FCC OET BULLETIN 65 SUPPLEMENT C 01-01
IEEE Std 1528-2003 and IEEE Std 1528a-2005

SAR EVALUATION REPORT

For
GSM850/1900 Phone with Bluetooth, WLAN and Edge Rx Only

Model: GT-S7562
FCC ID: A3LGTS7562

Report Number: 12I14606-1A
Issue Date: 12/7/2012

Prepared for
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NVLAP LAB CODE 200065-0

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Revision History

Rev.	Issue Date	Revisions	Revised By
--	10/2/2012		--
A	12/7/2012	Removed GPRS head SAR measurements - GPRS cannot support VoIP.	Dave Weaver

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1. Attestation of Test Results

Applicant	SAMSUNG ELECTRONICS CO., LTD.		
DUT description	GSM850/1900 Phone with Bluetooth, WLAN and Edge Rx Only		
Model	GT-S7562		
Test device is	An identical prototype		
Device category	Portable		
Exposure category	General Population/Uncontrolled Exposure		
Highest 1-g SAR	Refer to Sec. 13 Summary of Highest 1-g SAR		
Date tested	8/14/2012 – 9/13/2012		
FCC Rule Parts	Freq. Range	Highest 1-g SAR	Limit
22	824-849 MHz	0.275 W/kg (Rear with 10mm separation distance)	1.6 W/kg
24	1850-1910 MHz	Body & Hotspot: 0.887 W/kg (Rear with 10mm separation distance)	
Simultaneous Transmission Condition:		1.091 W/kg (The highest SAR across exposure conditions)	
Applicable Standards			Test Results
FCC OET Bulletin 65 Supplement C 01-01, IEEE Std 1528-2003 and IEEE Std 1528a-2005			Pass

UL CCS tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by UL CCS based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by UL CCS and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL CCS will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, any agency of the Federal Government, or any agency of any government (NIST Handbook 150, Annex A). This report is written to support regulatory compliance of the applicable standards stated above.

Approved & Released For UL CCS By:

Dave Weaver
Program Manager
UL CCS

Tested By:

Elijah Garcia
WiSE Lab Engineer
UL CCS

2. Test Methodology

The tests documented in this report were performed in accordance with FCC OET Bulletin 65 Supplement C Edition 01-01, IEEE STD 1528-2003, IEEE Std 1528a-2005 and the following published KDB Procedures:

- 648474 D01 SAR Handsets Multi Xmiter and Ant, v01r05
- 941225 D01 SAR test for 3G devices v02
- 941225 D06 Hot Spot SAR v01

3. Facilities and Accreditation

The test sites and measurement facilities used to collect data are located at 47173 Benicia Street, Fremont, California, USA.

UL CCS is accredited by NVLAP, Laboratory Code 200065-0. The full scope of accreditation can be viewed at http://www.ccsemc.com.

4. Calibration and Uncertainty

4.1. Measuring Instrument Calibration

The measuring equipment used to perform the tests documented in this report has been calibrated in accordance with the manufacturers' recommendations, and is traceable to recognized national standards.

Name of Equipment	Manufacturer	Type/Model	Serial No.	Cal. Due date		
				MM	DD	Year
Dielectronic Probe kit	HP	85070C	N/A	N/A		
Base Station Simulator	Agilent	8960	GB46160222	6	20	2013
ESA Series Network Analyzer	Agilent	E5071B	MY42100131	2	11	2013
Synthesized Signal Generator	HP	8665B	3744A01084	5	3	2013
E-Field Probe	SPEAG	EX3DV4	3686	2	16	2013
Thermometer	ERTCO	639-1S	8350	7	30	2013
Data Acquisition Electronics	SPEAG	DAE4	1259	2	13	2013
System Validation Dipole	SPEAG	D835V2	4d002	3	6	2013
System Validation Dipole	SPEAG	D1900V2	5d140	4	12	2013
System Validation Dipole	SPEAG	D2450V2	706	4	11	2013
Power Meter	HP	438A	2822A05684	10	7	2013
Power Sensor	HP	8481A	2702A66876	8	1	2013
Amplifier	MITEQ	4D00400600-50-30P	1620606	N/A		
Directional coupler	Werlatone	C8060-102	2141	N/A		

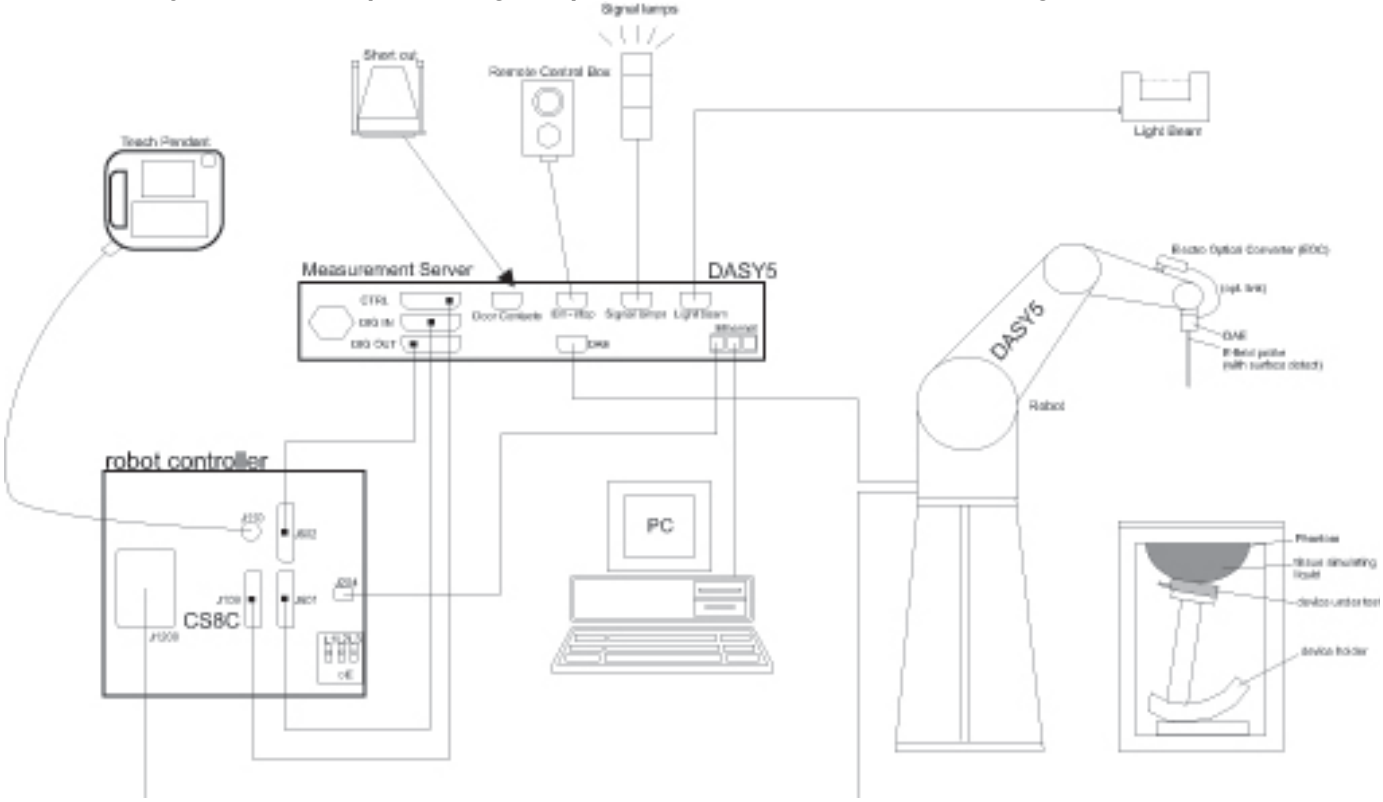
4.2. Measurement Uncertainty

Measurement uncertainty for 300 MHz to 3 GHz averaged over 1 gram

Component	Error, %	Distribution	Divisor	Sensitivity	U (Xi), %
Measurement System					
Probe Calibration (k=1)	**6.00**	Normal	1	1	6.00
Axial Isotropy	1.15	Rectangular	1.732	0.7071	0.47
Hemispherical Isotropy	2.30	Rectangular	1.732	0.7071	0.94
Boundary Effect	0.90	Rectangular	1.732	1	0.52
Probe Linearity	3.45	Rectangular	1.732	1	1.99
System Detection Limits	1.00	Rectangular	1.732	1	0.58
Readout Electronics	0.30	Normal	1	1	0.30
Response Time	0.80	Rectangular	1.732	1	0.46
Integration Time	2.60	Rectangular	1.732	1	1.50
RF Ambient Conditions - Noise	3.00	Rectangular	1.732	1	1.73
RF Ambient Conditions - Reflections	3.00	Rectangular	1.732	1	1.73
Probe Positioner Mechanical Tolerance	0.40	Rectangular	1.732	1	0.23
Probe Positioning with respect to Phantom	2.90	Rectangular	1.732	1	1.67
Extrapolation, Interpolation and Integration	1.00	Rectangular	1.732	1	0.58
Test Sample Related					
Test Sample Positioning	2.90	Normal	1	1	2.90
Device Holder Uncertainty	3.60	Normal	1	1	3.60
Output Power Variation - SAR Drift	5.00	Rectangular	1.732	1	2.89
Phantom and Tissue Parameters					
Phantom Uncertainty (shape and thickness)	4.00	Rectangular	1.732	1	2.31
Liquid Conductivity - deviation from target	5.00	Rectangular	1.732	0.64	1.85
Liquid Conductivity - measurement uncertainty	**-4.87**	Normal	1	0.64	-3.12
Liquid Permittivity - deviation from target	5.00	Rectangular	1.732	0.6	1.73
Liquid Permittivity - measurement uncertainty	**-4.19**	Normal	1	0.6	-2.51
				Combined Standard Uncertainty Uc(y) =	10.53
				Expanded Uncertainty U, Coverage Factor = 2, > 95 % Confidence = 21.06 %	
				Expanded Uncertainty U, Coverage Factor = 2, > 95 % Confidence = 1.66 dB	

5. Measurement System Description and Setup

The DASY5 system used for performing compliance tests consists of the following items:



- A standard high precision 6-axis robot with controller, teach pendant and software. An arm extension for accommodating the data acquisition electronics (DAE).
- An isotropic Field probe optimized and calibrated for the targeted measurement.
- A data acquisition electronics (DAE) which performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. The unit is battery powered with standard or rechargeable batteries. The signal is optically transmitted to the EOC.
- The Electro-optical converter (EOC) performs the conversion from optical to electrical signals for the digital communication to the DAE. To use optical surface detection, a special version of the EOC is required. The EOC signal is transmitted to the measurement server.
- The function of the measurement server is to perform the time critical tasks such as signal filtering, control of the robot operation and fast movement interrupts.
- The Light Beam used is for probe alignment. This improves the (absolute) accuracy of the probe positioning.
- A computer running WinXP or Win7 and the DASY5 software.
- Remote control and teach pendant as well as additional circuitry for robot safety such as warning lamps, etc.
- The phantom, the device holder and other accessories according to the targeted measurement.

6. SAR Measurement Procedure

6.1. Normal SAR Measurement Procedure

Step 1: Power Reference Measurement
The Power Reference Measurement and Power Drift Measurements are for monitoring the power drift of the device under test in the batch process. The minimum distance of probe sensors to surface determines the closest measurement point to phantom surface. The minimum distance of probe sensors to surface is 2.1 mm. This distance cannot be smaller than the distance of sensor calibration points to probe tip as defined in the probe properties.

Step 2: Area Scan
The Area Scan is used as a fast scan in two dimensions to find the area of high field values, before doing a fine measurement around the hot spot. The sophisticated interpolation routines implemented in DASY software can find the maximum locations even in relatively coarse grids. When an Area Scan has measured all reachable points, it computes the field maximal found in the scanned area, within a range of the global maximum. The range (in dB) is specified in the standards for compliance testing. For example, a 2 dB range is required in IEEE Standard 1528 and IEC 62209 standards, whereby 3 dB is a requirement when compliance is assessed in accordance with the ARIB standard (Japan). If only one Zoom Scan follows the Area Scan, then only the absolute maximum will be taken as reference. For cases where multiple maximums are detected, the number of Zoom Scans has to be increased accordingly.

Step 3: Zoom Scan
Zoom Scans are used to assess the peak spatial SAR values within a cubic averaging volume containing 1 g and 10 g of simulated tissue. The Zoom Scan measures ≥ 7x7x9 (above 4.5 GHz) or 5x5x7 (below 3 GHz) points within a cube whose base faces are centered on the maxima found in a preceding area scan job within the same procedure. When the measurement is done, the Zoom Scan evaluates the averaged SAR for 1 g and 10 g and displays these values next to the job's label.

Step 4: Power drift measurement
The Power Drift Measurement measures the field at the same location as the most recent power reference measurement within the same procedure, and with the same settings. The Power Drift Measurement gives the field difference in dB from the reading conducted within the last Power Reference Measurement. This allows a user to monitor the power drift of the device under test within a batch process. The measurement procedure is the same as Step 1.

Step 5: Z-Scan (FCC only)
The Z Scan measures points along a vertical straight line. The line runs along the Z-axis of a one-dimensional grid. In order to get a reasonable extrapolation the extrapolated distance should not be larger than the step size in Z-direction.

6.2. Volume Scan Procedures

Step 1: Power Reference Measurement
The Power Reference Measurement and Power Drift Measurements are for monitoring the power drift of the device under test in the batch process. The minimum distance of probe sensors to surface determines the closest measurement point to phantom surface. The minimum distance of probe sensors to surface is 2.1 mm. This distance cannot be smaller than the distance of sensor calibration points to probe tip as defined in the probe properties.

Step 2: Area Scan
The Area Scan is used as a fast scan in two dimensions to find the area of high field values, before doing a fine measurement around the hot spot. The sophisticated interpolation routines implemented in DASY software can find the maximum locations even in relatively coarse grids. When an Area Scan has measured all reachable points, it computes the field maximal found in the scanned area, within a range of the global maximum. The range (in dB) is specified in the standards for compliance testing. For example, a 2 dB range is required in IEEE Standard 1528 and IEC 62209 standards, whereby 3 dB is a requirement when compliance is assessed in accordance with the ARIB standard (Japan). If only one Zoom Scan follows the Area Scan, then only the absolute maximum will be taken as reference. For cases where multiple maximums are detected, the number of Zoom Scans has to be increased accordingly.

Step 3: Zoom Scan
Zoom Scans are used to assess the peak spatial SAR values within a cubic averaging volume containing 1 g and 10 g of simulated tissue. The Zoom Scan measures ≥ 7x7x9 (above 4.5 GHz) or 5x5x7 (below 3 GHz) points within a cube whose base faces are centered on the maxima found in a preceding area scan job within the same procedure. When the measurement is done, the Zoom Scan evaluates the averaged SAR for 1 g and 10 g and displays these values next to the job's label.

Step 4: Volume Scan
Volume Scans are used to assess peak SAR and averaged SAR measurements in largely extended 3-dimensional volumes within any phantom. This measurement does not need any previous area scan. The grid can be anchored to a user specific point or to the current probe location.

Step 5: Power drift measurement
The Power Drift Measurement measures the field at the same location as the most recent power reference measurement within the same procedure, and with the same settings. The Power Drift Measurement gives the field difference in dB from the reading conducted within the last Power Reference Measurement. This allows a user to monitor the power drift of the device under test within a batch process. The measurement procedure is the same as Step 1.

7. Device Under Test

GSM850/1900 Phone with Bluetooth, WLAN and Edge Rx Only Model: GT-S7562	
Normal operation	- Held to head, - Body-worn Accessory (Rear and Front sides) with 10 mm separation distance. - Hotspot mode with 10 mm separation distance to all sides and edges.
Accessory	1. Headset

7.1. Band and Air Interfaces

Tx Frequency Bands	- GSM850: 824 - 849 MHz - GSM1900: 1850 - 1910 MHz - 802.11b/g/n: 2412 - 2462 MHz, b / g / HT20 - Bluetooth: 2402 - 2480 MHz (Ver. 4.0 LE)
GPRS Multi-Slot Class	10
DTM Class	Not supported

7.2. Hotspot (Wireless router) Exposure Condition

The device is capable of personal hotspot mode. The hotspot mode can be enabled by the user.

7.3. Simultaneous Transmission Condition

No.	Conditions
1	GSM850 Voice + WiFi
2	GSM1900 Voice + WiFi
3	GSM850 GPRS + WiFi
4	GSM1900 GPRS + WiFi
1	GSM850 Voice + BT
2	GSM1900 Voice + BT
3	GSM850 GPRS + BT
4	GSM1900 GPRS + BT

8. Summary of Test Configurations

Refer to Section 16 “Antenna Location and Separation Distances” for the specific details of the antenna-to-antenna and antenna-to-edge(s) distances.

8.1. Head Exposure Conditions for WWAN (Ant.) and Wi-Fi/BT (Ant.)

Test Configurations	SAR Required	Note
Left Touch	Yes	
Left Tilt (15°)	Yes	
Right Touch	Yes	
Right Tilt (15°)	Yes	

8.2. Body-worn Accessory Exposure Conditions for WWAN (Ant.) and Wi-Fi/BT (Ant.)

Test Configurations	Antenna-to-edge/surface	SAR Required	Note
Rear	< 25 mm	Yes	
Front	< 25 mm	Yes	

8.3. Hotspot Mode Exposure Conditions for WWAN (Ant.)

Test Configurations	Antenna-to-edge/surface	SAR Required	Note
Rear	< 25 mm	Yes	
Front	< 25 mm	Yes	
Edge 1	108 mm	No	SAR is not required because the distance from the WWAN antenna to this edge is > 2.5 cm as per KDB 941225 D06 Hot Spot SAR v01
Edge 2	20 mm	Yes	
Edge 3	5 mm	Yes	
Edge 4	8 mm	Yes	

8.4. Hotspot Mode Exposure Conditions for Wi-Fi/BT (Ant.)

Test Configurations	Antenna-to-edge/surface	SAR Required	Note
Rear	< 25 mm	Yes	
Front	< 25 mm	Yes	
Edge 1*	13 mm	Yes	
Edge 2*	5 mm	Yes	
Edge 3*	> 80 mm	No	SAR is not required because the distance from the Wi-Fi/BT antenna to this edge is > 2.5 cm as per KDB 941225 D06 Hot Spot SAR v01
Edge 4*	> 55 mm	No	SAR is not required because the distance from the Wi-Fi/BT antenna to this edge is > 2.5 cm as per KDB 941225 D06 Hot Spot SAR v01

Notes:

- Edge 1= Top Edge
- Edge 2= Right Edge
- Edge 3= Bottom Edge
- Edge 4= Left Edge

9. RF Output Power Measurement

9.1. GSM850

Target Power: 30.7 dBm
Tune-up Tolerance: -1.5 dB / +0.5 dB

GSM (GMSK) Voice Mode			
Band	Ch No.	Freq. (MHz)	Avg burst Pwr (dBm)
850	128	824.2	31.2
	190	836.6	31.1
	251	848.8	31.0

Target Power:
GPRS 1 slot 30.7 dBm
GPRS 2 slot 30.7 dBm
GPRS 3 slot 28.7 dBm
GPRS 4 slot 26.7 dBm
Tune-up Tolerance: -1.5 dB / +0.5 dB

GMSK (GPRS) Mode - Coding Scheme: CS1

Band	Ch No.	Freq. (MHz)	Avg burst Pwr (dBm)				Avg burst Pwr (dBm)			
			1 slot	Frame Avg Pwr	2 slots	Frame Avg Pwr	3 slots	Frame Avg Pwr	4 slots	Frame Avg Pwr
850	128	824.2	31.1	22.0	30.3	**24.3**	27.7	23.5	26.7	23.7
	190	836.6	31.1	22.0	30.3	**24.3**	27.5	23.2	26.6	23.6
	251	848.8	31.1	22.1	30.1	**24.0**	27.4	23.1	26.4	23.4

Notes:
The worst-case configuration and mode for SAR testing is determined to be as follows:
- Head: GMSK Voice Mode
- Body: GMSK (GPRS) mode with 2 time slots, based on the output power measurements above

8PSK (EGPRS) Mode - Coding Scheme: MCS5
Edge Rx only

Notes:
The worst-case configuration and mode for SAR testing is determined to be as follows:
- Head: GMSK Voice Mode
- Body: GMSK (GPRS) mode with 2 time slots, based on the output power measurements above
- SAR is not required for EGPRS (8PSK) Mode because its output power is less than that of GPRS Mode

9.2. GSM1900

Target Power: 27.8 dBm
Tune-up Tolerance: -1.5 dB / +0.5 dB

GSM (GMSK) Voice Mode

Band	Ch No.	Freq. (MHz)	Avg burst Pwr (dBm)
1900	512	1850.2	28.0
	661	1880.0	27.9
	810	1909.8	28.0

Target Power:
GPRS 1 slot 27.8 dBm
GPRS 2 slot 27.8 dBm
GPRS 3 slot 25.8 dBm
GPRS 4 slot 23.8 dBm
Tune-up Tolerance: -1.5 dB / +0.5 dB

GMSK (GPRS) Mode - Coding Scheme: CS1

Band	Ch No.	Freq. (MHz)	Avg burst Pwr (dBm)				Avg burst Pwr (dBm)			
			1 slot	Frame Avg Pwr	2 slots	Frame Avg Pwr	3 slots	Frame Avg Pwr	4 slots	Frame Avg Pwr
1900	512	1850.2	28.0	19.0	27.5	**21.4**	24.8	20.5	24.0	21.0
	661	1880.0	27.9	18.9	27.5	**21.4**	24.7	20.5	23.9	20.9
	810	1909.8	27.9	18.9	27.4	**21.4**	24.7	20.4	23.4	20.4

Notes:
The worst-case configuration and mode for SAR testing is determined to be as follows:
- Head: GMSK Voice Mode
- Body: GMSK (GPRS) mode with 2 time slots, based on the output power measurements above

8PSK (EGPRS) Mode - Coding Scheme: MCS5
Edge Rx only

Notes:
The worst-case configuration and mode for SAR testing is determined to be as follows:
- Head: GMSK Voice Mode
- Body: GMSK (GPRS) mode with 2 time slots, based on the output power measurements above
- SAR is not required for EGPRS (8PSK) Mode because its output power is less than that of GPRS Mode

9.3. Wi-Fi (2.4 GHz band)

WiFi values are taken from HTC Co., LTD. Report # HCTA1206FS06

Required Test Channels per KDB 248227 D01

Mode	Band	GHz	Channel	"Default Test Channels"	
				802.11b	802.11g
802.11b/g	2.4 GHz	**2.412**	1#	√	∇
		2.437	6	√	∇
		2.462	11#	√	∇

Notes:
√ = "default test channels"
∇ = possible 802.11g channels with maximum average output ¼ dB ≥ the "default test channels"
= when output power is reduced for channel 1 and /or 11 to meet restricted band requirements the highest output channels closest to each of these channels should be tested.

Band (MHz)	Mode	Ch #	Freq. (MHz)	Target Pwr (dBm)	Avg Pwr (dBm)	Note
2.4	802.11b	1	2412	15	14.7	
		6	2437	15	15.5	
		11	2462	15	15.0	
	802.11g	1	2412	12	12.2	
		6	2437	12	12.4	
		11	2462	12	12.0	
	802.11n (HT20)	1	2412	10	10.3	
		6	2437	10	10.5	
		11	2462	10	9.9	

Note(s):

1. SAR is not required for 802.11g/HT20 channels when the maximum average output power is less than 1/4 dB higher than that measured on the corresponding 802.11a/b channels. As per KDB 248227

9.4. Bluetooth

Bluetooth power levels are taken from SGS report number F690501/RF-RTL005624

Mode	Channel #	Freq. (MHz)	Conducted Avg Power	
			(dBm)	(mW)
V2.1 + EDR, GFSK	0	2402	1.7	1.48
	39	2441	3.5	2.23
	78	2480	3.9	2.45
V2.1 + EDR, π/4 DQPSK	0	2402	-1.4	0.73
	39	2441	0.8	1.20
	78	2480	1.3	1.34
V2.1 + EDR, 8-DPSK	0	2402	-1.4	0.72
	39	2441	0.8	1.21
	78	2480	1.3	1.35

Note(s):

According to KDB 648474, Table 2, Unlicensed transmitters
When there is simultaneous transmission, Stand-alone SAR not required due to

☐ Output ≤ 2 · P_{Ref} (13.8dBm / 24 mW) and antenna is ≥ 5.0 cm from other antennas
☒ Output ≤ P_{Ref} (10.79dBm / 12 mW) and antenna is ≥ 2.5 cm from other antennas
☐ Output ≤ P_{Ref} (10.79dBm / 12 mW) and antenna is < 2.5 cm from other antennas

10. Tissue Dielectric Properties

IEEE Std 1528-2003 Table 2

Target Frequency (MHz)	Head	
	ε_r	σ (S/m)
300	45.3	0.87
450	43.5	0.87
835	41.5	0.90
900	41.5	0.97
1450	40.5	1.20
1800 – 2000	40.0	1.40
2450	39.2	1.80
2600	39.0	1.96
3000	38.5	2.40

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Target Frequency (MHz)	Head		Body	
	ε_r	σ (S/m)	ε_r	σ (S/m)
150	52.3	0.76	61.9	0.80
300	45.3	0.87	58.2	0.92
450	43.5	0.87	56.7	0.94
835	41.5	0.90	55.2	0.97
900	41.5	0.97	55.0	1.05
915	41.5	0.98	55.0	1.06
1450	40.5	1.20	54.0	1.30
1610	40.3	1.29	53.8	1.40
1800 – 2000	40.0	1.40	53.3	1.52
2450	39.2	1.80	52.7	1.95
3000	38.5	2.40	52.0	2.73
5000	36.2	4.45	49.3	5.07
5100	36.1	4.55	49.1	5.18
5200	36.0	4.66	49.0	5.30
5300	35.9	4.76	48.9	5.42
5400	35.8	4.86	48.7	5.53
5500	35.6	4.96	48.6	5.65
5600	35.5	5.07	48.5	5.77
5700	35.4	5.17	48.3	5.88
5800	35.3	5.27	48.2	6.00

10.1. Composition of Ingredients for the Tissue Material Used in the SAR Tests

The following tissue formulations are provided for reference only as some of the parameters have not been thoroughly verified. The composition of ingredients may be modified accordingly to achieve the desired target tissue parameters required for routine SAR evaluation.

Ingredients (% by weight)	Frequency (MHz)									
	450		835		915		1900		2450	
Tissue Type	Head	Body	Head	Body	Head	Body	Head	Body	Head	Body
Water	38.56	51.16	41.45	52.4	41.05	56.0	54.9	40.4	62.7	73.2
Salt (NaCl)	3.95	1.49	1.45	1.4	1.35	0.76	0.18	0.5	0.5	0.04
Sugar	56.32	46.78	56.0	45.0	56.5	41.76	0.0	58.0	0.0	0.0
HEC	0.98	0.52	1.0	1.0	1.0	1.21	0.0	1.0	0.0	0.0
Bactericide	0.19	0.05	0.1	0.1	0.1	0.27	0.0	0.1	0.0	0.0
Triton X-100	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	36.8	0.0
DGBE	0.0	0.0	0.0	0.0	0.0	0.0	44.92	0.0	0.0	26.7
Dielectric Constant	43.42	58.0	42.54	56.1	42.0	56.8	39.9	54.0	39.8	52.5
Conductivity (S/m)	0.85	0.83	0.91	0.95	1.0	1.07	1.42	1.45	1.88	1.78

Salt: 99+% Pure Sodium Chloride Sugar: 98+% Pure Sucrose
Water: De-ionized, 16 MΩ+ resistivity HEC: Hydroxyethyl Cellulose
DGBE: 99+% Di(ethylene glycol) butyl ether, [2-(2-butoxyethoxy)ethanol]
Triton X-100 (ultra pure): Polyethylene glycol mono [4-(1,1, 3, 3-tetramethylbutyl)phenyl]ether

10.2. Tissue Dielectric Parameter Check Results

Tissue dielectric parameters were measured at the low, middle and high frequency of each operating frequency range of the test device.

Date	Freq. (MHz)	Liquid Parameters			Measured	Target	Delta (%)	Limit ±(%)
08/29/2012	Body 835	e'	55.0224	Relative Permittivity (ϵ_r):	55.02	55.20	-0.32	5
		e''	20.9447	Conductivity (σ):	0.97	0.97	0.25	5
	Body 815	e'	55.2761	Relative Permittivity (ϵ_r):	55.28	55.30	-0.04	5
		e''	21.2210	Conductivity (σ):	0.96	0.97	-0.66	5
	Body 820	e'	55.1039	Relative Permittivity (ϵ_r):	55.10	55.28	-0.31	5
		e''	21.1481	Conductivity (σ):	0.96	0.97	-0.44	5
	Body 850	e'	54.8469	Relative Permittivity (ϵ_r):	54.85	55.16	-0.56	5
		e''	21.0366	Conductivity (σ):	0.99	0.99	0.72	5
09/11/2012	Body 1900	e'	51.1018	Relative Permittivity (ϵ_r):	51.10	53.30	-4.12	5
		e''	14.1862	Conductivity (σ):	1.50	1.52	-1.40	5
	Body 1850	e'	51.2776	Relative Permittivity (ϵ_r):	51.28	53.30	-3.79	5
		e''	14.0563	Conductivity (σ):	1.45	1.52	-4.87	5
	Body 1880	e'	51.1733	Relative Permittivity (ϵ_r):	51.17	53.30	-3.99	5
		e''	14.1414	Conductivity (σ):	1.48	1.52	-2.75	5
	Body 1910	e'	51.0656	Relative Permittivity (ϵ_r):	51.07	53.30	-4.19	5
		e''	14.2031	Conductivity (σ):	1.51	1.52	-0.76	5
09/11/2012	Head 1900	e'	39.5970	Relative Permittivity (ϵ_r):	39.60	40.00	-1.01	5
		e''	13.1380	Conductivity (σ):	1.39	1.40	-0.86	5
	Head 1850	e'	39.7958	Relative Permittivity (ϵ_r):	39.80	40.00	-0.51	5
		e''	12.9501	Conductivity (σ):	1.33	1.40	-4.85	5
	Head 1880	e'	39.7684	Relative Permittivity (ϵ_r):	39.77	40.00	-0.58	5
		e''	13.0688	Conductivity (σ):	1.37	1.40	-2.42	5
	Head 1910	e'	39.6554	Relative Permittivity (ϵ_r):	39.66	40.00	-0.86	5
		e''	13.1584	Conductivity (σ):	1.40	1.40	-0.18	5
09/13/2012	Head 835	e'	41.8272	Relative Permittivity (ϵ_r):	41.83	41.50	0.79	5
		e''	19.0785	Conductivity (σ):	0.89	0.90	-1.58	5
	Head 815	e'	42.0587	Relative Permittivity (ϵ_r):	42.06	41.63	1.03	5
		e''	19.1292	Conductivity (σ):	0.87	0.90	-3.47	5
	Head 820	e'	41.9977	Relative Permittivity (ϵ_r):	42.00	41.60	0.95	5
		e''	19.1150	Conductivity (σ):	0.87	0.90	-3.00	5
	Head 850	e'	41.6630	Relative Permittivity (ϵ_r):	41.66	41.50	0.39	5
		e''	19.0368	Conductivity (σ):	0.90	0.92	-1.67	5

11. System Performance Check

The system performance check is performed prior to any usage of the system in order to verify SAR system measurement accuracy. The system performance check verifies that the system operates within its specifications of ±10%.

11.1. System Performance Check Measurement Conditions

- The measurements were performed in the flat section of the TWIN SAM or ELI phantom, shell thickness: 2.0 ±0.2 mm (bottom plate) filled with Body or Head simulating liquid of the following parameters.
- The DASY system with an E-Field Probe was used for the measurements.
- The dipole was mounted on the small tripod so that the dipole feed point was positioned below the center marking of the flat phantom section and the dipole was oriented parallel to the body axis (the long side of the phantom). The standard measuring distance was 10 mm (above 1 GHz) and 15 mm (below 1 GHz) from dipole center to the simulating liquid surface.
- The coarse grid with a grid spacing of 15 mm was aligned with the dipole.
  For 5 GHz band - The coarse grid with a grid spacing of 10 mm was aligned with the dipole.
- Special 7x7x7 (below 3 GHz) and/or 8x8x7 (above 3 GHz) fine cube was chosen for the cube.
- Distance between probe sensors and phantom surface was set to 3 mm.
  For 5 GHz band - Distance between probe sensors and phantom surface was set to 2.5 mm
- The dipole input power (forward power) was 100 mW.
- The results are normalized to 1 W input power.

11.2. Reference SAR Values for System Performance Check

The reference SAR values can be obtained from the calibration certificate of system validation dipoles

System Dipole	Serial No.	Cal. Date	Freq. (MHz)	SAR Measured (mW/g)		
				1g/10g	Head	Body
D835V2	4d002	3/6/12	835	1g	9.24	9.64
				10g	6.04	6.32
D1900V2	5d140	4/12/12	1900	1g	39.1	40.0
				10g	20.6	21.3
D2450V2	706	4/11/12	2450	1g	51.2	49.6
				10g	23.9	23.4

11.3. System Performance Check Results

Date Tested	System Dipole		T.S. Liquid	SAR Measured (Normalized to 1 W)		Target (Ref. Value)	Delta (%)	Tolerance (%)
	Type	Serial No.						
8/29/2012	D835V2	4d002	Body	1g	9.39	9.64	-2.59	±10
				10g	6.18	6.32	-2.22	
9/11/2012	D1900V2	5d140	Body	1g	40.0	40.00	0.00	±10
				10g	20.9	21.30	-1.88	
9/12/2012	D1900V2	5d140	Head	1g	38.3	39.10	-2.05	±10
				10g	19.9	20.60	-3.40	
9/13/2012	D835V2	4d002	Head	1g	8.79	9.24	-4.87	±10
				10g	5.77	6.04	-4.47	

12. SAR Test Results

12.1. GSM850

12.1.1. Head Exposure Conditions

Test Position	Mode	Ch #.	Freq. (MHz)	Power (dBm)		1-g SAR (W/kg)		Note
				Tune-up limit	Measured	Measured	Scaled	
Left Touch	Voice	128	824.20	31.2	31.2			1
		190	836.60	31.2	31.1	**0.090**	**0.092**	
		251	848.80	31.2	31.0			1
Left Tilt (15°)	Voice	128	824.20	31.2	31.2			1
		190	836.60	31.2	31.1	0.060	0.061	
		251	848.80	31.2	31.0			1
Right Touch	Voice	128	824.20	31.2	31.2			1
		190	836.60	31.2	31.1	0.068	0.070	
		251	848.80	31.2	31.0			1
Right Tilt (15°)	Voice	128	824.20	31.2	31.2			1
		190	836.60	31.2	31.1	0.059	0.060	
		251	848.80	31.2	31.0			1

Note(s):

1. According to FCC "Public Notice DA 02-1438" by the SCC-34/SC-2, when the SAR measured for the middle channel is < 50% of the SAR limit, testing for the low and high channel is optional.

12.1.2. Body-worn Accessory Exposure Conditions

Test Position	Mode	Dist. (mm)	Ch #.	Freq. (MHz)	Power (dBm)		1-g SAR (W/kg)		Note
					Tune-up limit	Measured	Measured	Scaled	
Rear	Voice	10	128	824.20	31.2	31.2			1
			190	836.60	31.2	31.1	**0.207**	**0.212**	
			190	836.60	31.2	31.1	0.143	0.146	2
			251	848.80	31.2	31.0			1
Front	Voice	10	128	824.20	31.2	31.2			1
			190	836.60	31.2	31.1	0.106	0.108	
			251	848.80	31.2	31.0			1

Note(s):

1. According to FCC "Public Notice DA 02-1438" by the SCC-34/SC-2, when the SAR measured for the middle channel is < 50% of the SAR limit, testing for the low and high channel is optional.
2. With headset attached.

12.1.3. Hotspot Mode Exposure Conditions

Test Position	Mode	Dist. (mm)	Ch #.	Freq. (MHz)	Power (dBm)		1-g SAR (W/kg)		Note
					Tune-up limit	Measured	Measured	Scaled	
Rear	GPRS 2 slots	10	128	824.20	30.8	30.3			1
			190	836.60	30.8	30.3	**0.275**	**0.309**	
			251	848.80	30.8	30.1			1
Front	GPRS 2 slots	10	128	824.20	30.8	30.3			1
			190	836.60	30.8	30.3	0.147	0.165	
			251	848.80	30.8	30.1			1
Edge 2	GPRS 2 slots	10	128	824.20	30.8	30.3			1
			190	836.60	30.8	30.3	0.084	0.094	
			251	848.80	30.8	30.1			1
Edge 3	GPRS 2 slots	10	128	824.20	30.8	30.3			1
			190	836.60	30.8	30.3	0.060	0.067	
			251	848.80	30.8	30.1			1
Edge 4	GPRS 2 slots	10	128	824.20	30.8	30.3			1
			190	836.60	30.8	30.3	0.148	0.166	
			251	848.80	30.8	30.1			1

Note(s):

1. According to FCC “Public Notice DA 02-1438” by the SCC-34/SC-2, when the SAR measured for the middle channel is < 50% of the SAR limit, testing for the low and high channel is optional.

12.2. GSM1900

12.2.1. Head Exposure Conditions

Test Position	Mode	Ch #.	Freq. (MHz)	Power (dBm)		1-g SAR (W/kg)		Note
				Tune-up limit	Measured	Measured	Scaled	
Left Touch	Voice	512	1850.2	28.3	28.0			1
		661	1880.0	28.3	27.9	**0.395**	**0.433**	
		810	1909.8	28.3	28.0			1
Left Tilt (15°)	Voice	512	1850.2	28.3	28.0			1
		661	1880.0	28.3	27.9	0.130	0.143	
		810	1909.8	28.3	28.0			1
Right Touch	Voice	512	1850.2	28.3	28.0			1
		661	1880.0	28.3	27.9	0.217	0.238	
		810	1909.8	28.3	28.0			1
Right Tilt (15°)	Voice	512	1850.2	28.3	28.0			1
		661	1880.0	28.3	27.9	0.135	0.148	
		810	1909.8	28.3	28.0			1

Note(s):

1. According to FCC "Public Notice DA 02-1438" by the SCC-34/SC-2, when the SAR measured for the middle channel is < 50% of the SAR limit, testing for the low and high channel is optional.

12.2.2. Body-worn Accessory Exposure Conditions

Test Position	Mode	Dist. (mm)	Ch #.	Freq. (MHz)	Power (dBm)		1-g SAR (W/kg)		Note
					Tune-up limit	Measured	Measured	Scaled	
Rear	Voice	10	512	1850.2	28.3	28.0			1
			661	1880.0	28.3	27.9	**0.454**	**0.498**	
			661	1880.0	28.3	27.9	0.407	0.446	2
			810	1909.8	28.3	28.0			1
Front	Voice	10	512	1850.2	28.3	28.0			1
			661	1880.0	28.3	27.9	0.251	0.275	
			810	1909.8	28.3	28.0			1

Note(s):

1. According to FCC "Public Notice DA 02-1438" by the SCC-34/SC-2, when the SAR measured for the middle channel is < 50% of the SAR limit, testing for the low and high channel is optional.
2. With headset attached.

12.2.3. Hotspot Mode Exposure Conditions

Test Position	Mode	Dist. (mm)	Ch #.	Freq. (MHz)	Power (dBm)		1-g SAR (W/kg)		Note
					Tune-up limit	Measured	Measured	Scaled	
Rear	GPRS 2 slots	10	512	1850.2	28.3	27.5	0.883	1.062	
			661	1880.0	28.3	27.5	**0.887**	**1.066**	
			810	1909.8	28.3	27.4	0.847	1.042	
Front	GPRS 2 slots	10	512	1850.2	28.3	27.5			1
			661	1880.0	28.3	27.5	0.466	0.560	
			810	1909.8	28.3	27.4			1
Edge 2	GPRS 2 slots	10	512	1850.2	28.3	27.5			1
			661	1880.0	28.3	27.5	0.109	0.131	
			810	1909.8	28.3	27.4			1
Edge 3	GPRS 2 slots	10	512	1850.2	28.3	27.5			1
			661	1880.0	28.3	27.5	0.613	0.737	
			810	1909.8	28.3	27.4			1
Edge 4	GPRS 2 slots	10	512	1850.2	28.3	27.5			
			661	1880.0	28.3	27.5	0.259	0.311	
			810	1909.8	28.3	27.4			

Note(s):

1. According to FCC “Public Notice DA 02-1438” by the SCC-34/SC-2, when the SAR measured for the middle channel is < 50% of the SAR limit, testing for the low and high channel is optional.

12.3. Wi-Fi

12.3.1. Head Exposure Conditions

WiFi SAR values are taken from HTC Co., LTD. Report # HCTA1206FS06

Test Position	Mode	Ch #.	Freq. (MHz)	Power (dBm)		1-g SAR (W/kg)		Note
				Tune-up limit	Measured	Measured	Scaled	
Left Touch	802.11b	1	2412	15.5	14.7			1
		6	2437	15.5	15.5	**0.083**	**0.083**	1
		11	2462	15.5	15.0			1
Left Tilt (15°)	802.11b	1	2412	15.5	14.7			1
		6	2437	15.5	15.5	0.033	0.033	1
		11	2462	15.5	15.0			1
Right Touch	802.11b	1	2412	15.5	14.7			1
		6	2437	15.5	15.5	0.034	0.034	1
		11	2462	15.5	15.0			1
Right Tilt (15°)	802.11b	1	2412	15.5	14.7			1
		6	2437	15.5	15.5	0.041	0.041	1
		11	2462	15.5	15.0			1

12.3.1. Body & Hotspot SAR

Test Position	Mode	Dist. (mm)	Ch #.	Freq. (MHz)	Power (dBm)		1-g SAR (W/kg)		Note
					Tune-up limit	Measured	Measured	Scaled	
Rear	802.11b	10	1	2412	15.5	14.7			1
			6	2437	15.5	15.5	**0.204**	**0.204**	
			11	2462	15.5	15.0			1
Front	802.11b	10	1	2412	15.5	14.7			1
			6	2437	15.5	15.5	0.024	0.024	1
			11	2462	15.5	15.0			1
Edge 1	802.11b	10	1	2412	15.5	14.7			1
			6	2437	15.5	15.5	0.023	0.023	1
			11	2462	15.5	15.0			1
Edge 2	802.11b	10	1	2412	15.5	14.7			1
			6	2437	15.5	15.5	0.098	0.098	1
			11	2462	15.5	15.0			1

Note(s):

1. Testing was performed on the channel with the highest output power only as the SAR was ≤ 0.8 W/kg with the operating frequency band having a range of < 100 MHz. Per KDB 447498 1) e) i)
2. With headset attached.

12.3.1. Summary of Highest SAR Values

Results of highest SAR values for each frequency band and mode

Technology/Band	Test configuration		Mode	Highest 1g SAR (W/kg)
GSM850	Head	Left Touch	GMSK (Voice)	0.090
	Body	Rear	GMSK (Voice)	0.207
	Hotspot	Rear	GPRS 2 slots	0.275
GSM1900	Head	Left Touch	GMSK (Voice)	0.395
	Body	Rear	GMSK (Voice)	0.454
	Hotspot	Rear	GPRS 2 slots	0.887
WiFi 2.4 GHz	Head	Left Touch	802.11b 1Mbps	0.083
	Body & Hotspot	Rear	802.11b 1Mbps	0.204

WiFi SAR values are taken fromHTC Co., LTD., Report # HCTA1206FS06

12.4. Scaled SAR Values to the Maximum Tune-up Tolerances

The following measured results were scaled to the maximum tune-up tolerance, according to the output power of the channel tested for the highest measured results in each frequency band.

Test Configuration		Mode	Ch #.	Freq. (MHz)	Power (dBm)		SAR (W/kg)	
					Max. tune-up limit	Measured	Measured	Scaled
Body	Rear	GSM850 (GPRS 2 slot)	190	836.6	31.2	30.3	0.275	0.338
Body&Hotspot	Rear	GSM1900 (GPRS 2 slot)	661	1880.0	27.9	27.5	0.887	0.973
Body&Hotspot	Rear	802.11 b	6	2437.0	15.5	15.5	0.204	0.204

12.5. SAR Plots (from Summary of Highest SAR Values)

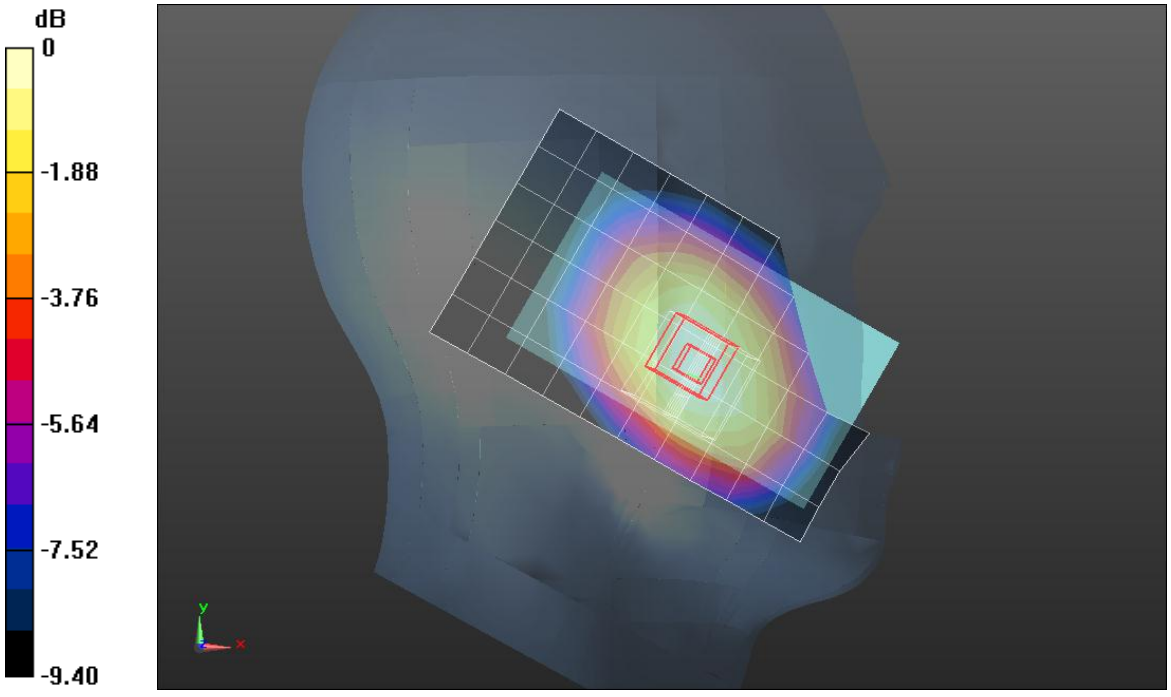
Test Laboratory: UL CCS SAR Lab B Date: 9/13/2012

GSM850

Frequency: 836.6 MHz; Duty Cycle: 1:8.00018; Room Ambient Temperature: 24.0°C; Liquid Temperature: 23.0°C
Medium parameters used (interpolated): f = 836.6 MHz; σ = 0.888 mho/m; ε_r = 41.809; ρ = 1000 kg/m^3
DASY5 Configuration:
- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Electronics: DAE4 Sn1259; Calibrated: 2/13/2012
- Probe: EX3DV4 - SN3686; ConvF(8.61, 8.61, 8.61); Calibrated: 2/16/2012
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Phantom: SAM; Type: QD000P40CD; Serial: 1629

Head/Left Touch/GMSK Voice/Ch 190/Area Scan (7x11x1): Measurement grid: dx=15mm, dy=15mm
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.101 mW/g

Head/Left Touch/GMSK Voice/Ch 190/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 10.813 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 0.1140
SAR(1 g) = 0.090 mW/g; SAR(10 g) = 0.067 mW/g
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.100 mW/g



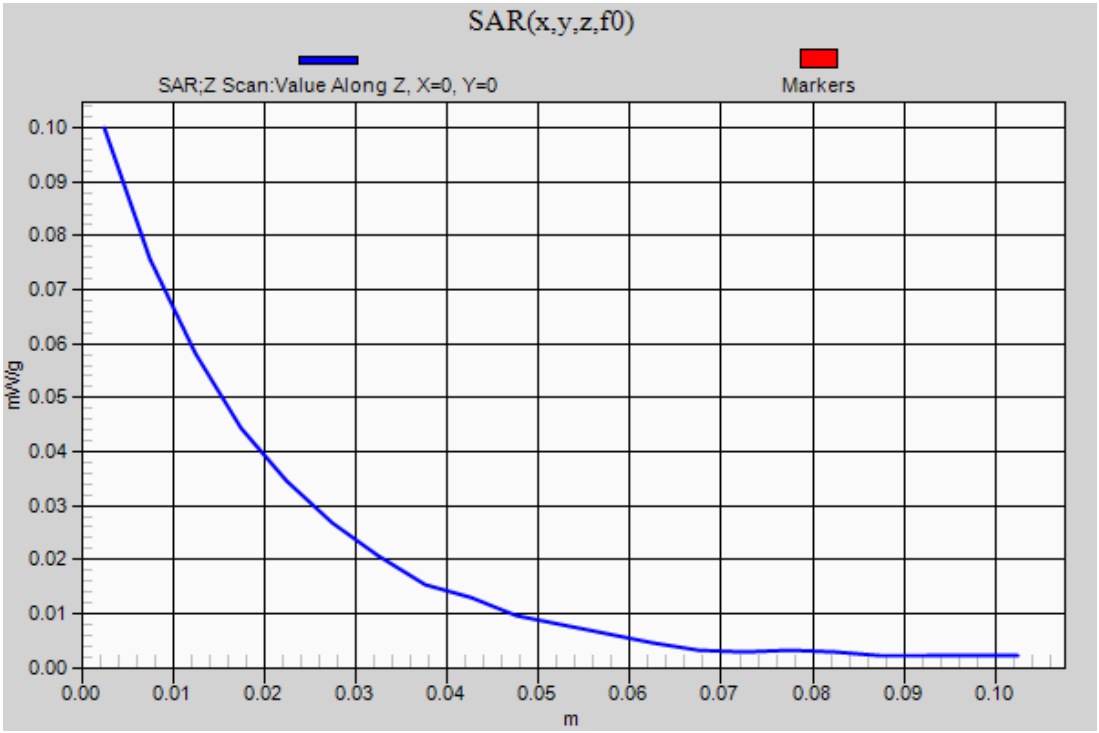
0 dB = 0.100mW/g = -20.00 dB mW/g

GSM850

Frequency: 836.6 MHz; Duty Cycle: 1:8.00018

Head/Left Touch/GMSK Voice/Ch 190/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.100 mW/g

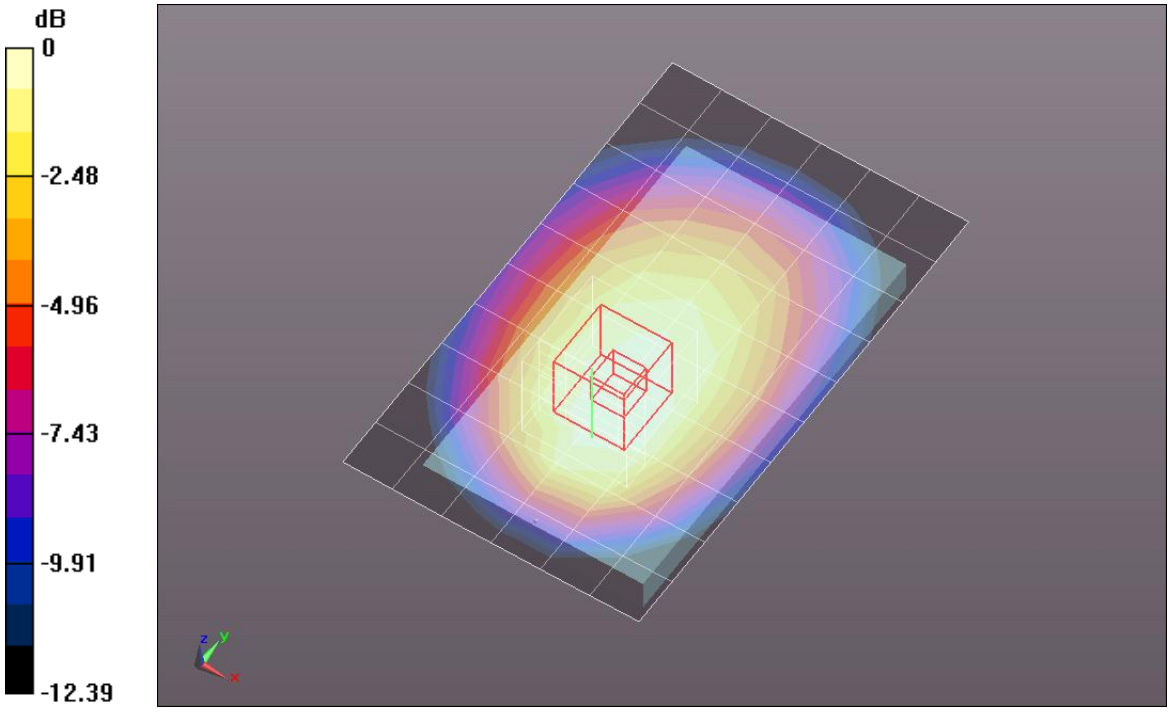


GSM850

Frequency: 836.6 MHz; Duty Cycle: 1:8.00018; Room Ambient Temperature: 24.0°C; Liquid Temperature: 23.0°C
Medium parameters used (interpolated): f = 836.6 MHz; σ = 0.975 mho/m; ε_r = 55.002; ρ = 1000 kg/m^3
DASY5 Configuration:
- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Electronics: DAE4 Sn1259; Calibrated: 2/13/2012
- Probe: EX3DV4 - SN3686; ConvF(8.73, 8.73, 8.73); Calibrated: 2/16/2012
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Phantom: ELI v5.0 (B); Type: QDOVA001BB; Serial: 1118

Body/Rear/GMSK Voice/10mm/Ch 190/Area Scan (7x11x1): Measurement grid: dx=15mm, dy=15mm
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.240 mW/g

Body/Rear/GMSK Voice/10mm/Ch 190/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 15.840 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 0.2980
SAR(1 g) = 0.207 mW/g; SAR(10 g) = 0.148 mW/g
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.239 mW/g

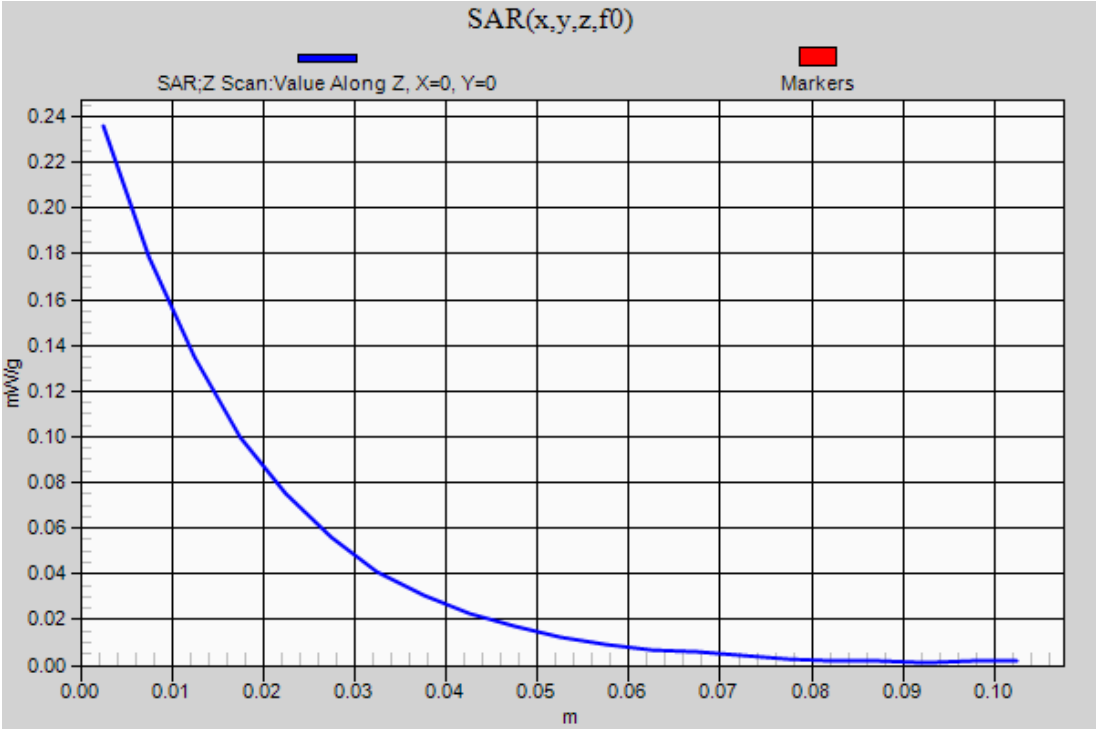


0 dB = 0.240mW/g = -12.40 dB mW/g

GSM850

Frequency: 836.6 MHz; Duty Cycle: 1:8.00018

Body/Rear/GMSK Voice/10mm/Ch 190/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.236 mW/g

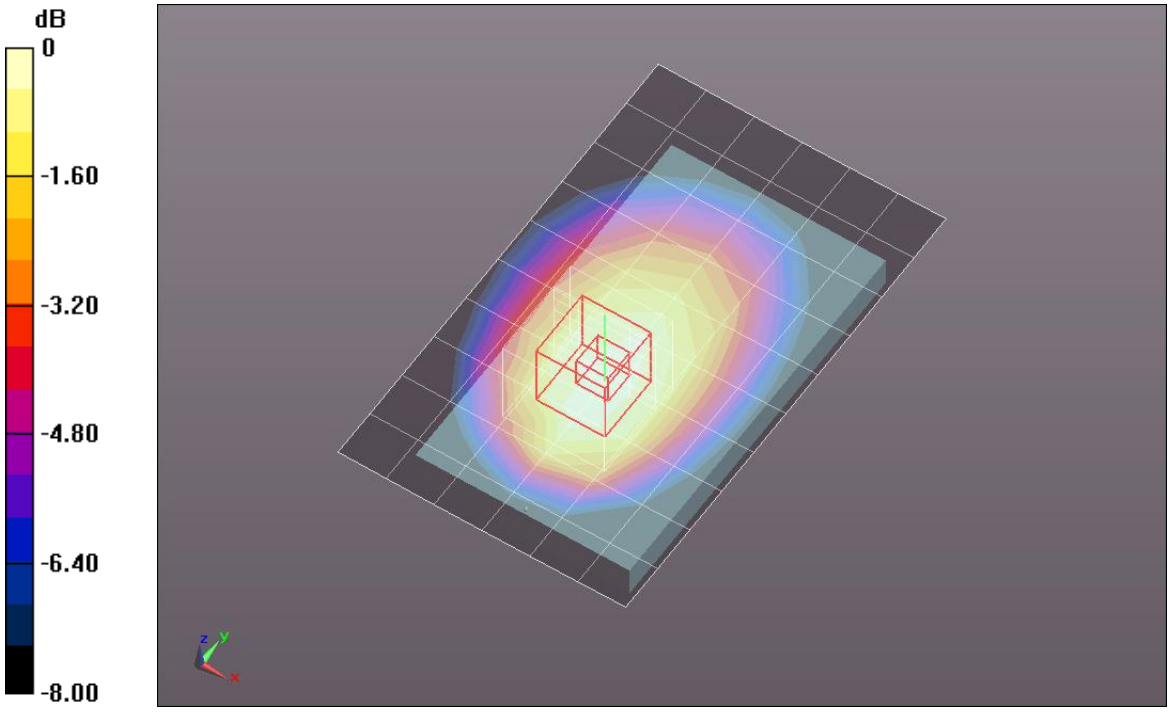


GSM850

Frequency: 836.6 MHz; Duty Cycle: 1:4.00037; Room Ambient Temperature: 24.0°C; Liquid Temperature: 23.0°C
Medium parameters used (interpolated): f = 836.6 MHz; σ = 0.975 mho/m; ε_r = 55.002; ρ = 1000 kg/m^3
DASY5 Configuration:
- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Electronics: DAE4 Sn1259; Calibrated: 2/13/2012
- Probe: EX3DV4 - SN3686; ConvF(8.73, 8.73, 8.73); Calibrated: 2/16/2012
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Phantom: ELI v5.0 (B); Type: QDOVA001BB; Serial: 1118

Body/Rear/GPRS 2 Slot/10mm/Ch 190/Area Scan (7x11x1): Measurement grid: dx=15mm, dy=15mm
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.319 mW/g

Body/Rear/GPRS 2 Slot/10mm/Ch 190/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 18.280 V/m; Power Drift = -0.06 dB
Peak SAR (extrapolated) = 0.3880
SAR(1 g) = 0.275 mW/g; SAR(10 g) = 0.197 mW/g
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.317 mW/g

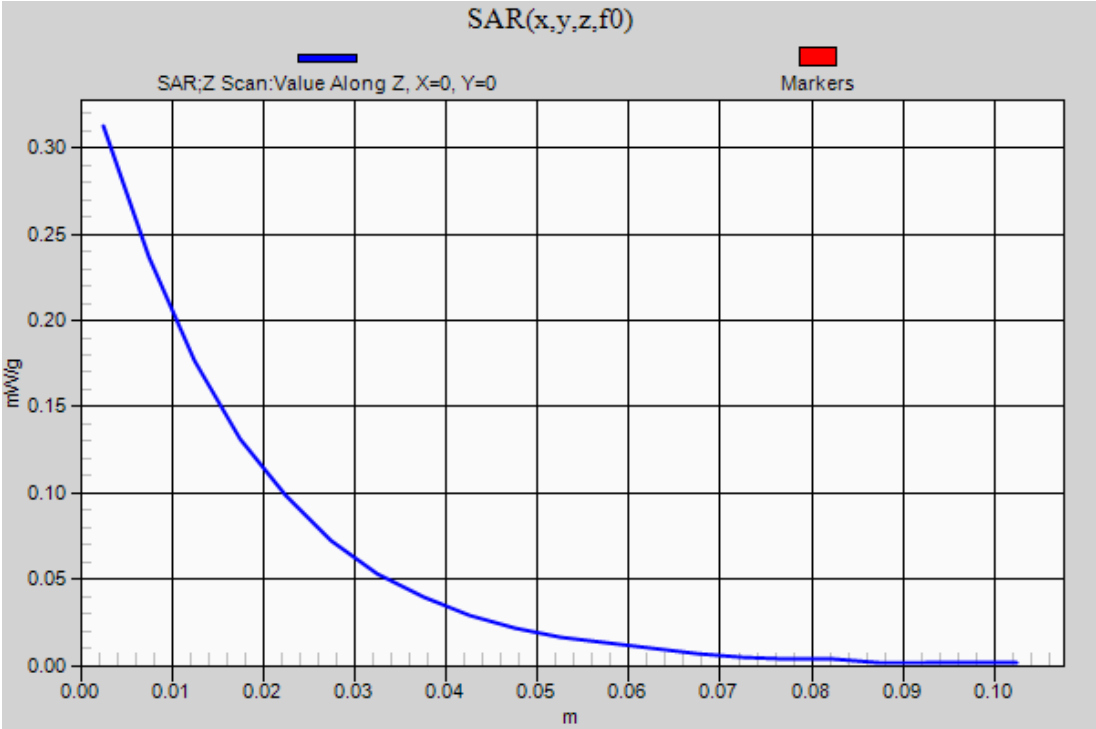


0 dB = 0.320mW/g = -9.90 dB mW/g

GSM850

Frequency: 836.6 MHz; Duty Cycle: 1:4.00037

Body/Rear/GPRS 2 Slot/10mm/Ch 190/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.313 mW/g

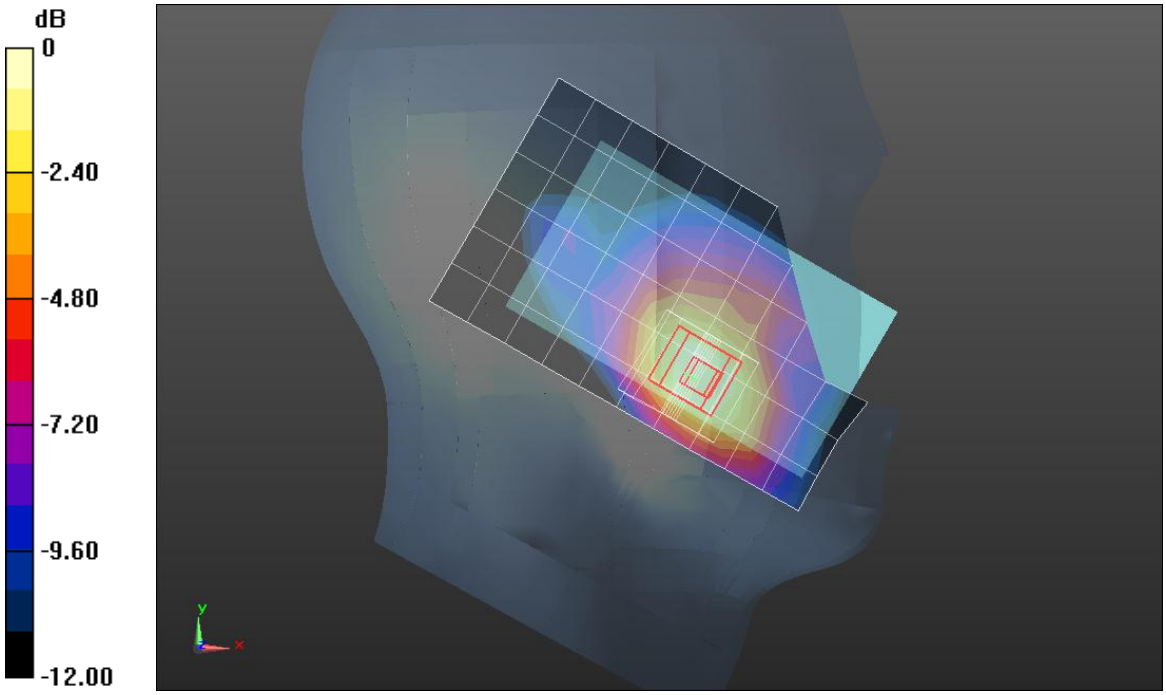


GSM1900

Frequency: 1880 MHz; Duty Cycle: 1:8.00018; Room Ambient Temperature: 24.0°C; Liquid Temperature: 23.0°C
Medium parameters used: f = 1880 MHz; σ = 1.367 mho/m; ε_r = 39.768; ρ = 1000 kg/m^3
DASY5 Configuration:
- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Electronics: DAE4 Sn1259; Calibrated: 2/13/2012
- Probe: EX3DV4 - SN3686; ConvF(7.51, 7.51, 7.51); Calibrated: 2/16/2012
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Phantom: SAM; Type: QD000P40CD; Serial: 1629

Head/Left Touch/GMSK Voice/Ch 661/Area Scan (7x11x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.420 mW/g

Head/Left Touch/GMSK Voice/Ch 661/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 17.599 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 0.6010
SAR(1 g) = 0.395 mW/g; SAR(10 g) = 0.244 mW/g
Maximum value of SAR (measured) = 0.485 mW/g

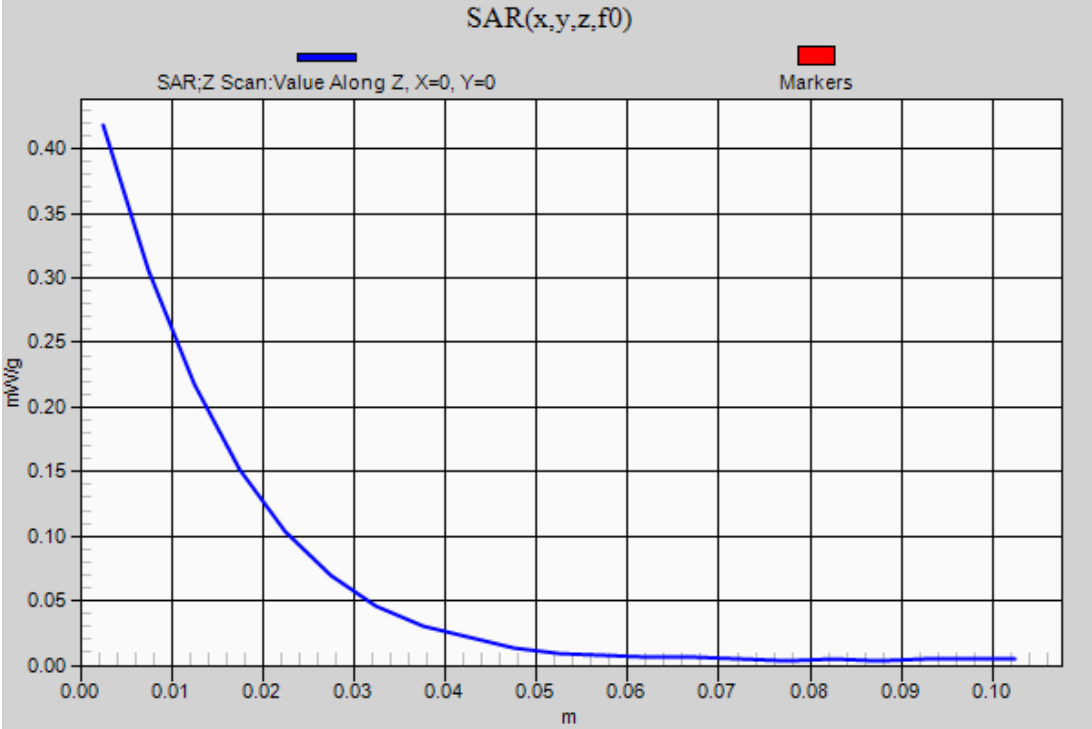


0 dB = 0.490mW/g = -6.20 dB mW/g

GSM1900

Frequency: 1880 MHz; Duty Cycle: 1:8.00018

Head/Left Touch/GMSK Voice/Ch 661/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Maximum value of SAR (measured) = 0.418 mW/g

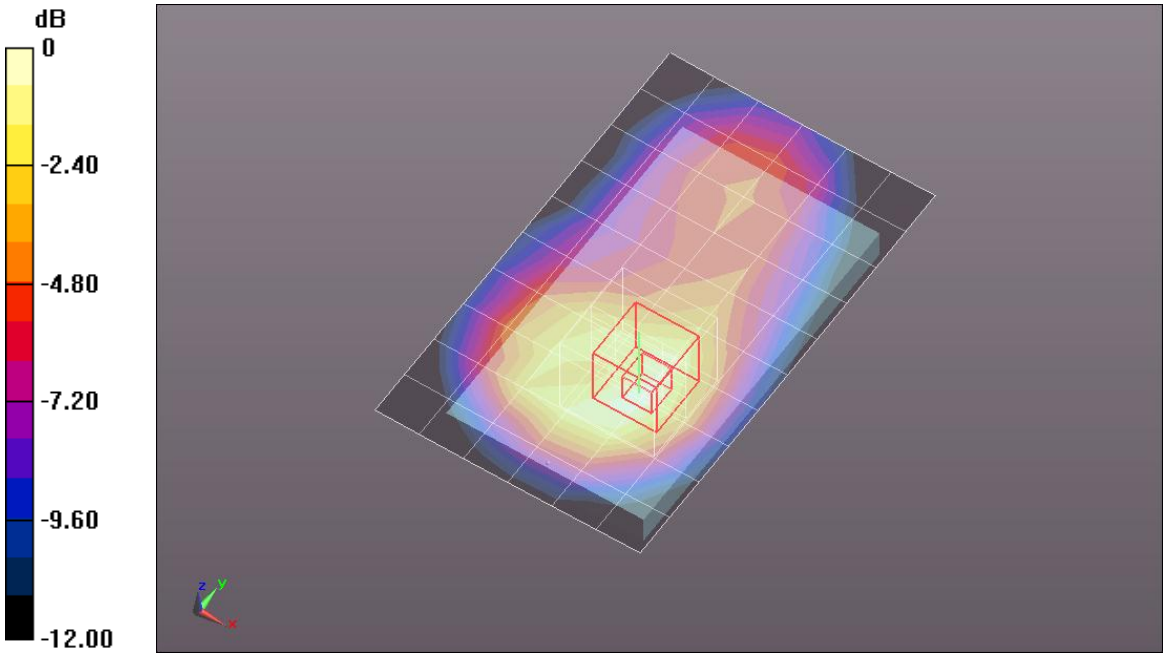


GSM1900

Frequency: 1880 MHz; Duty Cycle: 1:8.00018; Room Ambient Temperature: 24.0°C; Liquid Temperature: 23.0°C
Medium parameters used: f = 1880 MHz; σ = 1.479 mho/m; ε_r = 51.173; ρ = 1000 kg/m^3
DASY5 Configuration:
- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Electronics: DAE4 Sn1259; Calibrated: 2/13/2012
- Probe: EX3DV4 - SN3686; ConvF(7.04, 7.04, 7.04); Calibrated: 2/16/2012
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Phantom: ELI v5.0 (A); Type: QDOVA001BB; Serial: 1120

Body/Rear/GMSK Voice/10mm/Ch 661/Area Scan (7x11x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.566 mW/g

Body/Rear/GMSK Voice/10mm/Ch 661/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 19.713 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 0.7460
SAR(1 g) = 0.454 mW/g; SAR(10 g) = 0.264 mW/g
Maximum value of SAR (measured) = 0.579 mW/g

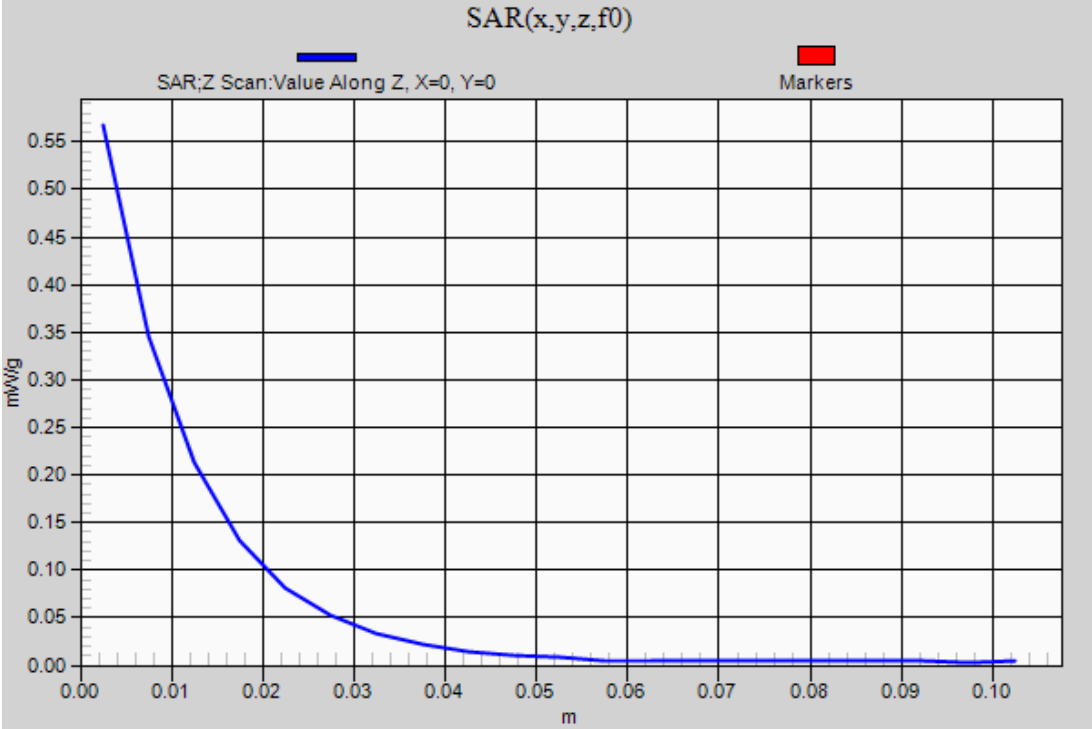


0 dB = 0.580mW/g = -4.73 dB mW/g

GSM1900

Frequency: 1880 MHz; Duty Cycle: 1:8.00018

Body/Rear/GMSK Voice/10mm/Ch 661/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Maximum value of SAR (measured) = 0.567 mW/g

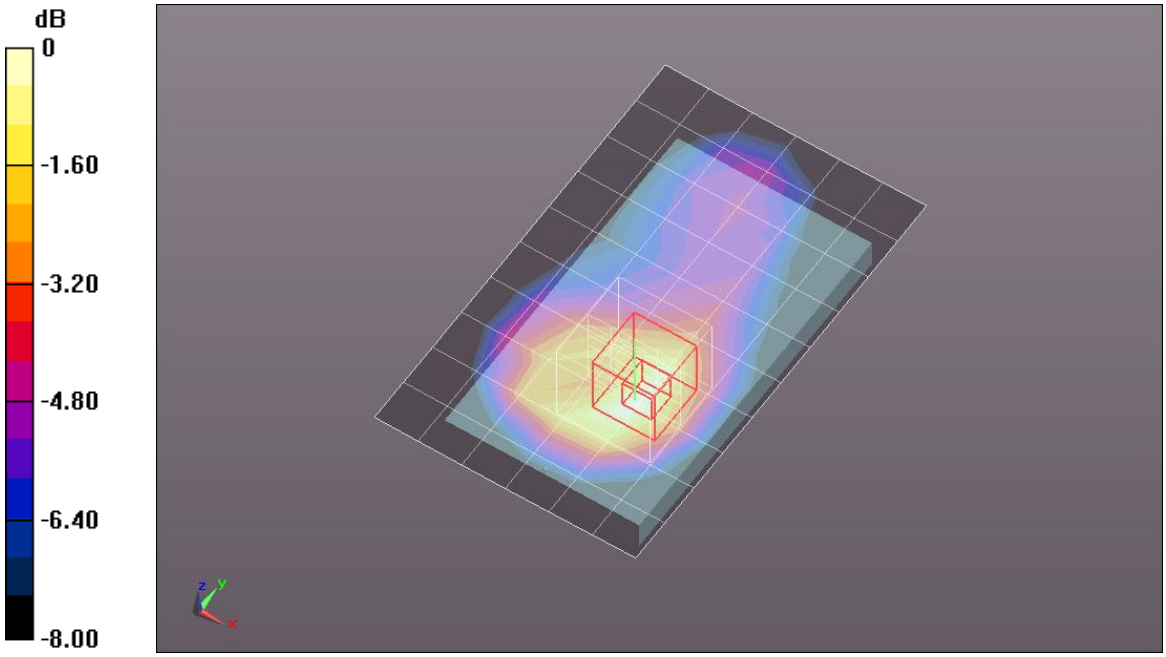


GSM1900

Frequency: 1880 MHz; Duty Cycle: 1:4.00037; Room Ambient Temperature: 24.0°C; Liquid Temperature: 23.0°C
Medium parameters used: f = 1880 MHz; σ = 1.479 mho/m; ε_r = 51.173; ρ = 1000 kg/m^3
DASY5 Configuration:
- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Electronics: DAE4 Sn1259; Calibrated: 2/13/2012
- Probe: EX3DV4 - SN3686; ConvF(7.04, 7.04, 7.04); Calibrated: 2/16/2012
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Phantom: ELI v5.0 (A); Type: QDOVA001BB; Serial: 1120

Body/Rear/GPRS 2 Slot/10mm/Ch 661/Area Scan (7x11x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 1.118 mW/g

Body/Rear/GPRS 2 Slot/10mm/Ch 661/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 27.609 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 1.4530
SAR(1 g) = 0.887 mW/g; SAR(10 g) = 0.514 mW/g
Maximum value of SAR (measured) = 1.108 mW/g

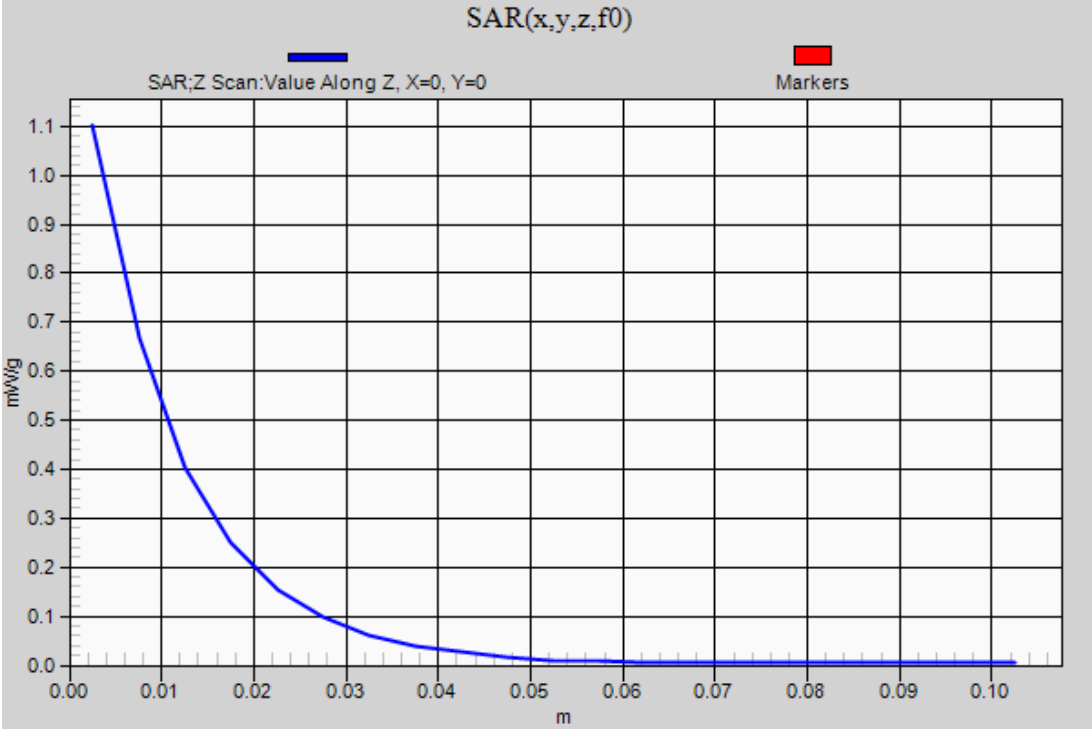


0 dB = 1.110mW/g = 0.91 dB mW/g

GSM1900

Frequency: 1880 MHz; Duty Cycle: 1:4.00037

Body/Rear/GPRS 2 Slot/10mm/Ch 661/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Maximum value of SAR (measured) = 1.102 mW/g



13. Simultaneous Transmission SAR Analysis

The Bluetooth's output power is ≤ 2·P_{Ref} (13.8 dBm / 24 mW), for which stand-alone SAR evaluation is not required. Therefore, simultaneous transmission SAR evaluation is not required.

13.1. Head Exposure Conditions

13.1.1. Sum of the SAR for GSM, W-CDMA & Wi-Fi in the 2.4 GHz Band

Sum of the 1-g Measured SAR for WWAN and WiFi 2.4GHz Band

WiFi values are taken from HTC Co., LTD. Report # HCTA1206FS06

Test Position	Voice		Data	∑ 1-g SAR (mW/g)
	GSM 850	GSM 1900	WiFi 2.4 GHz	
Left Touch	0.090		0.083	0.173
		0.395	0.083	0.478
Left Tilt	0.060		0.033	0.093
		0.130	0.033	0.163
Right Touch	0.068		0.034	0.102
		0.217	0.034	0.251
Right Tilt	0.059		0.041	0.100
		0.135	0.041	0.176

Sum of the 1-g Scaled SAR for WWAN and WiFi 2.4GHz Band

WiFi values are taken from HTC Co., LTD. Report # HCTA1206FS06

Test Position	Voice		Data	∑ 1-g SAR (mW/g)
	GSM 850	GSM 1900	WiFi 2.4 GHz	
Left Touch	0.092		0.083	0.175
		0.433	0.083	0.516
Left Tilt	0.061		0.033	0.094
		0.143	0.033	0.176
Right Touch	0.070		0.034	0.104
		0.238	0.034	0.272
Right Tilt	0.059		0.041	0.100
		0.135	0.041	0.176

SAR to Peak Location Separation Ratio (SPLSR)
As the Sum of the SAR is not greater than 1.6 W/kg SPLSR assessment is not required.

Conclusion:

- Simultaneous transmission SAR measurement (Volume Scan) is not required because the sum of the 1-g SAR is < 1.6 W/kg under all conditions.

13.1.2. Body Exposure Conditions

13.1.3. Sum of the SAR for GSM & Wi-Fi in the 2.4 GHz Band

Sum of the 1-g Measured SAR for WWAN and WiFi 2.4GHz Band

WiFi values are taken from HTC Co., LTD. Report # HCTA1206FS06

Test Position	Voice		Data	∑ 1-g SAR (mW/g)
	GSM850	GSM1900	WiFi 2.4 GHz	
Rear	0.207		0.204	0.411
		0.454	0.204	0.658
Front	0.106		0.024	0.130
		0.251	0.024	0.275

Sum of the 1-g Scaled SAR for WWAN and WiFi 2.4GHz Band

WiFi values are taken from HTC Co., LTD. Report # HCTA1206FS06

Test Position	Voice		Data	∑ 1-g SAR (mW/g)
	GSM850	GSM1900	WiFi 2.4 GHz	
Rear	0.212		0.204	0.416
		0.498	0.204	0.702
Front	0.108		0.024	0.132
		0.275	0.024	0.299

Conclusion:

- Simultaneous transmission SAR measurement (Volume Scan) is not required because the sum of the 1-g SAR is < 1.6 W/kg under all conditions.

13.2. Hotspot Mode Exposure Conditions

13.2.1. Sum of the SAR for GSM, W-CDMA & Wi-Fi in the 2.4 GHz Band

Sum of the 1-g Measured SAR for WWAN and WiFi 2.4GHz Band

WiFi values are taken from HTC Co., LTD. Report # HCTA1206FS06

Test Position	Data			∑ 1-g SAR (mW/g)
	GSM850	GSM1900	WiFi 2.4 GHz	
Rear	0.275		0.204	0.479
		0.887	0.204	1.091
Front	0.147		0.024	0.171
		0.466	0.024	0.490
Edge 1	0		0.023	0.023
		0	0.023	0.023
Edge 2	0.084		0.098	0.182
		0.109	0.098	0.207
Edge 3	0.06		0	0.060
		0.613	0	0.613
Edge 4	0.148		0	0.148
		0.259	0	0.259

Sum of the 1-g Scaled SAR for WWAN and WiFi 2.4GHz Band

WiFi values are taken from HTC Co., LTD. Report # HCTA1206FS06

Test Position	Data			∑ 1-g SAR (mW/g)
	GSM850	GSM1900	WiFi 2.4 GHz	
Rear	0.309		0.204	0.513
		1.066	0.204	1.270
Front	0.147		0.024	0.171
		0.56	0.024	0.584
Edge 1	0		0.023	0.023
		0	0.023	0.023
Edge 2	0.084		0.098	0.182
		0.131	0.098	0.229
Edge 3	0.06		0	0.060
		0.737	0	0.737
Edge 4	0.148		0	0.148
		0.311	0	0.311

Conclusion:

- Simultaneous transmission SAR measurement (Volume Scan) is not required because the sum of the 1-g SAR is < 1.6 W/kg under all conditions.

14. Appendixes

Refer to separated files for the following appendixes.

14.1. System Performance Check Plots

14.2. SAR Test Plots for GSM850

14.3. SAR Test Plots for GSM1900

14.4. Calibration Certificate for E-Field Probe EX3DV4 - SN 3686

14.5. Calibration Certificate for D835V2 - SN 4d002

14.6. Calibration Certificate for D1900V2 - SN 5d140