



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

SAR EVALUATION REPORT

For

**BT3.0, 802.11 b/g/n 1x1 HT20, GSM850/1900 & WCDMA850/1900MHz Bar phone w/hotspots.
VOIP supported**

**Model: GT-B5330L
FCC ID: A3LGTB5330L**

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A	6/28/2012	Made the following revisions: 1. Sec. 9.6: Added "Data Rate" column to output power table.	Ray Su
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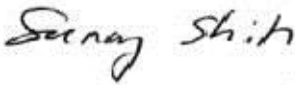
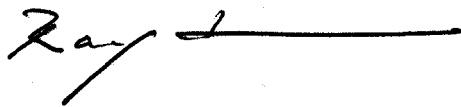
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1. Attestation of Test Results

Applicant	SAMSUNG ELECTRONICS CO., LTD.		
DUT description	BT3.0, 802.11 b/g/n 1x1 HT20, GSM850/1900 & WCDMA850/1900MHz Bar phone w/hotspots. VOIP supported		
Model	GT-B5330L		
Test device is	An identical prototype		
Device category	Portable		
Exposure category	General Population/Uncontrolled Exposure		
Date tested	6/10/2012 – 6/14/2012		
FCC Rule Parts	Freq. Range	Highest 1-g SAR	Limit
22	824-849 MHz	Head: 0.270 W/kg (Right Touch) (W-CDMA RMC, 12.2 kbps) Body & Hotspot: 0.601 W/kg (Rear w/ 10mm distance) (W-CDMA RMC, 12.2 kbps)	1.6 W/kg
24	1850-1910 MHz	Head: 0.559 W/kg (Right Touch) (W-CDMA RMC, 12.2 kbps) Body & Hotspot: 0.707 W/kg (Rear w/ 10 mm distance) (W-CDMA RMC, 12.2 kbps)	
15.247	2412-2462 MHz	Head: 0.247 W/kg (Right Touch) Body & Hotspot: 0.072 W/kg (Rear w/ 10 mm distance)	
Simultaneous Transmission Use Condition:		0.806 W/kg	
Applicable Standards			Test Results
FCC OET Bulletin 65 Supplement C 01-01, IEEE Std 1528-2003, IEEE Std 1528a-2005			Pass
<p>Compliance Certification Services, Inc. (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.</p> <p>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.</p>			
Approved & Released For UL CCS By:		Tested By:	
			
Sunny Shih Engineering Leader Compliance Certification Services (UL CCS)		Ray Su SAR Engineer Compliance Certification Services (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 Xmitter 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
- 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	R & S	CMU200	106291	6	24	2012
ESA Series Network Analyzer	Agilent	E5071B	MY42100131	2	11	2013
Synthesized Signal Generator	HP	83732B	US34490599	7	14	2012
E-Field Probe	SPEAG	EX3DV4	3751	12	19	2012
Thermometer	ERTCO	639-1S	1718	7	19	2012
Data Acquisition Electronics	SPEAG	DAE4	1257	10	25	2012
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
Amplifier	MITEQ	4D00400600-50-30P	1620606	N/A		
Directional coupler	Werlatone	C8060-102	2141	N/A		

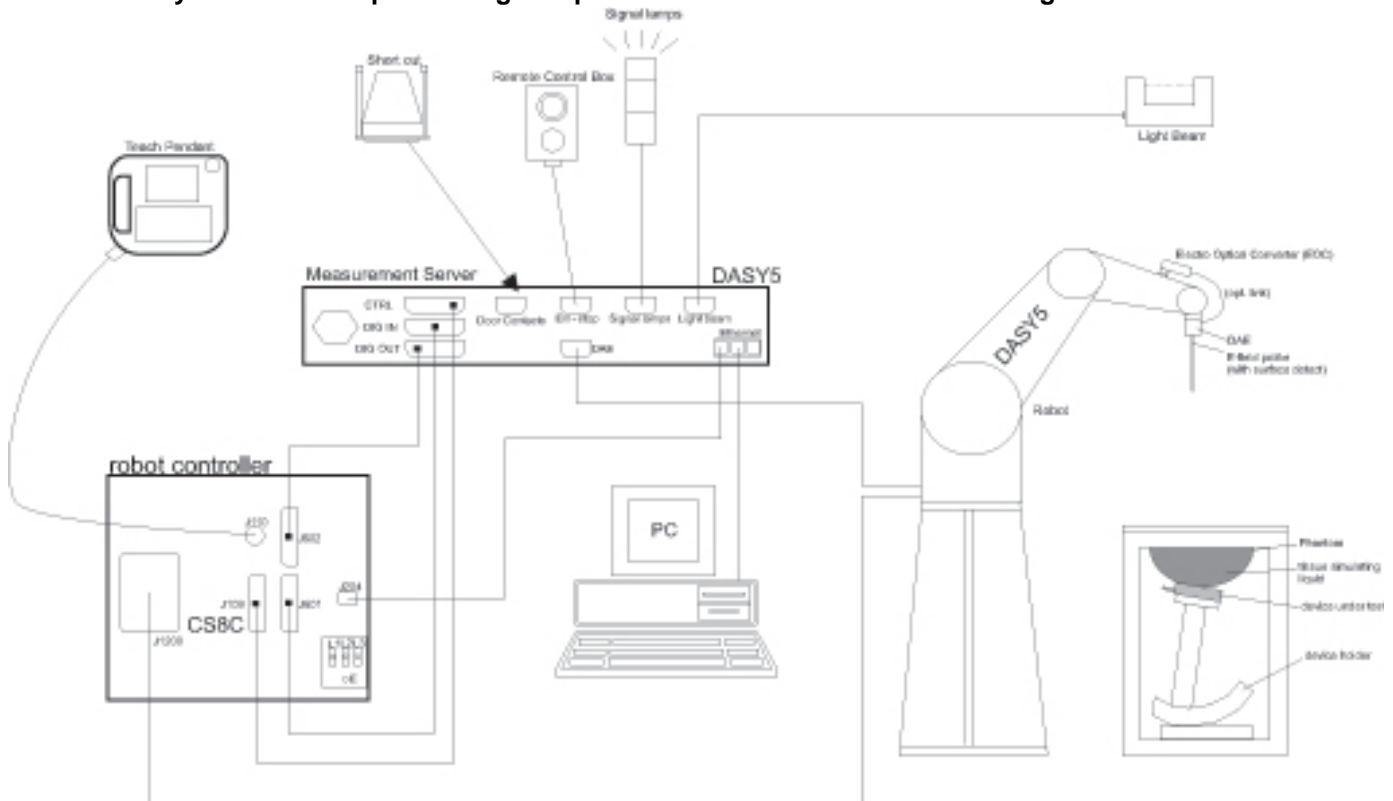
4.2. Measurement Uncertainty

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

Component	Error, %	Distribution	Divisor	Sensitivity	U (X), %
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	-4.25	Normal	1	0.64	-2.72
Liquid Permittivity - deviation from target	5.00	Rectangular	1.732	0.6	1.73
Liquid Permittivity - measurement uncertainty	4.10	Normal	1	0.6	2.46
Combined Standard Uncertainty $U_c(y) =$					10.41
Expanded Uncertainty U, Coverage Factor = 2, > 95 % Confidence =				20.82 %	
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 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 $\geq 7 \times 7 \times 9$ (above 4.5 GHz) or $5 \times 5 \times 7$ (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 $\geq 7 \times 7 \times 9$ (above 4.5 GHz) or $5 \times 5 \times 7$ (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

BT3.0, 802.11 b/g/n 1x1 HT20, GSM850/1900 & WCDMA850/1900MHz Bar phone w/hotspots. VOIP supported
 Base Model: GT-B5330L

Normal operation	<ul style="list-style-type: none"> - Held to head, - Body (Rear and Front sides) with 10 mm separation distance. - Hotspot (wireless router) with 10 mm separation distance to all sides and edges.
Accessory	<ol style="list-style-type: none"> 1. Headset 2. Battery Cover <ul style="list-style-type: none"> o Standard Battery Cove

7.1. Band and Air Interfaces

Tx Frequency Bands	<ul style="list-style-type: none"> - 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: 2412 - 2462 MHz - Bluetooth: 2402 - 2480 MHz
GPRS Multi-Slot Class:	12
GPRS Class:	B
DTM Class:	Not supported

7.2. Hotspot (Wireless router) Exposure Condition

The device is capable of personal hotspot mode through W-CDMA but not GSM. The hotspot mode can be enabled by the user.

7.3. Simultaneous Transmission

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

Notes:

1. WiFi and BT cannot transmit simultaneously because of shared antenna

8. Summary of Test Configurations

Refer to Section 17 “Antenna Location and Separation Distances” for the specific details of the antenna-to-antenna and antenna-to-edge(s) distances.

8.1. Head Test Configurations for WWAN and WiFi

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

8.2. Body-worn Accessory Test Configurations

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

8.3. Personal Router/Hotspot Test Configurations

For GSM850/1900

No Personal Router/Hotspot testing is required for GSM850/1900 as it does not support Hotspot mode.

For W-CDMA Band V and Band II

Test Configurations	Antenna-to-edge/surface	SAR Required	Note
Rear	< 25 mm	Yes	
Front	< 25 mm	Yes	
Edge 1	95 mm	No	SAR is not required because the distance from the antenna to this edge is > 2.5 cm as per KDB 941225 D06 Hot Spot SAR v01
Edge 2	2 mm	Yes	
Edge 3	1.95 mm	Yes	
	4.45 mm	Yes	
Edge 4	1.5 mm	Yes	

For WiFi

Test Configurations	Antenna-to-edge/surface	SAR Required	Note
Rear	< 25 mm	Yes	
Front	< 25 mm	Yes	
Edge 1	3 mm	Yes	
Edge 2	46.5 mm	No	SAR is not required because the distance from the antenna to this edge is > 2.5 cm as per KDB 941225 D06 Hot Spot SAR v01
Edge 3	94.7 mm	No	SAR is not required because the distance from the antenna to this edge is > 2.5 cm as per KDB 941225 D06 Hot Spot SAR v01
Edge 4	5.5 mm	Yes	

9. RF Output Power Measurement

9.1. Target Power with Tune-up Tolerance

Mode	Target Power (dBm)			
	GSM850	GSM1900	W-CDMA Band V	W-CDMA Band II
Voice	33.0	30.5	23.0	23.0
GPRS 1 Slot	33.0	30.5	-	-
GPRS 2 Slot	30.5	28.0	-	-
GPRS 3 Slot	28.5	26.5	-	-
GPRS 4 Slot	27.5	25.0	-	-
SUBTEST 1, 2	-	-	23.0	23.0
SUBTEST 3, 4	-	-	23.0	23.0

Tune-up Tolerance: -1.5 dBm / +0.5 dBm

9.2. GSM850

GMSK (Voice) Mode

Target Power: 33.0 dBm

Tune-up Tolerance: -1.5 dBm / +0.5 dBm

Band	Ch No.	Freq. (MHz)	Avg burst Pwr (dBm)
850	128	824.2	33.1
	190	836.6	33.1
	251	848.8	33.0

GMSK (GPRS) Mode - Coding Scheme: CS1

Target Power: 33.0 dBm for 1 slot

30.5 dBm for 2 slots

28.5 dBm for 3 slots

27.5 dBm for 4 slots

Tune-up Tolerance: -1.5 dBm / +0.5 dBm

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	33.1	24.1	30.6	24.5	28.6	24.3	27.5	24.5
	190	836.6	33.1	24.1	30.6	24.6	28.6	24.4	27.6	24.6
	251	848.8	33.0	24.0	30.5	24.5	28.5	24.3	27.5	24.5

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

This mode is Rx only

9.3. GSM1900

GMSK (Voice) Mode

Target Power: 30.5 dBm

Tune-up Tolerance: -1.5 dBm / +0.5 dBm

Ch No.	Freq. (MHz)	Avg burst Pwr (dBm)
512	1850.2	30.6
661	1880	30.5
810	1909.8	30.4

GMSK (GPRS) Mode - Coding Scheme: CS1

Target Power: 30.5 dBm for 1 slot

28.0 dBm for 2 slots

26.5 dBm for 3 slots

25.0 dBm for 4 slots

Tune-up Tolerance: -1.5 dBm / +0.5 dBm

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	30.6	21.6	28.1	22.0	26.5	22.2	25.1	22.1
	661	1880	30.5	21.5	28.0	22.0	26.4	22.1	25.0	22.0
	810	1909.8	30.4	21.3	27.8	21.8	26.3	22.0	24.9	21.8

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 3 time slots, based on the output power measurements above

8PSK (EGPRS) Mode - Coding Scheme: MCS5

N/A: This mode is Rx only

9.4. W-CDMA (UMTS) Band V

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
	β_c/β_d	8/15

Target Power: 23.0 dBm

Tune-up Tolerance: -1.5 dBm / +0.5 dBm

Band	Ch No.	Freq. (MHz)	Measured Avg. Power (dBm)
850 (Band V)	4132	826.4	23.1
	4183	836.6	23.1
	4233	846.6	23.1

HSDPA

The following 4 Sub-tests were completed according to Release 5 procedures in section 5.2 of 3GPP TS34.121. A summary of these settings are illustrated below:

Mode	HSDPA	HSDPA	HSDPA	HSDPA
Subtest	1	2	3	4
WCDMA General Settings	Loopback Mode			
	Test Mode 1			
	Rel99 RMC			
	12.2kbps RMC			
	HSDPA FRC			
	H-Set1			
	Power Control Algorithm			
	Algorithm 2			
	β_c	2/15	12/15	15/15
β_d	15/15	15/15	8/15	4/15
Bd (SF)				
64				
β_c/β_d	2/15	12/15	15/8	15/4
β_{hs}	4/15	24/15	30/15	30/15
CM (dB)	0	1	1.5	1.5
HSDPA Specific Settings	D_{ACK}			
	8			
	D_{NAK}			
	8			
	DCQI			
	8			
	Ack-Nack repetition factor			
3				
CQI Feedback (Table 5.2B.4)				
4ms				
CQI Repetition Factor (Table 5.2B.4)				
2				
$A_{hs} = \beta_{hs}/\beta_c$				
30/15				

Target Power: 23.0 dBm for Subset 1
 23.0 dBm for Subset 2
 23.0 dBm for Subset 3
 23.0 dBm for Subset 4

Tune-up Tolerance: -1.5 dBm / +0.5 dBm

Band	Subtest	Ch No.	Freq. (MHz)	Target MPR	Meas. MPR	Measured Avg. Power (dBm)
850 (Band V)	1	4132	826.4	0	0	23.0
		4183	836.6	0	0	23.0
		4233	846.6	0	0	22.9
	2	4132	826.4	0	0	22.9
		4183	836.6	0	0	22.9
		4233	846.6	0	0	22.8
	3	4132	826.4	0	0	22.9
		4183	836.6	0	0	22.9
		4233	846.6	0	0	22.8
	4	4132	826.4	0	0	22.9
		4183	836.6	0	0	22.9
		4233	846.6	0	0	22.8

9.5. W-CDMA (UMTS) Band II

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
	β_c/β_d	8/15

Target Power: 23.0 dBm

Tune-up Tolerance: -1.5 dBm / +0.5 dBm

Band	Ch No.	Freq. (MHz)	Measured Avg. Power (dBm)
1900 (Band II)	9262	1852.4	23.3
	9400	1880.0	23.2
	9538	1907.6	23.2

HSDPA

The following 4 Sub-tests were completed according to Release 5 procedures in section 5.2 of 3GPP TS34.121. A summary of these settings are illustrated below:

Mode	HSDPA	HSDPA	HSDPA	HSDPA
Subtest	1	2	3	4
WCDMA General Settings	Loopback Mode			
	Test Mode 1			
	Rel99 RMC			
	12.2kbps RMC			
	HSDPA FRC			
	H-Set1			
	Power Control Algorithm			
	Algorithm 2			
	β_c	2/15	12/15	15/15
β_d	15/15	15/15	8/15	4/15
Bd (SF)				
64				
β_c/β_d	2/15	12/15	15/8	15/4
β_{hs}	4/15	24/15	30/15	30/15
CM (dB)	0	1	1.5	1.5
HSDPA Specific Settings	D_{ACK}			
	8			
	D_{NAK}			
	8			
	DCQI			
	8			
	Ack-Nack repetition factor			
3				
CQI Feedback (Table 5.2B.4)				
4ms				
CQI Repetition Factor (Table 5.2B.4)				
2				
$A_{hs} = \beta_{hs}/\beta_c$				
30/15				

Target Power: 23.0 dBm for Subset 1
 23.0 dBm for Subset 2
 23.0 dBm for Subset 3
 23.0 dBm for Subset 4

Tune-up Tolerance: -1.5 dBm / +0.5 dBm

Band	Subtest	Ch No.	Freq. (MHz)	Target MPR	Meas. MPR	Measured Avg. Power (dBm)
1900 (Band II)	1	9262	1852.4	0	0	23.0
		9400	1880.0	0	0	22.9
		9538	1907.6	0	0	22.9
	2	9262	1852.4	0	0	22.9
		9400	1880.0	0	0	22.8
		9538	1907.6	0	0	22.8
	3	9262	1852.4	0	0	22.9
		9400	1880.0	0	0	22.8
		9538	1907.6	0	0	22.8
	4	9262	1852.4	0	0	23.0
		9400	1880.0	0	0	22.9
		9538	1907.6	0	0	22.9

9.6. Wi-Fi (802.11bg)

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.

Target Power: 15 dBm (802.11b Mode), 13 dBm (802.11g Mode) 11 dBm (802.11n Mode)

Tune-up Tolerance: -1.5 dBm / +0.5 dBm

Output power table

Band (GHz)	Mode	Data Rate (Mbps)	Ch #	Freq. (MHz)	Measured Avg Pwr(dBm)
2.4	802.11b	1	1	2412	14.6
			6	2437	14.7
			11	2462	14.7
	802.11g	6	1	2412	13.5
			6	2437	13.2
			11	2462	13.1
	802.11n	MCS0	1	2412	11.2
			6	2437	11.2
			11	2462	11.2

Output power for the different modulations and data rate configurations

Band (GHz)	Mode	Ch #	Freq. (MHz)	Data rate (Mbps)	Measured Avg Pwr(dBm)
2.4	802.11b	6	2462	1	14.7
				2	14.5
				5.5	13.9
				11	13.9
	802.11g	6	2462	6	13.2
				9	13.2
				12	13.1
				18	13.0
				24	12.7
				36	12.3
				48	12.0
				54	11.9

Note(s):

- 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 802.11b channels. As per KDB 248227.

9.7. Bluetooth

Version 3.0, Power class: 1 (100 mW/20 dBm)

Mode	Channel #	Freq. (MHz)	Measured Avg Pwr(dBm)
V2.1 + EDR, GFSK	0	2402	10.90
	39	2441	10.50
	78	2480	9.50
V2.1 + EDR, 8-PSK	0	2402	9.30
	39	2441	9.00
	78	2480	7.80

Note(s):

According to KDB 648474, Table 2, Unlicensed transmitters

When there is simultaneous transmission, Stand-alone SAR not required due to

- Output $\leq 2 \cdot P_{Ref}$ (13.8dBm / 24 mW) and antenna is ≥ 5.0 cm from other antennas
- Output $\leq P_{Ref}$ (10.79dBm / 12 mW) and antenna is ≥ 2.5 cm from other antennas
- Output $\leq P_{Ref}$ (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

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

MSL/HSL750 (Body and Head liquids for 700 – 800 MHz)

Item	Head Tissue Simulation Liquids HSL750 Muscle (body) Tissue Simulation Liquids MSL750
Type No	SL AAH 075
Manufacturer	SPEAG
The item is composed of the following ingredients:	
H ² O	Water, 35 – 58%
Sucrose	Sugar, white, refined, 40-60%
NaCl	Sodium Chloride, 0-6%
Hydroxyethyl-cellulose	Medium Viscosity (CAS# 9004-62-0), <0.3%
Preventol-D7	Preservative: aqueous preparation, (CAS# 55965-84-9), containing 5-chloro-2-methyl-3(2H)-isothiazolone and 2-methyl-3(2H)-isothiazolone, 0.1-0.7%

Simulating Liquids for 5 GHz, Manufactured by SPEAG

Ingredients	(% by weight)
Water	78
Mineral oil	11
Emulsifiers	9
Additives and Salt	2

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.

Tissue Dielectric Parameter Check Results

Date	Freq. (MHz)		Liquid Parameters	Measured	Target	Delta (%)	Limit \pm (%)	
6/10/2012	Head 1900	e'	41.4159	Relative Permittivity (ϵ_r):	41.42	40.00	3.54	5
		e"	13.6335	Conductivity (σ):	1.44	1.40	2.88	5
	Head 1850	e'	41.6397	Relative Permittivity (ϵ_r):	41.64	40.00	4.10	5
		e"	13.5131	Conductivity (σ):	1.39	1.40	-0.71	5
	Head 1880	e'	41.5074	Relative Permittivity (ϵ_r):	41.51	40.00	3.77	5
		e"	13.5858	Conductivity (σ):	1.42	1.40	1.44	5
Head 1910	e'	41.3732	Relative Permittivity (ϵ_r):	41.37	40.00	3.43	5	
	e"	13.6550	Conductivity (σ):	1.45	1.40	3.58	5	
6/10/2012	Head 835	e'	41.8662	Relative Permittivity (ϵ_r):	41.87	41.50	0.88	5
		e"	19.4636	Conductivity (σ):	0.90	0.90	0.41	5
	Head 820	e'	42.0679	Relative Permittivity (ϵ_r):	42.07	41.60	1.12	5
		e"	19.4933	Conductivity (σ):	0.89	0.90	-1.08	5
	Head 850	e'	41.6595	Relative Permittivity (ϵ_r):	41.66	41.50	0.38	5
		e"	19.4450	Conductivity (σ):	0.92	0.92	0.44	5
6/12/2012	Body 1900	e'	53.0498	Relative Permittivity (ϵ_r):	53.05	53.30	-0.47	5
		e"	14.2925	Conductivity (σ):	1.51	1.52	-0.66	5
	Body 1850	e'	53.2242	Relative Permittivity (ϵ_r):	53.22	53.30	-0.14	5
		e"	14.1487	Conductivity (σ):	1.46	1.52	-4.25	5
	Body 1880	e'	53.1236	Relative Permittivity (ϵ_r):	53.12	53.30	-0.33	5
		e"	14.2423	Conductivity (σ):	1.49	1.52	-2.05	5
Body 1910	e'	53.0074	Relative Permittivity (ϵ_r):	53.01	53.30	-0.55	5	
	e"	14.3161	Conductivity (σ):	1.52	1.52	0.03	5	
6/13/2012	Body 835	e'	54.6850	Relative Permittivity (ϵ_r):	54.69	55.20	-0.93	5
		e"	21.4942	Conductivity (σ):	1.00	0.97	2.88	5
	Body 820	e'	54.8278	Relative Permittivity (ϵ_r):	54.83	55.28	-0.81	5
		e"	21.5673	Conductivity (σ):	0.98	0.97	1.54	5
	Body 830	e'	54.7359	Relative Permittivity (ϵ_r):	54.74	55.24	-0.91	5
		e"	21.5165	Conductivity (σ):	0.99	0.97	2.45	5
Body 850	e'	54.5505	Relative Permittivity (ϵ_r):	54.55	55.16	-1.10	5	
	e"	21.4320	Conductivity (σ):	1.01	0.99	2.61	5	
6/14/2012	Head 2450	e'	39.8088	Relative Permittivity (ϵ_r):	39.81	39.20	1.55	5
		e"	13.3065	Conductivity (σ):	1.81	1.80	0.71	5
	Head 2410	e'	39.9567	Relative Permittivity (ϵ_r):	39.96	39.28	1.73	5
		e"	13.1672	Conductivity (σ):	1.76	1.76	0.23	5
	Head 2435	e'	39.8587	Relative Permittivity (ϵ_r):	39.86	39.24	1.59	5
		e"	13.2542	Conductivity (σ):	1.79	1.78	0.68	5
Head 2475	e'	39.7423	Relative Permittivity (ϵ_r):	39.74	39.17	1.47	5	
	e"	13.3846	Conductivity (σ):	1.84	1.83	0.82	5	

Tissue Dielectric Parameter Check Results (continued)

Date	Freq. (MHz)	Liquid Parameters		Measured	Target	Delta (%)	Limit ±(%)	
6/14/2012	Body 2450	e'	51.9647	Relative Permittivity (ϵ_r):	51.96	52.70	-1.40	5
		e"	14.4458	Conductivity (σ):	1.97	1.95	0.92	5
	Body 2410	e'	52.0998	Relative Permittivity (ϵ_r):	52.10	52.76	-1.25	5
		e"	14.2726	Conductivity (σ):	1.91	1.91	0.27	5
	Body 2435	e'	52.0112	Relative Permittivity (ϵ_r):	52.01	52.73	-1.36	5
		e"	14.3810	Conductivity (σ):	1.95	1.93	0.83	5
Body 2475	e'	51.8995	Relative Permittivity (ϵ_r):	51.90	52.67	-1.46	5	
	e"	14.5497	Conductivity (σ):	2.00	1.99	0.86	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 $\pm 10\%$.

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	748	2/7/12	2450	1g	53.6	50.8
				10g	24.8	23.6

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.		1g	10g			
6/10/2012	D1900V2	5d140	Head	1g	41.7	39.1	6.65	±10
				10g	21.8	20.6	5.83	
6/10/2012	D835V2	4d002	Head	1g	8.89	9.24	-3.79	±10
				10g	6.45	6.04	6.79	
6/12/2012	D1900V2	5d140	Body	1g	43.1	40.0	7.75	±10
				10g	22.7	21.3	6.57	
6/13/2012	D835V2	4d002	Body	1g	10.10	9.64	4.77	±10
				10g	6.64	6.32	5.06	
6/14/2012	D2450V2	748	Head	1g	53.1	53.6	-0.93	±10
				10g	24.6	24.8	-0.81	
6/14/2012	D2450V2	748	Body	1g	51.5	50.8	1.38	±10
				10g	24.1	23.6	2.12	

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	33.1			
		190	836.60	33.1	0.187	0.140	1
		251	848.80	33.0			
Left Tilt (15°)	GMSK (Voice)	128	824.20	33.1			
		190	836.60	33.1	0.127	0.096	1
		251	848.80	33.0			
Right Touch	GMSK (Voice)	128	824.20	33.1			
		190	836.60	33.1	0.192	0.143	1
		251	848.80	33.0			
Right Tilt (15°)	GMSK (Voice)	128	824.20	33.1			
		190	836.60	33.1	0.130	0.098	1
		251	848.80	33.0			

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 2 slots	10	128	824.20	30.6			1
			190	836.60	30.6	0.539	0.385	
			190	836.60	30.6	0.362	0.250	2
			251	848.80	30.5			1
Front	GPRS 2 slots	10	128	824.20	30.6			1
			190	836.60	30.6	0.202	0.150	
			251	848.80	30.5			1
Edge 1	GPRS 2 slots	10	128	824.20	30.6			3
			190	836.60	30.6			3
			251	848.80	30.5			3
Edge 2	GPRS 2 slots	10	128	824.20	30.6			3
			190	836.60	30.6			3
			251	848.80	30.5			3
Edge 3	GPRS 2 slots	10	128	824.20	30.6			3
			190	836.60	30.6			3
			251	848.80	30.5			3
Edge 4	GPRS 2 slots	10	128	824.20	30.6			3
			190	836.60	30.6			3
			251	848.80	30.5			3

Note(s):

- 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.
- With headset attached.
- SAR is not required because Hotspot Mode is not supported with GPRS.

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	30.6			
		661	1880.0	30.5	0.409	0.257	1
		810	1909.8	30.4			
Left Tilt (15°)	GMSK (Voice)	512	1850.2	30.6			
		661	1880.0	30.5	0.214	0.133	1
		810	1909.8	30.4			
Right Touch	GMSK (Voice)	512	1850.2	30.6			
		661	1880.0	30.5	0.433	0.278	1
		810	1909.8	30.4			
Right Tilt (15°)	GMSK (Voice)	512	1850.2	30.6			
		661	1880.0	30.5	0.201	0.119	1
		810	1909.8	30.4			

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 3 slots	10	512	1850.2	26.5			1
			661	1880.0	26.4	0.562	0.343	
			661	1880.0	26.4	0.439	0.271	2
			810	1909.8	26.3			1
Front	GPRS 3 slots	10	512	1850.2	26.5			1
			661	1880.0	26.4	0.447	0.280	
			810	1909.8	26.3			1
Edge 1	GPRS 3 slots	10	512	1850.2	26.5			3
			661	1880.0	26.4			3
			810	1909.8	26.3			3
Edge 2	GPRS 3 slots	10	512	1850.2	26.5			3
			661	1880.0	26.4			3
			810	1909.8	26.3			3
Edge 3	GPRS 3 slots	10	512	1850.2	26.5			3
			661	1880.0	26.4			3
			810	1909.8	26.3			3
Edge 4	GPRS 3 slots	10	512	1850.2	26.5			3
			661	1880.0	26.4			3
			810	1909.8	26.3			3

Note(s):

- 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.
- With headset attached.
- SAR is not required because Hotspot Mode is not supported with GPRS.

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	23.1			
		4183	836.6	23.1	0.261	0.194	1
		4233	846.6	23.1			
Left Tilt (15°)	Rel 99 RMC 12.2kbps	4132	826.4	23.1			
		4183	836.6	23.1	0.168	0.127	1
		4233	846.6	23.1			
Right Touch	Rel 99 RMC 12.2kbps	4132	826.4	23.1			
		4183	836.6	23.1	0.270	0.201	1
		4233	846.6	23.1			
Right Tilt (15°)	Rel 99 RMC 12.2kbps	4132	826.4	23.1			
		4183	836.6	23.1	0.181	0.137	1
		4233	846.6	23.1			

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	10	4132	826.4	23.1			1
			4183	836.6	23.1	0.601	0.428	
			4183	836.6	23.1	0.432	0.297	2
			4233	846.6	23.1			1
Front	Rel 99 RMC 12.2kbps	10	4132	826.4	23.1			1
			4183	836.6	23.1	0.255	0.190	
			4233	846.6	23.1			1
Edge 1	Rel 99 RMC 12.2kbps	10	4132	826.4	23.1			3
			4183	836.6	23.1			3
			4233	846.6	23.1			3
Edge 2	Rel 99 RMC 12.2kbps	10	4132	826.4	23.1			1
			4183	836.6	23.1	0.237	0.165	
			4233	846.6	23.1			1
Edge 3	Rel 99 RMC 12.2kbps	10	4132	826.4	23.1			1
			4183	836.6	23.1	0.040	0.025	
			4233	846.6	23.1			1
Edge 4	Rel 99 RMC 12.2kbps	10	4132	826.4	23.1			1
			4183	836.6	23.1	0.266	0.184	
			4233	846.6	23.1			1

Note(s):

- 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.
- With headset attached.
- 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	23.3			
		9400	1880.0	23.2	0.558	0.354	1
		9538	1907.6	23.2			
Left Tilt (15°)	Rel 99 RMC 12.2kbps	9262	1852.4	23.3			
		9400	1880.0	23.2	0.290	0.181	1
		9538	1907.6	23.2			
Right Touch	Rel 99 RMC 12.2kbps	9262	1852.4	23.3			
		9400	1880.0	23.2	0.559	0.360	1
		9538	1907.6	23.2			
Right Tilt (15°)	Rel 99 RMC 12.2kbps	9262	1852.4	23.3			
		9400	1880.0	23.2	0.269	0.159	1
		9538	1907.6	23.2			

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	10	9262	1852.4	23.3			1
			9400	1880.0	23.2	0.707	0.429	
			9400	1880.0	23.2	0.606	0.372	2
			9538	1907.6	23.2			1
Front	Rel 99 RMC 12.2kbps	10	9262	1852.4	23.3			1
			9400	1880.0	23.2	0.543	0.340	
			9538	1907.6	23.2			1
Edge 1	Rel 99 RMC 12.2kbps	10	9262	1852.4	23.3			3
			9400	1880.0	23.2			3
			9538	1907.6	23.2			3
Edge 2	Rel 99 RMC 12.2kbps	10	9262	1852.4	23.3			1
			9400	1880.0	23.2	0.132	0.081	
			9538	1907.6	23.2			1
Edge 3	Rel 99 RMC 12.2kbps	10	9262	1852.4	23.3			1
			9400	1880.0	23.2	0.403	0.236	
			9538	1907.6	23.2			1
Edge 4	Rel 99 RMC 12.2kbps	10	9262	1852.4	23.3			1
			9400	1880.0	23.2	0.311	0.182	
			9538	1907.6	23.2			1

Note(s):

- 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.
- With headset attached.
- SAR is not required because the distance from the tested antenna to this edge is greater than 2.5 cm.

12.5. Wi-Fi (2.4 GHz Band)

12.5.1. Head SAR

Test Position	Mode	Ch #.	Freq. (MHz)	Avg Pwr (dBm)	SAR (mW/g)		Note
					1-g	10-g	
Left Touch	802.11b	1	2412	14.6			1
		6	2437	14.7			1
		11	2462	14.7	0.132	0.073	
Left Tilt (15°)	802.11b	1	2412	14.6			1
		6	2437	14.7			1
		11	2462	14.7	0.096	0.053	
Right Touch	802.11b	1	2412	14.6			1
		6	2437	14.7			1
		11	2462	14.7	0.247	0.122	
Right Tilt (15°)	802.11b	1	2412	14.6			1
		6	2437	14.7			1
		11	2462	14.7	0.107	0.056	

12.5.2. Body & Hotspot SAR

Test Position	Mode	Dist. (mm)	Ch #.	Freq. (MHz)	Avg Pwr (dBm)	SAR (mW/g)		Note
						1-g	10-g	
Rear	802.11b	10	1	2412	14.6			1
			6	2437	14.7			1
			11	2462	14.7	0.072	0.038	
			11	2462	14.7	0.057	0.033	2
Front	802.11b	10	1	2412	14.6			1
			6	2437	14.7			1
			11	2462	14.7	0.039	0.024	
Edge 1	802.11b	10	1	2412	14.6			1
			6	2437	14.7			1
			11	2462	14.7	0.067	0.035	
Edge 2	802.11b	10	1	2412	14.6			3
			6	2437	14.7			3
			11	2462	14.7			3
Edge 3	802.11b	10	1	2412	14.6			3
			6	2437	14.7			3
			11	2462	14.7			3
Edge 4	802.11b	10	1	2412	14.6			1
			6	2437	14.7			1
			11	2462	14.7	0.065	0.033	

Note(s):

- For frequency bands with an operating range of < 100 MHz, when the SAR measured for the highest output power channel within is ≤ 0.8 W/kg, SAR for the remaining channels is not required. Per KDB 447498 1) e) i)
- With headset attached.
- SAR is not required because the distance from the tested antenna to this edge is greater than 2.5 cm.

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	Right Touch	GMSK (Voice)	0.192
	Body & Hotspot	Rear	GMSK (GPRS 2 slots)	0.539
GSM1900	Head	Right Touch	GMSK (Voice)	0.433
	Body & Hotspot	Rear	GMSK (GPRS 2 slots)	0.562
WCDMA Band V	Head	Right Touch	Rel.99 (RMC, 12.2 kbps)	0.270
	Body & Hotspot	Rear	Rel.99 (RMC, 12.2 kbps)	0.601
WCDMA Band II	Head	Right Touch	Rel.99 (RMC, 12.2 kbps)	0.559
	Body & Hotspot	Rear	Rel.99 (RMC, 12.2 kbps)	0.707
WiFi 2.4 GHz	Head	Right Touch	802.11b 1Mbps	0.247
	Body & Hotspot	Rear	802.11b 1Mbps	0.072

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	Right Touch	GSM Voice	190	836.60	33.5	33.10	0.192	0.211
Body	Rear	GPRS 2 Slots	190	836.60	31.0	30.60	0.539	0.591
Head	Right Touch	GSM Voice	661	1880.00	31.0	30.50	0.433	0.486
Body	Rear	GPRS 3 Slots	661	1880.00	27.0	26.40	0.562	0.645
Head	Right Touch	RMC 12.2 kbps	4183	836.60	23.5	23.10	0.270	0.296
Body&Hotspot	Rear	RMC 12.2 kbps	4183	836.60	23.5	23.10	0.601	0.659
Head	Right Touch	RMC 12.2 kbps	9400	1880.00	23.5	23.20	0.559	0.599
Body&Hotspot	Rear	RMC 12.2 kbps	9400	1880.00	23.5	23.20	0.707	0.758
Head	Right Touch	802.11b	1	2412.00	15.5	14.70	0.247	0.297
Body&Hotspot	Rear	802.11b	1	2412.00	15.5	14.70	0.072	0.087

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

Test Laboratory: UL CCS SAR Lab C

Date: 6/11/2012

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; $\sigma = 0.906$ mho/m; $\epsilon_r = 41.843$; $\rho = 1000$ kg/m³
DASY5 Configuration:

- Electronics: DAE4 Sn1257; Calibrated: 10/25/2011
- 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

RHS/Touch_M ch/Area Scan (8x12x1): Measurement grid: dx=15mm, dy=15mm

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.201 mW/g

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

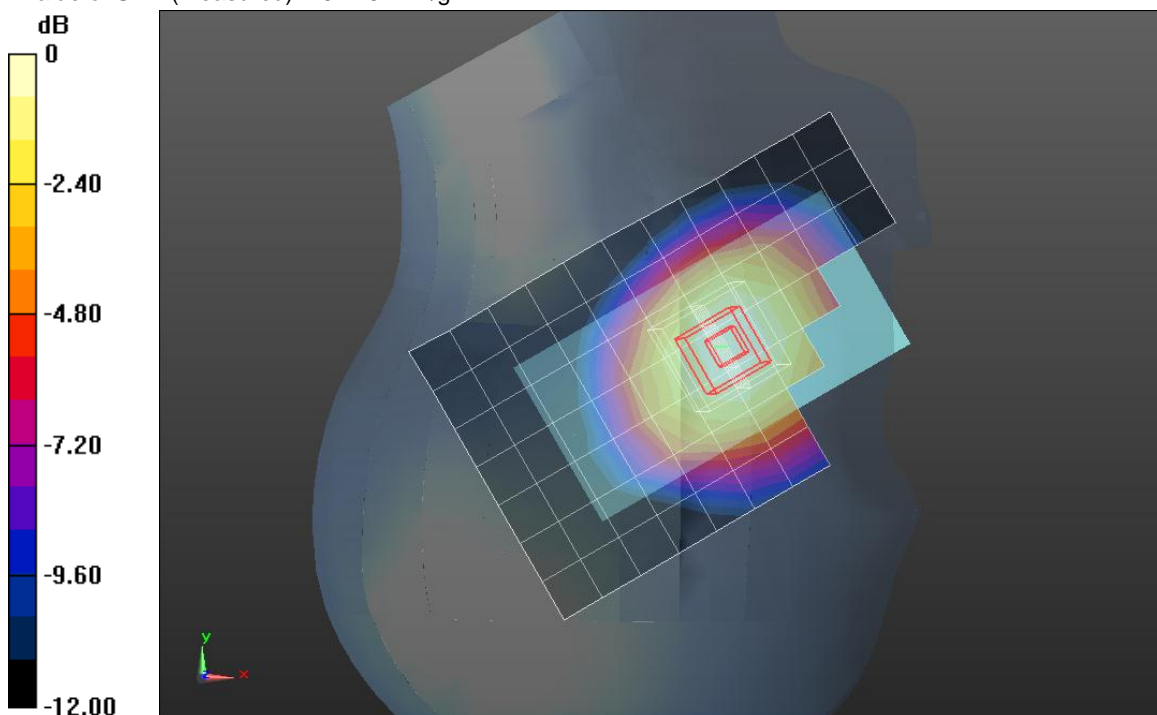
Reference Value = 15.173 V/m; Power Drift = 0.03 dB

Peak SAR (extrapolated) = 0.2350

SAR(1 g) = 0.192 mW/g; SAR(10 g) = 0.143 mW/g

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.215 mW/g



0 dB = 0.210mW/g = -13.56 dB mW/g

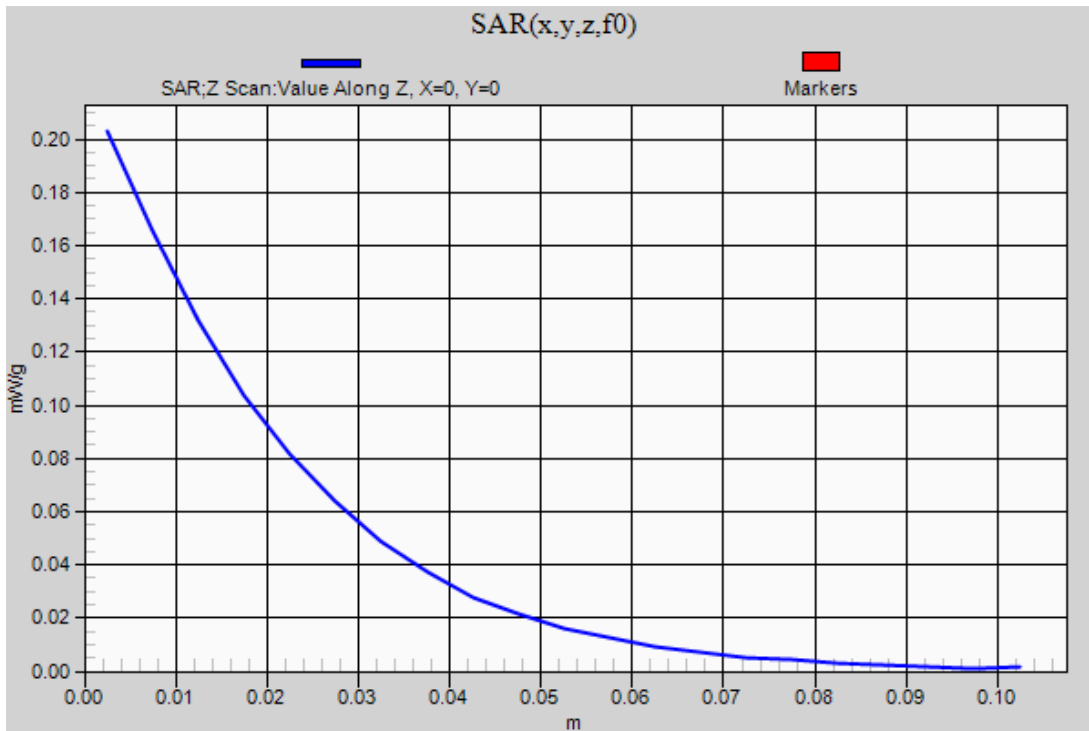
GSM850

Frequency: 836.6 MHz; Duty Cycle: 1:8.00018

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

Info: [Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.203 mW/g



Test Laboratory: UL CCS SAR Lab C

Date: 6/13/2012

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; $\sigma = 1$ mho/m; $\epsilon_r = 54.671$; $\rho = 1000$ kg/m³

DASY5 Configuration:

- Electronics: DAE4 Sn1257; Calibrated: 10/25/2011
- 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

Rear/GPRS 2 Slot_Ch 190/Area Scan (8x12x1): Measurement grid: dx=15mm, dy=15mm

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.635 mW/g

Rear/GPRS 2 Slot_Ch 190/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

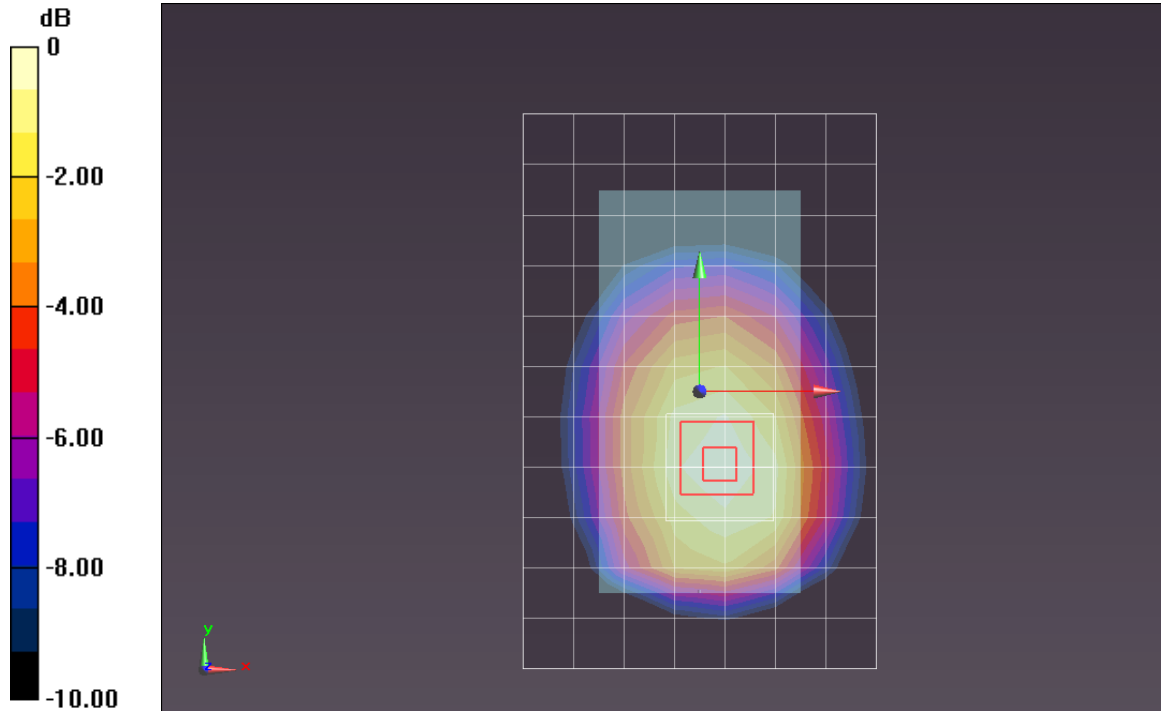
Reference Value = 25.435 V/m; Power Drift = -0.0031 dB

Peak SAR (extrapolated) = 0.7240

SAR(1 g) = 0.539 mW/g; SAR(10 g) = 0.385 mW/g

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.622 mW/g



0 dB = 0.620mW/g = -4.15 dB mW/g

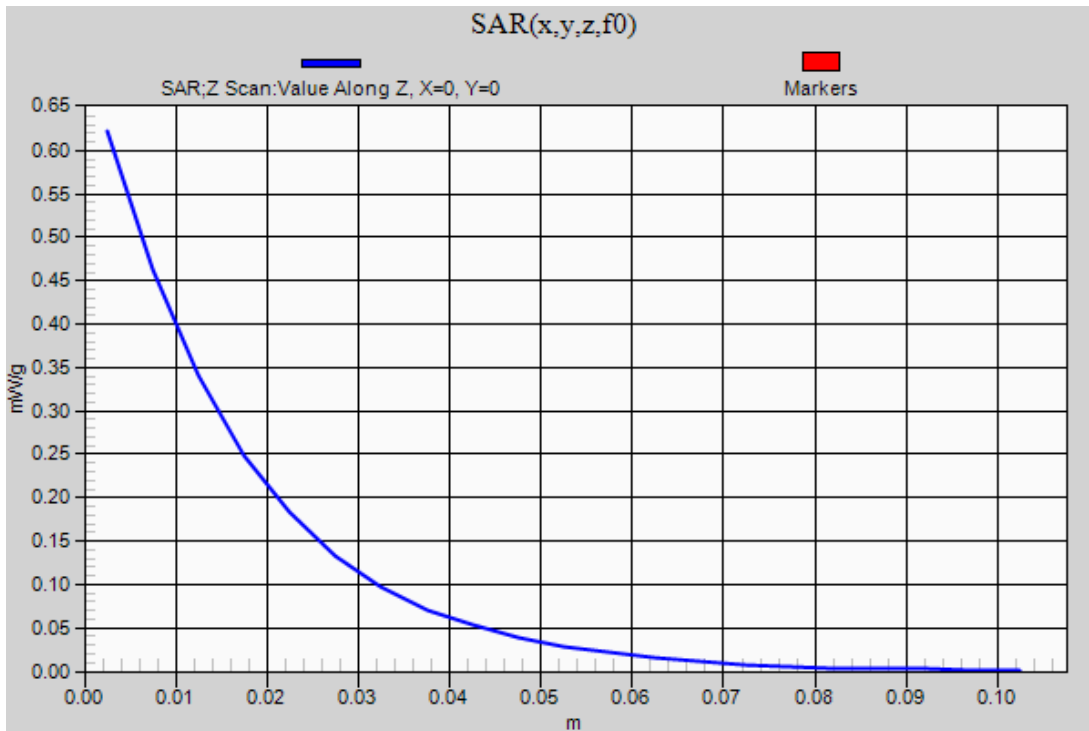
GSM850

Frequency: 836.6 MHz; Duty Cycle: 1:4.00037

Rear/GPRS 2 Slot_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) = 0.622 mW/g



Test Laboratory: UL CCS SAR Lab C

Date: 6/10/2012

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; $\sigma = 1.421$ mho/m; $\epsilon_r = 41.507$; $\rho = 1000$ kg/m³

DASY5 Configuration:

- Electronics: DAE4 Sn1257; Calibrated: 10/25/2011
- 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

RHS/Touch_M ch/Area Scan (8x12x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.481 mW/g

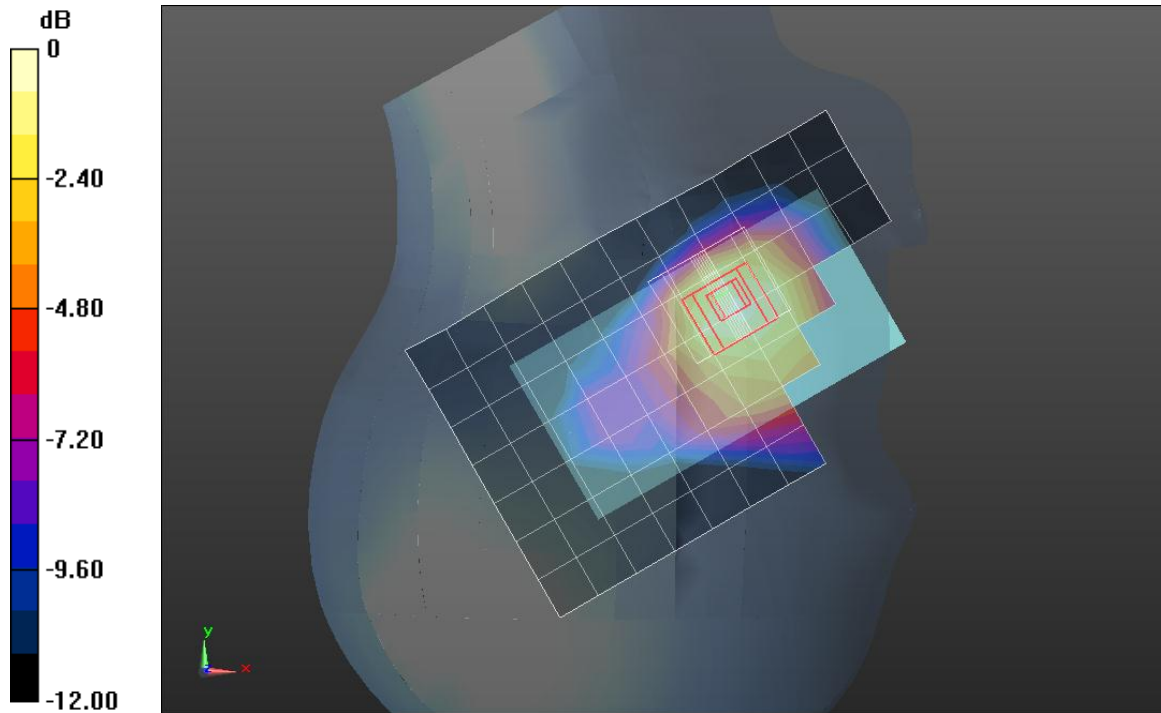
RHS/Touch_M ch/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 18.522 V/m; Power Drift = -0.02 dB

Peak SAR (extrapolated) = 0.6440

SAR(1 g) = 0.433 mW/g; SAR(10 g) = 0.278 mW/g

Maximum value of SAR (measured) = 0.522 mW/g

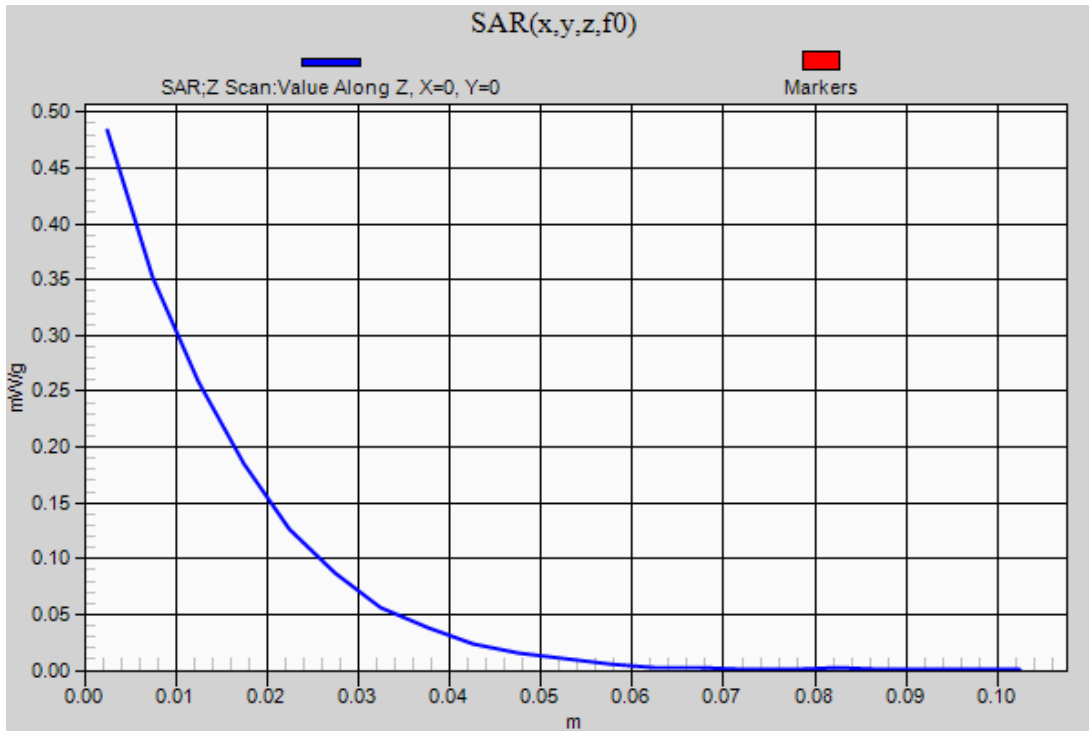


0 dB = 0.520mW/g = -5.68 dB mW/g

GSM1900

Frequency: 1880 MHz; Duty Cycle: 1:8.00018

RHS/Touch_M ch/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Maximum value of SAR (measured) = 0.484 mW/g



Test Laboratory: UL CCS SAR Lab C

Date: 6/12/2012

GSM1900

Frequency: 1880 MHz; Duty Cycle: 1:2.60016; Room Ambient Temperature: 24.0°C; Liquid Temperature: 23.0°C
Medium parameters used: $f = 1880$ MHz; $\sigma = 1.49$ mho/m; $\epsilon_r = 53.124$; $\rho = 1000$ kg/m³

DASY5 Configuration:

- Electronics: DAE4 Sn1257; Calibrated: 10/25/2011
- 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

Rear/GPRS 3 Slot_Ch 661/Area Scan (8x12x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.696 mW/g

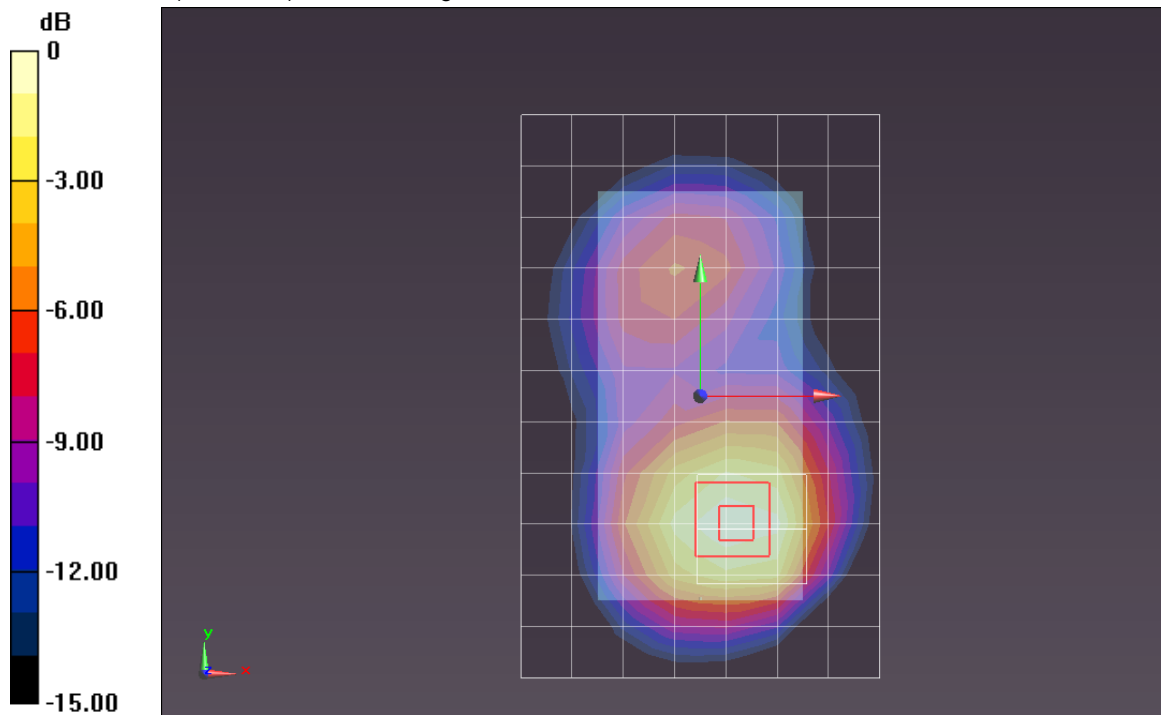
Rear/GPRS 3 Slot_Ch 661/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 21.896 V/m; Power Drift = -0.01 dB

Peak SAR (extrapolated) = 0.9120

SAR(1 g) = 0.562 mW/g; SAR(10 g) = 0.343 mW/g

Maximum value of SAR (measured) = 0.693 mW/g



0 dB = 0.690mW/g = -3.22 dB mW/g

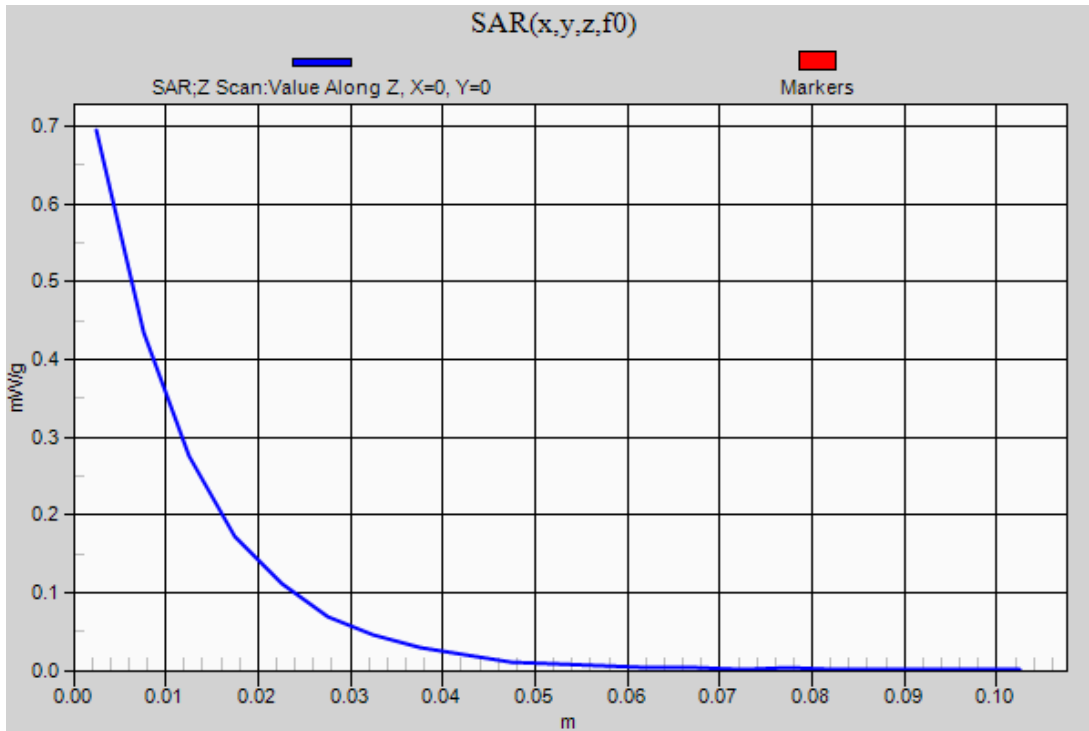
Test Laboratory: UL CCS SAR Lab C

Date: 6/12/2012

GSM1900

Frequency: 1880 MHz; Duty Cycle: 1:2.60016

Rear/GPRS 3 Slot_Ch 661/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Maximum value of SAR (measured) = 0.695 mW/g



Test Laboratory: UL CCS SAR Lab C

Date: 6/10/2012

UMTS 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; $\sigma = 0.906$ mho/m; $\epsilon_r = 41.843$; $\rho = 1000$ kg/m³

DASY5 Configuration:

- Electronics: DAE4 Sn1257; Calibrated: 10/25/2011
- 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

RHS/Touch_M ch/Area Scan (8x12x1): Measurement grid: dx=15mm, dy=15mm

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.284 mW/g

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

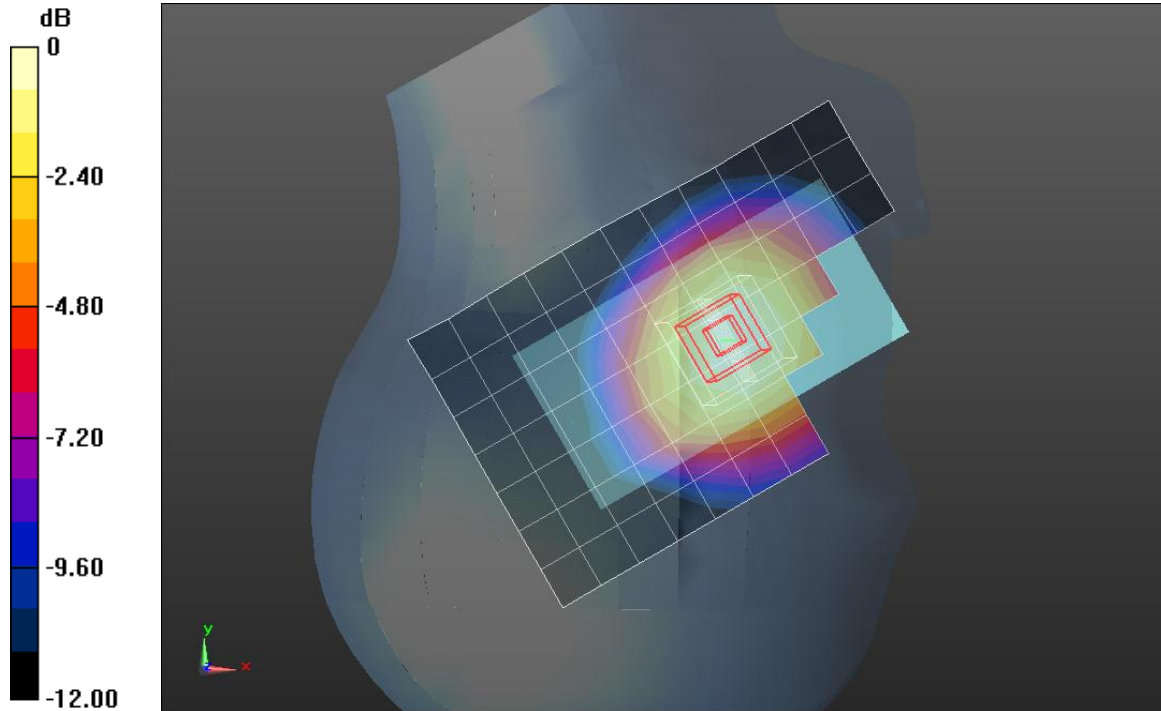
Reference Value = 18.061 V/m; Power Drift = 0.04 dB

Peak SAR (extrapolated) = 0.3310

SAR(1 g) = 0.270 mW/g; SAR(10 g) = 0.201 mW/g

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.299 mW/g



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

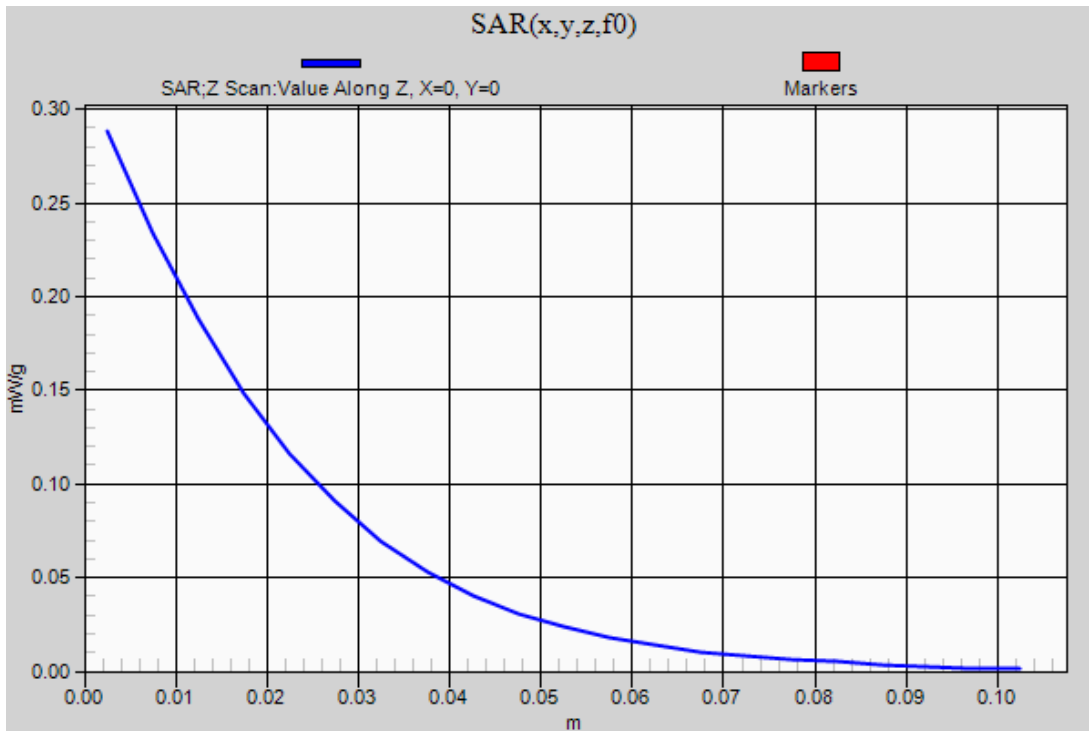
UMTS band V

Frequency: 836.6 MHz; Duty Cycle: 1:1

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

Info: [Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.288 mW/g



Test Laboratory: UL CCS SAR Lab C

Date: 6/13/2012

WCDMA 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; $\sigma = 1$ mho/m; $\epsilon_r = 54.671$; $\rho = 1000$ kg/m³

DASY5 Configuration:

- Electronics: DAE4 Sn1257; Calibrated: 10/25/2011
- 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 (B); Type: QDOVA001BB; Serial: 1121

Rear/R99_Ch 4183/Area Scan (8x12x1): Measurement grid: dx=15mm, dy=15mm

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.713 mW/g

Rear/R99_Ch 4183/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

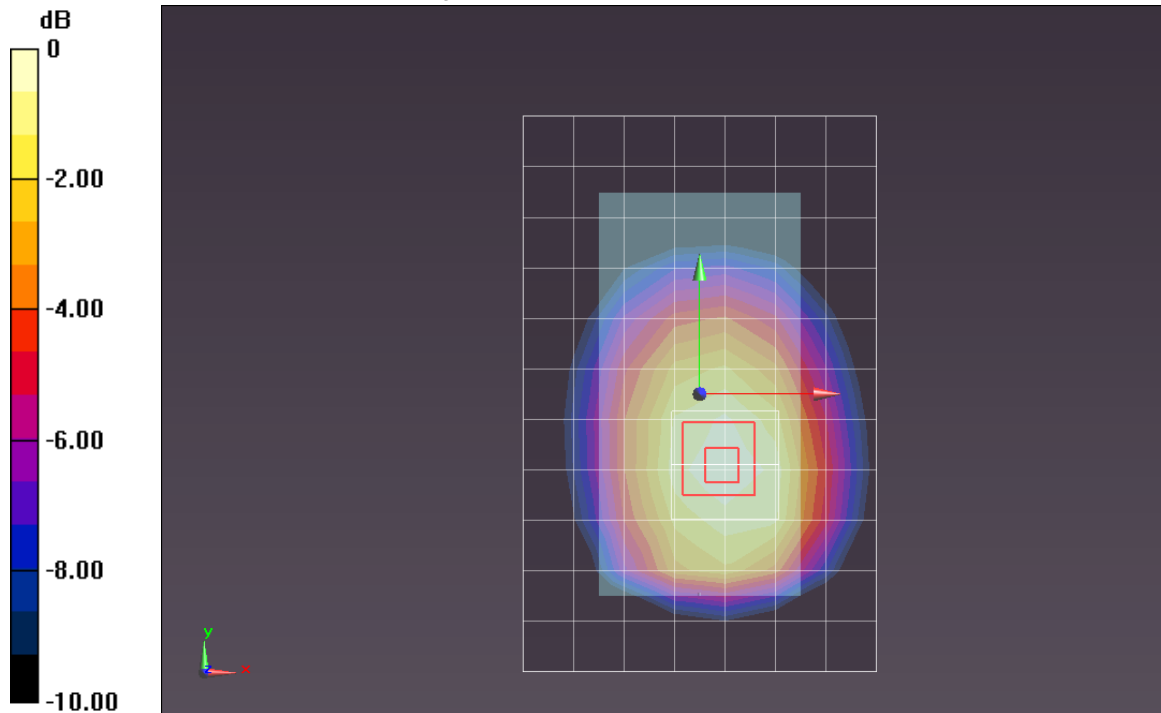
Reference Value = 26.924 V/m; Power Drift = -0.08 dB

Peak SAR (extrapolated) = 0.8180

SAR(1 g) = 0.601 mW/g; SAR(10 g) = 0.428 mW/g

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.698 mW/g



0 dB = 0.700mW/g = -3.10 dB mW/g

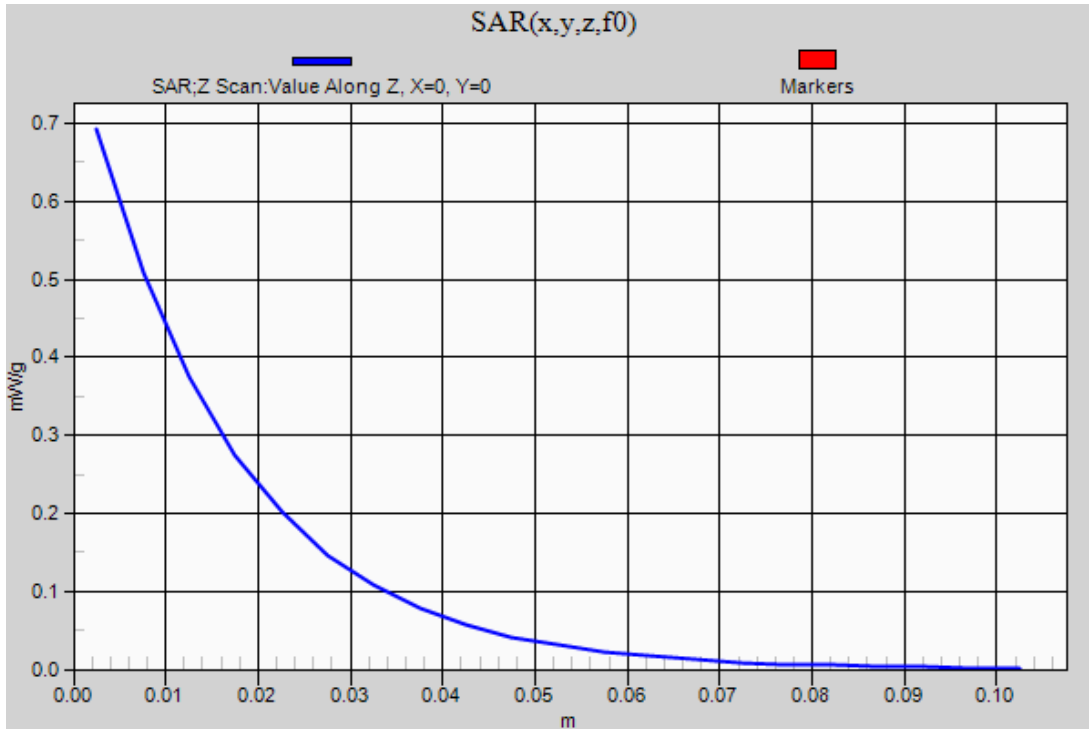
WCDMA Band V

Frequency: 836.6 MHz; Duty Cycle: 1:1

Rear/R99_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) = 0.692 mW/g



Test Laboratory: UL CCS SAR Lab C

Date: 6/10/2012

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; $\sigma = 1.421$ mho/m; $\epsilon_r = 41.507$; $\rho = 1000$ kg/m³

DASY5 Configuration:

- Electronics: DAE4 Sn1257; Calibrated: 10/25/2011
- 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

RHS/Touch_M ch/Area Scan (8x12x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.632 mW/g

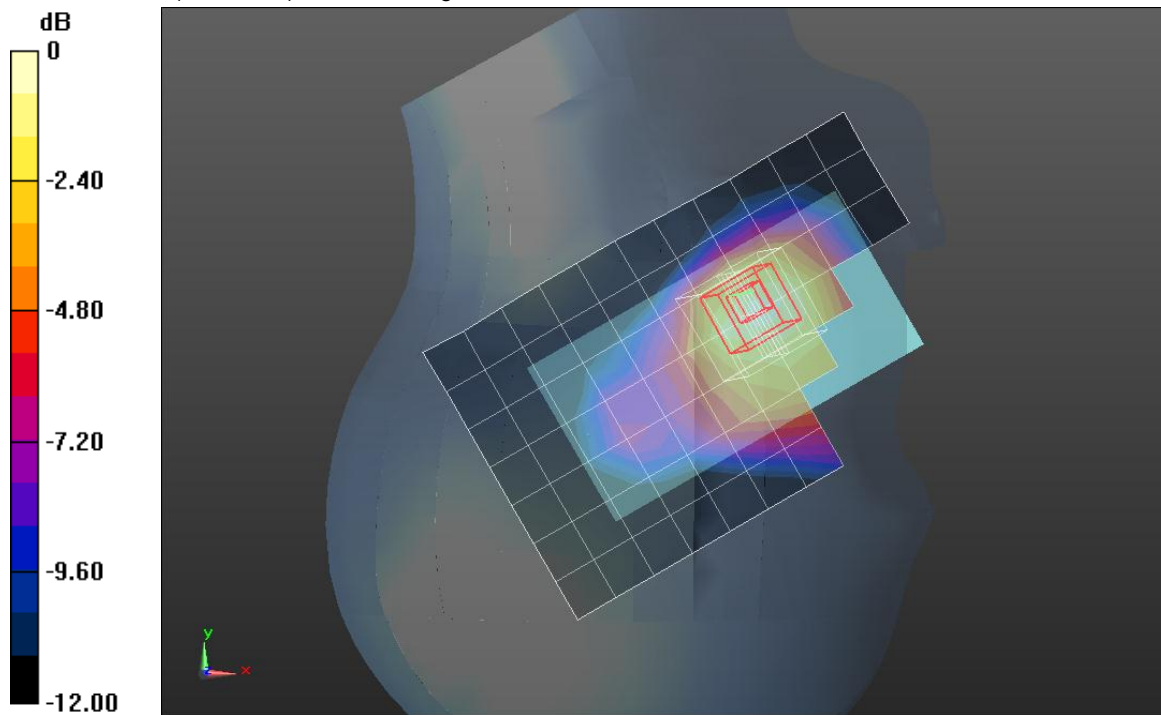
RHS/Touch_M ch/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 21.253 V/m; Power Drift = 0.002 dB

Peak SAR (extrapolated) = 0.8190

SAR(1 g) = 0.559 mW/g; SAR(10 g) = 0.360 mW/g

Maximum value of SAR (measured) = 0.662 mW/g



0 dB = 0.660mW/g = -3.61 dB mW/g

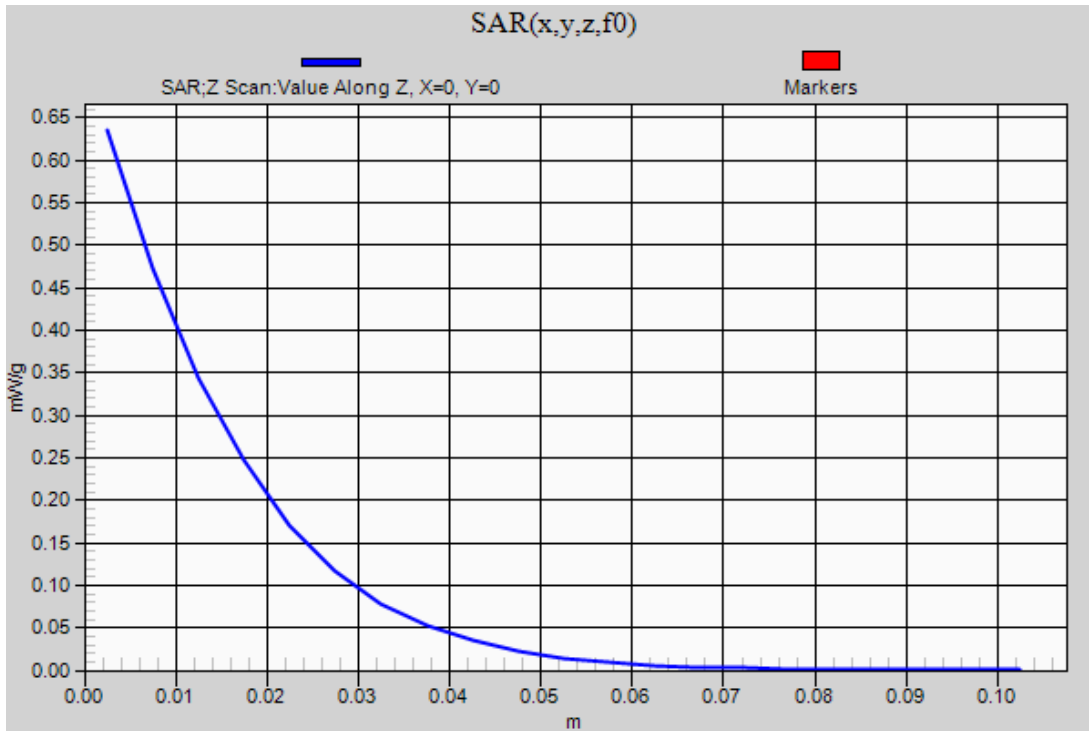
Test Laboratory: UL CCS SAR Lab C

Date: 6/10/2012

UMTS band II

Frequency: 1880 MHz; Duty Cycle: 1:1

RHS/Touch_M ch/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Maximum value of SAR (measured) = 0.635 mW/g



Test Laboratory: UL CCS SAR Lab C

Date: 6/12/2012

W-CDMA Band II

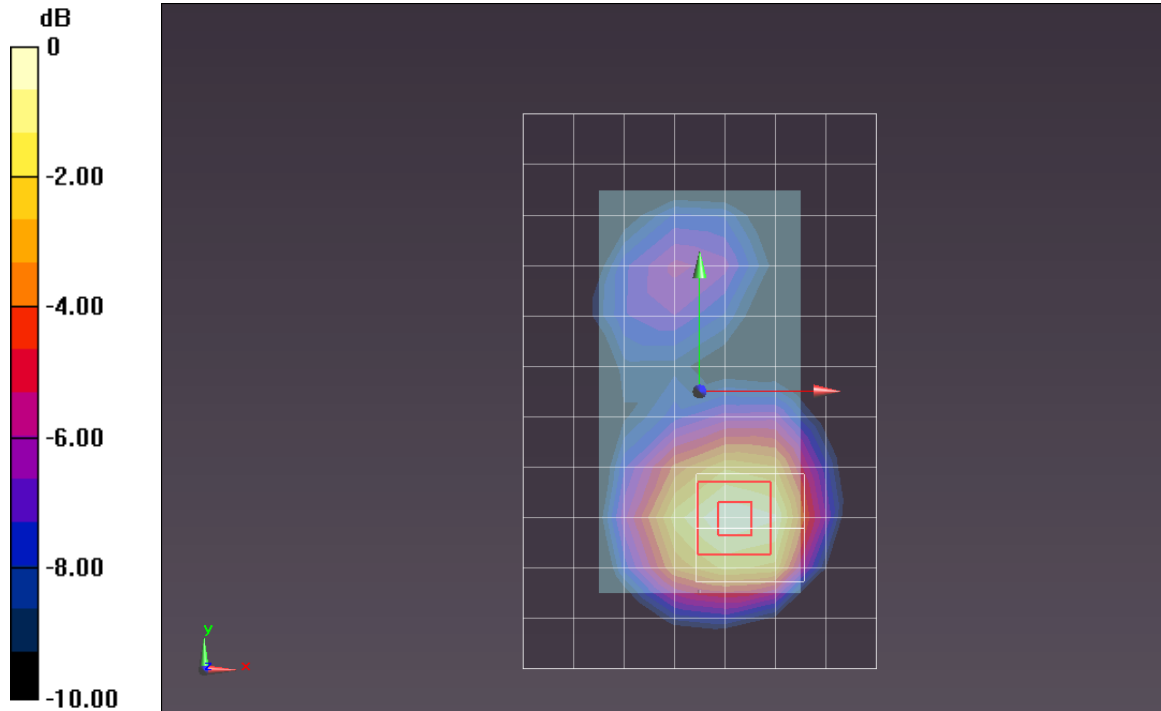
Frequency: 1880 MHz; Duty Cycle: 1:1; Room Ambient Temperature: 24.0°C; Liquid Temperature: 23.0°C
Medium parameters used: $f = 1880$ MHz; $\sigma = 1.49$ mho/m; $\epsilon_r = 53.124$; $\rho = 1000$ kg/m³

DASY5 Configuration:

- Electronics: DAE4 Sn1257; Calibrated: 10/25/2011
- Probe: EX3DV4 - SN3751; ConvF(6.83, 6.83, 6.83); 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/R99_Ch 9400/Area Scan (8x12x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.887 mW/g

Rear/R99_Ch 9400/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 24.645 V/m; Power Drift = -0.10 dB
Peak SAR (extrapolated) = 1.2220
SAR(1 g) = 0.707 mW/g; SAR(10 g) = 0.429 mW/g
Maximum value of SAR (measured) = 0.867 mW/g



0 dB = 0.870mW/g = -1.21 dB mW/g

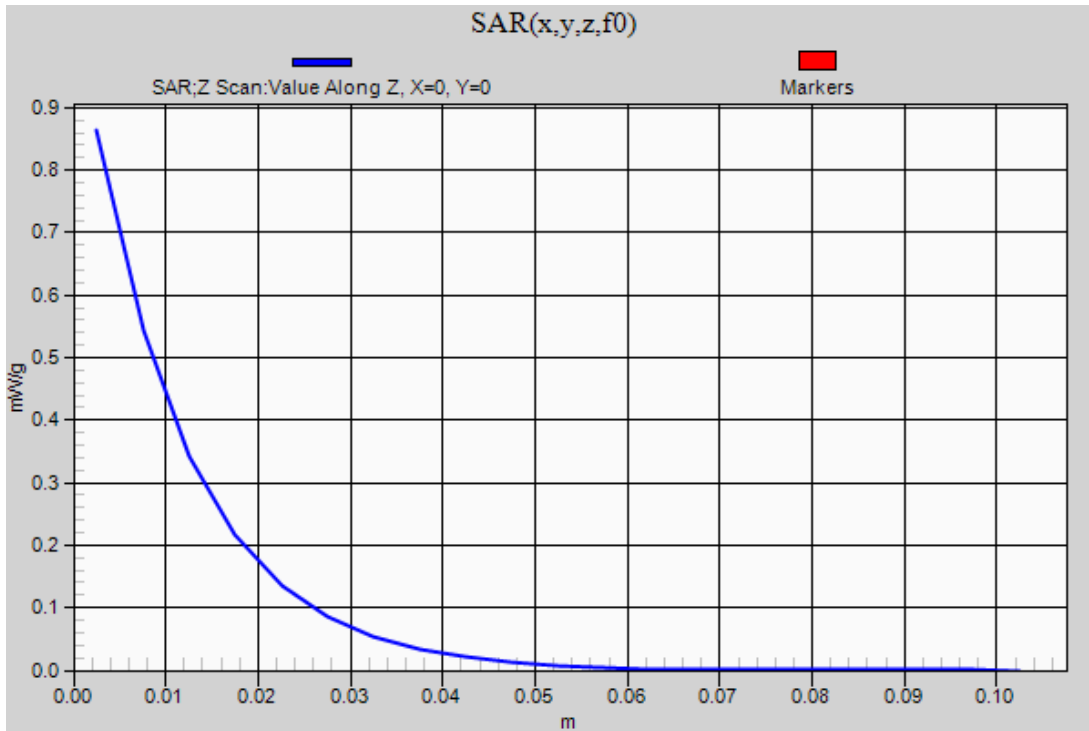
Test Laboratory: UL CCS SAR Lab C

Date: 6/12/2012

W-CDMA Band II

Frequency: 1880 MHz; Duty Cycle: 1:1

Rear/R99_Ch 9400/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Maximum value of SAR (measured) = 0.864 mW/g



Test Laboratory: UL CCS SAR Lab C

Date: 6/14/2012

WiFi 2.4 GHz

Frequency: 2462 MHz; Duty Cycle: 1:1; Room Ambient Temperature: 24.0°C; Liquid Temperature: 23.0°C
Medium parameters used (interpolated): $f = 2462$ MHz; $\sigma = 1.828$ mho/m; $\epsilon_r = 39.776$; $\rho = 1000$ kg/m³

DASY5 Configuration:

- Electronics: DAE4 Sn1257; Calibrated: 10/25/2011
- 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_802.11b_Ch 11/Area Scan (8x12x1): Measurement grid: dx=15mm, dy=15mm

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.337 mW/g

RHS/Touch_802.11b_Ch 11/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

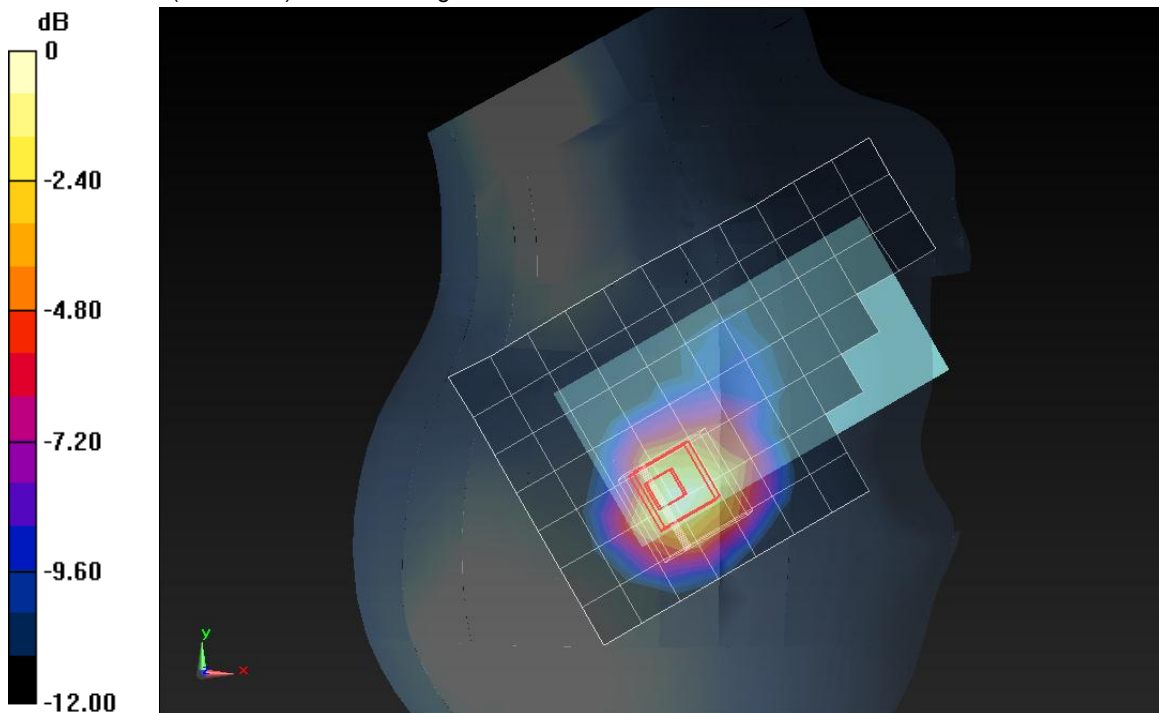
Reference Value = 12.925 V/m; Power Drift = 0.12 dB

Peak SAR (extrapolated) = 0.4780

SAR(1 g) = 0.247 mW/g; SAR(10 g) = 0.122 mW/g

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.307 mW/g



0 dB = 0.310mW/g = -10.17 dB mW/g

Test Laboratory: UL CCS SAR Lab C

Date: 6/14/2012

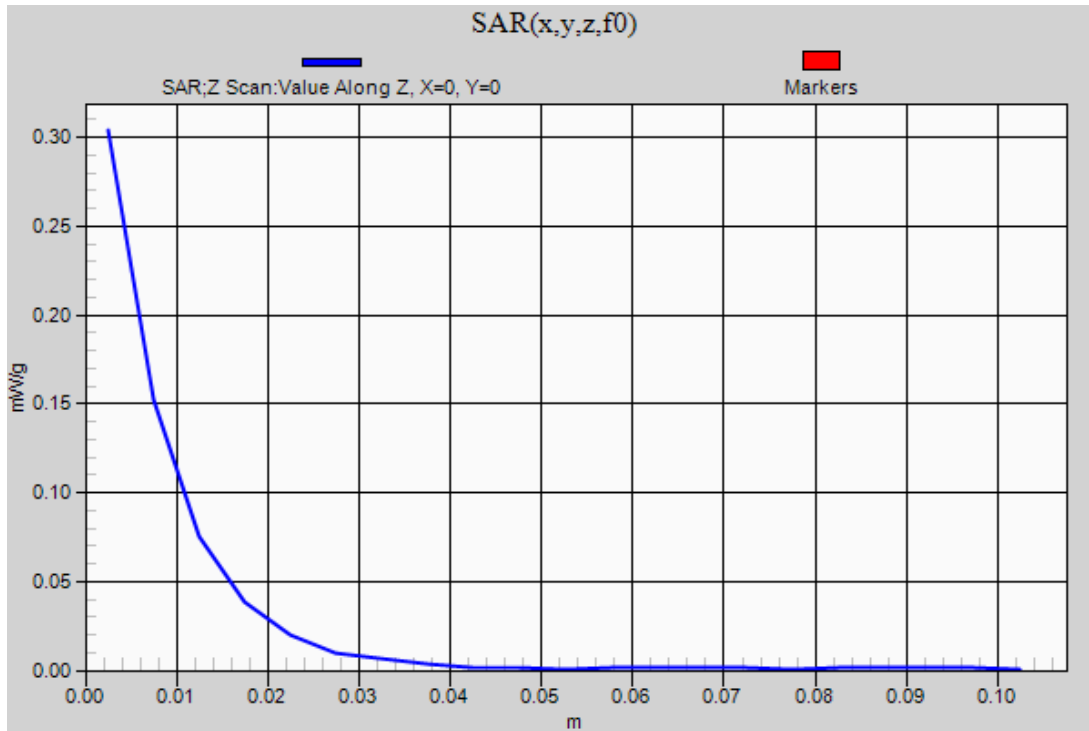
WiFi 2.4 GHz

Frequency: 2462 MHz; Duty Cycle: 1:1

RHS/Touch_802.11b_Ch 11/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.304 mW/g



Test Laboratory: UL CCS SAR Lab C

Date: 6/14/2012

WiFi 2.4 GHz

Frequency: 2462 MHz; Duty Cycle: 1:1; Room Ambient Temperature: 24.0°C; Liquid Temperature: 23.0°C

Medium parameters used (interpolated): $f = 2462$ MHz; $\sigma = 1.986$ mho/m; $\epsilon_r = 51.932$; $\rho = 1000$ kg/m³

DASY5 Configuration:

- Electronics: DAE4 Sn1257; Calibrated: 10/25/2011
- Probe: EX3DV4 - SN3751; ConvF(6.62, 6.62, 6.62); Calibrated: 12/19/2011
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Phantom: ELI v5.0 (A); Type: QDOVA001BB; Serial: 1120

Rear/802.11b_Ch 11/Area Scan (8x12x1): Measurement grid: dx=15mm, dy=15mm

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.087 mW/g

Rear/802.11b_Ch 11/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

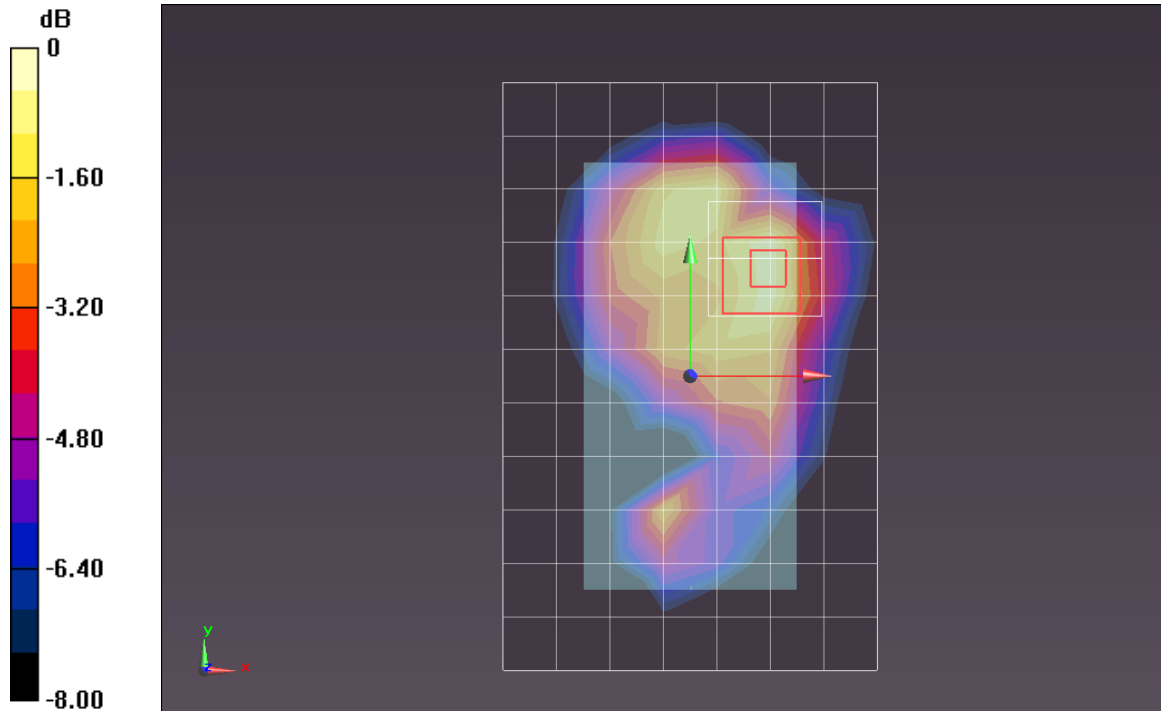
Reference Value = 6.722 V/m; Power Drift = -0.10 dB

Peak SAR (extrapolated) = 0.1420

SAR(1 g) = 0.072 mW/g; SAR(10 g) = 0.038 mW/g

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.099 mW/g



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

Test Laboratory: UL CCS SAR Lab C

Date: 6/14/2012

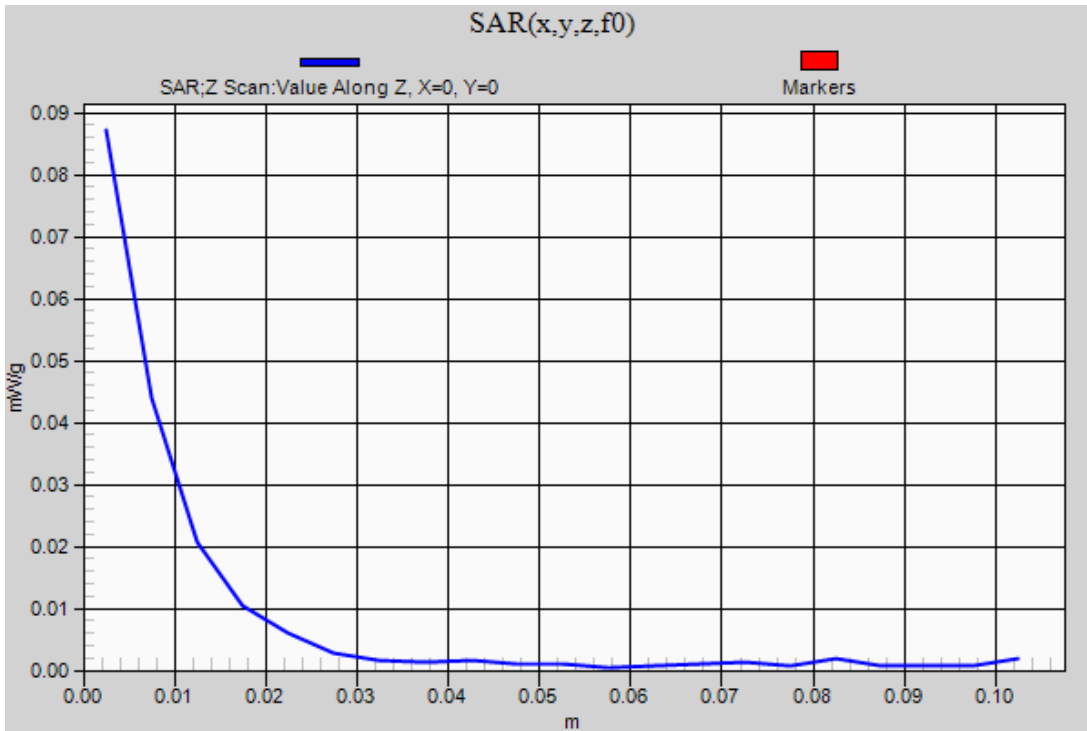
WiFi 2.4 GHz

Frequency: 2462 MHz; Duty Cycle: 1:1

Rear/802.11b_Ch 11/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.087 mW/g



14. Simultaneous Transmission SAR Analysis

As its max average power is 12.3 mW [$<60/f(\text{GHz})$ mW], standalone SAR is not required for Bluetooth. Therefore, Bluetooth need not be considered in the simultaneous transmission SAR evaluation of 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	Σ 1-g SAR (mW/g)
	GSM 850	GSM 1900	W-CDMA Band V	W-CDMA Band II	WiFi 2.4 GHz	
Left Touch	0.187				0.132	0.319
		0.409			0.132	0.541
			0.261		0.132	0.393
				0.588	0.132	0.720
Left Tilt	0.127				0.096	0.223
		0.214			0.096	0.310
			0.168		0.096	0.264
				0.29	0.096	0.386
Right Touch	0.192				0.247	0.439
		0.433			0.247	0.680
			0.27		0.247	0.517
				0.559	0.247	0.806
Right Tilt	0.130				0.107	0.237
		0.201			0.107	0.308
			0.181		0.107	0.288
				0.269	0.107	0.376

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

Test Position	Voice				Data	Σ 1-g SAR (mW/g)
	GSM 850	GSM 1900	W-CDMA Band V	W-CDMA Band II	WiFi 2.4 GHz	
Right Touch	0.211				0.297	0.508
		0.486			0.297	0.783
			0.296		0.297	0.593
				0.599	0.297	0.896

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	Σ 1-g SAR (mW/g)
	GSM 850	GSM 1900	W-CDMA Band V	W-CDMA Band II	WiFi 2.4 GHz	
Rear	0.539				0.072	0.611
		0.562			0.072	0.634
			0.601		0.072	0.673
				0.707	0.072	0.779
Front	0.202				0.039	0.241
		0.447			0.039	0.486
			0.255		0.039	0.294
				0.543	0.039	0.582
Edge 1	0				0.067	0.067
		0			0.067	0.067
			0		0.067	0.067
				0	0.067	0.067
Edge 2	0				0	0.000
		0			0	0.000
			0.237		0	0.237
				0.132	0	0.132
Edge 3	0				0	0.000
		0			0	0.000
			0.04		0	0.040
				0.403	0	0.403
Edge 4	0				0	0.000
		0			0	0.000
			0.266		0	0.266
				0.311	0	0.311

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

Test Position	Voice				Data	Σ 1-g SAR (mW/g)
	GSM 850	GSM 1900	W-CDMA Band V	W-CDMA Band II	WiFi 2.4 GHz	
Rear	0.591				0.087	0.678
		0.645			0.087	0.732
			0.659		0.087	0.746
				0.758	0.087	0.845

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 Band
- 15.7. Calibration Certificate for E-Field Probe EX3DV4 - SN 3751
- 15.8. Calibration Certificate for D835V2 - SN 4d002
- 15.9. Calibration Certificate for D1900V2 - SN 5d043
- 15.10. Calibration Certificate for D2450V2 - SN 748