

13 Evaluation of Simultaneous

Table 13.1: The sum of reported SAR values for main antenna and WiFi2.4G

	Position	Main antenna	WiFi	Sum
Highest reported SAR value for Head	Left Head, Touch Cheek	0.26 (LTE B5)	0.52	0.78
Highest reported SAR value for Body	Rear 10mm	1.19 (LTE B41)	0.11	1.30
Highest reported SAR value for Body	Bottom 10mm	1.21 (LTE B41)	0.00	1.21

Table 13.1: The sum of reported SAR values for main antenna and BT

	Position	Main antenna	BT	Sum
Maximum reported SAR value for Head	Left Head, Touch Cheek	0.26 (LTE B5)	0.23 ^[1]	0.49
Maximum reported SAR value for Body	Bottom 10mm	1.21 (LTE B41)	0.12 ^[1]	1.33

[1] - Estimated SAR for Bluetooth (see the table 13.3)

Table 13.3: Estimated SAR for Bluetooth

Mode/Band	F (GHz)	Position	Distance (mm)	Upper limit of power *		Estimated _{1g} (W/kg)
				dBm	mW	
Bluetooth	2.441	Head	5	7.5	5.62	0.23
Bluetooth	2.441	Body	10	7.5	5.62	0.12

* - Maximum possible output power declared by manufacturer

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

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

where x = 7.5 for 1-g SAR.

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

Conclusion:

According to the above tables, the sum of reported SAR values is<1.6W/kg. So the simultaneous transmission SAR with volume scans is not required.

14 SAR Test Result

It is performed for all SAR measurements with area scan based 1-g SAR estimation (Fast SAR). A zoom scan measurement is added when the estimated 1-gSAR is the highest measured SAR in each exposure configuration, wireless mode and frequency band combination or more than 1.2W/kg.

The calculated SAR is obtained by the following formula:

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

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

P_{Measured} is the measured power in chapter 11.

Table 14.1: Duty Cycle

Mode	Duty Cycle
GPRS&EGPRS for GSM850	1:4
GPRS&EGPRS for GSM1900 (Low power)	1:8.3
GPRS&EGPRS for GSM1900(Normal power)	1:4
WCDMA<E FDD	1:1
LTE TDD	1:1.58

14.1 SAR results for Fast SAR

We'll perform the head measurement in all bands with the primary SIM card depending on the evaluation of multi-SIM cards and retest on highest value point with other SIM cards. Then, repeat the measurement in the Body test.

Table 14.1: The evaluation of multi-SIM cards for Head Test

Frequency		Side	Test Position	SIM	SAR(1g) (W/kg)	Power Drift(dB)
MHz	Ch.					
836.6	190	Left	Touch	SIM1	0.195	-0.18
836.6	190	Left	Touch	SIM2	0.188	0.01

Note: According to the values in the above table, the **SIM1** is the primary SIM card.

We'll perform the head measurement with the SIM2 and retest on highest value point with others.

Table 14.2: The evaluation of multi-SIM cards for Body Test

Frequency		Test Position	Spacing (mm)	SIM	SAR(1g) (W/kg)	Power Drift(dB)
MHz	Ch.					
848.8	251	Rear	10	SIM1	0.367	-0.05
848.8	251	Rear	10	SIM2	0.353	0.03

Note: According to the values in the above table, the **SIM1** is the primary SIM card.

We'll perform the body measurement with the SIM2 and retest on highest value point with others.

Note:

S1: SIM1

S2: SIM2

H: HS-34 New Leader Industry Co., Ltd

Table 14.1-1: SAR Values (GSM 850 MHz Band - Head)

Ambient Temperature: 22.9°C						Liquid Temperature: 22.5°C					
Frequency		Side	Test Position	Figure No.	Conducted Power (dBm)	Max. tune-up Power (dBm)	Measured SAR(10g) (W/kg)	Reported SAR(10g) (W/kg)	Measured SAR(1g) (W/kg)	Reported SAR(1g) (W/kg)	Power Drift (dB)
Ch.	MHz										
251	848.8	Left	Touch	/	32.21	33	0.153	0.18	0.189	0.23	-0.01
190	836.6	Left	Touch	Fig.1	32.17	33	0.152	0.18	0.195	0.24	-0.18
128	824.2	Left	Touch	/	32.1	33	0.126	0.16	0.156	0.19	0.12
190	836.6	Left	Tilt	/	32.17	33	0.1	0.12	0.124	0.15	-0.17
190	836.6	Right	Touch	/	32.17	33	0.119	0.14	0.153	0.19	-0.09
190	836.6	Right	Tilt	/	32.17	33	0.099	0.12	0.12	0.15	0.15
190	836.6	Left	Touch	S2	32.17	33	0.147	0.18	0.187	0.23	0.06

Note: the head SAR of GSM850 is tested with GPRS (2Txslots) mode because of VoIP.

Table 14.1-2: SAR Values (GSM 850 MHz Band - Body)

Ambient Temperature: 22.9 °C Liquid Temperature: 22.5°C											
Frequency		Mode (number of timeslots)	Test Position	Figure No.	Conducte d Power (dBm)	Max. tune-up Power (dBm)	Measured SAR(10g) (W/kg)	Reported SAR(10g) (W/kg)	Measure d SAR(1g) (W/kg)	Reporte d SAR(1g) (W/kg)	Power Drift (dB)
Ch.	MHz										
190	836.6	GPRS (2)	Front	/	32.17	33	0.12	0.15	0.192	0.23	0.03
251	848.8	GPRS (2)	Rear	Fig.2	32.21	33	0.219	0.26	0.367	0.44	-0.05
190	836.6	GPRS (2)	Rear	/	32.17	33	0.208	0.25	0.359	0.43	-0.01
128	824.2	GPRS (2)	Rear	/	32.10	33	0.166	0.20	0.283	0.35	0.10
190	836.6	GPRS (2)	Left	/	32.17	33	0.112	0.14	0.172	0.21	-0.09
190	836.6	GPRS (2)	Right	/	32.17	33	0.111	0.13	0.168	0.20	-0.16
190	836.6	GPRS (2)	Bottom	/	32.17	33	0.052	0.06	0.104	0.13	0.02
251	848.8	EGPRS (2)	Rear	/	32.15	33	0.214	0.26	0.360	0.43	-0.15
251	848.8	GPRS (2)	Rear	S2	32.21	33	0.187	0.22	0.341	0.41	0.08

Note: The distance between the EUT and the phantom bottom is 10mm.

Table 14.1-3: SAR Values (GSM 1900 MHz Band - Head)

Ambient Temperature: 22.9 °C Liquid Temperature: 22.5°C											
Frequency		Side	Test Position	Figure No.	Conducte d Power (dBm)	Max. tune- up Power (dBm)	Measur ed SAR(10 g) (W/kg)	Reporte d SAR(10 g)(W/kg)	Measur ed SAR(1g) (W/kg)	Reporte d SAR(1g) (W/kg)	Power Drift (dB)
Ch.	MHz										
810	1909.8	Left	Touch	/	29.25	30	0.075	0.09	0.119	0.14	-0.11
661	1880	Left	Touch	/	29.25	30	0.081	0.10	0.129	0.15	0.17
512	1850.2	Left	Touch	Fig.3	29.27	30	0.091	0.11	0.14	0.17	0.13
661	1880	Left	Tilt	/	29.25	30	0.073	0.09	0.126	0.15	-0.12
661	1880	Right	Touch		29.25	30	0.063	0.07	0.1	0.12	-0.17
661	1880	Right	Tilt	/	29.25	30	0.075	0.09	0.122	0.14	-0.03
512	1850.2	Left	Touch	S2	29.27	30	0.087	0.10	0.012	0.01	0.06

Note: the head SAR of GSM1900 is tested with GPRS (2Txslots) mode because of VoIP.

Table 14.1-4: SAR Values (GSM 1900 MHz Band - Body)

Ambient Temperature: 22.9 °C Liquid Temperature: 22.5°C											
Frequency		Mode (number of timeslots)	Test Position	Figure No.	Conducte d Power (dBm)	Max. tune-up Power (dBm)	Measure d SAR(10g) (W/kg)	Report ed SAR(10 g)(W/kg)	Measur ed SAR(1g) (W/kg)	Reported SAR(1g) (W/kg)	Power Drift (dB)
Ch.	MHz										
661	1880	GPRS (2)	Front	/	29.25	30	0.283	0.34	0.459	0.55	0.03
661	1880	GPRS (2)	Rear	Note2	29.25	30	0.207	0.25	0.341	0.41	-0.03
661	1880	GPRS (2)	Left	/	29.25	30	0.072	0.09	0.116	0.14	0.11
661	1880	GPRS (2)	Right		29.25	30	0.113	0.13	0.189	0.22	-0.18

810	1909.8	GPRS (2)	Bottom	Note2	29.25	30	0.233	0.28	0.398	0.47	-0.12
661	1880	GPRS (2)	Bottom	Note2	29.25	30	0.311	0.37	0.534	0.63	0.09
512	1850.2	GPRS (2)	Bottom	Note2	29.27	30	0.356	0.42	0.607	0.72	0.07
661	1880	GPRS (1)	Front	/	30.54	31.5	0.194	0.24	0.3	0.37	-0.18
661	1880	GPRS (1)	Rear	/	30.54	31.5	0.247	0.31	0.447	0.56	0.09
810	1909.8	GPRS (1)	Bottom	/	30.56	31.5	0.294	0.37	0.556	0.69	-0.05
661	1880	GPRS (1)	Bottom	/	30.54	31.5	0.378	0.47	0.699	0.87	-0.16
512	1850.2	GPRS (1)	Bottom	Fig.4	30.56	31.5	0.45	0.56	0.869	1.08	0.01
512	1850.2	EGPRS (1)	Bottom	/	30.61	31.5	0.417	0.51	0.809	0.99	0.06
512	1850.2	GPRS (1)	Bottom	S2	30.56	31.5	0.423	0.53	0.831	1.03	0.07

Note1: The distance between the EUT and the phantom bottom is 10mm

Note2: The distance between the EUT and the phantom bottom is 20mm by sensor (See detail in annex I).

Table 14.1-5: SAR Values (WCDMA 850 MHz Band - Head)

Ambient Temperature: 22.9 °C Liquid Temperature: 22.5°C											
Frequency		Side	Test Position	Figure No.	Conducted Power (dBm)	Max. tune-up Power (dBm)	Measured SAR(10g) (W/kg)	Reported SAR(10g) (W/kg)	Measured SAR(1g) (W/kg)	Reported SAR(1g) (W/kg)	Power Drift (dB)
Ch.	MHz										
4233	846.6	Left	Touch	Fig.5	24.24	25	0.136	0.16	0.173	0.21	-0.14
4183	836.6	Left	Touch	/	24.26	25	0.123	0.15	0.157	0.19	-0.14
4132	826.4	Left	Touch	/	24.27	25	0.113	0.13	0.144	0.17	-0.16
4183	836.6	Left	Tilt	/	24.26	25	0.078	0.09	0.096	0.11	-0.01
4183	836.6	Right	Touch	/	24.26	25	0.112	0.13	0.144	0.17	-0.18
4183	836.6	Right	Tilt		24.26	25	0.078	0.09	0.095	0.11	-0.01
4233	846.6	Left	Touch	S2	24.24	25	0.127	0.15	0.159	0.19	-0.09

Table 14.1-6: SAR Values (WCDMA 850 MHz Band - Body)

Ambient Temperature: 22.9 °C Liquid Temperature: 22.5°C										
Frequency		Test Position	Figure No.	Conducted Power (dBm)	Max. tune-up Power (dBm)	Measured SAR(10g) (W/kg)	Reported SAR(10g) (W/kg)	Measured SAR(1g) (W/kg)	Reported SAR(1g) (W/kg)	Power Drift (dB)
Ch.	MHz									
4183	836.6	Front	/	24.26	25	0.088	0.10	0.146	0.17	0.07
4233	846.6	Rear	Fig.6	24.24	25	0.16	0.19	0.269	0.32	0.02
4183	836.6	Rear	/	24.26	25	0.14	0.17	0.234	0.28	-0.13
4132	826.4	Rear		24.27	25	0.148	0.18	0.209	0.25	-0.11
4183	836.6	Left		24.26	25	0.098	0.12	0.151	0.18	0.06
4183	836.6	Right		24.26	25	0.093	0.11	0.145	0.17	-0.10
4183	836.6	Bottom		24.26	25	0.032	0.04	0.058	0.07	0.00
4233	846.6	Rear	S2	24.24	25	0.147	0.18	0.247	0.29	0.08

Note1: The distance between the EUT and the phantom bottom is 10mm

Table 14.1-7: SAR Values (LTE Band5 - Head)

Ambient Temperature: 22.9 °C Liquid Temperature: 22.5 °C												
Frequency		Mode	Side	Test Position	Figure No.	Conducted Power (dBm)	Max. tune-up Power (dBm)	Measured SAR(10g) (W/kg)	Reported SAR(10g) (W/kg)	Measured SAR(1g) (W/kg)	Reported SAR(1g) (W/kg)	Power Drift (dB)
Ch.	MHz											
20600	844	1RB_Middle	Left	Touch	Fig.7	24.07	25	0.166	0.21	0.21	0.26	-0.15
20600	844	1RB_Middle	Left	Tilt	/	24.07	25	0.103	0.13	0.126	0.16	0.15
20600	844	1RB_Middle	Right	Touch	/	24.07	25	0.141	0.17	0.179	0.22	0.17
20600	844	1RB_Middle	Right	Tilt	/	24.07	25	0.103	0.13	0.126	0.16	-0.01
20525	836.5	25RB_Low	Left	Touch	/	22.98	25	0.112	0.18	0.14	0.22	0.04
20525	836.5	25RB_low	Left	Tilt	/	22.98	25	0.073	0.12	0.088	0.14	-0.04
20525	836.5	25RB_Low	Right	Touch	/	22.98	25	0.104	0.17	0.131	0.21	0.11
20525	836.5	25RB_Low	Right	Tilt	/	22.98	25	0.074	0.12	0.09	0.14	-0.10
20600	844	1RB_Middle	Left	Touch	S2	24.07	25	0.157	0.19	0.187	0.23	-0.03

Note1: The LTE mode is QPSK_10MHz.

Table 14.1-8: SAR Values (LTE Band5- Body)

Ambient Temperature: 22.9 °C Liquid Temperature: 22.5°C											
Frequency		Mode	Test Position	Figure No.	Conducted Power (dBm)	Max. tune-up Power (dBm)	Measured SAR(10g) (W/kg)	Reported SAR(10g) (W/kg)	Measured SAR(1g) (W/kg)	Reported SAR(1g) (W/kg)	Power Drift (dB)
Ch.	MHz										
20600	844	1RB-Middle	Front	/	24.07	25	0.103	0.13	0.173	0.21	-0.08
20600	844	1RB-Middle	Rear	Fig.8	24.07	25	0.164	0.20	0.279	0.35	-0.03
20600	844	1RB-Middle	Left	/	24.07	25	0.109	0.14	0.173	0.21	-0.11
20600	844	1RB-Middle	Right		24.07	25	0.101	0.13	0.162	0.20	0.12
20600	844	1RB-Middle	Bottom		24.07	25	0.04	0.05	0.08	0.10	0.10
20525	836.5	25RB-Low	Front		22.98	24	0.072	0.09	0.124	0.16	-0.14
20525	836.5	25RB-Low	Rear		22.98	24	0.113	0.14	0.195	0.25	-0.18
20525	836.5	25RB-Low	Left		22.98	24	0.079	0.10	0.123	0.16	0.13
20525	836.5	25RB-Low	Right		22.98	24	0.075	0.09	0.119	0.15	-0.17
20525	836.5	25RB-Low	Bottom		22.98	24	0.03	0.04	0.063	0.08	0.17
20600	844	1RB-Middle	Rear	S2	24.07	25	0.153	0.19	0.247	0.31	0.08

Note1: The distance between the EUT and the phantom bottom is 10mm

Note2: The LTE mode is QPSK_10MHz.

Table 14.1-9: SAR Values (LTE Band7 - Head)

Ambient Temperature: 22.9 °C Liquid Temperature: 22.5°C												
Frequency		Mode	Side	Test Position	Figure No.	Conducted Power (dBm)	Max. tune-up Power (dBm)	Measured SAR(10g) (W/kg)	Reported SAR(10g) (W/kg)	Measured SAR(1g) (W/kg)	Reported SAR(1g) (W/kg)	Power Drift (dB)
Ch.	MHz											
21350	2560	1RB-Middle	Left	Touch	/	23.64	24.5	0.038	0.05	0.093	0.11	-0.14
21350	2560	1RB-Middle	Left	Tilt	/	23.64	24.5	0.027	0.03	0.072	0.09	-0.04
21350	2560	1RB-Middle	Right	Touch	Fig.9	23.64	24.5	0.063	0.08	0.169	0.21	-0.06
21350	2560	1RB-Middle	Right	Tilt	/	23.64	24.5	0.016	0.02	0.039	0.05	-0.18
21100	2535	50RB_High	Left	Touch	/	22.58	23.5	0.028	0.03	0.069	0.09	0.04
21100	2535	50RB_High	Left	Tilt	/	22.58	23.5	0.019	0.02	0.051	0.06	-0.13
21100	2535	50RB_High	Right	Touch	/	22.58	23.5	0.055	0.07	0.146	0.18	-0.02
21100	2535	50RB_High	Right	Tilt	/	22.58	23.5	0.014	0.02	0.034	0.04	0.08
21350	2560	1RB-Middle	Right	Touch	S2	23.64	24.5	0.057	0.07	0.158	0.19	0.06

Note1: The LTE mode is QPSK_20MHz.

Table 14.1-10: SAR Values (LTE Band7 - Body)

Ambient Temperature: 22.9 °C Liquid Temperature: 22.5°C											
Frequency		Mode	Test Position	Figure No.	Conducted Power (dBm)	Max. tune-up Power (dBm)	Measured SAR(10g) (W/kg)	Reported SAR(10g)(W/kg)	Measured SAR(1g) (W/kg)	Reported SAR(1g) (W/kg)	Power Drift (dB)
Ch.	MHz										
21350	2560	1RB-Mid	Front	/	23.64	24.5	0.21	0.26	0.396	0.48	0.00
21350	2560	1RB-Mid	Rear	Note2	23.64	24.5	0.269	0.33	0.54	0.66	0.08
21350	2560	1RB-Mid	Left	/	23.64	24.5	0.056	0.07	0.099	0.12	0.09
21350	2560	1RB-Mid	Right	/	23.64	24.5	0.148	0.18	0.271	0.33	-0.06
21350	2560	1RB-Mid	Bottom	Note2	23.64	24.5	0.287	0.35	0.561	0.68	-0.12
21100	2535	50RB_High	Front	/	22.58	23.5	0.145	0.18	0.276	0.34	-0.02
21100	2535	50RB_High	Rear	Note2	22.58	23.5	0.169	0.21	0.345	0.43	0.10
21100	2535	50RB_High	Left	/	22.58	23.5	0.034	0.04	0.061	0.08	-0.14
21100	2535	50RB_High	Right	/	22.58	23.5	0.101	0.12	0.185	0.23	-0.02
21100	2535	50RB_High	Bottom	Note2	22.58	23.5	0.183	0.23	0.371	0.46	0.02
21350	2560	1RB-Mid	Front	/	20.03	21.5	0.124	0.17	0.238	0.33	0.05
21350	2560	1RB-Mid	Rear	Fig.10	20.03	21.5	0.299	0.42	0.649	0.91	-0.13
21100	2535	1RB-Mid	Rear	/	19.94	21.5	0.25	0.36	0.545	0.78	-0.03
20850	2510	1RB-Mid	Rear	/	20.01	21.5	0.204	0.29	0.443	0.62	-0.16
21350	2560	1RB-Mid	Bottom	/	20.03	21.5	0.286	0.40	0.644	0.90	-0.05
21100	2535	1RB-Mid	Bottom		19.94	21.5	0.233	0.33	0.511	0.73	-0.13
20850	2510	1RB-Mid	Bottom		20.01	21.5	0.176	0.25	0.382	0.54	0.08

21100	2535	50RB_High	Front		18.90	20.5	0.087	0.13	0.183	0.26	-0.01
21100	2535	50RB_High	Rear		18.90	20.5	0.203	0.29	0.457	0.66	-0.09
21100	2535	50RB_High	Bottom		18.90	20.5	0.185	0.27	0.418	0.60	0.01
21100	2535	100RB	Rear		19.94	21.5	0.197	0.28	0.43	0.62	0.12
21100	2535	100RB	bottom		19.94	21.5	0.181	0.26	0.4	0.57	0.01
21350	2560	1RB-Mid	Rear	S2	20.03	21.5	0.268	0.38	0.618	0.87	0.08

Note1: The distance between the EUT and the phantom bottom is 10mm.

Note2: The distance between the EUT and the phantom bottom is 20mm by sensor (See detail in annex I).

Note3: The LTE mode is QPSK_20MHz.

Table 14.1-10b: SAR Values (LTE Band7 -Limb SAR)

Frequency		Mode	Test Position	Figure No.	Conducted Power (dBm)	Max. tune-up Power (dBm)	Measured SAR(10g) (W/kg)	Reported SAR(10g) (W/kg)	Measured SAR(1g) (W/kg)	Reported SAR(1g) (W/kg)	Power Drift (dB)
Ch.	MHz										
21350	2560	1RB-Middle	Rear	/	20.03	21.5	2.43	3.41	7.51	10.54	0.14
21100	2535	1RB-Middle	Rear	/	19.94	21.5	2.11	3.02	6.13	8.78	0.03
20850	2510	1RB-Middle	Rear	/	20.01	21.5	2.23	3.14	6.16	8.68	0.05

Note: The distance between the EUT and the phantom bottom is 0mm.

Table 14.1-11: SAR Values (LTE Band41 - Head)

Ambient Temperature: 22.9°C Liquid Temperature: 22.5°C												
Frequency		Mode	Side	Test Position	Figure No.	Conducted Power (dBm)	Max. tune-up Power (dBm)	Measured SAR(10g) (W/kg)	Reported SAR(10g)(W/kg)	Measured SAR(1g) (W/kg)	Reported SAR(1g) (W/kg)	Power Drift (dB)
Ch.	MHz											
40800	2611	1RB-Middle	Left	Touch		23.94	25	0.047	0.06	0.085	0.11	-0.05
40800	2611	1RB-Middle	Left	Tilt	/	23.94	25	0.031	0.04	0.056	0.07	-0.13
40800	2611	1RB-Middle	Right	Touch	Fig.11	23.94	25	0.066	0.08	0.127	0.16	-0.03
40800	2611	1RB-Middle	Right	Tilt	/	23.94	25	<0.01	<0.01	<0.01	<0.01	0.14
41140	2645	50RB-Middle	Left	Touch	/	22.84	24	0.04	0.05	0.075	0.10	0.14
41140	2645	50RB-Middle	Left	Tilt	/	22.84	24	0.029	0.04	0.055	0.07	0.13
41140	2645	50RB-Middle	Right	Touch	/	22.84	24	0.06	0.08	0.118	0.15	-0.10
41140	2645	50RB-Middle	Right	Tilt	/	22.84	24	<0.01	<0.01	<0.01	<0.01	-0.10
40800	2611	1RB-Middle	Right	Touch	S2	23.94	25	0.058	0.07	0.117	0.15	0.09

Note1: The LTE mode is QPSK_20MHz.

Table 14.1-12: SAR Values (LTE Band41 - Body)

Ambient Temperature: 22.9 °C Liquid Temperature: 22.5 °C											
Frequency		Mode	Test Position	Figure No.	Conducted Power (dBm)	Max. tune-up Power (dBm)	Measured SAR(10g) (W/kg)	Reported SAR(10g) (W/kg)	Measured SAR(1g) (W/kg)	Reported SAR(1g) (W/kg)	Power Drift (dB)
Ch.	MHz										
40800	2611	1RB-Middle	Front	/	23.94	25	0.163	0.21	0.309	0.39	0.04
41140	2645	1RB-Middle	Rear		23.87	25	0.395	0.51	0.884	1.15	-0.09
40800	2611	1RB-Middle	Rear		23.94	25	0.329	0.42	0.857	1.09	0.08
40470	2578	1RB-Middle	Rear	/	23.84	25	0.405	0.53	0.911	1.19	-0.14
40140	2545	1RB-Middle	Rear		23.86	25	0.329	0.43	0.742	0.96	-0.18
40800	2611	1RB-Middle	Left		23.94	25	0.029	0.04	0.05	0.06	0.16
40800	2611	1RB-Middle	Right	/	23.94	25	0.026	0.03	0.046	0.06	-0.04
41140	2645	1RB-Middle	Bottom	Fig.12	23.87	25	0.408	0.53	0.931	1.21	0.19
40800	2611	1RB-Middle	Bottom		23.94	25	0.403	0.51	0.877	1.12	-0.15
40470	2578	1RB-Middle	Bottom		23.84	25	0.392	0.51	0.904	1.18	-0.05
40140	2545	1RB-Middle	Bottom		23.86	25	0.296	0.38	0.681	0.89	0.05
41140	2645	50RB-Middle	Front		22.84	24	0.11	0.14	0.22	0.29	-0.10
41140	2645	50RB-Middle	Rear		22.84	24	0.303	0.40	0.665	0.87	-0.05
40800	2611	50RB-Middle	Rear		22.83	24	0.313	0.41	0.702	0.92	0.07
40470	2578	50RB-Middle	Rear		22.72	24	0.296	0.40	0.662	0.89	0.11
40140	2545	50RB-Middle	Rear		22.78	24	0.248	0.33	0.555	0.74	0.14
41140	2645	50RB-Middle	Left		22.84	24	0.026	0.03	0.045	0.06	-0.06
41140	2645	50RB-Middle	Right		22.84	24	0.065	0.08	0.116	0.15	-0.18
41140	2645	50RB-Middle	Bottom		22.84	24	0.303	0.40	0.666	0.87	-0.18
40800	2611	50RB-Middle	Bottom		22.83	24	0.319	0.42	0.729	0.95	0.17
40470	2578	50RB-Middle	Bottom		22.72	24	0.288	0.39	0.666	0.89	-0.15
40140	2545	50RB-Middle	Bottom		22.78	24	0.219	0.29	0.507	0.67	0.03
41140	2645	100RB	Rear		22.84	24	0.279	0.36	0.619	0.81	-0.06
41140	2645	100RB	Bottom		22.84	24	0.3	0.39	0.688	0.90	-0.16
41140	2645	1RB-Middle	Bottom	S2	23.87	25	0.378	0.49	0.867	1.12	0.11
41140	2645	1RB-Middle	Bottom	H	23.87	25	0.307	0.40	0.843	1.09	0.02

Note1: The distance between the EUT and the phantom bottom is 10mm

Note2: The LTE mode is QPSK_20MHz.

14.2 SAR results for Standard procedure

There is zoom scan measurement to be added for the highest measured SAR in each exposure configuration/band.

Table 14.2-1: SAR Values (GSM 850 MHz Band - Head)

Ambient Temperature: 22.9 °C						Liquid Temperature: 22.5°C					
Frequency		Side	Test Position	Figure No.	Conducted Power (dBm)	Max. tune-up Power (dBm)	Measured SAR(10g) (W/kg)	Reported SAR(10g) (W/kg)	Measured SAR(1g) (W/kg)	Reported SAR(1g) (W/kg)	Power Drift (dB)
Ch.	MHz										
190	836.6	Left	Touch	Fig.1	32.17	33	0.152	0.18	0.195	0.24	-0.18

Note: the head SAR of GSM850 is tested with GPRS (2Txslots) mode because of VoIP.

Table 14.2-2: SAR Values (GSM 850 MHz Band - Body)

Ambient Temperature: 22.9 °C						Liquid Temperature: 22.5°C					
Frequency		Mode (number of timeslots)	Test Position	Figure No.	Conducted Power (dBm)	Max. tune-up Power (dBm)	Measured SAR(10g) (W/kg)	Reported SAR(10g) (W/kg)	Measured SAR(1g) (W/kg)	Reported SAR(1g) (W/kg)	Power Drift (dB)
Ch.	MHz										
251	848.8	GPRS (2)	Rear	Fig.2	32.21	33	0.219	0.26	0.367	0.44	-0.05

Note: The distance between the EUT and the phantom bottom is 10mm.

Table 14.2-3: SAR Values (GSM 1900 MHz Band - Head)

Ambient Temperature: 22.9 °C						Liquid Temperature: 22.5°C					
Frequency		Side	Test Position	Figure No.	Conducted Power (dBm)	Max. tune-up Power (dBm)	Measured SAR(10g) (W/kg)	Reported SAR(10g) (W/kg)	Measured SAR(1g) (W/kg)	Reported SAR(1g) (W/kg)	Power Drift (dB)
Ch.	MHz										
512	1850.2	Left	512	Fig.3	29.27	30	0.091	0.11	0.14	0.17	0.13

Note: the head SAR of GSM1900 is tested with GPRS (2Txslots) mode because of VoIP.

Table 14.2-4: SAR Values (GSM 1900 MHz Band - Body)

Ambient Temperature: 22.9 °C						Liquid Temperature: 22.5°C					
Frequency		Mode (number of timeslots)	Test Position	Figure No.	Conducted Power (dBm)	Max. tune-up Power (dBm)	Measured SAR(10g) (W/kg)	Reported SAR(10g) (W/kg)	Measured SAR(1g) (W/kg)	Reported SAR(1g) (W/kg)	Power Drift (dB)
Ch.	MHz										
512	1850.2	GPRS (1)	Bottom	Fig.4	30.56	31.5	0.45	0.56	0.869	1.08	0.01

Note1: The distance between the EUT and the phantom bottom is 10mm

Table 14.2-5: SAR Values (WCDMA 850 MHz Band - Head)

Ambient Temperature: 22.9 °C						Liquid Temperature: 22.5°C					
Frequency		Side	Test Position	Figure No.	Conducted Power (dBm)	Max. tune-up Power (dBm)	Measured SAR(10g) (W/kg)	Reported SAR(10g) (W/kg)	Measured SAR(1g) (W/kg)	Reported SAR(1g) (W/kg)	Power Drift (dB)
Ch.	MHz										
4233	846.6	Left	Touch	Fig.5	24.24	25	0.136	0.16	0.173	0.21	-0.14

Table 14.2-6: SAR Values (WCDMA 850 MHz Band - Body)

Ambient Temperature: 22.9 °C Liquid Temperature: 22.5°C										
Frequency		Test Position	Figure No.	Conducted Power (dBm)	Max. tune-up Power (dBm)	Measured SAR(10g) (W/kg)	Reported SAR(10g) (W/kg)	Measured SAR(1g) (W/kg)	Reported SAR(1g) (W/kg)	Power Drift (dB)
Ch.	MHz									
4233	846.6	Rear	Fig.6	24.24	25	0.16	0.19	0.269	0.32	0.02

Note: The distance between the EUT and the phantom bottom is 10mm.

Table 14.2-7: SAR Values (LTE Band5 - Head)

Ambient Temperature: 22.9°C Liquid Temperature: 22.5°C												
Frequency		Mode	Side	Test Position	Figure No.	Conducted Power (dBm)	Max. tune-up Power (dBm)	Measured SAR(10g) (W/kg)	Reported SAR(10g)(W/kg)	Measured SAR(1g) (W/kg)	Reported SAR(1g) (W/kg)	Power Drift (dB)
Ch.	MHz											
20600	844	1RB_Middle	Left	Touch	Fig.7	24.07	25	0.166	0.21	0.21	0.26	-0.15

Note1: The LTE mode is QPSK_10MHz.

Table 14.2-8: SAR Values (LTE Band5- Body)

Ambient Temperature: 22.9 °C Liquid Temperature: 22.5°C											
Frequency		Mode	Test Position	Figure No.	Conducted Power (dBm)	Max. tune-up Power (dBm)	Measured SAR(10g) (W/kg)	Reported SAR(10g)(W/kg)	Measured SAR(1g) (W/kg)	Reported SAR(1g) (W/kg)	Power Drift (dB)
Ch.	MHz										
20600	844	1RB-Mid	Rear	Fig.8	24.07	25	0.164	0.20	0.279	0.35	-0.03

Note: The distance between the EUT and the phantom bottom is 10mm.

Note2: The LTE mode is QPSK_10MHz.

Table 14.2-9: SAR Values (LTE Band7 - Head)

Ambient Temperature: 22.9°C Liquid Temperature: 22.5°C												
Frequency		Mode	Side	Test Position	Figure No.	Conducted Power (dBm)	Max. tune-up Power (dBm)	Measured SAR(10g) (W/kg)	Reported SAR(10g)(W/kg)	Measured SAR(1g) (W/kg)	Reported SAR(1g) (W/kg)	Power Drift (dB)
Ch.	MHz											
21350	2560	1RB-Mid	Right	Touch	Fig.9	23.64	24.5	0.063	0.08	0.169	0.21	-0.06

Note1: The LTE mode is QPSK_20MHz.

Table 14.2-10: SAR Values (LTE Band7 - Body)

Ambient Temperature: 22.9 °C Liquid Temperature: 22.5°C											
Frequency		Mode	Test Position	Figure No.	Conducted Power (dBm)	Max. tune-up Power (dBm)	Measured SAR(10g) (W/kg)	Reported SAR(10g)(W/kg)	Measured SAR(1g) (W/kg)	Reported SAR(1g) (W/kg)	Power Drift (dB)
Ch.	MHz										
21350	2560	1RB-Mid	Rear	Fig.10	20.03	21.5	0.299	0.42	0.649	0.91	-0.13

Note1: The distance between the EUT and the phantom bottom is 10mm.

Note2: The LTE mode is QPSK_20MHz.

Table 14.2-11: SAR Values (LTE Band41 - Head)

Ambient Temperature: 22.9 °C						Liquid Temperature: 22.5°C						
Frequency		Mode	Side	Test Position	Figure No.	Conducted Power (dBm)	Max. tune-up Power (dBm)	Measured SAR(10g) (W/kg)	Reported SAR(10g) (W/kg)	Measured SAR(1g) (W/kg)	Reported SAR(1g) (W/kg)	Power Drift (dB)
Ch.	MHz											
40800	2611	1RB-Mid	Right	Touch	Fig.11	23.94	25	0.066	0.08	0.127	0.16	-0.03

Note1: The LTE mode is QPSK_20MHz.

Table 14.2-12: SAR Values (LTE Band41 - Body)

Ambient Temperature: 22.9 °C						Liquid Temperature: 22.5°C					
Frequency		Mode	Test Position	Figure No.	Conducte d Power (dBm)	Max. tune-up Power (dBm)	Measure d SAR(10g) (W/kg)	Report ed SAR(1 0g)(W/ kg)	Measure d SAR(1g) (W/kg)	Reporte d SAR(1g) (W/kg)	Powe r Drift (dB)
Ch.	MHz										
41140	2645	1RB-Mid	Bottom	Fig.12	23.87	25	0.408	0.53	0.931	1.21	0.19

Note1: The distance between the EUT and the phantom bottom is 10mm

Note2: The LTE mode is QPSK_20MHz.

14.3 WLAN Evaluation for 2.4G

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

Head Evaluation

Table 14.3-1: SAR Values (WLAN - Head)– 802.11b (Fast SAR)

Ambient Temperature: 22.9 °C						Liquid Temperature: 22.5 °C					
Frequency		Side	Test Position	Figure No.	Conducted Power (dBm)	Max. tune-up Power (dBm)	Measured SAR(10g) (W/kg)	Reported SAR(10g) (W/kg)	Measured SAR(1g) (W/kg)	Reported SAR(1g) (W/kg)	Power Drift (dB)
MHz	Ch.										
2437	6	Left	Touch	/	17.4	18	0.235	0.27	0.45	0.52	-0.09
2437	6	Left	Tilt	/	17.4	18	0.187	0.21	0.387	0.44	0.1
2437	6	Right	Touch	/	17.4	18	0.073	0.08	0.142	0.16	0.02
2437	6	Right	Tilt	/	17.4	18	0.109	0.13	0.213	0.24	0.03
2437	6	Right	Touch	S2	17.4	18	0.218	0.25	0.39	0.45	0.02

As shown above table, the initial test position for head is “Left Touch”. So the head SAR of WLAN is presented as below:

Table 14.3-2: SAR Values (WLAN - Head)– 802.11b (Full SAR)

Ambient Temperature: 22.9 °C						Liquid Temperature: 22.5 °C					
Frequency		Side	Test Position	Figure No.	Conducted Power (dBm)	Max. tune-up Power (dBm)	Measured SAR(10g) (W/kg)	Reported SAR(10g) (W/kg)	Measured SAR(1g) (W/kg)	Reported SAR(1g) (W/kg)	Power Drift (dB)
MHz	Ch.										
2437	6	Left	Touch	Fig.13	17.4	18	0.226	0.26	0.456	0.52	-0.09
2437	6	Left	Tilt	/	16.10	16.5	0.178	0.20	0.394	0.45	0.1

Note1: When the reported SAR of the initial test position is > 0.4 W/kg, SAR is repeated for the 802.11 transmission mode configuration tested in the initial test position using subsequent highest estimated 1-g SAR conditions determined by area scans, on the highest maximum output power channel, until the reported SAR is ≤ 0.8 W/kg.
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. The scaled reported SAR is presented as below.

Table 14.3-3: SAR Values (WLAN - Head) – 802.11b (Scaled Reported SAR)

Ambient Temperature: 22.9 °C				Liquid Temperature: 22.5°C			
Frequency		Side	Test Position	Actual duty factor	maximum duty factor	Reported SAR (1g)(W/kg)	Scaled reported SAR (1g)(W/kg)
MHz	Ch.						
2437	6	Left	Touch	100%	100%	0.52	0.52

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

Body Evaluation

Table 14.3-4: SAR Values (WLAN - Body)– 802.11b (Fast SAR)

Ambient Temperature: 22.9 °C					Liquid Temperature: 22.5°C					
Frequency		Test Position	Figure No.	Conducted Power (dBm)	Max. tune-up Power (dBm)	Measured SAR(10g) (W/kg)	Reported SAR(10g) (W/kg)	Measured SAR(1g) (W/kg)	Reported SAR(1g)(W/kg)	Power Drift (dB)
MHz	Ch.									
2437	6	Front	/	17.4	18	0.051	0.05	0.094	0.09	-0.07
2437	6	Rear	/	17.4	18	0.064	0.07	0.121	0.14	0.01
2437	6	Right	/	17.4	18	0.056	0.06	0.106	0.12	-0.03
2437	6	Top	/	17.4	18	0.036	0.04	0.081	0.09	0.02
2437	6	Rear	S2	17.4	18	0.058	0.07	0.113	0.13	0.05

As shown above table, the initial test position for body is “Rear”. So the body SAR of WLAN is presented as below:

Table 14.3-5: SAR Values (WLAN - Body)– 802.11b (Full SAR)

Ambient Temperature: 22.9 °C					Liquid Temperature: 22.5°C					
Frequency		Test Position	Figure No.	Conducted Power (dBm)	Max. tune-up Power (dBm)	Measured SAR(10g) (W/kg)	Reported SAR(10g) (W/kg)	Measured SAR(1g) (W/kg)	Reported SAR(1g)(W/kg)	Power Drift (dB)
MHz	Ch.									
2437	6	Rear	Fig.14	17.4	18	0.06	0.06	0.112	0.11	-0.07

Note1: When the reported SAR of the initial test position is > 0.4 W/kg, SAR is repeated for the 802.11 transmission mode configuration tested in the initial test position using subsequent highest estimated 1-g SAR conditions determined by area scans, on the highest maximum output power channel, until the reported SAR is $\leq$ 0.8 W/kg.

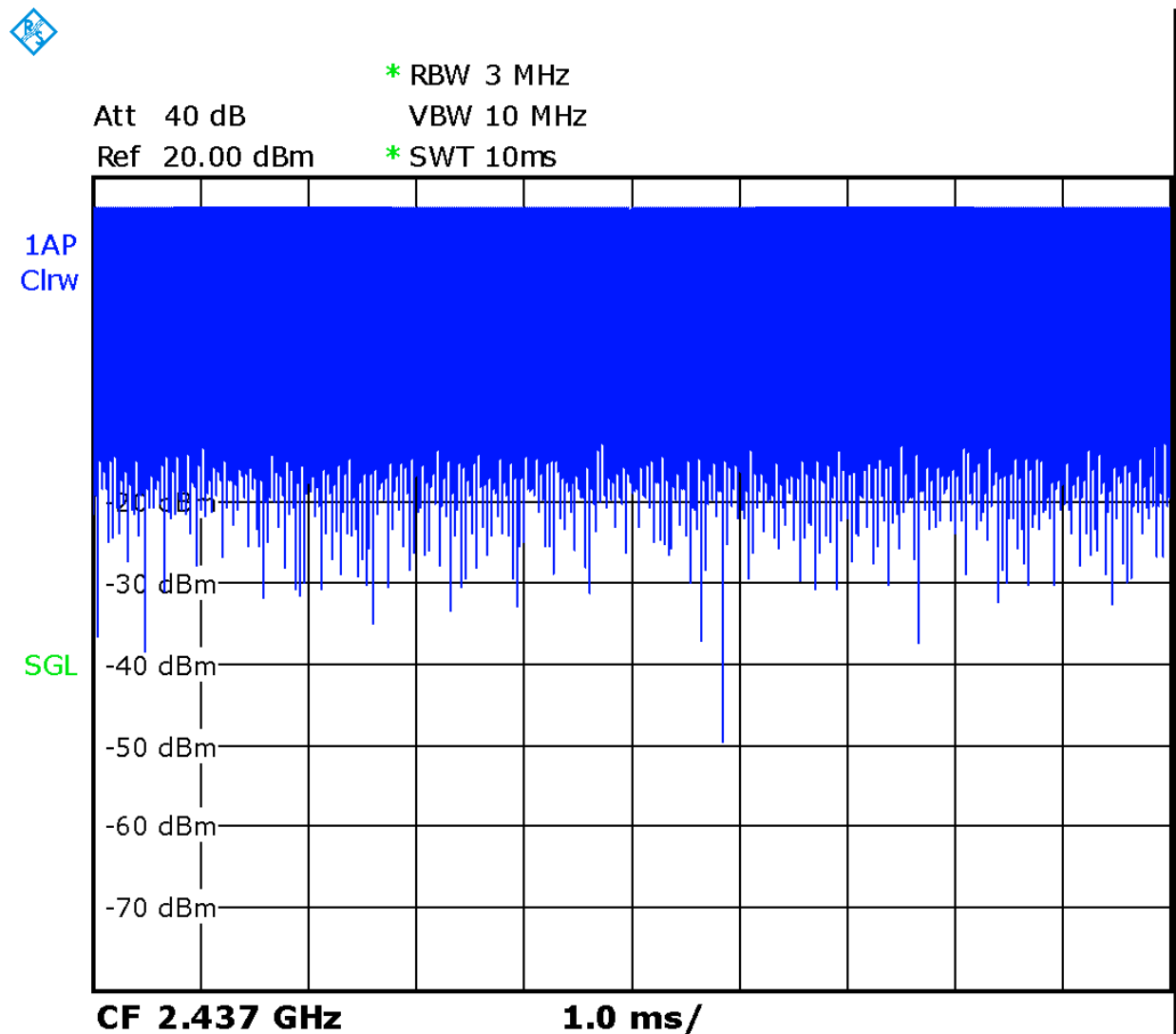
Note2: For all positions/configurations tested using the initial test position and subsequent test positions, when the reported SAR is > 0.8 W/kg, SAR is measured for these test positions/configurations on the subsequent next highest measured output power channel until the reported SAR is $\leq$ 1.2 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. The scaled reported SAR is presented as below.

Table 14.3-6: SAR Values (WLAN - Body) – 802.11b (Scaled Reported SAR)

Ambient Temperature: 22.9 °C				Liquid Temperature: 22.5°C		
Frequency		Test Position	Actual duty factor	maximum duty factor	Reported SAR (1g)(W/kg)	Scaled reported SAR (1g)(W/kg)
MHz	Ch.					
2437	6	Rear	100%	100%	0.11	0.11

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



Picture 14.1 Duty factor plot

15 SAR Measurement Variability

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

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

- 1) Repeated measurement is not required when the original highest measured SAR is < 0.80 W/kg; steps 2) through 4) do not apply.
- 2) When the original highest measured SAR is ≥ 0.80 W/kg, repeat that measurement once.
- 3) Perform a second repeated measurement only if the ratio of largest to smallest SAR for the original and first repeated measurements is > 1.20 or when the original or repeated measurement is ≥ 1.45 W/kg ($\sim 10\%$ from the 1-g SAR limit).
- 4) Perform a third repeated measurement only if the original, first or second repeated measurement is ≥ 1.5 W/kg and the ratio of largest to smallest SAR for the original, first and second repeated measurements is > 1.20 .

Mode	CH	Freq	Test Poisition	Original SAR (W/kg)	First Repeated SAR(W/kg)	The Ratio
GSM 1900	512	1850.2 MHz	Bottom 10mm	0.869	0.857	1.01
LTE Band41	41140	2645 MHz	Bottom 10mm	0.931	0.919	1.01

16 Measurement Uncertainty

16.1 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	6.0	N	1	1	1	6.0	6.0	∞
2	Isotropy	B	4.7	R	$\sqrt{3}$	0.7	0.7	1.9	1.9	∞
3	Boundary effect	B	1.0	R	$\sqrt{3}$	1	1	0.6	0.6	∞
4	Linearity	B	4.7	R	$\sqrt{3}$	1	1	2.7	2.7	∞
5	Detection limit	B	1.0	N	1	1	1	0.6	0.6	∞
6	Readout electronics	B	0.3	R	$\sqrt{3}$	1	1	0.3	0.3	∞
7	Response time	B	0.8	R	$\sqrt{3}$	1	1	0.5	0.5	∞
8	Integration time	B	2.6	R	$\sqrt{3}$	1	1	1.5	1.5	∞
9	RF ambient conditions-noise	B	0	R	$\sqrt{3}$	1	1	0	0	∞
10	RF ambient conditions-reflection	B	0	R	$\sqrt{3}$	1	1	0	0	∞
11	Probe positioned mech. restrictions	B	0.4	R	$\sqrt{3}$	1	1	0.2	0.2	∞
12	Probe positioning with respect to phantom shell	B	2.9	R	$\sqrt{3}$	1	1	1.7	1.7	∞
13	Post-processing	B	1.0	R	$\sqrt{3}$	1	1	0.6	0.6	∞
Test sample related										
14	Test sample positioning	A	3.3	N	1	1	1	3.3	3.3	71
15	Device holder uncertainty	A	3.4	N	1	1	1	3.4	3.4	5
16	Drift of output power	B	5.0	R	$\sqrt{3}$	1	1	2.9	2.9	∞
Phantom and set-up										
17	Phantom uncertainty	B	4.0	R	$\sqrt{3}$	1	1	2.3	2.3	∞
18	Liquid conductivity (target)	B	5.0	R	$\sqrt{3}$	0.64	0.43	1.8	1.2	∞
19	Liquid conductivity (meas.)	A	2.06	N	1	0.64	0.43	1.32	0.89	43
20	Liquid permittivity (target)	B	5.0	R	$\sqrt{3}$	0.6	0.49	1.7	1.4	∞
21	Liquid permittivity (meas.)	A	1.6	N	1	0.6	0.49	1.0	0.8	521

Combined standard uncertainty	$u_c = \sqrt{\sum_{i=1}^{21} c_i^2 u_i^2}$					9.55	9.43	257
Expanded uncertainty (confidence interval of 95 %)	$u_e = 2u_c$					19.1	18.9	

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

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	6.55	N	1	1	1	6.55	6.55	∞
2	Isotropy	B	4.7	R	$\sqrt{3}$	0.7	0.7	1.9	1.9	∞
3	Boundary effect	B	2.0	R	$\sqrt{3}$	1	1	1.2	1.2	∞
4	Linearity	B	4.7	R	$\sqrt{3}$	1	1	2.7	2.7	∞
5	Detection limit	B	1.0	R	$\sqrt{3}$	1	1	0.6	0.6	∞
6	Readout electronics	B	0.3	R	$\sqrt{3}$	1	1	0.3	0.3	∞
7	Response time	B	0.8	R	$\sqrt{3}$	1	1	0.5	0.5	∞
8	Integration time	B	2.6	R	$\sqrt{3}$	1	1	1.5	1.5	∞
9	RF ambient conditions-noise	B	0	R	$\sqrt{3}$	1	1	0	0	∞
10	RF ambient conditions-reflection	B	0	R	$\sqrt{3}$	1	1	0	0	∞
11	Probe positioned mech. restrictions	B	0.8	R	$\sqrt{3}$	1	1	0.5	0.5	∞
12	Probe positioning with respect to phantom shell	B	6.7	R	$\sqrt{3}$	1	1	3.9	3.9	∞
13	Post-processing	B	4.0	R	$\sqrt{3}$	1	1	2.3	2.3	∞
Test sample related										
14	Test sample positioning	A	3.3	N	1	1	1	3.3	3.3	71
15	Device holder uncertainty	A	3.4	N	1	1	1	3.4	3.4	5
16	Drift of output power	B	5.0	R	$\sqrt{3}$	1	1	2.9	2.9	∞
Phantom and set-up										
17	Phantom uncertainty	B	4.0	R	$\sqrt{3}$	1	1	2.3	2.3	∞
18	Liquid conductivity (target)	B	5.0	R	$\sqrt{3}$	0.64	0.43	1.8	1.2	∞
19	Liquid conductivity (meas.)	A	2.06	N	1	0.64	0.43	1.32	0.89	43
20	Liquid permittivity (target)	B	5.0	R	$\sqrt{3}$	0.6	0.49	1.7	1.4	∞

21	Liquid permittivity (meas.)	A	1.6	N	1	0.6	0.49	1.0	0.8	521
Combined standard uncertainty		$u'_c = \sqrt{\sum_{i=1}^{21} c_i^2 u_i^2}$						10.7	10.6	257
Expanded uncertainty (confidence interval of 95 %)		$u_e = 2u_c$						21.4	21.1	

16.3 Measurement Uncertainty for Fast 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	6.0	N	1	1	1	6.0	6.0	∞
2	Isotropy	B	4.7	R	$\sqrt{3}$	0.7	0.7	1.9	1.9	∞
3	Boundary effect	B	1.0	R	$\sqrt{3}$	1	1	0.6	0.6	∞
4	Linearity	B	4.7	R	$\sqrt{3}$	1	1	2.7	2.7	∞
5	Detection limit	B	1.0	R	$\sqrt{3}$	1	1	0.6	0.6	∞
6	Readout electronics	B	0.3	R	$\sqrt{3}$	1	1	0.3	0.3	∞
7	Response time	B	0.8	R	$\sqrt{3}$	1	1	0.5	0.5	∞
8	Integration time	B	2.6	R	$\sqrt{3}$	1	1	1.5	1.5	∞
9	RF ambient conditions-noise	B	0	R	$\sqrt{3}$	1	1	0	0	∞
10	RF ambient conditions-reflection	B	0	R	$\sqrt{3}$	1	1	0	0	∞
11	Probe positioned mech. Restrictions	B	0.4	R	$\sqrt{3}$	1	1	0.2	0.2	∞
12	Probe positioning with respect to phantom shell	B	2.9	R	$\sqrt{3}$	1	1	1.7	1.7	∞
13	Post-processing	B	1.0	R	$\sqrt{3}$	1	1	0.6	0.6	∞
14	Fast SAR z-Approximation	B	7.0	R	$\sqrt{3}$	1	1	4.0	4.0	∞
Test sample related										
15	Test sample positioning	A	3.3	N	1	1	1	3.3	3.3	71
16	Device holder uncertainty	A	3.4	N	1	1	1	3.4	3.4	5
17	Drift of output power	B	5.0	R	$\sqrt{3}$	1	1	2.9	2.9	∞
Phantom and set-up										
18	Phantom uncertainty	B	4.0	R	$\sqrt{3}$	1	1	2.3	2.3	∞
19	Liquid conductivity (target)	B	5.0	R	$\sqrt{3}$	0.64	0.43	1.8	1.2	∞

20	Liquid conductivity (meas.)	A	2.06	N	1	0.64	0.43	1.32	0.89	43
21	Liquid permittivity (target)	B	5.0	R	$\sqrt{3}$	0.6	0.49	1.7	1.4	∞
22	Liquid permittivity (meas.)	A	1.6	N	1	0.6	0.49	1.0	0.8	521
Combined standard uncertainty		$u_c' = \sqrt{\sum_{i=1}^{22} c_i^2 u_i^2}$						10.4	10.3	257
Expanded uncertainty (confidence interval of 95 %)		$u_e = 2u_c$						20.8	20.6	

16.4 Measurement Uncertainty for Fast SAR Tests (3~6GHz)

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	6.55	N	1	1	1	6.55	6.55	∞
2	Isotropy	B	4.7	R	$\sqrt{3}$	0.7	0.7	1.9	1.9	∞
3	Boundary effect	B	2.0	R	$\sqrt{3}$	1	1	1.2	1.2	∞
4	Linearity	B	4.7	R	$\sqrt{3}$	1	1	2.7	2.7	∞
5	Detection limit	B	1.0	R	$\sqrt{3}$	1	1	0.6	0.6	∞
6	Readout electronics	B	0.3	R	$\sqrt{3}$	1	1	0.3	0.3	∞
7	Response time	B	0.8	R	$\sqrt{3}$	1	1	0.5	0.5	∞
8	Integration time	B	2.6	R	$\sqrt{3}$	1	1	1.5	1.5	∞
9	RF ambient conditions-noise	B	0	R	$\sqrt{3}$	1	1	0	0	∞
10	RFambient conditions-reflection	B	0	R	$\sqrt{3}$	1	1	0	0	∞
11	Probe positioned mech. Restrictions	B	0.8	R	$\sqrt{3}$	1	1	0.5	0.5	∞
12	Probe positioning with respect to phantom shell	B	6.7	R	$\sqrt{3}$	1	1	3.9	3.9	∞
13	Post-processing	B	1.0	R	$\sqrt{3}$	1	1	0.6	0.6	∞
14	Fast SAR z-Approximation	B	14.0	R	$\sqrt{3}$	1	1	8.1	8.1	∞
Test sample related										
15	Test sample positioning	A	3.3	N	1	1	1	3.3	3.3	71
16	Device holder uncertainty	A	3.4	N	1	1	1	3.4	3.4	5

17	Drift of output power	B	5.0	R	$\sqrt{3}$	1	1	2.9	2.9	∞
Phantom and set-up										
18	Phantom uncertainty	B	4.0	R	$\sqrt{3}$	1	1	2.3	2.3	∞
19	Liquid conductivity (target)	B	5.0	R	$\sqrt{3}$	0.64	0.43	1.8	1.2	∞
20	Liquid conductivity (meas.)	A	2.06	N	1	0.64	0.43	1.32	0.89	43
21	Liquid permittivity (target)	B	5.0	R	$\sqrt{3}$	0.6	0.49	1.7	1.4	∞
22	Liquid permittivity (meas.)	A	1.6	N	1	0.6	0.49	1.0	0.8	521
Combined standard uncertainty		$u_c' = \sqrt{\sum_{i=1}^{22} c_i^2 u_i^2}$						13.5	13.4	257
Expanded uncertainty (confidence interval of 95 %)		$u_e = 2u_c$						27.0	26.8	

17 MAIN TEST INSTRUMENTS

Table 17.1: List of Main Instruments

No.	Name	Type	Serial Number	Calibration Date	Valid Period
01	Network analyzer	N5239A	MY46110673	January 24, 2020	One year
02	Power meter	NRP2	106277	September 4, 2019	One year
03	Power sensor	NRP8S	104291		
04	Signal Generator	E4438C	MY49070393	January 4, 2020	One Year
05	Amplifier	60S1G4	0331848	No Calibration Requested	
06	BTS	CMW500	129942	February 10, 2020	One year
07	E-field Probe	SPEAG EX3DV4	3617	Jan 30, 2020	One year
08	DAE	SPEAG DAE4	777	Jan 8, 2020	One year
09	Dipole Validation Kit	SPEAG D835V2	4d069	July 18,2019	One year
10	Dipole Validation Kit	SPEAG D1900V2	5d101	July 17,2019	One year
11	Dipole Validation Kit	SPEAG D2450V2	853	July 17,2019	One year
12	Dipole Validation Kit	SPEAG D2600V2	1012	July 17,2019	One year

END OF REPORT BODY

ANNEX A Graph Results

GSM850_CH190 Left Cheek

Date: 6/25/2020

Electronics: DAE4 Sn777

Medium: body 835 MHz

Medium parameters used: $f = 836.6$; $\sigma = 0.909$ mho/m; $\epsilon_r = 41.63$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.5°C, Liquid Temperature: 22.3°C

Communication System: GSM850 836.6MHz Duty Cycle: 1:4

Probe: EX3DV4 – SN3617 ConvF(9.66,9.66,9.66)

Area Scan (71x121x1): Interpolated grid: $dx=1.000$ mm, $dy=1.000$ mm

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

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

Reference Value = 4.655 V/m; Power Drift = -0.18 dB

Peak SAR (extrapolated) = 0.251 W/kg

SAR(1 g) = 0.195 W/kg; SAR(10 g) = 0.152 W/kg

Maximum value of SAR (measured) = 0.229 W/kg

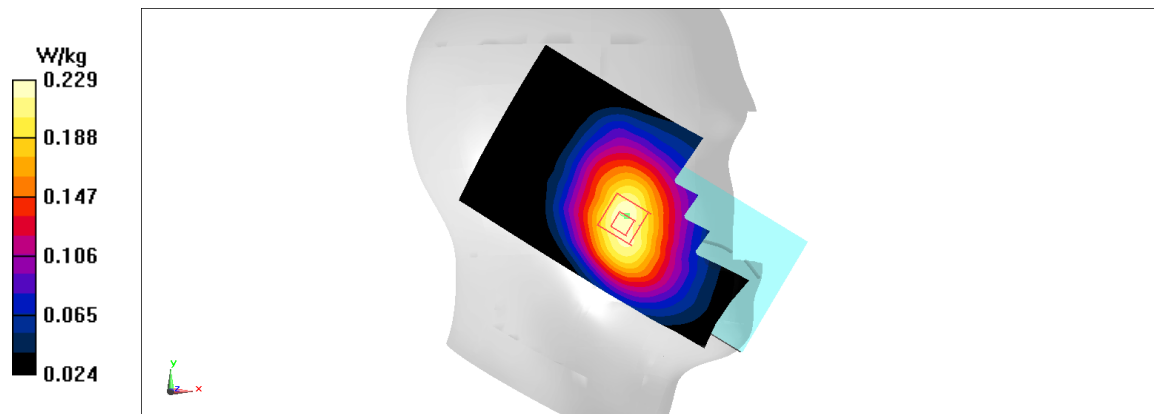


Fig A.1

GSM850_CH251 Rear

Date: 6/25/2020

Electronics: DAE4 Sn777

Medium: body 835 MHz

Medium parameters used: $f = 848.8\text{MHz}$; $\sigma = 0.92\text{ mho/m}$; $\epsilon_r = 41.61$; $\rho = 1000\text{ kg/m}^3$

Ambient Temperature: 22.5°C, Liquid Temperature: 22.3°C

Communication System: GSM850 848.8MHz Duty Cycle: 1:4

Probe: EX3DV4 – SN3617 ConvF(9.66,9.66,9.66)

Area Scan (71x121x1): Interpolated grid: $dx=1.000\text{ mm}$, $dy=1.000\text{ mm}$

Maximum value of SAR (interpolated) = 0.566 W/kg

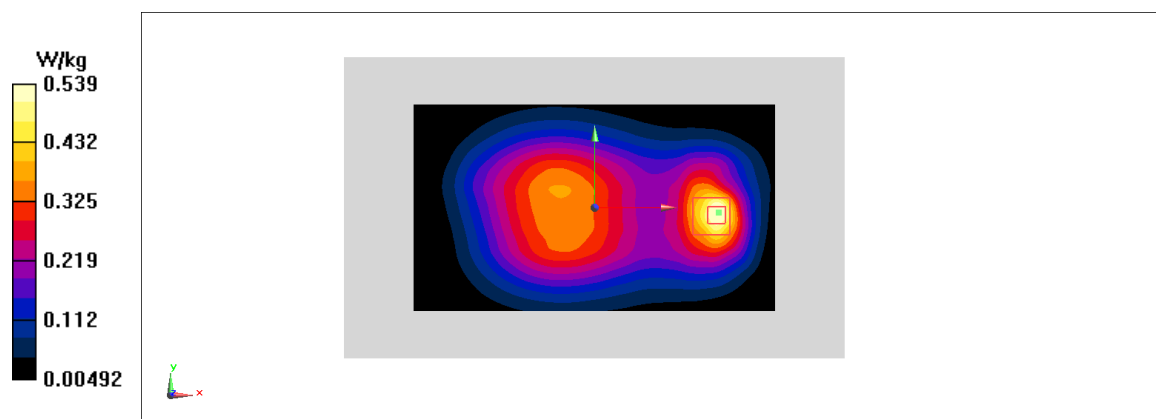
Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 19.93 V/m; Power Drift = -0.05 dB

Peak SAR (extrapolated) = 0.654 W/kg

SAR(1 g) = 0.367 W/kg; SAR(10 g) = 0.219 W/kg

Maximum value of SAR (measured) = 0.539 W/kg


Fig A.2

PCS1900_CH512 Left Cheek

Date: 6/26/2020

Electronics: DAE4 Sn777

Medium: body 1900 MHz

Medium parameters used: $f = 1850.2$; $\sigma = 1.328$ mho/m; $\epsilon_r = 40.01$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.5°C, Liquid Temperature: 22.3°C

Communication System: PCS1900 1850.2MHz Duty Cycle: 1:4

Probe: EX3DV4 – SN3617 ConvF(8.14,8.14,8.14)

Area Scan (71x121x1): Interpolated grid: $dx=1.000$ mm, $dy=1.000$ mm

Maximum value of SAR (interpolated) = 0.245 W/kg

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

Reference Value = 1.339 V/m; Power Drift = 0.13 dB

Peak SAR (extrapolated) = 0.215 W/kg

SAR(1 g) = 0.14 W/kg; SAR(10 g) = 0.091 W/kg

Maximum value of SAR (measured) = 0.179 W/kg

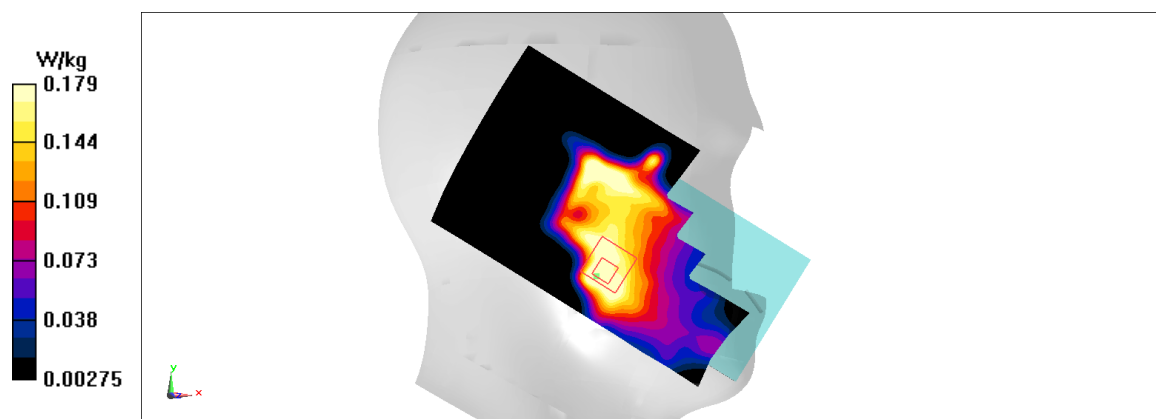


Fig A.3

PCS1900_CH512 Bottom

Date: 6/26/2020

Electronics: DAE4 Sn777

Medium: body 1900 MHz

Medium parameters used: $f = 1850.2$; $\sigma = 1.328$ mho/m; $\epsilon_r = 40.01$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.5°C, Liquid Temperature: 22.3°C

Communication System: PCS1900 1850.2MHz Duty Cycle: 1:8.3

Probe: EX3DV4 – SN3617 ConvF(8.14,8.14,8.14)

Area Scan (71x121x1): Interpolated grid: $dx=1.000$ mm, $dy=1.000$ mm

Maximum value of SAR (interpolated) = 1.32 W/kg

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

Reference Value = 30.19 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 1.59 W/kg

SAR(1 g) = 0.869 W/kg; SAR(10 g) = 0.45 W/kg

Maximum value of SAR (measured) = 1.32 W/kg

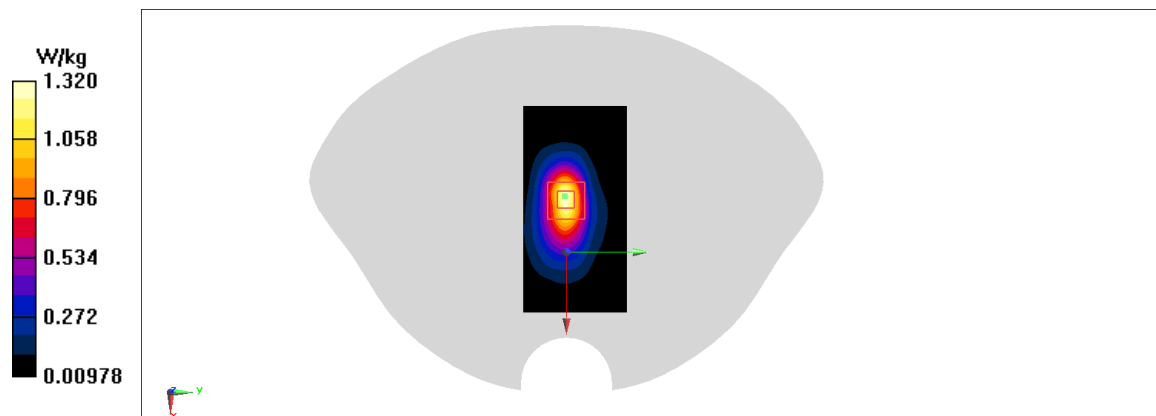


Fig A.4

WCDMA850-BV_CH4233 Left Cheek

Date: 6/25/2020

Electronics: DAE4 Sn777

Medium: body 835 MHz

Medium parameters used: $f = 846.6$; $\sigma = 0.918$ mho/m; $\epsilon_r = 41.62$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.5°C, Liquid Temperature: 22.3°C

Communication System: WCDMA850-BV 846.6MHz Duty Cycle: 1:1

Probe: EX3DV4 – SN3617 ConvF(9.66,9.66,9.66)

Area Scan (71x121x1): Interpolated grid: $dx=1.000$ mm, $dy=1.000$ mm

Maximum value of SAR (interpolated) = 0.203 W/kg

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

Reference Value = 2.95 V/m; Power Drift = -0.14 dB

Peak SAR (extrapolated) = 0.22 W/kg

SAR(1 g) = 0.173 W/kg; SAR(10 g) = 0.136 W/kg

Maximum value of SAR (measured) = 0.202W/kg

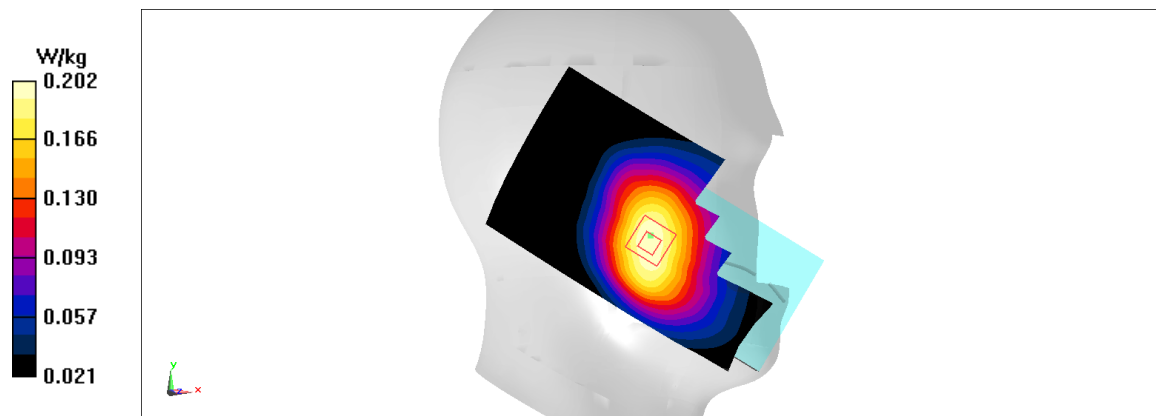


Fig A.5

WCDMA850-BV_CH4233 Rear

Date: 6/25/2020

Electronics: DAE4 Sn777

Medium: body 835 MHz

Medium parameters used: $f = 846.6$; $\sigma = 0.918$ mho/m; $\epsilon_r = 41.62$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.5°C, Liquid Temperature: 22.3°C

Communication System: WCDMA850-BV 846.6MHz Duty Cycle: 1:1

Probe: EX3DV4 – SN3617 ConvF(9.66,9.66,9.66)

Area Scan (71x121x1): Interpolated grid: $dx=1.000$ mm, $dy=1.000$ mm

Maximum value of SAR (interpolated) = 0.422 W/kg

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

Reference Value = 18.07 V/m; Power Drift = 0.02 dB

Peak SAR (extrapolated) = 0.489 W/kg

SAR(1 g) = 0.269 W/kg; SAR(10 g) = 0.16 W/kg

Maximum value of SAR (measured) = 0.390 W/kg

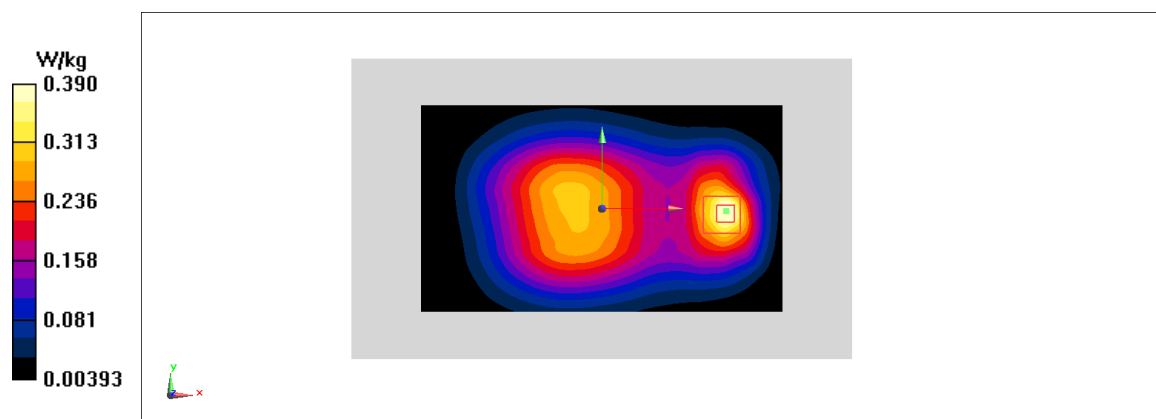


Fig A.6

LTE850-FDD5_CH20600 Left Cheek

Date: 6/25/2020

Electronics: DAE4 Sn777

Medium: body 835 MHz

Medium parameters used: $f = 844 \text{ MHz}$; $\sigma = 0.916 \text{ mho/m}$; $\epsilon_r = 41.62$; $\rho = 1000 \text{ kg/m}^3$

Ambient Temperature: 22.5°C , Liquid Temperature: 22.3°C

Communication System: LTE850-FDD5 844 MHz Duty Cycle: 1:1

Probe: EX3DV4 – SN3617 ConvF(9.66,9.66,9.66)

Area Scan (71x121x1): Interpolated grid: $dx=1.000 \text{ mm}$, $dy=1.000 \text{ mm}$

Maximum value of SAR (interpolated) = 0.244 W/kg

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

Reference Value = 3.362 V/m ; Power Drift = -0.15 dB

Peak SAR (extrapolated) = 0.267 W/kg

SAR(1 g) = 0.21 W/kg ; SAR(10 g) = 0.166 W/kg

Maximum value of SAR (measured) = 0.247 W/kg

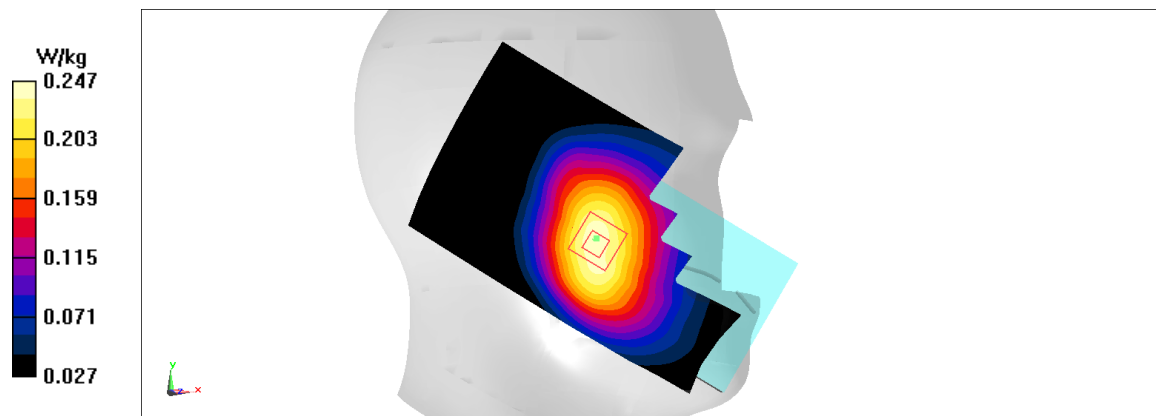


Fig A.7

LTE850-FDD5_CH20600 Rear

Date: 6/25/2020

Electronics: DAE4 Sn777

Medium: body 835 MHz

Medium parameters used: $f = 844 \text{ MHz}$; $\sigma = 0.916 \text{ mho/m}$; $\epsilon_r = 41.62$; $\rho = 1000 \text{ kg/m}^3$

Ambient Temperature: 22.5°C, Liquid Temperature: 22.3°C

Communication System: LTE850-FDD5 844 MHz Duty Cycle: 1:1

Probe: EX3DV4 – SN3617 ConvF(9.66,9.66,9.66)

Area Scan (71x121x1): Interpolated grid: $dx=1.000 \text{ mm}$, $dy=1.000 \text{ mm}$

Maximum value of SAR (interpolated) = 0.401 W/kg

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

Reference Value = 19.38 V/m; Power Drift = -0.03 dB

Peak SAR (extrapolated) = 0.51 W/kg

SAR(1 g) = 0.279 W/kg; SAR(10 g) = 0.164 W/kg

Maximum value of SAR (measured) = 0.406 W/kg

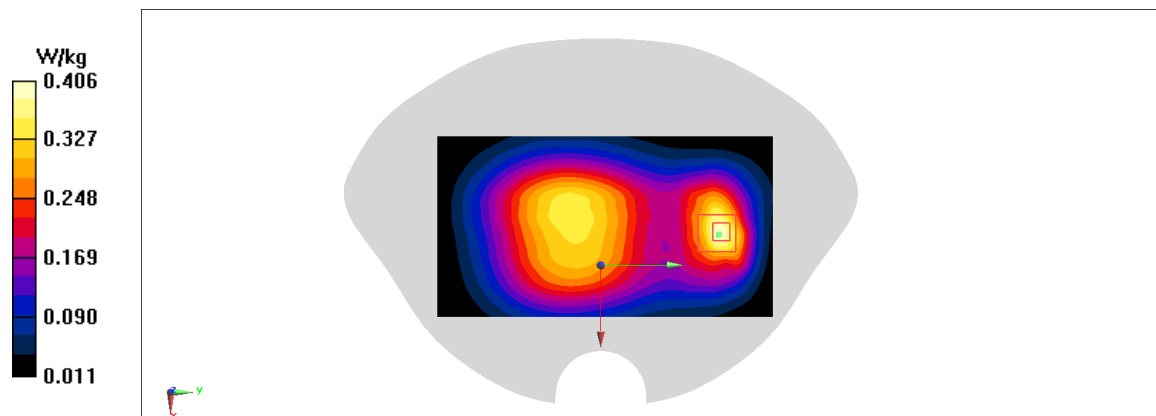


Fig A.8

LTE2500-FDD7_CH21350 Right Cheek

Date: 6/28/2020

Electronics: DAE4 Sn777

Medium: body 2600 MHz

Medium parameters used: $f = 2560$ MHz; $\sigma = 1.897$ mho/m; $\epsilon_r = 38.41$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.5°C, Liquid Temperature: 22.3°C

Communication System: LTE2500-FDD7 2560 MHz Duty Cycle: 1:1

Probe: EX3DV4 – SN3617 ConvF(7.65,7.65,7.65)

Area Scan (71x121x1): Interpolated grid: $dx=1.000$ mm, $dy=1.000$ mm

Maximum value of SAR (interpolated) = 0.279 W/kg

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

Reference Value = 2.588 V/m; Power Drift = -0.06 dB

Peak SAR (extrapolated) = 0.293 W/kg

SAR(1 g) = 0.169 W/kg; SAR(10 g) = 0.063 W/kg

Maximum value of SAR (measured) = 0.264 W/kg

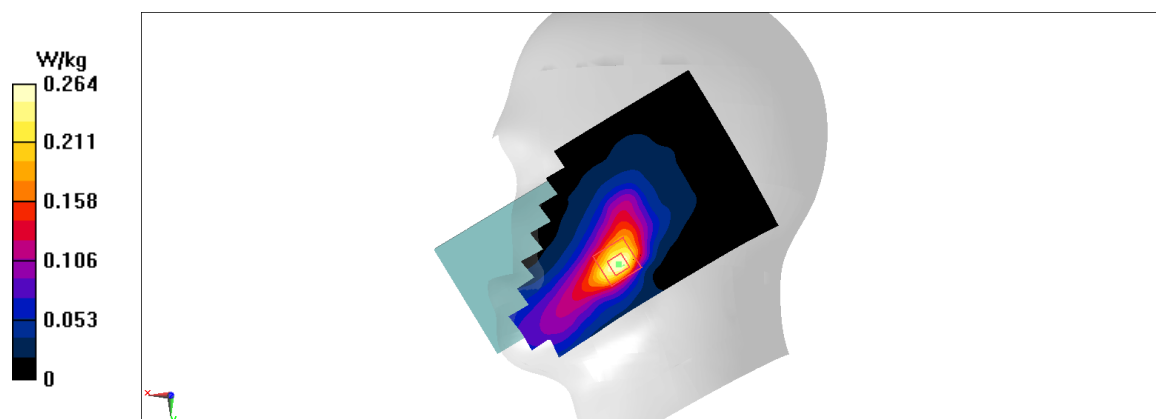


Fig A.9

LTE2500-FDD7_CH21350 Rear

Date: 6/28/2020

Electronics: DAE4 Sn777

Medium: body 2600 MHz

Medium parameters used: $f = 2560$ MHz; $\sigma = 1.897$ mho/m; $\epsilon_r = 38.41$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.5°C, Liquid Temperature: 22.3°C

Communication System: LTE2500-FDD7 2560 MHz Duty Cycle: 1:1

Probe: EX3DV4 – SN3617 ConvF(7.65,7.65,7.65)

Area Scan (71x121x1): Interpolated grid: $dx=1.000$ mm, $dy=1.000$ mm

Maximum value of SAR (interpolated) = 1.16 W/kg

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

Reference Value = 3.236 V/m; Power Drift = -0.13 dB

Peak SAR (extrapolated) = 1.33 W/kg

SAR(1 g) = 0.649 W/kg; SAR(10 g) = 0.299 W/kg

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

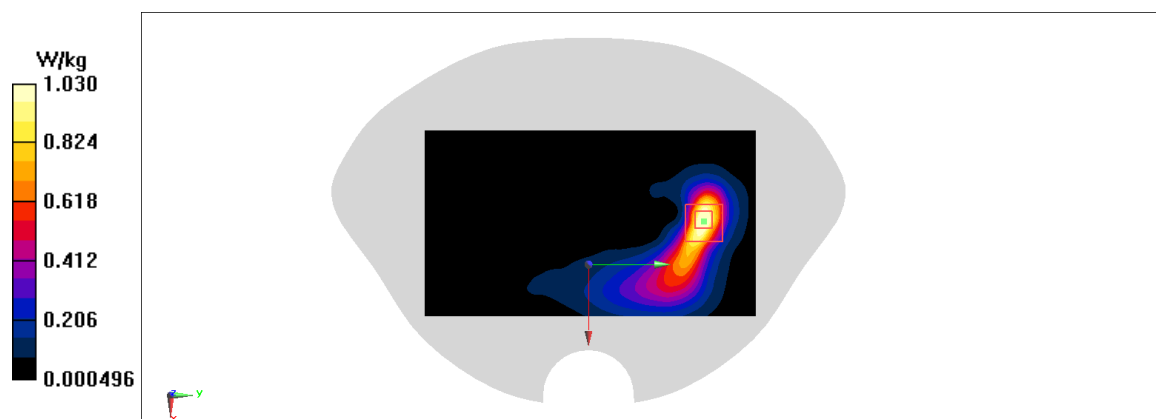


Fig A.10

LTE B41 Right Cheek

Date: 6/28/2020

Electronics: DAE4 Sn777

Medium: body 2600 MHz

Medium parameters used: $f = 2611\text{MHz}$; $\sigma = 1.935\text{ mho/m}$; $\epsilon_r = 38.43$; $\rho = 1000\text{ kg/m}^3$

Ambient Temperature: 22.5°C, Liquid Temperature: 22.3°C

Communication System: Max 2611MHz Duty Cycle: 1:1.58

Probe: EX3DV4 – SN3617 (7.52,7.52,7.52)

Area Scan (71x121x1): Interpolated grid: $dx=1.000\text{ mm}$, $dy=1.000\text{ mm}$

Maximum value of SAR (interpolated) = 0.212 W/kg

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

Reference Value = 3.063 V/m; Power Drift = -0.03 dB

Peak SAR (extrapolated) = 0.23 W/kg

SAR(1 g) = 0.127 W/kg; SAR(10 g) = 0.066 W/kg

Maximum value of SAR (measured) = 0.191 W/kg

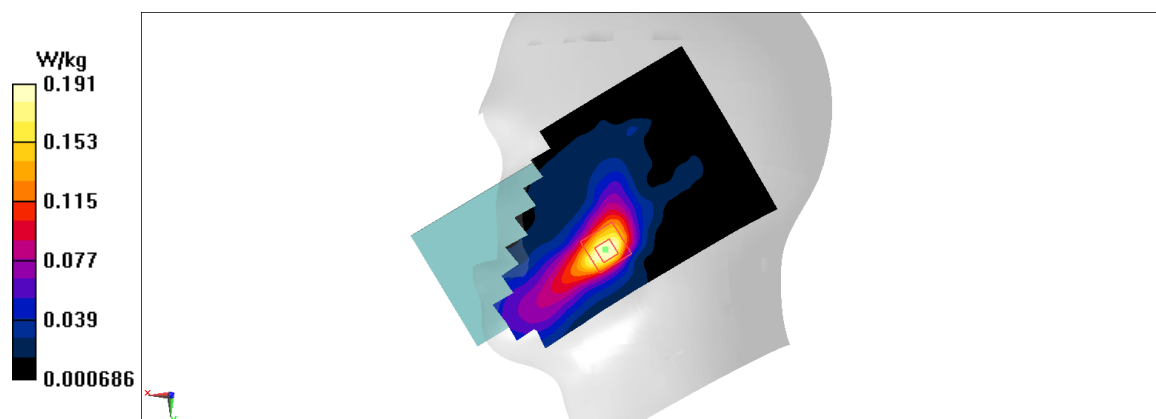


Fig A.11

LTE B41 Bottom

Date: 6/28/2020

Electronics: DAE4 Sn777

Medium: body 2600 MHz

Medium parameters used: $f = 2645$; $\sigma = 1.939$ mho/m; $\epsilon_r = 38.11$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.5°C, Liquid Temperature: 22.3°C

Communication System: Max 2645MHz Duty Cycle: 1:1.58

Probe: EX3DV4 – SN3617 (7.52,7.52,7.52)

Area Scan (71x121x1): Interpolated grid: $dx=1.000$ mm, $dy=1.000$ mm

Maximum value of SAR (interpolated) = 1.65 W/kg

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

Reference Value = 16.77 V/m; Power Drift = 0.19 dB

Peak SAR (extrapolated) = 2.01 W/kg

SAR(1 g) = 0.931 W/kg; SAR(10 g) = 0.408 W/kg

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

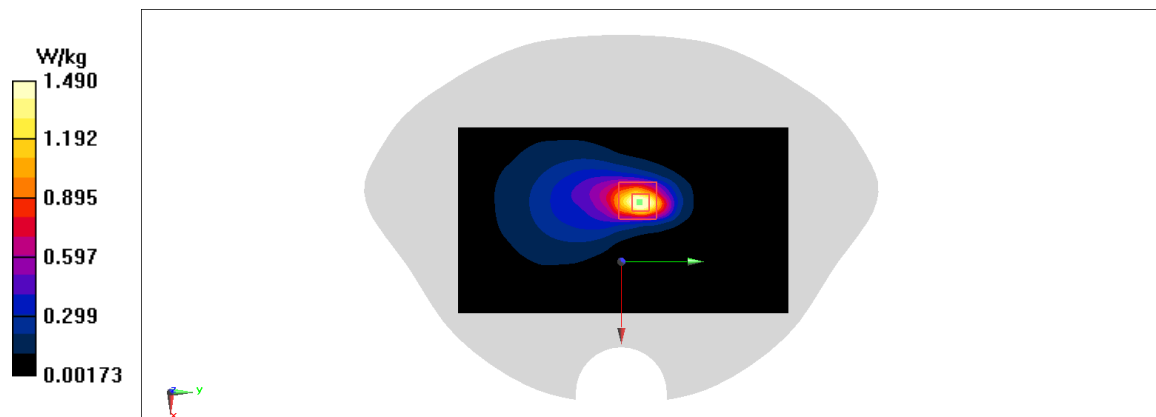


Fig A.12

WLAN2450_CH2437 Left Cheek

Date: 6/27/2020

Electronics: DAE4 Sn777

Medium: body 2450 MHz

Medium parameters used: $f = 2437\text{MHz}$; $\sigma = 1.804\text{ mho/m}$; $\epsilon_r = 38.61$; $\rho = 1000\text{ kg/m}^3$

Ambient Temperature: 22.5°C, Liquid Temperature: 22.3°C

Communication System: WLAN2450 Duty Cycle: 1:1

Probe: EX3DV4 – SN3617 ConvF(7.65,7.65,7.65)

Area Scan (71x121x1): Interpolated grid: $dx=1.000\text{ mm}$, $dy=1.000\text{ mm}$

Maximum value of SAR (interpolated) = 0.868 W/kg

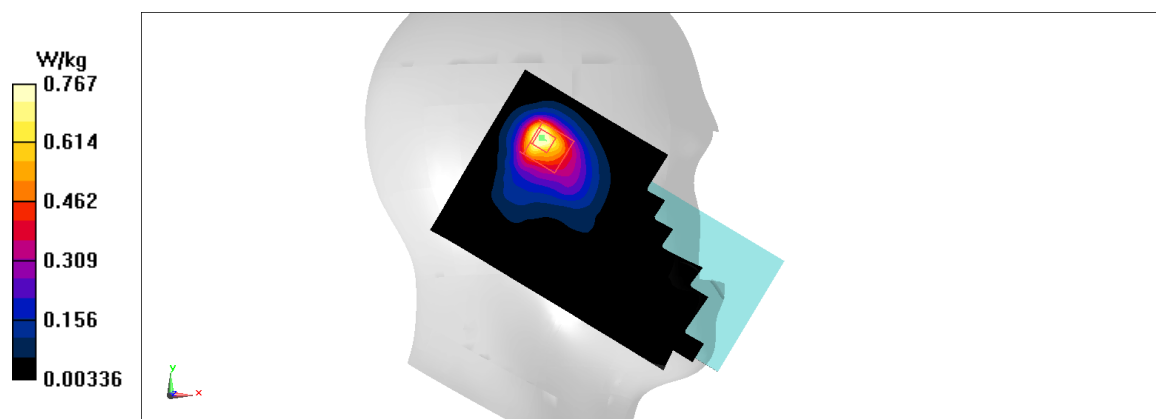
Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 9.635 V/m; Power Drift = -0.09 dB

Peak SAR (extrapolated) = 0.966 W/kg

SAR(1 g) = 0.456 W/kg; SAR(10 g) = 0.226 W/kg

Maximum value of SAR (measured) = 0.767W/kg


Fig A.13

WLAN2450_CH2437 Rear

Date: 6/27/2020

Electronics: DAE4 Sn777

Medium: body 2450 MHz

Medium parameters used: $f = 2437\text{MHz}$; $\sigma = 1.804\text{ mho/m}$; $\epsilon_r = 38.61$; $\rho = 1000\text{ kg/m}^3$

Ambient Temperature: 22.5°C, Liquid Temperature: 22.3°C

Communication System: WLAN2450 Duty Cycle: 1:1

Probe: EX3DV4 – SN3617 ConvF(7.65,7.65,7.65)

Area Scan (71x121x1): Interpolated grid: $dx=1.000\text{ mm}$, $dy=1.000\text{ mm}$

Maximum value of SAR (interpolated) = 0.186 W/kg

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

Reference Value = 4.024 V/m; Power Drift = -0.07 dB

Peak SAR (extrapolated) = 0.219 W/kg

SAR(1 g) = 0.112 W/kg; SAR(10 g) = 0.06 W/kg

Maximum value of SAR (measured) = 0.175 W/kg

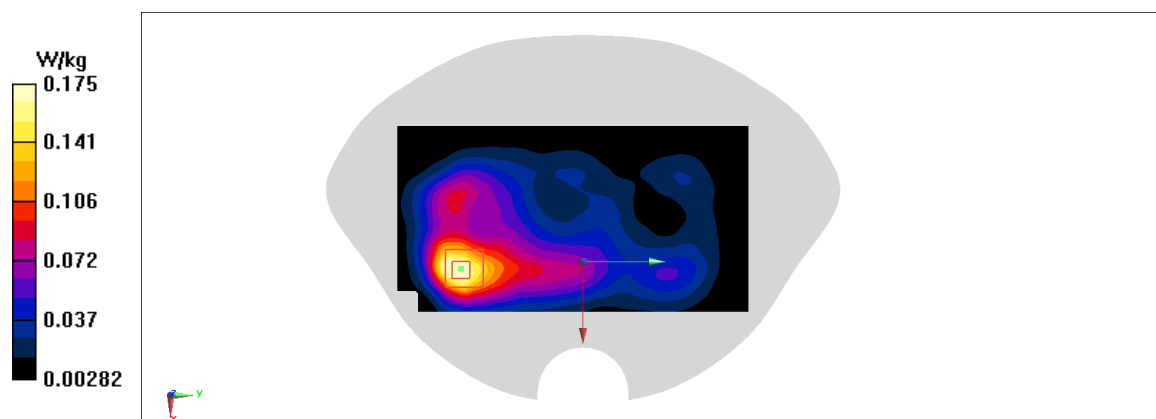


Fig A.14



Fig. 1-1 Z-Scan at power reference point (GSM850)

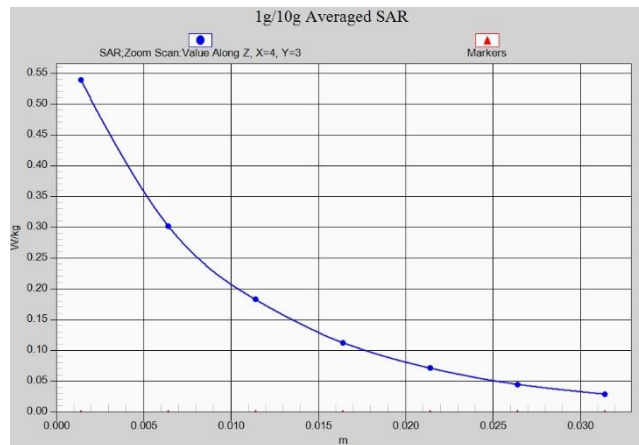


Fig. 1-2 Z-Scan at power reference point (GSM850)



Fig. 1-3 Z-Scan at power reference point (PCS1900)

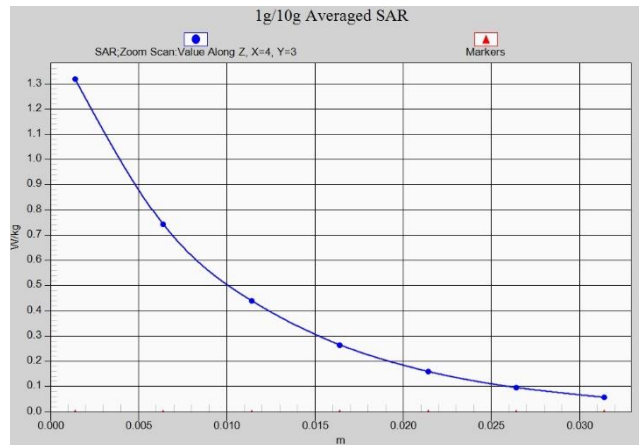


Fig. 1-4 Z-Scan at power reference point (PCS1900 10mm)



Fig. 1-5 Z-Scan at power reference point (WCDMA850)



Fig. 1-6 Z-Scan at power reference point (WCDMA850 10mm)

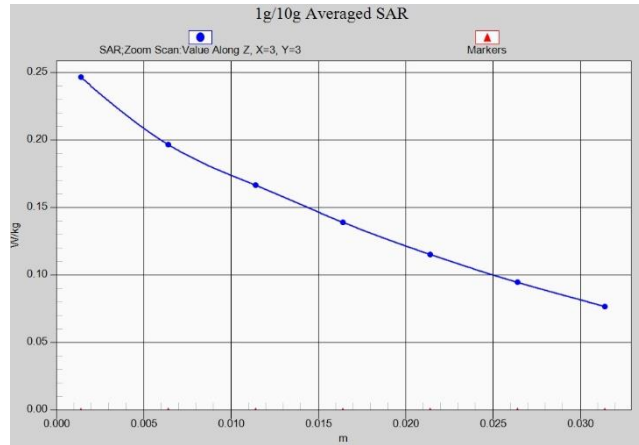


Fig. 1-7 Z-Scan at power reference point (LTE Band 5)

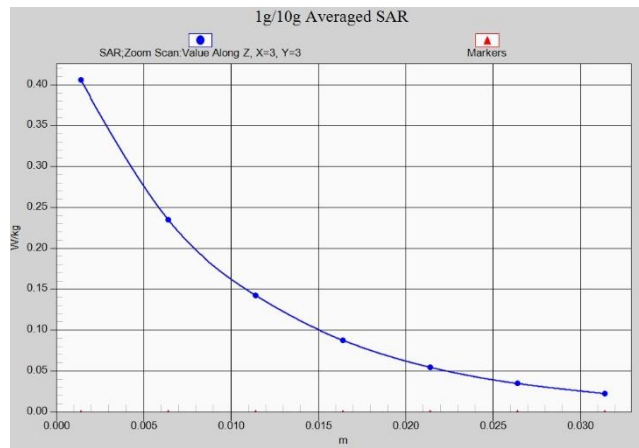


Fig. 1-8 Z-Scan at power reference point (LTE Band 5)

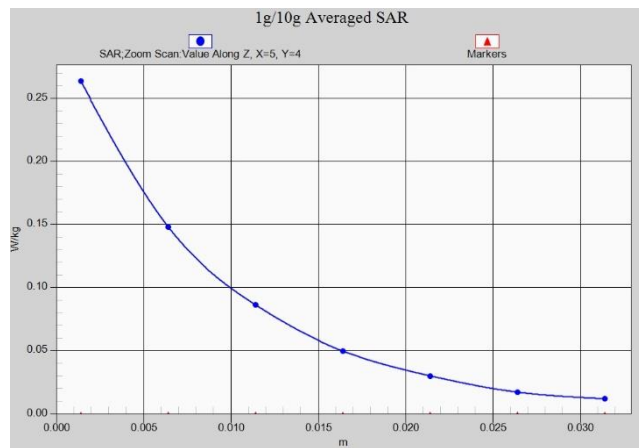


Fig. 1-9 Z-Scan at power reference point (LTE Band 7)