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

SAR EVALUATION REPORT

For
Braille Pad

Model: RC001
FCC ID: U48-RC002B

Report Number: 12U14401-1
Issue Date: 8/2/2012

Prepared for
LEVELSTAR
685 S. Arthur Ave. Unit 1A
Louisville, CO, 80027

Prepared by
UL CCS
47173 BENICIA STREET
FREMONT, CA 94538, U.S.A.
TEL: (510) 771-1000
FAX: (510) 661-0888

NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
--	8/2/2012	Initial Issue	--

Table of Contents

1. Attestation of Test Results

Applicant	LEVELSTAR		
DUT description	Braille Pad		
Model	RC001		
Test device is	An identical prototype		
Device category	Portable		
Exposure category	General Population/Uncontrolled Exposure		
Date tested	6/15/2012 – 8/1/2012		
FCC Rule Parts	Freq. Range	Highest 1-g SAR	Limit
22	824-849 MHz	Head (Touch flat): 0.395 W/kg Body (Rear): 0.614 W/kg	1.6 W/kg
24	1850-1910 MHz	Head (Touch flat): 0.431 W/kg Body (Edge 3): 0.794 W/kg	
15.247	2412-2462 MHz	Head (Right Touch): 0.286 Body (Rear): 0.065 W/kg	
Applicable Standards			Test Results
FCC OET Bulletin 65 Supplement C 01-01, IEEE Std 1528-2003, IEEE Std 1528a-2005			Pass

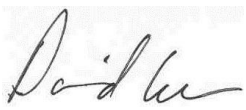
UL CCS tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by UL CCS based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and 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
Staff Engineer
UL CCS

Tested By:



David Lee
SAR 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 KDB Procedures:

- 648474 D01 SAR Handsets Multi Xmiter and Ant, v01r05
- 248227 D01 SAR meas for 802 11abg v01r02
- 941225 D01 SAR test for 3G devices v02
- 941225 D03 SAR Test Reduction GSM GPRS EDGE 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	R & S	CMU 200	120111	5	25	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	3749	1	27	2013
Thermometer	ERTCO	639-1S	8350	7	30	2013
Data Acquisition Electronics	SPEAG	DAE3	427	1	17	2013
System Validation Dipole	SPEAG	D835V2	4d002	3	6	2013
System Validation Dipole	SPEAG	D1900V2	5d043	11	10	2012
System Validation Dipole	SPEAG	D2450V2	748	2	7	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		

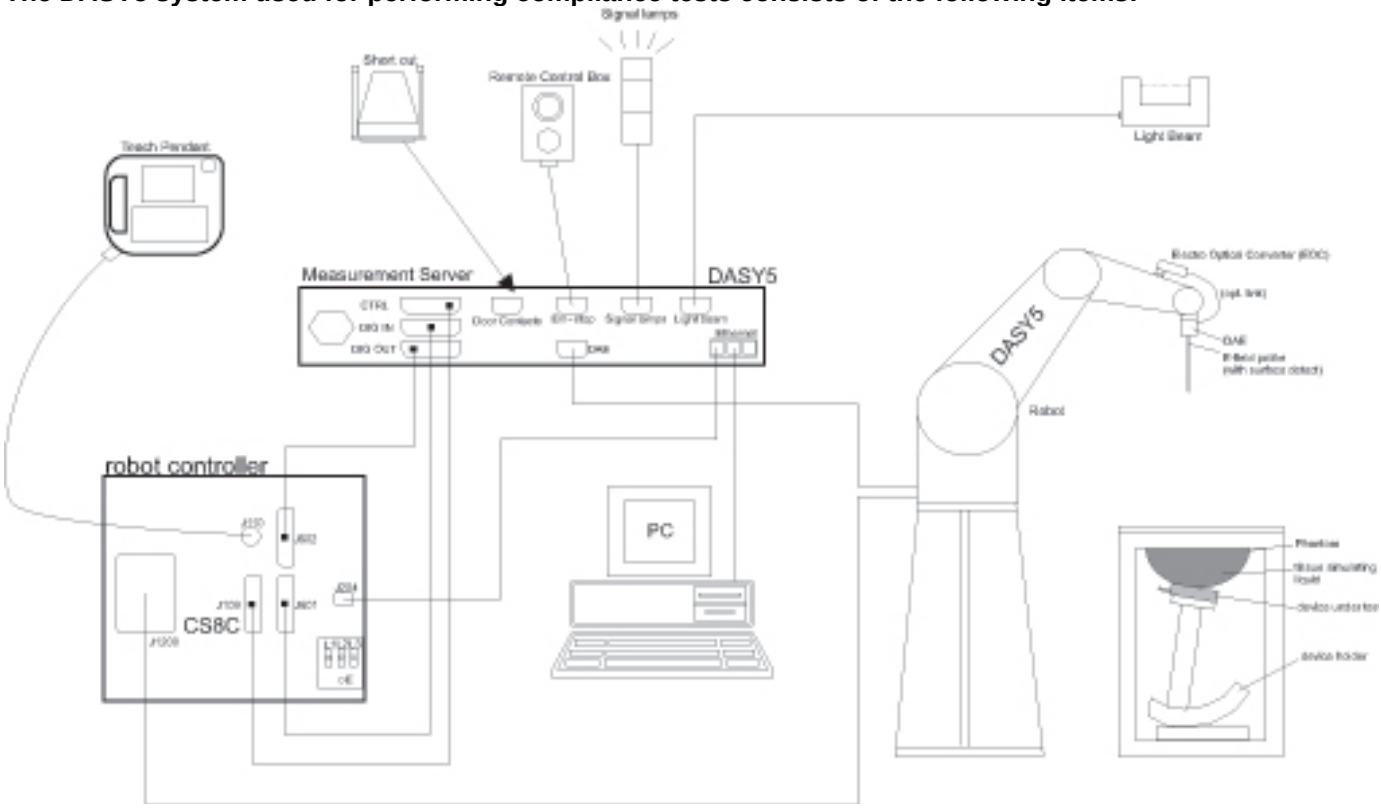
4.2. Measurement Uncertainty

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	**-4.50**	Normal	1	0.64	-2.88
Liquid Permittivity - deviation from target	5.00	Rectangular	1.732	0.6	1.73
Liquid Permittivity - measurement uncertainty	**-3.47**	Normal	1	0.6	-2.08
				Combined Standard Uncertainty Uc(y) =	10.37
				Expanded Uncertainty U, Coverage Factor = 2, > 95 % Confidence =	20.74 %
				Expanded Uncertainty U, Coverage Factor = 2, > 95 % Confidence =	1.64 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 Procedures

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 1528-2003, IEEE Standard 1528a-2005 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 1528-2003, IEEE 1528a-2005 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

Braille Pad Model: RC001	
Normal operation	- Held to head, - Body (Rear and Edge 3) with 0 mm separation distance.
Accessory	1. Headset

7.1. Air Interfaces and Frequency Ranges

Air Interfaces	- GSM, GPRS and EGPRS (EGPRS is Rx only) - UMTS (WCDMA) Rel 99, HSDPA (Rel 5, CAT 5), (HSUPA is not supported) - 802.11b/g/n with HT20 - Bluetooth Ver. 2.1 +EDR
Tx Frequency Ranges	- GSM850: 824 - 849 MHz - GSM1900: 1850 - 1910 MHz - W-CDMA (UMTS) Band V: 824 - 849 MHz - W-CDMA (UMTS) Band II: 1850 - 1910 MHz - 802.11b/g/n: 2412 - 2462 MHz - Bluetooth: 2402 - 2480 MHz

7.2. Simultaneous Transmission

No.	Conditions
1	GSM850 Voice + BT
2	GSM1900 Voice + BT
3	GSM850 GPRS + BT
4	GSM1900 GPRS + BT
5	W-CDMA Band V+ BT
6	W-CDMA Band II+ BT
7	GSM850 Voice + WIFI
8	GSM1900 Voice + WIFI
9	GSM850 GPRS + WIFI
10	GSM1900 GPRS + WIFI
11	W-CDMA Band V+ WIFI
12	W-CDMA Band II+ WIFI

Notes:

1. WiFi 2.4 GHz and BT cannot transmit simultaneously

8. Summary of Test Configurations

Refer to section 17 for antenna location and separation distance

8.1. Head Exposure Condition for WWAN

Test Configurations	SAR Required	Note
Left Touch	Yes	EUT size and antenna location prevented testing on the head phantom. Testing was performed using the flat phantom according to KDB 648474
Left Tilt (15°)	Yes	
Right Touch	Yes	
Right Tilt (15°)	Yes	

8.2. Head Exposure Condition for Wi-Fi

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

8.3. Body Exposure Conditions for WWAN

Test Configurations	Antenna-to-edge/surface	SAR Required	Note
Rear	20 mm	Yes	
Rear w/ Headset	20 mm	Yes	
Front	4 mm	No	Not normal use
Edge 1	51 mm	No	Not normal use
Edge 2	143 mm	No	Not normal use
Edge 3	7 mm	Yes	
Edge 4	6 mm	No	Not normal use

8.4. Body Exposure Conditions for Wi-Fi

Test Configurations	Antenna-to-edge/surface	SAR Required	Note
Rear	20 mm	Yes	
Rear w/ Headset	20 mm	Yes	
Front	4 mm	No	Not normal use
Edge 1	11 mm	No	Not normal use
Edge 2	146 mm	No	Not normal use
Edge 3	79 mm	No	Antenna to user distance greater than 2.5 cm
Edge 4	7 mm	No	Not normal use

8.1. Head SAR

Justification for using body phantom for measuring head SAR

Due to the size of the EUT and the position of the WWAN antenna it was impossible to get meaningful data for head SAR.

The following procedure was applied (KDB 648474 section on SAR Tests in Mouth and Jaw Regions of the SAM Phantom):

- EUT was positioned with its bottom edge positioned from the flat phantom with the same distance provided by the cheek touching position using SAM.
- The ear reference point (ERP, as defined for SAM) of the device should be positioned ½ cm from the flat phantom shell.
- The lower half of the EUT is secured in the test device holder at a fixed distance below the flat phantom determined by the minimum separation along the lower edge of the EUT in the cheek touching position using SAM.

The EUT protruded too far from the SAM to allow measurement from its bottom edge. The separation distance from the antenna to the phantom was used as a reference. This resulted in the antenna being closer to the phantom when the EUT was mounted on the left. Therefore the left head distance was used as the most conservative.

See section 18 Setup Photos for details on device positioning and photographs showing how separation distances are determined.

The following head SAR plot is provided to show the difficulties associated with using the SAM for measuring head SAR with this EUT.

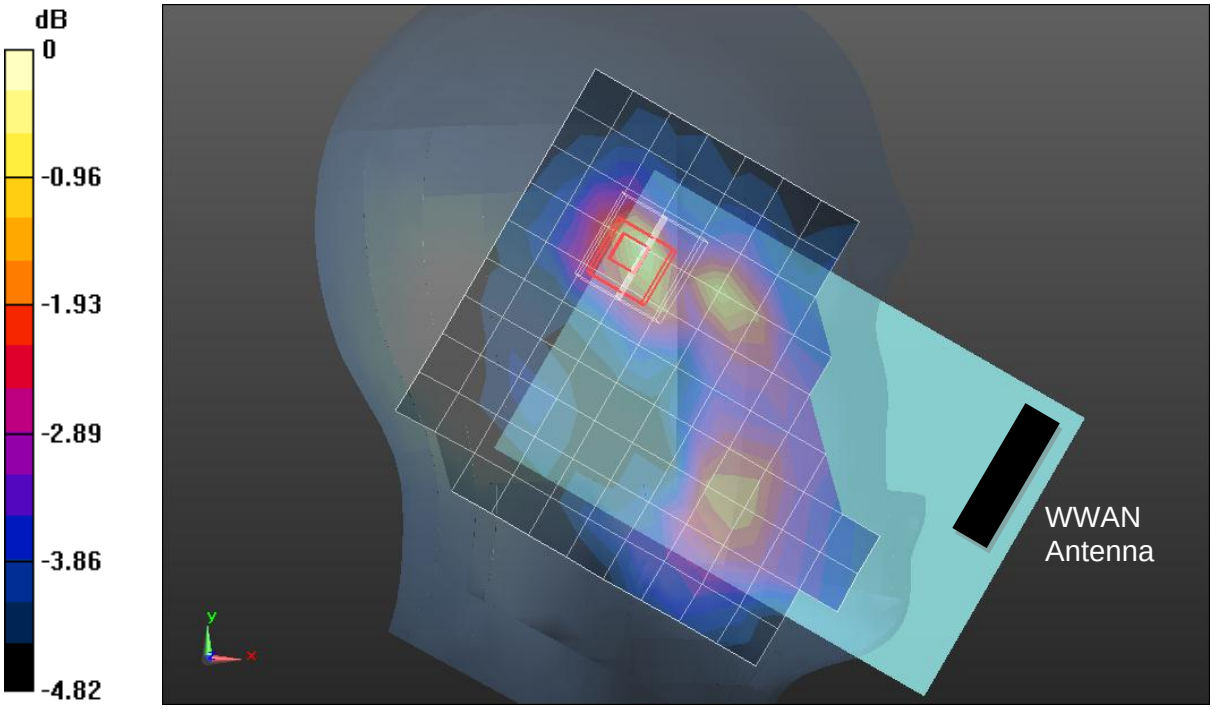
Test Laboratory: UL CCS SAR Lab C Date: 6/24/2012

GSM 1900

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 = 1.403 mho/m; ε_r = 40.413; 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 Sn1239; Calibrated: 6/6/2012
- Probe: EX3DV4 - SN3751; ConvF(7.33, 7.33, 7.33); Calibrated: 12/19/2011
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Phantom: SAM; Type: QD000P40CD; Serial: 1632

LHS/Touch_GSMK_ch 661/Area Scan (11x12x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.129 mW/g

LHS/Touch_GMSK_ch 661/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 9.806 V/m; Power Drift = 0.13 dB
Peak SAR (extrapolated) = 0.1820
SAR(1 g) = 0.118 mW/g; SAR(10 g) = 0.081 mW/g
Maximum value of SAR (measured) = 0.138 mW/g



0 dB = 0.140mW/g = -17.08 dB mW/g

9. RF Output Power Measurement

9.1. GSM850

Target power

GMSK: 32.0 dBm. Tune-up Tolerance: -1 dB / +1 dB

8PSK: 27.0 dBm. Tune-up Tolerance: -1 dB / +1 dB

GMSK (Voice) Mode

Band	Ch No.	Freq. (MHz)	Avg burst Pwr (dBm)
850	128	824.2	32.9
	190	836.6	32.9
	251	848.8	32.7

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	32.7	23.7	32.3	26.3	32.2	27.9	32.1	29.1
	190	836.6	32.8	23.8	32.4	26.4	32.7	28.4	32.7	29.7
	251	848.8	32.7	23.7	32.4	26.4	32.4	28.1	32.2	29.2

EGPRS (8PSK) - Coding Scheme: MCS5

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	27.6	18.6	27.5	21.5	27.3	23.0	27.0	24.0
	190	836.6	27.6	18.6	27.5	21.5	27.1	22.8	27.0	24.0
	251	848.8	27.4	18.4	27.3	21.3	27.1	22.8	26.8	23.8

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 4 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

GMSK: 29.0 dBm. Tune-up Tolerance: -1 dB / +1 dB

8PSK: 26.0 dBm. Tune-up Tolerance: -1 dB / +1 dB

GMSK (Voice) Mode

Band	Ch No.	Freq. (MHz)	Avg burst Pwr (dBm)
1900	512	1850.2	29.5
	661	1880	30.0
	810	1909.8	30.3

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	28.7	19.7	28.8	22.8	28.8	24.5	29.4	26.4
	661	1880	28.8	19.8	29.3	23.3	29.2	24.9	29.7	26.7
	810	1909.8	29.0	20.0	29.7	23.7	29.5	25.2	29.4	26.4

EGPRS (8PSK) - Coding Scheme: MCS5

Band	Ch No.	f (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	25.5	16.5	26.0	20.0	25.9	21.6	25.9	22.9
	661	1880.0	25.8	16.8	26.3	20.3	26.2	21.9	26.2	23.2
	810	1909.8	26.1	17.1	26.6	20.6	26.5	22.2	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 4 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. W-CDMA (UMTS) Band V

Target Power: 22.0 dBm
Tune-up Tolerance: -1 dB / +2 dB

Release 99 (RMC, 12.2kbps)
The following tests were completed according to the test requirements outlined in section 5.2 of the 3GPP TS34.121-1 specification. The DUT supports power Class 3, which has a nominal maximum output power of 24 dBm (+1.7/-3.7).

Mode	Subtest	Rel99
WCDMA General Settings	Loopback Mode	Test Mode 1
	Rel99 RMC	12.2kbps RMC
	Power Control Algorithm	Algorithm2
	βc/βd	8/15

Output power table

Band	Ch No.	Freq. (MHz)	Measured Avg. Power (dBm)
850 (Band V)	4132	826.4	21.05
	4183	836.6	21.13
	4233	846.6	21.08

HSPA (HSDPA & HSUPA)

The following 5 Sub-tests were completed according to Release 6 procedures in section 5.2 of 3GPP TS34.121. A summary of these settings are illustrated below:

	Mode	HSPA	HSPA	HSPA	HSPA	HSPA
	Subtest	1	2	3	4	5
W-CDMA General Settings	Loopback Mode	Test Mode 1				
	Rel99 RMC	12.2kbps RMC				
	HSDPA FRC	H-Set1				
	HSUPA Test	HSUPA Loopback				
	Power Control Algorithm	Algorithm2				
	βc	11/15	6/15	15/15	2/15	15/15
	βd	15/15	15/15	9/15	15/15	15/15
	βec	209/225	12/15	30/15	2/15	24/15
	βc/βd	11/15	6/15	15/9	2/15	15/15
	βhs	22/15	12/15	30/15	4/15	30/15
	βed	1309/225	94/75	47/15 47/15	56/75	134/15
	CM (dB)	1.0	3.0	2.0	3.0	1.0
	MPR (dB)	0	2	1	2	0
HSDPA Specific Settings	DACK	8				
	DNAK	8				
	DCQI	8				
	Ack-Nack repetition factor	3				
	CQI Feedback (Table 5.2B.4)	4ms				
	CQI Repetition Factor (Table 5.2B.4)	2				
	Ahs = βhs/βc	30/15				
HSUPA Specific Settings	D E-DPCCH	6	8	8	5	7
	DHARQ	0	0	0	0	0
	AG Index	20	12	15	17	21
	ETFCI (from 34.121 Table C.11.1.3)	75	67	92	71	81
	Associated Max UL Data Rate kbps	242.1	174.9	482.8	205.8	308.9
	Reference E_TFCIs	E-TFCI 11 E-TFCI PO 4 E-TFCI 67 E-TFCI PO 18 E-TFCI 71 E-TFCI PO 23 E-TFCI 75 E-TFCI PO 26 E-TFCI 81 E-TFCI PO 27		E-TFCI 11 E-TFCI PO 4 E-TFCI 92 E-TFCI PO 18	E-TFCI 11 E-TFCI PO 4 E-TFCI 67 E-TFCI PO 18 E-TFCI 71 E-TFCI PO 23 E-TFCI 75 E-TFCI PO 26 E-TFCI 81 E-TFCI PO 27	

Output power table

Band	Mode	UL Ch No.	Freq. (MHz)	Target MPR	Avg Pwr (dBm)
W-CDMA (UMTS) Band V	Subtest 1	4132	826.4	0	19.11
		4183	836.6	0	19.25
		4233	846.6	0	19.11
	Subtest 2	4132	826.4	2	19.21
		4183	836.6	2	19.47
		4233	846.6	2	19.12
	Subtest 3	4132	826.4	1	19.25
		4183	836.6	1	19.57
		4233	846.6	1	19.02
	Subtest 4	4132	826.4	1	19.15
		4183	836.6	1	19.35
		4233	846.6	1	19.02
	Subtest 5	4132	826.4	0	19.12
		4183	836.6	0	19.54
		4233	846.6	0	19.03

Note(s):

KDB 941225 D01 – Body SAR is not required for handsets with HSPA capabilities when the maximum average output of each RF channel with HSUPA/HSDPA active is less than ¼ dB higher than that measured without HSUPA/HSDPA using 12.2 kbps RMC and the maximum SAR for 12.2kbps RMC is ≤ 75% of the SAR limit.

9.4. W-CDMA (UMTS) Band II

Target Power: 22.0 dBm
Tune-up Tolerance: -1 dB / +2 dB

Release 99 (RMC, 12.2kbps)
The following tests were completed according to the test requirements outlined in section 5.2 of the 3GPP TS34.121-1 specification. The DUT supports power Class 3, which has a nominal maximum output power of 24 dBm (+1.7/-3.7).

Mode	Subtest	Rel99
WCDMA General Settings	Loopback Mode	Test Mode 1
	Rel99 RMC	12.2kbps RMC
	Power Control Algorithm	Algorithm2
	βc/βd	8/15

Output power table

Band	Ch No.	Freq. (MHz)	Measured Avg. Power (dBm)
1900 (Band II)	9262	1852.4	22.1
	9400	1880.0	22.0
	9538	1907.6	22.4

HSPA (HSDPA & HSUPA)

The following 5 Sub-tests were completed according to Release 6 procedures in section 5.2 of 3GPP TS34.121. A summary of these settings are illustrated below:

	Mode	HSPA	HSPA	HSPA	HSPA	HSPA
	Subtest	1	2	3	4	5
W-CDMA General Settings	Loopback Mode	Test Mode 1				
	Rel99 RMC	12.2kbps RMC				
	HSDPA FRC	H-Set1				
	HSUPA Test	HSUPA Loopback				
	Power Control Algorithm	Algorithm2				
	βc	11/15	6/15	15/15	2/15	15/15
	βd	15/15	15/15	9/15	15/15	15/15
	βec	209/225	12/15	30/15	2/15	24/15
	βc/βd	11/15	6/15	15/9	2/15	15/15
	βhs	22/15	12/15	30/15	4/15	30/15
	βed	1309/225	94/75	47/15 47/15	56/75	134/15
	CM (dB)	1.0	3.0	2.0	3.0	1.0
	MPR (dB)	0	2	1	2	0
HSDPA Specific Settings	DACK	8				
	DNAK	8				
	DCQI	8				
	Ack-Nack repetition factor	3				
	CQI Feedback (Table 5.2B.4)	4ms				
	CQI Repetition Factor (Table 5.2B.4)	2				
	Ahs = βhs/βc	30/15				
HSUPA Specific Settings	D E-DPCCH	6	8	8	5	7
	DHARQ	0	0	0	0	0
	AG Index	20	12	15	17	21
	ETFCI (from 34.121 Table C.11.1.3)	75	67	92	71	81
	Associated Max UL Data Rate kbps	242.1	174.9	482.8	205.8	308.9
	Reference E_TFCIs	E-TFCI 11 E-TFCI PO 4 E-TFCI 67 E-TFCI PO 18 E-TFCI 71 E-TFCI PO 23 E-TFCI 75 E-TFCI PO 26 E-TFCI 81 E-TFCI PO 27		E-TFCI 11 E-TFCI PO 4 E-TFCI 92 E-TFCI PO 18	E-TFCI 11 E-TFCI PO 4 E-TFCI 67 E-TFCI PO 18 E-TFCI 71 E-TFCI PO 23 E-TFCI 75 E-TFCI PO 26 E-TFCI 81 E-TFCI PO 27	

Output power table

Band	Mode	UL Ch No.	Freq. (MHz)	Target MPR	Avg Pwr (dBm)
W-CDMA (UMTS) Band II	Subtest 1	9262	1852.4	0	20.63
		9400	1880.0	0	20.57
		9538	1907.6	0	20.87
	Subtest 2	9262	1852.4	2	20.50
		9400	1880.0	2	20.62
		9538	1907.6	2	20.66
	Subtest 3	9262	1852.4	1	20.55
		9400	1880.0	1	20.62
		9538	1907.6	1	20.95
	Subtest 4	9262	1852.4	1	20.45
		9400	1880.0	1	20.50
		9538	1907.6	1	20.63
	Subtest 5	9262	1852.4	0	20.53
		9400	1880.0	0	20.39
		9538	1907.6	0	20.93

Note(s):

KDB 941225 D01 – Body SAR is not required for handsets with HSPA capabilities when the maximum average output of each RF channel with HSUPA/HSDPA active is less than ¼ dB higher than that measured without HSUPA/HSDPA using 12.2 kbps RMC and the maximum SAR for 12.2kbps RMC is ≤ 75% of the SAR limit.

9.5. Wi-Fi (802.11bgn)

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.

Output power table

Band (MHz)	Mode	Ch #	Freq. (MHz)	Target Power (dBm)	Avg Pwr (dBm)
2.4	802.11b	1	2412	15	14.1
		6	2437	15	14.2
		11	2462	15	14.2
	802.11g	1	2412	15	14.3
		6	2437	15	14.3
		11	2462	15	14.1
	802.11n (HT20)	1	2412	15	14.2
		6	2437	15	14.1
		11	2462	15	13.9
	802.11n (HT40)	3	2422	10	9.9
		6	2437	10	10.0
		9	2452	10	9.8

Note(s):

1. SAR is not required for 802.11g/n 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

9.6. Bluetooth

Version 2.1+EDR, Power class: 1 (100 mW/20 dBm)

Mode	Channel #	Freq. (MHz)	Conducted Avg Power	
			(dBm)	(mW)
GFSK	1	2402	7.95	6.24
	40	2441	7.71	5.90
	79	2480	7.35	5.43

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, IEEE Std 1528a-2005 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

FCC OET Bulletin 65 Supplement C 01-01

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 ±(%)
06/15/2012	Body 2450	e'	51.7172	Relative Permittivity (ϵ_r):	51.72	52.70	-1.86	5
		e"	14.7504	Conductivity (σ):	2.01	1.95	3.05	5
	Body 2410	e'	51.8606	Relative Permittivity (ϵ_r):	51.86	52.76	-1.70	5
		e"	14.5588	Conductivity (σ):	1.95	1.91	2.28	5
	Body 2435	e'	51.7562	Relative Permittivity (ϵ_r):	51.76	52.73	-1.84	5
		e"	14.6772	Conductivity (σ):	1.99	1.93	2.91	5
	Body 2475	e'	51.6713	Relative Permittivity (ϵ_r):	51.67	52.67	-1.89	5
		e"	14.8581	Conductivity (σ):	2.04	1.99	3.00	5
06/19/2012	Body 835	e'	54.2309	Relative Permittivity (ϵ_r):	54.23	55.20	-1.76	5
		e"	21.3660	Conductivity (σ):	0.99	0.97	2.27	5
	Body 820	e'	54.3739	Relative Permittivity (ϵ_r):	54.37	55.28	-1.63	5
		e"	21.4326	Conductivity (σ):	0.98	0.97	0.90	5
	Body 850	e'	54.0859	Relative Permittivity (ϵ_r):	54.09	55.16	-1.94	5
		e"	21.2874	Conductivity (σ):	1.01	0.99	1.92	5
06/21/2012	Body 835	e'	53.3866	Relative Permittivity (ϵ_r):	53.39	55.20	-3.29	5
		e"	21.0264	Conductivity (σ):	0.98	0.97	0.64	5
	Body 820	e'	53.5366	Relative Permittivity (ϵ_r):	53.54	55.28	-3.15	5
		e"	21.0933	Conductivity (σ):	0.96	0.97	-0.69	5
	Body 850	e'	53.2406	Relative Permittivity (ϵ_r):	53.24	55.16	-3.47	5
		e"	20.9705	Conductivity (σ):	0.99	0.99	0.40	5
06/22/2012	Head 835	e'	42.2087	Relative Permittivity (ϵ_r):	42.21	41.50	1.71	5
		e"	18.9557	Conductivity (σ):	0.88	0.90	-2.21	5
	Head 820	e'	42.4128	Relative Permittivity (ϵ_r):	42.41	41.60	1.95	5
		e"	18.9904	Conductivity (σ):	0.87	0.90	-3.63	5
	Head 850	e'	42.0210	Relative Permittivity (ϵ_r):	42.02	41.50	1.26	5
		e"	18.9274	Conductivity (σ):	0.89	0.92	-2.23	5
06/24/2012	Head 1900	e'	40.3270	Relative Permittivity (ϵ_r):	40.33	40.00	0.82	5
		e"	13.4688	Conductivity (σ):	1.42	1.40	1.64	5
	Head 1850	e'	40.5511	Relative Permittivity (ϵ_r):	40.55	40.00	1.38	5
		e"	13.3175	Conductivity (σ):	1.37	1.40	-2.15	5
	Head 1880	e'	40.4134	Relative Permittivity (ϵ_r):	40.41	40.00	1.03	5
		e"	13.4100	Conductivity (σ):	1.40	1.40	0.13	5
	Head 1910	e'	40.2808	Relative Permittivity (ϵ_r):	40.28	40.00	0.70	5
		e"	13.4972	Conductivity (σ):	1.43	1.40	2.39	5
06/24/2012	Body 1900	e'	53.7369	Relative Permittivity (ϵ_r):	53.74	53.30	0.82	5
		e"	14.2832	Conductivity (σ):	1.51	1.52	-0.73	5
	Body 1850	e'	53.9255	Relative Permittivity (ϵ_r):	53.93	53.30	1.17	5
		e"	14.1123	Conductivity (σ):	1.45	1.52	-4.50	5
	Body 1880	e'	53.8084	Relative Permittivity (ϵ_r):	53.81	53.30	0.95	5
		e"	14.2184	Conductivity (σ):	1.49	1.52	-2.22	5
	Body 1910	e'	53.6983	Relative Permittivity (ϵ_r):	53.70	53.30	0.75	5
		e"	14.3172	Conductivity (σ):	1.52	1.52	0.03	5

Date	Freq. (MHz)	Liquid Parameters			Measured	Target	Delta (%)	Limit ±(%)
6/25/2012	Head 2450	e'	39.1827	Relative Permittivity (ε_r):	39.18	39.20	-0.04	5
		e"	13.7452	Conductivity (σ):	1.87	1.80	4.03	5
	Head 2410	e'	39.3034	Relative Permittivity (ε_r):	39.30	39.28	0.06	5
		e"	13.6374	Conductivity (σ):	1.83	1.76	3.81	5
	Head 2435	e'	39.2374	Relative Permittivity (ε_r):	39.24	39.24	0.01	5
		e"	13.7115	Conductivity (σ):	1.86	1.78	4.15	5
	Head 2475	e'	39.0521	Relative Permittivity (ε_r):	39.05	39.17	-0.30	5
		e"	13.8145	Conductivity (σ):	1.90	1.83	4.06	5
6/26/2012	Head 835	e'	41.7712	Relative Permittivity (ε_r):	41.77	41.50	0.65	5
		e"	18.9069	Conductivity (σ):	0.88	0.90	-2.46	5
	Head 820	e'	41.9617	Relative Permittivity (ε_r):	41.96	41.60	0.86	5
		e"	18.9495	Conductivity (σ):	0.86	0.90	-3.84	5
	Head 850	e'	41.5877	Relative Permittivity (ε_r):	41.59	41.50	0.21	5
		e"	18.8769	Conductivity (σ):	0.89	0.92	-2.49	5
7/8/2012	Body 835	e'	53.4220	Relative Permittivity (ε_r):	53.42	55.20	-3.22	5
		e"	21.4210	Conductivity (σ):	0.99	0.97	2.53	5
	Body 820	e'	53.7651	Relative Permittivity (ε_r):	53.77	55.28	-2.73	5
		e"	21.4807	Conductivity (σ):	0.98	0.97	1.13	5
	Body 830	e'	53.5086	Relative Permittivity (ε_r):	53.51	55.24	-3.13	5
		e"	21.5346	Conductivity (σ):	0.99	0.97	2.54	5
	Body 850	e'	53.4272	Relative Permittivity (ε_r):	53.43	55.16	-3.14	5
		e"	21.4908	Conductivity (σ):	1.02	0.99	2.89	5
7/8/2012	Head 835	e'	41.5745	Relative Permittivity (ε_r):	41.57	41.50	0.18	5
		e"	19.0387	Conductivity (σ):	0.88	0.90	-1.78	5
	Head 820	e'	41.8995	Relative Permittivity (ε_r):	41.90	41.60	0.71	5
		e"	19.1107	Conductivity (σ):	0.87	0.90	-3.02	5
	Head 850	e'	41.4925	Relative Permittivity (ε_r):	41.49	41.50	-0.02	5
		e"	19.1177	Conductivity (σ):	0.90	0.92	-1.25	5
7/8/2012	Body 1900	e'	53.1222	Relative Permittivity (ε_r):	53.12	53.30	-0.33	5
		e"	14.5716	Conductivity (σ):	1.54	1.52	1.28	5
	Body 1850	e'	53.2586	Relative Permittivity (ε_r):	53.26	53.30	-0.08	5
		e"	14.4880	Conductivity (σ):	1.49	1.52	-1.95	5
	Body 1880	e'	53.1709	Relative Permittivity (ε_r):	53.17	53.30	-0.24	5
		e"	14.6267	Conductivity (σ):	1.53	1.52	0.59	5
	Body 1910	e'	53.0988	Relative Permittivity (ε_r):	53.10	53.30	-0.38	5
		e"	14.6867	Conductivity (σ):	1.56	1.52	2.62	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	4d117	4/10/12	835	1g	9.4	9.84
				10g	6.16	6.48
D1900V2	5d140	4/12/12	1900	1g	39.08	40.0
				10g	20.56	21.28
D2450V2	748	2/7/12	2450	1g	53.6	50.8
				10g	24.8	23.64

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.						
6/15/2012	D2450V2	748	Body	1g	51.50	50.8	1.38	±10
				10g	24.00	23.64	1.52	
6/20/2012	D835V2	4d117	Body	1g	10.40	9.84	5.69	±10
				10g	6.84	6.48	5.56	
6/21/2012	D835V2	4d117	Body	1g	9.74	9.84	-1.02	±10
				10g	6.40	6.48	-1.23	
6/22/2012	D835V2	4d117	Body	1g	10.00	9.84	1.63	±10
				10g	6.61	6.48	2.01	
6/22/2012	D835V2	4d117	Head	1g	9.42	9.40	0.21	±10
				10g	6.18	6.16	0.32	
6/24/2012	D1900V2	5d140	Head	1g	36.40	39.08	-6.86	±10
				10g	19.00	20.56	-7.59	
6/24/2012	D1900V2	5d140	Body	1g	38.60	40.00	-3.50	±10
				10g	20.03	21.28	-5.87	
6/25/2012	D2450V2	748	Head	1g	56.4	53.6	5.22	±10
				10g	25.7	24.8	3.63	
6/26/2012	D835V2	4d117	Head	1g	9.45	9.4	0.53	±10
				10g	6.21	6.16	0.81	
7/8/2012	D835V2	4d117	Body	1g	10.40	9.84	5.69	±10
				10g	6.84	6.48	5.56	
7/8/2012	D835V2	4d117	Head	1g	9.35	9.4	-0.53	±10
				10g	6.17	6.16	0.16	
7/8/2012	D1900V2	5d140	Body	1g	38.90	40.00	-2.75	±10
				10g	20.30	21.28	-4.61	

12. SAR Test Results

12.1. GSM850

12.1.1. Head SAR

Test Position	Mode	Ch #.	Freq. (MHz)	Avg Pwr (dBm)	SAR (mW/g)		Note
					1-g	10-g	
Left Touch	GMSK (Voice)	128	824.20	32.9			1
		190	836.60	32.9	0.253	0.152	
		251	848.80	32.7			1
Touch Flat	GMSK (Voice)	128	824.20	32.9			1
		190	836.60	32.9	**0.272**	**0.197**	
		251	848.80	32.7			1

12.1.2. Body SAR

Test Position	Mode	Dist. (mm)	Ch #.	Freq. (MHz)	Avg Pwr (dBm)	SAR (mW/g)		Note
						1-g	10-g	
Rear	GPRS 4 slots	0	128	824.20	33.0			1
			190	836.60	32.9	0.611	0.398	
			190	836.60	32.9	**0.614**	**0.406**	2
			251	848.80	32.6			1
Edge 3	GPRS 4 slots	0	128	824.20	33.0			1
			190	836.60	32.9	0.366	0.228	
			251	848.80	32.6			1

Note(s):

1. SAR test was performed in the middle channel only as the measured level was < 50% of the SAR limit as stated in FCC "Public Notice DA 02-1438" by the SCC-34/SC-2. Testing in the low and high channel is optional.
2. With headset attached.
3. SAR is not required because the distance from the tested antenna to this edge is greater than 2.5 cm.

12.2. GSM1900

12.2.1. Head SAR

Test Position	Mode	Ch #.	Freq. (MHz)	Avg Pwr (dBm)	SAR (mW/g)		Note
					1-g	10-g	
Left Touch	GMSK (Voice)	512	1850.2	29.5			1
		661	1880.0	30.0	0.118	0.081	
		810	1909.8	30.3			1
Touch Flat	GMSK (Voice)	512	1850.2	29.5			1
		661	1880.0	30.0	**0.241**	**0.134**	
		810	1909.8	30.3			1

12.2.2. Body SAR

Test Position	Mode	Dist. (mm)	Ch #.	Freq. (MHz)	Avg Pwr (dBm)	SAR (mW/g)		Note
						1-g	10-g	
Rear	GPRS 4 slots	0	512	1850.2	29.4			1
			661	1880.0	29.7	0.661	0.374	
			810	1909.8	29.4			1
			661	1880.0	29.7	0.404	0.279	2
Edge 3	GPRS 4 slots	0	512	1850.2	29.4			1
			661	1880.0	29.7	**0.794**	**0.463**	
			810	1909.8	29.4			1

Note(s):
1. SAR test was performed in the middle channel only as the measured level was < 50% of the SAR limit as stated in FCC "Public Notice DA 02-1438" by the SCC-34/SC-2. Testing in the low and high channel is optional.
2. With headset attached.
3. SAR is not required because the distance from the tested antenna to this edge is greater than 2.5 cm.

12.3. WCDMA (UMTS) Band V

Test mode reduction considerations

Body SAR is not required for handsets with HSPA capabilities when the maximum average output of each RF channel with HSUPA/HSDPA active is less than ¼ dB higher than that measured without HSUPA/HSDPA using 12.2 kbps RMC and the maximum SAR for 12.2kbps RMC is ≤ 75% of the SAR limit as per KDB 941225 D01

12.3.1. Head SAR

Test Position	Mode	Ch #.	Freq. (MHz)	Avg Pwr (dBm)	SAR (mW/g)		Note
					1-g	10-g	
Left Touch	Rel 99 RMC 12.2kbps	4132	826.4	21.05			1
		4183	836.6	21.13	0.140	0.108	
		4233	846.6	21.08			1
Touch Flat	Rel 99 RMC 12.2kbps	4132	826.4	21.05			1
		4183	836.6	21.13	**0.395**	**0.249**	
		4233	846.6	21.08			1

12.3.2. Body SAR

Test Position	Mode	Dist. (mm)	Ch #.	Freq. (MHz)	Avg Pwr (dBm)	SAR (mW/g)		Note
						1-g	10-g	
Rear	Rel 99 RMC 12.2Kbps	0	4132	826.4	21.05			1
			4183	836.6	21.13	0.095	0.058	
			4233	846.6	21.08			1
Edge 3	Rel 99 RMC 12.2Kbps	0	4132	826.4	21.05			1
			4183	836.6	21.13	0.106	0.086	
			4183	836.6	21.13	**0.107**	**0.073**	2
			4233	846.6	21.08			1

Note(s):

1. SAR test was performed in the middle channel only as the measured level was < 50% of the SAR limit as stated in FCC "Public Notice DA 02-1438" by the SCC-34/SC-2. Testing in the low and high channel is optional.
2. With headset attached.
3. SAR is not required because the distance from the tested antenna to this edge is greater than 2.5 cm.

12.4. WCDMA (UMTS) Band II

Test mode reduction considerations

Body SAR is not required for handsets with HSPA capabilities when the maximum average output of each RF channel with HSUPA/HSDPA active is less than ¼ dB higher than that measured without HSUPA/HSDPA using 12.2 kbps RMC and the maximum SAR for 12.2kbps RMC is ≤ 75% of the SAR limit as per KDB 941225 D01

12.4.1. Head SAR

Test Position	Mode	Ch #.	Freq. (MHz)	Avg Pwr (dBm)	SAR (mW/g)		Note
					1-g	10-g	
Left Touch	Rel 99 RMC 12.2kbps	9262	1852.4	22.1			1
		9400	1880.0	22.0	0.177	0.122	4
		9538	1907.6	22.4			1
Touch Flat	Rel 99 RMC 12.2kbps	9262	1852.4	22.1			1
		9400	1880.0	22.0	**0.431**	**0.243**	
		9538	1907.6	22.4			1

12.4.2. Body SAR

Test Position	Mode	Dist. (mm)	Ch #.	Freq. (MHz)	Avg Pwr (dBm)	SAR (mW/g)		Note
						1-g	10-g	
Rear	Rel 99 RMC 12.2Kbps	0	9262	1852.4	22.1			1
			9400	1880.0	22.0	**0.469**	**0.274**	
			9400	1880.0	22.0	0.461	0.265	2
			9538	1907.6	22.4			1
Edge 3	Rel 99 RMC 12.2Kbps	0	9262	1852.4	22.1			1
			9400	1880.0	22.0	0.294	0.158	
			9538	1907.6	22.4			1

Note(s):

1. SAR test was performed in the middle channel only as the measured level was < 50% of the SAR limit as stated in FCC "Public Notice DA 02-1438" by the SCC-34/SC-2. Testing in the low and high channel is optional.
2. With headset attached.
3. SAR is not required because the distance from the tested antenna to this edge is greater than 2.5 cm.
4. A second Z Scan

12.5. Wi-Fi (2.4 GHz Band)

12.5.1. Head SAR

Test Position	Mode	Dist. (mm)	Ch #.	Freq. (MHz)	Avg Pwr (dBm)	SAR (mW/g)		Note
						1-g	10-g	
LHS Touch	802.11b	0	1	2412	14.12			1
			6	2437	14.20	0.210	0.178	
			11	2462	14.18			1
LHS Tilt	802.11b	0	1	2412	14.12			1
			6	2437	14.20	0.171	0.114	
			11	2462	14.18			1
RHS Touch	802.11b	0	1	2412	14.12			1
			6	2437	14.20	**0.286**	**0.191**	
			11	2462	14.18			1
RHS Tilt	802.11b	0	1	2412	14.12			1
			6	2437	14.20	0.284	0.158	
			11	2462	14.18			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)

12.5.2. Body SAR

Test Position	Mode	Dist. (mm)	Ch #.	Freq. (MHz)	Avg Pwr (dBm)	SAR (mW/g)		Note
						1-g	10-g	
Rear	802.11b	0	1	2412	14.12			1
			6	2437	14.20	**0.065**	0.036	
			11	2462	14.18			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)

13. Summary of Highest SAR Values

Results for highest SAR values for each frequency band and mode

Technology/Band	Test configuration		Mode	Highest 1g SAR (W/kg)
GSM850	Head	Touch Flat	GMSK (Voice)	0.272
	Body	Rear	GPRS (4 slots)	0.614
GSM1900	Head	Touch Flat	GMSK (Voice)	0.241
	Body	Edge 3	GPRS (4 slots)	0.794
WCDMA (UMTS) band V	Head	Touch Flat	Rel.99 (RMC, 12.2 kbps)	0.395
	Body	Edge 3 w/Headset	Rel.99 (RMC, 12.2 kbps)	0.107
WCDMA (UMTS) band II	Head	Touch Flat	Rel.99 (RMC, 12.2 kbps)	0.431
	Body	Rear	Rel.99 (RMC, 12.2 kbps)	0.469
WiFi 2.4 GHz	Head	Right Touch	802.11b	0.286
WiFi 2.4 GHz	Body	Rear	802.11b	0.065

13.1. 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
Head	Touch Flat	GSM850	190	836.60	33.0	32.90	0.272	0.278
Body	Rear	GSM850 (GPRS 4 slot)	190	836.60	33.0	32.90	0.614	0.628
Head	Touch Flat	GSM1900	661	1880.00	30.0	30.00	0.241	0.241
Body	Rear	GSM1900 (GPRS 4 slot)	661	1880.00	30.0	30.00	0.794	0.794
Head	Touch Flat	W-CDMA BAND V	4183	836.60	24.0	21.13	0.395	0.765
Body	Edge 3	W-CDMA BAND V	4183	836.60	24.0	21.13	0.107	0.207
Head	Touch Flat	W-CDMA BAND II	9400	1880.00	24.0	22.00	0.431	0.683
Body	Rear	W-CDMA BAND II	9400	1880.00	24.0	22.00	0.469	0.743
Body	Right Touch	802.11b	6	2437.00	15.0	14.20	0.286	0.344
Body	Rear	802.11b	6	2437.00	15.0	14.20	0.065	0.078

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

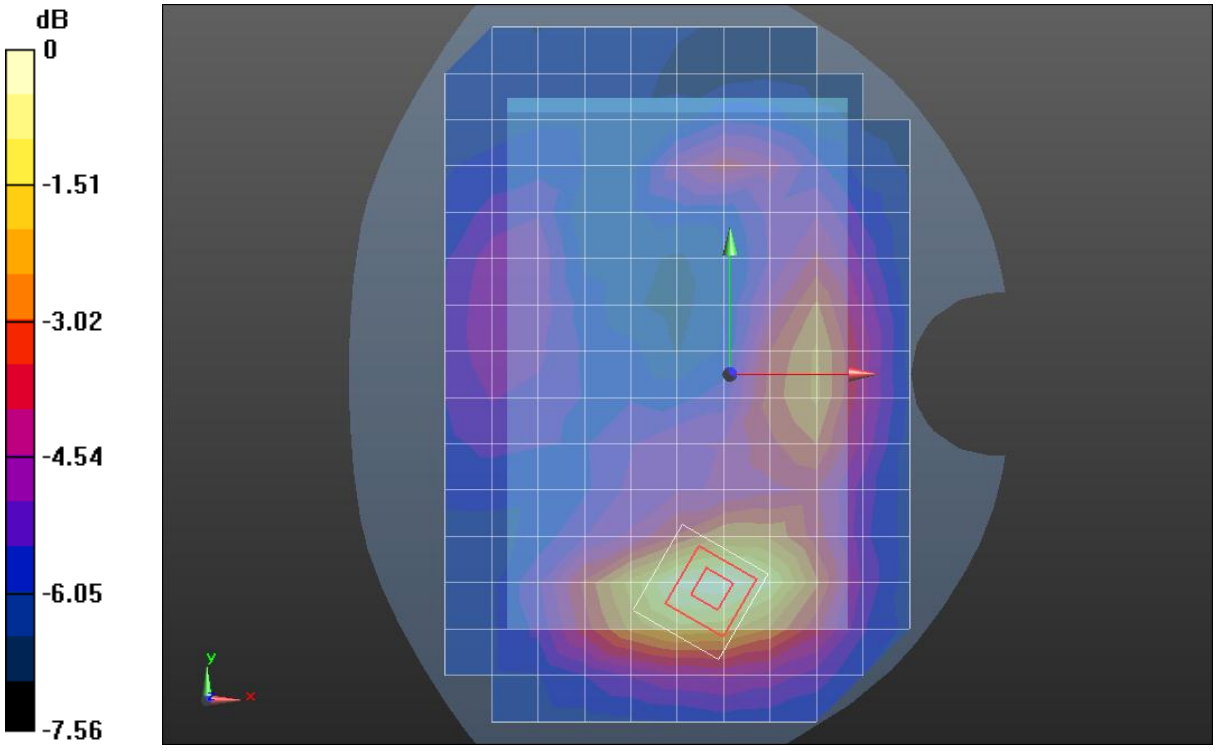
Test Laboratory: UL CCS SAR Lab C Date: 7/8/2012

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 = 0.887 mho/m; ε_r = 41.608; 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 Sn1239; Calibrated: 6/6/2012
- Probe: EX3DV4 - SN3751; ConvF(8.35, 8.35, 8.35); Calibrated: 12/19/2011;
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Phantom: SAM; Type: QD000P40CD; Serial: 1632

Head Flat/GMSK Voice/1slot_Touch Flat_ch 190/Area Scan (11x16x1): Measurement grid: dx=15mm, dy=15mm
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.308 mW/g

Head Flat/GMSK Voice/1slot_Touch Flat_ch 190/Zoom Scan (5x5x7)/Cube 0:
Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 19.050 V/m; Power Drift = 0.07 dB
Peak SAR (extrapolated) = 0.385 mW/g
SAR(1 g) = 0.272 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



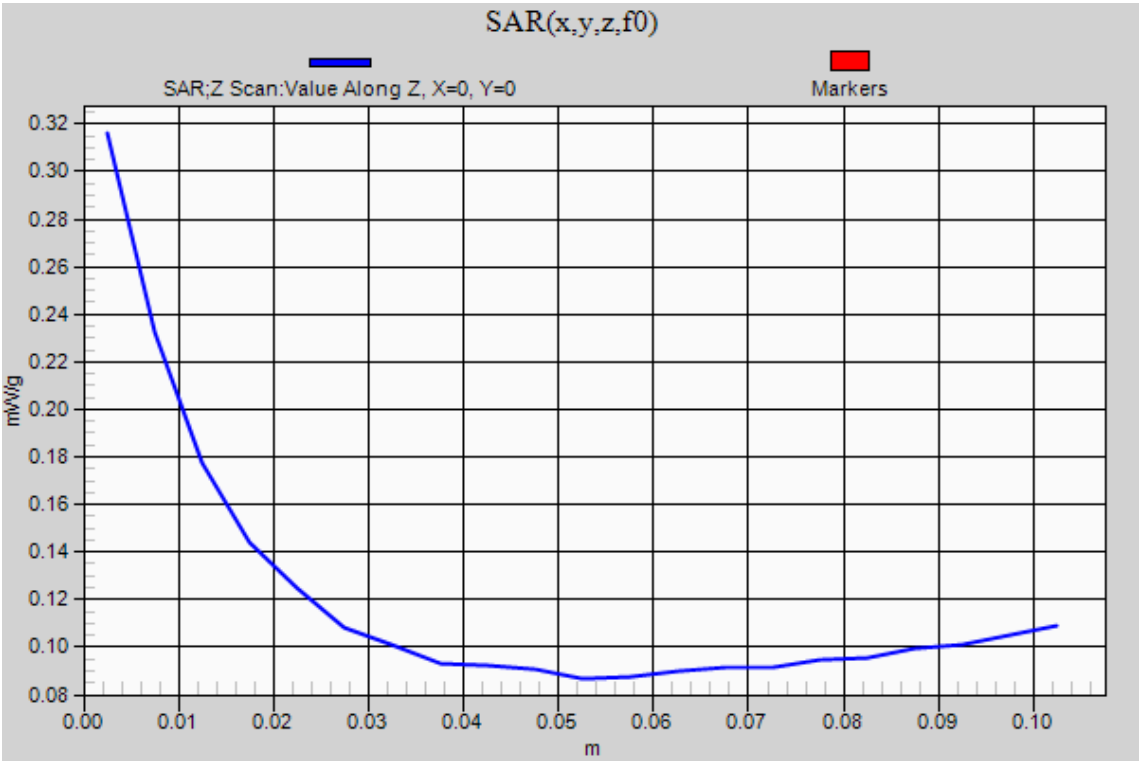
0 dB = 0.317 mW/g = -9.98 dB mW/g

Test Laboratory: UL CCS SAR Lab C Date: 7/8/2012

GSM850

Frequency: 836.6 MHz; Duty Cycle: 1:8.00018

Head Flat/GMSK Voice/1slot_Touch Flat_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) = 0.316 mW/g



Test Laboratory: UL CCS SAR Lab C Date: 7/8/2012

GSM850

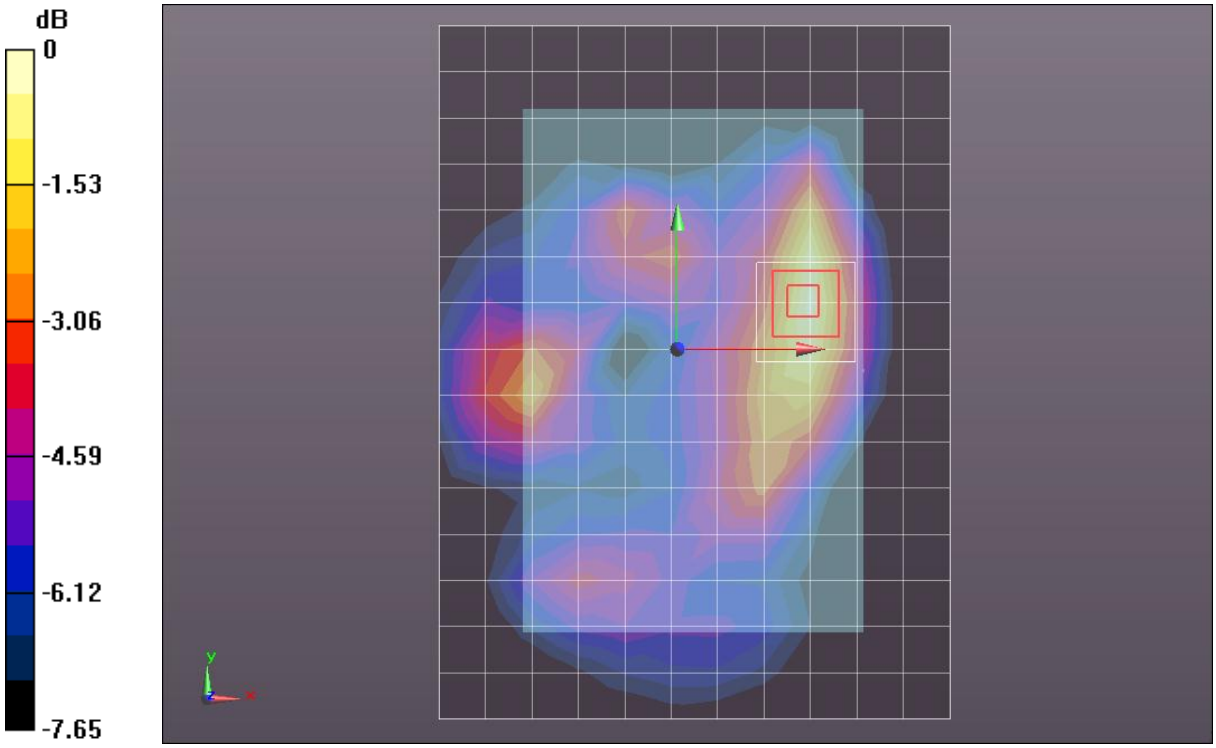
Frequency: 836.6 MHz; Duty Cycle: 1:1.99986; Room Ambient Temperature: 24.0°C; Liquid Temperature: 23.0°C
Medium parameters used (interpolated): f = 836.6 MHz; σ = 0.999 mho/m; ε_r = 53.418; ρ = 1000 kg/m^3
DASY5 Configuration:
- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Electronics: DAE4 Sn1239; Calibrated: 6/6/2012
- Probe: EX3DV4 - SN3751; ConvF(8.64, 8.64, 8.64); Calibrated: 12/19/2011;
- Sensor-Surface: 2.5mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Phantom: ELI v5.0 (A); Type: QDOVA001BB; Serial: 1120

Rear/GPRS_Ch 190 4 slot w/Headset/Area Scan (12x16x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.702 mW/g

Rear/GPRS_Ch 190 4 slot w/Headset/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 27.446 V/m; Power Drift = 0.08 dB
Peak SAR (extrapolated) = 0.955 mW/g
SAR(1 g) = 0.614 mW/g; SAR(10 g) = 0.406 mW/g
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.747 mW/g



0 dB = 0.747 mW/g = -2.53 dB mW/g

Test Laboratory: UL CCS SAR Lab C Date: 7/8/2012

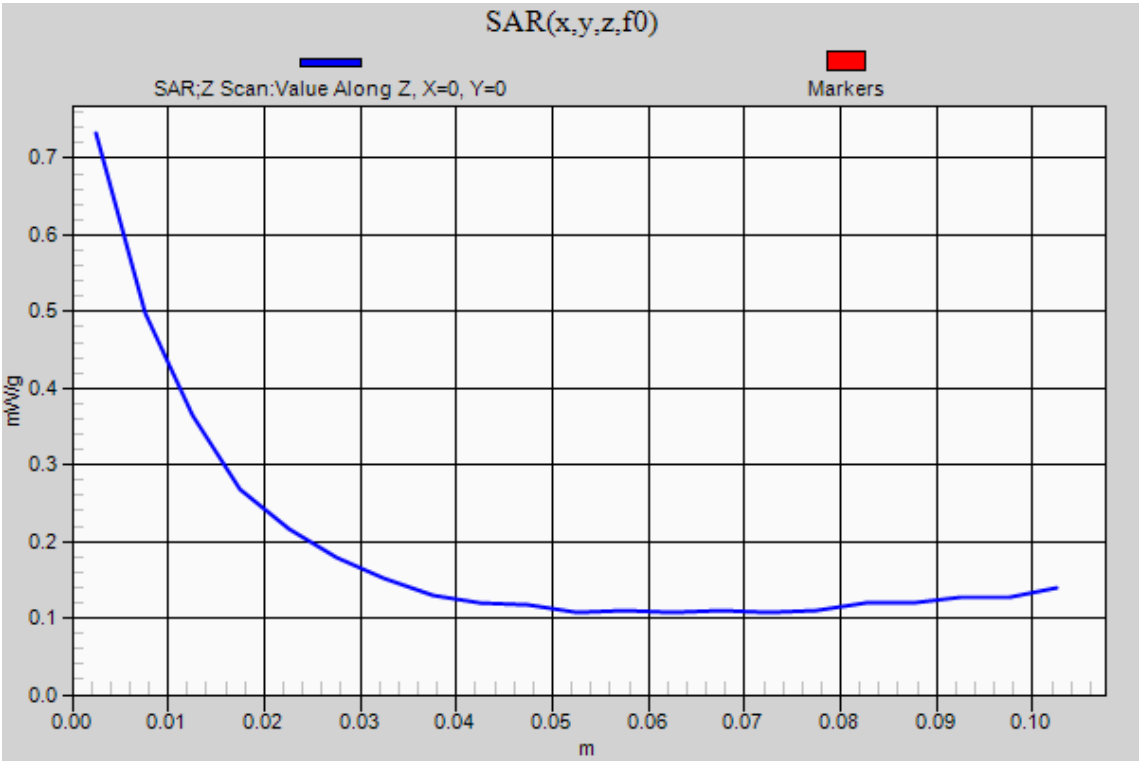
GSM850

Frequency: 836.6 MHz; Duty Cycle: 1:1.99986

Rear/GPRS_Ch 190 4 slot w/Headset/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 0.733 mW/g



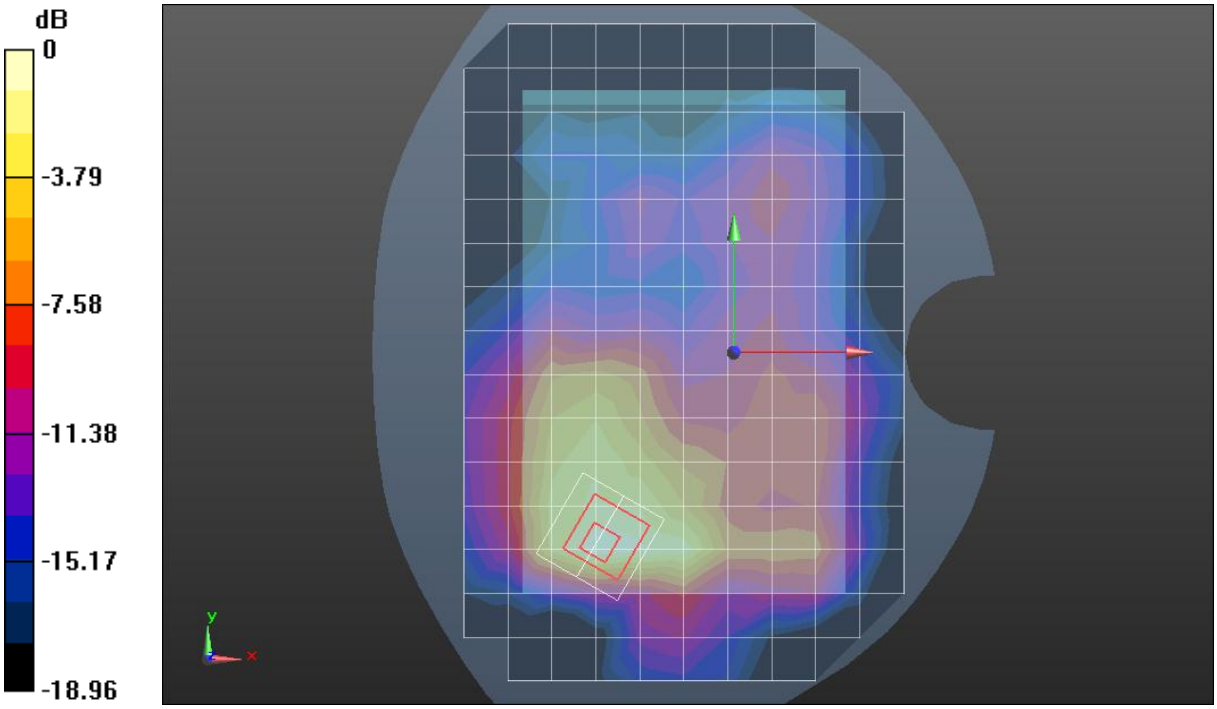
Test Laboratory: UL CCS SAR Lab C Date: 6/25/2012

GSM 1900

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 = 1.403 mho/m; ε_r = 40.413; 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 Sn1239; Calibrated: 6/6/2012
- Probe: EX3DV4 - SN3751; ConvF(7.33, 7.33, 7.33); Calibrated: 12/19/2011
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Phantom: SAM; Type: QD000P40CD; Serial: 1632

Head Flat/Touch_GMSK_ch 661/Area Scan (11x16x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.298 mW/g

Head Flat/Touch_GMSK_ch 661/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 14.728 V/m; Power Drift = 0.0079 dB
Peak SAR (extrapolated) = 0.3980
SAR(1 g) = 0.241 mW/g; SAR(10 g) = 0.134 mW/g
Maximum value of SAR (measured) = 0.297 mW/g



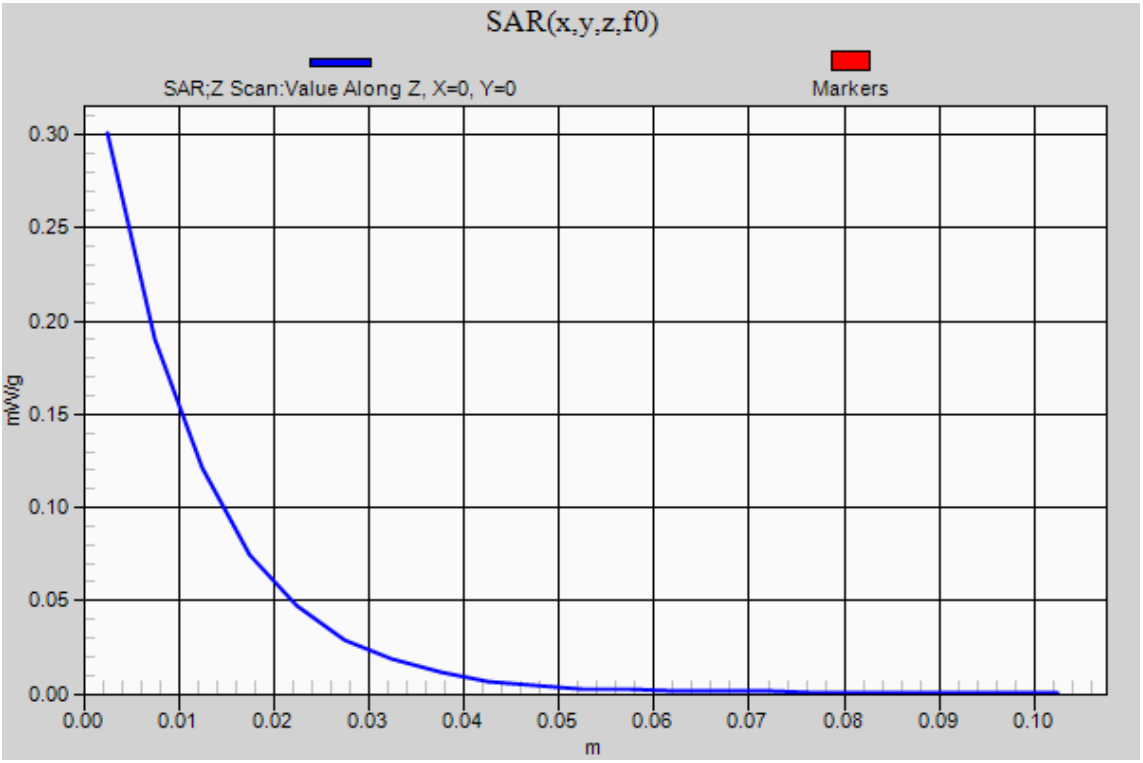
0 dB = 0.300mW/g = -10.46 dB mW/g

Test Laboratory: UL CCS SAR Lab C Date: 6/25/2012

GSM 1900

Frequency: 1880 MHz; Duty Cycle: 1:8.00018

Head/Touch/Flat_GMSK Voice 1 slot_ch 661/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Maximum value of SAR (measured) = 0.301 mW/g



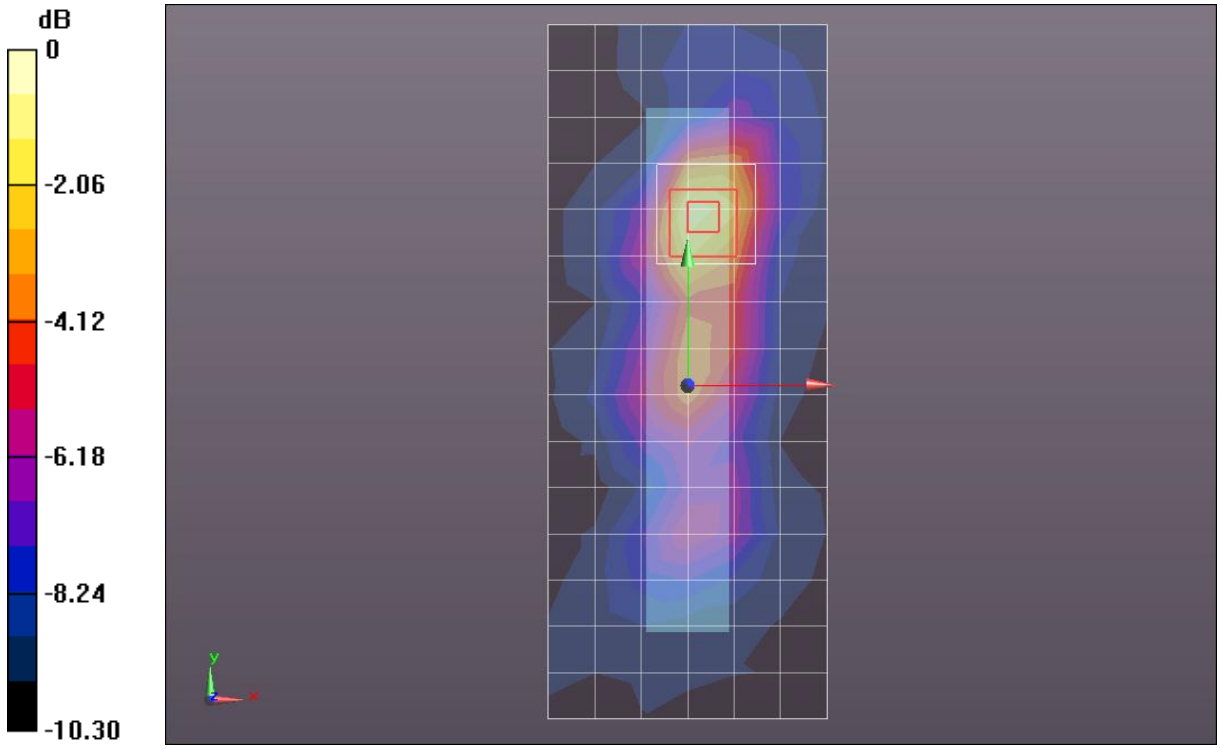
Test Laboratory: UL CCS SAR Lab C Date: 7/8/2012

GSM 1900

Frequency: 1880 MHz; Duty Cycle: 1:1.99986; Room Ambient Temperature: 24.0°C; Liquid Temperature: 23.0°C
Medium parameters used: f = 1880 MHz; σ = 1.53 mho/m; ε_r = 53.171; 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 Sn1239; Calibrated: 6/6/2012
- Probe: EX3DV4 - SN3751; ConvF(6.83, 6.83, 6.83); Calibrated: 12/19/2011;
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Phantom: ELI v5.0 (A); Type: QDOVA001BB; Serial: 1117

Body/Edge 3_GPRS 4 slots_ch 661/Area Scan (7x16x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.837 mW/g

Body/Edge 3_GPRS 4 slots_ch 661/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 23.503 V/m; Power Drift = -0.08 dB
Peak SAR (extrapolated) = 1.352 mW/g
SAR(1 g) = 0.794 mW/g; SAR(10 g) = 0.463 mW/g
Maximum value of SAR (measured) = 1.01 mW/g



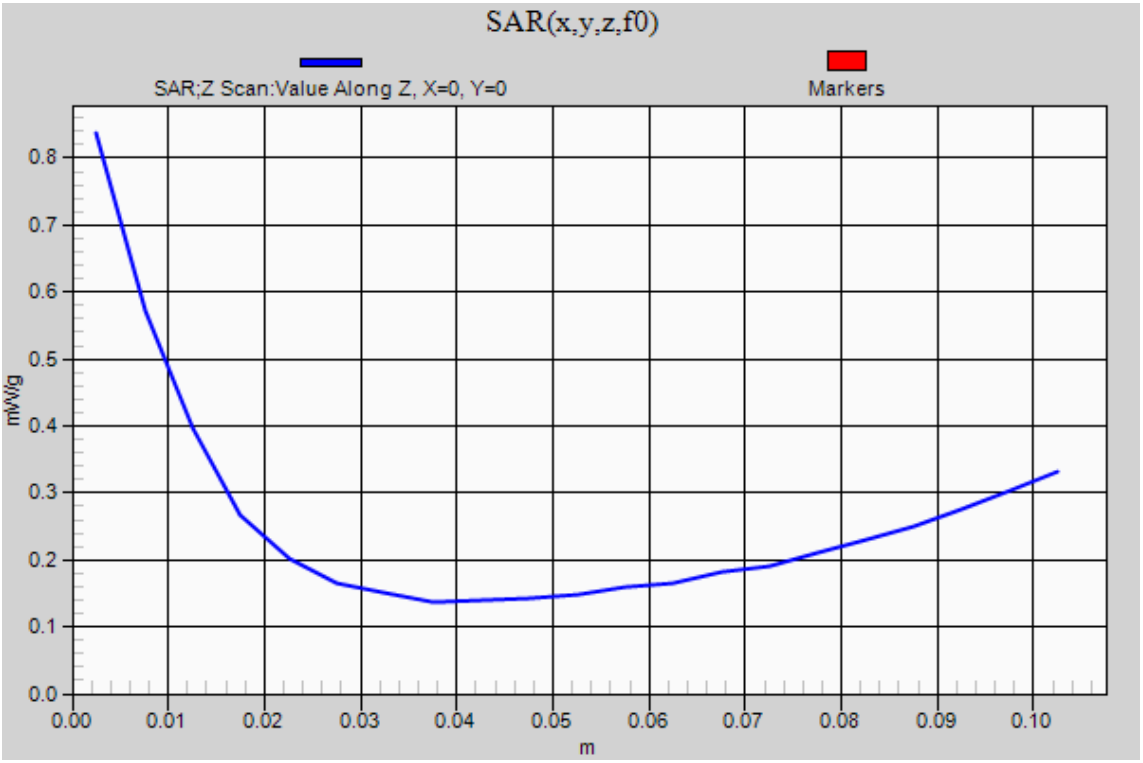
0 dB = 1.01 mW/g = 0.09 dB mW/g

Test Laboratory: UL CCS SAR Lab B Date: 7/8/2012

GSM 1900

Frequency: 1880 MHz; Duty Cycle: 1:1.99986

Body/Edge 3_GPRS 4 slots_ch 661/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Maximum value of SAR (measured) = 0.837 mW/g



Test Laboratory: UL CCS SAR Lab C Date: 6/26/2012

W-CDMA Band V

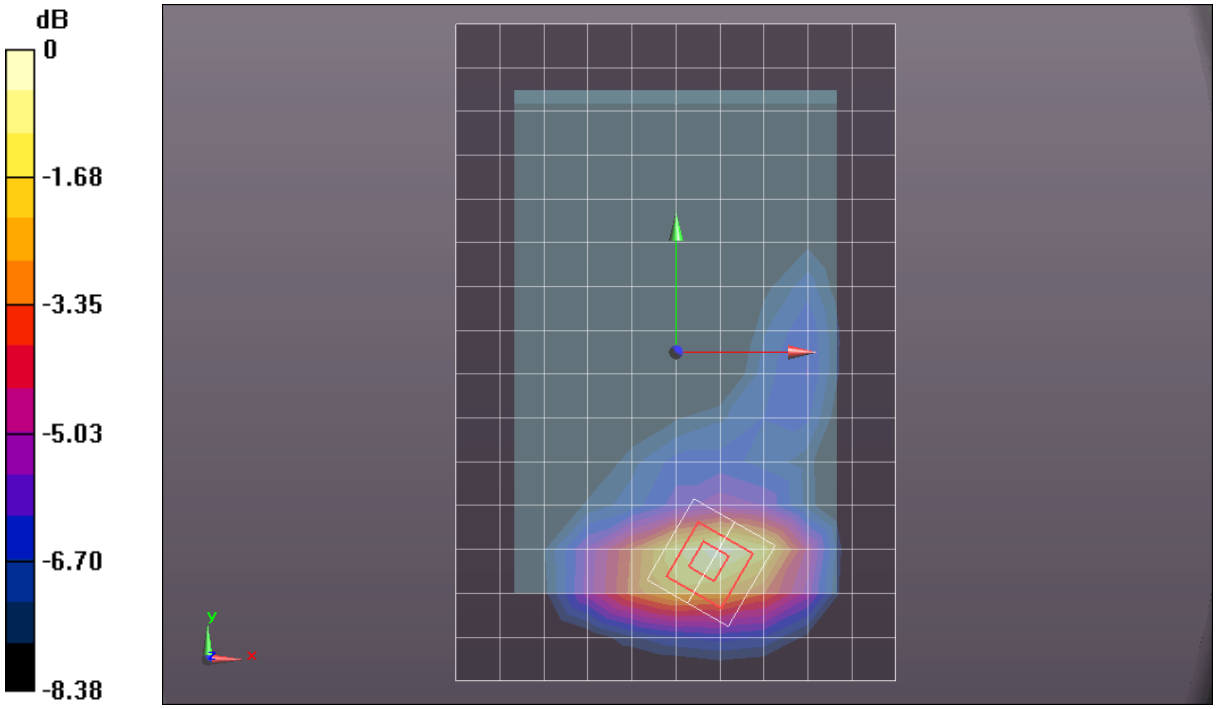
Frequency: 836.6 MHz; Duty Cycle: 1:1; Room Ambient Temperature: 24.0°C; Liquid Temperature: 23.0°C
Medium parameters used (interpolated): f = 836.6 MHz; σ = 0.88 mho/m; ε_r = 41.752; ρ = 1000 kg/m^3
DASY5 Configuration:
- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Electronics: DAE4 Sn1239; Calibrated: 6/6/2012
- Probe: EX3DV4 - SN3751; ConvF(8.35, 8.35, 8.35); Calibrated: 12/19/2011
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Phantom: ELI v5.0 (B); Type: QDOVA001BB; Serial: 1121

Head/Touch Flat/R99_ch 4183/Area Scan (11x16x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.479 mW/g

Head/Touch Flat/R99_ch 4183/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 23.574 V/m; Power Drift = 0.08 dB
Peak SAR (extrapolated) = 0.6530
SAR(1 g) = 0.395 mW/g; SAR(10 g) = 0.249 mW/g
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.498 mW/g



0 dB = 0.500mW/g = -6.02 dB mW/g

Test Laboratory: UL CCS SAR Lab C Date: 6/26/2012

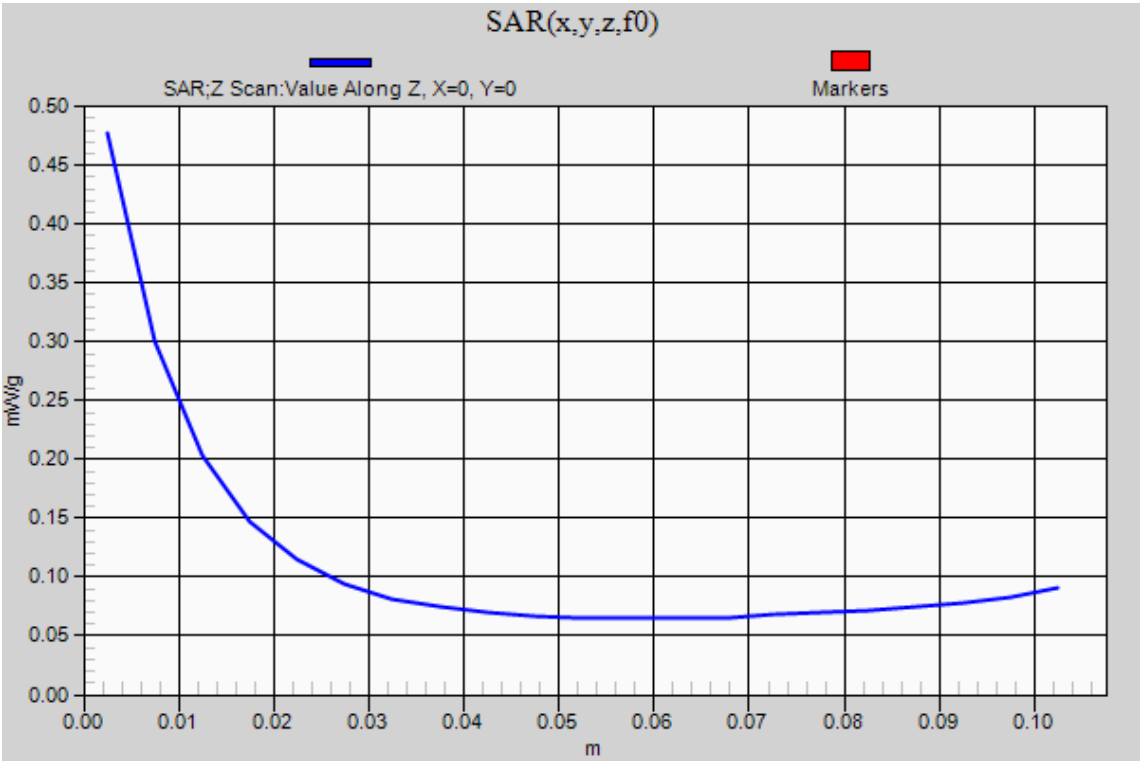
W-CDMA Band V

Frequency: 836.6 MHz; Duty Cycle: 1:1

Head Flat/Touch Flat_ch 4183/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 0.477 mW/g



Test Laboratory: UL CCS SAR Lab C Date: 6/22/2012

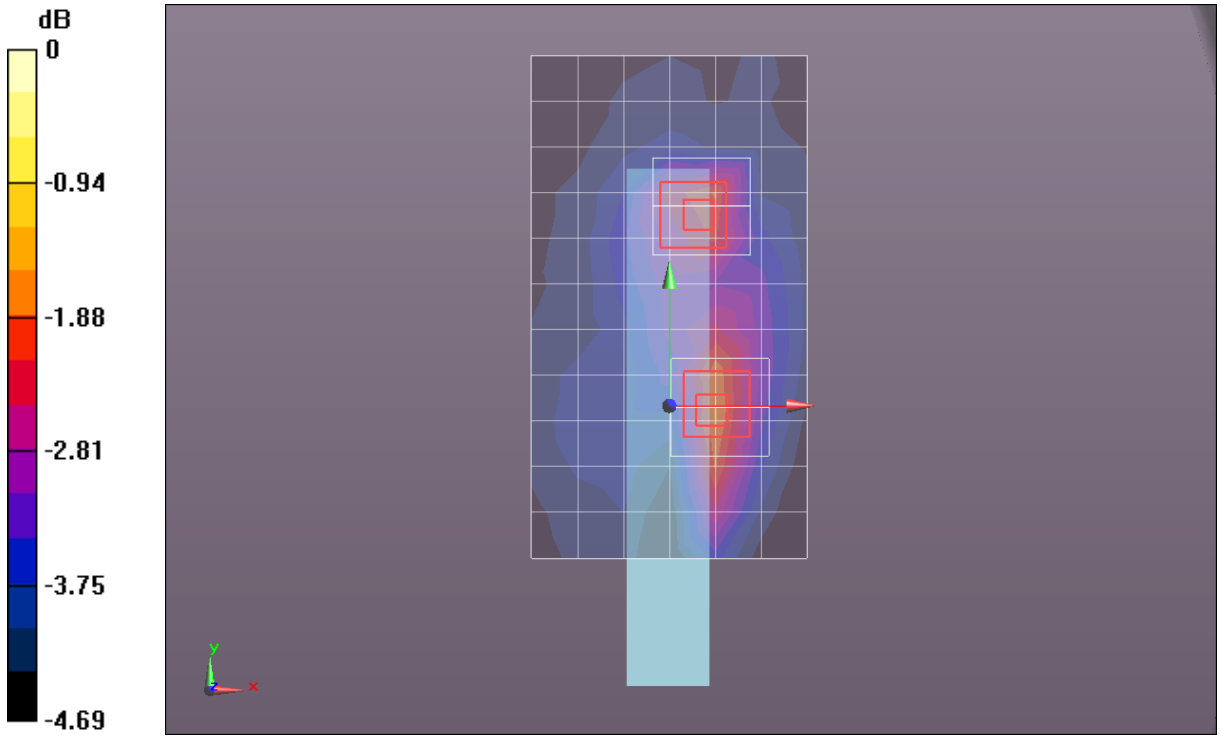
W-CDMA Band V Body

Frequency: 836.6 MHz; Duty Cycle: 1:1; Room Ambient Temperature: 24.0°C; Liquid Temperature: 23.0°C
Medium parameters used (interpolated): f = 836.6 MHz; σ = 0.988 mho/m; ε_r = 53.91; 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 Sn1239; Calibrated: 6/6/2012
- Probe: EX3DV4 - SN3751; ConvF(8.64, 8.64, 8.64); Calibrated: 12/19/2011
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Phantom: ELI v5.0 (B); Type: QDOVA001BB; Serial: 1121

Edge 3/ Rel 99 RMC w/Hset_Ch 4183/Area Scan (7x12x1): Measurement grid: dx=15mm, dy=15mm
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.100 mW/g

Edge 3/ Rel 99 RMC w/Hset_Ch 4183/Zoom Scan 2 (5x5x7)/Cube 1: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 10.042 V/m; Power Drift = 0.05 dB
Peak SAR (extrapolated) = 0.1270
SAR(1 g) = 0.089 mW/g; SAR(10 g) = 0.072 mW/g
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.097 mW/g

Edge 3/ Rel 99 RMC w/Hset_Ch 4183/Zoom Scan 2 (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 10.042 V/m; Power Drift = 0.05 dB
Peak SAR (extrapolated) = 0.2490
SAR(1 g) = 0.107 mW/g; SAR(10 g) = 0.073 mW/g
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.143 mW/g



0 dB = 0.140mW/g = -17.08 dB mW/g

Test Laboratory: UL CCS SAR Lab C Date: 6/22/2012

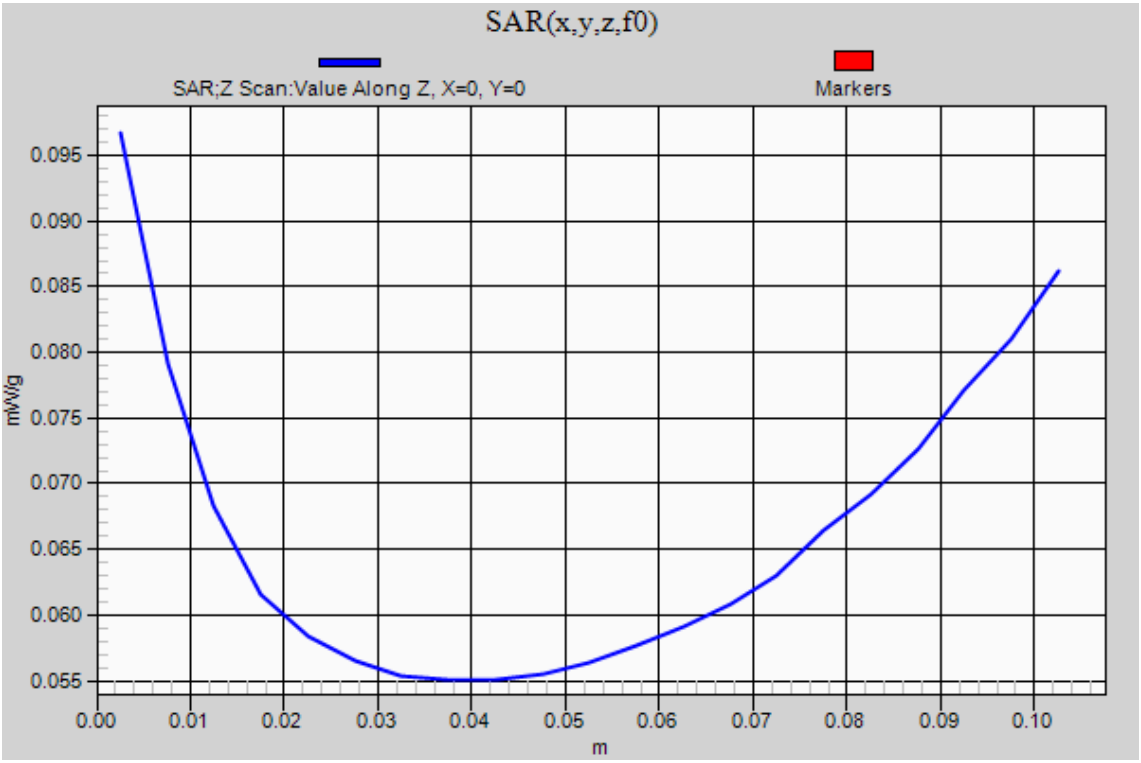
W-CDMA Band V Body

Frequency: 836.6 MHz; Duty Cycle: 1:1

Edge 3/ Rel 99 RMC w/Hset_Ch 4183/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 0.097 mW/g



Test Laboratory: UL CCS SAR Lab C Date: 6/25/2012

UMTS Band II

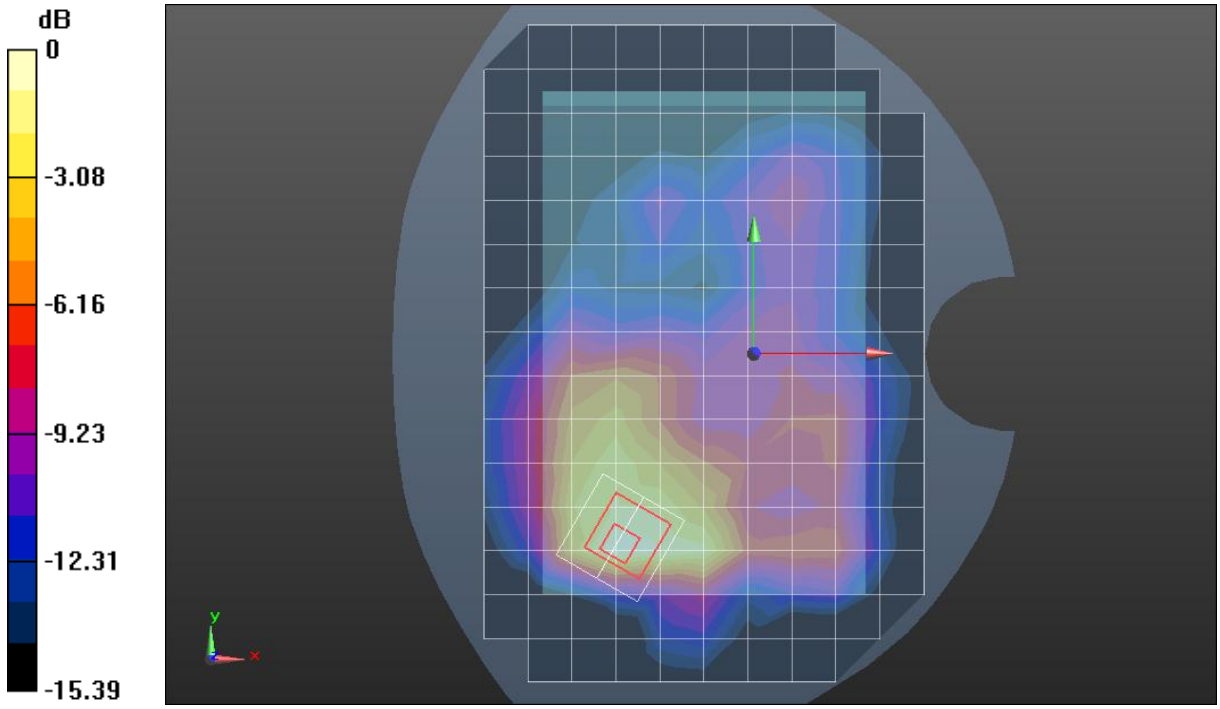
Frequency: 1880 MHz; Duty Cycle: 1:1; Room Ambient Temperature: 24.0°C; Liquid Temperature: 23.0°C
Medium parameters used: f = 1880 MHz; σ = 1.403 mho/m; ε_r = 40.413; ρ = 1000 kg/m^3
DASY5 Configuration:
- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Electronics: DAE4 Sn1239; Calibrated: 6/6/2012
- Probe: EX3DV4 - SN3751; ConvF(7.33, 7.33, 7.33); Calibrated: 12/19/2011
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Phantom: SAM; Type: QD000P40CD; Serial: 1632

Head Flat/Touch_UMTS R99_ch 9400/Area Scan (11x16x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.540 mW/g

Head Flat/Touch_UMTS R99_ch 9400/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 19.655 V/m; Power Drift = -0.06 dB
Peak SAR (extrapolated) = 0.7000
SAR(1 g) = 0.431 mW/g; SAR(10 g) = 0.243 mW/g
Maximum value of SAR (measured) = 0.537 mW/g



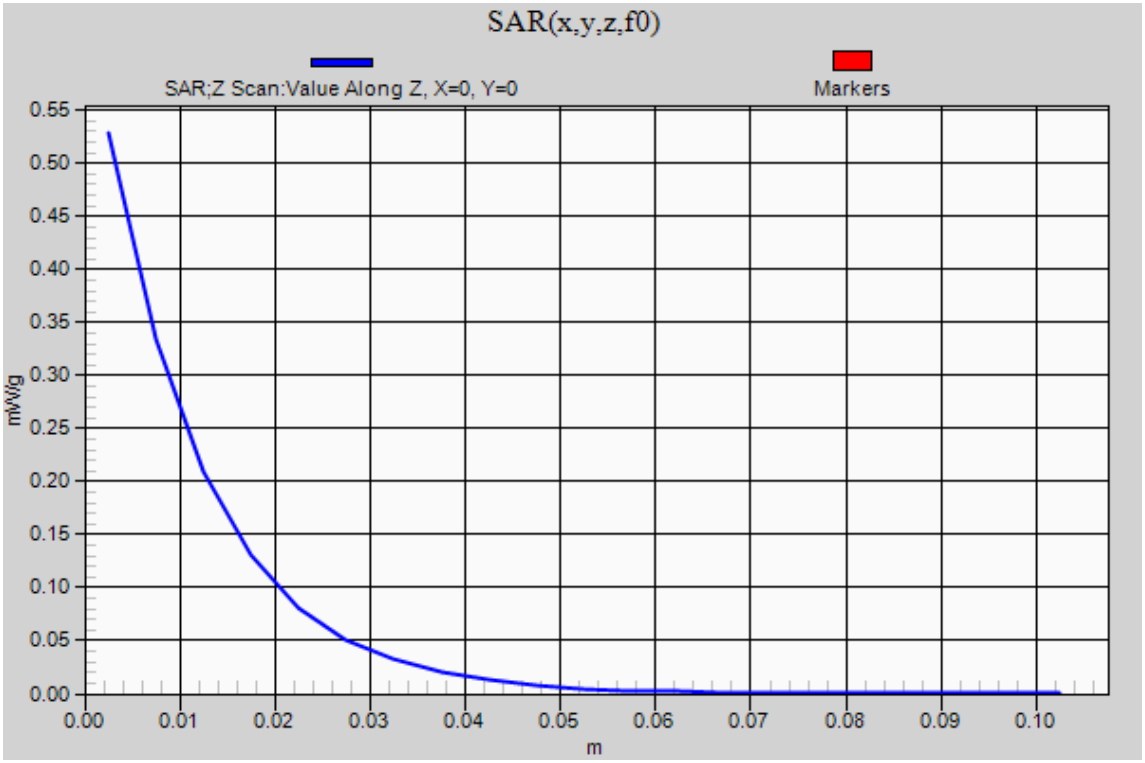
0 dB = 0.540mW/g = -5.35 dB mW/g

Test Laboratory: UL CCS SAR Lab C Date: 6/25/2012

UMTS Band II

Frequency: 1880 MHz; Duty Cycle: 1:1

Head Flat/Touch_UMTS R99_ch 9400/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Maximum value of SAR (measured) = 0.528 mW/g



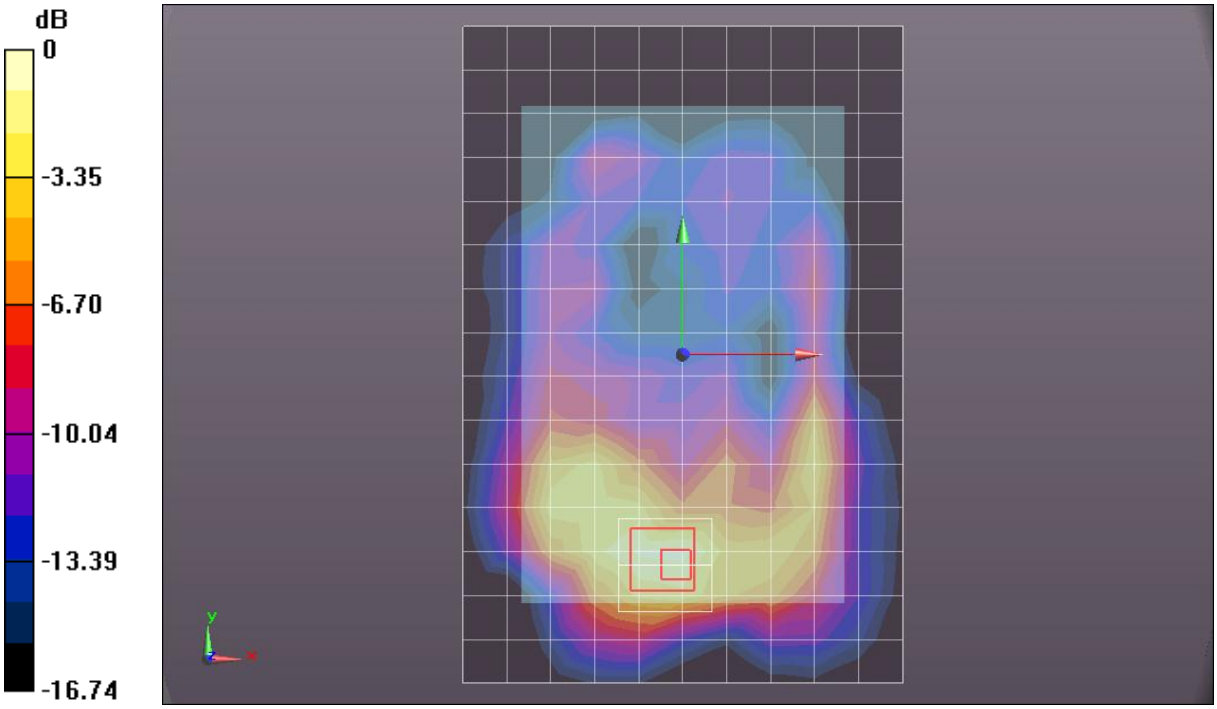
Test Laboratory: UL CCS SAR Lab C Date: 6/24/2012

UMTS Band II

Frequency: 1880 MHz; Duty Cycle: 1:1; Room Ambient Temperature: 24.0°C; Liquid Temperature: 23.0°C
Medium parameters used: f = 1880 MHz; σ = 1.534 mho/m; ε_r = 54.363; 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 Sn1239; Calibrated: 6/6/2012
- Probe: EX3DV4 - SN3751; ConvF(6.83, 6.83, 6.83); Calibrated: 12/19/2011
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Phantom: ELI v5.0 (A); Type: QDOVA001BB; Serial: 1120

Body/Rear_R99 RMC_ch 9400/Area Scan (11x16x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.520 mW/g

Body/Rear_R99 RMC_ch 9400/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 18.492 V/m; Power Drift = 0.11 dB
Peak SAR (extrapolated) = 0.7740
SAR(1 g) = 0.469 mW/g; SAR(10 g) = 0.274 mW/g
Maximum value of SAR (measured) = 0.599 mW/g



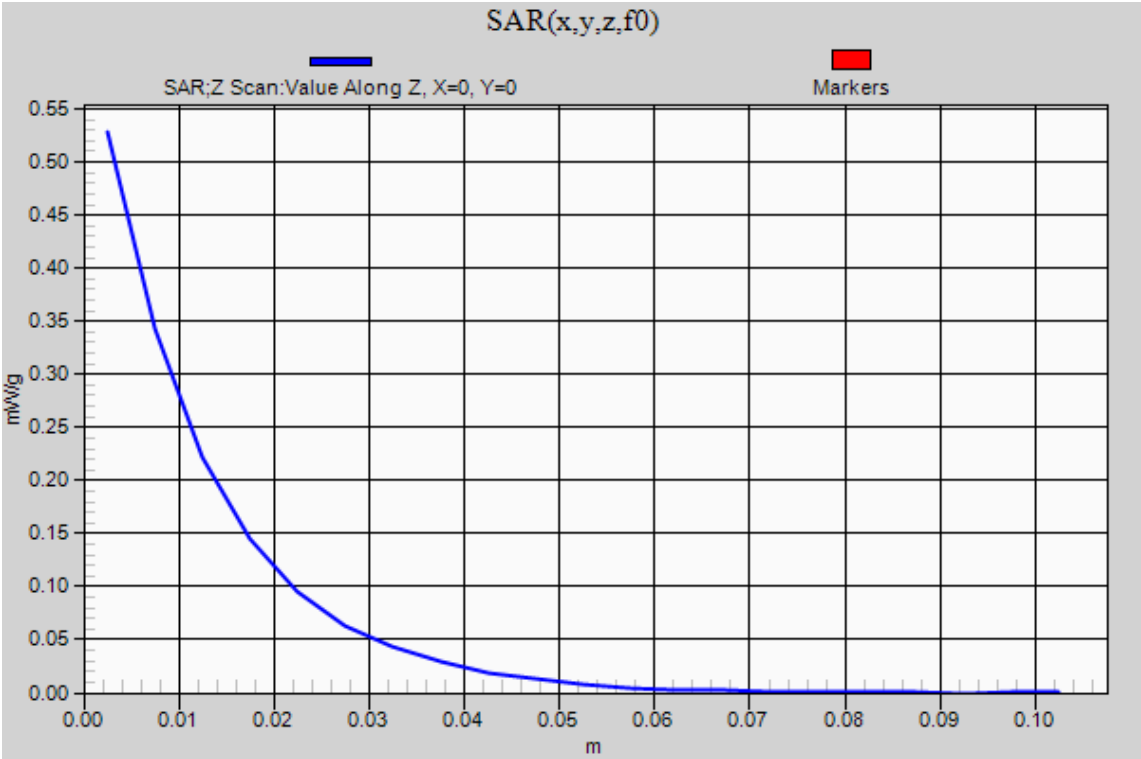
0 dB = 0.600mW/g = -4.44 dB mW/g

Test Laboratory: UL CCS SAR Lab C Date: 6/24/2012

UMTS Band II

Frequency: 1880 MHz; Duty Cycle: 1:1

Body/Rear_R99 RMC_ch 9400/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Maximum value of SAR (measured) = 0.528 mW/g



Test Laboratory: UL CCS SAR Lab C Date: 6/26/2012

WiFi_2.4GHz Band

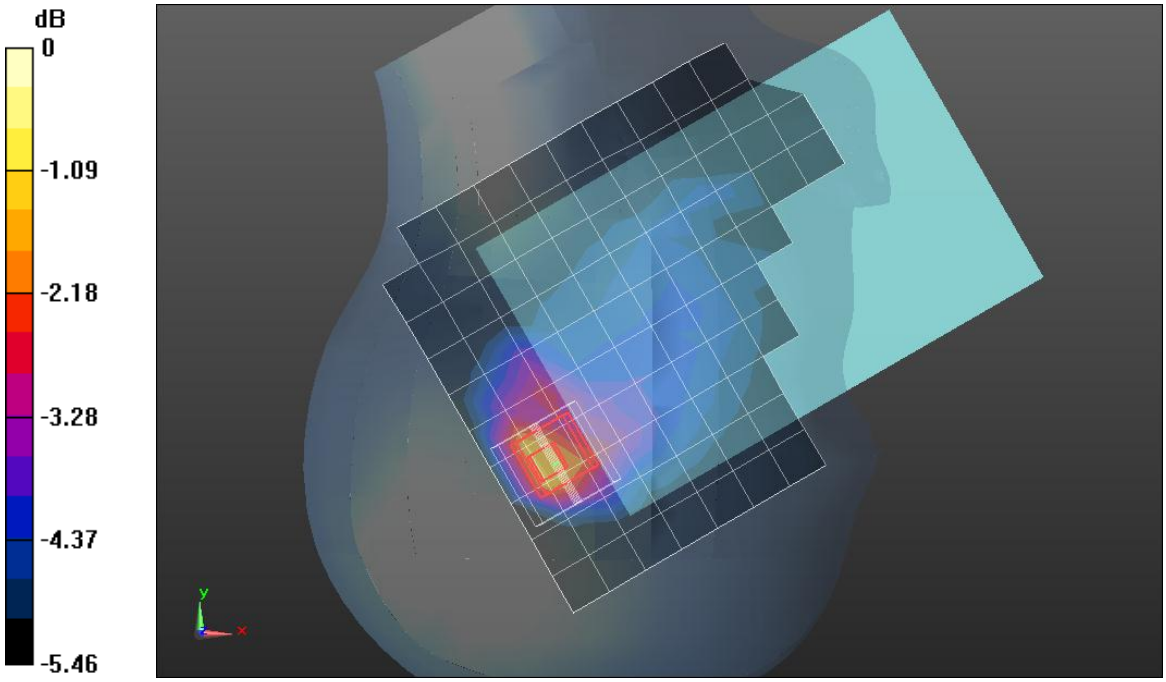
Frequency: 2437 MHz; Duty Cycle: 1:1; Room Ambient Temperature: 24.0°C; Liquid Temperature: 23.0°C
Medium parameters used (interpolated): f = 2437 MHz; σ = 1.86 mho/m; ε_r = 39.232; ρ = 1000 kg/m^3
DASY5 Configuration:
- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Electronics: DAE4 Sn1239; Calibrated: 6/6/2012
- Probe: EX3DV4 - SN3751; ConvF(6.53, 6.53, 6.53); Calibrated: 12/19/2011
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Phantom: SAM; Type: QD000P40CD; Serial: 1632

RHS/Touch_ch 6/Area Scan (11x12x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.277 mW/g

RHS/Touch_ch 6/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 12.188 V/m; Power Drift = 0.05 dB
Peak SAR (extrapolated) = 0.5310
SAR(1 g) = 0.286 mW/g; SAR(10 g) = 0.191 mW/g
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.377 mW/g



0 dB = 0.380mW/g = -8.40 dB mW/g

Test Laboratory: UL CCS SAR Lab C Date: 6/26/2012

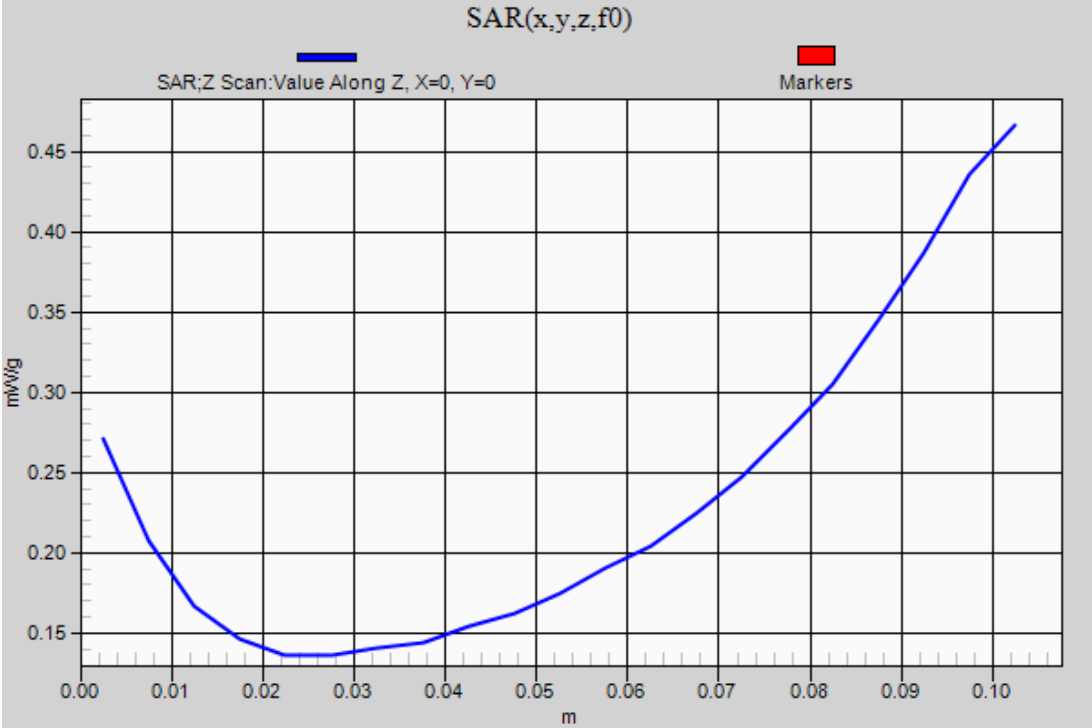
WiFi_2.4GHz Band

Frequency: 2437 MHz; Duty Cycle: 1:1

RHS/Touch_ch 6/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 0.466 mW/g



14. Simultaneous Transmission SAR Analysis

Stand-alone SAR evaluation is not required as the Bluetooth output power is ≤ 2·P_{Ref} (13.8dBm / 24 mW) and the antenna separation is ≥ 5 cm. Therefore, simultaneous transmission SAR evaluation is not required between Bluetooth and any other transmitters.

14.1. Head Exposure Conditions

14.1.1. Sum of the SAR for GSM, W-CDMA, & WiFi

Sum of the SAR with Measured Values

Test Position	Voice				Data	∑ 1-g SAR (mW/g)
	GSM 850	GSM 1900	W-CDMA Band V	W-CDMA Band II	WiFi 2.4 GHz	
Touch Flat	0.272				0.286	0.558
		0.241			0.286	0.527
			0.395		0.286	0.681
				0.431	0.286	**0.717**

Sum of the SAR with Scaled Values for the Worst-case Configuration

Test Position	Voice				Data	∑ 1-g SAR (mW/g)
	GSM 850	GSM 1900	W-CDMA Band V	W-CDMA Band II	WiFi 2.4 GHz	
Touch Flat	0.278				0.344	0.622
		0.241			0.344	0.585
			0.765		0.344	1.109
				0.683	0.344	**1.027**

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.

14.2. Body Exposure Conditions

14.2.1. Sum of the SAR for GSM, W-CDMA, & WiFi

Sum of the SAR with Measured Values

Test Position	Voice				Data	∑ 1-g SAR (mW/g)
	GSM 850	GSM 1900	W-CDMA Band V	W-CDMA Band II	WiFi 2.4 GHz	
Rear	0.614				0.065	0.679
		0.661			0.065	0.726
			0.095		0.065	0.160
				0.469	0.065	0.534
Edge 3	0.336				0	0.336
		0.794			0	**0.794**
			0.107		0	0.107
				0.294	0	0.294

Sum of the SAR with Scaled Values for the Worst-case Configuration

Test Position	Voice				Data	∑ 1-g SAR (mW/g)
	GSM 850	GSM 1900	W-CDMA Band V	W-CDMA Band II	WiFi 2.4 GHz	
Rear	0.628				0.078	0.706
		0.708			0.078	0.786
			0.184		0.078	0.262
				0.743	0.078	**0.821**

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.

15. Appendixes

Refer to separated files for the following appendixes.

15.1. System Performance Check Plots

15.2. SAR Test Plots for GSM850

15.3. SAR Test Plots for GSM1900

15.4. SAR Test Plots for WCDMA (UMTS) Band V

15.5. SAR Test Plots for WCDMA (UMTS) Band II

15.6. SAR Test Plots for WiFi 2.4 GHz

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

15.8. Calibration Certificate for E-Field Probe EX3DV4 - SN 3751

15.9. Calibration Certificate for D835V2 - SN 4d117

15.10. Calibration Certificate for D1900V2 - SN 5d140

15.11. Calibration Certificate for D2450V2 - SN 748