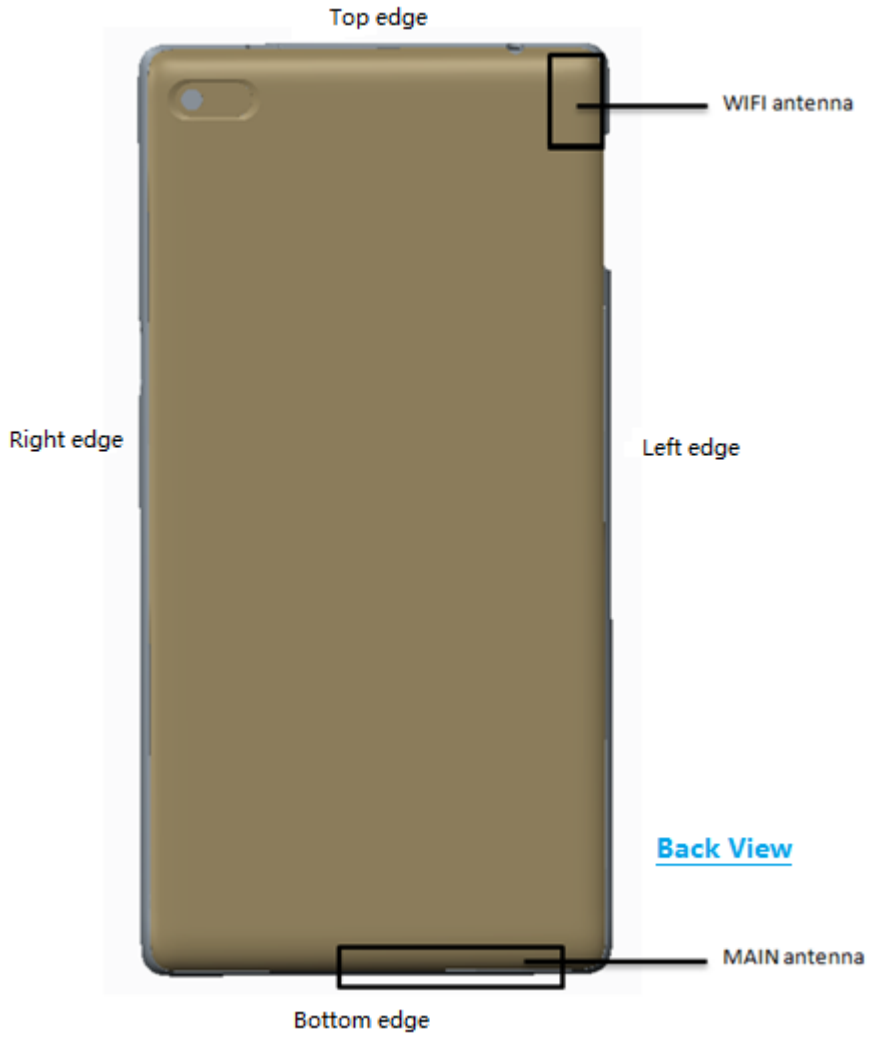
12 Simultaneous TX SAR Considerations

12.1 Introduction

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

12.2 Transmit Antenna Separation Distances



Picture 12.1 Antenna Locations

12.3 SAR Measurement Positions

According to the KDB941225 D06 Hot Spot SAR v01, the edges with less than 2.5 cm distance to the antennas need to be tested for SAR.

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

12.4 Standalone SAR Test Exclusion Considerations

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

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

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

Table 12.1: Standalone SAR test exclusion considerations

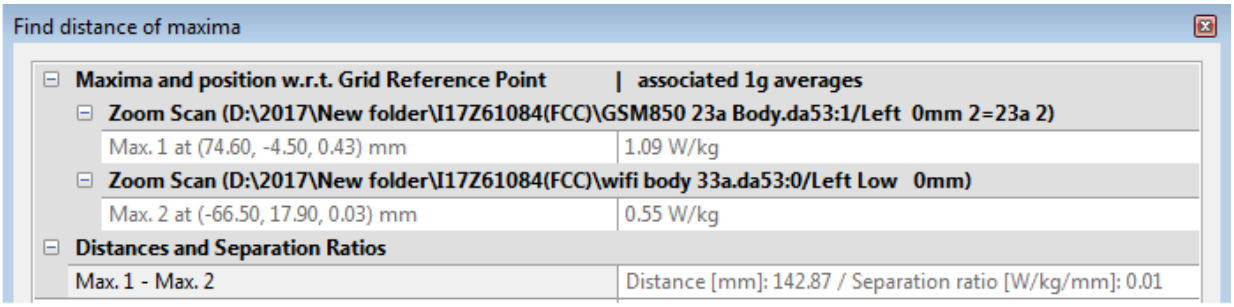
Band/Mode	F(GHz)	Position	SAR test exclusion threshold(mW)	RF output power		SAR test exclusion
				dBm	mW	
Bluetooth	2.441	Head	9.60	6	3.98	Yes
		Body	19.20	6	3.98	Yes
2.4GHz WLAN	2.45	Head	9.58	17	50.12	No
		Body	19.17	17	50.12	No

13 Evaluation of Simultaneous

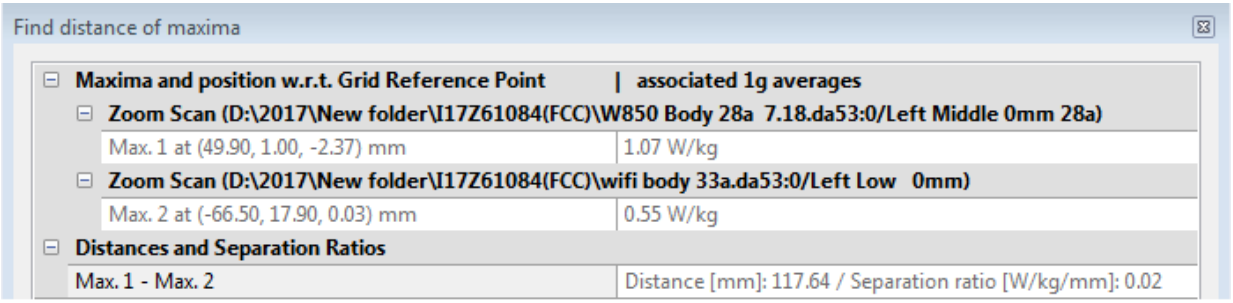
Table 13.1: The sum of reported SAR values for main antenna and WiFi

	Position	Main antenna band	Main antenna	WiFi	Sum	Distance (mm)	Ratio
Maximum reported SAR value for Head	Right hand, Touch cheek	UMTS FDD 5	0.32	0.89	**1.21**	/	**/**
Maximum reported SAR value for Body	Left edge with 0mm	GSM 850	1.19	0.63	**1.82**[1]	142.87	**0.02**
		UMTS FDD 5	1.19		**1.82**[1]	117.64	**0.02**
		LTE Band 7	1.16		**1.79**[1]	145.24	**0.02**

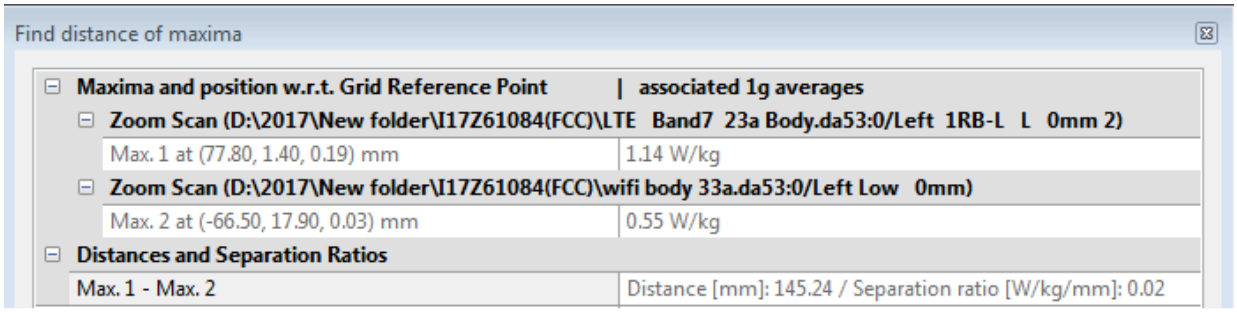
[1] – According to the KDB 447498 D01, when the sum of SAR is larger than the limit, SAR test exclusion is determined by the SAR to peak location separation ratio. The ratio is determined by $(SAR1 + SAR2)^{1.5}/Ri$, rounded to two decimal digits, and must be ≤ 0.04 for all antenna pairs in the configuration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



Picture 13.1 Distance evaluation for GSM850 and WiFi



Picture 13.2 Distance evaluation for W850 and WiFi



Picture 13.3 Distance evaluation for LTE B7 and WiFi

Table 13.2: The sum of reported SAR values for main antenna and BT

	Position	Main antenna	BT	Sum
Maximum reported SAR value for Head	Right hand, Touch cheek	0.32	0.17[1]	**0.49**
Maximum reported SAR value for Body	Left edge with 0mm	1.19	0.17[1]	**1.36**

[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	6	3.98	0.17
Bluetooth	2.441	Body	5	6	3.98	0.17

* - 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 but the ratio < 0.04.
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:

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

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

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

This device uses a proximity sensor for SAR compliance. The proximity sensor is activated when the device is used in close proximity to the user's body. The proximity sensors trigger power reduction for all bands except BT. There is no power reduction mechanism for BT modes for SAR purposes.

Table 14.1: Duty Cycle

Mode	Duty Cycle
Speech for GSM850 and PCS1900	1:8.3
GPRS&EGPRS for Normal power	1:2
GPRS&EGPRS for Low power of GSM850	1:2
GPRS&EGPRS for Low power of PCS1900	1:2.67
WCDMA&LTE FDD	1:1
LTE TDD	1:1.58

14.1 SAR results for Fast SAR

We'll perform the SAR measurement with SIM1/SKU1 and retest on highest value point with SIM2/SKU1, SIM1/SKU3 and SIM1/SKU5.

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

Ambient Temperature: 22.5 °C Liquid Temperature: 22.0°C											
Frequency		Side	Test Position	Figure No./Note	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	/	32.67	33.5	0.122	**0.15**	0.148	**0.18**	0.08
190	836.6	Left	Tilt	/	32.67	33.5	0.097	**0.12**	0.125	**0.15**	0.02
251	848.8	Right	Touch	Fig.1	32.70	33.5	0.199	**0.24**	0.261	**0.31**	-0.07
190	836.6	Right	Touch	/	32.67	33.5	0.143	**0.17**	0.184	**0.22**	-0.04
128	824.2	Right	Touch	/	32.57	33.5	0.115	**0.14**	0.149	**0.18**	-0.01
190	836.6	Right	Tilt	/	32.67	33.5	0.085	**0.10**	0.106	**0.13**	0.05
251	848.8	Right	Touch	SIM2	32.70	33.5	0.183	**0.22**	0.243	**0.29**	0.06
251	848.8	Right	Touch	SKU3	32.70	33.5	0.180	**0.22**	0.239	**0.29**	0.08
251	848.8	Right	Touch	SKU5	32.70	33.5	0.173	**0.21**	0.228	**0.27**	-0.05

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

Ambient Temperature: 22.5 °C Liquid Temperature: 22.0°C											
Frequency		Mode (number of timeslots)	Test Position	Figure No./ Note	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	GPRS (4)	Rear 15mm	/	28.58	29	0.126	**0.14**	0.169	**0.19**	-0.11
251	848.8	GPRS (4)	Left 0mm	Fig.2	28.62	29	0.615	**0.67**	1.09	**1.19**	-0.10
190	836.6	GPRS (4)	Left 0mm	/	28.58	29	0.457	**0.50**	0.800	**0.88**	0.14
128	824.2	GPRS (4)	Left 0mm	/	28.47	29	0.309	**0.35**	0.537	**0.61**	0.09
190	836.6	GPRS (4)	Bottom 15mm	/	28.58	29	0.069	**0.08**	0.097	**0.11**	0.07
190	836.6	GPRS (4)	Rear 0mm		23.79	24	0.247	**0.26**	0.443	**0.46**	0.03
190	836.6	GPRS (4)	Bottom 0mm	/	23.79	24	0.142	**0.15**	0.229	**0.24**	0.08
251	848.8	EGPRS (4)	Left 0mm	/	28.60	29	0.608	**0.67**	1.08	**1.18**	0.08
251	848.8	GPRS (4)	Left 0mm	SIM2	28.62	29	0.605	**0.66**	1.08	**1.18**	-0.05
251	848.8	GPRS (4)	Left 0mm	SKU3	28.62	29	0.596	**0.65**	1.07	**1.17**	0.03
251	848.8	GPRS (4)	Left 0mm	SKU5	28.62	29	0.589	**0.64**	1.06	**1.16**	-0.07

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

Ambient Temperature: 22.5 °C Liquid Temperature: 22.0°C											
Frequency		Side	Test Position	Figure No./Note	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										
810	1909.8	Left	Touch	/	29.93	30.5	0.029	**0.03**	0.046	**0.05**	0.09
661	1880	Left	Touch	/	29.93	30.5	0.028	**0.03**	0.044	**0.05**	0.07
512	1850.2	Left	Touch	Fig.3	29.93	30.5	0.033	**0.04**	0.049	**0.06**	0.04
661	1880	Left	Tilt	/	29.93	30.5	0.011	**0.01**	0.019	**0.02**	0.09
661	1880	Right	Touch	/	29.93	30.5	0.018	**0.02**	0.030	**0.03**	-0.08
661	1880	Right	Tilt	/	29.93	30.5	0.017	**0.02**	0.028	**0.03**	0.17
512	1850.2	Left	Touch	SIM2	29.93	30.5	0.024	**0.03**	0.041	**0.05**	0.08
512	1850.2	Left	Touch	SKU3	29.93	30.5	0.028	**0.03**	0.045	**0.05**	0.09
512	1850.2	Left	Touch	SKU5	29.93	30.5	0.021	**0.02**	0.036	**0.04**	-0.11

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

Ambient Temperature: 22.5 °C Liquid Temperature: 22.0°C											
Frequency		Mode (number of timeslots)	Test Position	Figure No./ Note	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										
661	1880	GPRS (4)	Rear 15mm	/	25.58	26	0.043	**0.05**	0.073	**0.08**	0.01
661	1880	GPRS (4)	Left 0mm	/	25.58	26	0.034	**0.04**	0.062	**0.07**	0.02
661	1880	GPRS (4)	Bottom 15mm	/	25.58	26	0.068	**0.07**	0.114	**0.13**	-0.03
661	1880	GPRS (3)	Rear 0mm	/	16.91	17	0.188	**0.19**	0.417	**0.43**	0.05
810	1909.8	GPRS (3)	Bottom 0mm	/	16.98	17	0.286	**0.29**	0.686	**0.69**	0.02
661	1880	GPRS (3)	Bottom 0mm	Fig.4	16.91	17	0.300	**0.31**	0.723	**0.74**	0.09
512	1850.2	GPRS (3)	Bottom 0mm	/	16.84	17	0.279	**0.29**	0.651	**0.68**	0.05
661	1880	EGPRS (3)	Bottom 0mm	/	16.79	17	0.286	**0.30**	0.709	**0.74**	0.09
661	1880	GPRS (3)	Bottom 0mm	SIM2	16.91	17	0.282	**0.29**	0.685	**0.70**	-0.01
661	1880	GPRS (3)	Bottom 0mm	SKU3	16.91	17	0.280	**0.29**	0.679	**0.69**	-0.01
661	1880	GPRS (3)	Bottom 0mm	SKU5	16.91	17	0.277	**0.28**	0.682	**0.70**	0.01

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

Ambient Temperature: 22.5 °C					Liquid Temperature: 22.0°C						
Frequency		Side	Test Position	Figure No./Note	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										
4182	836.4	Left	Touch	/	23.55	24	0.152	**0.17**	0.217	**0.24**	0.07
4182	836.4	Left	Tilt	/	23.55	24	0.131	**0.15**	0.196	**0.22**	0.07
4233	846.6	Right	Touch	/	23.34	24	0.178	**0.21**	0.257	**0.30**	-0.03
4182	836.4	Right	Touch	Fig.5	23.55	24	0.218	**0.24**	0.287	**0.32**	-0.02
4132	826.4	Right	Touch	/	23.41	24	0.210	**0.24**	0.272	**0.31**	-0.02
4182	836.4	Right	Tilt	/	23.55	24	0.111	**0.12**	0.163	**0.18**	0.15
4182	836.4	Right	Touch	SIM2	23.55	24	0.189	**0.21**	0.273	**0.30**	0.17
4182	836.4	Right	Touch	SKU3	23.55	24	0.192	**0.21**	0.261	**0.29**	0.09
4182	836.4	Right	Touch	SKU5	23.55	24	0.182	**0.20**	0.249	**0.28**	0.06

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

Ambient Temperature: 22.5 °C					Liquid Temperature: 22.0°C					
Frequency		Test Position	Figure No./ Note	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									
4182	836.4	Rear 15mm	/	23.55	24	0.169	**0.19**	0.226	**0.25**	0.12
4233	846.6	Left 0mm	/	23.34	24	0.476	**0.55**	0.828	**0.96**	0.07
4182	836.4	Left 0mm	Fig.6	23.55	24	0.616	**0.68**	1.07	**1.19**	-0.09
4132	826.4	Left 0mm	/	23.41	24	0.417	**0.48**	0.718	**0.82**	0.11
4182	836.4	Bottom 15mm	/	23.55	24	0.093	**0.10**	0.129	**0.14**	-0.14
4182	836.4	Rear 0mm	/	20.47	21	0.333	**0.38**	0.592	**0.67**	0.06
4182	836.4	Bottom 0mm	/	20.47	21	0.191	**0.22**	0.305	**0.34**	0.09
4182	836.4	Left 0mm	SIM2	23.55	24	0.608	**0.67**	1.06	**1.18**	0.10
4182	836.4	Left 0mm	SKU3	23.55	24	0.587	**0.65**	1.03	**1.14**	-0.04
4182	836.4	Left 0mm	SKU5	23.55	24	0.581	**0.64**	1.02	**1.13**	0.08

Table 14.1-7: SAR Values (WCDMA 1900 MHz Band - Head)

Ambient Temperature: 22.5 °C Liquid Temperature: 22.0°C											
Frequency		Side	Test Position	Figure No./Note	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										
9538	1907.6	Left	Touch	Fig.7	22.23	23	0.061	**0.07**	0.095	**0.11**	0.05
9400	1880	Left	Touch	/	22.48	23	0.044	**0.05**	0.077	**0.09**	-0.04
9262	1852.4	Left	Touch	/	22.64	23	0.045	**0.05**	0.077	**0.08**	0.08
9400	1880	Left	Tilt	/	22.48	23	0.019	**0.02**	0.031	**0.04**	0.02
9400	1880	Right	Touch	/	22.48	23	0.030	**0.03**	0.049	**0.06**	-0.19
9400	1880	Right	Tilt	/	22.48	23	0.024	**0.03**	0.042	**0.05**	0.05
9538	1907.6	Left	Touch	SIM2	22.23	23	0.055	**0.07**	0.085	**0.10**	0.06
9538	1907.6	Left	Touch	SKU3	22.23	23	0.058	**0.07**	0.088	**0.11**	-0.05
9538	1907.6	Left	Touch	SKU5	22.23	23	0.049	**0.06**	0.081	**0.10**	0.04

Table 14.1-8: SAR Values (WCDMA 1900 MHz Band - Body)

Ambient Temperature: 22.5 °C Liquid Temperature: 22.0°C										
Frequency		Test Position	Figure No./ Note	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									
9400	1880	Rear 15mm	/	22.48	23	0.052	**0.06**	0.097	**0.11**	-0.03
9400	1880	Left 0mm	/	22.48	23	0.246	**0.28**	0.494	**0.56**	-0.09
9400	1880	Bottom 15mm	/	22.48	23	0.060	**0.07**	0.111	**0.13**	0.08
9400	1880	Rear 0mm	/	14.53	15	0.303	**0.34**	0.655	**0.73**	-0.05
9538	1907.6	Bottom 0mm	Fig.8	14.26	14.5	0.467	**0.49**	1.13	**1.19**	0.06
9400	1880	Bottom 0mm	/	14.33	14.5	0.343	**0.36**	0.908	**0.94**	0.09
9262	1852.4	Bottom 0mm	/	14.42	14.5	0.290	**0.30**	0.768	**0.78**	0.10
9538	1907.6	Bottom 0mm	SIM2	14.26	14.5	0.432	**0.46**	1.05	**1.11**	-0.05
9538	1907.6	Bottom 0mm	SKU3	14.26	14.5	0.445	**0.47**	1.07	**1.13**	0.09
9538	1907.6	Bottom 0mm	SKU5	14.26	14.5	0.421	**0.44**	1.02	**1.08**	0.07

Table 14.1-9: SAR Values (LTE Band2 - Head)

Ambient Temperature: 22.5 °C						Liquid Temperature: 22.0°C						
Frequency		Mode	Side	Test Position	Figure No./ Note	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											
18700	1860	1RB_Low	Left	Touch	Fig.9	22.78	24	0.046	**0.06**	0.072	**0.09**	0.07
18700	1860	1RB_Low	Left	Tilt	/	22.78	24	0.027	**0.04**	0.047	**0.06**	0.05
18700	1860	1RB_Low	Right	Touch	/	22.78	24	0.036	**0.05**	0.053	**0.07**	0.12
18700	1860	1RB_Low	Right	Tilt	/	22.78	24	0.034	**0.05**	0.051	**0.07**	-0.09
18900	1880	50RB_Low	Left	Touch	/	21.64	23	0.037	**0.05**	0.058	**0.08**	0.14
18900	1880	50RB_Low	Left	Tilt	/	21.64	23	0.019	**0.03**	0.026	**0.04**	-0.11
18900	1880	50RB_Low	Right	Touch	/	21.64	23	0.038	**0.05**	0.056	**0.08**	0.06
18900	1880	50RB_Low	Right	Tilt	/	21.64	23	0.028	**0.04**	0.043	**0.06**	0.02
18700	1860	1RB_Low	Left	Touch	SIM2	22.78	24	0.041	**0.05**	0.063	**0.08**	0.15
18700	1860	1RB_Low	Left	Touch	SKU3	22.78	24	0.043	**0.06**	0.066	**0.09**	0.05
18700	1860	1RB_Low	Left	Touch	SKU5	22.78	24	0.037	**0.05**	0.058	**0.08**	-0.04

Note: The LTE mode is QPSK_20MHz.

Table 14.1-10: SAR Values (LTE Band2 - Body)

Ambient Temperature: 22.5 °C						Liquid Temperature: 22.0°C						
Frequency		Mode	Test Position	Figure No./ Note	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											
18700	1860	1RB_Low	Rear 15mm	/	22.78	24	0.327	**0.43**	0.580	**0.77**	0.02	
18700	1860	1RB_Low	Left 0mm	/	22.78	24	0.280	**0.37**	0.556	**0.74**	0.02	
19100	1900	1RB_Low	Bottom 15mm	/	22.68	24	0.416	**0.56**	0.746	**1.01**	0.03	
18900	1880	1RB_Low	Bottom 15mm	/	22.74	24	0.401	**0.54**	0.718	**0.96**	-0.08	
18700	1860	1RB_Low	Bottom 15mm	/	22.78	24	0.385	**0.51**	0.691	**0.92**	0.05	
18700	1860	1RB_Low	Rear 0mm	/	13.65	14.5	0.177	**0.22**	0.369	**0.45**	0.01	
19100	1900	1RB_Low	Bottom 0mm	/	13.54	14.5	0.369	**0.46**	0.898	**1.12**	0.06	
18900	1880	1RB_Low	Bottom 0mm	/	13.56	14.5	0.357	**0.44**	0.869	**1.08**	0.08	
18700	1860	1RB_Low	Bottom 0mm	/	13.65	14.5	0.350	**0.43**	0.851	**1.03**	0.03	
18900	1880	50RB_Low	Rear 15mm	/	21.64	23	0.275	**0.38**	0.494	**0.68**	0.04	
18900	1880	50RB_Low	Left 0mm	/	21.64	23	0.176	**0.24**	0.346	**0.47**	0.01	
19100	1900	50RB_Low	Bottom 15mm	/	21.56	23	0.343	**0.48**	0.615	**0.86**	-0.04	
18900	1880	50RB_Low	Bottom 15mm	/	21.64	23	0.331	**0.45**	0.593	**0.81**	-0.03	
18700	1860	50RB_Low	Bottom 15mm	/	21.63	23	0.319	**0.44**	0.571	**0.78**	0.07	
18700	1860	50RB_Low	Rear 0mm	/	13.62	14.5	0.183	**0.22**	0.380	**0.46**	-0.03	
19100	1900	50RB_Low	Bottom 0mm	Fig.10	13.47	14.5	0.378	**0.48**	0.917	**1.16**	0.07	

18900	1880	50RB_Low	Bottom 0mm	/	13.59	14.5	0.364	**0.45**	0.882	**1.09**	0.01
18700	1860	50RB_Low	Bottom 0mm	/	13.62	14.5	0.349	**0.43**	0.849	**1.04**	0.01
18900	1880	100RB	Bottom 15mm	/	21.60	23	0.309	**0.43**	0.554	**0.76**	-0.03
18700	1860	100RB	Bottom 0mm	/	13.56	14.5	0.332	**0.41**	0.811	**1.01**	0.04
19100	1900	50RB_Low	Bottom 0mm	SIM2	13.47	14.5	0.370	**0.47**	0.901	**1.14**	0.09
19100	1900	50RB_Low	Bottom 0mm	SKU3	13.47	14.5	0.363	**0.46**	0.885	**1.12**	0.11
19100	1900	50RB_Low	Bottom 0mm	SKU5	13.47	14.5	0.357	**0.45**	0.871	**1.10**	0.06

Note: The LTE mode is QPSK_20MHz.

Table 14.1-11: SAR Values (LTE Band7 - Head)

Ambient Temperature: 22.8 ℃ Liquid Temperature: 22.4℃												
Frequency		Mode	Side	Test Position	Figure No./ Note	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											
20850	2510	1RB_Low	Left	Touch	Fig.11	23.43	23.5	0.034	**0.03**	0.064	**0.07**	0.07
20850	2510	1RB_Low	Left	Tilt	/	23.43	23.5	0.013	**0.01**	0.026	**0.03**	-0.02
20850	2510	1RB_Low	Right	Touch	/	23.43	23.5	0.023	**0.02**	0.042	**0.04**	0.08
20850	2510	1RB_Low	Right	Tilt	/	23.43	23.5	0.025	**0.03**	0.048	**0.05**	0.01
20850	2510	50RB_Low	Left	Touch	/	22.21	22.5	0.026	**0.03**	0.048	**0.05**	-0.03
20850	2510	50RB_Low	Left	Tilt	/	22.21	22.5	0.007	**0.01**	0.016	**0.02**	0.10
20850	2510	50RB_Low	Right	Touch	/	22.21	22.5	0.017	**0.02**	0.033	**0.04**	-0.06
20850	2510	50RB_Low	Right	Tilt	/	22.21	22.5	0.019	**0.02**	0.041	**0.04**	0.02
20850	2510	1RB_Low	Left	Touch	SIM2	23.43	23.5	0.030	**0.03**	0.062	**0.06**	-0.09
20850	2510	1RB_Low	Left	Touch	SKU3	23.43	23.5	0.028	**0.03**	0.060	**0.06**	-0.06
20850	2510	1RB_Low	Left	Touch	SKU5	23.43	23.5	0.023	**0.02**	0.054	**0.05**	0.08

Note1: The LTE mode is QPSK_20MHz.

Table 14.1-12: SAR Values (LTE Band7 - Body)

Ambient Temperature: 22.8 ºC					Liquid Temperature: 22.4ºC						
Frequency		Mode	Test Position	Figure No./ Note	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										
20850	2510	1RB_Low	Rear 15mm	/	23.43	23.5	0.386	**0.39**	0.769	**0.78**	0.11
21350	2560	1RB_Low	Left 0mm	/	23.26	23.5	0.489	**0.52**	1.09	**1.15**	-0.12
21100	2535	1RB_Low	Left 0mm	/	23.27	23.5	0.483	**0.51**	1.06	**1.12**	0.04
20850	2510	1RB_Low	Left 0mm	Fig.12	23.43	23.5	0.525	**0.53**	1.14	**1.16**	-0.11
20850	2510	1RB_Low	Bottom 15mm	/	23.43	23.5	0.383	**0.39**	0.747	**0.76**	0.05
21350	2560	1RB_Mid	Rear 0mm	/	15.13	16	0.402	**0.49**	0.945	**1.15**	-0.02
21100	2535	1RB_Mid	Rear 0mm	/	15.25	16	0.385	**0.46**	0.870	**1.03**	0.11
20850	2510	1RB_Low	Rear 0mm	/	15.42	16	0.388	**0.44**	0.911	**1.04**	0.08
20850	2510	1RB_Low	Bottom 0mm	/	15.42	16	0.270	**0.31**	0.647	**0.74**	0.04
20850	2510	50RB_Low	Rear 15mm	/	22.21	22.5	0.304	**0.32**	0.609	**0.65**	-0.14
21350	2560	50RB_Low	Left 0mm	/	21.86	22.5	0.407	**0.47**	0.898	**1.04**	0.09
21100	2535	50RB_Low	Left 0mm	/	21.95	22.5	0.382	**0.43**	0.844	**0.96**	0.06
20850	2510	50RB_Low	Left 0mm	/	22.21	22.5	0.401	**0.43**	0.890	**0.95**	0.02
20850	2510	50RB_Low	Bottom 15mm	/	22.21	22.5	0.284	**0.30**	0.554	**0.59**	0.05
21100	2535	50RB_Low	Rear 0mm	/	14.97	16	0.380	**0.48**	0.860	**1.09**	0.09
20850	2510	50RB_Low	Rear 0mm	/	15.09	16	0.366	**0.45**	0.861	**1.06**	0.02
20850	2510	50RB_Low	Rear 0mm	/	15.29	16	0.407	**0.48**	0.949	**1.12**	0.03
20850	2510	50RB_Low	Bottom 0mm	/	15.29	16	0.251	**0.30**	0.595	**0.70**	0.02
20850	2510	100RB	Left 0mm	/	22.10	22.5	0.385	**0.42**	0.856	**0.94**	-0.07
20850	2510	100RB	Rear 0mm	/	15.16	16	0.364	**0.44**	0.841	**1.02**	0.06
20850	2510	1RB_Low	Left 0mm	SIM2	23.43	23.5	0.511	**0.52**	1.11	**1.13**	-0.09
20850	2510	1RB_Low	Left 0mm	SKU3	23.43	23.5	0.454	**0.46**	0.986	**1.00**	-0.11
20850	2510	1RB_Low	Left 0mm	SKU5	23.43	23.5	0.471	**0.48**	1.02	**1.04**	0.00

Note1: The LTE mode is QPSK_20MHz.

Table 14.1-13: SAR Values (LTE Band38 - Head)

Ambient Temperature: 22.8 ºC												
Frequency		Mode	Side	Test Position	Figure No./ Note	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											
38000	2595	1RB_High	Left	Touch	/	23.50	24	0.006	**0.01**	0.019	**0.02**	0.01
38000	2595	1RB_High	Left	Tilt	/	23.50	24	0.005	**0.01**	0.012	**0.01**	0.06
38000	2595	1RB_High	Right	Touch	/	23.50	24	0.008	**0.01**	0.019	**0.02**	0.02
38000	2595	1RB_High	Right	Tilt	/	23.50	24	0.004	**0.00**	0.012	**0.01**	0.01
37850	2580	50RB_Low	Left	Touch	Fig.13	22.24	23	0.009	**0.01**	0.021	**0.02**	-0.05
37850	2580	50RB_Low	Left	Tilt	/	22.24	23	0.001	**0.00**	0.004	**0.01**	0.08
37850	2580	50RB_Low	Right	Touch	/	22.24	23	0.008	**0.01**	0.020	**0.02**	-0.06
37850	2580	50RB_Low	Right	Tilt	/	22.24	23	0.001	**0.00**	0.011	**0.01**	-0.06
37850	2580	50RB_Low	Left	Touch	SIM2	22.24	23	0.007	**0.01**	0.019	**0.02**	0.07
37850	2580	50RB_Low	Left	Touch	SKU3	22.24	23	0.006	**0.01**	0.017	**0.02**	-0.05
37850	2580	50RB_Low	Left	Touch	SKU5	22.24	23	0.006	**0.01**	0.019	**0.02**	0.10

Note1: The LTE mode is QPSK_20MHz.

Table 14.1-14: SAR Values (LTE Band38 - Body)

Ambient Temperature: 22.8 ºC												
Frequency		Mode	Test Position	Figure No./ Note	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											
38000	2595	1RB_High	Rear 15mm	/	23.50	24	0.132	**0.15**	0.265	**0.30**	-0.10	
38000	2595	1RB_High	Left 0mm	/	23.50	24	0.125	**0.14**	0.270	**0.30**	0.09	
38000	2595	1RB_High	Bottom 15mm	/	23.50	24	0.106	**0.12**	0.206	**0.23**	-0.05	
38150	2610	1RB_Low	Rear 0mm	/	20.88	21.5	0.318	**0.37**	0.771	**0.89**	0.18	
38000	2595	1RB_Low	Rear 0mm	/	21.11	21.5	0.351	**0.38**	0.839	**0.92**	-0.07	
37150	2580	1RB_Mid	Rear 0mm	Fig.14	21.07	21.5	0.360	**0.40**	0.877	**0.97**	-0.06	
38000	2595	1RB_Low	Bottom 0mm	/	21.11	21.5	0.220	**0.24**	0.563	**0.62**	0.19	
37150	2580	50RB_Low	Rear 15mm	/	22.24	23	0.107	**0.13**	0.214	**0.25**	-0.15	
37150	2580	50RB_Low	Left 0mm	/	22.24	23	0.092	**0.11**	0.197	**0.23**	0.14	
37150	2580	50RB_Low	Bottom 15mm	/	22.24	23	0.091	**0.11**	0.174	**0.21**	0.05	
38150	2610	50RB_Low	Rear 0mm	/	20.84	21.5	0.322	**0.37**	0.789	**0.92**	-0.10	
38000	2595	50RB_Low	Rear 0mm	/	20.93	21.5	0.335	**0.38**	0.808	**0.92**	-0.12	
37150	2580	50RB_Mid	Rear 0mm	/	21.01	21.5	0.350	**0.39**	0.834	**0.93**	-0.14	
37150	2580	50RB_Mid	Bottom 0mm	/	21.01	21.5	0.219	**0.25**	0.557	**0.62**	0.06	
37150	2580	100RB	Rear 0mm	/	20.93	21.5	0.321	**0.37**	0.756	**0.86**	0.09	
37150	2580	1RB_Mid	Rear 0mm	SIM2	21.07	21.5	0.351	**0.39**	0.856	**0.95**	-0.03	
37150	2580	1RB_Mid	Rear 0mm	SKU3	21.07	21.5	0.342	**0.38**	0.839	**0.93**	-0.07	
37150	2580	1RB_Mid	Rear 0mm	SKU5	21.07	21.5	0.331	**0.37**	0.814	**0.90**	0.05	

Note1: The LTE mode is QPSK_20MHz.

Table 14.1-15: SAR Values (WLAN - Head) – 802.11b

Ambient Temperature: 22.5 ºC Liquid Temperature: 22.0ºC											
Frequency		Side	Test Position	Figure No./ Note	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	/	16.72	17	0.161	**0.17**	0.257	**0.27**	-0.05
2437	6	Left	Tilt	/	16.72	17	0.138	**0.15**	0.222	**0.24**	-0.08
2462	11	Right	Touch	/	16.61	17	0.347	**0.38**	0.676	**0.74**	0.13
2437	6	Right	Touch	/	16.72	17	0.355	**0.38**	0.698	**0.74**	0.05
2412	1	Right	Touch	Fig.15	16.38	17	0.342	**0.39**	0.775	**0.89**	-0.05
2437	6	Right	Tilt	/	16.72	17	0.242	**0.26**	0.423	**0.45**	0.10
2412	1	Right	Touch	SIM2	16.38	17	0.358	**0.41**	0.705	**0.81**	-0.09
2412	1	Right	Touch	SKU3	16.38	17	0.325	**0.37**	0.736	**0.85**	0.06
2412	1	Right	Touch	SKU5	16.38	17	0.315	**0.36**	0.718	**0.83**	-0.02

Table 14.1-16: SAR Values (WLAN - Body) – 802.11b

Ambient Temperature: 22.5 ºC Liquid Temperature: 22.0ºC										
Frequency		Test Position	Figure No./ Note	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 7mm	/	16.72	17	0.117	**0.12**	0.255	**0.27**	-0.02
2437	6	Rear 0mm	/	11.90	12	0.182	**0.19**	0.467	**0.48**	0.12
2462	11	Left 0mm	/	16.61	17	0.153	**0.17**	0.367	**0.40**	0.08
2437	6	Left 0mm	/	16.72	17	0.185	**0.20**	0.468	**0.50**	0.01
2412	1	Left 0mm	Fig.16	16.38	17	0.233	**0.27**	0.547	**0.63**	-0.11
2437	6	Top 0mm	/	16.72	17	0.164	**0.17**	0.381	**0.41**	0.12
2412	1	Left 0mm	SIM2	16.38	17	0.225	**0.26**	0.528	**0.61**	0.09
2412	1	Left 0mm	SKU3	16.38	17	0.211	**0.24**	0.499	**0.58**	-0.07
2412	1	Left 0mm	SKU5	16.38	17	0.203	**0.23**	0.476	**0.55**	0.12

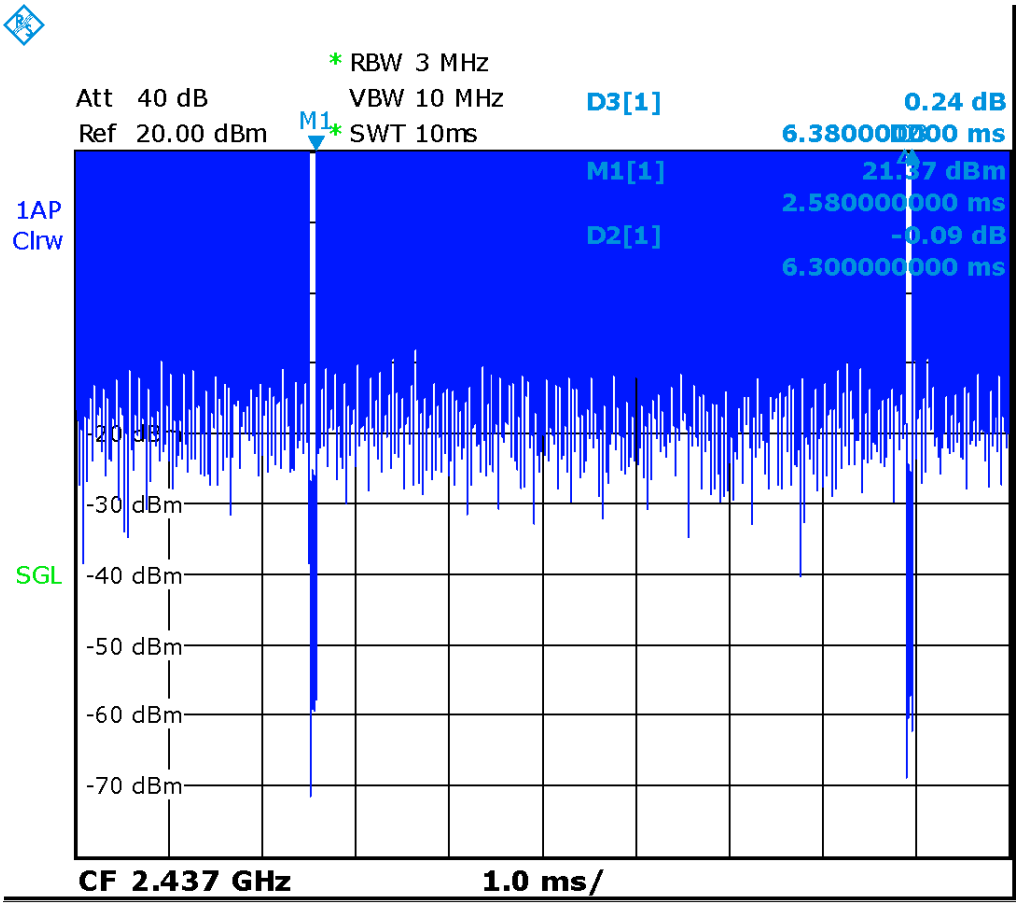
According to the KDB248227 D01, The reported SAR must be scaled to 100% transmission duty factor to determine compliance at the maximum tune-up tolerance limit. The scaled reported SAR is presented as below.

Table 14.1-17: SAR Values (WLAN - Head) – 802.11b (Scaled Reported SAR)

Ambient Temperature: 22.5 ºC Liquid Temperature: 22.0ºC							
Frequency		Side	Test Position	Actual duty factor	maximum duty factor	Reported SAR (1g)(W/kg)	Scaled reported SAR (1g)(W/kg)
MHz	Ch.						
2412	1	Right	Touch	99.52%	100%	**0.89**	**0.89**

Table 14.1-18: SAR Values (WLAN - Body) – 802.11b (Scaled Reported SAR)

Ambient Temperature: 22.5 ºC Liquid Temperature: 22.0ºC						
Frequency		Test Position	Actual duty factor	maximum duty factor	Reported SAR (1g)(W/kg)	Scaled reported SAR (1g)(W/kg)
MHz	Ch.					
2412	1	Left 0mm	99.52%	100%	**0.63**	**0.63**



Picture 14.1 Duty factor plot

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: 22.5 °C Liquid Temperature: 22.0°C											
Frequency		Side	Test Position	Figure No./Note	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	Right	Touch	Fig.1	32.70	33.5	0.199	**0.24**	0.261	**0.31**	-0.07

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

Ambient Temperature: 22.5 °C Liquid Temperature: 22.0°C											
Frequency		Mode (number of timeslots)	Test Position	Figure No./ Note	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 (4)	Left 0mm	Fig.2	28.62	29	0.615	**0.67**	1.09	**1.19**	-0.10

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

Ambient Temperature: 22.5 °C Liquid Temperature: 22.0°C											
Frequency		Side	Test Position	Figure No./Note	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	Touch	Fig.3	29.93	30.5	0.033	**0.04**	0.049	**0.06**	0.04

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

Ambient Temperature: 22.5 °C Liquid Temperature: 22.0°C											
Frequency		Mode (number of timeslots)	Test Position	Figure No./ Note	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										
661	1880	GPRS (3)	Bottom 0mm	Fig.4	16.91	17	0.300	**0.31**	0.723	**0.74**	0.09

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

Ambient Temperature: 22.5 °C Liquid Temperature: 22.0°C											
Frequency		Side	Test Position	Figure No./Note	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										
4182	836.4	Right	Touch	Fig.5	23.55	24	0.218	**0.24**	0.287	**0.32**	-0.02

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

Ambient Temperature: 22.5 °C Liquid Temperature: 22.0°C										
Frequency		Test Position	Figure No./ Note	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									
4182	836.4	Left 0mm	Fig.6	23.55	24	0.616	**0.68**	1.07	**1.19**	-0.09

Table 14.2-7: SAR Values (WCDMA 1900 MHz Band - Head)

Ambient Temperature: 22.5 °C Liquid Temperature: 22.0°C											
Frequency		Side	Test Position	Figure No./Note	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										
9538	1907.6	Left	Touch	Fig.7	22.23	23	0.061	**0.07**	0.095	**0.11**	0.05

Table 14.2-8: SAR Values (WCDMA 1900 MHz Band - Body)

Ambient Temperature: 22.5 ºC Liquid Temperature: 22.0ºC										
Frequency		Test Position	Figure No./ Note	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									
9538	1907.6	Bottom 0mm	Fig.8	14.26	14.5	0.467	**0.49**	1.13	**1.19**	0.06

Table 14.2-9: SAR Values (LTE Band2 - Head)

Ambient Temperature: 22.5 ºC Liquid Temperature: 22.0ºC												
Frequency		Mode	Side	Test Position	Figure No./ Note	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											
18700	1860	1RB_Low	Left	Touch	Fig.9	22.78	24	0.046	**0.06**	0.072	**0.09**	0.07

Note: The LTE mode is QPSK_20MHz.

Table 14.2-10: SAR Values (LTE Band2 - Body)

Ambient Temperature: 22.5 ºC Liquid Temperature: 22.0ºC												
Frequency		Mode	Test Position	Figure No./ Note	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											
19100	1900	50RB_Low	Bottom 0mm	Fig.10	13.47	14.5	0.378	**0.48**	0.917	**1.16**	0.07	

Note: The LTE mode is QPSK_20MHz.

Table 14.2-11: SAR Values (LTE Band7 - Head)

Ambient Temperature: 22.8 ºC Liquid Temperature: 22.4ºC												
Frequency		Mode	Side	Test Position	Figure No./ Note	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											
20850	2510	1RB_Low	Left	Touch	Fig.11	23.43	23.5	0.034	**0.03**	0.064	**0.07**	0.07

Note1: The LTE mode is QPSK_20MHz.

Table 14.2-12: SAR Values (LTE Band7 - Body)

Ambient Temperature: 22.8 ºC Liquid Temperature: 22.4ºC											
Frequency		Mode	Test Position	Figure No./ Note	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										
20850	2510	1RB_Low	Left 0mm	Fig.12	23.43	23.5	0.525	**0.53**	1.14	**1.16**	-0.11

Note1: The LTE mode is QPSK_20MHz.

Table 14.2-13: SAR Values (LTE Band38 - Head)

Ambient Temperature: 22.8 ºC Liquid Temperature: 22.4ºC												
Frequency		Mode	Side	Test Position	Figure No./ Note	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											
37850	2580	50RB_Low	Left	Touch	Fig.13	22.24	23	0.009	**0.01**	0.021	**0.02**	-0.05

Note1: The LTE mode is QPSK_20MHz.

Table 14.2-14: SAR Values (LTE Band38 - Body)

Ambient Temperature: 22.8 ºC Liquid Temperature: 22.4ºC											
Frequency		Mode	Test Position	Figure No./ Note	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										
37150	2580	1RB_Mid	Rear 0mm	Fig.14	21.07	21.5	0.360	**0.40**	0.877	**0.97**	-0.06

Note1: The LTE mode is QPSK_20MHz.

Table 14.2-15: SAR Values (WLAN - Head) – 802.11b

Ambient Temperature: 22.5 ºC Liquid Temperature: 22.0ºC											
Frequency		Side	Test Position	Figure No./ Note	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.										
2412	1	Right	Touch	Fig.15	16.38	17	0.342	**0.39**	0.775	**0.89**	-0.05

Table 14.2-16: SAR Values (WLAN - Body) – 802.11b

Ambient Temperature: 22.5 ºC Liquid Temperature: 22.0ºC										
Frequency		Test Position	Figure No./ Note	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.									
2412	1	Left 0mm	Fig.16	16.38	17	0.233	**0.27**	0.547	**0.63**	-0.11

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; 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 15.1: SAR Measurement Variability for Body GSM850 (1g)

Frequency		Test Position	Spacing (mm)	Original SAR (W/kg)	First Repeated SAR (W/kg)	The Ratio	Second Repeated SAR (W/kg)
Ch.	MHz						
251	848.8	Left	0	1.09	1.05	1.04	/

Table 15.2: SAR Measurement Variability for Body WCDMA850 (1g)

Frequency		Test Position	Spacing (mm)	Original SAR (W/kg)	First Repeated SAR (W/kg)	The Ratio	Second Repeated SAR (W/kg)
Ch.	MHz						
4182	836.4	Left	0	1.07	1.04	1.03	/

Table 15.3: SAR Measurement Variability for Body WCDMA1900 (1g)

Frequency		Test Position	Spacing (mm)	Original SAR (W/kg)	First Repeated SAR (W/kg)	The Ratio	Second Repeated SAR (W/kg)
Ch.	MHz						
9538	1907.6	Bottom	0	1.13	1.11	1.02	/

Table 15.4: SAR Measurement Variability for Body LTE B2 (1g)

Frequency		Mode	Test Position	Spacing (mm)	Original SAR (W/kg)	First Repeated SAR (W/kg)	The Ratio	Second Repeated SAR (W/kg)
Ch.	MHz							
19100	1900	50RB_Low	Bottom	0	0.917	0.902	1.02	/

Table 15.5: SAR Measurement Variability for Body LTE B7 (1g)

Frequency		Mode	Test Position	Spacing (mm)	Original SAR (W/kg)	First Repeated SAR (W/kg)	The Ratio	Second Repeated SAR (W/kg)
Ch.	MHz							
20850	2510	1RB_Low	Left	0	1.14	1.11	1.03	/

Table 15.6: SAR Measurement Variability for Body LTE B38 (1g)

Frequency		Mode	Test Position	Spacing (mm)	Original SAR (W/kg)	First Repeated SAR (W/kg)	The Ratio	Second Repeated SAR (W/kg)
Ch.	MHz							
37850	2580	1RB_Mid	Rear	0	0.877	0.859	1.02	/

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	√3	0.7	0.7	1.9	1.9	∞
3	Boundary effect	B	1.0	R	√3	1	1	0.6	0.6	∞
4	Linearity	B	4.7	R	√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	√3	1	1	0.3	0.3	∞
7	Response time	B	0.8	R	√3	1	1	0.5	0.5	∞
8	Integration time	B	2.6	R	√3	1	1	1.5	1.5	∞
9	RF ambient conditions-noise	B	0	R	√3	1	1	0	0	∞
10	RFambient conditions-reflection	B	0	R	√3	1	1	0	0	∞
11	Probe positioned mech. restrictions	B	0.4	R	√3	1	1	0.2	0.2	∞
12	Probe positioning with respect to phantom shell	B	2.9	R	√3	1	1	1.7	1.7	∞
13	Post-processing	B	1.0	R	√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	√3	1	1	2.9	2.9	∞
Phantom and set-up										
17	Phantom uncertainty	B	4.0	R	√3	1	1	2.3	2.3	∞
18	Liquid conductivity (target)	B	5.0	R	√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	√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	√3	0.7	0.7	1.9	1.9	∞
3	Boundary effect	B	2.0	R	√3	1	1	1.2	1.2	∞
4	Linearity	B	4.7	R	√3	1	1	2.7	2.7	∞
5	Detection limit	B	1.0	R	√3	1	1	0.6	0.6	∞
6	Readout electronics	B	0.3	R	√3	1	1	0.3	0.3	∞
7	Response time	B	0.8	R	√3	1	1	0.5	0.5	∞
8	Integration time	B	2.6	R	√3	1	1	1.5	1.5	∞
9	RF ambient conditions-noise	B	0	R	√3	1	1	0	0	∞
10	RFambient conditions-reflection	B	0	R	√3	1	1	0	0	∞
11	Probe positioned mech. restrictions	B	0.8	R	√3	1	1	0.5	0.5	∞
12	Probe positioning with respect to phantom shell	B	6.7	R	√3	1	1	3.9	3.9	∞
13	Post-processing	B	4.0	R	√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	√3	1	1	2.9	2.9	∞
Phantom and set-up										
17	Phantom uncertainty	B	4.0	R	√3	1	1	2.3	2.3	∞
18	Liquid conductivity (target)	B	5.0	R	√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	B	5.0	R	√3	0.6	0.49	1.7	1.4	∞

	(target)									
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	RFambient 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	A	3.4	N	1	1	1	3.4	3.4	5