				39750	40620	41490
QPSK	1	Low	23.5	22.92	23.11	22.93
		Middle		23.14	23.31	23.17
		High		22.99	23.07	22.98
	50%	Low	23	22.09	22.27	21.98
		Middle		22.11	22.27	22.15
		High		22.22	22.16	22.16
	100%	/	23	22.21	22.25	22.13
16QAM	1	Low	23	22.14	22.33	22.11
		Middle		22.37	22.51	22.34
		High		22.22	22.27	22.10
	50%	Low	22	21.10	21.31	21.07
		Middle		21.10	21.30	21.13
		High		21.19	21.19	21.16
	100%	/	22	21.16	21.27	21.10

LTE			LTE B66			
Modulation	RB	RB Offset	Tune up	1.4MHz		
				131979	132422	132665
QPSK	1	Low	22	21.27	21.58	21.20
		Middle		21.32	21.58	21.46
		High		21.17	21.34	21.27
	50%	Low	22	21.39	21.41	21.34
		Middle		21.47	21.48	21.36
		High		21.52	21.36	21.40
	100%	/	21	20.41	20.34	20.32
16QAM	1	Low	21	20.23	20.18	20.36
		Middle		20.36	20.26	20.04
		High		20.19	20.33	20.26
	50%	Low	21	20.07	20.12	20.19
		Middle		20.13	20.21	20.34
		High		20.16	20.31	20.22
	100%	/	20	19.20	19.20	19.16
Modulation	RB	RB Offset	Tune up	3MHz		
				131987	132422	132657
QPSK	1	Low	22	21.06	21.01	21.04
		Middle		21.04	21.08	21.05
		High		21.07	21.03	20.97
	50%	Low	21	20.01	20.02	20.16
		Middle		20.08	20.06	20.07
		High		20.07	20.03	20.02
	100%	/	21	19.98	19.97	19.98
16QAM	1	Low	21	20.51	20.21	20.17

		Middle		20.22	20.64	20.24
		High		20.58	20.10	20.14
	50%	Low	20	19.12	19.32	19.13
		Middle		19.16	19.16	19.15
		High		19.10	19.30	19.12
	100%	/	20	19.19	19.06	19.01
Modulation	RB	RB Offset	Tune up	5MHz		
				131997	132422	132647
QPSK	1	Low	22	20.84	20.89	20.97
		Middle		20.97	20.86	20.96
		High		20.80	20.81	20.83
	50%	Low	22	20.09	20.11	20.13
		Middle		20.15	20.12	20.09
		High		20.04	20.02	20.00
	100%	/	21	20.01	20.03	20.01
16QAM	1	Low	21	20.23	20.21	20.27
		Middle		20.28	20.28	20.34
		High		20.22	20.15	20.17
	50%	Low	20	19.08	19.10	19.17
		Middle		19.12	19.18	19.12
		High		19.07	19.08	19.09
	100%	/	20	19.16	19.14	19.18
Modulation	RB	RB Offset	Tune up	10MHz		
				132022	132422	132622
QPSK	1	Low	22	20.97	20.99	20.96
		Middle		21.05	21.08	21.04
		High		20.98	21.01	20.99
	50%	Low	21	20.12	20.13	20.09
		Middle		20.11	20.09	20.16
		High		20.09	20.11	20.12
	100%	/	21	20.03	20.01	20.04
16QAM	1	Low	21	20.29	20.36	20.26
		Middle		20.38	20.42	20.39
		High		20.34	20.29	20.22
	50%	Low	20	19.26	19.35	19.24
		Middle		19.16	19.15	19.11
		High		19.15	19.17	19.12
	100%	/	20	19.03	19.05	19.04
Modulation	RB	RB Offset	Tune up	15MHz		
				132047	132422	132597
QPSK	1	Low	22	21.07	21.04	21.05
		Middle		21.01	21.03	21.06
		High		21.03	21.07	21.09

	50%	Low	21	19.18	19.16	19.22
		Middle		19.07	19.07	19.05
		High		19.04	19.03	19.03
	100%	/	21	19.02	19.01	19.08
16QAM	1	Low	21	20.78	20.81	20.74
		Middle		20.80	20.83	20.76
		High		20.19	20.18	20.20
	50%	Low	20	19.07	19.11	19.10
		Middle		19.10	19.12	19.13
		High		19.12	19.10	19.11
	100%	/	20	19.03	19.07	19.06
Modulation	RB	RB Offset	Tune up	20MHz		
				132072	132422	132572
QPSK	1	Low	22	**21.96**	20.89	20.94
		Middle		21.04	21.03	21.07
		High		21.87	20.84	20.97
	50%	Low	21	20.02	20.02	20.08
		Middle		20.03	20.07	**20.12**
		High		20.05	19.97	19.98
	100%	/	21	20.00	20.05	**20.07**
16QAM	1	Low	21	20.37	20.23	20.33
		Middle		20.40	20.34	20.32
		High		20.12	20.13	20.14
	50%	Low	20	19.15	19.14	19.23
		Middle		19.06	19.11	19.10
		High		19.04	19.03	19.00
	100%	/	20	19.07	19.05	19.04

13.3. WiFi Measurement result

Table 13.5: The average conducted power for WiFi

WiFi			WIFI 2.4G (dBm)	
Mode	BW	Channel	Tune up	Output Power
802.11b	20M	1	17.5	16.76
		6	18	**17.21**
		11	17.5	16.88
802.11g	20M	1	17.5	16.51
		6	17.5	16.9
		11	17.5	16.33
802.11n	20M	1	16	15.48

		6	16	15.67
		11	16	15.32
	40M	3	16	15.11
		6	16	15.11
		9	16	15.03

WiFi			WIFi 5G (dBm)	
Mode	BW	Channel	Tune up	Output Power
802.11a Rate 6M	20M	36	13.5	12.68
		40	13.5	12.66
		44	13.5	12.67
		48	13.5	12.58
		52	13.5	13.13
		56	13.5	12.42
		60	13.5	12.43
		64	13.5	12.45
		100	13.5	12.47
		104	13.5	12.55
		108	13.5	12.44
		112	13.5	12.51
		116	13.5	12.48
		132	13.5	12.68
		136	13.5	12.89
		140	13.5	12.34
802.11n Rate MCS0	20M	36	13.5	12.88
		40	13.5	12.86
		44	13.5	12.93
		48	13.5	12.88
		52	13.5	12.46
		56	13.5	12.79
		60	13.5	12.66
		64	13.5	12.37
		100	13.5	12.55
		104	13.5	12.49
		108	13.5	12.51
		112	13.5	12.49
		116	13.5	12.77

		132	13.5	12.49
		136	13.5	12.82
		140	13.5	12.09
	40M	38	12.5	11.47
		46	12.5	11.62
		54	12.5	11.57
		62	12.5	12.03
		102	12.5	11.85
		110	12.5	12.35
		134	12.5	11.85
802.11ac Rate MCS0	20M	36	12.5	11.34
		40	12.5	11.31
		44	12.5	11.46
		48	12.5	11.44
		52	12.5	11.45
		56	12.5	11.58
		60	12.5	11.9
		64	12.5	11.33
		100	12.5	11.44
		104	12.5	11.47
		108	12.5	11.87
		112	12.5	11.68
		116	12.5	11.77
		132	12.5	11.66
		136	12.5	11.71
		140	12.5	11.55
	40M	38	12.5	11.55
		46	12.5	11.61
		54	12.5	12.12
		62	12.5	11.59
		102	12.5	12.37
		110	12.5	12.41
		134	12.5	11.93
	80M	42	12.5	11.84
		58	12.5	11.81
		106	12.5	12.44
		122	12.5	12.19

2.4 GHz 802.11g/n OFDM SAR Test Exclusion Requirements

When SAR measurement is required for 2.4 GHz 802.11g/n OFDM configurations, the measurement and test reduction procedures for OFDM are applied. SAR is not required for the following 2.4 GHz OFDM conditions.

a) When KDB Publication 447498 D01 SAR test exclusion applies to the OFDM configuration.

b) When the highest *reported* SAR for DSSS is adjusted by the ratio of OFDM to DSSS specified maximum output power and the adjusted SAR is ≤ 1.2 W/kg.

The default power measurement procedures are:

a) Power must be measured at each transmit antenna port according to the DSSS and OFDM transmission configurations in each standalone and aggregated frequency band.

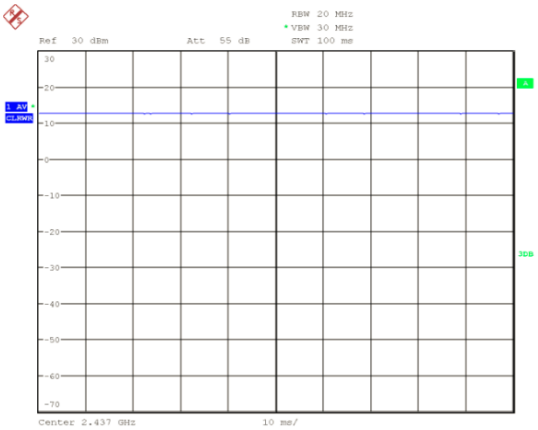
b) Power measurement is required for the transmission mode configuration with the highest maximum output power specified for production units.

1) When the same highest maximum output power specification applies to multiple transmission modes, the largest channel bandwidth configuration with the lowest order modulation and lowest data rate is measured.

2) When the same highest maximum output power is specified for multiple largest channel bandwidth configurations with the same lowest order modulation or lowest order modulation and lowest data rate, power measurement is required for all equivalent 802.11 configurations with the same maximum output power.

c) For each transmission mode configuration, power must be measured for the highest and lowest channels; and at the mid-band channel(s) when there are at least 3 channels. For configurations with multiple mid-band channels, due to an even number of channels, both channels should be measured.

During WiFi SAR testing EUT is configured with the WiFi continuous TX tool, and the transmission duty factor was monitored on the spectrum analyzer with zero-span setting，the duty cycle is 100%.



Picture 13-1 WiFi 11b duty factor

14. SAR Measurement Result

14.1. Standalone SAR Test Result

Table 14.1: SAR Values for WCDMA Band2

Test Position	Cover Type	Mode	Channel	Frequency (MHz)	Measured power (dBm)	Tune-up (dBm)	Power Drift (dB)	Limit of 1gSAR 1.6 W/kg (mW/g)			Figure No.
								Measured SAR1g	Scaling Factor	Report SAR1g	
Body SAR (HotSpot 10mm)											
Front Side	Standard	RMC12.2k	9400	1880	22.4	23	0.060	0.455	1.15	0.522	/
Back Side	Standard	RMC12.2k	9400	1880	22.4	23	0.030	0.692	1.15	**0.795**	**1**
Left Side	Standard	RMC12.2k	9400	1880	22.4	23	0.000	0.103	1.15	0.118	/
Right Side	Standard	RMC12.2k	9400	1880	22.4	23	0.020	0.061	1.15	0.069	/
Bottom Side	Standard	RMC12.2k	9400	1880	22.4	23	0.010	0.176	1.15	0.202	/

Table 14.2: SAR Values for WCDMA Band4

Test Position	Cover Type	Mode	Channel	Frequency (MHz)	Measured power (dBm)	Tune-up (dBm)	Power Drift (dB)	Limit of 1gSAR 1.6 W/kg (mW/g)			Figure No.
								Measured SAR1g	Scaling Factor	Report SAR1g	
Body SAR (HotSpot 10mm)											
Front Side	Standard	RMC12.2k	1413	1732.6	21.91	22	-0.110	0.572	1.02	0.584	/
Back Side	Standard	RMC12.2k	1413	1732.6	21.91	22	0.030	1.050	1.02	1.072	/
Back Side	Standard	RMC12.2k	1312	1712.4	21.89	22	0.000	0.980	1.03	1.005	/
Back Side	Standard	RMC12.3k	1513	1752.6	21.9	22	-0.030	1.110	1.02	1.136	/
Left Side	Standard	RMC12.2k	1413	1732.6	21.91	22	0.120	0.119	1.02	0.121	/
Right Side	Standard	RMC12.2k	1413	1732.6	21.91	22	0.020	0.067	1.02	0.068	/
Bottom Side	Standard	RMC12.2k	1413	1732.6	21.91	22	0.020	0.212	1.02	0.216	/
Body SAR (HotSpot 10mm) Secondary Supply											
Back Side	Standard	RMC12.3k	1513	1752.6	21.9	22	0.080	1.150	1.02	**1.177**	**2**
Body SAR (HotSpot 10mm)NO esim											
Back Side	Standard	RMC12.3k	1513	1752.6	21.9	22	-0.080	0.919	1.02	0.940	/
Body SAR (HotSpot 10mm)NO esim Secondary Supply											
Back Side	Standard	RMC12.3k	1513	1752.6	21.9	22	-0.030	1.040	1.02	1.064	/
Repeated											
Back Side	Standard	RMC12.2k	1513	1752.6	21.9	22	-0.050	1.1	1.02	1.126	/

Table 14.3: SAR Values for WCDMA Band5

Test Position	Cover Type	Mode	Channel	Frequency (MHz)	Measured power (dBm)	Tune-up (dBm)	Power Drift (dB)	Limit of 1gSAR 1.6 W/kg (mW/g)			Figure No.
								Measured SAR1g	Scaling Factor	Report SAR1g	
Body SAR (HotSpot 10mm)											
Front Side	Standard	RMC12.2k	4183	836.6	23.1	23.5	0.030	0.457	1.10	0.501	/
Back Side	Standard	RMC12.2k	4183	836.6	23.1	23.5	0.030	0.611	1.10	**0.670**	**3**
Left Side	Standard	RMC12.2k	4183	836.6	23.1	23.5	0.010	0.266	1.10	0.292	/
Right Side	Standard	RMC12.2k	4183	836.6	23.1	23.5	0.000	0.165	1.10	0.181	/
Bottom Side	Standard	RMC12.2k	4183	836.6	23.1	23.5	0.110	0.083	1.10	0.091	/

Table 14.4: SAR Values for LTE Band7

Test Position	Cover Type	Mode				Channel	Frequency (MHz)	Measured power (dBm)	Tune-up (dBm)	Power Drift (dB)	Limit of 1gSAR 1.6 W/kg (mW/g)			Figure No.
		Modulation	BW(MHz)	RB Allocation	RB Offset						Measured SAR1g	Scaling Factor	Report SAR1g	
Body SAR (HotSpot 10mm)														
Front Side	Standard	QPSK	20	1	mid	21350	2560	22.8	23	0.060	0.092	1.05	0.096	/
Back Side	Standard	QPSK	20	1	mid	21350	2560	22.8	23	0.070	0.558	1.05	**0.584**	**4**
Left Side	Standard	QPSK	20	1	mid	21350	2560	22.8	23	0.160	0.045	1.05	0.047	/
Right Side	Standard	QPSK	20	1	mid	21350	2560	22.8	23	0.050	0.125	1.05	0.131	/
Bottom Side	Standard	QPSK	20	1	mid	21350	2560	22.8	23	0.120	0.255	1.05	0.267	/
Front Side	Standard	QPSK	20	50%	low	21100	2535	21.81	22.5	0.080	0.084	1.17	0.098	/
Back Side	Standard	QPSK	20	50%	low	21100	2535	21.81	22.5	0.140	0.448	1.17	0.525	/
Left Side	Standard	QPSK	20	50%	low	21100	2535	21.81	22.5	0.080	0.046	1.17	0.053	/
Right Side	Standard	QPSK	20	50%	low	21100	2535	21.81	22.5	0.080	0.093	1.17	0.109	/
Bottom Side	Standard	QPSK	20	50%	low	21100	2535	21.81	22.5	0.160	0.219	1.17	0.257	/

Table 14.5: SAR Values for LTE Band12

Test Position	Cover Type	Mode				Channel	Frequency (MHz)	Measured power (dBm)	Tune-up (dBm)	Power Drift (dB)	Limit of 1gSAR 1.6 W/kg (mW/g)			Figure No.
		Modulation	BW(MHz)	RB Allocation	RB Offset						Measured SAR1g	Scaling Factor	Report SAR1g	
Body SAR (HotSpot 10mm)														
Front Side	Standard	QPSK	10	1	mid	23095	707.5	23.2	23.5	0.030	0.099	1.07	0.106	/
Back Side	Standard	QPSK	10	1	mid	23095	707.5	23.2	23.5	0.160	0.168	1.07	**0.180**	**5**
Left Side	Standard	QPSK	10	1	mid	23095	707.5	23.2	23.5	0.060	0.066	1.07	0.070	/
Right Side	Standard	QPSK	10	1	mid	23095	707.5	23.2	23.5	0.070	0.067	1.07	0.072	/
Bottom Side	Standard	QPSK	10	1	mid	23095	707.5	23.2	23.5	0.140	0.023	1.07	0.025	/
Front Side	Standard	QPSK	10	50%	high	23095	707.5	22.41	23	0.040	0.077	1.15	0.088	/
Back Side	Standard	QPSK	10	50%	high	23095	707.5	22.41	23	0.020	0.133	1.15	0.152	/
Left Side	Standard	QPSK	10	50%	high	23095	707.5	22.41	23	0.020	0.052	1.15	0.059	/
Right Side	Standard	QPSK	10	50%	high	23095	707.5	22.41	23	0.060	0.053	1.15	0.060	/
Bottom Side	Standard	QPSK	10	50%	high	23095	707.5	22.41	23	0.150	0.018	1.15	0.020	/

Table 14.6: SAR Values for LTE Band13

Test Position	Cover Type	Mode				Channel	Frequency (MHz)	Measured power (dBm)	Tune-up (dBm)	Power Drift (dB)	Limit of 1gSAR 1.6 W/kg (mW/g)			Figure No.
		Modulation	BW(MHz)	RB Allocation	RB Offset						Measured SAR1g	Scaling Factor	Report SAR1g	
Body SAR (HotSpot 10mm)														
Front Side	Standard	QPSK	10	1	mid	23230	782	23.01	23.5	0.000	0.550	1.12	0.616	/
Back Side	Standard	QPSK	10	1	mid	23230	782	23.01	23.5	0.020	0.837	1.12	**0.937**	**6**
Left Side	Standard	QPSK	10	1	mid	23230	782	23.01	23.5	0.060	0.537	1.12	0.601	/
Right Side	Standard	QPSK	10	1	mid	23230	782	23.01	23.5	0.030	0.514	1.12	0.575	/
Bottom Side	Standard	QPSK	10	1	mid	23230	782	23.01	23.5	0.060	0.079	1.12	0.088	/
Front Side	Standard	QPSK	10	50%	high	23230	782	22.22	23	0.030	0.468	1.20	0.560	/
Back Side	Standard	QPSK	10	50%	high	23230	782	22.22	23	0.020	0.694	1.20	0.831	/
Left Side	Standard	QPSK	10	50%	high	23230	782	22.22	23	0.050	0.448	1.20	0.536	/
Right Side	Standard	QPSK	10	50%	high	23230	782	22.22	23	0.040	0.430	1.20	0.515	/
Bottom Side	Standard	QPSK	10	50%	high	23230	782	22.22	23	0.060	0.067	1.20	0.080	/

Table 14.7: SAR Values for LTE Band25

Test Position	Cover Type	Mode				Channel	Frequency (MHz)	Measured power (dBm)	Tune-up (dBm)	Power Drift (dB)	Limit of 1gSAR 1.6 W/kg (mW/g)			Figure No.
		Modulation	BW(MHz)	RB Allocation	RB Offset						Measured SAR1g	Scaling Factor	Report SAR1g	
Body SAR (HotSpot 10mm)														
Front Side	Standard	QPSK	20	1	mid	26365	1882.5	21.82	22	0.020	0.339	1.04	0.353	/
Back Side	Standard	QPSK	20	1	mid	26365	1882.5	21.82	22	0.010	0.467	1.04	**0.487**	**7**
Left Side	Standard	QPSK	20	1	mid	26365	1882.5	21.82	22	0.070	0.208	1.04	0.217	/
Right Side	Standard	QPSK	20	1	mid	26365	1882.5	21.82	22	0.170	0.212	1.04	0.221	/
Bottom Side	Standard	QPSK	20	1	mid	26365	1882.5	21.82	22	0.070	0.186	1.04	0.194	/
Front Side	Standard	QPSK	20	50%	low	26365	1882.5	20.93	21.5	0.030	0.354	1.14	0.404	/
Back Side	Standard	QPSK	20	50%	low	26365	1882.5	20.93	21.5	0.040	0.381	1.14	0.434	/
Left Side	Standard	QPSK	20	50%	low	26365	1882.5	20.93	21.5	0.150	0.168	1.14	0.192	/
Right Side	Standard	QPSK	20	50%	low	26365	1882.5	20.93	21.5	0.050	0.165	1.14	0.188	/
Bottom Side	Standard	QPSK	20	50%	low	26365	1882.5	20.93	21.5	0.040	0.149	1.14	0.170	/

Table 14.8: SAR Values for LTE Band26

Test Position	Cover Type	Mode				Channel	Frequency (MHz)	Measured power (dBm)	Tune-up (dBm)	Power Drift (dB)	Limit of 1gSAR 1.6 W/kg (mW/g)			Figure No.
		Modulation	BW(MHz)	RB Allocation	RB Offset						Measured SAR1g	Scaling Factor	Report SAR1g	
Body SAR (HotSpot 10mm)														
Front Side	Standard	QPSK	15	1	mid	26765	821.5	23.02	23.5	0.050	0.583	1.12	0.651	/
Back Side	Standard	QPSK	15	1	mid	26765	821.5	23.02	23.5	0.020	0.732	1.12	**0.818**	**8**
Left Side	Standard	QPSK	15	1	mid	26765	821.5	23.02	23.5	0.060	0.524	1.12	0.585	/
Right Side	Standard	QPSK	15	1	mid	26765	821.5	23.02	23.5	0.040	0.451	1.12	0.504	/
Bottom Side	Standard	QPSK	15	1	mid	26765	821.5	23.02	23.5	0.190	0.087	1.12	0.098	/
Front Side	Standard	QPSK	15	50%	low	26865	831.5	22.18	23	0.010	0.429	1.21	0.518	/
Back Side	Standard	QPSK	15	50%	low	26865	831.5	22.18	23	0.010	0.538	1.21	0.650	/
Left Side	Standard	QPSK	15	50%	low	26865	831.5	22.18	23	0.050	0.384	1.21	0.464	/
Right Side	Standard	QPSK	15	50%	low	26865	831.5	22.18	23	0.040	0.328	1.21	0.396	/
Bottom Side	Standard	QPSK	15	50%	low	26865	831.5	22.18	23	0.190	0.068	1.21	0.082	/
Back Side	Standard	QPSK	15	1	mid	26865	831.5	23.01	23.5	0.000	0.662	1.12	0.741	/
Back Side	Standard	QPSK	15	1	mid	26965	841.5	22.97	23.5	0.000	0.603	1.13	0.681	/

Table 14.9: SAR Values for LTE Band40

Test Position	Cover Type	Mode				Channel	Frequency (MHz)	Measured power (dBm)	Tune-up (dBm)	Power Drift (dB)	Limit of 1gSAR 1.6 W/kg (mW/g)			Figure No.
		Modulation	BW(MHz)	RB Allocation	RB Offset						Measured SAR1g	Scaling Factor	Report SAR1g	
Body SAR (HotSpot 10mm)														
Front Side	Standard	QPSK	20	1	mid	39550	2390	23.59	24	0.030	0.078	1.10	0.086	/
Back Side	Standard	QPSK	20	1	mid	39550	2390	23.59	24	0.100	0.379	1.10	**0.417**	**9**
Left Side	Standard	QPSK	20	1	mid	39550	2390	23.59	24	0.060	0.030	1.10	0.033	/
Right Side	Standard	QPSK	20	1	mid	39550	2390	23.59	24	0.130	0.051	1.10	0.056	/
Bottom Side	Standard	QPSK	20	1	mid	39550	2390	23.59	24	0.120	0.117	1.10	0.129	/
Front Side	Standard	QPSK	20	50%	low	39550	2390	22.7	23	0.060	0.060	1.07	0.064	/
Back Side	Standard	QPSK	20	50%	low	39550	2390	22.7	23	0.160	0.295	1.07	0.316	/
Left Side	Standard	QPSK	20	50%	low	39550	2390	22.7	23	0.110	0.023	1.07	0.025	/
Right Side	Standard	QPSK	20	50%	low	39550	2390	22.7	23	0.160	0.040	1.07	0.043	/
Bottom Side	Standard	QPSK	20	50%	low	39550	2390	22.7	23	0.120	0.089	1.07	0.096	/

Table 14.10: SAR Values for LTE Band41

Test Position	Cover Type	Mode				Channel	Frequency (MHz)	Measured power (dBm)	Tune-up (dBm)	Power Drift (dB)	Limit of 1gSAR 1.6 W/kg (mW/g)			Figure No.
		Modulation	BW(MHz)	RB Allocation	RB Offset						Measured SAR1g	Scaling Factor	Report SAR1g	
Body SAR (HotSpot 10mm)														
Front Side	Standard	QPSK	20	1	mid	40620	2593	23.31	24	0.060	0.032	1.17	0.038	/
Back Side	Standard	QPSK	20	1	mid	40620	2593	23.31	24	0.070	0.432	1.17	**0.506**	**10**
Left Side	Standard	QPSK	20	1	mid	40620	2593	23.31	24	0.070	0.018	1.17	0.021	/
Right Side	Standard	QPSK	20	1	mid	40620	2593	23.31	24	0.060	0.066	1.17	0.077	/
Bottom Side	Standard	QPSK	20	1	mid	40620	2593	23.31	24	0.080	0.190	1.17	0.223	/
Front Side	Standard	QPSK	20	50%	mid	40620	2593	22.27	23	0.060	0.025	1.18	0.029	/
Back Side	Standard	QPSK	20	50%	mid	40620	2593	22.27	23	0.090	0.337	1.18	0.399	/
Left Side	Standard	QPSK	20	50%	mid	40620	2593	22.27	23	0.040	0.015	1.18	0.018	/
Right Side	Standard	QPSK	20	50%	mid	40620	2593	22.27	23	0.190	0.051	1.18	0.060	/
Bottom Side	Standard	QPSK	20	50%	mid	40620	2593	22.27	23	0.020	0.149	1.18	0.176	/

Table 14.11: SAR Values for LTE Band66

Test Position	Cover Type	Mode				Channel	Frequency (MHz)	Measured power (dBm)	Tune-up (dBm)	Power Drift (dB)	Limit of 1gSAR 1.6 W/kg (mW/g)			Figure No.
		Modulation	BW(MHz)	RB Allocation	RB Offset						Measured SAR1g	Scaling Factor	Report SAR1g	
Body SAR (HotSpot 10mm)														
Front Side	Standard	QPSK	20	1	low	132072	1720	21.96	22	0.120	0.391	1.01	0.395	/
Back Side	Standard	QPSK	20	1	low	132072	1720	21.96	22	0.060	0.799	1.01	0.806	/
Left Side	Standard	QPSK	20	1	low	132072	1720	21.96	22	0.190	0.146	1.01	0.147	/
Right Side	Standard	QPSK	20	1	low	132072	1720	21.96	22	0.070	0.235	1.01	0.237	/
Bottom Side	Standard	QPSK	20	1	low	132072	1720	21.96	22	0.050	0.186	1.01	0.188	/
Front Side	Standard	QPSK	20	50%	mid	132572	1770	20.12	21	0.080	0.322	1.22	0.394	/
Back Side	Standard	QPSK	20	50%	mid	132572	1770	20.12	21	0.040	0.695	1.22	0.851	/
Left Side	Standard	QPSK	20	50%	mid	132572	1770	20.12	21	0.070	0.151	1.22	0.185	/
Right Side	Standard	QPSK	20	50%	mid	132572	1770	20.12	21	0.160	0.199	1.22	0.244	/
Bottom Side	Standard	QPSK	20	50%	mid	132572	1770	20.12	21	0.010	0.142	1.22	0.174	/
Back Side	Standard	QPSK	20	1	low	132422	1755	20.89	22	0.020	0.883	1.29	1.140	/
Back Side	Standard	QPSK	20	1	low	132572	1770	20.94	22	0.030	0.894	1.28	**1.141**	**11**
Back Side	Standard	QPSK	20	50%	mid	132072	1720	20.03	21	-0.030	0.750	1.25	0.938	/
Back Side	Standard	QPSK	20	50%	mid	132422	1755	20.07	21	-0.080	0.752	1.24	0.932	/
Repeated														
Back Side	Standard	QPSK	20	1	low	132572	1770	20.94	22	0.030	0.835	1.28	1.066	/

Table 14.12: SAR Values for WiFi 2.4G

Test Position	Cover Type	Mode	BW(MHz)	Duty Cycle	Channel	Frequency (MHz)	Measured power (dBm)	Tune-up (dBm)	Power Drift (dB)	Limit of 1gSAR 1.6 W/kg (mW/g)			Figure No.
										Measured SAR1g	Scaling Factor	Report SAR1g	
Body SAR (HotSpot 10mm)													
Front Side	Standard	802.11b	20	1:1	6	2437	17.21	18	0.090	0.166	1.20	**0.199**	**12**
Back Side	Standard	802.11b	20	1:1	6	2437	17.21	18	0.170	0.155	1.20	0.186	/
Left Side	Standard	802.11b	20	1:1	6	2437	17.21	18	0.150	0.083	1.20	0.100	/
Right Side	Standard	802.11b	20	1:1	6	2437	17.21	18	0.060	0.130	1.20	0.156	/
Top Side	Standard	802.11b	20	1:1	6	2437	17.21	18	0.130	0.011	1.20	0.013	/

Table 14.13: SAR Values for WiFi 5G

Test Position	Cover Type	Mode	BW(MHz)	Duty Cycle	Channel	Frequency (MHz)	Measured power (dBm)	Tune-up (dBm)	Power Drift (dB)	Limit of 1gSAR 1.6 W/kg (mW/g)			Figure No.
										Measured SAR1g	Scaling Factor	Report SAR1g	
Body SAR (HotSpot 10mm)													
Front Side	Standard	802.11a	20	1:1	52	5260	13.13	13.5	0.000	0.009	1.09	0.010	/
Back Side	Standard	802.11a	20	1:1	52	5260	13.13	13.5	0.020	0.322	1.09	**0.351**	**13**
Left Side	Standard	802.11a	20	1:1	52	5260	13.13	13.5	-0.080	0.015	1.09	0.016	/
Right Side	Standard	802.11a	20	1:1	52	5260	13.13	13.5	0.000	0.101	1.09	0.110	/
Top Side	Standard	802.11a	20	1:1	52	5260	13.13	13.5	-0.040	0.089	1.09	0.097	/
Front Side	Standard	802.11a	20	1:1	136	5680	12.89	13.5	0.000	0.019	1.15	0.022	/
Back Side	Standard	802.11a	20	1:1	136	5680	12.89	13.5	0.020	0.236	1.15	0.272	/
Left Side	Standard	802.11a	20	1:1	136	5680	12.89	13.5	0.040	0.011	1.15	0.013	/
Right Side	Standard	802.11a	20	1:1	136	5680	12.89	13.5	0.070	0.073	1.15	0.084	/
Top Side	Standard	802.11a	20	1:1	136	5680	12.89	13.5	0.030	0.104	1.15	0.120	/

14.2. Simultaneous SAR Evaluation

Table 14.14 Simultaneous transmission SAR

FCC SAR Test		Cellular											Max. of Cellular	Non-Cellular Simultanuous Tra		
		W B2	W B4	W B5	L B7	L B12	L B13	L B25	L B26	L B66	L B40	L B41		WiFi2G Core0	WiFi5G Core0	Max(Cel.)+ WiFi2G Core0+1
Hotspot (10mm)	Top													0.013	0.120	0.013
	Left	0.118	0.121	0.292	0.053	0.070	0.601	0.217	0.585	0.185	0.033	0.019	0.601	0.100	0.016	0.701
	Right	0.069	0.068	0.181	0.131	0.072	0.575	0.221	0.504	0.244	0.056	0.069	0.575	0.156	0.110	0.731
	Front	0.522	0.584	0.501	0.098	0.106	0.616	0.404	0.651	0.395	0.086	0.034	0.651	0.199	0.022	0.850
	Back	0.795	1.177	0.670	0.584	0.180	0.937	0.487	0.818	1.141	0.417	0.451	1.177	0.186	0.351	1.363
	Bottom	0.202	0.216	0.091	0.267	0.025	0.088	0.194	0.098	0.188	0.129	0.198	0.267			0.267

According to the conducted power measurement result, we can draw the conclusion that: stand-alone SAR for WiFi should be performed. Then, simultaneous transmission SAR for WiFi/BT is considered with measurement results of WCDMA/LTE and WiFi/BT. According to the above table, the sum of reported SAR values for WCDMA/LTE and WiFi<1.6W/kg. So the simultaneous transmission SAR is not required for WiFi/BT transmitter.

14.3. 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; steps2) 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 ≥ 1.45W/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 14.15: SAR Measurement Variability (1g)

Frequency (MHz)		Configuration	Test Position	Original SAR (W/kg)	First Repeated SAR (W/kg)	The Ratio
Tx	Channel					
1752.6	1513	WCDMA Band 4	Back Side	1.136	1.126	1.01
1770	132572	LTE Band 66	Back Side	0.894	0.835	1.07

Note: According to the KDB 865664 D01 repeated measurement is not required when the original highest measured SAR is < 0.8 W/kg.

15. Test Equipment Utilized

Table 15.1 SAR Test System Equipment List

Item	Instrument Name	Type	Serial Number	Manufacturer	Cal. Date	Cal. interval
1	Network analyzer	N5242A	MY51221755	Agilent	2019-12-11	1 year
2	Power meter	NRVD	102257	RS	2020-5-10	1 year
3	Power sensor	NRV-Z5	100241			
			100644			
4	Signal Generator	E4438C	MY49072044	Agilent	2020-5-10	1 Year
5	Amplifier	NTWPA-0086010F	12023024	rflight	No Calibration Requested	
6	Coupler	778D	MY4825551	Agilent	2020-5-10	1 year
7	BTS	E5515C	MY50266468	Agilent	2019-12-11	1 year
		MT8820C	6201240338	Anritsu	2019-12-11	1 year
8	E-field Probe	ES3DV3	3252	SPEAG	2020-1-3	1 year
9	DAE	SPEAG DAE4	1244	SPEAG	2019-12-17	1 year
10	Dipole Validation Kit	SPEAG D750V3	1144	SPEAG	2018-10-26	3 year
		SPEAG D835V2	4d112	SPEAG	2018-10-25	3 year
		SPEAG D900V2	1d109	SPEAG	2018-10-29	3 year
		SPEAG D1750V2	1044	SPEAG	2018-10-31	3 year
		SPEAG D1900V2	5d232	SPEAG	2020-2-12	3 year
		SPEAG D2000V2	1051	SPEAG	2018-10-31	3 year
		SPEAG D2300V2	1021	SPEAG	2018-11-1	3 year
		SPEAG D2450V2	858	SPEAG	2018-10-26	3 year
		SPEAG D2600V2	1031	SPEAG	2018-11-1	3 year
		SPEAG D5GHzV2	1172	SPEAG	2018-3-30	3 year

16. Measurement Uncertainty

Table 16.1 Measurement Uncertainty Evaluation for SAR test

Error Description	Uncert. Value	Prob. Dist.	Div.	(Ci) 1g	(Ci) 10g	Std. Unc. (1g)	Std. Unc. (10g)	(Ui) ueff
Measurement System								
Probe Calibration	13.3	N	2	1	1	6.65	6.65	∞
Axial Isotropy	4.7	R	$\sqrt{3}$	0.7	0.7	1.90	1.90	∞
Hemispherical Isotropy	9.6	R	$\sqrt{3}$	0.7	0.7	3.88	3.88	∞
Boundary effects	1	R	$\sqrt{3}$	1	1	0.58	0.58	∞
Linearity	4.7	R	$\sqrt{3}$	1	1	2.70	2.70	∞
System Detection Limits	1	R	$\sqrt{3}$	1	1	0.58	0.58	∞
Readout Electronics	0.7	N	1	1	1	0.70	0.70	∞
Response Time	0.8	R	$\sqrt{3}$	1	1	0.50	0.50	∞
Integration Time	2.6	R	$\sqrt{3}$	1	1	1.50	1.50	∞
RF Ambient Noise	3	R	$\sqrt{3}$	1	1	1.70	1.70	∞
RF Ambient Re	3	R	$\sqrt{3}$	1	1	1.70	1.70	∞
Probe Positioner	0.4	R	$\sqrt{3}$	1	1	0.20	0.20	∞
Probe Positioning	2.9	R	$\sqrt{3}$	1	1	1.70	1.70	∞
Post-processing	4	R	$\sqrt{3}$	1	1	2.30	2.30	∞
Test Sample Related								
Device Holder	2.42	N	1	1	1	2.42	2.42	71
Test dample Positioning	3	N	1	1	1	3	3	3
Power Drift	5	R	$\sqrt{3}$	1	1	2.9	2.9	∞
Phantom and Setup								
Phantom Uncertainty	4	R	$\sqrt{3}$	1	1	2.3	2.3	∞
Liquid Conductivity (target)	5	R	$\sqrt{3}$	0.64	0.43	2.9	2.9	∞
Liquid Conductivity (meas.)	5	N	1	0.64	0.43	5	5	∞
Liquid Permittivity (target)	5	R	$\sqrt{3}$	0.6	0.49	2.9	2.9	∞
Liquid Permittivity (meas.)	5	N	1	0.6	0.49	5	5	∞
Combined Std. Uncertainty	$U_C' = \sqrt{\sum_{i=1}^{23} Ci^2 Ui^2}$					11.51	11.00	
Expanded STD Uncertainty	$U_C = 2U_C'$					23.03	22.01	

Table 16.2 Measurement Uncertainty Evaluation for System Validation

Error Description	Uncert. Value	Prob. Dist.	Div.	(Ci) 1g	(Ci) 10g	Std. Unc. (1g)	Std. Unc. (10g)	(Ui) ueff
Measurement System								
Probe Calibration	12.1	N	2	1	1	6.05	6.05	∞
Axial Isotropy	4.7	R	$\sqrt{3}$	0.7	0.7	1.90	1.90	∞
Hemispherical Isotropy	9.6	R	$\sqrt{3}$	0.7	0.7	3.88	3.88	∞
Boundary effects	1	R	$\sqrt{3}$	1	1	0.58	0.58	∞
Linearity	4.7	R	$\sqrt{3}$	1	1	2.70	2.70	∞
System Detection Limits	1	R	$\sqrt{3}$	1	1	0.58	0.58	∞
Readout Electronics	0.7	N	1	1	1	0.70	0.70	∞
Response Time	0.8	R	$\sqrt{3}$	1	1	0.50	0.50	∞
Integration Time	2.6	R	$\sqrt{3}$	1	1	1.50	1.50	∞
RF Ambient Noise	3	R	$\sqrt{3}$	1	1	1.70	1.70	∞
RF Ambient Re	3	R	$\sqrt{3}$	1	1	1.70	1.70	∞
Probe Positioner	0.4	R	$\sqrt{3}$	1	1	0.20	0.20	∞
Probe Positioning	2.9	R	$\sqrt{3}$	1	1	1.70	1.70	∞
Post-processing	4	R	$\sqrt{3}$	1	1	2.30	2.30	∞
Test Sample Related								
Validation Dipole Positioning	2	N	1	1	1	2	2	71
Dipole Input Power	5	N	1	1	1	5	5	3
Power Drift	5	R	$\sqrt{3}$	1	1	2.9	2.9	∞
Phantom and Setup								
Phantom Uncertainty	4	R	$\sqrt{3}$	1	1	2.3	2.3	∞
Liquid Conductivity (target)	5	R	$\sqrt{3}$	0.64	0.43	2.9	2.9	∞
Liquid Conductivity (meas.)	5	N	1	0.64	0.43	5	5	∞
Liquid Permittivity (target)	5	R	$\sqrt{3}$	0.6	0.49	2.9	2.9	∞
Liquid Permittivity (meas.)	5	N	1	0.6	0.49	5	5	∞
Combined Std. Uncertainty	$U_C^{'} = \sqrt{\sum_{i=1}^{23} Ci^2 Ui^2}$					11.79	11.30	
Expanded STD Uncertainty	$U_C = 2U_C^{'}$					23.59	22.59	

END OF REPORT BODY

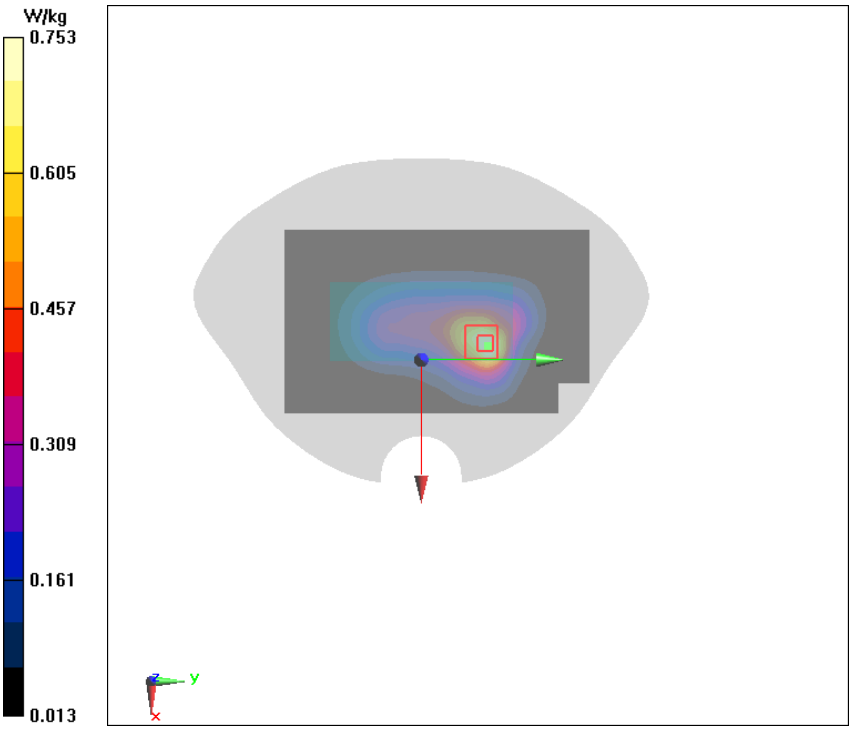
ANNEX A. Graph Results

WCDMA B2 Ground Mode

Date/Time: 2020/5/20
Electronics: DAE4 Sn1244
Medium: HSL600-6GHz
Medium parameters used: f = 1880 MHz; σ = 1.441 S/m; ε_r = 38.975; ρ = 1000 kg/m^3
Ambient Temperature:22.6 ℃ Liquid Temperature:22.6 ℃
Communication System: WCDMA HSL600-6GHz; Frequency: 1880 MHz; Duty Cycle: 1:1
Probe: ES3DV3 - SN3252ConvF(5.2, 5.2, 5.2); Calibrated: 1/3/2020

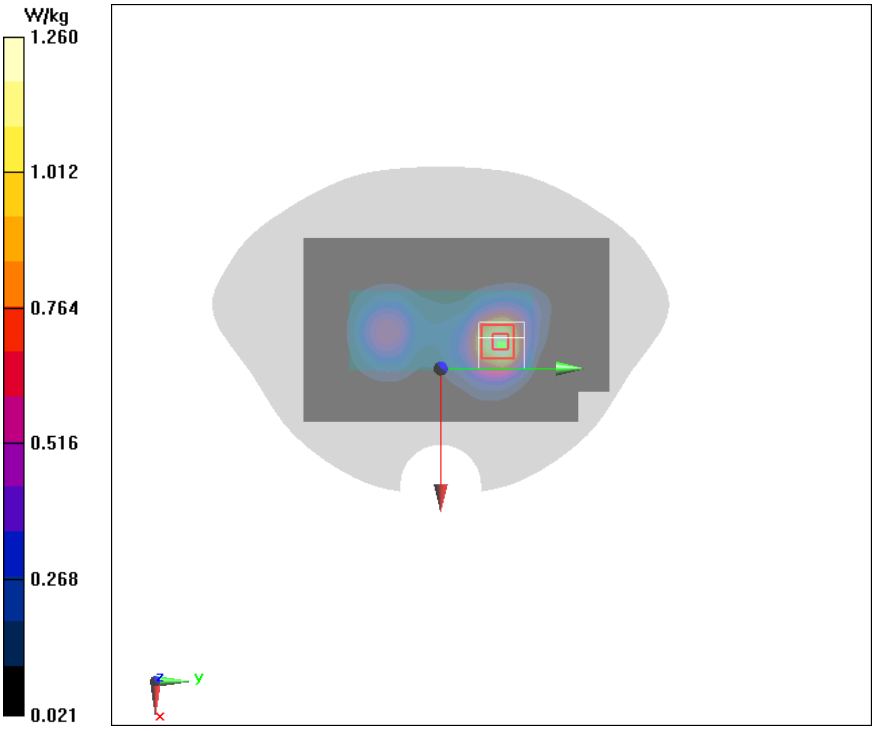
WCDMA B2 Ground Mode/Area Scan (61x101x1):
Measurement grid: dx=10 mm, dy=10 mm
Maximum value of SAR (Measurement) = 0.799 W/kg

WCDMA B2 Ground Mode/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 15.55 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 1.20 W/kg
SAR(1 g) = 0.692 W/kg; SAR(10 g) = 0.397 W/kg
Maximum of SAR (measured) = 0.753 W/kg



WCDMA B4 Ground Mode supply

Date/Time: 2020/5/27
Electronics: DAE4 Sn1581
Medium: HSL600-6GHz
Medium parameters used (interpolated): f = 1752.6 MHz; σ = 1.367 S/m; ε_r = 39.17; ρ = 1000 kg/m^3
Ambient Temperature:22.6 ℃ Liquid Temperature:22.6 ℃
Communication System: WCDMA HSL600-6GHz; Frequency: 1752.6 MHz; Duty Cycle: 1:1
Probe: EX3DV4 - SN7401ConvF(8.65, 8.65, 8.65); Calibrated: 4/1/2020
WCDMA B4 Ground Mode supply/Area Scan (61x101x1):
Measurement grid: dx=10 mm, dy=10 mm
Maximum value of SAR (Measurement) = 1.37 W/kg
WCDMA B4 Ground Mode supply/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 10.72 V/m; Power Drift = 0.08 dB
Peak SAR (extrapolated) = 1.88 W/kg
SAR(1 g) = 1.15 W/kg; SAR(10 g) = 0.661 W/kg
Maximum value of SAR (measured) = 1.26 W/kg

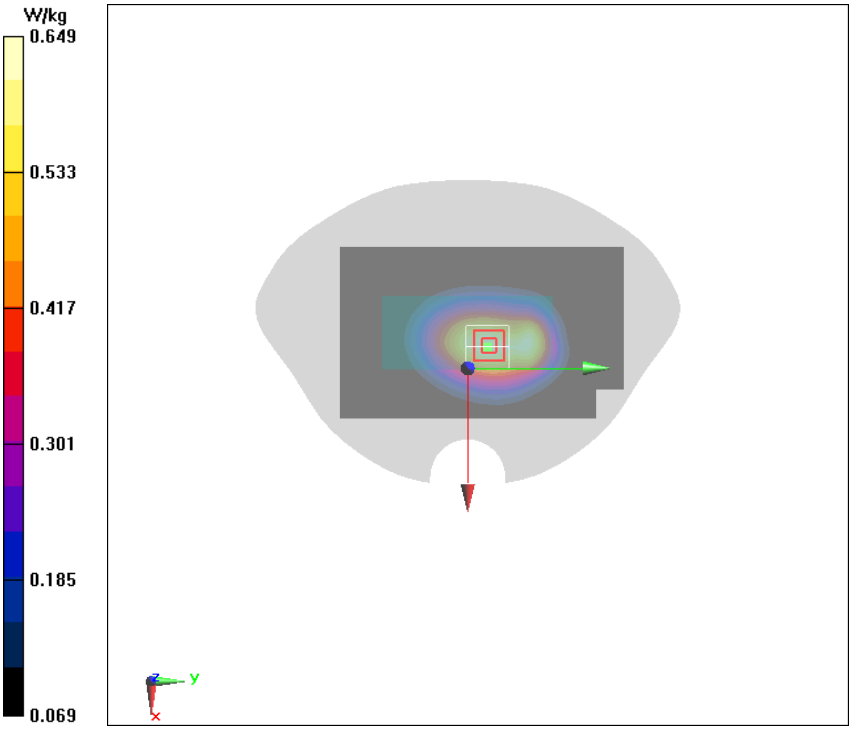


WCDMA B5 Ground Mode

Date/Time: 2020/5/18
Electronics: DAE4 Sn1244
Medium: HSL600-6GHz
Medium parameters used (interpolated): f = 836.6 MHz; σ = 0.962 S/m; ε_r = 40.852; ρ = 1000 kg/m^3
Ambient Temperature:22.6 ℃ Liquid Temperature:22.6 ℃
Communication System: WCDMA HSL600-6GHz; Frequency: 836.6 MHz; Duty Cycle: 1:1
Probe: ES3DV3 - SN3252ConvF(6.29, 6.29, 6.29); Calibrated: 1/3/2020

WCDMA B5 Ground Mode/Area Scan (61x101x1):
Measurement grid: dx=10 mm, dy=10 mm
Maximum value of SAR (Measurement) = 0.645 W/kg

WCDMA B5 Ground Mode/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 24.27 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 0.814 W/kg
SAR(1 g) = 0.611 W/kg; SAR(10 g) = 0.434 W/kg
Maximum value of SAR (measured) = 0.649 W/kg

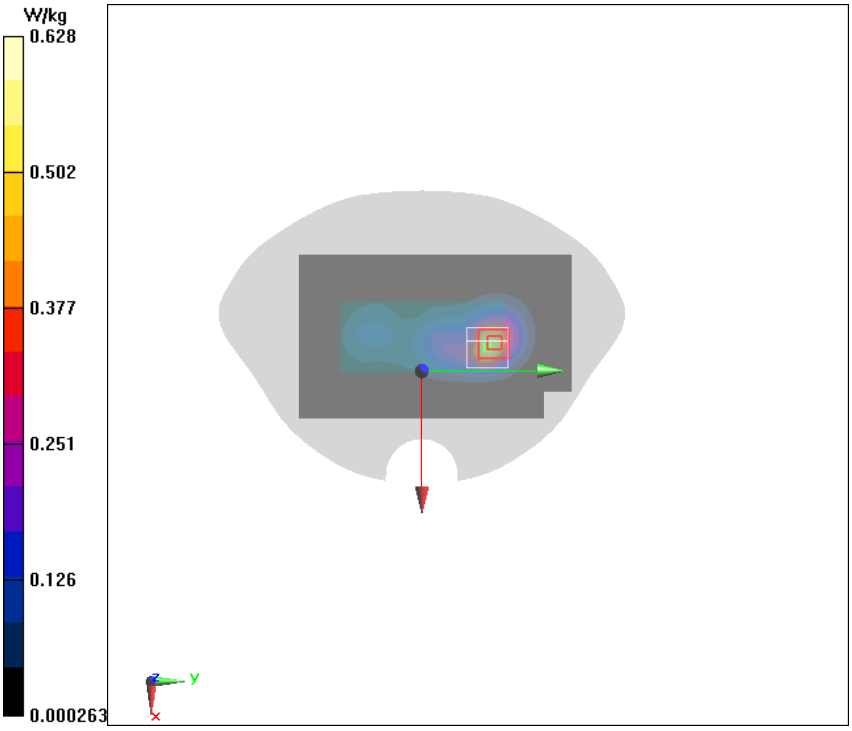


LTE B7 20M 1RB 50offset Ground Mode High

Date/Time: 2020/5/22
Electronics: DAE4 Sn1244
Medium: HSL600-6GHz
Medium parameters used: f = 2560 MHz; σ = 1.89 S/m; ε_r = 38.1; ρ = 1000 kg/m^3
Ambient Temperature:22.6 ℃ Liquid Temperature:22.6 ℃
Communication System: LTE B7 HSL600-6GHz; Frequency: 2560 MHz; Duty Cycle: 1:1
Probe: ES3DV3 - SN3252ConvF(4.52, 4.52, 4.52); Calibrated: 1/3/2020

LTE B7 20M 1RB 50offset Ground Mode High/Area Scan (61x101x1):
Measurement grid: dx=10 mm, dy=10 mm
Maximum value of SAR (Measurement) = 0.564 W/kg

LTE B7 20M 1RB 50offset Ground Mode High/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 8.232 V/m; Power Drift = 0.07 dB
Peak SAR (extrapolated) = 1.17 W/kg
SAR(1 g) = 0.558 W/kg; SAR(10 g) = 0.256 W/kg
Maximum of SAR (measured) = 0.628 W/kg

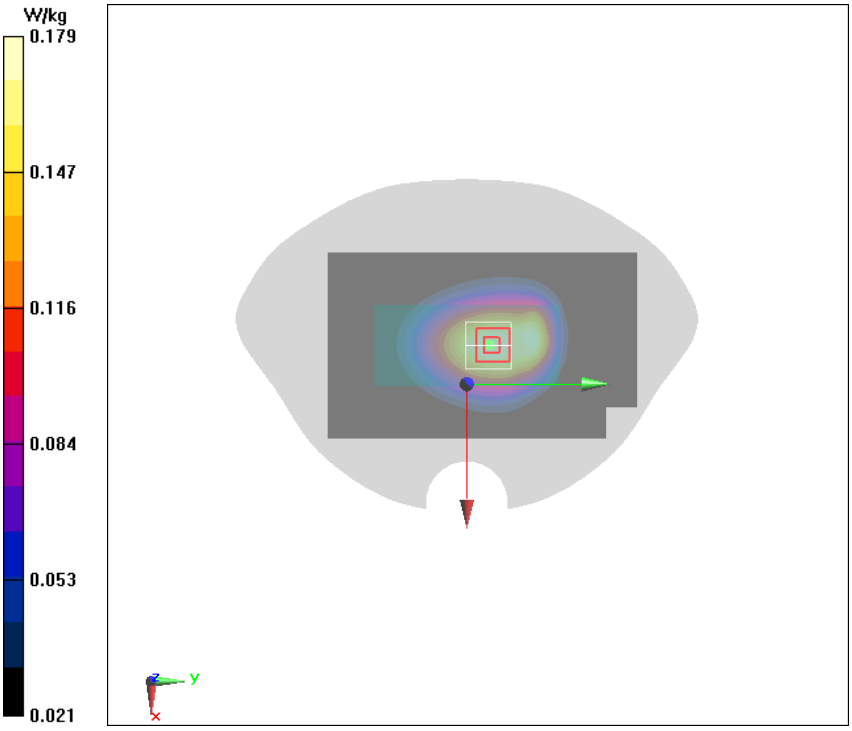


LTE B12 10M 1RB 25offset Ground Mode High

Date/Time: 2020/5/15
Electronics: DAE4 Sn1244
Medium: HSL600-6GHz
Medium parameters used (interpolated): f = 707.5 MHz; σ = 0.918 S/m; ε_r = 41.227; ρ = 1000 kg/m^3
Ambient Temperature:22.6 ℃ Liquid Temperature:22.6 ℃
Communication System: LTE B12 HSL600-6GHz; Frequency: 707.5 MHz; Duty Cycle: 1:1
Probe: ES3DV3 - SN3252ConvF(6.46, 6.46, 6.46); Calibrated: 1/3/2020

LTE B12 10M 1RB 25offset Ground Mode High/Area Scan (61x101x1):
Measurement grid: dx=10 mm, dy=10 mm
Maximum value of SAR (Measurement) = 0.181 W/kg

LTE B12 10M 1RB 25offset Ground Mode High/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 13.73 V/m; Power Drift = 0.16 dB
Peak SAR (extrapolated) = 0.231 W/kg
SAR(1 g) = 0.168 W/kg; SAR(10 g) = 0.119 W/kg
Maximum value of SAR (measured) = 0.179 W/kg

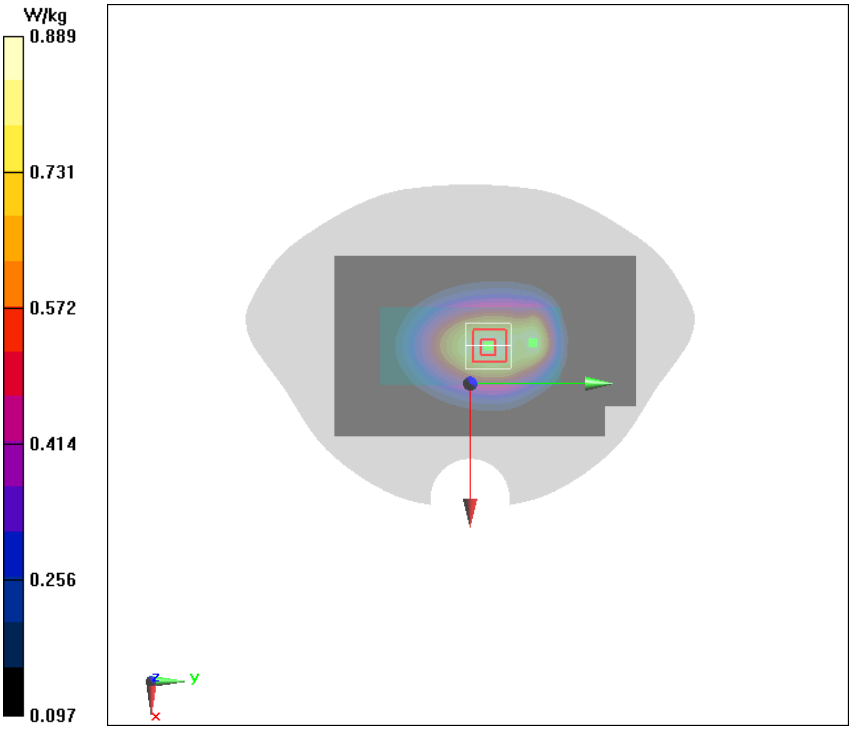


LTE B13 10M 1RB 25offset Ground Mode High

Date/Time: 2020/5/15
Electronics: DAE4 Sn1244
Medium: HSL600-6GHz
Medium parameters used (interpolated): f = 782 MHz; σ = 0.943 S/m; ε_r = 41.003; ρ = 1000 kg/m^3
Ambient Temperature:22.6 ℃ Liquid Temperature:22.6 ℃
Communication System: LTE B13 HSL600-6GHz; Frequency: 782 MHz; Duty Cycle: 1:1
Probe: ES3DV3 - SN3252ConvF(6.46, 6.46, 6.46); Calibrated: 1/3/2020

LTE B13 10M 1RB 25offset Ground Mode High/Area Scan (61x101x1):
Measurement grid: dx=10 mm, dy=10 mm
Maximum value of SAR (Measurement) = 0.889 W/kg

LTE B13 10M 1RB 25offset Ground Mode High/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 30.03 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 1.14 W/kg
SAR(1 g) = 0.837 W/kg; SAR(10 g) = 0.591 W/kg
Maximum value of SAR (measured) = 0.889 W/kg

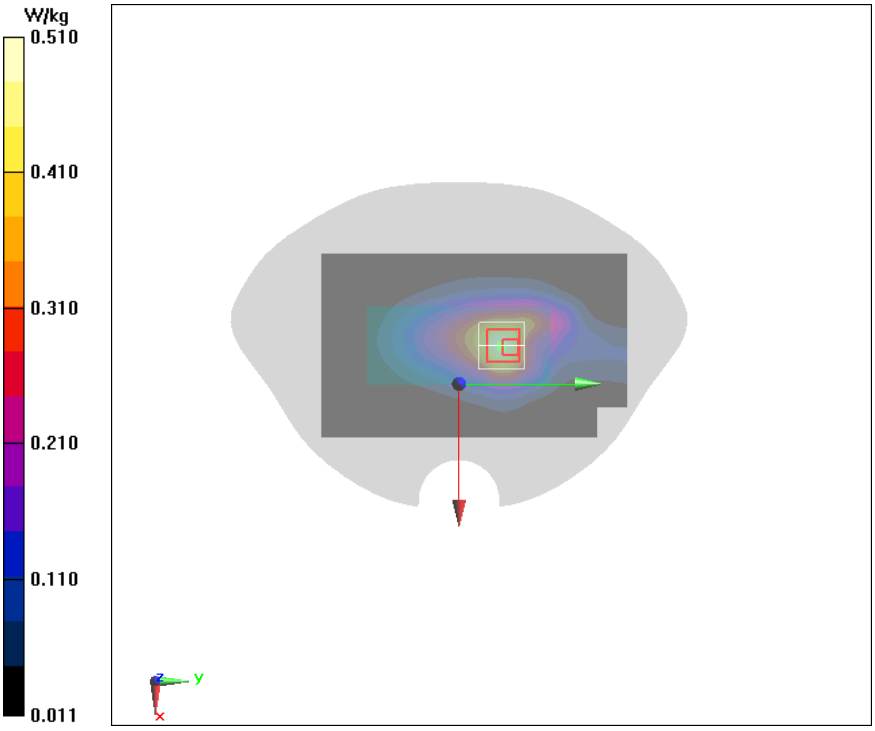


LTE B25 20M 1RB 50offset Ground Mode High

Date/Time: 2020/5/20
Electronics: DAE4 Sn1244
Medium: HSL600-6GHz
Medium parameters used (interpolated): f = 1882.5 MHz; σ = 1.442 S/m; ε_r = 38.972; ρ = 1000 kg/m^3
Ambient Temperature:22.6 ℃ Liquid Temperature:22.6 ℃
Communication System: LTE B25 HSL600-6GHz; Frequency: 1882.5 MHz; Duty Cycle: 1:1
Probe: ES3DV3 - SN3252ConvF(5.2, 5.2, 5.2); Calibrated: 1/3/2020

LTE B25 20M 1RB 50offset Ground Mode High/Area Scan (61x101x1):
Measurement grid: dx=10 mm, dy=10 mm
Maximum value of SAR (Measurement) = 0.504 W/kg

LTE B25 20M 1RB 50offset Ground Mode High/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 14.36 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 0.808 W/kg
SAR(1 g) = 0.467 W/kg; SAR(10 g) = 0.277 W/kg
Maximum value of SAR (measured) = 0.510 W/kg

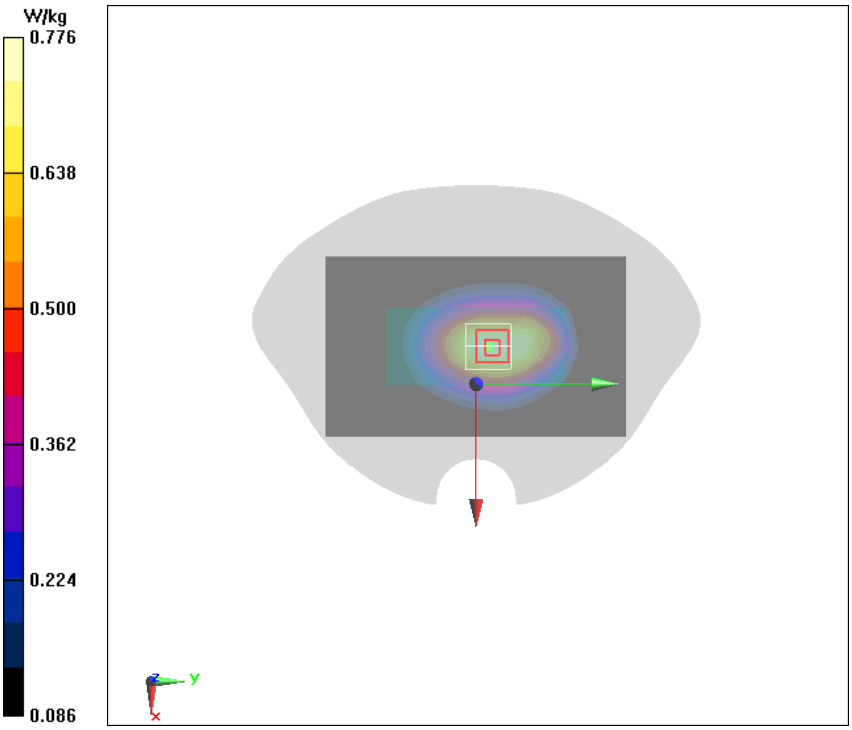


LTE B26 15M 1RB 38offset Ground Mode Low

Date/Time: 2020/5/18
Electronics: DAE4 Sn1244
Medium: HSL600-6GHz
Medium parameters used (interpolated): f = 821.5 MHz; σ = 0.957 S/m; ε_r = 40.893; ρ = 1000 kg/m^3
Ambient Temperature:22.6 ℃ Liquid Temperature:22.6 ℃
Communication System: LTE B26 HSL600-6GHz; Frequency: 821.5 MHz; Duty Cycle: 1:1
Probe: ES3DV3 - SN3252ConvF(6.29, 6.29, 6.29); Calibrated: 1/3/2020

LTE B26 15M 1RB 38offset Ground Mode Low/Area Scan (61x101x1):
Measurement grid: dx=10 mm, dy=10 mm
Maximum value of SAR (Measurement) = 0.772 W/kg

LTE B26 15M 1RB 38offset Ground Mode Low/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 28.31 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 0.982 W/kg
SAR(1 g) = 0.732 W/kg; SAR(10 g) = 0.518 W/kg
Maximum value of SAR (measured) = 0.776 W/kg

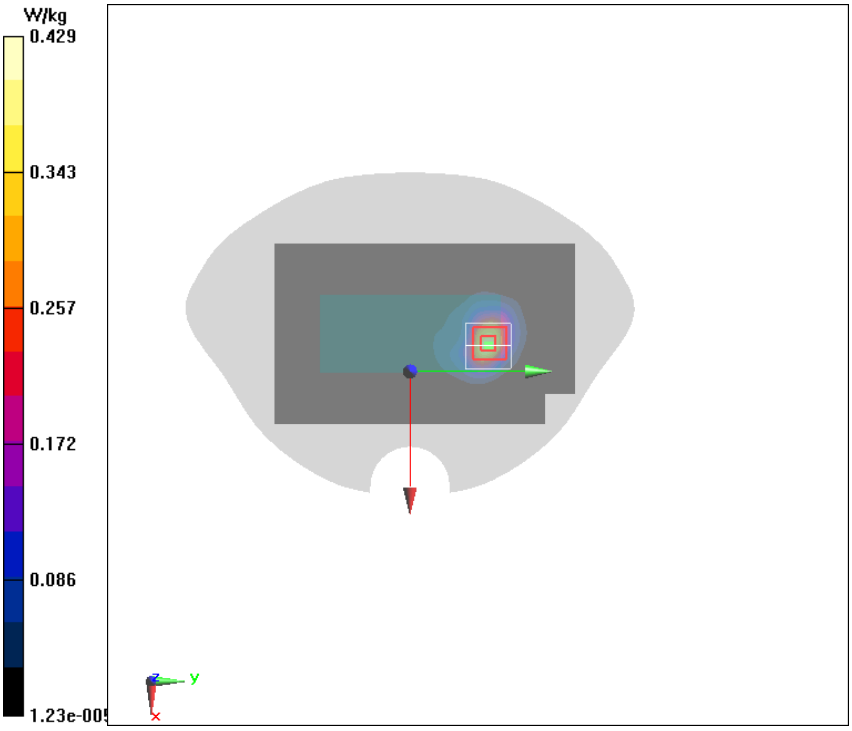


LTE B40 20M 1RB 50offset Ground Mode High

Date/Time: 2020/5/19
Electronics: DAE4 Sn1244
Medium: HSL600-6GHz
Medium parameters used (interpolated): f = 2390 MHz; σ = 1.764 S/m; ε_r = 38.366; ρ = 1000 kg/m^3
Ambient Temperature:22.6 ℃ Liquid Temperature:22.6 ℃
Communication System: LTE B40 HSL600-6GHz; Frequency: 2390 MHz; Duty Cycle: 1:1
Probe: ES3DV3 - SN3252ConvF(4.94, 4.94, 4.94); Calibrated: 1/3/2020

LTE B40 20M 1RB 50offset Ground Mode High/Area Scan (61x101x1):
Measurement grid: dx=10 mm, dy=10 mm
Maximum value of SAR (Measurement) = 0.408 W/kg

LTE B40 20M 1RB 50offset Ground Mode High/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 2.956 V/m; Power Drift = 0.10 dB
Peak SAR (extrapolated) = 0.781 W/kg
SAR(1 g) = 0.379 W/kg; SAR(10 g) = 0.171 W/kg
Maximum value of SAR (measured) = 0.429 W/kg

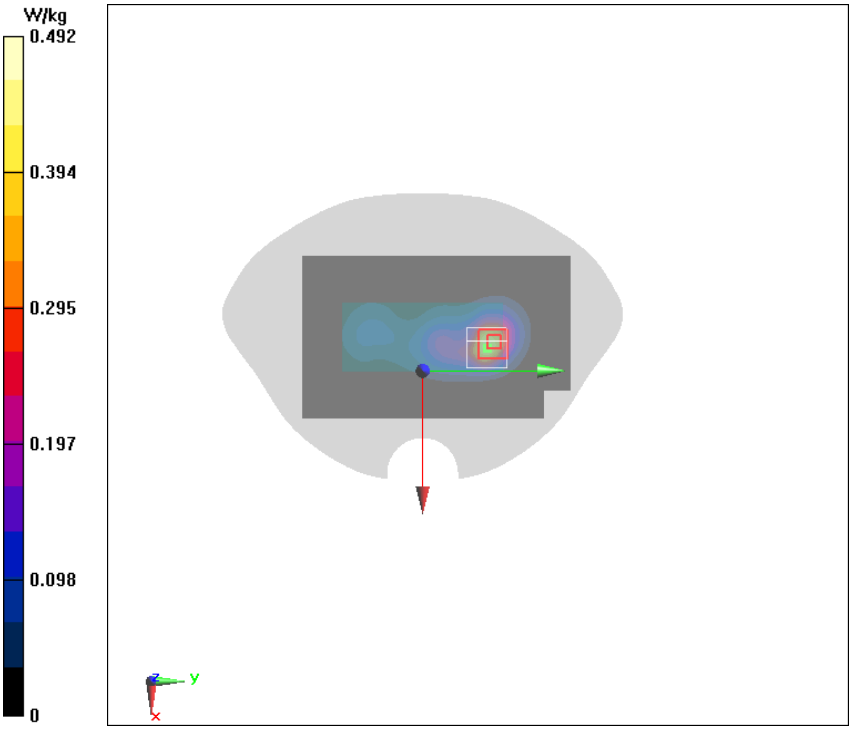


LTE B41 20M 1RB 50offset Ground Mode Middle

Date/Time: 2020/5/22
Electronics: DAE4 Sn1244
Medium: HSL600-6GHz
Medium parameters used (interpolated): f = 2593 MHz; σ = 1.915 S/m; ε_r = 38.053; ρ = 1000 kg/m^3
Ambient Temperature:22.6 ℃ Liquid Temperature:22.6 ℃
Communication System: LTE B41 HSL600-6GHz; Frequency: 2593 MHz; Duty Cycle: 1:1
Probe: ES3DV3 - SN3252ConvF(4.52, 4.52, 4.52); Calibrated: 1/3/2020

LTE B41 20M 1RB 50offset Ground Mode Middle/Area Scan (61x101x1):
Measurement grid: dx=10 mm, dy=10 mm
Maximum value of SAR (Measurement) = 0.449 W/kg

LTE B41 20M 1RB 50offset Ground Mode Middle/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 7.854 V/m; Power Drift = 0.07 dB
Peak SAR (extrapolated) = 0.925 W/kg
SAR(1 g) = 0.432 W/kg; SAR(10 g) = 0.194 W/kg
Maximum of SAR (measured) = 0.492 W/kg

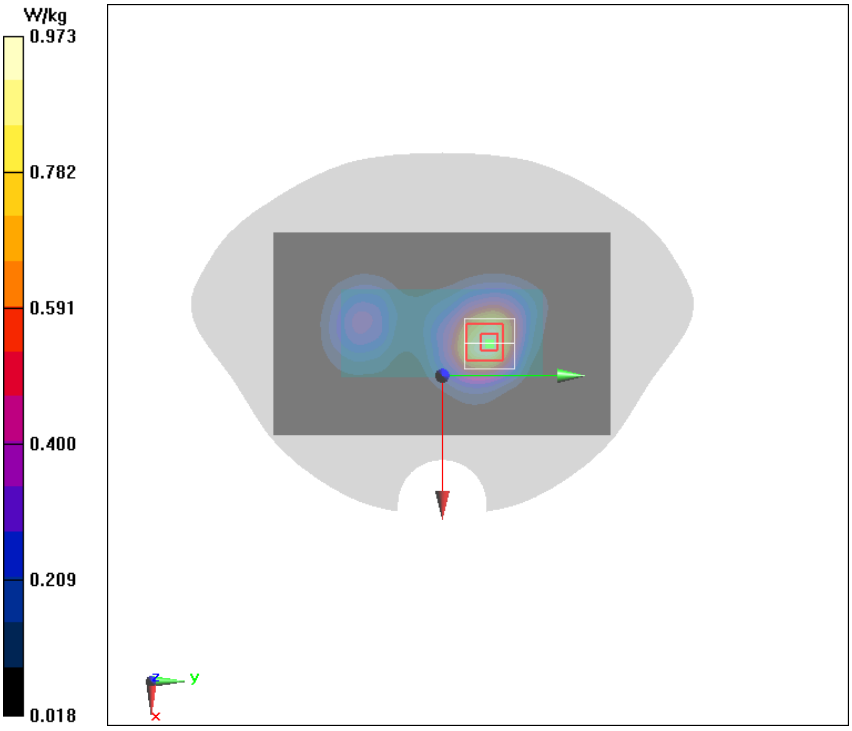


LTE B66 20M 1RB 0offset Ground Mode High

Date/Time: 2020/5/27
Electronics: DAE4 Sn1244
Medium: HSL600-6GHz
Medium parameters used (interpolated): f = 1770 MHz; σ = 1.377 S/m; ε_r = 39.152; ρ = 1000 kg/m^3
Ambient Temperature:22.6 ℃ Liquid Temperature:22.6 ℃
Communication System: LTE B66 HSL600-6GHz; Frequency: 1770 MHz; Duty Cycle: 1:1
Probe: ES3DV3 - SN3252ConvF(5.36, 5.36, 5.36); Calibrated: 1/3/2020

LTE B66 20M 1RB 0offset Ground Mode High/Area Scan (61x101x1):
Measurement grid: dx=10 mm, dy=10 mm
Maximum value of SAR (Measurement) = 1.02 W/kg

LTE B66 20M 1RB 0offset Ground Mode High/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 15.68 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 1.45 W/kg
SAR(1 g) = 0.894 W/kg; SAR(10 g) = 0.534 W/kg
Maximum value of SAR (measured) = 0.973 W/kg



Wifi 11b Phantom Mode 10mm

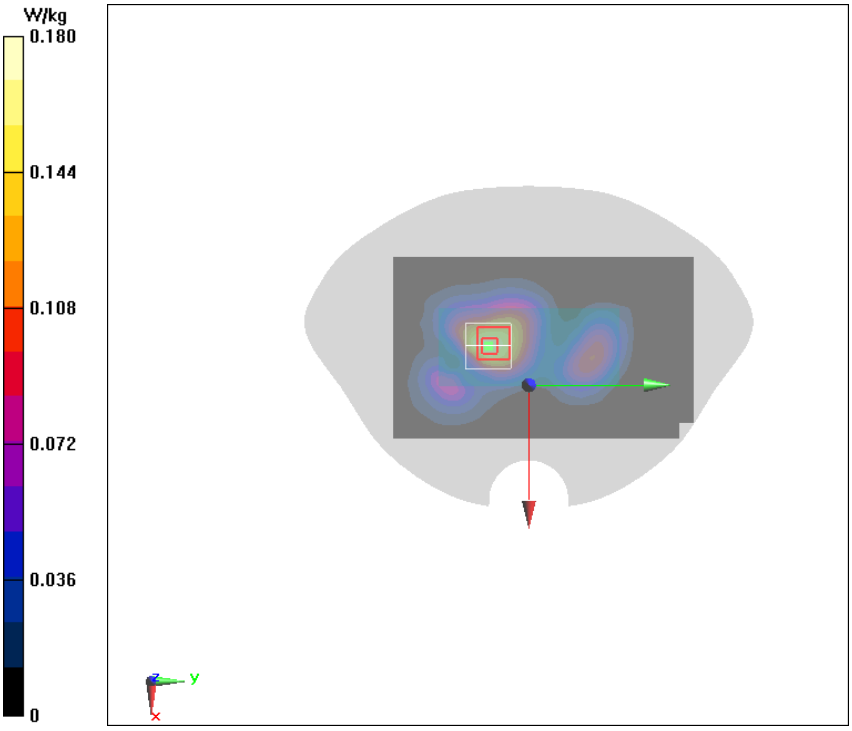
Date/Time: 2020/5/21
Electronics: DAE4 Sn1244
Medium: HSL600-6GHz
Medium parameters used (interpolated): f = 2437 MHz; σ = 1.801 S/m; ε_r = 38.303; ρ = 1000 kg/m^3
Ambient Temperature:22.6 ℃ Liquid Temperature:22.6 ℃
Communication System: WLan 2450 HSL600-6GHz; Frequency: 2437 MHz; Duty Cycle: 1:1
Probe: ES3DV3 - SN3252ConvF(4.75, 4.75, 4.75); Calibrated: 1/3/2020

Wifi 11b Phantom Mode 10mm/Area Scan (121x201x1):

Measurement grid: dx=10 mm, dy=10 mm
Maximum value of SAR (Measurement) = 0.174 W/kg

Wifi 11b Phantom Mode 10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 6.910 V/m; Power Drift = 0.09 dB
Peak SAR (extrapolated) = 0.297 W/kg
SAR(1 g) = 0.166 W/kg; SAR(10 g) = 0.094 W/kg
Maximum value of SAR (measured) = 0.180 W/kg

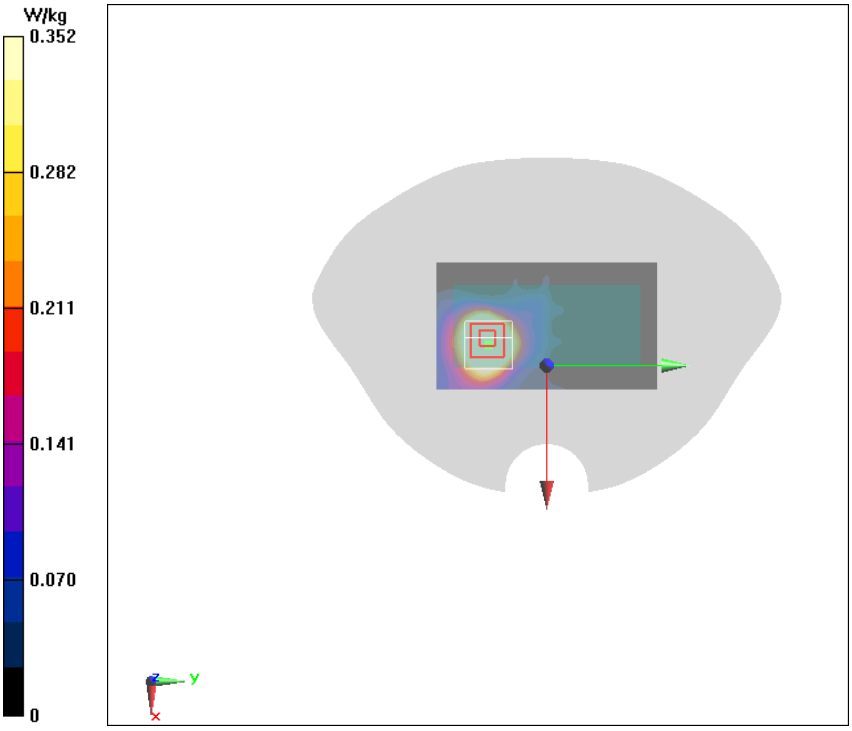


Wifi 11a U-NII-2A Ground Mode Low

Date/Time: 2020/5/19
Electronics: DAE4 Sn1244
Medium: HSL5GHz
Medium parameters used: f = 5260 MHz; σ = 4.654 S/m; ε_r = 37.068; ρ = 1000 kg/m^3
Ambient Temperature:22.6 ℃ Liquid Temperature:22.6 ℃
Communication System: 5G-U-NII-2A HSL5GHz; Frequency: 5260 MHz; Duty Cycle: 1:1
Probe: EX3DV4 - SN7401ConvF(5.74, 5.74, 5.74); Calibrated: 4/1/2020

Wifi 11a U-NII-2A Ground Mode Low/Area Scan (81x141x1):
Measurement grid: dx=10 mm, dy=10 mm
Maximum value of SAR (Measurement) = 0.911 W/kg

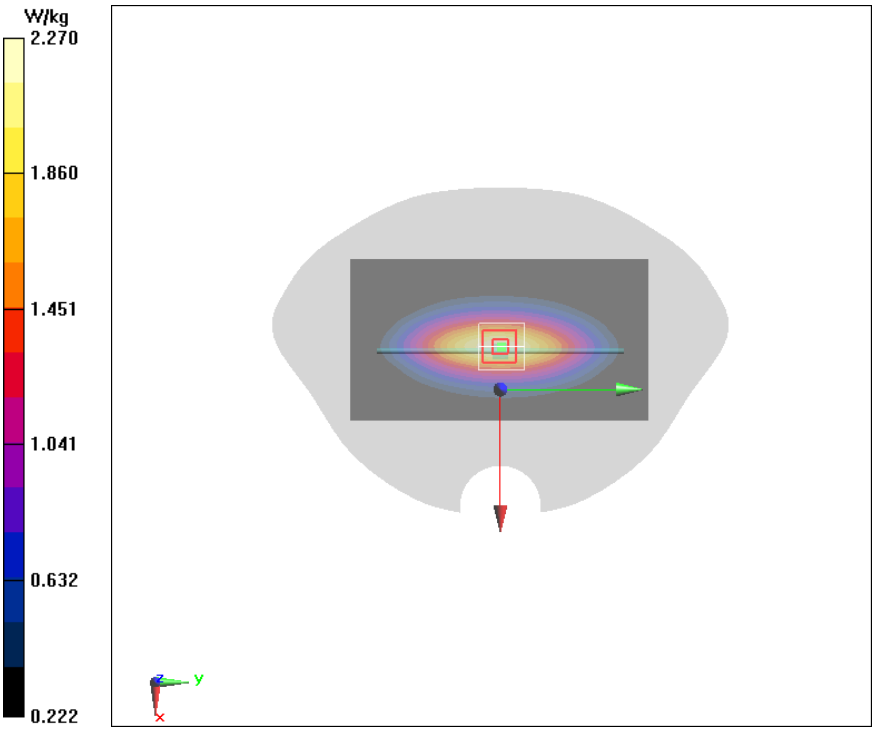
Wifi 11a U-NII-2A Ground Mode Low/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 5.137 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 0.900 W/kg
SAR(1 g) = 0.322 W/kg; SAR(10 g) = 0.130 W/kg
Maximum value of SAR (measured) = 0.352 W/kg



ANNEX B. System Validation Plot

Head 750MHz

Date/Time: 2020/5/15
Electronics: DAE4 Sn1244
Medium: HSL600-6GHz
Medium parameters used (interpolated): f = 750 MHz; σ = 0.933 S/m; ε_r = 41.104; ρ = 1000 kg/m^3
Ambient Temperature:22.6 ℃ Liquid Temperature:22.6 ℃
Communication System: CW HSL600-6GHz; Frequency: 750 MHz; Duty Cycle: 1:1
Probe: ES3DV3 - SN3252ConvF(6.46, 6.46, 6.46); Calibrated: 1/3/2020
System Validation/Area Scan (71x131x1):
Measurement grid: dx=10 mm, dy=10 mm
Maximum value of SAR (Measurement) = 2.25 W/kg
System Validation/Zoom Scan (7x7x7) (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 51.60 V/m; Power Drift = -0.29 dB
Peak SAR (extrapolated) = 3.15 W/kg
SAR(1 g) = 2.11 W/kg; SAR(10 g) = 1.39 W/kg
Maximum value of SAR (measured) = 2.27 W/kg



Head 835MHz

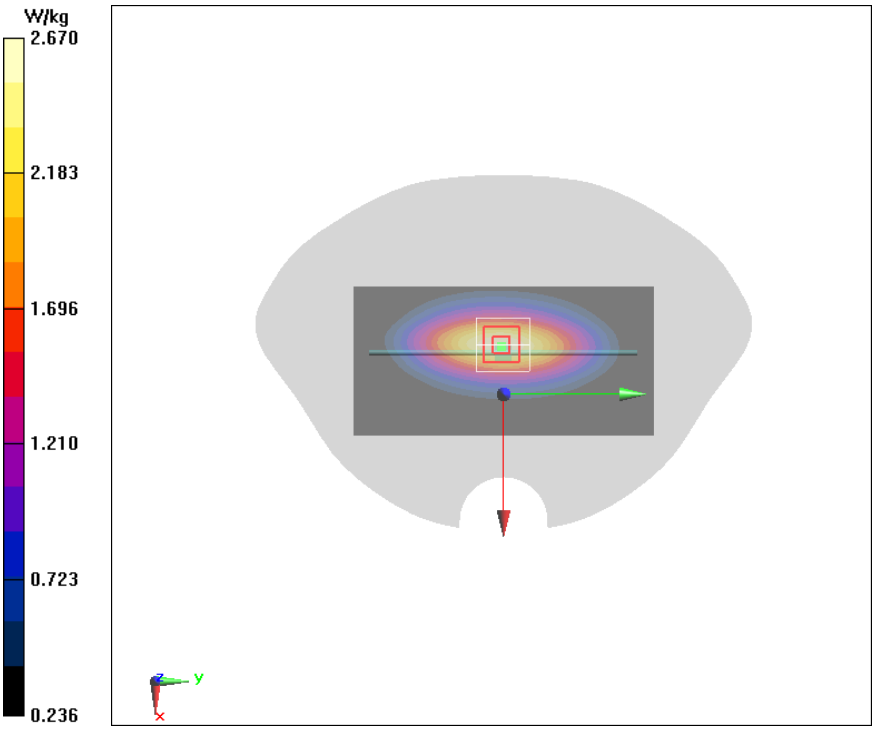
Date/Time: 2020/5/18
Electronics: DAE4 Sn1244
Medium: HSL600-6GHz
Medium parameters used (interpolated): f = 835 MHz; σ = 0.962 S/m; ε_r = 40.856; ρ = 1000 kg/m^3
Ambient Temperature:22.6 ℃ Liquid Temperature:22.6 ℃
Communication System: CW HSL600-6GHz; Frequency: 835 MHz; Duty Cycle: 1:1
Probe: ES3DV3 - SN3252ConvF(6.29, 6.29, 6.29); Calibrated: 1/3/2020

System Validation 835MHz/Area Scan (61x121x1):

Measurement grid: dx=10 mm, dy=10 mm
Maximum value of SAR (Measurement) = 2.67 W/kg

System Validation 835MHz/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 52.54 V/m; Power Drift = -0.07 dB
Peak SAR (extrapolated) = 3.62 W/kg
SAR(1 g) = 2.47 W/kg; SAR(10 g) = 1.63 W/kg
Maximum value of SAR (measured) = 2.67 W/kg



Head 900MHz

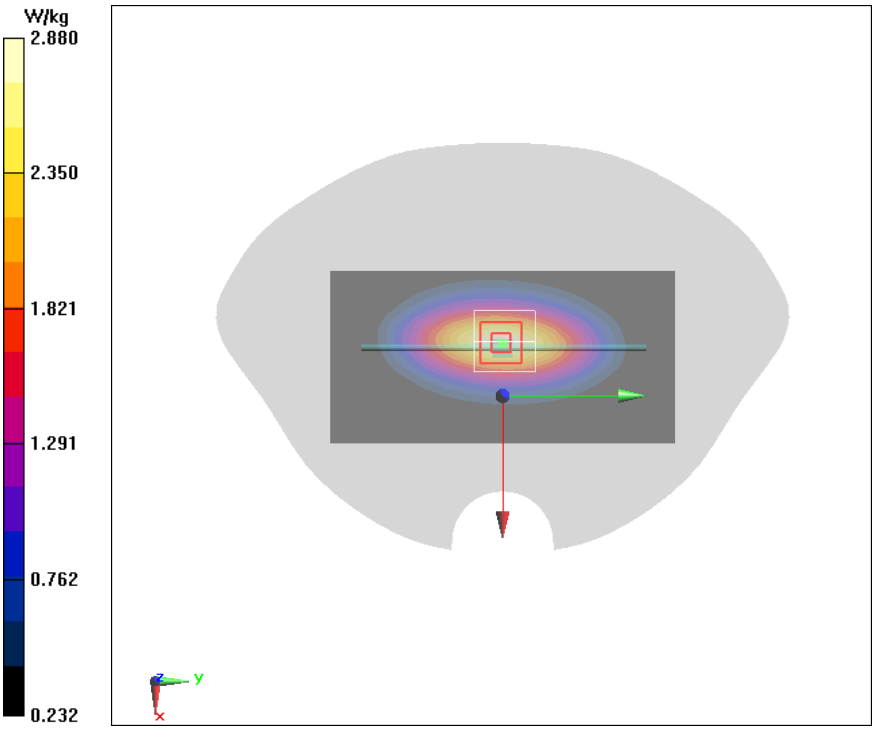
Date/Time: 2020/5/18
Electronics: DAE4 Sn1244
Medium: HSL600-6GHz
Medium parameters used: f = 900 MHz; σ = 0.985 S/m; ε_r = 40.685; ρ = 1000 kg/m^3
Ambient Temperature:22.6 ℃ Liquid Temperature:22.6 ℃
Communication System: CW HSL600-6GHz; Frequency: 900 MHz; Duty Cycle: 1:1
Probe: ES3DV3 - SN3252ConvF(6.27, 6.27, 6.27); Calibrated: 1/3/2020

System Validation 900MHz/Area Scan (61x121x1):

Measurement grid: dx=10 mm, dy=10 mm
Maximum value of SAR (Measurement) = 2.87 W/kg

System Validation 900MHz/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 56.30 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 3.95 W/kg
SAR(1 g) = 2.66 W/kg; SAR(10 g) = 1.73 W/kg
Maximum value of SAR (measured) = 2.88 W/kg



Head 1750MHz

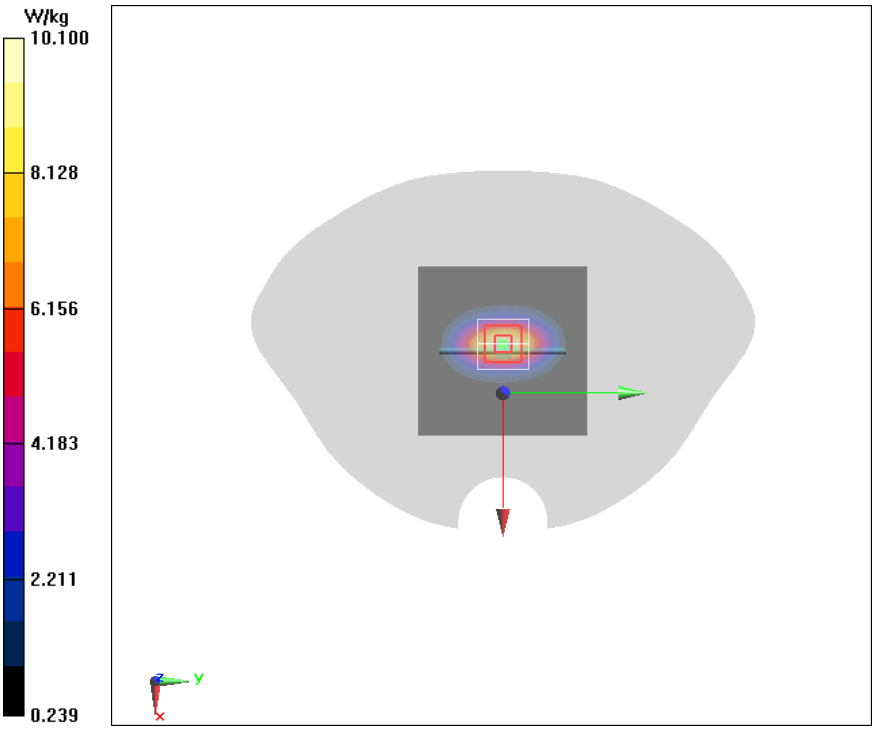
Date/Time: 2020/5/27
Electronics: DAE4 Sn1244
Medium: HSL600-6GHz
Medium parameters used (interpolated): f = 1750 MHz; σ = 1.365 S/m; ε_r = 39.173; ρ = 1000 kg/m^3
Ambient Temperature:22.6 ℃ Liquid Temperature:22.6 ℃
Communication System: CW HSL600-6GHz; Frequency: 1750 MHz; Duty Cycle: 1:1
Probe: ES3DV3 - SN3252ConvF(5.36, 5.36, 5.36); Calibrated: 1/3/2020

System Validation 1750MHz /Area Scan (101x101x1):

Measurement grid: dx=10 mm, dy=10 mm
Maximum value of SAR (Measurement) = 10.1 W/kg

System Validation 1750MHz /Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 82.02 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 16.3 W/kg
SAR(1 g) = 9.04 W/kg; SAR(10 g) = 4.83 W/kg
Maximum value of SAR (measured) = 10.1 W/kg



Head 1900MHz

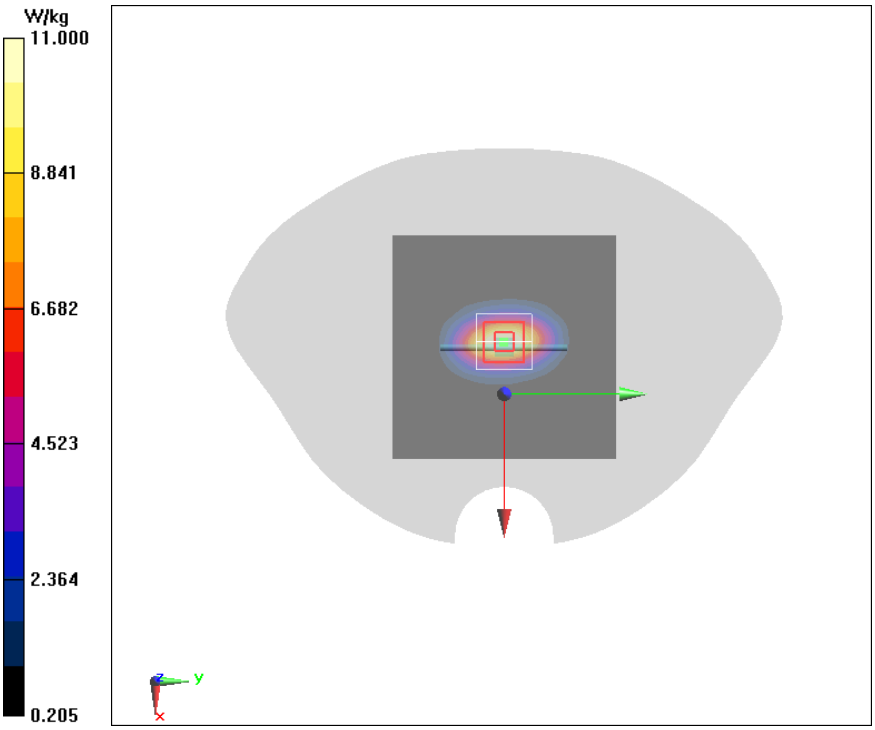
Date/Time: 2020/5/20
Electronics: DAE4 Sn1244
Medium: HSL600-6GHz
Medium parameters used: f = 1900 MHz; σ = 1.452 S/m; ε_r = 38.947; ρ = 1000 kg/m^3
Ambient Temperature:22.6 ℃ Liquid Temperature:22.6 ℃
Communication System: CW HSL600-6GHz; Frequency: 1900 MHz; Duty Cycle: 1:1
Probe: ES3DV3 - SN3252ConvF(5.2, 5.2, 5.2); Calibrated: 1/3/2020

System Validation 1900MHz /Area Scan (121x121x1):

Measurement grid: dx=10 mm, dy=10 mm
Maximum value of SAR (Measurement) = 11.9 W/kg

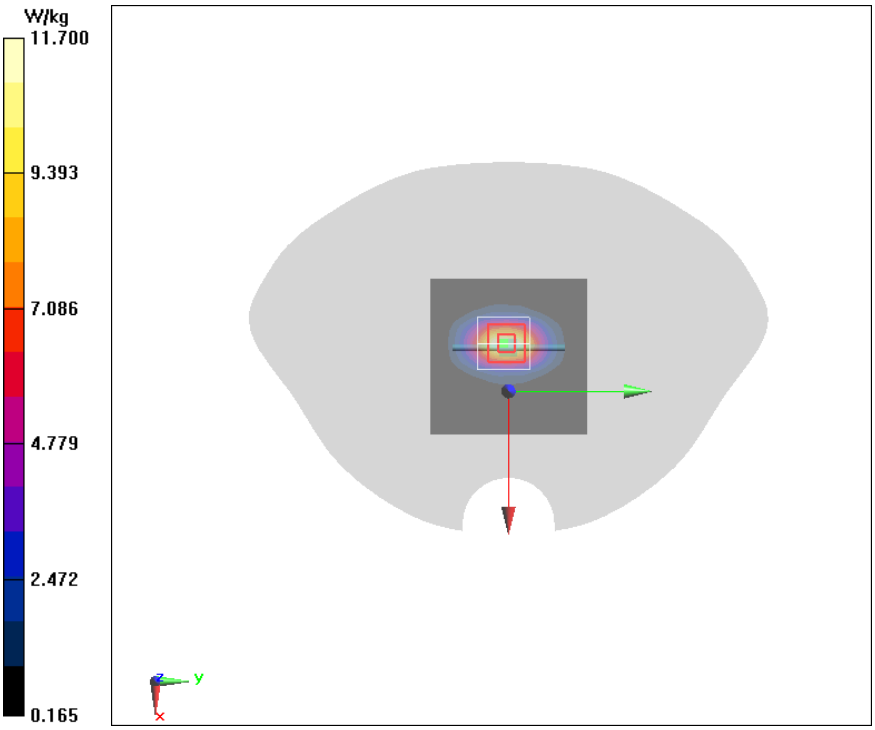
System Validation 1900MHz /Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 89.07 V/m; Power Drift = -0.06 dB
Peak SAR (extrapolated) = 18.4 W/kg
SAR(1 g) = 9.8 W/kg; SAR(10 g) = 5.07 W/kg
Maximum value of SAR (measured) = 11.0 W/kg



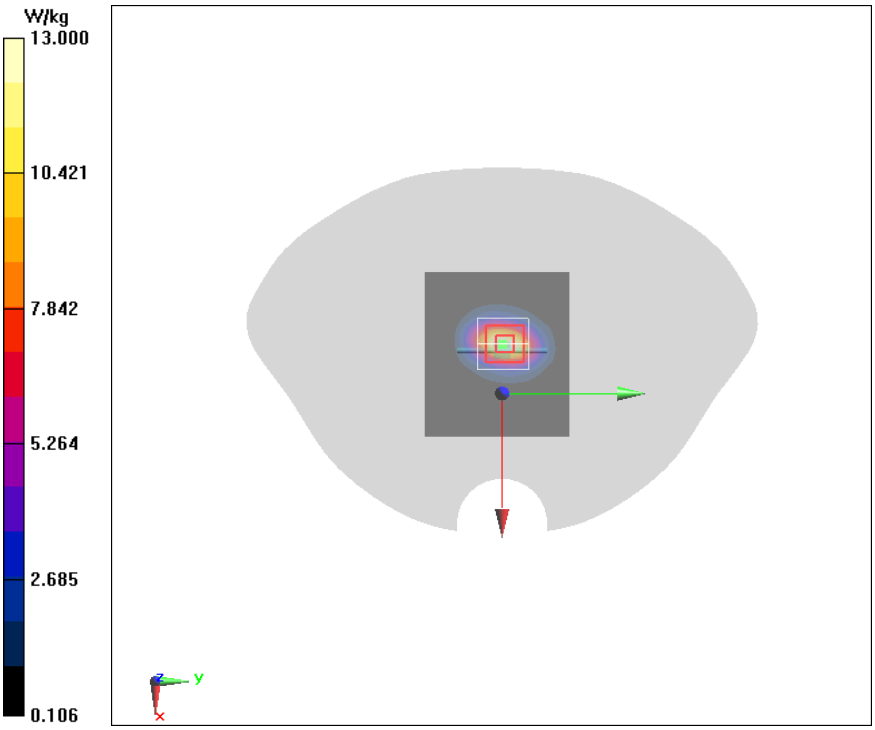
Head 2000MHz

Date/Time: 2020/5/20
Electronics: DAE4 Sn1244
Medium: HSL600-6GHz
Medium parameters used: f = 2000 MHz; σ = 1.507 S/m; ε_r = 38.799; ρ = 1000 kg/m^3
Ambient Temperature:22.6 ℃ Liquid Temperature:22.6 ℃
Communication System: CW HSL600-6GHz; Frequency: 2000 MHz; Duty Cycle: 1:1
Probe: ES3DV3 - SN3252ConvF(5.12, 5.12, 5.12); Calibrated: 1/3/2020
System check Validation/Area Scan (61x61x1):
Measurement grid: dx=10 mm, dy=10 mm
Maximum value of SAR (Measurement) = 12.3 W/kg
System check Validation/Zoom Scan (7x7x7) (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 88.15 V/m; Power Drift = 0.05 dB
Peak SAR (extrapolated) = 19.8 W/kg
SAR(1 g) = 10.4 W/kg; SAR(10 g) = 5.3 W/kg
Maximum value of SAR (measured) = 11.7 W/kg



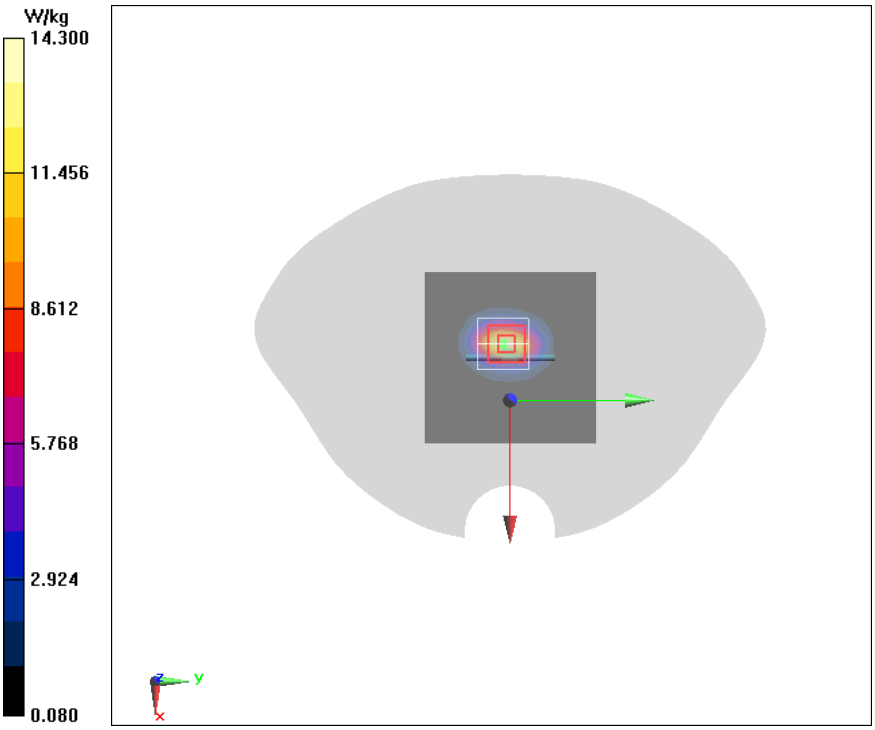
Head 2300MHz

Date/Time: 2020/5/19
Electronics: DAE4 Sn1244
Medium: HSL600-6GHz
Medium parameters used: f = 2300 MHz; σ = 1.7 S/m; ε_r = 38.46; ρ = 1000 kg/m^3
Ambient Temperature:22.6 ℃ Liquid Temperature:22.6 ℃
Communication System: CW HSL600-6GHz; Frequency: 2300 MHz; Duty Cycle: 1:1
Probe: ES3DV3 - SN3252ConvF(4.94, 4.94, 4.94); Calibrated: 1/3/2020
SystemCheck+0.5dbm/Area Scan (81x71x1):
Measurement grid: dx=10 mm, dy=10 mm
Maximum value of SAR (Measurement) = 13.6 W/kg
SystemCheck+0.5dbm/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 86.65 V/m; Power Drift = -0.06 dB
Peak SAR (extrapolated) = 23.9 W/kg
SAR(1 g) = 11.5 W/kg; SAR(10 g) = 5.49 W/kg
Maximum value of SAR (measured) = 13.0 W/kg



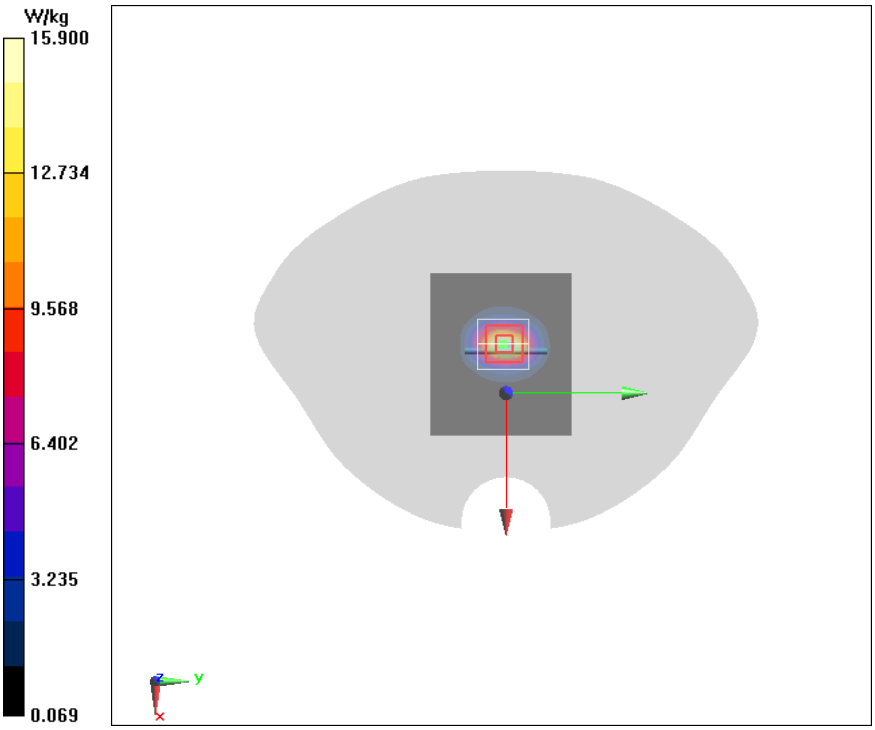
Head 2450MHz

Date/Time: 2020/5/21
Electronics: DAE4 Sn1244
Medium: HSL600-6GHz
Medium parameters used (interpolated): f = 2450 MHz; σ = 1.81 S/m; ε_r = 38.281; ρ = 1000 kg/m^3
Ambient Temperature:22.6 ℃ Liquid Temperature:22.6 ℃
Communication System: CW HSL600-6GHz; Frequency: 2450 MHz; Duty Cycle: 1:1
Probe: ES3DV3 - SN3252ConvF(4.75, 4.75, 4.75); Calibrated: 1/3/2020
SystemCheck+0.3dbm/Area Scan (101x101x1):
Measurement grid: dx=10 mm, dy=10 mm
Maximum value of SAR (Measurement) = 14.0 W/kg
SystemCheck+0.3dbm/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 74.07 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 27.0 W/kg
SAR(1 g) = 12.7 W/kg; SAR(10 g) = 5.85 W/kg
Maximum value of SAR (measured) = 14.3 W/kg



Head 2600MHz

Date/Time: 2020/5/22
Electronics: DAE4 Sn1244
Medium: HSL600-6GHz
Medium parameters used: f = 2600 MHz; σ = 1.92 S/m; ε_r = 38.041; ρ = 1000 kg/m^3
Ambient Temperature:22.6 ℃ Liquid Temperature:22.6 ℃
Communication System: CW HSL600-6GHz; Frequency: 2600 MHz; Duty Cycle: 1:1
Probe: ES3DV3 - SN3252ConvF(4.52, 4.52, 4.52); Calibrated: 1/3/2020
System Validation+0.3dbm/Area Scan (81x71x1):
Measurement grid: dx=10 mm, dy=10 mm
Maximum value of SAR (Measurement) = 17.3 W/kg
System Validation+0.3dbm/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 87.33 V/m; Power Drift = 0.07 dB
Peak SAR (extrapolated) = 31.0 W/kg
SAR(1 g) = 14 W/kg; SAR(10 g) = 6.25 W/kg
Maximum value of SAR (measured) = 15.9 W/kg



Head 5300MHz

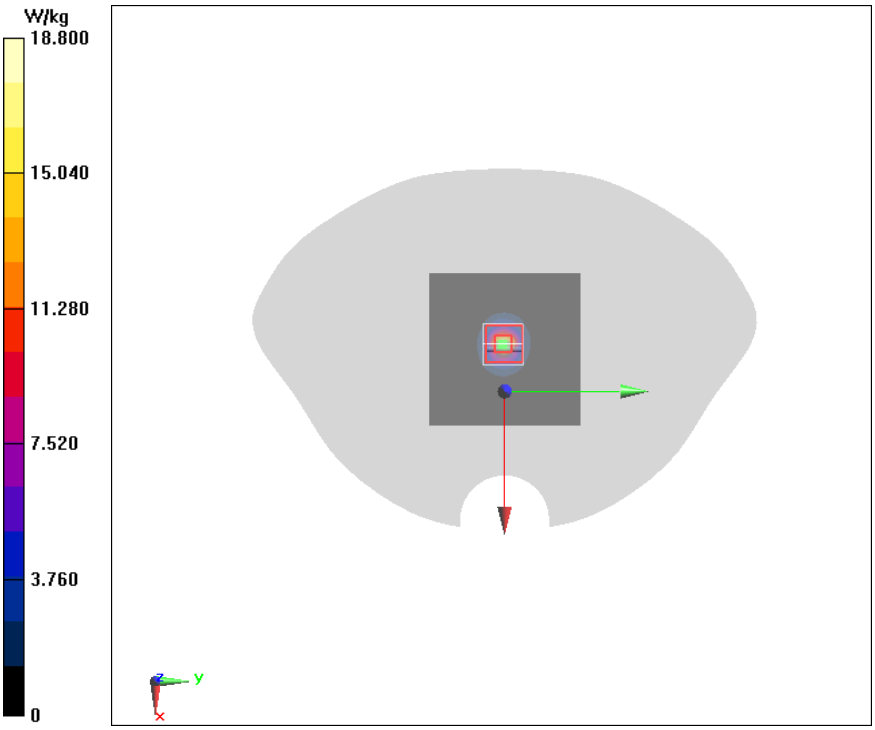
Date/Time: 2020/5/19
Electronics: DAE4 Sn1244
Medium: HSL5GHz
Medium parameters used: f = 5300 MHz; σ = 4.697 S/m; ε_r = 36.988; ρ = 1000 kg/m^3
Ambient Temperature:22.6 ℃ Liquid Temperature:22.6 ℃
Communication System: CW HSL5GHz; Frequency: 5300 MHz; Duty Cycle: 1:1
Probe: EX3DV4 - SN7401ConvF(5.74, 5.74, 5.74); Calibrated: 4/1/2020

System Validation 5300MHz/Area Scan (91x91x1):

Measurement grid: dx=10 mm, dy=10 mm
Maximum value of SAR (Measurement) = 18.1 W/kg

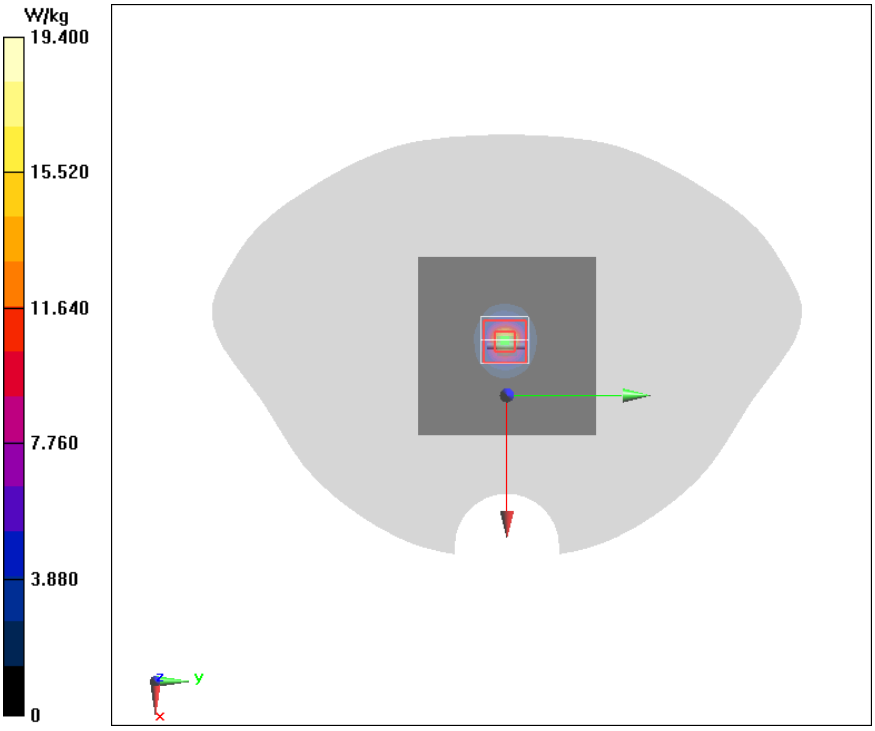
System Validation 5300MHz/Zoom Scan (4x4x1.4mm, graded), dist=1.4mm (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 64.80 V/m; Power Drift = 0.11 dB
Peak SAR (extrapolated) = 29.9 W/kg
SAR(1 g) = 7.33 W/kg; SAR(10 g) = 2.1 W/kg
Maximum of SAR (measured) = 18.8 W/kg



Head 5600MHz

Date/Time: 2020/5/23
Electronics: DAE4 Sn1244
Medium: HSL5GHz
Medium parameters used: f = 5600 MHz; σ = 5.024 S/m; ε_r = 36.426; ρ = 1000 kg/m^3
Ambient Temperature:22.6 ℃ Liquid Temperature:22.6 ℃
Communication System: CW HSL5GHz; Frequency: 5600 MHz; Duty Cycle: 1:1
Probe: EX3DV4 - SN7401ConvF(5.21, 5.21, 5.21); Calibrated: 4/1/2020
System Validation 5600MHz/Area Scan (91x91x1):
Measurement grid: dx=10 mm, dy=10 mm
Maximum value of SAR (Measurement) = 18.8 W/kg
System Validation 5600MHz/Zoom Scan (4x4x1.4mm, graded), dist=1.4mm (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 64.60 V/m; Power Drift = 0.09 dB
Peak SAR (extrapolated) = 32.5 W/kg
SAR(1 g) = 7.39 W/kg; SAR(10 g) = 2.1 W/kg
Maximum of SAR (measured) = 19.4 W/kg



ANNEX C. Calibration Certification

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CNAS L0570

Client : ECIT

Certificate No: Z19-60489

CALIBRATION CERTIFICATE

Object	DAE4 - SN: 1244
Calibration Procedure(s)	FF-Z11-002-01 Calibration Procedure for the Data Acquisition Electronics (DAEx)
Calibration date:	December 17, 2019

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

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

Calibration Equipment used (M&TE critical for calibration)

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

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

Issued: December 18, 2019

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Certificate No: Z19-60489 Page 1 of 3

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Glossary:

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

Methods Applied and Interpretation of Parameters:

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

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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	403.859 ± 0.15% (k=2)	403.595 ± 0.15% (k=2)	404.513 ± 0.15% (k=2)
Low Range	3.95597 ± 0.7% (k=2)	3.97332 ± 0.7% (k=2)	3.98293 ± 0.7% (k=2)

Connector Angle

Connector Angle to be used in DASY system	23.5° ± 1 °

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CALIBRATION
CNAS L0570

Client ECIT Certificate No: Z20-60027

CALIBRATION CERTIFICAT

Object	ES3DV3 - SN : 3252
Calibration Procedure(s)	FF-Z11-004-01 Calibration Procedures for Dosimetric E-field Probes
Calibration date:	January 03, 2020

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
Power Meter NRP2	101919	18-Jun-19(CTTL, No.J19X05125)	Jun-20
Power sensor NRP-Z91	101547	18-Jun-19(CTTL, No.J19X05125)	Jun-20
Power sensor NRP-Z91	101548	18-Jun-19(CTTL, No.J19X05125)	Jun-20
Reference 10dBAttenuator	18N50W-10dB	9-Feb-18(CTTL, No.J18X01133)	Feb-20
Reference 20dBAttenuator	18N50W-20dB	9-Feb-18(CTTL, No.J18X01132)	Feb-20
Reference Probe EX3DV4	SN 7307	24-May-19(SPEAG, No.EX3-7307_May19/2)	May-20
DAE4	SN 1525	26-Aug-19(SPEAG, No.DAE4-1525_Aug19)	Aug-20
Secondary Standards	**ID #**	**Cal Date(Calibrated by, Certificate No.)**	**Scheduled Calibration**
SignalGenerator MG3700A	6201052605	18-Jun-19(CTTL, No.J19X05127)	Jun-20
Network Analyzer E5071C	MY46110673	24-Jan-19(CTTL, No.J19X00547)	Jan-20

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

Issued: January 05, 2020

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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).

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Probe ES3DV3

SN: 3252

Calibrated: January 03, 2020

Calibrated for DASY/EASY Systems

(Note: non-compatible with DASY2 system!)

Certificate No: Z20-60027 Page 3 of 11

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DASY/EASY – Parameters of Probe: ES3DV3 – SN:3252

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm(μV/(V/m)^2) [A]	1.31	1.35	1.33	±10.0%
DCP(mV) [B]	104.4	104.4	104.6	

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	286.5	±2.3%
		Y	0.0	0.0	1.0		282.4	
		Z	0.0	0.0	1.0		282.4	

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 5 and Page 6).
[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 : ES3DV3 – SN:3252

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	6.46	6.46	6.46	0.40	1.40	±12.1%
835	41.5	0.90	6.29	6.29	6.29	0.35	1.62	±12.1%
900	41.5	0.97	6.27	6.27	6.27	0.38	1.57	±12.1%
1750	40.1	1.37	5.36	5.36	5.36	0.64	1.27	±12.1%
1900	40.0	1.40	5.20	5.20	5.20	0.64	1.29	±12.1%
2000	40.0	1.40	5.12	5.12	5.12	0.64	1.31	±12.1%
2300	39.5	1.67	4.94	4.94	4.94	0.90	1.09	±12.1%
2450	39.2	1.80	4.75	4.75	4.75	0.90	1.10	±12.1%
2600	39.0	1.96	4.52	4.52	4.52	0.90	1.10	±12.1%

[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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DASY/EASY – Parameters of Probe : ES3DV3 – SN:3252

Calibration Parameter Determined in Body 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	55.5	0.96	6.45	6.45	6.45	0.36	1.61	±12.1%
835	55.2	0.97	6.25	6.25	6.25	0.35	1.63	±12.1%
900	55.0	1.05	6.23	6.23	6.23	0.46	1.47	±12.1%
1750	53.4	1.49	5.05	5.05	5.05	0.61	1.36	±12.1%
1900	53.3	1.52	4.81	4.81	4.81	0.58	1.41	±12.1%
2000	53.3	1.52	4.86	4.86	4.86	0.65	1.35	±12.1%
2300	52.9	1.81	4.60	4.60	4.60	0.90	1.17	±12.1%
2450	52.7	1.95	4.48	4.48	4.48	0.90	1.15	±12.1%
2600	52.5	2.16	4.27	4.27	4.27	0.90	1.15	±12.1%

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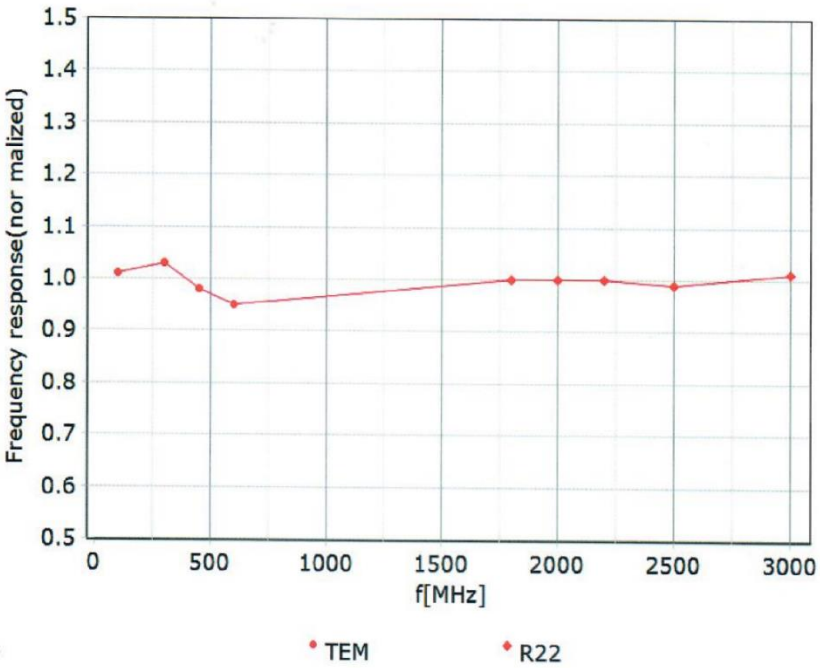
Frequency Response of E-Field
(TEM-Cell: ifi110 EXX, Waveguide: R22)



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

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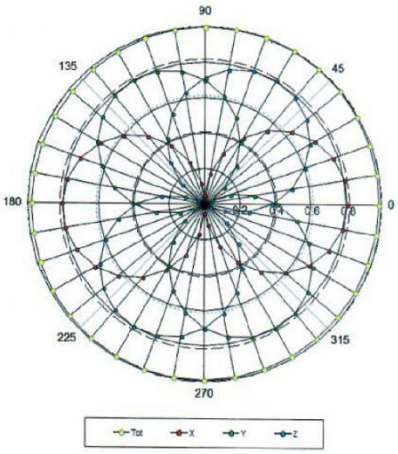
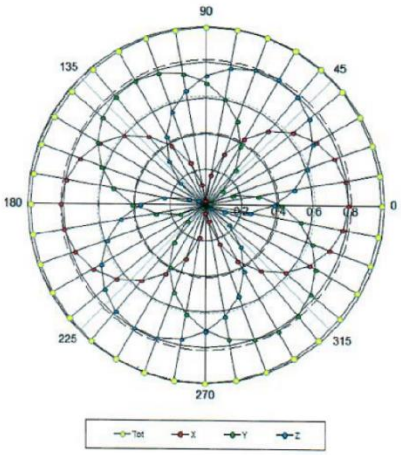
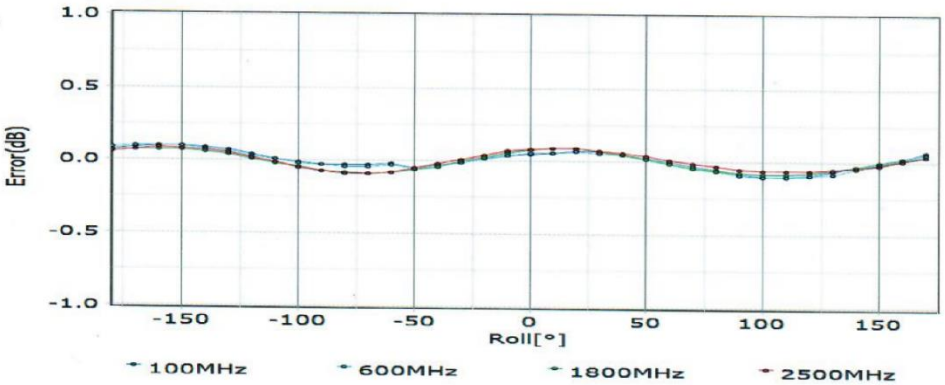
Receiving Pattern (Φ), θ=0°

f=600 MHz, TEM



f=1800 MHz, R22





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

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