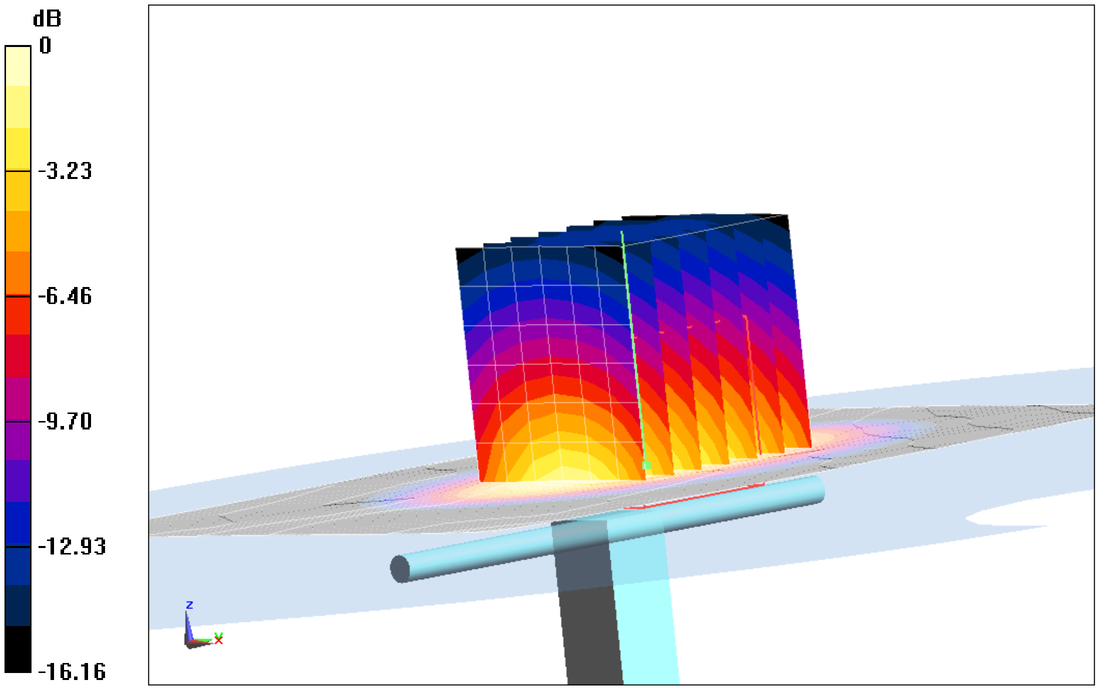
System Validation/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 78.515 V/m; Power Drift = 0.08 dB

Peak SAR (extrapolated) = 18.6 W/kg

SAR(1 g) = 9.45 W/kg; SAR(10 g) = 4.93 W/kg

Maximum value of SAR (measured) = 11.3 W/kg



0 dB = 11.3 W/kg = 10.53 dB W/kg

Fig.B.3. Validation 1750MHz 250mW

1900MHz

Date: 2020-5-1

Electronics: DAE4 Sn1527

Medium: Head 1900MHz

Medium parameters used: f = 1900 MHz; σ = 1.422 S/m; ε_r = 39.018; ρ = 1000 kg/m^3

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

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

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

Reference Value = 88.483 V/m; Power Drift = 0.05 dB

SAR(1 g) = 10.4 W/kg; SAR(10 g) = 5.29 W/kg

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

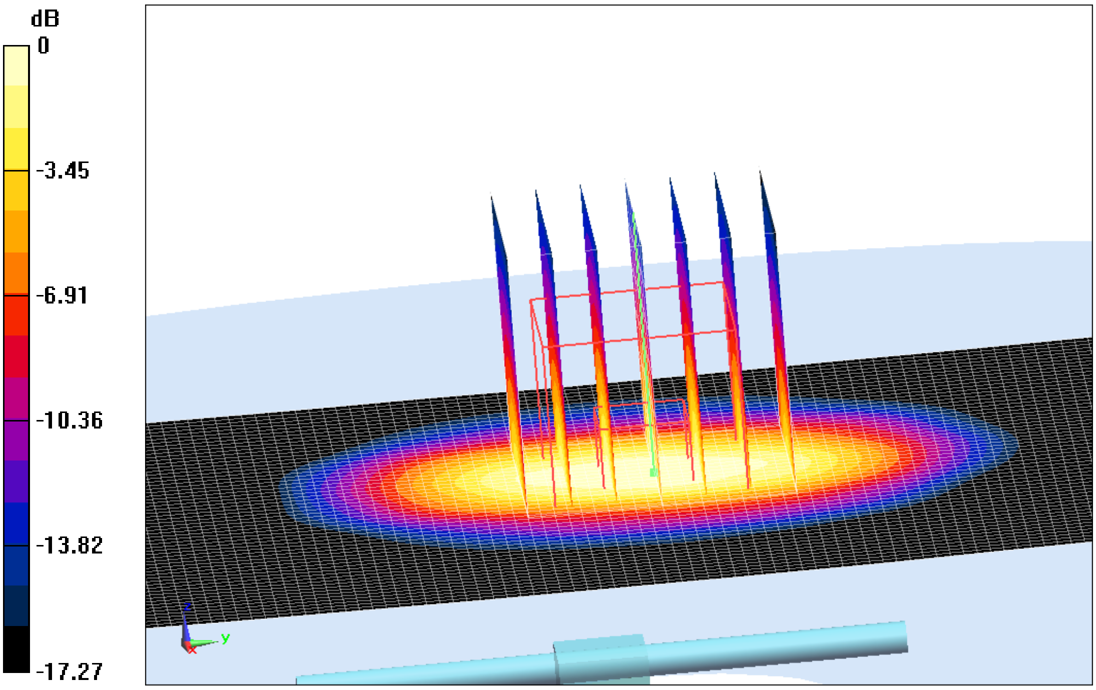
System Validation /Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 88.483 V/m; Power Drift = 0.05 dB

Peak SAR (extrapolated) = 23.1 W/kg

SAR(1 g) = 10.6 W/kg; SAR(10 g) = 5.38 W/kg

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



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

Fig.B.4. Validation 1900MHz 250mW

2300MHz

Date: 2020-5-2

Electronics: DAE4 Sn1527

Medium: Head 2300MHz

Medium parameters used: f = 2300 MHz; σ = 1.648 S/m; ε_r = 39.94; ρ = 1000 kg/m^3

Communication System: CW Frequency: 2300 MHz Duty Cycle: 1:1

Probe: EX3DV4 – SN3633 ConvF (7.69, 7.69, 7.69);

System Validation /Area Scan (31x91x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Reference Value = 90.042 V/m; Power Drift = -0.06 dB

SAR(1 g) = 12.0 W/kg; SAR(10 g) = 5.92 W/kg

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

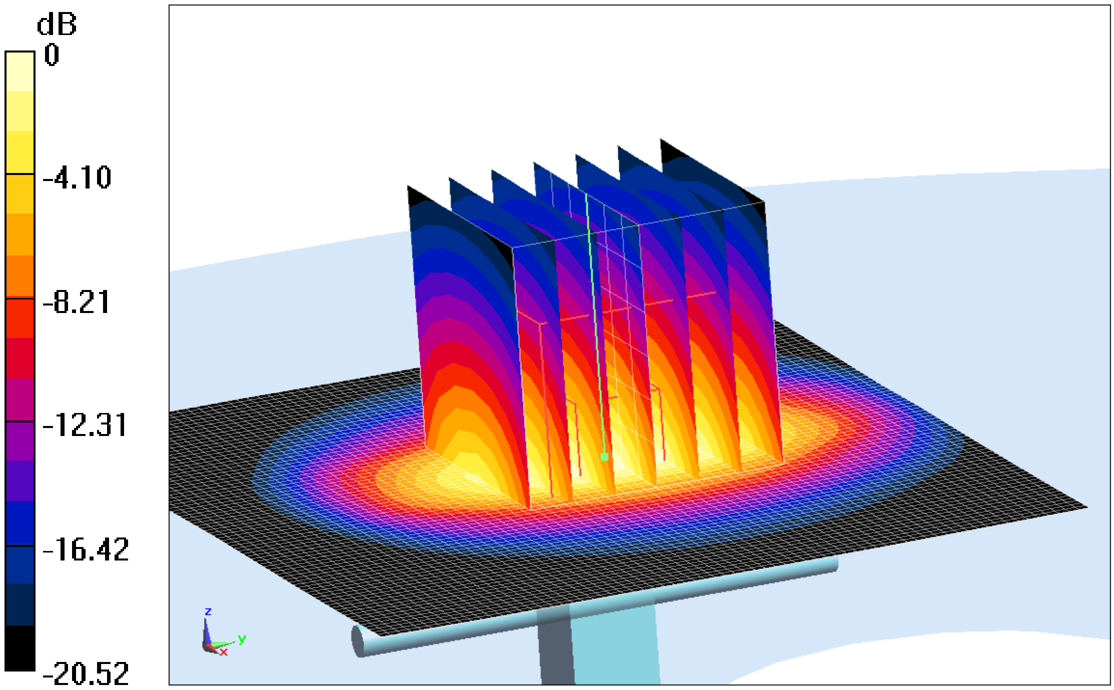
System Validation/Zoom Scan (7x7x7)/Cube0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 90.042 V/m; Power Drift = -0.06 dB

Peak SAR (extrapolated) = 26.9 W/kg

SAR(1 g) = 11.7 W/kg; SAR(10 g) = 5.77 W/kg

Maximum value of SAR (measured) = 13.6 W/kg



0 dB = 13.6 W/kg = 11.34 dB W/kg

Fig.B.5. Validation 2300MHz 250mW

2450MHz

Date: 2020-5-5

Electronics: DAE4 Sn1527

Medium: Head 2450MHz

Medium parameters used: f = 2450 MHz; σ = 1.845 S/m; ε_r = 38.753; ρ = 1000 kg/m^3

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

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

System Validation /Area Scan (61x81x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Reference Value = 92.682 V/m; Power Drift = 0.12 dB

SAR(1 g) = 13.2 W/kg; SAR(10 g) = 6.04 W/kg

Maximum value of SAR (interpolated) = 15.2 W/kg

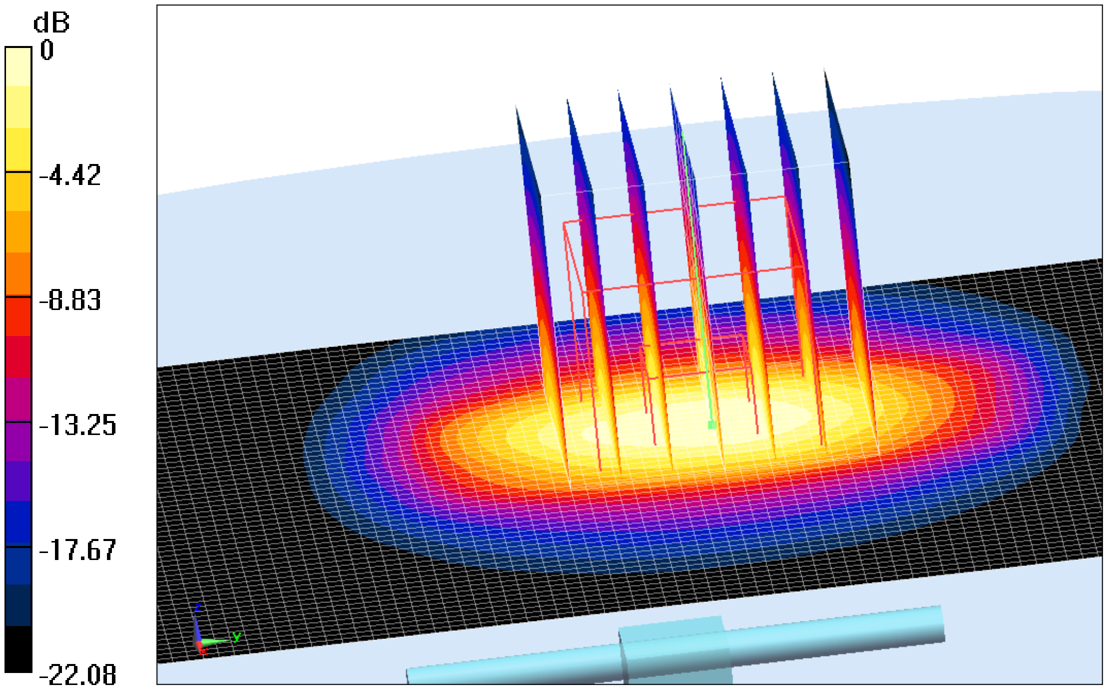
System Validation /Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 92.682 V/m; Power Drift = 0.12 dB

Peak SAR (extrapolated) = 30.4 W/kg

SAR(1 g) = 13.5 W/kg; SAR(10 g) = 6.18 W/kg

Maximum value of SAR (measured) = 15.6 W/kg



0 dB = 15.6 W/kg = 11.93 dB W/kg

Fig.B.6. Validation 2450MHz 250mW

2550MHz

Date: 2020-6-1

Electronics: DAE4 Sn1527

Medium: Head 2550MHz

Medium parameters used: f = 2550 MHz; σ = 1.939 S/m; ε_r = 38.084; ρ = 1000 kg/m^3

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

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

System Validation/Area Scan (61x121x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Reference Value = 93.556 V/m; Power Drift = 0.09 dB

SAR(1 g) = 14.5 W/kg; SAR(10 g) = 6.63 W/kg

Maximum value of SAR (interpolated) = 16.3 W/kg

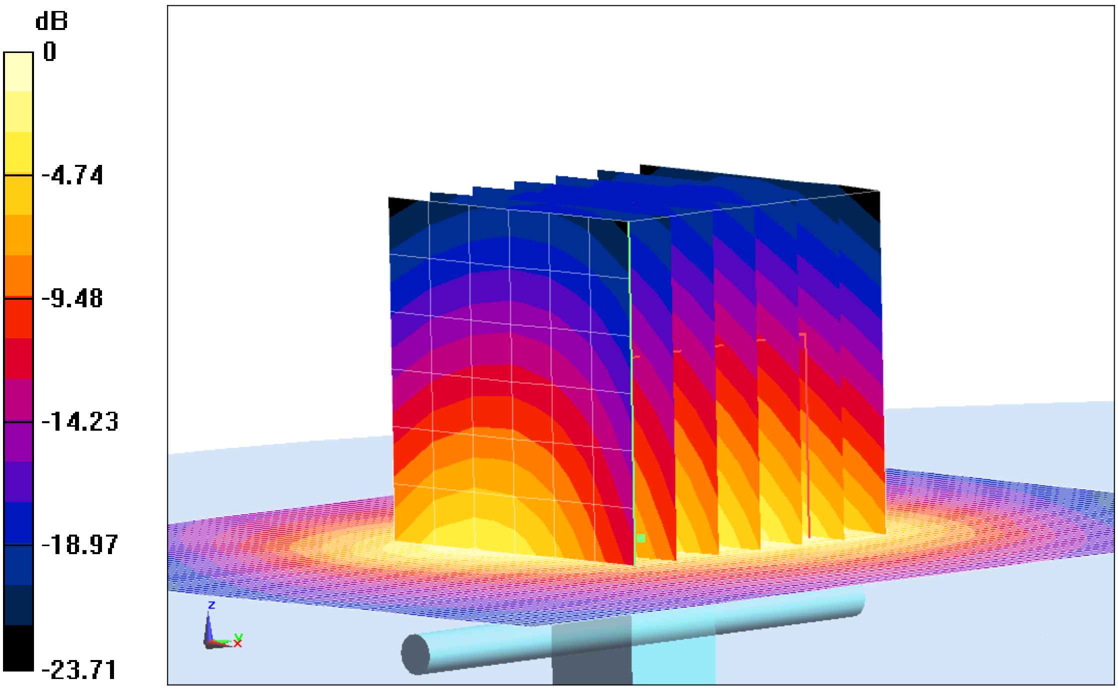
System Validation/Zoom Scan (7x7x7)/Cube0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 93.556 V/m; Power Drift = 0.09 dB

Peak SAR (extrapolated) = 34.2 W/kg

SAR(1 g) = 14.8 W/kg; SAR(10 g) = 6.74 W/kg

Maximum value of SAR (measured) = 16.6 W/kg



0 dB = 16.6 W/kg = 12.20 dB W/kg

Fig.B.7. Validation 2550MHz 250mW

5250MHz

Date: 2020-5-6

Electronics: DAE4 Sn1527

Medium: Head 5250MHz

Medium parameters used: f = 5250 MHz; σ = 4.661 S/m; ε_r = 36.485; ρ = 1000 kg/m^3

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

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

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

Reference Value = 60.454 V/m; Power Drift = -0.13 dB

SAR(1 g) = 7.81 W/kg; SAR(10 g) = 2.23 W/kg

Maximum value of SAR (interpolated) = 9.37 W/kg

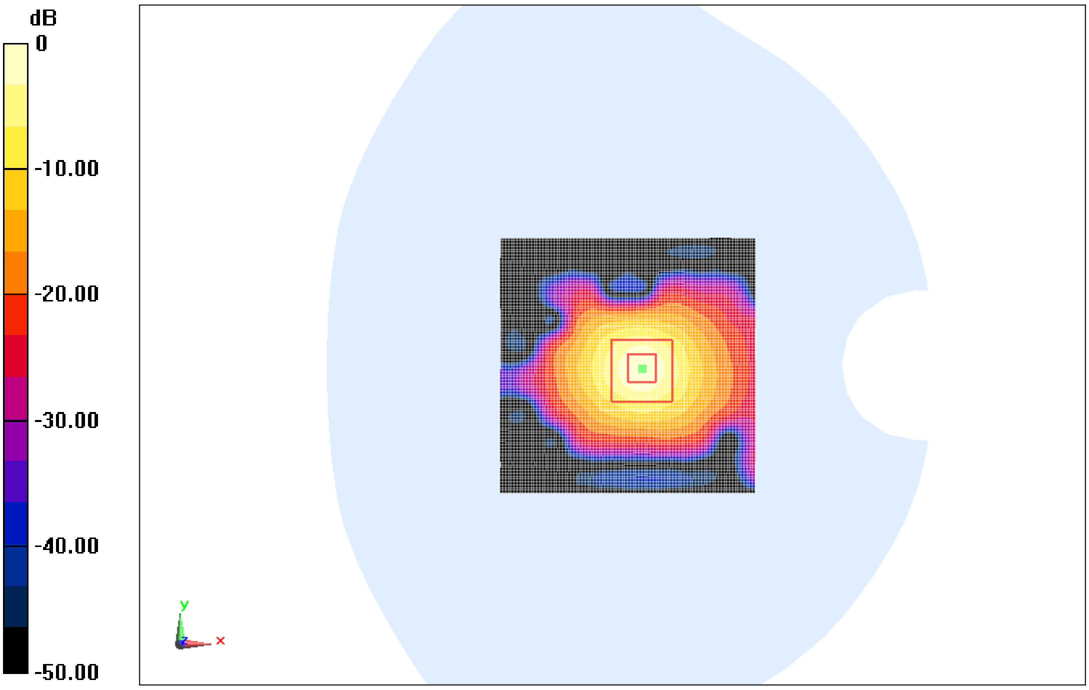
System Validation/Zoom Scan (8x8x8)/Cube0: Measurement grid: dx=4mm, dy=4mm, dz=4mm

Reference Value = 60.454 V/m; Power Drift = -0.13 dB

Peak SAR (extrapolated) = 22.1 W/kg

SAR(1 g) = 7.62 W/kg; SAR(10 g) = 2.20 W/kg

Maximum value of SAR (measured) = 9.28 W/kg



0 dB = 9.28 W/kg = 9.68 dB W/kg

Fig.B.8. Validation 5250MHz 100mW

5600MHz

Date: 2020-5-6

Electronics: DAE4 Sn1527

Medium: Head 5600MHz

Medium parameters used: f = 5600 MHz; σ = 5.134 S/m; ε_r = 34.55; ρ = 1000 kg/m^3

Communication System: CW Frequency: 5600 MHz Duty Cycle: 1:1

Probe: EX3DV4 – SN3633 ConvF (4.72, 4.72, 4.72);

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

Reference Value = 64.893 V/m; Power Drift = 0.10 dB

SAR(1 g) = 8.15 W/kg; SAR(10 g) = 2.29 W/kg

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

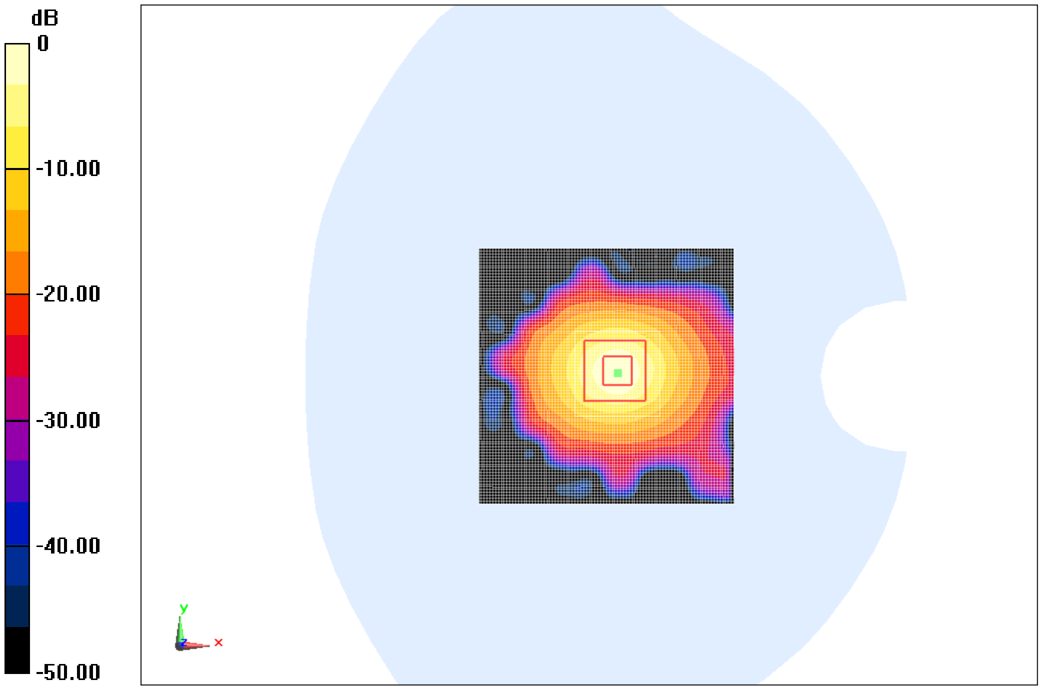
System Validation/Zoom Scan (8x8x8)/Cube0: Measurement grid: dx=4mm, dy=4mm, dz=4mm

Reference Value = 64.893 V/m; Power Drift = 0.10 dB

Peak SAR (extrapolated) = 26.8 W/kg

SAR(1 g) = 8.26 W/kg; SAR(10 g) = 2.32 W/kg

Maximum value of SAR (measured) = 10.6 W/kg



0 dB = 10.4 W/kg = 10.17 dB W/kg

Fig.B.9. Validation 5600MHz 100mW

5750MHz

Date: 2020-5-6

Electronics: DAE4 Sn1527

Medium: Head 5750MHz

Medium parameters used: f = 5750 MHz; σ = 5.157 S/m; ε_r = 36.417; ρ = 1000 kg/m^3

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

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

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

Reference Value = 59.758 V/m; Power Drift = -0.05 dB

SAR(1 g) = 7.62 W/kg; SAR(10 g) = 2.20 W/kg

Maximum value of SAR (interpolated) = 9.24 W/kg

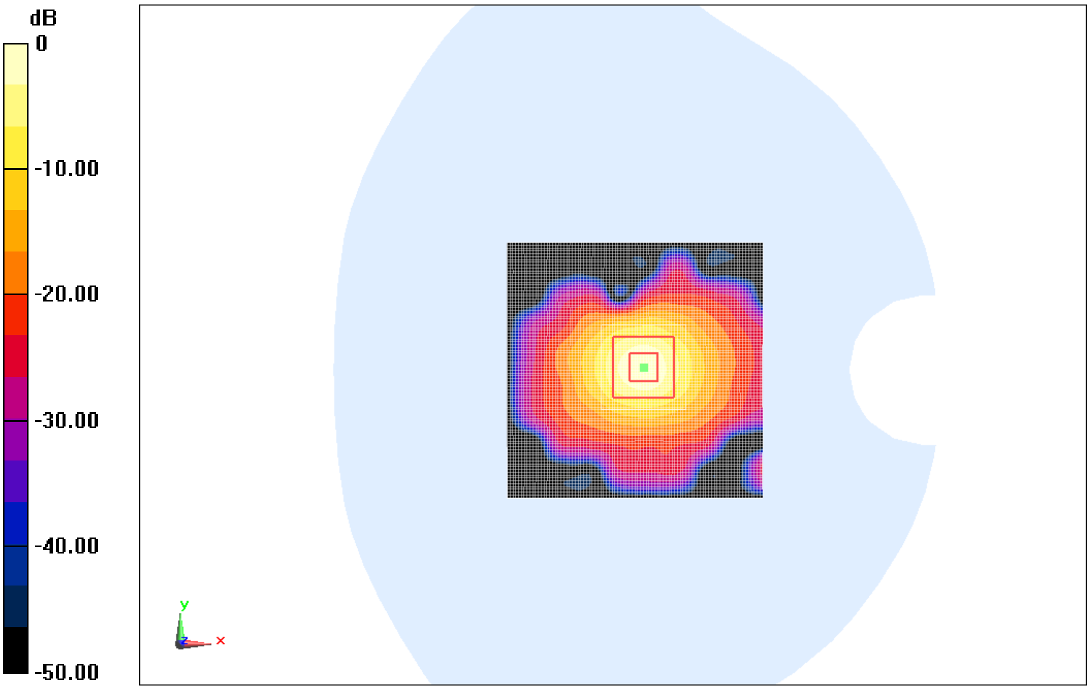
System Validation/Zoom Scan (8x8x8)/Cube0: Measurement grid: dx=4mm, dy=4mm, dz=4mm

Reference Value = 59.758 V/m; Power Drift = -0.05 dB

Peak SAR (extrapolated) = 20.7 W/kg

SAR(1 g) = 7.46 W/kg; SAR(10 g) = 2.16 W/kg

Maximum value of SAR (measured) = 9.19 W/kg



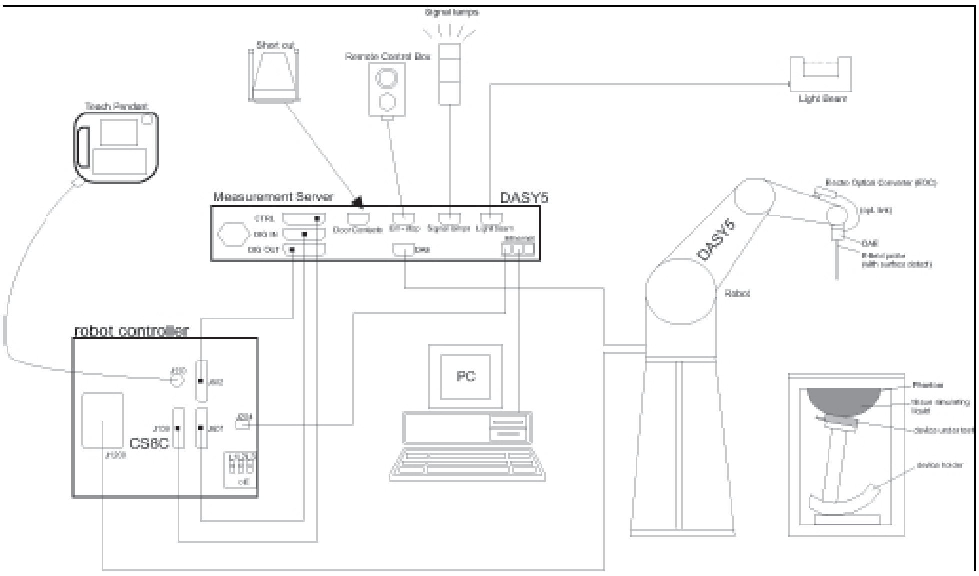
0 dB = 9.19 W/kg = 9.63 dB W/kg

Fig.B.10. 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.

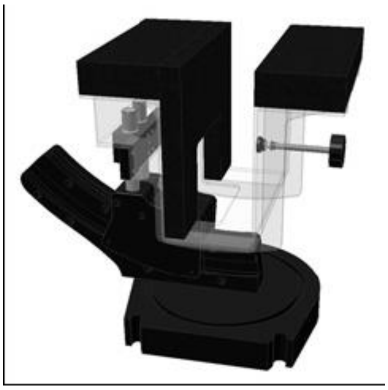
The DASY device holder is designed to cope with the different positions given in the standard. It has two scales for device rotation (with respect to the body axis) and device inclination (with respect to the line between the ear reference points). The rotation centers for both scales is the ear reference 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)

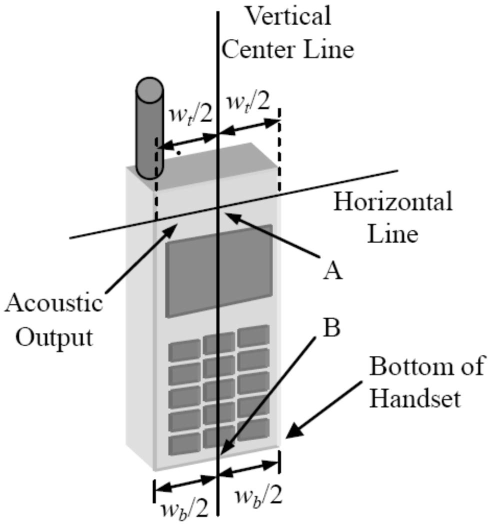
Available: Special

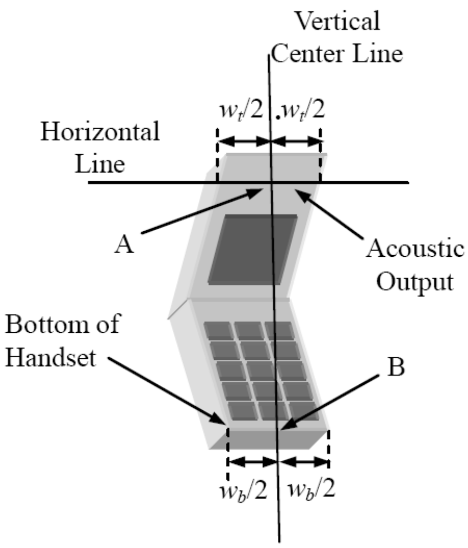
Picture C.8: SAM Twin Phantom

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

D.1. General considerations

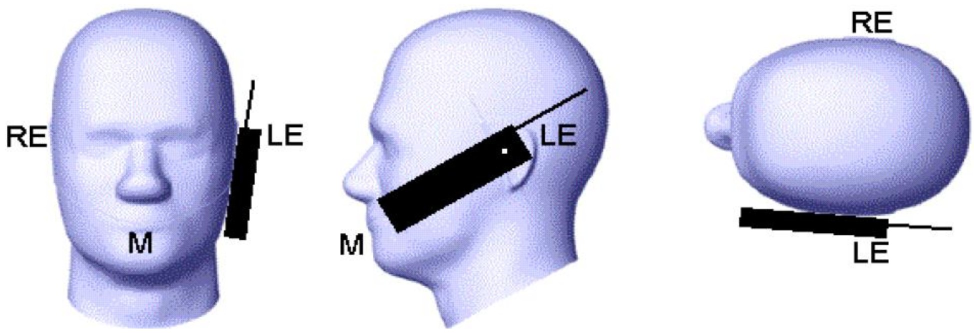
This standard specifies two handset test positions against the head phantom – the “cheek” position and the “tilt” position.



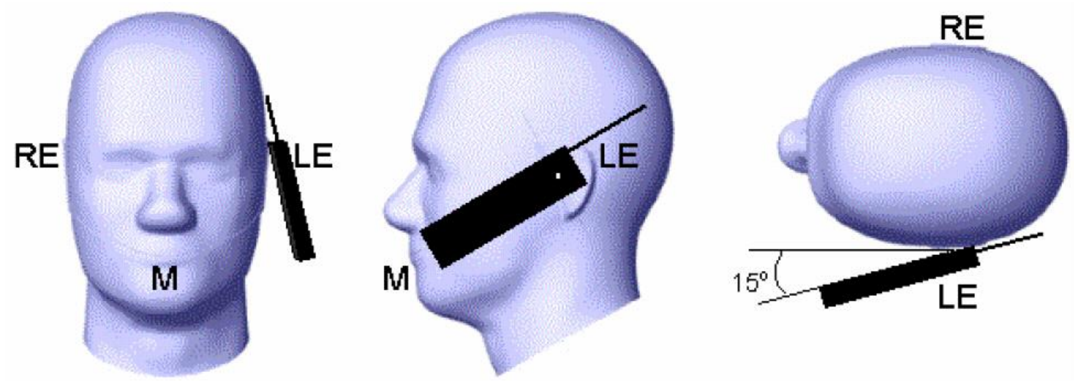


w_t	Width of the handset at the level of the acoustic
w_b	Width of the bottom of the handset
A	Midpoint of the width w_t of the handset at the level of the acoustic output
B	Midpoint of the width w_b of the bottom of the handset

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



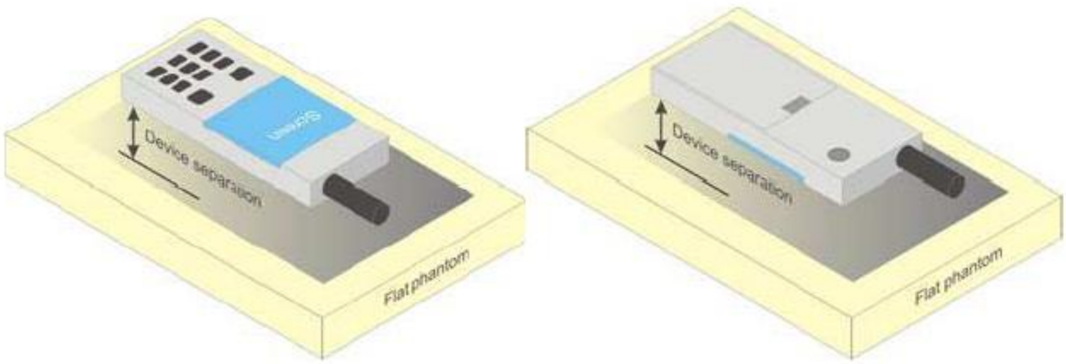
Picture D.2 Cheek position of the wireless device on the left side of SAM



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.

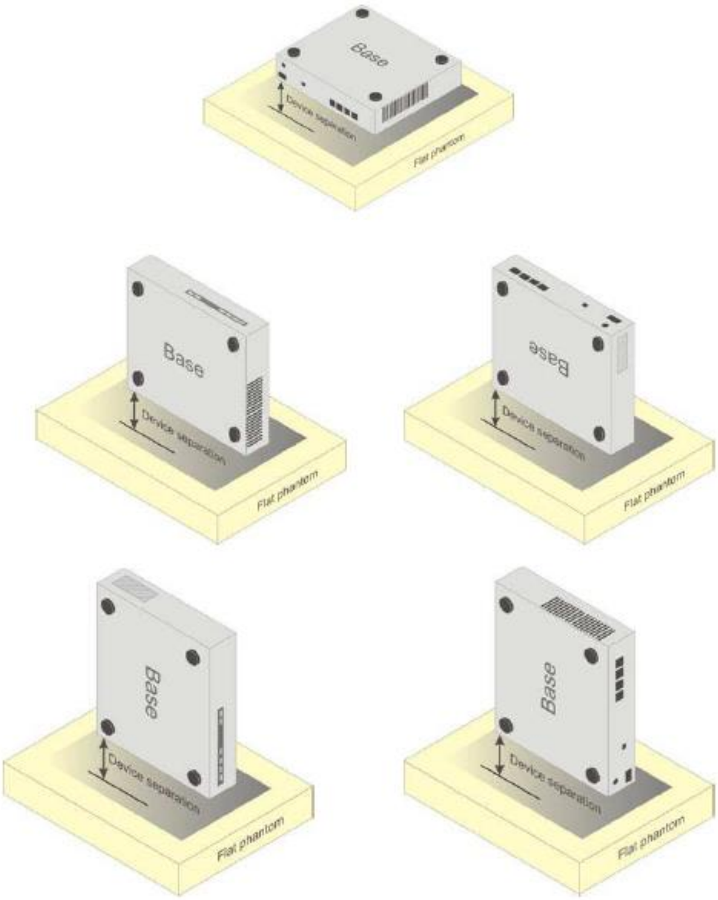


Picture D.4 Test positions for body-worn devices

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	1750	1900	2450	2600	5200	5800
Water	41.45	55.242	55.242	58.79	58.79	65.53	66.10
Sugar	56.0	/	/	/	/	/	/
Salt	1.45	0.306	0.306	0.06	0.06		
Preventol	0.1	/	/	/	/	17.24	16.95
Cellulose	1.0	/	/	/	/	17.24	16.95
Glycol Monobutyl	/	44.452	44.452	41.15	41.15	/	/
Diethylenglycol monohexylether	/	/	/	/	/	/	/
Triton X-100	/	/	/	/	/	/	/
Dielectric Parameters Target Value	ε=41.5 σ=0.90	ε=40.08 σ=1.37	ε=40.0 σ=1.40	ε=39.20 σ=1.80	ε=39.01 σ=1.96	ε=35.99 σ=4.66	ε=35.30 σ=5.27

Note: There is a little adjustment respectively for 750, 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)
7621	Head 750MHz	2022-05-09	750MHz	OK
7621	Head 835MHz	2022-05-09	835MHz	OK
7621	Head 1750MHz	2022-05-09	1750MHz	OK
7621	Head 1900MHz	2022-05-09	1900MHz	OK
7621	Head 2300MHz	2022-05-09	2300MHz	OK
7621	Head 2450MHz	2022-05-08	2450MHz	OK
7621	Head 2550MHz	2022-05-08	2550MHz	OK
7621	Head 5250MHz	2022-05-08	5250MHz	OK
7621	Head 5600MHz	2022-05-08	5600MHz	OK
7621	Head 5750MHz	2022-05-08	5750MHz	OK

ANNEX G: DAE Calibration Certificate

DAE4 SN: 1527 (2022)

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

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

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

Accreditation No.: **SCS 0108**

Client **Saict-SZ (Auden)**

Certificate No: **DAE4-1527_Jun22**

CALIBRATION CERTIFICATE

Object	DAE4 - SD 000 D04 BM - SN: 1527
Calibration procedure(s)	QA CAL-06.v30 Calibration procedure for the data acquisition electronics (DAE)
Calibration date:	June 21, 2022

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Keithley Multimeter Type 2001	SN: 0810278	31-Aug-21 (No:31368)	Aug-22
Secondary Standards	**ID #**	**Check Date (in house)**	**Scheduled Check**
Auto DAE Calibration Unit	SE UWS 053 AA 1001	24-Jan-22 (in house check)	In house check: Jan-23
Calibrator Box V2.1	SE UMS 006 AA 1002	24-Jan-22 (in house check)	In house check: Jan-23

	Name	Function	Signature
Calibrated by:	Adrian Gehring	Laboratory Technician	
Approved by:	Sven Kühn	Technical Manager	i.V.

Issued: June 21, 2022

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

Certificate No: DAE4-1527_Jun22   Page 1 of 5

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

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

Accreditation No.: **SCS 0108**

Glossary

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 following parameters as documented in the Appendix contain technical information as a result from the performance test and require no uncertainty.
  - *DC Voltage Measurement Linearity:* Verification of the Linearity at +10% and -10% of the nominal calibration voltage. Influence of offset voltage is included in this measurement.
  - *Common mode sensitivity:* Influence of a positive or negative common mode voltage on the differential measurement.
  - *Channel separation:* Influence of a voltage on the neighbor channels not subject to an input voltage.
  - *AD Converter Values with inputs shorted:* Values on the internal AD converter corresponding to zero input voltage
  - *Input Offset Measurement*: Output voltage and statistical results over a large number of zero voltage measurements.
  - *Input Offset Current:* Typical value for information; Maximum channel input offset current, not considering the input resistance.
  - *Input resistance:* Typical value for information: DAE input resistance at the connector, during internal auto-zeroing and during measurement.
  - *Low Battery Alarm Voltage:* Typical value for information. Below this voltage, a battery alarm signal is generated.
  - *Power consumption:* Typical value for information. Supply currents in various operating modes.

DC Voltage Measurement

A/D - Converter Resolution nominal

High Range: 1LSB = 6.1μV , full range = -100...+300 mV

Low Range: 1LSB = 61nV , full range = -1.......+3mV

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

Calibration Factors	X	Y	Z
High Range	403.865 ± 0.02% (k=2)	403.595 ± 0.02% (k=2)	403.805 ± 0.02% (k=2)
Low Range	3.95898 ± 1.50% (k=2)	3.98939 ± 1.50% (k=2)	3.96763 ± 1.50% (k=2)

Connector Angle

Connector Angle to be used in DASY system	61.0 ° ± 1 °

Appendix (Additional assessments outside the scope of SCS0108)

1. DC Voltage Linearity

High Range		Reading (μV)	Difference (μV)	Error (%)
Channel X	+ Input	200037.59	1.98	0.00
Channel X	+ Input	20007.61	1.34	0.01
Channel X	- Input	-20004.09	1.79	-0.01
Channel Y	+ Input	200037.45	1.53	0.00
Channel Y	+ Input	20002.68	-3.42	-0.02
Channel Y	- Input	-20007.17	-1.14	0.01
Channel Z	+ Input	200037.73	2.17	0.00
Channel Z	+ Input	20005.72	-0.34	-0.00
Channel Z	- Input	-20006.63	-0.49	0.00

Low Range		Reading (μV)	Difference (μV)	Error (%)
Channel X	+ Input	2001.36	-0.15	-0.01
Channel X	+ Input	201.70	0.16	0.08
Channel X	- Input	-198.10	0.49	-0.24
Channel Y	+ Input	2001.44	0.07	0.00
Channel Y	+ Input	201.07	-0.21	-0.11
Channel Y	- Input	-199.66	-0.98	0.50
Channel Z	+ Input	2001.52	0.21	0.01
Channel Z	+ Input	200.81	-0.41	-0.20
Channel Z	- Input	-199.00	-0.15	0.07

2. Common mode sensitivity

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

	Common mode Input Voltage (mV)	High Range Average Reading (μV)	Low Range Average Reading (μV)
Channel X	200	-3.95	-5.31
	- 200	5.96	4.97
Channel Y	200	-16.18	-16.25
	- 200	14.41	14.34
Channel Z	200	3.01	2.86
	- 200	-3.93	-4.13

3. Channel separation

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

	Input Voltage (mV)	Channel X (μV)	Channel Y (μV)	Channel Z (μV)
Channel X	200	-	-0.68	-2.76
Channel Y	200	5.43	-	-0.31
Channel Z	200	10.73	3.29	-

4. AD-Converter Values with inputs shorted

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

	High Range (LSB)	Low Range (LSB)
Channel X	16059	17078
Channel Y	15965	16219
Channel Z	15888	13556

5. Input Offset Measurement

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec
Input 10MΩ

	Average (μV)	min. Offset (μV)	max. Offset (μV)	Std. Deviation (μV)
Channel X	1.40	0.30	2.25	0.35
Channel Y	-0.62	-1.30	0.47	0.33
Channel Z	-0.18	-0.90	0.60	0.31

6. Input Offset Current

Nominal Input circuitry offset current on all channels: <25fA

7. Input Resistance (Typical values for information)

	Zeroing (kOhm)	Measuring (MOhm)
Channel X	200	200
Channel Y	200	200
Channel Z	200	200

8. Low Battery Alarm Voltage (Typical values for information)

Typical values	Alarm Level (VDC)
Supply (+ Vcc)	+7.9
Supply (- Vcc)	-7.6

9. Power Consumption (Typical values for information)

Typical values	Switched off (mA)	Stand by (mA)	Transmitting (mA)
Supply (+ Vcc)	+0.01	+6	+14
Supply (- Vcc)	-0.01	-8	-9

ANNEX H: Probe Calibration Certificate

Probe EX3DV4-SN: 7621 (2022)

In Collaboration with s p e a g CALIBRATION LABORATORY

Add: No.52 HuaYuanBei Road, Haidian District, Beijing, 100191, China
Tel: +86-10-62304633-2117
E-mail: cttl@chinattl.com http://www.caict.ac.cn

中国认可 国际互认 校准 CALIBRATION CNAS L0570 CAICT

Client SAICT Certificate No: Z22-60124

CALIBRATION CERTIFICATE

Object	EX3DV4 - SN : 7621
Calibration Procedure(s)	FF-Z11-004-02 Calibration Procedures for Dosimetric E-field Probes
Calibration date:	May 06, 2022

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
Power Meter NRP2	101919	15-Jun-21(CTTL, No.J21X04466)	Jun-22
Power sensor NRP-Z91	101547	15-Jun-21(CTTL, No.J21X04466)	Jun-22
Power sensor NRP-Z91	101548	15-Jun-21(CTTL, No.J21X04466)	Jun-22
Reference 10dBAttenuator	18N50W-10dB	20-Jan-21(CTTL, No.J21X00486)	Jan-23
Reference 20dBAttenuator	18N50W-20dB	20-Jan-21(CTTL, No.J21X00485)	Jan-23
Reference Probe EX3DV4	SN 7464	26-Jan-22(SPEAG, No.EX3-7464_Jan22)	Jan-23
DAE4	SN 1555	20-Aug-21(SPEAG, No.DAE4-1555_Aug21/2)	Aug-22
Secondary Standards	**ID #**	**Cal Date(Calibrated by, Certificate No.)**	**Scheduled Calibration**
SignalGenerator MG3700A	6201052605	16-Jun-21(CTTL, No.J21X04467)	Jun-22
Network Analyzer E5071C	MY46110673	14-Jan-22(CTTL, No.J22X00406)	Jan-23

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

Issued: May 23, 2022

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

Certificate No: Z22-60124 Page 1 of 9

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CALIBRATION LABORATORY

CAICT

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E-mail: cttl@chinattl.com http://www.caict.ac.cn

Glossary:

TSL	tissue simulating liquid
NORMx,y,z	sensitivity in free space
ConvF	sensitivity in TSL / NORMx,y,z
DCP	diode compression point
CF	crest factor (1/duty_cycle) of the RF signal
A,B,C,D	modulation dependent linearization parameters
Polarization Φ	Φ rotation around probe axis
Polarization θ	θ rotation around an axis that is in the plane normal to probe axis (at measurement center), i θ=0 is normal to probe axis
Connector Angle	information used in DASY system to align probe sensor X to the robot coordinate system

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013

b) IEC 62209-1, "Measurement procedure for the assessment of Specific Absorption Rate (SAR) from hand-held and body-mounted devices used next to the ear (frequency range of 300 MHz to 6 GHz)", July 2016

c) IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010

d) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Methods Applied and Interpretation of Parameters:

- *NORMx,y,z:* Assessed for E-field polarization θ=0 (f≤900MHz in TEM-cell; f>1800MHz: waveguide). NORMx,y,z are only intermediate values, i.e., the uncertainties of NORMx,y,z does not effect the E^2-field uncertainty inside TSL (see below ConvF).
- *NORM(f)x,y,z = NORMx,y,z* frequency_response* (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of ConvF.
- *DCPx,y,z:* DCP are numerical linearization parameters assessed based on the data of power sweep (no uncertainty required). DCP does not depend on frequency nor media.
- PAR: PAR is the Peak to Average Ratio that is not calibrated but determined based on the signal characteristics.
- *Ax,y,z; Bx,y,z; Cx,y,z;VRx,y,z:*A,B,C are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. VR is the maximum calibration range expressed in RMS voltage across the diode.
- *ConvF and Boundary Effect Parameters:* Assessed in flat phantom using E-field (or Temperature Transfer Standard for f≤800MHz) and inside waveguide using analytical field distributions based on power measurements for f >800MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty valued are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to NORMx,y,z* ConvF whereby the uncertainty corresponds to that given for ConvF. A frequency dependent ConvF is used in DASY version 4.4 and higher which allows extending the validity from±50MHz to±100MHz.
- *Spherical isotropy (3D deviation from isotropy):* in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- *Sensor Offset:* The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.
- *Connector Angle:* The angle is assessed using the information gained by determining the *NORMx* (no uncertainty required).

Certificate No:Z22-60124 Page 2 of 9

In Collaboration with
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CAICT

Add: No.52 HuaYuanBei Road, Haidian District, Beijing, 100191, China
Tel: +86-10-62304633-2117
E-mail: cttl@chinattl.com http://www.caict.ac.cn

DASY/EASY – Parameters of Probe: EX3DV4 – SN:7621

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm(μV/(V/m)^2)[A]	0.71	0.71	0.56	±10.0%
DCP(mV)[B]	111.7	111.8	115.7	

Modulation Calibration Parameters

UID	Communication System Name		A dB	B dB√μV	C	D dB	VR mV	Unc[E] (k=2)
0	CW	X	0.0	0.0	1.0	0.00	210.8	±3.5%
		Y	0.0	0.0	1.0		218.6	
		Z	0.0	0.0	1.0		190.8	

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

[A] The uncertainties of Norm X, Y, Z do not affect the E^2-field uncertainty inside TSL (see Page 4).
[B] Numerical linearization parameter: uncertainty not required.
[E] Uncertainly is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

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DASY/EASY – Parameters of Probe: EX3DV4 – SN:7621

Calibration Parameter Determined in Head Tissue Simulating Media

f [MHz][C]	Relative Permittivity [F]	Conductivity (S/m) [F]	ConvF X	ConvF Y	ConvF Z	Alpha[G]	Depth[G] (mm)	Unct. (*k*=2)
750	41.9	0.89	11.12	11.12	11.12	0.18	1.14	±12.1%
900	41.5	0.97	10.68	10.68	10.68	0.14	1.14	±12.1%
1450	40.5	1.20	9.65	9.65	9.65	0.21	0.91	±12.1%
1750	40.1	1.37	9.22	9.22	9.22	0.31	0.90	±12.1%
1900	40.0	1.40	8.90	8.90	8.90	0.35	0.84	±12.1%
2100	39.8	1.49	8.95	8.95	8.95	0.23	1.13	±12.1%
2300	39.5	1.67	8.60	8.60	8.60	0.44	0.78	±12.1%
2450	39.2	1.80	8.17	8.17	8.17	0.49	0.78	±12.1%
2600	39.0	1.96	7.93	7.93	7.93	0.51	0.75	±12.1%
3300	38.2	2.71	7.74	7.74	7.74	0.45	0.92	±13.3%
3500	37.9	2.91	7.56	7.56	7.56	0.44	1.00	±13.3%
3700	37.7	3.12	7.18	7.18	7.18	0.38	1.05	±13.3%
3900	37.5	3.32	7.26	7.26	7.26	0.35	1.35	±13.3%
4100	37.2	3.53	7.21	7.21	7.21	0.25	1.30	±13.3%
4400	36.9	3.84	7.01	7.01	7.01	0.25	1.55	±13.3%
4600	36.7	4.04	6.90	6.90	6.90	0.30	1.72	±13.3%
4800	36.4	4.25	6.79	6.79	6.79	0.30	1.85	±13.3%
4950	36.3	4.40	6.44	6.44	6.44	0.30	1.80	±13.3%
5250	35.9	4.71	5.98	5.98	5.98	0.35	1.63	±13.3%
5600	35.5	5.07	5.47	5.47	5.47	0.40	1.55	±13.3%
5750	35.4	5.22	5.40	5.40	5.40	0.40	1.55	±13.3%

[C] Frequency validity above 300 MHz of ±100MHz only applies for DASY v4.4 and higher (Page 2), else it is restricted to ±50MHz. The uncertainty is the RSS of ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band. Frequency validity below 300 MHz is ± 10, 25, 40, 50 and 70 MHz for ConvF assessments at 30, 64, 128, 150 and 220 MHz respectively. Above 5 GHz frequency validity can be extended to ± 110 MHz.

[F] At frequency below 3 GHz, the validity of tissue parameters (ε and σ) can be relaxed to ±10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ε and σ) is restricted to ±5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

[G] Alpha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ± 1% for frequencies below 3 GHz and below ± 2% for the frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.

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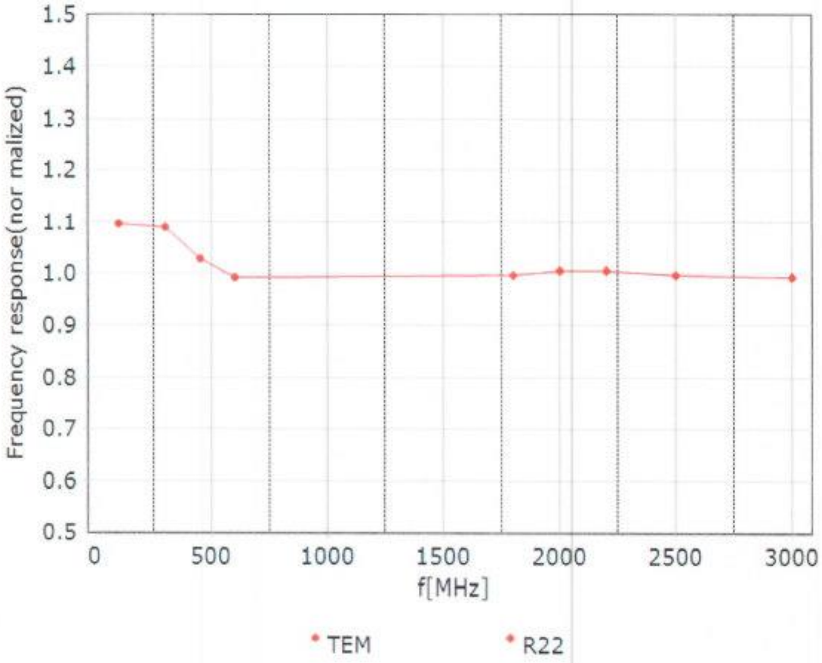
Frequency Response of E-Field
(TEM-Cell: ifi110 EXX, Waveguide: R22)



Uncertainty of Frequency Response of E-field: ±7.4% (*k*=2)

Certificate No:Z22-60124 Page 5 of 9

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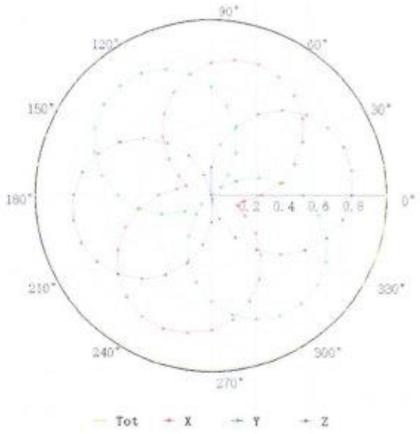
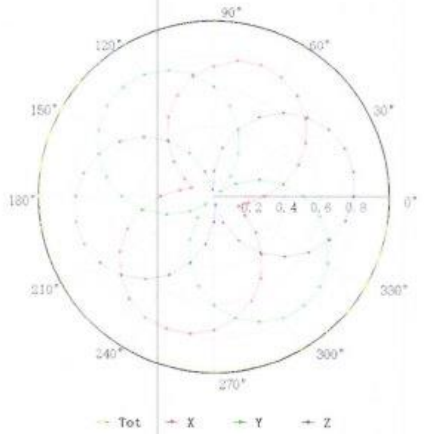
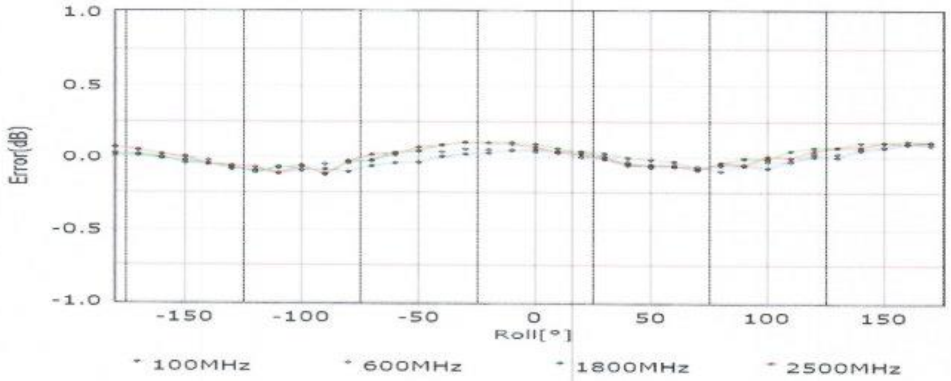
Receiving Pattern (Φ), θ=0°

f=600 MHz, TEM



f=1800 MHz, R22





Uncertainty of Axial Isotropy Assessment: ±1.2% (k=2)

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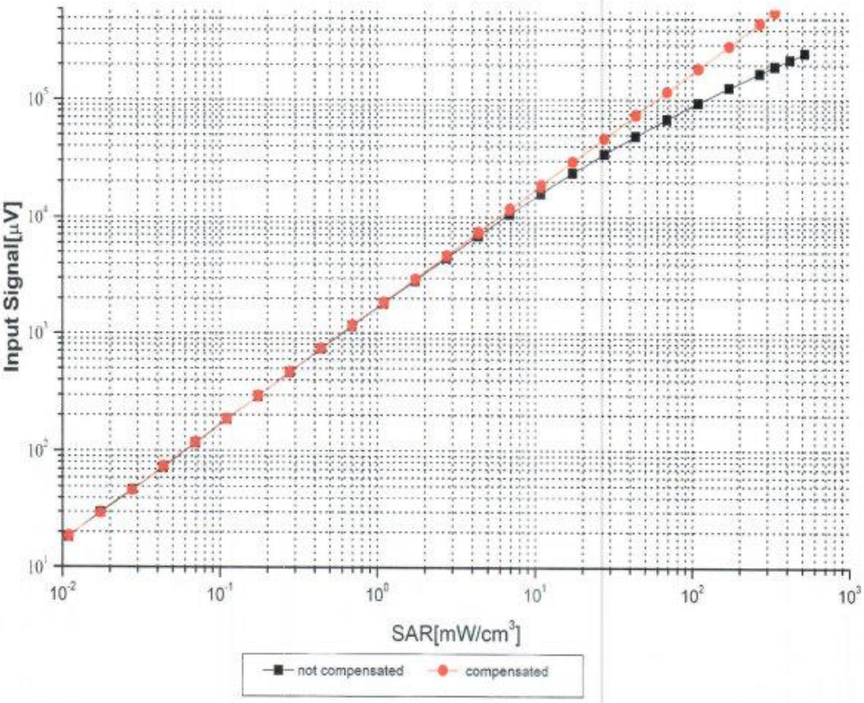
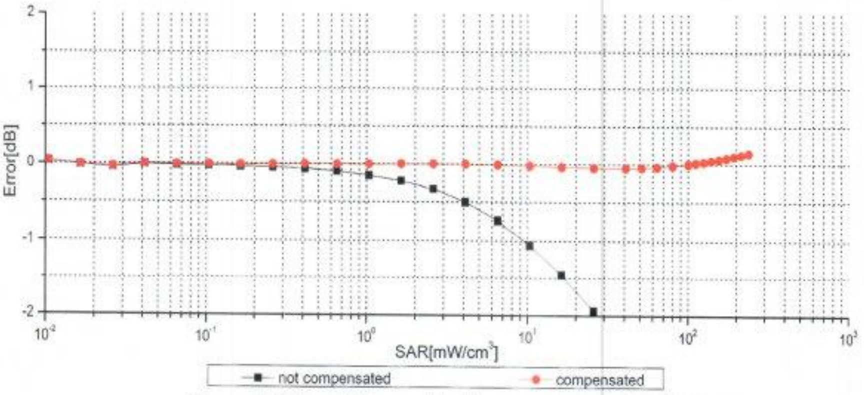
Dynamic Range f(SAR$_{head}$)
(TEM cell, f = 900 MHz)





Uncertainty of Linearity Assessment: ±0.9% (*k*=2)

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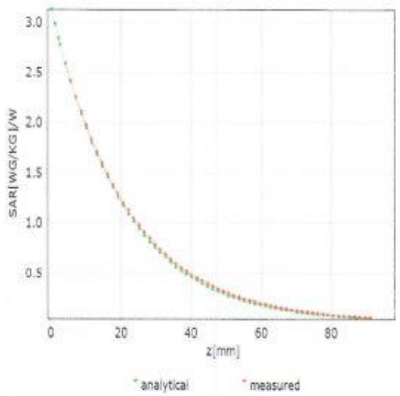
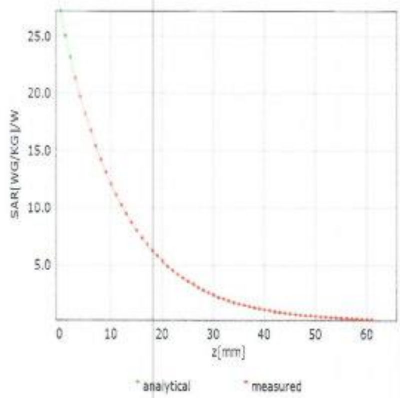
Conversion Factor Assessment

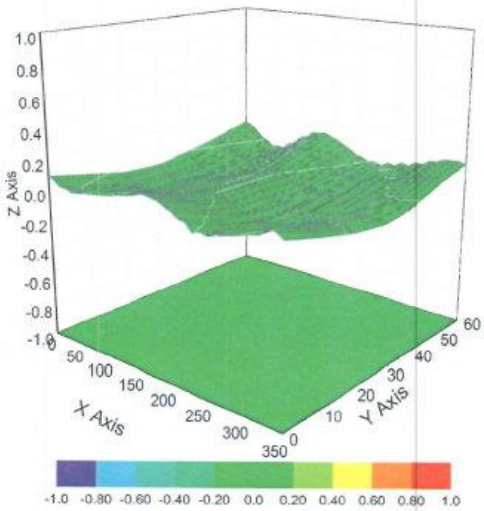
f=750 MHz,WGLS R9(H_convF)



f=1750 MHz,WGLS R22(H_convF)



Deviation from Isotropy in Liquid



Uncertainty of Spherical Isotropy Assessment: ±3.2% (*k*=2)

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DASY/EASY – Parameters of Probe: EX3DV4 – SN:7621

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	95.4
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disable
Probe Overall Length	337mm
Probe Body Diameter	10mm
Tip Length	9mm
Tip Diameter	2.5mm
Probe Tip to Sensor X Calibration Point	1mm
Probe Tip to Sensor Y Calibration Point	1mm
Probe Tip to Sensor Z Calibration Point	1mm
Recommended Measurement Distance from Surface	1.4mm

ANNEX I: Dipole Calibration Certificate

750MHz Dipole (2022)

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CNAS L0570

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Client **SAICT** **Certificate No: Z22-60333**

CALIBRATION CERTIFICATE

Object	D750V3 - SN: 1163
Calibration Procedure(s)	FF-Z11-003-01 Calibration Procedures for dipole validation kits
Calibration date:	August 22, 2022

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration
Power Meter NRP2	106277	24-Sep-21 (CTTL, No.J21X08326)	Sep-22
Power sensor NRP8S	104291	24-Sep-21 (CTTL, No.J21X08326)	Sep-22
Reference Probe EX3DV4	SN 7464	26-Jan-22(SPEAG,No.EX3-7464_Jan22)	Jan-23
DAE4	SN 1556	12-Jan-22(CTTL-SPEAG,No.Z22-60007)	Jan-23
Secondary Standards	ID #	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration
Signal Generator E4438C	MY49071430	13-Jan-22 (CTTL, No.J22X00409)	Jan-23
Network Analyzer E5071C	MY46110673	14-Jan-22 (CTTL, No.J22X00406)	Jan-23

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

Issued: August 26, 2022

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Glossary:

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

Calibration is Performed According to the Following Standards:

a) IEC/IEEE 62209-1528, "Measurement Procedure for The Assessment of Specific Absorption Rate of Human Exposure to Radio Frequency Fields from Hand-held and Body-mounted Wireless Communication Devices- Part 1528: Human Models, Instrumentation and Procedures (Frequency range of 4 MHz to 10 GHz)", October 2020

b) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

c) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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

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Measurement Conditions

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

DASY Version	DASY52	V52.10.4
Extrapolation	Advanced Extrapolation	
Phantom	Triple Flat Phantom 5.1C	
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	750 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 ℃	42.0	0.90 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) ℃	41.3 ± 6 %	0.90 mho/m ± 6 %
Head TSL temperature change during test	<1.0 ℃	----	----

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.15 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**8.48 W/kg ± 18.8 % (*k*=2)**
SAR averaged over 10 cm^3 (10 g) of Head TSL	Condition	
SAR measured	250 mW input power	1.42 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**5.62 W/kg ± 18.7 % (*k*=2)**

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Appendix (Additional assessments outside the scope of CNAS L0570)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	50.0Ω- 4.06jΩ
Return Loss	- 27.8dB

General Antenna Parameters and Design

Electrical Delay (one direction)	0.941 ns

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

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.
No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feed-point may be damaged.

Additional EUT Data

Manufactured by	SPEAG

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DASY5 Validation Report for Head TSL Date: 2022-08-22

Test Laboratory: CTTL, Beijing, China

DUT: Dipole 750 MHz; Type: D750V3; Serial: D750V3 - SN: 1163

Communication System: UID 0, CW; Frequency: 750 MHz; Duty Cycle: 1:1

Medium parameters used: f = 750 MHz; σ = 0.902 S/m; ε_r = 41.26; ρ = 1000 kg/m^3

Phantom section: Right Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN7464; ConvF(10.26, 10.26, 10.26) @ 750 MHz; Calibrated: 2022-01-26
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1556; Calibrated: 2022-01-12
- Phantom: MFP_V5.1C (20deg probe tilt); Type: QD 000 P51 Cx; Serial: 1062
- DASY52 52.10.4(1535); SEMCAD X 14.6.14(7501)

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

Reference Value = 55.49 V/m; Power Drift = -0.01 dB

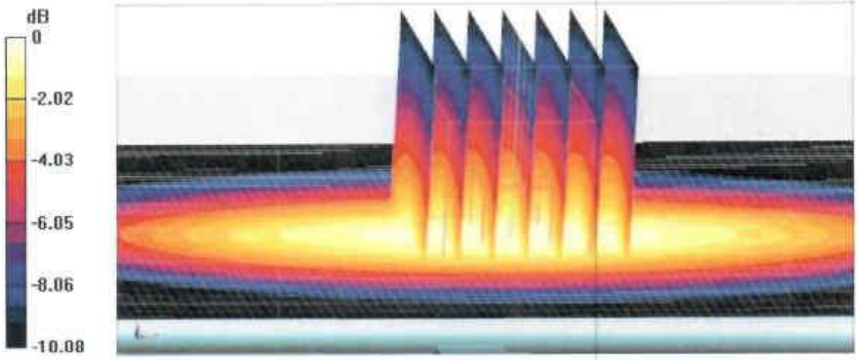
Peak SAR (extrapolated) = 3.17 W/kg

SAR(1 g) = 2.15 W/kg; SAR(10 g) = 1.42 W/kg

Smallest distance from peaks to all points 3 dB below = 21.2 mm

Ratio of SAR at M2 to SAR at M1 = 67.5%

Maximum value of SAR (measured) = 2.84 W/kg



0 dB = 2.84 W/kg = 4.53 dBW/kg

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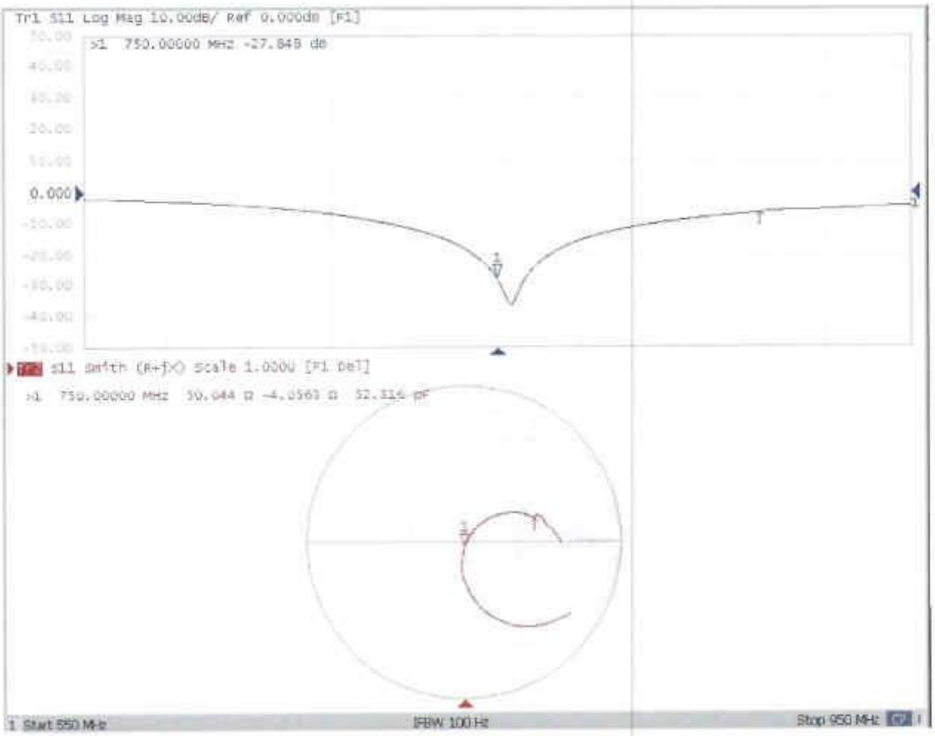
Impedance Measurement Plot for Head TSL



Certificate No: Z22-60333 Page 6 of 6

835MHz Dipole (2021)

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校准
CALIBRATION
CNAS L0570

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E-mail: cttl@chinattl.com http://www.chinattl.cn

Client SAICT Certificate No: Z21-60355

CALIBRATION CERTIFICATE

Object: D835V2 - SN: 4d057

Calibration Procedure(s): FF-Z11-003-01
Calibration Procedures for dipole validation kits

Calibration date: October 18, 2021

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
Power Meter NRP2	106277	24-Sep-21 (CTTL, No.J21X08326)	Sep-22
Power sensor NRP8S	104291	24-Sep-21 (CTTL, No.J21X08326)	Sep-22
Reference Probe EX3DV4	SN 7517	03-Feb-21(CTTL-SPEAG,No.Z21-60001)	Feb-22
DAE4	SN 1556	15-Jan-21(SPEAG,No.DAE4-1556_Jan21)	Jan-22
Secondary Standards	**ID #**	**Cal Date (Calibrated by, Certificate No.)**	**Scheduled Calibration**
Signal Generator E4438C	MY49071430	01-Feb-21 (CTTL, No.J21X00593)	Jan-22
NetworkAnalyzer E5071C	MY46110673	14-Jan-21 (CTTL, No.J21X00232)	Jan-22

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

Issued: October 24, 2021

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Glossary:

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

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013

b) IEC 62209-1, "Measurement procedure for assessment of specific absorption rate of human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices- Part 1: Device used next to the ear (Frequency range of 300MHz to 6GHz)", July 2016

c) IEC 62209-2, "Procedure to measure the Specific Absorption Rate (SAR) For wireless communication devices used in close proximity to the human body (frequency range of 30MHz to 6GHz)", March 2010

d) KDB865664, SAR Measurement Requirements for 100 MHz to 6 GHz

Additional Documentation:

e) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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

Certificate No: Z21-60355 Page 2 of 6

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Measurement Conditions

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

DASY Version	DASY52	V52.10.4
Extrapolation	Advanced Extrapolation	
Phantom	Triple Flat Phantom 5.1C	
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	835 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	41.5	0.90 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	40.9 ± 6 %	0.89 mho/m ± 6 %
Head TSL temperature change during test	<1.0 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.39 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**9.64 W/kg ± 18.8 % (*k*=2)**
SAR averaged over 10 cm^3 (10 g) of Head TSL	Condition	
SAR measured	250 mW input power	1.56 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**6.29 W/kg ± 18.7 % (*k*=2)**

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Appendix (Additional assessments outside the scope of CNAS L0570)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	49.8Ω- 4.19jΩ
Return Loss	- 27.5dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.301 ns

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

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.
No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG

In Collaboration with
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CALIBRATION LABORATORY

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E-mail: cttl@chinattl.com http://www.chinattl.cn

DASY5 Validation Report for Head TSL Date: 10.18.2021

Test Laboratory: CTTL, Beijing, China

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN: 4d057

Communication System: UID 0, CW; Frequency: 835 MHz; Duty Cycle: 1:1

Medium parameters used: f = 835 MHz; $\sigma = 0.886$ S/m; $\varepsilon_r = 40.9$; $\rho = 1000$ kg/m^3

Phantom section: Right Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7517; ConvF(9.81, 9.81, 9.81) @ 835 MHz; Calibrated: 2021-02-03
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1556; Calibrated: 2021-01-15
- Phantom: MFP_V5.1C (20deg probe tilt); Type: QD 000 P51 Cx; Serial: 1062
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7501)

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

Reference Value = 58.86 V/m; Power Drift = 0.00 dB

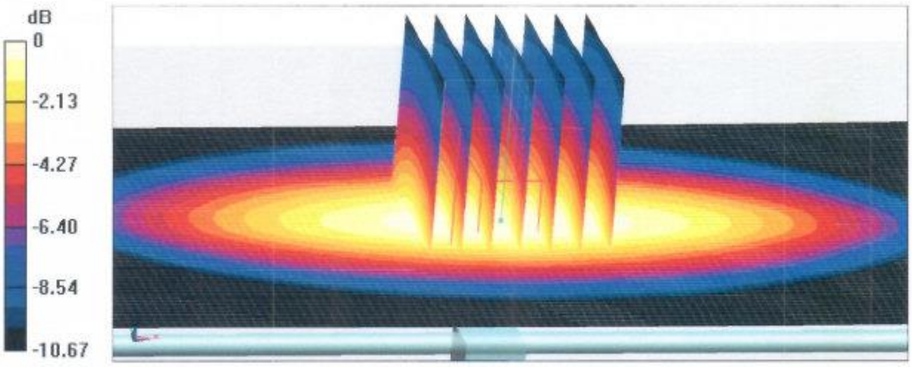
Peak SAR (extrapolated) = 3.68 W/kg

SAR(1 g) = 2.39 W/kg; SAR(10 g) = 1.56 W/kg

Smallest distance from peaks to all points 3 dB below = 18 mm

Ratio of SAR at M2 to SAR at M1 = 64.9%

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



0 dB = 3.23 W/kg = 5.09 dBW/kg

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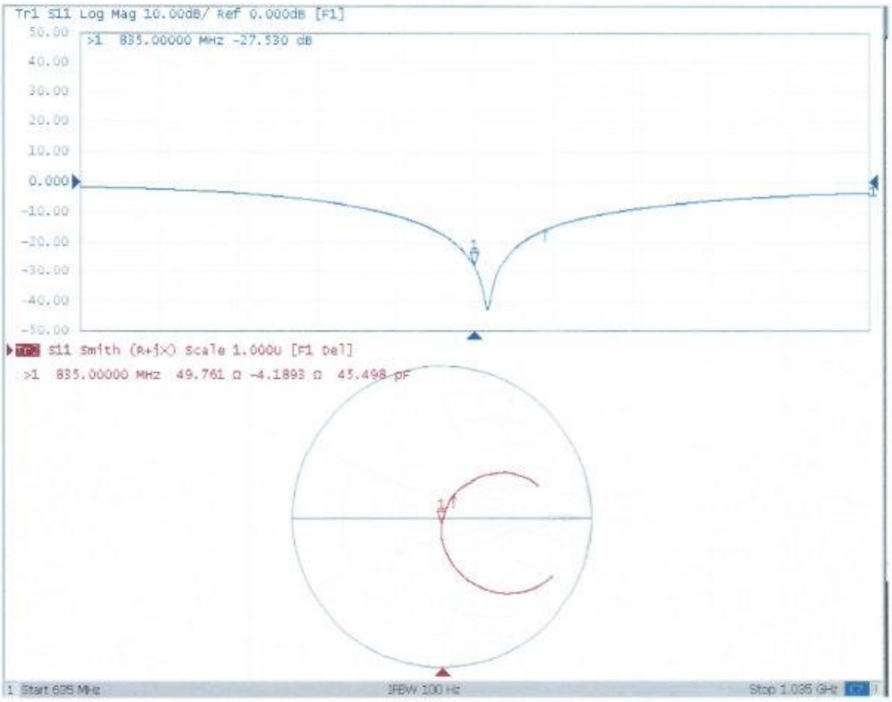
Impedance Measurement Plot for Head TSL



1750MHz Dipole (2022)

In Collaboration with s p e a g CALIBRATION LABORATORY

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CAICT

Client **SAICT** **Certificate No: Z22-60335**

CALIBRATION CERTIFICATE

Object	D1750V2 - SN: 1152
Calibration Procedure(s)	FF-Z11-003-01 Calibration Procedures for dipole validation kits
Calibration date:	August 22, 2022

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration
Power Meter NRP2	106277	24-Sep-21 (CTTL, No.J21X08326)	Sep-22
Power sensor NRP8S	104291	24-Sep-21 (CTTL, No.J21X08326)	Sep-22
Reference Probe EX3DV4	SN 7464	26-Jan-22(SPEAG,No.EX3-7464_Jan22)	Jan-23
DAE4	SN 1556	12-Jan-22(CTTL-SPEAG,No.Z22-60007)	Jan-23
Secondary Standards	ID #	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration
Signal Generator E4438C	MY49071430	13-Jan-22 (CTTL, No.J22X00409)	Jan-23
Network Analyzer E5071C	MY46110673	14-Jan-22 (CTTL, No.J22X00406)	Jan-23

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

Issued: August 26, 2022

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Glossary:

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

Calibration is Performed According to the Following Standards:

a) IEC/IEEE 62209-1528, "Measurement Procedure for The Assessment of Specific Absorption Rate of Human Exposure to Radio Frequency Fields from Hand-held and Body-mounted Wireless Communication Devices- Part 1528: Human Models, Instrumentation and Procedures (Frequency range of 4 MHz to 10 GHz)", October 2020

b) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

c) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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