



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

SAR EVALUATION REPORT

For

Cellular/PCS CDMA/GSM/WCDMA & LTE Phone with BT & WLAN + NFC

**Model: LG-VS930
FCC ID: ZNFVS930**

**Report Number: 12U14331-6C
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Prepared for

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Revision History

<u>Rev.</u>	<u>Issue Date</u>	<u>Revisions</u>	<u>Revised By</u>
--	5/4/2012	Initial Issue	--
A	5/9/2012	<p>Corrected the following typo errors:</p> <ol style="list-style-type: none"> Sec. 9.3 – 9.8: Revised the statements under “Note” in each of these sections to reflect the correct antenna tested for the respective wireless technologies, where the previous iteration of the report erroneously identified the antenna for “GSM850/1900” as the antenna tested for all wireless technologies under body exposure conditions. Sec. 10.8: The second table was erroneously identified as being “CDMA 1xRTT (BC0)”, when it should have been “CDMA 1xRTT (BC1)”. This error has now been corrected in the report. Sec. 12.3: Corrected the Reference Body SAR Value for Dipole D835V2 SN 4d002 on 3/29/2012 to the value shown under Sec. 12.2 Sec. 15.2.2: Revised the first statement under “Conclusion” to further clarify the conditions that constitute the need of performing volume scans. 	Ray Su
B	5/15/2012	<p>The following corrections were made in this revision:</p> <ol style="list-style-type: none"> Sec. 2: Added KDB 941225 D03 SAR Test Reduction GSM GPRS EDGE v01 and KDB 865664 SAR 3 to 6 GHz Rev to the list of procedures applied to the tests documented in this report. Sec. 12.2: Corrected Reference Body SAR Value for Dipole D5GHzV2 SN1075 to the value as shown in the Calibration Certificate. Sec. 7: Replaced the value under “Simultaneous Transmission Condition” from 1.35 W/kg to 1.41 W/kg. Sec. 8.2: Added statement that WiFi in the 5 GHz Bands does not support hotspot mode. Sec. 7: Replaced WiFi 5 GHz Bands Hotspot Mode SAR data with Body SAR data Sec. 13.8: Removed all WiFi 5 GHz Bands Hotspot Mode SAR data. Sec. 14: Removed all WiFi 5 GHz Bands Hotspot Mode SAR data and plots. Sec. 14.1: Removed all WiFi 5 GHz Bands Hotspot Mode SAR test plots. Sec. 15.2: Entered SAR data for WiFi 2.4 GHz at the Edge 4 test position under the varying Sum of the SAR tables for Body Exposure conditions. Sec. 9: Added Sec. 9.9 to distinguish WiFi 5 GHz Bands test positions from that of WiF 2.4 GHz Band 	Ray Su
C	6/18/2012	<p>Made the following corrections in this revision:</p> <ol style="list-style-type: none"> Sec. 2: Renamed “PBA 181634” to “KDB inquiry #: 181634” Sec. 9: Revised the tables of test configurations to clearly distinguish Body-worn Accessory test positions from Personal Router/Hotspot test positions Sec. 8.4, Item #12: Corrected target output power for CDMA BC0 EVDO mode with power reduction from 18.7 dBm to 19.5 dBm Sec. 7: For Simultaneous Transmission Condition result, replaced the summed value of 1.41 W/kg with the highest combined volume scan value of 1.35 W/kg Sec. 8.3: Included description to clarify that WiFi in the 5 GHz bands cannot transmit simultaneously with WWAN transmitters. 	Sunny Shih

Table of Contents

1. Attestation of Test Results..... 7

2. Test Methodology 8

3. Facilities and Accreditation 8

4. Calibration and Uncertainty 9

 4.1. *Measuring Instrument Calibration 9*

 4.2. *Measurement Uncertainty..... 10*

5. Measurement System Description and Setup..... 11

6. SAR Measurement Procedure..... 12

 6.1. *Normal SAR Measurement Procedure..... 12*

 6.2. *Volume Scan Procedures 13*

7. Summary of Highest 1g SAR..... 14

8. Device Under Test..... 15

 8.1. *Band and Air Interfaces 15*

 8.2. *Hotspot (Wireless router) Exposure Condition 15*

 8.3. *Simultaneous Transmission..... 16*

 8.4. *KDB 941225 D05 SAR for LTE Devices v01..... 17*

9. Summary of Test Configurations..... 19

 9.1. *Head Test Configurations for WWAN and Wi-Fi..... 19*

 9.2. *Body-worn Accessory Test Configurations for GSM850/1900..... 19*

 9.3. *Personal Router/Hotspot Test Configurations for GSM850/1900 19*

 9.4. *Body-worn Accessory Test Configurations for W-CDMA (UMTS) Band II 20*

 9.5. *Personal Router/Hotspot Test Configurations for W-CDMA (UMTS) Band II..... 20*

 9.6. *Body-worn Accessory Test Configurations for CDMA BC0/BC1, 1xRTT Mode 20*

 9.7. *Personal Router/Hotspot Test Configurations for CDMA BC0/BC1, 1xRTT Mode..... 20*

 9.8. *Body-worn Accessory Test Configurations for CDMA BC0, 1xEVDO Mode..... 21*

 9.9. *Personal Router/Hotspot Test Configurations for CDMA BC0, 1xEVDO Mode 21*

 9.10. *Body-worn Accessory Test Configurations for CDMA BC1, 1xEVDO Mode 21*

 9.11. *Personal Router/Hotspot Test Configurations for CDMA BC1, 1xEVDO Mode..... 21*

 9.12. *Body-worn Accessory Test Configurations for LTE Band 13 22*

 9.13. *Personal Router/Hotspot Test Configurations for LTE Band 13..... 22*

 9.14. *Body-worn Accessory Test Configurations for Wi-Fi 2.4 and 5 GHz Bands 22*

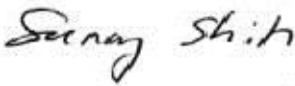
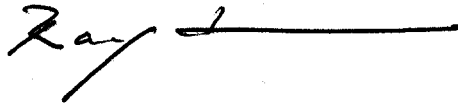
 9.15. *Personal Router/Hotspot Test Configurations for Wi-Fi 2.4 GHz Band 22*

10.	RF Output Power Measurement	23
10.1.	GSM850.....	23
10.2.	GSM1900.....	24
10.3.	W-CDMA (UMTS) Band II	25
10.4.	CDMA BC0.....	29
10.5.	CDMA BC1.....	29
10.6.	LTE Band 13.....	30
10.7.	Power Reduction for SV-DO.....	32
10.8.	Power Reduction for SV-LTE Band 13	32
10.9.	Wi-Fi (2.4 GHz band)	33
10.10.	Wi-Fi (5 GHz bands).....	34
10.11.	Bluetooth.....	35
11.	Tissue Dielectric Properties	36
11.1.	Composition of Ingredients for the Tissue Material Used in the SAR Tests	37
11.2.	Tissue Dielectric Parameter Check Results.....	38
12.	System Performance Check	42
12.1.	System Performance Check Measurement Conditions.....	42
12.2.	Reference SAR Values for System Performance Check.....	42
12.3.	System Performance Check Results	43
13.	SAR Test Results	45
13.1.	GSM850.....	45
13.1.1.	Head SAR.....	45
13.1.2.	Body & Hotspot SAR	46
13.2.	GSM1900.....	47
13.2.1.	Head SAR.....	47
13.2.2.	Body & Hotspot SAR	47
13.3.	WCDMA (UMTS) Band II.....	48
13.3.1.	Head SAR.....	48
13.3.2.	Body & Hotspot SAR	49
13.4.	CDMA BC0.....	50
13.4.1.	Head SAR.....	50
13.4.2.	Body & Hotspot SAR	51
13.5.	CDMA BC1.....	52
13.5.1.	Head SAR.....	52
13.5.2.	Body & Hotspot SAR	53

13.6.	<i>LTE Band 13</i>	54
13.6.1.	Head SAR.....	54
13.6.2.	Body & Hotspot SAR.....	55
13.7.	<i>Wi-Fi (2.4 GHz Band)</i>	56
13.7.1.	Head SAR.....	56
13.7.2.	Body & Hotspot SAR.....	56
13.8.	<i>Wi-Fi (5 GHz Bands)</i>	57
13.8.1.	Head SAR.....	57
13.8.2.	Body SAR.....	59
14.	Summary of Highest SAR Values	60
14.1.	<i>SAR Plots (from Summary of Highest SAR Values)</i>	61
15.	Simultaneous Transmission SAR Analysis	117
15.1.	<i>Head Exposure Conditions</i>	117
15.1.1.	Sum of the SAR for W-CDMA & Wi-Fi.....	117
15.1.2.	Sum of the SAR for SV-DO & Wi-Fi.....	118
15.1.3.	Sum of the SAR for SV-LTE & Wi-Fi.....	119
15.2.	<i>Body Exposure Conditions</i>	120
15.2.1.	Sum of the SAR for GSM, WCDMA & Wi-Fi.....	120
15.2.2.	Sum of the SAR for SV-DO & Wi-Fi.....	121
15.2.3.	Sum of the SAR for SV-LTE & Wi-Fi.....	122
15.3.	<i>SAR Peak Location Separation Distance Calculations and Figures</i>	123
15.4.	<i>Multi-Band Combined Volume Scan Results</i>	132
16.	Appendixes	133
16.1.	<i>System Performance Check Plots</i>	133
16.2.	<i>SAR Test Plots for GSM850</i>	133
16.3.	<i>SAR Test Plots for GSM1900</i>	133
16.4.	<i>SAR Test Plots for W-CDMA (UMTS) Band II</i>	133
16.5.	<i>SAR Test Plots for CDMA BC0</i>	133
16.6.	<i>SAR Test Plots for CDMA BC1</i>	133
16.7.	<i>SAR Test Plots for LTE Band 13</i>	133
16.8.	<i>SAR Test Plots for Wi-Fi 2.4 GHz Band</i>	133
16.9.	<i>SAR Test Plots for Wi-Fi 5 GHz Bands</i>	133
16.10.	<i>SAR Test Plots for Standalone Volume Scans</i>	133
16.11.	<i>SAR Test Plots for SV-DO Multi-Band Combined Volume Scans</i>	133
16.12.	<i>SAR Test Plots for SV-LTE Multi-Band Combined Volume Scans</i>	133

16.13.	Calibration Certificate for E-Field Probe EX3DV4 - SN 3772	133
16.14.	Calibration Certificate for E-Field Probe EX3DV4 - SN 3751	133
16.15.	Calibration Certificate for D750V3 - SN 1019	133
16.16.	Calibration Certificate for D835V2 - SN 4d002	133
16.17.	Calibration Certificate for D1900V2 - SN 5d043	133
16.18.	Calibration Certificate for D2450V2 - SN 748	133
16.19.	Calibration Certificate for D5GHzV2 - SN 1075	133
17.	External Photos	134
18.	Antenna Locations & Separation Distances.....	137
19.	Setup Photos	138

1. Attestation of Test Results

Applicant	LG ELECTRONICS MOBILECOMM U.S.A., INC.	
DUT description	Cellular/PCS CDMA/GSM/WCDMA & LTE Phone with BT & WLAN + NFC	
Model	LG-VS930	
Test device is	An identical prototype	
Device category	Portable	
Exposure category	General Population/Uncontrolled Exposure	
Highest 1-g SAR	Refer to Sec. 7 Summary of Highest 1-g SAR	
Date tested	3/27/2012 – 4/5/2012	
	Applicable Standards	Test Results
	<ul style="list-style-type: none"> - FCC OET Bulletin 65 Supplement C 01-01, - IEEE Std 1528-2003 	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 and the following KDB Procedures:

- 648474 D01 SAR Handsets Multi Xmitter and Ant, v01r05
- 648474 D03 Handset Wireless Battery Chargers v01
- 248227 D01 SAR meas for 802 11abg v01r02
- 865664 SAR 3 to 6 GHz Rev
- 941225 D01 SAR test for 3G devices v02
- 941225 D03 SAR Test Reduction GSM GPRS EDGE v01
- 941225 D05 SAR for LTE Devices v01
- 941225 D06 Hot Spot SAR v01

KDB Inquiry #: 181634

As this device, LG-VS930 (FCC ID ZNFVS930) is similar to the model LG-VS920 (FCC ID BEJVS920), KDB Inquiry # 181634 was used in the testing of this filing.

3. Facilities and Accreditation

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

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

4. Calibration and Uncertainty

4.1. Measuring Instrument Calibration

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

Name of Equipment	Manufacturer	Type/Model	Serial No.	Cal. Due date		
				MM	DD	Year
Dielectronic Probe kit	HP	85070C	N/A	N/A		
Base Station Simulator	Agilent	8960	GB46160222	6	17	2012
Base Station Simulator	R & S	CMU200	54-1005296	6	24	2012
Base Station Simulator	R & S	CMW500	10-300233773	12	14	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	3772	2	16	2012
E-Field Probe	SPEAG	EX3DV4	3751	12	19	2012
Thermometer	ERTCO	639-1S	1718	7	19	2012
Data Acquisition Electronics	SPEAG	DAE4	1239	10	18	2012
Data Acquisition Electronics	SPEAG	DAE43	500	7	14	2012
System Validation Dipole	SPEAG	D750V3	1019	2	9	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
System Validation Dipole	SPEAG	D5GHzV2	1075	2	14	2013
Power Meter	HP	437B	3125U16345	5	13	2012
Power Sensor	HP	8481A	2702A60780	5	13	2012
Amplifier	MITEQ	4D00400600-50-30P	1620606	N/A		
Directional coupler	Werlatone	C8060-102	2141	N/A		

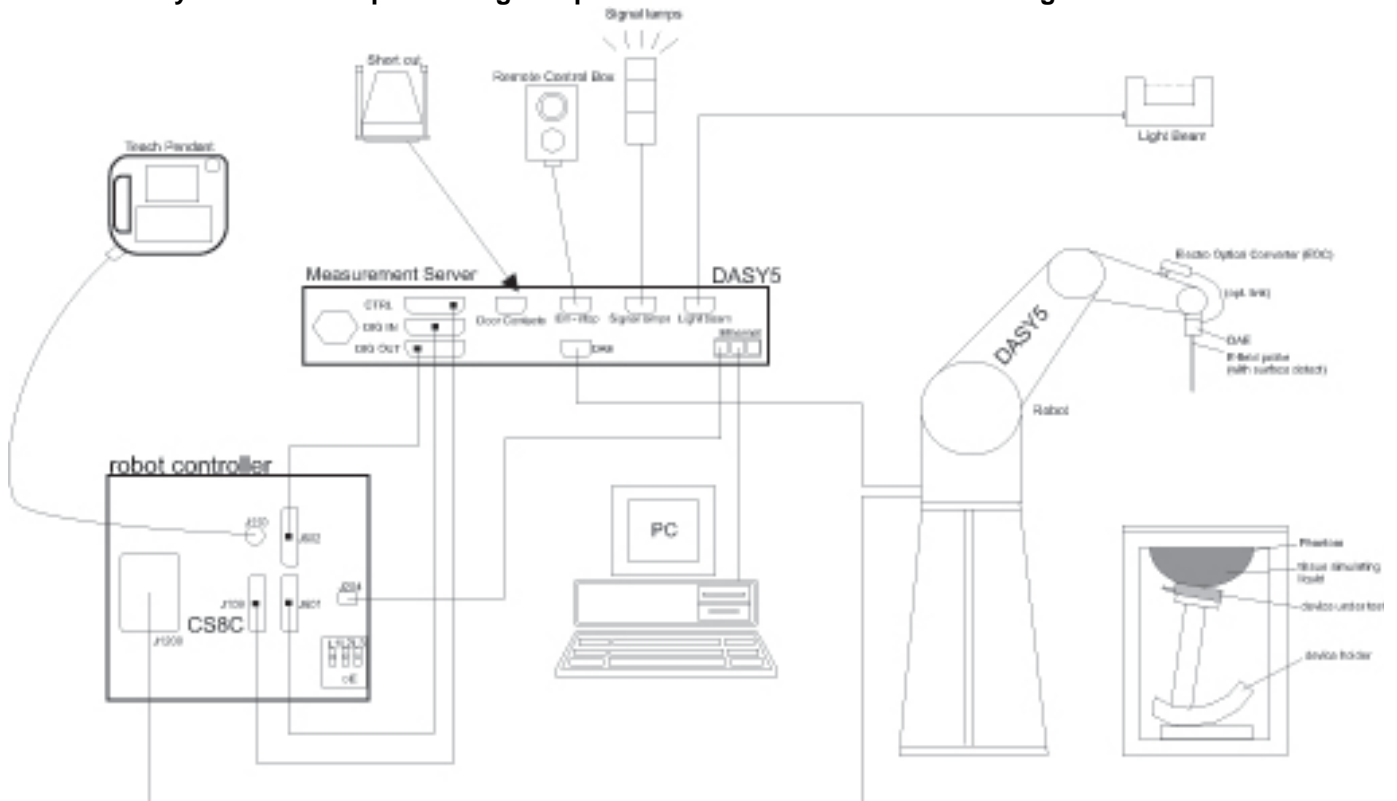
4.2. Measurement Uncertainty

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	-4.77	Normal	1	0.64	-3.05
Liquid Permittivity - deviation from target	5.00	Rectangular	1.732	0.6	1.73
Liquid Permittivity - measurement uncertainty	-4.42	Normal	1	0.6	-2.65
Combined Standard Uncertainty Uc(y) =					10.55
Expanded Uncertainty U, Coverage Factor = 2, > 95 % Confidence =				21.09 %	
Expanded Uncertainty U, Coverage Factor = 2, > 95 % Confidence =				1.66 dB	

Measurement uncertainty for 3 to 6 GHz averaged over 1 gram					
Component	Error, %	Distribution	Divisor	Sensitivity	U (Xi), %
Measurement System					
Probe Calibration (k=1)	6.55	Normal	1	1	6.55
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	1.00	Normal	1	1	1.00
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	3.90	Rectangular	1.732	1	2.25
Test Sample Related					
Test Sample Positioning	1.10	Normal	1	1	1.10
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	3.74	Normal	1	0.64	2.39
Liquid Permittivity - deviation from target	10.00	Rectangular	1.732	0.6	3.46
Liquid Permittivity - measurement uncertainty	5.51	Normal	1	0.6	3.31
Combined Standard Uncertainty Uc(y), %:					11.22
Expanded Uncertainty U, Coverage Factor = 1.96, > 95 % Confidence =				21.99 %	
Expanded Uncertainty U, Coverage Factor = 1.96, > 95 % Confidence =				1.73 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. Summary of Highest 1g SAR

FCC Rule Parts	Freq. Range	Highest 1-g SAR	Limit
22	824-849 MHz	Head: 0.335 W/kg (Right Touch) Body & Hotspot: 0.706 W/kg (Rear with 10mm distance)	1.6 W/kg
24	1850-1910 MHz	Head: 0.300 W/kg (Right Touch) Body & Hotspot: 0.771 W/kg (Rear with 10 mm distance)	
24 WCDMA (UMTS) Band II	1850-1910 MHz	Head: 0.407 W/kg (Left Touch) Body & Hotspot: 0.588 W/kg (Rear with 10 mm distance)	
22 CDMA BC0	824-849 MHz	Head: 0.497 W/kg (Right Touch) (1xRTT) Head: 0.763 W/kg (Left Touch) (1xEV-DO) Body & Hotspot: 0.624 W/kg (Rear with 10mm distance) (1xRTT) Body & Hotspot: 0.550 W/kg (Rear with 10mm distance) (1xEV-DO)	
24 CDMA BC1	1850-1910 MHz	Head: 0.813 W/kg (Right Touch) (1xRTT) Head: 0.564 W/kg (Left Touch) (1xEV-DO) Body & Hotspot: 1.040 W/kg (Rear with 10mm distance) (1xRTT) Body & Hotspot: 0.918 W/kg (Rear with 10mm distance) (1xEV-DO)	
27 (LTE Band 13)	777-787 MHz	Head: 0.324 W/kg (Left Touch) Body & Hotspot: 0.548 W/kg (Rear with 10 mm distance)	
15.247	2412-2462 MHz	Head: 0.132 W/kg (Right Touch) Body & Hotspot: 0.117 W/kg (Rear with 10 mm distance)	
	5725-5850 MHz	Head: 0.070 W/kg (Right Tilt) Body: 0.149 W/kg (Rear with 10 mm distance)	
15.407	5150-5250 MHz	Head: 0.852 W/kg (Left Touch) Body: 0.164 W/kg (Rear with 10 mm distance)	
	5250-5350 MHz	Head: 0.772 W/kg (Right Touch) Body: 0.129 W/kg (Rear with 10 mm distance)	
	5500-5700 MHz	Head: 0.374 W/kg (Right Touch) Body: 0.110 W/kg (Rear with 10 mm distance)	
Simultaneous Transmission Condition:		1.35 W/kg (The highest SAR across exposure conditions)	

8. Device Under Test

Cellular/PCS CDMA and LTE Phone with Bluetooth & WLAN	
Model: LG-VS930	
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 Cover with NFC o Wireless Charging Battery Cover with NFC

8.1. Band and Air Interfaces

Tx Frequency Bands	<ul style="list-style-type: none"> - GSM850: 824 - 849 MHz - GSM1900: 1850 - 1910 MHz - W-CDMA Band II: 1850 - 1910 MHz - CDMA BC 0: 824 - 849 MHz - CDMA BC 1: 1850 - 1910 MHz - LTE Band 13: 777 - 787 MHz - 802.11ab/g/n: 2412 - 2462 MHz, b / g / HT20 5150 - 5250 MHz, a / HT20 5250 - 5350 MHz, a / HT20 5500 - 5700 MHz, a / HT20 5725 - 5850 MHz, a / HT20 - Bluetooth: 2402 - 2480 MHz
GPRS Multi-Slot Class:	10
GPRS Class:	B
DTM Class:	Not supported

8.2. Hotspot (Wireless router) Exposure Condition

The device is capable of personal hotspot mode. The hotspot mode can be enabled by the user. However, the 5 GHz bands do not support hotspot mode.

8.3. Simultaneous Transmission

WiFi is able to transmit simultaneously with WWAN in the 2.4 GHz band, but not in the 5 GHz bands.
 WiFi is able to transmit simultaneously with BT in the 5 GHz bands, but not in the 2.4 GHz bands.

No.	Conditions
1	GSM850 GPRS + Wi-Fi 2.4GHz
2	GSM1900 GPRS + Wi-Fi 2.4GHz
3	W-CDMA (UMTS) Band II+ Wi-Fi 2.4GHz
4	GSM850 Voice + BT
5	GSM1900 Voice + BT
6	GSM850 GPRS + BT
7	GSM1900 GPRS + BT
8	W-CDMA (UMTS) Band II+ BT
9	CDMA BC0 1xRTT + Wi-Fi 2.4 GHz
10	CDMA BC1 1xRTT + Wi-Fi 2.4 GHz
11	CDMA BC0 1xEVDO + Wi-Fi 2.4 GHz
12	CDMA BC1 1xEVDO + Wi-Fi 2.4 GHz
13	CDMA BC0 1xRTT + BT
14	CDMA BC1 1xRTT + BT
15	CDMA BC0 1xEVDO + BT
16	CDMA BC1 1xEVDO + BT
17	CDMA BC0 1xRTT + CDMA BC0 1xEVDO (SV-DO BC0/BC0)
18	CDMA BC0 1xRTT + CDMA BC1 1xEVDO (SV-DO BC0/BC1)
19	CDMA BC1 1xRTT + CDMA BC0 1xEVDO (SV-DO BC1/BC0)
20	CDMA BC1 1xRTT + CDMA BC1 1xEVDO (SV-DO BC1/BC1)
21	SV-DO BC0/BC0 + Wi-Fi 2.4 GHz
22	SV-DO BC0/BC1+ Wi-Fi 2.4 GHz
23	SV-DO BC1/BC0+ Wi-Fi 2.4 GHz
24	SV-DO BC1/BC1+ Wi-Fi 2.4 GHz
25	SV-DO BC0/BC0 + BT
26	SV-DO BC0/BC1+ BT
27	SV-DO BC1/BC0+ BT
28	SV-DO BC1/BC1+ BT
29	CDMA BC0 1xRTT + LTE Band 13 (SV-LTE BC0)
30	CDMA BC1 1xRTT + LTE Band 13 (SV-LTE BC1)
31	SV-LTE BC0 + Wi-Fi 2.4 GHz
32	SV-LTE BC1 + Wi-Fi 2.4 GHz
33	SV-LTE BC0 + BT
34	SV-LTE BC1 + BT
35	Wi-Fi 5 GHz Bands + BT

8.4. KDB 941225 D05 SAR for LTE Devices v01

#	Description	Information															
1	Identify the operating frequency range of each LTE transmission band used by the device	Band 13: 777 - 787 MHz															
2	Identify the channel bandwidths used in each frequency band; 1.4, 3, 5, 10, 15, 20 MHz etc.	Band 13: 10 MHz															
3	Identify the high, middle and low (H, M, L) channel numbers and frequencies in each LTE frequency band	LTE Band13 - Bandwidth: 10MHz Ch No.: 23230 Frequency: 782MHz															
4	Specify the UE category and uplink modulations used	The UE Category is 3 Uplink modulations: QPSK, 16QAM															
5	Descriptions of the LTE transmitter and antenna implementation & identify whether it is a standalone transmitter operating independently of other wireless transmitters in the device or sharing hardware components and/or antenna(s) with other transmitters etc.	This model(VS930) has the same HW and one Tx antenna for CDMA US PCS (BC1) EVDO/LTE Band 13/W-CDMA Band II. For details, please refer to Section 18 or the antenna distance document.															
6	Identify the LTE voice/data requirements in each operating mode and exposure condition with respect to head and body test configurations, antenna locations, handset flip-cover or slide positions, antenna diversity conditions, etc.	Exposure conditions 1) Body SAR is required. 2) Hotspot SAR: Front, Rear, Edge 3 and Edge 4 require assessment for SAR evaluation. 3) Please refer to Section 18 for definition of edges and test positions, and Section 9.7 for the specific test positions required for LTE Band 13.															
7	Identify if Maximum Power Reduction (MPR) is optional or mandatory, i.e. built-in by design: a) only mandatory MPR may be considered during SAR testing, when the maximum output power is permanently limited by the MPR implemented within the UE; and only for the applicable RB (resource block) configurations specified in LTE standards b) A-MPR (additional MPR) must be disabled.	As per 3GPP TS 36.101: <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Modulation</th> <th>Channel bandwidth / Transmission bandwidth configuration (RB)</th> <th>MPR (dB)</th> </tr> </thead> <tbody> <tr> <td></td> <td>10 MHz</td> <td></td> </tr> <tr> <td>QPSK</td> <td>> 12</td> <td>≤ 1</td> </tr> <tr> <td>16 QAM</td> <td>≤ 12</td> <td>≤ 1</td> </tr> <tr> <td>16 QAM</td> <td>> 12</td> <td>≤ 2</td> </tr> </tbody> </table> <p>MPR is permanently built-in by design. A-MPR was disabled</p>	Modulation	Channel bandwidth / Transmission bandwidth configuration (RB)	MPR (dB)		10 MHz		QPSK	> 12	≤ 1	16 QAM	≤ 12	≤ 1	16 QAM	> 12	≤ 2
Modulation	Channel bandwidth / Transmission bandwidth configuration (RB)	MPR (dB)															
	10 MHz																
QPSK	> 12	≤ 1															
16 QAM	≤ 12	≤ 1															
16 QAM	> 12	≤ 2															
8	Include the maximum average conducted output power measured on the required test channels for each channel bandwidth and UL modulation used in each frequency band: a) with 1 RB allocated at the upper edge of a channel b) with 1 RB allocated at the lower edge of a channel c) using 50% RB allocation centered within a channel d) using 100% RB allocation	Refer to Section 10.6 RF output power table															

KDB 941225 D05 SAR for LTE devices v01 (Continued)

#	Description	Information																			
9	Identify all other U.S. wireless operating modes (3G, Wi-Fi, WiMax, Bluetooth etc.), device/exposure configurations (head and body, antenna and handset flip-cover or slide positions, antenna diversity conditions etc.) and frequency bands used for these modes	* Supported band & Exposure conditions 1) Bluetooth 2.4GHz - Exposure Conditions: BT SAR is not required due to the lower power and antenna separation distance. 2) Wi-Fi 2.4GHz - Exposure Conditions: Head/Body SAR required * Wi-Fi hotspot is supported. 3) Supported WWAN bands: GSM850/1900, W-CDMA Band II CDMA BC0/BC1 -Exposure Conditions: Head and Body SAR required.																			
10	Include the maximum average conducted output power measured for the other wireless mode and frequency bands	See Section 10.6 RF output power measurements																			
11	Identify the simultaneous transmission conditions for the voice and data configurations supported by all wireless modes, device configurations and frequency bands, for the head and body exposure conditions and device operating configurations (handset flip or cover positions, antenna diversity conditions etc.)	Refer to the table in Section 8.3																			
12	When power reduction is applied to certain wireless modes to satisfy SAR compliance for simultaneous transmission conditions, other equipment certification or operating requirements, include the maximum average conducted output power measured in each power reduction mode applicable to the simultaneous voice/data transmission configurations for such wireless configurations and frequency bands; and also include details of the power reduction implementation and measurement setup	1. Power Reduction operation table for SV-DO Mode <table border="1" style="margin-left: 20px;"> <thead> <tr> <th>Mode</th> <th>CDMA Current Voice Power for BC0, BC1</th> <th>CDMA EVDO Max. Power for BC0</th> <th>CDMA EVDO Max. Power for BC1</th> </tr> </thead> <tbody> <tr> <td rowspan="2">SV-DO</td> <td>P < 15.5 dBm</td> <td>24.5 dBm (Limited)</td> <td>23.7 dBm (Limited)</td> </tr> <tr> <td>P ≥ 15.5 dBm</td> <td>19.5 dBm (Limited)</td> <td>18.7 dBm (Limited)</td> </tr> </tbody> </table> 2. Power Reduction operation table for SV-LTE Mode <table border="1" style="margin-left: 20px;"> <thead> <tr> <th>Mode</th> <th>CDMA Current Voice Power for BC0, BC1</th> <th>LTE Max. Power for B13</th> </tr> </thead> <tbody> <tr> <td rowspan="2">SV-LTE</td> <td>P < 18.5 dBm</td> <td>22.5 dBm (Limited)</td> </tr> <tr> <td>P ≥ 18.5 dBm</td> <td>18.5 dBm (Limited)</td> </tr> </tbody> </table>	Mode	CDMA Current Voice Power for BC0, BC1	CDMA EVDO Max. Power for BC0	CDMA EVDO Max. Power for BC1	SV-DO	P < 15.5 dBm	24.5 dBm (Limited)	23.7 dBm (Limited)	P ≥ 15.5 dBm	19.5 dBm (Limited)	18.7 dBm (Limited)	Mode	CDMA Current Voice Power for BC0, BC1	LTE Max. Power for B13	SV-LTE	P < 18.5 dBm	22.5 dBm (Limited)	P ≥ 18.5 dBm	18.5 dBm (Limited)
Mode	CDMA Current Voice Power for BC0, BC1	CDMA EVDO Max. Power for BC0	CDMA EVDO Max. Power for BC1																		
SV-DO	P < 15.5 dBm	24.5 dBm (Limited)	23.7 dBm (Limited)																		
	P ≥ 15.5 dBm	19.5 dBm (Limited)	18.7 dBm (Limited)																		
Mode	CDMA Current Voice Power for BC0, BC1	LTE Max. Power for B13																			
SV-LTE	P < 18.5 dBm	22.5 dBm (Limited)																			
	P ≥ 18.5 dBm	18.5 dBm (Limited)																			
13	Include descriptions of the test equipment, test software, built-in test firmware etc. required to support testing the device when power reduction is applied to one or more transmitters/antennas for simultaneous voice/data transmission	Not Applicable																			
14	When appropriate, include a SAR test plan proposal with respect to the above	Not Applicable																			
15	If applicable, include preliminary SAR test data and/or supporting information in laboratory testing inquiries to address specific issues and concerns or for requesting further test reduction considerations appropriate for the device; for example, simultaneous transmission configurations	Not applicable																			

9. Summary of Test Configurations

Refer to Section 18 “Antenna Location and Separation Distances” for the specific details of the antenna-to-antenna and antenna-to-edge(s) distances.

9.1. Head Test Configurations for WWAN and Wi-Fi

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

9.2. Body-worn Accessory Test Configurations for GSM850/1900

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

9.3. Personal Router/Hotspot Test Configurations for GSM850/1900

Test Configurations	Antenna-to-edge/surface	SAR Required	Note
Rear	< 25 mm	Yes	
Front	< 25 mm	Yes	
Edge 1	117 mm	No	SAR is not required because the distance from the GSM850/1900 antenna to this edge is > 2.5 cm as per KDB 941225 D06 Hot Spot SAR v01
Edge 2	1.3 mm	Yes	
Edge 3	1.5 mm	Yes	
Edge 4	37.1 mm	No	SAR is not required because the distance from the GSM850/1900 antenna to this edge is > 2.5 cm as per KDB 941225 D06 Hot Spot SAR v01

9.4. Body-worn Accessory Test Configurations for W-CDMA (UMTS) Band II

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

9.5. Personal Router/Hotspot Test Configurations for W-CDMA (UMTS) Band II

Test Configurations	Antenna-to-edge/surface	SAR Required	Note
Rear	< 25 mm	Yes	
Front	< 25 mm	Yes	
Edge 1	117 mm	No	SAR is not required because the distance from the W-CDMA antenna to this edge is > 2.5 cm as per KDB 941225 D06 Hot Spot SAR v01
Edge 2	36.1 mm	No	SAR is not required because the distance from the W-CDMA antenna to this edge is > 2.5 cm as per KDB 941225 D06 Hot Spot SAR v01
Edge 3	1.5 mm	Yes	
Edge 4	1.3 mm	Yes	

9.6. Body-worn Accessory Test Configurations for CDMA BC0/BC1, 1xRTT Mode

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

9.7. Personal Router/Hotspot Test Configurations for CDMA BC0/BC1, 1xRTT Mode

Test Configurations	Antenna-to-edge/surface	SAR Required	Note
Rear	< 25 mm	Yes	
Front	< 25 mm	Yes	
Edge 1	117 mm	No	SAR is not required because the distance from the CDMA BC0/BC1 1xRTT antenna to this edge is > 2.5 cm as per KDB 941225 D06 Hot Spot SAR v01
Edge 2	1.3 mm	Yes	
Edge 3	1.5 mm	Yes	
Edge 4	37.1 mm	No	SAR is not required because the distance from the CDMA BC0/BC1 1xRTT antenna to this edge is > 2.5 cm as per KDB 941225 D06 Hot Spot SAR v01

9.8. Body-worn Accessory Test Configurations for CDMA BC0, 1xEVDO Mode

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

9.9. Personal Router/Hotspot Test Configurations for CDMA BC0, 1xEVDO Mode

Test Configurations	Antenna-to-edge/surface	SAR Required	Note
Rear	< 25 mm	Yes	
Front	< 25 mm	Yes	
Edge 1	3 mm	Yes	
Edge 2	1.3 mm	Yes	
Edge 3	108 mm	No	SAR is not required because the distance from the CDMA BC0 1xEVDO antenna to this edge is > 2.5 cm as per KDB 941225 D06 Hot Spot SAR v01
Edge 4	42.2 mm	No	SAR is not required because the distance from the CDMA BC0 1xEVDO antenna to this edge is > 2.5 cm as per KDB 941225 D06 Hot Spot SAR v01

9.10. Body-worn Accessory Test Configurations for CDMA BC1, 1xEVDO Mode

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

9.11. Personal Router/Hotspot Test Configurations for CDMA BC1, 1xEVDO Mode

Test Configurations	Antenna-to-edge/surface	SAR Required	Note
Rear	< 25 mm	Yes	
Front	< 25 mm	Yes	
Edge 1	117 mm	No	SAR is not required because the distance from the CDMA BC1 1xEVDO antenna to this edge is > 2.5 cm as per KDB 941225 D06 Hot Spot SAR v01
Edge 2	36.1 mm	No	SAR is not required because the distance from the CDMA BC1 1xEVDO antenna to this edge is > 2.5 cm as per KDB 941225 D06 Hot Spot SAR v01
Edge 3	1.5 mm	Yes	
Edge 4	1.3 mm	Yes	

9.12. Body-worn Accessory Test Configurations for LTE Band 13

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

9.13. Personal Router/Hotspot Test Configurations for LTE Band 13

Test Configurations	Antenna-to-edge/surface	SAR Required	Note
Rear	< 25 mm	Yes	
Front	< 25 mm	Yes	
Edge 1	117 mm	No	SAR is not required because the distance from the LTE Band 13 antenna to this edge is > 2.5 cm as per KDB 941225 D06 Hot Spot SAR v01
Edge 2	36.1 mm	No	SAR is not required because the distance from the LTE Band 13 antenna to this edge is > 2.5 cm as per KDB 941225 D06 Hot Spot SAR v01
Edge 3	1.5 mm	Yes	
Edge 4	1.3 mm	Yes	

9.14. Body-worn Accessory Test Configurations for Wi-Fi 2.4 and 5 GHz Bands

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

9.15. Personal Router/Hotspot Test Configurations for Wi-Fi 2.4 GHz Band

Test Configurations	Antenna-to-edge/surface	SAR Required	Note
Rear	< 25 mm	Yes	
Front	< 25 mm	Yes	
Edge 1*	3 mm	Yes	
Edge 2	31.6 mm	No	SAR is not required because the distance from the Wi-Fi antenna to this edge is > 2.5 cm as per KDB 941225 D06 Hot Spot SAR v01
Edge 3	121.3 mm	No	SAR is not required because the distance from the Wi-Fi antenna to this edge is > 2.5 cm as per KDB 941225 D06 Hot Spot SAR v01
Edge 4*	20.7 mm	Yes	

*: SAR testing under Hotspot Mode test positions is not required as Wi-Fi in the 5 GHz Bands does not support hotspot mode operation,

10. RF Output Power Measurement

10.1. GSM850

GSM (GMSK) Voice Mode

Band	Ch No.	Freq. (MHz)	Avg burst Pwr (dBm)
850	128	824.2	32.9
	190	836.6	33.0
	251	848.8	32.8

GPRS (GMSK) - Coding Scheme: CS1

Band	Ch No.	f (MHz)	Avg burst Pwr (dBm)			
			1 slot	Frame Avg Pwr	2 slots	Frame Avg Pwr
850	128	824.2	32.8	23.8	32.6	26.6
	190	836.6	32.9	23.9	32.6	26.6
	251	848.8	32.7	23.7	32.5	26.5

EGPRS (8PSK) - Coding Scheme: MCS5

Band	Ch No.	f (MHz)	Avg burst Pwr (dBm)			
			1 slot	Frame Avg Pwr	2 slots	Frame Avg Pwr
850	128	824.2	25.8	16.8	25.8	19.7
	190	836.6	26.2	17.2	26.2	20.2
	251	848.8	26.3	17.3	26.3	20.3

Notes:

The worst-case configuration and mode for SAR testing is determined to be as follows:

- Head: GMSK Voice Mode
- Body: GMSK (GPRS) mode with 2 time slots, based on the output power measurements above
- SAR is not required for EGPRS (8PSK) Mode because its output power is less than that of GPRS Mode

10.2. GSM1900

GSM (GMSK) Voice Mode

Band	Ch No.	Freq. (MHz)	Avg burst Pwr (dBm)
1900	512	1850.2	29.6
	661	1880.0	29.6
	810	1909.8	29.5

GPRS (GMSK) - Coding Scheme: CS1

Band	Ch No.	f (MHz)	Avg burst Pwr (dBm)			
			1 slot	Frame Avg Pwr	2 slots	Frame Avg Pwr
1900	512	1850.2	29.6	20.6	29.5	23.5
	661	1880.0	29.6	20.6	29.5	23.5
	810	1909.8	29.5	20.5	29.4	23.4

EGPRS (8PSK) - Coding Scheme: MCS5

Band	Ch No.	f (MHz)	Avg burst Pwr (dBm)			
			1 slot	Frame Avg Pwr	2 slots	Frame Avg Pwr
1900	512	1850.2	25.2	16.2	25.1	19.0
	661	1880.0	25.2	16.1	25.0	19.0
	810	1909.8	25.1	16.1	25.0	18.9

Notes:

The worst-case configuration and mode for SAR testing is determined to be as follows:

- Head: GMSK Voice Mode
- Body: GMSK (GPRS) mode with 2 time slots, based on the output power measurements above
- SAR is not required for EGPRS (8PSK) Mode because its output power is less than that of GPRS Mode

10.3. W-CDMA (UMTS) Band II

Release 99

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

Results

Band	Mode	UL Ch No.	Freq. (MHz)	Avg Pwr (dBm)
W-CDMA (UMTS) Band II	Rel 99 (RMC, 12.2 kbps)	9262	1852.4	23.1
		9400	1880.0	23.1
		9538	1907.6	23.1

HSDPA

The following 4 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	HSDPA	HSDPA	HSDPA	HSDPA	
Subtest	1	2	3	4	
W-CDMA 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	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			

Results

Band	Mode	UL Ch No.	Freq. (MHz)	Target MPR	Meas. MPR	Avg Pwr (dBm)
W-CDMA (UMTS) Band II	Subtest 1	9262	1852.4	0	0	23.1
		9400	1880.0	0	0	23.1
		9538	1907.6	0	0	23.1
	Subtest 2	9262	1852.4	0	0	23.1
		9400	1880.0	0	0	23.1
		9538	1907.6	0	0	23.1
	Subtest 3	9262	1852.4	0.5	0.4	22.7
		9400	1880.0	0.5	0.4	22.6
		9538	1907.6	0.5	0.5	22.6
	Subtest 4	9262	1852.4	0.5	0.4	22.7
		9400	1880.0	0.5	0.4	22.6
		9538	1907.6	0.5	0.5	22.6

Note(s):

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

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	
WCDMA General Settings	Loopback Mode					
	Test Mode 1					
	Rel99 RMC					
	12.2kbps RMC					
	HSDPA FRC					
	H-Set1					
	HSUPA Test					
	HSUPA Loopback					
	Power Control Algorithm					
	Algorithm2					
	β_c	11/15	6/15	15/15	2/15	15/15
	β_d	15/15	15/15	9/15	15/15	15/15
β_{ec}	209/225	12/15	30/15	2/15	24/15	
β_c/β_d	11/15	6/15	15/9	2/15	15/15	
β_{hs}	22/15	12/15	30/15	4/15	30/15	
β_{ed}	1309/225	94/75	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						
$A_{hs} = \beta_{hs}/\beta_c$						
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

Results

Mode	UL Ch No.	Freq. (MHz)	Target MPR	*Meas. MPR	Avg Pwr (dBm)
Subtest 1	9262	1852.4	0	0.4	22.7
	9400	1880.0	0	0.4	22.6
	9538	1907.6	0	0.5	22.6
Subtest 2	9262	1852.4	2	0.3	22.8
	9400	1880.0	2	0.4	22.7
	9538	1907.6	2	0.5	22.7
Subtest 3	9262	1852.4	1	0.0	23.1
	9400	1880.0	1	0.0	23.1
	9538	1907.6	1	0.1	23.1
Subtest 4	9262	1852.4	2	-0.1	23.2
	9400	1880.0	2	-0.1	23.1
	9538	1907.6	2	0.0	23.1
Subtest 5	9262	1852.4	0	-0.1	23.2
	9400	1880.0	0	-0.1	23.1
	9538	1907.6	0	0.4	22.8

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.
- *: Please refer to the separately attached document *MPR HSUPA Issue_ZNFVS930* for a detailed explanation/justification from the manufacturer on why MPR was not implemented for this particular mode on this device.

10.4. CDMA BC0

1xRTT

CDMA			Avg Pwr (dBm)		
			RC1 - SO55	RC3 - SO55	RC3 - SO32
Band	Ch	Freq. (MHz)	(Loopback)	(Loopback)	(+F-SCH)
BC 0	1013	824.7	25.0	25.1	25.0
	384	836.52	25.1	25.1	25.1
	777	848.31	25.0	25.0	25.0

1xEv-Do Rel. 0

Band	FTAP Rate	RTAP Rate	Channel	f (MHz)	Avg Pwr (dBm)
BC0	307.2 kbps (2 slot, QPSK)	153.6 kbps	1013	824.7	25.1
			384	836.52	25.1
			777	848.31	25.1

1xEv-Do Rev. A

Band	FETAP Traffic Format	RETAP Data Payload Size	Channel	f (MHz)	Avg Pwr (dBm)
BC0	307.2k, QPSK/ ACK channel is transmitted at all the slots	4096	1013	824.7	25.1
			384	836.52	25.1
			777	848.31	25.0

10.5. CDMA BC1

1xRTT

CDMA			Avg Pwr (dBm)		
			RC1 - SO55	RC3 - SO55	RC3 - SO32
Band	Ch	Freq. (MHz)	(Loopback)	(Loopback)	(+F-SCH)
BC 1	25	1851.25	24.0	24.0	24.1
	600	1880	24.0	24.0	24.1
	1175	1908.75	24.0	24.1	24.0

1xEv-Do Rel. 0

Band	FTAP Rate	RTAP Rate	Channel	f (MHz)	Avg Pwr (dBm)
BC1	307.2 kbps (2 slot, QPSK)	153.6 kbps	25	1851.25	24.2
			600	1880	24.2
			1175	1908.75	24.2

1xEv-Do Rev. A

Band	FETAP Traffic Format	RETAP Data Payload Size	Channel	f (MHz)	Avg Pwr (dBm)
BC1	307.2k, QPSK/ ACK channel is transmitted at all the slots	4096	25	1851.25	24.2
			600	1880	24.2
			1175	1908.75	24.1

10.6. LTE Band 13

The following tests were conducted according to the test requirements outlined in section 6.2 of the 3GPP TS36.101 specification.

UE Power Class: 3 (23 +/- 2dBm). The allowed Maximum Power Reduction (MPR) for the maximum output power due to higher order modulation and transmit bandwidth configuration (resource blocks) is specified in Table 6.2.3-1 of the 3GPP TS36.101.

Table 6.2.3-1: Maximum Power Reduction (MPR) for Power Class 3

Modulation	Channel bandwidth / Transmission bandwidth (RB)						MPR (dB)
	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz	
QPSK	> 5	> 4	> 8	> 12	> 16	> 18	≤ 1
16 QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	≤ 1
16 QAM	> 5	> 4	> 8	> 12	> 16	> 18	≤ 2

The allowed A-MPR values specified below in Table 6.2.4.-1 of 3GPP TS36.101 are in addition to the allowed MPR requirements. All the measurements below were performed with A-MPR disabled, by using Network Signaling Value of "NS_01".

Table 6.2.4-1: Additional Maximum Power Reduction (A-MPR)

Network Signalling value	Requirements (sub-clause)	E-UTRA Band	Channel bandwidth (MHz)	Resources Blocks (N_{RB})	A-MPR (dB)
NS_01	6.6.2.1.1	Table 5.5-1	1.4, 3, 5, 10, 15, 20	Table 5.6-1	NA
NS_03	6.6.2.2.1	2, 4, 10, 23, 25, 35, 36	3	>5	≤ 1
			5	>6	≤ 1
			10	>6	≤ 1
			15	>8	≤ 1
			20	>10	≤ 1
NS_04	6.6.2.2.2	41	5	>6	≤ 1
			10, 15, 20	See Table 6.2.4-4	
NS_05	6.6.3.3.1	1	10, 15, 20	≥ 50	≤ 1
NS_06	6.6.2.2.3	12, 13, 14, 17	1.4, 3, 5, 10	Table 5.6-1	n/a
NS_07	6.6.2.2.3	13	10	Table 6.2.4-2	Table 6.2.4-2
	6.6.3.3.2				
NS_08	6.6.3.3.3	19	10, 15	> 44	≤ 3
NS_09	6.6.3.3.4	21	10, 15	> 40	≤ 1
				> 55	≤ 2
NS_10		20	15, 20	Table 6.2.4-3	Table 6.2.4-3
NS_11	6.6.2.2.1	23 ¹	1.4, 3, 5, 10	Table 6.2.4-5	Table 6.2.4-5
..					
NS_32	-	-	-	-	-

Note 1: Applies to the lower block of Band 23, i.e. a carrier placed in the 2000-2010 MHz region.

Band 13

BW	Ch	Freq. (MHz)	Mode	UL RB Allocation	UL RB Start	Target MPR	Meas. MPR	Avg Pwr (dBm)
10	23230	782.0	QPSK	25	12	1	1	21.8
				1	0	0	0	22.6
				1	49	0	0	22.5
				50	0	1	1	21.6
			16QAM	25	12	2	2	20.8
				1	0	1	1	21.9
				1	49	1	1	21.8
				50	0	2	2	20.6

10.7. Power Reduction for SV-DO

CDMA 1xRTT (BC0) to 1xEVDO (BC0 & BC1)

Agilent 8960		R&S CMU 200					
CDMA BC0 1xRTT		BC0 1xEVDO			BC1 1xEVDO		
		Output Power [dBm]			Output Power [dBm]		
Ch. #	Output Power [dBm]	1013	384	777	25	600	1175
1013	15	24.8	25.0	24.9	23.8	23.9	23.6
	16	19.8	19.9	20.0	18.8	18.8	18.7
384	15	24.8	24.9	24.8	23.8	23.8	23.6
	16	19.9	20.0	20.0	18.8	18.7	18.6
777	15	24.8	25.0	25.0	23.8	23.7	23.6
	16	19.9	20.1	20.0	18.7	18.7	18.6

CDMA 1xRTT (BC1) to 1xEVDO (BC0 & BC1)

Agilent 8960		R&S CMU 200					
CDMA BC1 1xRTT		BC0 1xEVDO			BC1 1xEVDO		
		Output Power [dBm]			Output Power [dBm]		
Ch. #	Output Power [dBm]	1013	384	777	25	600	1175
25	15	24.8	24.9	24.8	23.8	23.8	23.6
	16	19.9	20.0	19.8	18.8	18.7	18.7
600	15	24.8	25.0	24.8	23.8	23.9	23.6
	16	19.8	20.0	19.7	18.8	18.8	18.6
1175	15	24.8	25.0	24.9	23.8	23.9	23.6
	16	19.7	20.0	19.9	18.7	18.9	18.6

10.8. Power Reduction for SV-LTE Band 13

CDMA 1xRTT (BC0) to SV-LTE Band 13 (QPSK, 16QAM)

Agilent 8960		R&S CMW 500							
CDMA BC0 1xRTT		QPSK				16QAM			
		Output Power [dBm]				Output Power [dBm]			
Ch. #	Output Power [dBm]	1RB, 0 offset	1RB 49 offset	25RB 12 offset	50RB	1RB, 0 offset	1RB 49 offset	25RB 12 offset	50RB
1013	18	22.5	22.3	21.7	21.6	21.9	21.8	20.8	20.6
	19	18.5	18.2	18.6	18.7	18.9	18.8	18.8	18.5
384	18	22.4	22.3	21.7	21.6	21.8	21.8	20.8	20.5
	19	18.4	18.3	18.5	18.6	18.8	18.7	18.7	18.5
777	18	22.6	22.3	21.8	21.6	21.9	21.7	20.8	20.6
	19	18.5	18.3	18.6	18.7	18.8	18.7	18.8	18.6

CDMA 1xRTT (BC1) to SV-LTE Band 13 (QPSK, 16QAM)

Agilent 8960		R&S CMW 500							
CDMA BC1 1xRTT		QPSK				16QAM			
		Output Power [dBm]				Output Power [dBm]			
Ch. #	Output Power [dBm]	1RB, 0 offset	1RB 49 offset	25RB 12 offset	50RB	1RB, 0 offset	1RB 49 offset	25RB 12 offset	50RB
25	18	22.5	22.3	21.8	21.7	21.9	21.7	20.7	20.6
	19	18.6	18.3	18.7	18.7	18.8	18.8	18.8	18.6
600	18	22.4	22.3	21.7	21.7	21.8	21.7	20.8	20.6
	19	18.5	18.3	18.7	18.6	18.8	18.7	18.8	18.7
1175	18	22.6	22.4	21.8	21.7	21.7	21.8	20.8	20.5
	19	18.5	18.4	18.7	18.8	18.8	18.8	18.9	18.6

10.9. Wi-Fi (2.4 GHz band)

Band (MHz)	Mode	Ch #	Freq. (MHz)	Measured Avg Pwr(dBm)
2.4	802.11b	1	2412	15.4
		6	2437	14.9
		11	2462	14.9
	802.11g	1	2412	12.1
		6	2437	11.8
		11	2462	11.7
	802.11n (HT20)	1	2412	11.2
		6	2437	10.8
		11	2462	10.8

Note(s):

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

10.10. Wi-Fi (5 GHz bands)

Band (MHz)	Mode	Ch #	Freq. (MHz)	Measured Avg Pwr(dBm)
5.2	802.11a	36	5180	11.9
		40	5200	11.8
		44	5220	11.4
		48	5240	11.6
	802.11n (HT20)	36	5180	10.7
		40	5200	10.5
48		5240	10.6	
5.3	802.11a	52	5260	11.4
		56	5280	11.6
		60	5300	11.5
		64	5320	11.6
	802.11n (HT20)	52	5260	10.7
		60	5300	10.8
64		5320	10.7	
5.5	802.11a	100	5500	11.9
		104	5520	11.8
		108	5540	12.0
		112	5560	11.9
		116	5580	12.0
		120	5600	n/a*
		124	5620	n/a*
		128	5640	n/a*
		132	5660	11.9
		136	5680	11.8
	140	5700	11.9	
	802.11n (HT20)	100	5500	10.9
		120	5600	n/a*
		140	5700	10.8
5.8	802.11a	149	5745	11.9
		153	5765	11.5
		157	5785	11.6
		161	5805	11.6
		165	5825	11.9
	802.11n (HT20)	149	5745	10.9
		157	5785	10.5
		165	5825	10.8

Note(s):

- SAR is not required for 802.HT20 channels when the maximum average output power is less than 1/4 dB higher than that measured on the corresponding 802.11a/b channels. As per KDB 248227
- *: These channels were disabled

10.11. Bluetooth

Mode	Channel #	Freq. (MHz)	Conducted Avg Power	
			(dBm)	(mW)
V2.1 + EDR, GFSK	0	2402	7.8	6.03
	39	2441	7.9	6.17
	78	2480	8.5	7.08
V2.1 + EDR, $\pi/4$ DQPSK	0	2402	7.2	5.25
	39	2441	6.5	4.47
	78	2480	7.0	5.01
V2.1 + EDR, 8-DPSK	0	2402	6.2	4.17
	39	2441	6.4	4.37
	78	2480	6.9	4.90
V4.0 LE, GFSK	0	2402	7.3	5.38
	39	2441	8.0	6.32
	78	2480	7.5	5.56

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

11. 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

11.1. 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

11.2. 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 ±(%)	
3/27/2012	Head 750	e'	42.1837	Relative Permittivity (ϵ_r):	42.18	41.96	0.53	5
		e"	21.6073	Conductivity (σ):	0.90	0.89	0.90	5
	Head 780	e'	42.2163	Relative Permittivity (ϵ_r):	42.22	41.81	0.98	5
		e"	21.4475	Conductivity (σ):	0.93	0.90	3.89	5
	Head 790	e'	42.0943	Relative Permittivity (ϵ_r):	42.09	41.76	0.81	5
		e"	21.3295	Conductivity (σ):	0.94	0.90	4.55	5
3/28/2012	Body 750	e'	55.5308	Relative Permittivity (ϵ_r):	55.53	55.55	-0.03	5
		e"	22.9237	Conductivity (σ):	0.96	0.96	-0.74	5
	Body 780	e'	55.2742	Relative Permittivity (ϵ_r):	55.27	55.43	-0.28	5
		e"	22.6262	Conductivity (σ):	0.98	0.97	1.65	5
	Body 790	e'	55.1971	Relative Permittivity (ϵ_r):	55.20	55.39	-0.35	5
		e"	22.5641	Conductivity (σ):	0.99	0.97	2.59	5
3/28/2012	Body 1900	e'	52.8700	Relative Permittivity (ϵ_r):	52.87	53.30	-0.81	5
		e"	14.5272	Conductivity (σ):	1.53	1.52	0.97	5
	Body 1850	e'	53.0274	Relative Permittivity (ϵ_r):	53.03	53.30	-0.51	5
		e"	14.3817	Conductivity (σ):	1.48	1.52	-2.67	5
	Body 1880	e'	52.9270	Relative Permittivity (ϵ_r):	52.93	53.30	-0.70	5
		e"	14.4693	Conductivity (σ):	1.51	1.52	-0.49	5
	Body 1910	e'	52.8440	Relative Permittivity (ϵ_r):	52.84	53.30	-0.86	5
		e"	14.5541	Conductivity (σ):	1.55	1.52	1.69	5
3/29/2012	Head 2450	e'	37.8645	Relative Permittivity (ϵ_r):	37.86	39.20	-3.41	5
		e"	13.1493	Conductivity (σ):	1.79	1.80	-0.48	5
	Head 2410	e'	38.0055	Relative Permittivity (ϵ_r):	38.01	39.28	-3.24	5
		e"	13.0310	Conductivity (σ):	1.75	1.76	-0.81	5
	Head 2435	e'	37.9184	Relative Permittivity (ϵ_r):	37.92	39.24	-3.36	5
		e"	13.1031	Conductivity (σ):	1.77	1.78	-0.47	5
	Head 2460	e'	37.8327	Relative Permittivity (ϵ_r):	37.83	39.19	-3.46	5
		e"	13.1820	Conductivity (σ):	1.80	1.81	-0.43	5
3/29/2012	Body 835	e'	54.1476	Relative Permittivity (ϵ_r):	54.15	55.20	-1.91	5
		e"	20.8257	Conductivity (σ):	0.97	0.97	-0.32	5
	Body 820	e'	54.2690	Relative Permittivity (ϵ_r):	54.27	55.28	-1.82	5
		e"	20.8840	Conductivity (σ):	0.95	0.97	-1.68	5
	Body 850	e'	54.0217	Relative Permittivity (ϵ_r):	54.02	55.16	-2.06	5
		e"	20.7474	Conductivity (σ):	0.98	0.99	-0.67	5
3/29/2012	Body 1900	e'	52.1678	Relative Permittivity (ϵ_r):	52.17	53.30	-2.12	5
		e"	14.8432	Conductivity (σ):	1.57	1.52	3.17	5
	Body 1850	e'	52.3219	Relative Permittivity (ϵ_r):	52.32	53.30	-1.84	5
		e"	14.7160	Conductivity (σ):	1.51	1.52	-0.41	5
	Body 1880	e'	52.2255	Relative Permittivity (ϵ_r):	52.23	53.30	-2.02	5
		e"	14.7992	Conductivity (σ):	1.55	1.52	1.78	5
	Body 1910	e'	52.1431	Relative Permittivity (ϵ_r):	52.14	53.30	-2.17	5
		e"	14.8647	Conductivity (σ):	1.58	1.52	3.86	5

Tissue Dielectric Parameter Check Results (continued)

Date	Freq. (MHz)	Liquid Parameters		Measured	Target	Delta (%)	Limit ±(%)	
3/29/2012	Body 2450	e'	50.6712	Relative Permittivity (ϵ_r):	50.67	52.70	-3.85	5
		e"	13.9652	Conductivity (σ):	1.90	1.95	-2.44	5
	Body 2410	e'	50.8421	Relative Permittivity (ϵ_r):	50.84	52.76	-3.63	5
		e"	13.8038	Conductivity (σ):	1.85	1.91	-3.03	5
	Body 2435	e'	50.7281	Relative Permittivity (ϵ_r):	50.73	52.73	-3.79	5
		e"	13.9023	Conductivity (σ):	1.88	1.93	-2.53	5
	Body 2475	e'	50.6260	Relative Permittivity (ϵ_r):	50.63	52.67	-3.88	5
		e"	14.0766	Conductivity (σ):	1.94	1.99	-2.42	5
3/30/2012	Body 5180	e'	50.7643	Relative Permittivity (ϵ_r):	50.76	49.05	3.50	10
		e"	18.2092	Conductivity (σ):	5.24	5.27	-0.51	5
	Body 5200	e'	50.6727	Relative Permittivity (ϵ_r):	50.67	49.02	3.37	10
		e"	18.2623	Conductivity (σ):	5.28	5.29	-0.27	5
	Body 5500	e'	50.3207	Relative Permittivity (ϵ_r):	50.32	48.61	3.51	10
		e"	18.6304	Conductivity (σ):	5.70	5.64	0.94	5
	Body 5800	e'	49.6094	Relative Permittivity (ϵ_r):	49.61	48.20	2.92	10
		e"	18.9723	Conductivity (σ):	6.12	6.00	1.98	5
	Body 5825	e'	49.7520	Relative Permittivity (ϵ_r):	49.75	48.20	3.22	10
		e"	19.1184	Conductivity (σ):	6.19	6.00	3.20	5
3/30/2012	Head 1900	e'	40.3152	Relative Permittivity (ϵ_r):	40.32	40.00	0.79	5
		e"	13.5044	Conductivity (σ):	1.43	1.40	1.91	5
	Head 1850	e'	40.4875	Relative Permittivity (ϵ_r):	40.49	40.00	1.22	5
		e"	13.3724	Conductivity (σ):	1.38	1.40	-1.75	5
	Head 1880	e'	40.3807	Relative Permittivity (ϵ_r):	40.38	40.00	0.95	5
		e"	13.4550	Conductivity (σ):	1.41	1.40	0.46	5
	Head 1910	e'	40.2786	Relative Permittivity (ϵ_r):	40.28	40.00	0.70	5
		e"	13.5272	Conductivity (σ):	1.44	1.40	2.62	5
3/31/2012	Body 5180	e'	50.6443	Relative Permittivity (ϵ_r):	50.64	49.05	3.26	10
		e"	18.3059	Conductivity (σ):	5.27	5.27	0.02	5
	Body 5200	e'	50.6063	Relative Permittivity (ϵ_r):	50.61	49.02	3.24	10
		e"	18.3636	Conductivity (σ):	5.31	5.29	0.28	5
	Body 5500	e'	50.1482	Relative Permittivity (ϵ_r):	50.15	48.61	3.16	10
		e"	18.7333	Conductivity (σ):	5.73	5.64	1.50	5
	Body 5800	e'	49.5087	Relative Permittivity (ϵ_r):	49.51	48.20	2.72	10
		e"	19.0073	Conductivity (σ):	6.13	6.00	2.16	5
	Body 5825	e'	49.5129	Relative Permittivity (ϵ_r):	49.51	48.20	2.72	10
		e"	19.1587	Conductivity (σ):	6.21	6.00	3.42	5
4/2/2011	Head 5180	e'	35.2047	Relative Permittivity (ϵ_r):	35.20	36.01	-2.24	10
		e"	16.4502	Conductivity (σ):	4.74	4.63	2.32	5
	Head 5200	e'	35.1660	Relative Permittivity (ϵ_r):	35.17	35.99	-2.29	10
		e"	16.4776	Conductivity (σ):	4.76	4.65	2.44	5
	Head 5500	e'	34.6803	Relative Permittivity (ϵ_r):	34.68	35.65	-2.71	10
		e"	16.6672	Conductivity (σ):	5.10	4.96	2.81	5
	Head 5800	e'	34.1541	Relative Permittivity (ϵ_r):	34.15	35.30	-3.25	10
		e"	16.8223	Conductivity (σ):	5.43	5.27	2.94	5
	Head 5825	e'	34.1145	Relative Permittivity (ϵ_r):	34.11	35.30	-3.36	10
		e"	16.8560	Conductivity (σ):	5.46	5.27	3.60	5

Tissue Dielectric Parameter Check Results (continued)

Date	Freq. (MHz)	Liquid Parameters		Measured	Target	Delta (%)	Limit ±(%)	
4/3/2012	Body 1900	e'	50.9778	Relative Permittivity (ϵ_r):	50.98	53.30	-4.36	5
		e"	14.2404	Conductivity (σ):	1.50	1.52	-1.02	5
	Body 1850	e'	51.1376	Relative Permittivity (ϵ_r):	51.14	53.30	-4.06	5
		e"	14.0714	Conductivity (σ):	1.45	1.52	-4.77	5
	Body 1880	e'	51.0458	Relative Permittivity (ϵ_r):	51.05	53.30	-4.23	5
		e"	14.1691	Conductivity (σ):	1.48	1.52	-2.56	5
	Body 1910	e'	50.9461	Relative Permittivity (ϵ_r):	50.95	53.30	-4.42	5
		e"	14.2760	Conductivity (σ):	1.52	1.52	-0.25	5
4/3/2011	Head 5180	e'	35.9579	Relative Permittivity (ϵ_r):	35.96	36.01	-0.15	10
		e"	16.3465	Conductivity (σ):	4.71	4.63	1.68	5
	Head 5200	e'	35.9115	Relative Permittivity (ϵ_r):	35.91	35.99	-0.22	10
		e"	16.3834	Conductivity (σ):	4.74	4.65	1.85	5
	Head 5500	e'	35.4150	Relative Permittivity (ϵ_r):	35.42	35.65	-0.65	10
		e"	16.6255	Conductivity (σ):	5.08	4.96	2.55	5
	Head 5800	e'	34.8418	Relative Permittivity (ϵ_r):	34.84	35.30	-1.30	10
		e"	16.7850	Conductivity (σ):	5.41	5.27	2.72	5
	Head 5825	e'	34.8010	Relative Permittivity (ϵ_r):	34.80	35.30	-1.41	10
		e"	16.8800	Conductivity (σ):	5.47	5.27	3.74	5
4/4/2012	Body 5180	e'	50.7917	Relative Permittivity (ϵ_r):	50.79	49.05	3.56	10
		e"	17.6642	Conductivity (σ):	5.09	5.27	-3.48	5
	Body 5200	e'	50.7646	Relative Permittivity (ϵ_r):	50.76	49.02	3.56	10
		e"	17.6885	Conductivity (σ):	5.11	5.29	-3.41	5
	Body 5500	e'	50.3123	Relative Permittivity (ϵ_r):	50.31	48.61	3.50	10
		e"	17.9476	Conductivity (σ):	5.49	5.64	-2.76	5
	Body 5800	e'	50.8574	Relative Permittivity (ϵ_r):	50.86	48.20	5.51	10
		e"	18.1883	Conductivity (σ):	5.87	6.00	-2.24	5
	Body 5825	e'	49.8361	Relative Permittivity (ϵ_r):	49.84	48.20	3.39	10
		e"	18.2593	Conductivity (σ):	5.91	6.00	-1.43	5
4/4/2012	Head 835	e'	42.4235	Relative Permittivity (ϵ_r):	42.42	41.50	2.23	5
		e"	19.0995	Conductivity (σ):	0.89	0.90	-1.47	5
	Head 820	e'	42.6104	Relative Permittivity (ϵ_r):	42.61	41.60	2.42	5
		e"	19.1347	Conductivity (σ):	0.87	0.90	-2.90	5
	Head 850	e'	42.2505	Relative Permittivity (ϵ_r):	42.25	41.50	1.81	5
		e"	19.0626	Conductivity (σ):	0.90	0.92	-1.54	5
4/4/2011	Head 5180	e'	36.0569	Relative Permittivity (ϵ_r):	36.06	36.01	0.12	10
		e"	16.3331	Conductivity (σ):	4.70	4.63	1.59	5
	Head 5200	e'	36.0167	Relative Permittivity (ϵ_r):	36.02	35.99	0.07	10
		e"	16.3474	Conductivity (σ):	4.73	4.65	1.63	5
	Head 5500	e'	35.5876	Relative Permittivity (ϵ_r):	35.59	35.65	-0.17	10
		e"	16.4185	Conductivity (σ):	5.02	4.96	1.27	5
	Head 5800	e'	35.1795	Relative Permittivity (ϵ_r):	35.18	35.30	-0.34	10
		e"	16.5362	Conductivity (σ):	5.33	5.27	1.19	5
	Head 5825	e'	35.1533	Relative Permittivity (ϵ_r):	35.15	35.30	-0.42	10
		e"	16.5204	Conductivity (σ):	5.35	5.27	1.53	5
4/4/2012	Body 1900	e'	51.7839	Relative Permittivity (ϵ_r):	51.78	53.30	-2.84	5
		e"	14.4415	Conductivity (σ):	1.53	1.52	0.37	5
	Body 1850	e'	51.9895	Relative Permittivity (ϵ_r):	51.99	53.30	-2.46	5
		e"	14.2441	Conductivity (σ):	1.47	1.52	-3.60	5
	Body 1880	e'	51.8689	Relative Permittivity (ϵ_r):	51.87	53.30	-2.68	5
		e"	14.3582	Conductivity (σ):	1.50	1.52	-1.26	5
	Body 1910	e'	51.7492	Relative Permittivity (ϵ_r):	51.75	53.30	-2.91	5
		e"	14.4829	Conductivity (σ):	1.54	1.52	1.19	5

Tissue Dielectric Parameter Check Results (continued)

Date	Freq. (MHz)	Liquid Parameters		Measured	Target	Delta (%)	Limit ±(%)	
4/5/2012	Body 750	e'	55.6494	Relative Permittivity (ϵ_r):	55.65	55.55	0.19	5
		e"	22.9487	Conductivity (σ):	0.96	0.96	-0.63	5
	Body 780	e'	55.3383	Relative Permittivity (ϵ_r):	55.34	55.43	-0.17	5
		e"	22.6890	Conductivity (σ):	0.98	0.97	1.93	5
	Body 790	e'	55.2479	Relative Permittivity (ϵ_r):	55.25	55.39	-0.26	5
		e"	22.6254	Conductivity (σ):	0.99	0.97	2.87	5
4/5/2012	Body 835	e'	54.8959	Relative Permittivity (ϵ_r):	54.90	55.20	-0.55	5
		e"	21.1849	Conductivity (σ):	0.98	0.97	1.40	5
	Body 820	e'	55.0370	Relative Permittivity (ϵ_r):	55.04	55.28	-0.43	5
		e"	21.2634	Conductivity (σ):	0.97	0.97	0.11	5
	Body 850	e'	54.7702	Relative Permittivity (ϵ_r):	54.77	55.16	-0.70	5
		e"	21.1154	Conductivity (σ):	1.00	0.99	1.10	5
4/6/2012	Body 2450	e'	51.4247	Relative Permittivity (ϵ_r):	51.42	52.70	-2.42	5
		e"	14.6345	Conductivity (σ):	1.99	1.95	2.24	5
	Body 2410	e'	51.5638	Relative Permittivity (ϵ_r):	51.56	52.76	-2.27	5
		e"	14.4759	Conductivity (σ):	1.94	1.91	1.70	5
	Body 2435	e'	51.4691	Relative Permittivity (ϵ_r):	51.47	52.73	-2.38	5
		e"	14.5727	Conductivity (σ):	1.97	1.93	2.17	5
	Body 2475	e'	51.3571	Relative Permittivity (ϵ_r):	51.36	52.67	-2.49	5
		e"	14.7428	Conductivity (σ):	2.03	1.99	2.20	5

12. 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 $\pm 10\%$.

12.1. 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.

12.2. 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
D750V3	1019	2/9/12	750	1g	8.64	8.84
				10g	5.64	5.84
D835V2	4d002	3/6/12	835	1g	9.24	9.64
				10g	6.04	6.32
D1900V2	5d043	11/10/11	1900	1g	40.8	42.0
				10g	21.2	22.0
D2450V2	748	2/7/12	2450	1g	53.6	50.8
				10g	24.8	23.6
D5GHzV2	1075	2/14/12	5200	1g	79.7	72.8
				10g	22.9	20.5
			5500	1g	86.1	77.7
				10g	24.5	21.7
			5800	1g	79.4	72.4
				10g	22.7	20.2

12.3. 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			
3/27/2012	D750V3	1019	Head	1g	8.70	8.64	0.69	±10
				10g	5.71			
3/28/2012	D750V3	1019	Body	1g	9.03	8.84	2.15	±10
				10g	6.01			
3/28/2012	D1900V2	5d043	Body	1g	44.7	42.0	6.43	±10
				10g	23.4			
3/29/2012	D2450	748	Head	1g	55.8	53.6	4.10	±10
				10g	25.6			
3/29/2012	D835V2	4d002	Body	1g	9.41	9.64	-2.39	±10
				10g	6.19			
3/29/2012	D1900V2	5d043	Body	1g	41.7	42.0	-0.71	±10
				10g	22.0			
3/29/2012	D2450	748	Body	1g	53.3	50.8	4.92	±10
				10g	24.8			
3/30/2012	D5GHzV2 5.2GHz	1075	Body	1g	71.6	72.8	-1.65	±10
				10g	20.4			
	D5GHzV2 5.5GHz	1075	Body	1g	79.6	77.7	2.45	±10
				10g	22.6			
D5GHzV2 5.8GHz	1075	Body	1g	75.7	72.4	4.56	±10	
			10g	21.4				20.2
3/30/2012	D1900V2	5d043	Head	1g	39.4	40.8	-3.43	±10
				10g	20.5			
3/31/2012	D5GHzV2 5.2GHz	1075	Body	1g	73.2	72.8	0.55	±10
				10g	20.9			
	D5GHzV2 5.5GHz	1075	Body	1g	79.6	77.7	2.45	±10
				10g	22.6			
D5GHzV2 5.8GHz	1075	Body	1g	71.1	72.4	-1.80	±10	
			10g	20.1				20.2
4/2/2012	D5GHzV2 5.2GHz	1075	Head	1g	79.9	79.7	0.25	±10
				10g	23.1			
	D5GHzV2 5.5GHz	1075	Head	1g	83.9	86.1	-2.56	±10
				10g	24.0			
D5GHzV2 5.8GHz	1075	Head	1g	83.5	79.4	5.16	±10	
			10g	23.9				22.7
4/3/2012	D1900V2	5d043	Body	1g	43.6	42.0	3.81	±10
				10g	22.6			
4/3/2012	D5GHzV2 5.2GHz	1075	Head	1g	82.3	79.7	3.26	±10
				10g	23.8			
	D5GHzV2 5.5GHz	1075	Head	1g	88.3	86.1	2.56	±10
				10g	25.3			
D5GHzV2 5.8GHz	1075	Head	1g	84.7	79.4	6.68	±10	
			10g	24.2				22.7
4/4/2012	D5GHzV2 5.2GHz	1075	Body	1g	71.0	72.8	-2.47	±10
				10g	20.4			
	D5GHzV2 5.5GHz	1075	Body	1g	74.9	77.7	-3.60	±10
				10g	21.3			
D5GHzV2 5.8GHz	1075	Body	1g	74.0	72.4	2.21	±10	
			10g	20.9				20.2

System Performance Check Results (continued)

Date Tested	System Dipole		T.S. Liquid	SAR Measured (Normalized to 1 W)		Target (Ref. Value)	Delta (%)	Tolerance (%)
	Type	Serial No.		1g	10g			
4/4/2012	D835V2	4d002	Head	1g	9.85	9.24	6.60	±10
				10g	6.47	6.04	7.12	
4/4/2012	D5GHzV2 5.2GHz	1075	Head	1g	78.2	79.7	-1.88	±10
				10g	22.5	22.9	-1.75	
4/4/2012	D1900V2	5d043	Body	1g	42.5	42.0	1.19	±10
				10g	22.3	22.0	1.36	
4/5/2012	D835V2	4d002	Body	1g	9.57	9.64	-0.73	±10
				10g	6.28	6.32	-0.63	
3/28/2012	D750V3	1019	Body	1g	9.06	8.84	2.49	±10
				10g	5.74	5.84	-1.71	
3/29/2012	D2450	748	Body	1g	52.7	50.8	3.74	±10
				10g	24.7	23.6	4.66	

13. SAR Test Results

All SAR tests were performed with the normal battery cover with NFC (without the wireless charging hardware). Testing was repeated with the wireless charging battery cover for the highest SAR measured from normal battery cover, as per KDB 648474 D03 Handset Wireless Battery Chargers v01.

13.1. GSM850

13.1.1. Head SAR

Test Position	Mode	Ch #.	Freq. (MHz)	Avg Pwr (dBm)	SAR (mW/g)		Note
					1-g	10-g	
Left Touch	GSM	128	824.20	32.9			1
		190	836.60	33.0	0.311	0.240	
		251	848.80	32.8			1
Left Tilt (15°)	GSM	128	824.20	32.9			1
		190	836.60	33.0	0.183	0.144	
		251	848.80	32.8			1
Right Touch	GSM	128	824.20	32.9			1
		190	836.60	33.0	0.332	0.255	1
		190	836.60	33.0	0.335	0.257	2
		251	848.80	32.8			1
Right Tilt (15°)	GSM	128	824.20	32.9			1
		190	836.60	33.0	0.204	0.161	
		251	848.80	32.8			1

Note(s):

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

13.1.2. Body & Hotspot 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	32.6			1
			190	836.60	32.6	0.706	0.482	
			190	836.60	32.6	0.662	0.438	2
			190	836.60	32.6	0.655	0.446	3
			251	848.80	32.5			1
Front	GPRS 2 slots	10	128	824.20	32.6			1
			190	836.60	32.6	0.469	0.360	
			251	848.80	32.5			1
Edge 1	GPRS 2 slots	10	128	824.20	32.6			4
			190	836.60	32.6			4
			251	848.80	32.5			4
Edge 2	GPRS 2 slots	10	128	824.20	32.6			1
			190	836.60	32.6	0.381	0.267	
			251	848.80	32.5			1
Edge 3	GPRS 2 slots	10	128	824.20	32.6			1
			190	836.60	32.6	0.179	0.115	
			251	848.80	32.5			1
Edge 4	GPRS 2 slots	10	128	824.20	32.6			4
			190	836.60	32.6			4
			251	848.80	32.5			4

Note(s):

1. According to FCC "Public Notice DA 02-1438" by the SCC-34/SC-2, when the SAR measured for the middle channel is < 50% of the SAR limit, testing for the low and high channel is optional.
2. With headset attached.
3. With wireless charging battery cover.
4. SAR is not required because the distance from the tested antenna to this edge is greater than 2.5 cm.

13.2. GSM1900

13.2.1. Head SAR

Test Position	Mode	Ch #.	Freq. (MHz)	Avg Pwr (dBm)	SAR (mW/g)		Note
					1-g	10-g	
Left Touch	GSM	512	1850.2	29.6			1
		661	1880.0	29.6	0.141	0.094	
		810	1909.8	29.5			1
Left Tilt (15°)	GSM	512	1850.2	29.6			1
		661	1880.0	29.6	0.060	0.036	
		810	1909.8	29.5			1
Right Touch	GSM	512	1850.2	29.6			1
		661	1880.0	29.6	0.269	0.169	
		661	1880.0	29.6	0.300	0.185	3
		810	1909.8	29.5			1
Right Tilt (15°)	GSM	512	1850.2	29.6			1
		661	1880.0	29.6	0.078	0.051	
		810	1909.8	29.5			1

13.2.2. Body & Hotspot 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	512	1850.2	29.5			1
			661	1880.0	29.5	0.704	0.413	
			661	1880.0	29.5	0.771	0.450	2
			661	1880.0	29.5	0.666	0.388	3
			810	1909.8	29.4			1
Front	GPRS 2 slots	10	512	1850.2	29.5			1
			661	1880.0	29.5	0.527	0.301	
			810	1909.8	29.4			1
Edge 1	GPRS 2 slots	10	512	1850.2	29.5			4
			661	1880.0	29.5			4
			810	1909.8	29.4			4
Edge 2	GPRS 2 slots	10	512	1850.2	29.5			1
			661	1880.0	29.5	0.295	0.175	
			810	1909.8	29.4			1
Edge 3	GPRS 2 slots	10	512	1850.2	29.5			1
			661	1880.0	29.5	0.210	0.120	
			810	1909.8	29.4			1
Edge 4	GPRS 2 slots	10	512	1850.2	29.5			4
			661	1880.0	29.5			4
			810	1909.8	29.4			4

Note(s):

1. According to FCC "Public Notice DA 02-1438" by the SCC-34/SC-2, when the SAR measured for the middle channel is < 50% of the SAR limit, testing for the low and high channel is optional.
2. With headset attached.
3. With wireless charging battery cover.
4. SAR is not required because the distance from the tested antenna to this edge is greater than 2.5 cm.

13.3. 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

13.3.1. 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	9262	1852.4	23.1			1
		9400	1880.0	23.1	0.340	0.211	
		9400	1880.0	23.1	0.407	0.251	2
		9538	1907.6	23.1			1
Left Tilt (15°)	Rel 99 RMC 12.2kbps	9262	1852.4	23.1			1
		9400	1880.0	23.1	0.088	0.058	
		9538	1907.6	23.1			1
Right Touch	Rel 99 RMC 12.2kbps	9262	1852.4	23.1			1
		9400	1880.0	23.1	0.185	0.121	
		9538	1907.6	23.1			1
Right Tilt (15°)	Rel 99 RMC 12.2kbps	9262	1852.4	23.1			1
		9400	1880.0	23.1	0.079	0.049	
		9538	1907.6	23.1			1

Note(s):

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

13.3.2. Body & Hotspot 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	23.1			1
			9400	1880.0	23.1	0.583	0.346	
			9400	1880.0	23.1	0.588	0.344	2
			9400	1880.0	23.1	0.557	0.323	3
			9538	1907.6	23.1			1
Front	Rel 99 RMC 12.2kbps	10	9262	1852.4	23.1			1
			9400	1880.0	23.1	0.406	0.238	
			9538	1907.6	23.1			1
Edge 1	Rel 99 RMC 12.2kbps	10	9262	1852.4	23.1			4
			9400	1880.0	23.1			4
			9538	1907.6	23.1			4
Edge 2	Rel 99 RMC 12.2kbps	10	9262	1852.4	23.1			4
			9400	1880.0	23.1			4
			9538	1907.6	23.1			4
Edge 3	Rel 99 RMC 12.2kbps	10	9262	1852.4	23.1			1
			9400	1880.0	23.1	0.248	0.140	
			9538	1907.6	23.1			1
Edge 4	Rel 99 RMC 12.2kbps	10	9262	1852.4	23.1			1
			9400	1880.0	23.1	0.214	0.128	
			9538	1907.6	23.1			1

Note(s):

1. According to FCC "Public Notice DA 02-1438" by the SCC-34/SC-2, when the SAR measured for the middle channel is < 50% of the SAR limit, testing for the low and high channel is optional.
2. With headset attached.
3. With wireless charging battery cover.
4. SAR is not required because the distance from the tested antenna to this edge is greater than 2.5 cm.

13.4. CDMA BC0

13.4.1. Head SAR

Test Position	Mode	Ch #.	Freq. (MHz)	Avg Pwr (dBm)	SAR (mW/g)		Note
					1-g	10-g	
Left Touch	1xRTT (RC3 SO55)	1013	824.7	25.1			1
		384	836.5	25.1	0.391	0.304	
		777	848.3	25.0			1
Left Tilt (15°)	1xRTT (RC3 SO55)	1013	824.7	25.1			1
		384	836.5	25.1	0.225	0.177	
		777	848.3	25.0			1
Right Touch	1xRTT (RC3 SO55)	1013	824.7	25.1			1
		384	836.5	25.1	0.452	0.348	
		384	836.5	25.1	0.497	0.386	2
		777	848.3	25.0			1
Right Tilt (15°)	1xRTT (RC3 SO55)	1013	824.7	25.1			1
		384	836.5	25.1	0.270	0.211	
		777	848.3	25.0			1
Test Position	Mode	Ch #.	Freq. (MHz)	Avg Pwr (dBm)	SAR (mW/g)		Note
Left Touch	1xEVDO (Rel. 0)	1013	824.7	25.1			1
		384	836.5	25.1	0.729	0.410	
		384	836.5	25.1	0.763	0.429	2
		777	848.3	25.1			1
Left Tilt (15°)	1xEVDO (Rel. 0)	1013	824.7	25.1			1
		384	836.5	25.1	0.477	0.267	
		777	848.3	25.1			1
Right Touch	1xEVDO (Rel. 0)	1013	824.7	25.1			1
		384	836.5	25.1	0.518	0.334	
		777	848.3	25.1			1
Right Tilt (15°)	1xEVDO (Rel. 0)	1013	824.7	25.1			1
		384	836.5	25.1	0.313	0.200	
		777	848.3	25.1			1

Note(s):

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

13.4.2. Body & Hotspot SAR

Test Position	Mode	Dist. (mm)	Ch #.	Freq. (MHz)	Avg Pwr (dBm)	SAR (mW/g)		Note
						1-g	10-g	
Rear	1xRTT (RC3 SO32)	10	1013	824.7	25.0			1
			384	836.5	25.1	0.624	0.422	
			384	836.5	25.1	0.543	0.352	2
			384	836.5	25.1	0.596	0.406	3
			777	848.3	25.0			1
Front	1xRTT (RC3 SO32)	10	1013	824.7	25.0			1
			384	836.5	25.1	0.425	0.327	
			777	848.3	25.0			1
Edge 1	1xRTT (RC3 SO32)	10	1013	824.7	25.0			4
			384	836.5	25.1			4
			777	848.3	25.0			4
Edge 2	1xRTT (RC3 SO32)	10	1013	824.7	25.0			1
			384	836.5	25.1	0.336	0.235	
			777	848.3	25.0			1
Edge 3	1xRTT (RC3 SO32)	10	1013	824.7	25.0			1
			384	836.5	25.1	0.174	0.112	
			777	848.3	25.0			1
Edge 4	1xRTT (RC3 SO32)	10	1013	824.7	25.0			4
			384	836.5	25.1			4
			777	848.3	25.0			4

Test Position	Mode	Dist. (mm)	Ch #.	Freq. (MHz)	Avg Pwr (dBm)	SAR (mW/g)		Note
						1-g	10-g	
Rear	1xEVDO (Rel. 0)	10	1013	824.7	25.1			1
			384	836.5	25.1	0.550	0.381	
			384	836.5	25.1	0.528	0.357	2
			384	836.5	25.1	0.359	0.235	3
			777	848.3	25.1			1
Front	1xEVDO (Rel. 0)	10	1013	824.7	25.1			1
			384	836.5	25.1	0.215	0.135	
			777	848.3	25.1			1
Edge 1	1xEVDO (Rel. 0)	10	1013	824.7	25.1			1
			384	836.5	25.1	0.127	0.081	
			777	848.3	25.1			1
Edge 2	1xEVDO (Rel. 0)	10	1013	824.7	25.1			1
			384	836.5	25.1	0.290	0.170	
			777	848.3	25.1			1
Edge 3	1xEVDO (Rel. 0)	10	1013	824.7	25.1			4
			384	836.5	25.1			4
			777	848.3	25.1			4
Edge 4	1xEVDO (Rel. 0)	10	1013	824.7	25.1			4
			384	836.5	25.1			4
			777	848.3	25.1			4

Note(s):

1. According to FCC "Public Notice DA 02-1438" by the SCC-34/SC-2, when the SAR measured for the middle channel is < 50% of the SAR limit, testing for the low and high channel is optional.
2. With headset attached.
3. With wireless charging battery cover.
4. SAR is not required because the distance from the tested antenna to this edge is greater than 2.5 cm.

13.5. CDMA BC1

13.5.1. Head SAR

Test Position	Mode	Ch #.	Freq. (MHz)	Avg Pwr (dBm)	SAR (mW/g)		Note
					1-g	10-g	
Left Touch	1xRTT (RC3 SO55)	25	1851.25	24.0			1
		600	1880.00	24.0	0.408	0.268	
		1175	1908.75	24.1			1
Left Tilt (15°)	1xRTT (RC3 SO55)	25	1851.25	24.0			1
		600	1880.00	24.0	0.163	0.100	
		1175	1908.75	24.1			1
Right Touch	1xRTT (RC3 SO55)	25	1851.25	24.0	0.758	0.471	
		600	1880.00	24.0	0.813	0.499	
		600	1880.00	24.0	0.775	0.478	3
		1175	1908.75	24.1	0.702	0.427	
Right Tilt (15°)	1xRTT (RC3 SO55)	25	1851.25	24.0			1
		600	1880.00	24.0	0.224	0.143	
		1175	1908.75	24.1			1
Test Position	Mode	Ch #.	Freq. (MHz)	Avg Pwr (dBm)	SAR (mW/g)		Note
					1-g	10-g	
Left Touch	1xEVDO (Rel. 0)	25	1851.25	24.0			1
		600	1880.00	24.0	0.564	0.350	
		600	1880.00	24.0	0.468	0.293	3
		1175	1908.75	24.1			1
Left Tilt (15°)	1xEVDO (Rel. 0)	25	1851.25	24.0			1
		600	1880.00	24.0	0.180	0.116	
		1175	1908.75	24.1			1
Right Touch	1xEVDO (Rel. 0)	25	1851.25	24.0			1
		600	1880.00	24.0	0.236	0.155	
		1175	1908.75	24.1			1
Right Tilt (15°)	1xEVDO (Rel. 0)	25	1851.25	24.0			1
		600	1880.00	24.0	0.119	0.074	
		1175	1908.75	24.1			1

Note(s):

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

13.5.2. Body & Hotspot SAR

Test Position	Mode	Dist. (mm)	Ch #.	Freq. (MHz)	Avg Pwr (dBm)	SAR (mW/g)		Note
						1-g	10-g	
Rear	1xRTT (RC3 SO32)	10	25	1851.25	24.1	0.976	0.576	
			25	1851.25	24.1	1.04	0.602	2
			25	1851.25	24.1	0.938	0.554	3
			600	1880.00	24.1	0.968	0.571	
			1175	1908.75	24.0	0.796	0.467	
Front	1xRTT (RC3 SO32)	10	25	1851.25	24.1	0.831	0.482	
			600	1880.00	24.1	0.818	0.475	
			1175	1908.75	24.0	0.741	0.429	
Edge 1	1xRTT (RC3 SO32)	10	25	1851.25	24.1			4
			600	1880.00	24.1			4
			1175	1908.75	24.0			4
Edge 2	1xRTT (RC3 SO32)	10	25	1851.25	24.1			1
			600	1880.00	24.1	0.494	0.299	
			1175	1908.75	24.0			1
Edge 3	1xRTT (RC3 SO32)	10	25	1851.25	24.1			1
			600	1880.00	24.1	0.348	0.204	
			1175	1908.75	24.0			1
Edge 4	1xRTT (RC3 SO32)	10	25	1851.25	24.1			4
			600	1880.00	24.1			4
			1175	1908.75	24.0			4
Test Position	Mode	Dist. (mm)	Ch #.	Freq. (MHz)	Avg Pwr (dBm)	SAR (mW/g)		Note
Rear	1xEVDO (Rel. 0)	10	25	1851.25	24.2	0.656	0.394	
			600	1880.00	24.2	0.667	0.388	
			1175	1908.75	24.2	0.906	0.521	
			1175	1908.75	24.2	0.918	0.524	2
			1175	1908.75	24.2	0.891	0.507	3
Front	1xEVDO (Rel. 0)	10	25	1851.25	24.2			1
			600	1880.00	24.2	0.547	0.325	
			1175	1908.75	24.2			1
Edge 1	1xEVDO (Rel. 0)	10	25	1851.25	24.2			4
			600	1880.00	24.2			4
			1175	1908.75	24.2			4
Edge 2	1xEVDO (Rel. 0)	10	25	1851.25	24.2			4
			600	1880.00	24.2			4
			1175	1908.75	24.2			4
Edge 3	1xEVDO (Rel. 0)	10	25	1851.25	24.2			1
			600	1880.00	24.2	0.296	0.170	
			1175	1908.75	24.2			1
Edge 4	1xEVDO (Rel. 0)	10	25	1851.25	24.2			1
			600	1880.00	24.2	0.325	0.198	
			1175	1908.75	24.2			1

Note(s):

1. According to FCC "Public Notice DA 02-1438" by the SCC-34/SC-2, when the SAR measured for the middle channel is < 50% of the SAR limit, testing for the low and high channel is optional.
2. With headset attached.
3. With wireless charging battery cover.
4. SAR is not required because the distance from the tested antenna to this edge is greater than 2.5 cm.

13.6. LTE Band 13

13.6.1. Head SAR

Test Position	Mode	UL Ch #.	Freq. (MHz)	UL RB Allocatio	UL RB Start	MPR	Avg Pwr (dBm)	SAR (mW/g)		Note	
								1-g	10-g		
Left Touch	QPSK	23230	782.0	25	12	1	21.8	0.276	0.202		
				1	0	0	22.6	0.324	0.246		
				1	0	0	22.6	0.276	0.212	2	
				1	49	0	22.5	0.258	0.197		
				50	0	1	21.6			1	
	16QAM	23230	782.0	25	12	1	20.8	0.239	0.175		
				1	0	0	21.9	0.267	0.199		
				1	0	0	21.9	0.233	0.179	2	
				1	49	0	21.8	0.220	0.163		
				50	0	1	20.6			1	
Left Tilt (15°)	QPSK	23230	782.0	25	12	1	21.8	0.155	0.122		
				1	0	0	22.6	0.186	0.145		
				1	49	0	22.5	0.142	0.110		
				50	0	1	21.6			1	
				16QAM	23230	782.0	25	12	1	20.8	0.131
	1	0	0				21.9	0.157	0.123		
	1	49	0				21.8	0.121	0.094		
	50	0	1				20.6			1	
	Right Touch	QPSK	23230				782.0	25	12	1	21.8
				1	0	0		22.6	0.241	0.185	
1				49	0	22.5		0.194	0.150		
50				0	1	21.6				1	
16QAM				23230	782.0	25		12	1	20.8	0.160
		1	0			0	21.9	0.209	0.161		
		1	49			0	21.8	0.170	0.131		
		50	0			1	20.6			1	
		Right Tilt (15°)	QPSK			23230	782.0	25	12	1	21.8
1				0	0			22.6	0.117	0.093	
1	49			0	22.5			0.091	0.072		
50	0			1	21.6					1	
16QAM	23230			782.0	25			12	1	20.8	0.082
			1		0	0	21.9	0.101	0.080		
			1		49	0	21.8	0.080	0.063		
			50		0	1	20.6			1	

Note(s):

1. Testing for 100% RB allocation is not required because the SAR value for 50% RB allocation is $\leq 1.45W/Kg$, as per KDB 941225 D05 SAR for LTE Devices v01
2. With wireless charging battery cover.

13.6.2. Body & Hotspot SAR

Test Position	Mode	Dist. (mm)	UL Ch #.	Freq. (MHz)	UL RB Allocatio	UL RB Start	MPR	Avg Pwr (dBm)	SAR (mW/g)		Note	
									1-g	10-g		
Rear	QPSK	10	23230	782.0	25	12	1	21.8	0.471	0.299		
					1	0	0	22.6	0.548	0.352		
					1	0	0	22.6	0.501	0.323	2	
					1	0	0	22.6	0.427	0.275	3	
					1	49	0	22.5	0.477	0.300		
	50	0	1	21.6			1					
	16QAM	10	23230	782.0	25	12	1	20.8	0.378	0.240		
	1	0	0	21.9	0.468	0.298						
	1	0	0	21.9	0.423	0.273	2					
	1	0	0	21.9	0.322	0.210	3					
1	49	0	21.8	0.407	0.256							
50	0	1	20.6			1						
Front	QPSK	10	23230	782.0	25	12	1	21.8	0.287	0.194		
					1	0	0	22.6	0.328	0.221		
					1	49	0	22.5	0.288	0.191		
					50	0	1	21.6			1	
					16QAM	10	23230	782.0	25	12	1	20.8
	1	0	0	21.9	0.267	0.180						
	1	49	0	21.8	0.238	0.157						
	50	0	1	20.6			1					
	Edge 3	QPSK	10	23230	782.0	25	12	1	21.8	0.167	0.115	
						1	0	0	22.6	0.179	0.123	
1						49	0	22.5	0.187	0.129		
50						0	1	21.6			1	
16QAM						10	23230	782.0	25	12	1	20.8
1		0	0	21.9	0.153	0.105						
1		49	0	21.8	0.160	0.111						
50		0	1	20.6			1					
Edge 4		QPSK	10	23230	782.0	25	12	1	21.8	0.284	0.199	
						1	0	0	22.6	0.364	0.255	
	1					49	0	22.5	0.245	0.172		
	50					0	1	21.6			1	
	16QAM					10	23230	782.0	25	12	1	20.8
	1	0	0	21.9	0.309	0.217						
	1	49	0	21.8	0.213	0.150						
	50	0	1	20.6			1					

Note(s):

1. Testing for 100% RB allocation is not required because the SAR value for 50% RB allocation is $\leq 1.45W/Kg$, as per KDB 941225 D05 SAR for LTE Devices v01
2. With headset attached.
3. With wireless charging battery cover.

13.7. Wi-Fi (2.4 GHz Band)

13.7.1. 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	15.4	0.110	0.059	
		6	2437	14.9			1
		11	2462	14.9			1
Left Tilt (15°)	802.11b	1	2412	15.4	0.101	0.051	
		6	2437	14.9			1
		11	2462	14.9			1
Right Touch	802.11b	1	2412	15.4	0.132	0.065	
		1	2421	15.4	0.084	0.043	3
		6	2437	14.9			1
		11	2462	14.9			1
Right Tilt (15°)	802.11b	1	2412	15.4	0.104	0.052	
		6	2437	14.9			1
		11	2462	14.9			1

13.7.2. 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	15.4	0.117	0.059	
			1	2412	15.4	0.113	0.057	2
			1	2412	15.4	0.070	0.036	3
			6	2437	14.9			1
			11	2462	14.9			1
Front	802.11b	10	1	2412	15.4	0.032	0.016	
			6	2437	14.9			1
			11	2462	14.9			1
Edge 1	802.11b	10	1	2412	15.4	0.060	0.032	
			6	2437	14.9			1
			11	2462	14.9			1
Edge 2	802.11b	10	1	2412	15.4			4
			6	2437	14.9			4
			11	2462	14.9			4
Edge 3	802.11b	10	1	2412	15.4			4
			6	2437	14.9			4
			11	2462	14.9			4
Edge 4	802.11b	10	1	2412	15.4	0.012	0.006	
			6	2437	14.9			1
			11	2462	14.9			1

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.
- With wireless charging battery cover.
- SAR is not required because the distance from the tested antenna to this edge is greater than 2.5 cm.

13.8. Wi-Fi (5 GHz Bands)

13.8.1. Head SAR

Test Position	Mode	Ch #.	Freq. (MHz)	Avg Pwr (dBm)	SAR (mW/g)		Note
					1-g	10-g	
Left Touch	802.11a (5.2 GHz)	36	5180	11.9	0.852	0.189	
		36	5180	11.9	0.463	0.105	3
		48	5240	11.6	0.719	0.165	
Left Tilt (15°)		36	5180	11.9	0.820	0.203	
		48	5240	11.6	0.667	0.161	
Right Touch		36	5180	11.9	0.835	0.210	
		48	5240	11.6	0.752	0.184	
Right Tilt (15°)		36	5180	11.9	0.781	0.189	
		48	5240	11.6			1
Left Touch	802.11a (5.3 GHz)	52	5260	11.4			
		64	5320	11.6	0.683	0.153	
Left Tilt (15°)		52	5260	11.4			
		64	5320	11.6	0.634	0.150	
Right Touch		52	5260	11.4			
		64	5320	11.6	0.772	0.181	
Right Tilt (15°)		64	5320	11.6	0.401	0.102	3
		52	5260	11.4			
Left Touch		802.11a (5.5 GHz)	64	5320	11.6	0.640	0.151
	104		5520	11.8			2
Left Touch	116		5580	12.0	0.302	0.090	
	132		5660	11.9			2
	136		5680	11.8			2
Left Tilt (15°)	104		5520	11.8			2
	116		5580	12.0	0.272	0.079	
	132		5660	11.9			2
Right Touch	136		5680	11.8			2
	104		5520	11.8			2
	116		5580	12.0	0.374	0.100	
Right Tilt (15°)	116		5580	12.0	0.278	0.078	3
	132		5660	11.9			2
	136		5680	11.8			2
Right Tilt (15°)	104		5520	11.8			2
	116		5580	12.0	0.312	0.078	
	132		5660	11.9			2
			136	5680	11.8		

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)
- For frequency bands with an operating range of < 200 MHz, when the SAR for the highest output power channel within is ≤ 0.4 W/kg, SAR for the remaining channels is not required. Per KDB 447498 1) e) i)
- With wireless charging battery cover.

Head SAR continued

Test Position	Mode	Ch #.	Freq. (MHz)	Avg Pwr (dBm)	SAR (mW/g)		Note
					1-g	10-g	
Left Touch	802.11a (5.8 GHz)	149	5745	11.9			1
		157	5785	11.6			1
		165	5825	11.9	0.054	0.016	
Left Tilt (15°)		149	5745	11.9			1
		157	5785	11.6			1
		165	5825	11.9	0.050	0.011	
Right Touch		149	5745	11.9			1
		157	5785	11.6			1
		165	5825	11.9	0.052	0.013	
Right Tilt (15°)		149	5745	11.9			1
		157	5785	11.6			1
		165	5825	11.9	0.070	0.013	
	165	5825	11.9	0.044	0.012	3	

Note(s):

1. 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)
2. For frequency bands with an operating range of < 200 MHz, when the SAR measured for the highest output power channel within is ≤ 0.4 W/kg, SAR for the remaining channels is not required. Per KDB 447498 1) e) i)
3. With wireless charging battery cover.

13.8.2. Body SAR

Hotspot SAR is not required for WiFi in the 5 GHz Bands as these transmission bands do not support hotspot mode operation.

Test Position	Mode	Dist. (mm)	Ch #.	Freq. (MHz)	Avg Pwr (dBm)	SAR (mW/g)		Note	
						1-g	10-g		
Rear	802.11a (5.2 GHz)	10	36	5180	11.9	0.151	0.049		
			36	5180	11.9	0.164	0.053	3	
			36	5180	11.9	0.130	0.044	4	
			48	5240	11.6			1	
Front		10	36	5180	11.9	0.116	0.039		
			48	5240	11.6			1	
Rear		802.11a (5.3 GHz)	10	52	5260	11.4			
				64	5320	11.6	0.105	0.033	
	64			5320	11.6	0.129	0.039	3	
Front	10		52		11.4				
			64	5320	11.6	0.092	0.031		
Rear	802.11a (5.5 GHz)	10	104	5520	11.8			2	
			116	5580	12.0	0.110	0.042		
			116	5580	12.0	0.103	0.040	3	
			124	5620	11.9			2	
			136	5680	11.8			2	
Front		10	104	5520	11.8			2	
			116	5580	12.0	0.110	0.037		
			124	5620	11.9			2	
			136	5680	11.8			2	
Rear	802.11a (5.8 GHz)	10	149	5745	11.9			1	
			157	5785	11.6			1	
			165	5825	11.9	0.149	0.039		
			165	5825	11.9	0.101	0.034	3	
Front		10	149	5745	11.9			1	
			157	5785	11.6			1	
			165	5825	11.9	0.097	0.022		

Note(s):

1. 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)
2. For frequency bands with an operating range of < 200 MHz, when the SAR measured for the highest output power channel within is ≤ 0.4 W/kg, SAR for the remaining channels is not required. Per KDB 447498 1) e) i)
3. With headset attached.
4. With wireless charging battery cover.

14. Summary of Highest SAR Values

Results of highest SAR values for each frequency band and mode

Technology/Band	Test configuration		Mode	Highest 1g SAR (W/kg)
GSM850	Head	Right Touch	GSM With wireless charging battery cover	0.335
	Body & Hotspot	Rear	GPRS 2 slot	0.706
GSM1900	Head	Right Touch	GSM With wireless charging battery cover	0.300
	Body & Hotspot	Rear	GPRS 2 slot with headset	0.771
W-CDMA Band II	Head	Left Touch	Rel 99 RMC 12.2kbps With wireless charging battery cover	0.407
	Body & Hotspot	Rear	Rel 99 RMC 12.2kbps with headset	0.588
CDMA BC0	Head	Right Touch	1xRTT (RC3, SO55) with wireless charging battery cover	0.497
	Head	Left Touch	1xEVDO (Rel.0) with wireless charging battery cover	0.763
	Body & Hotspot	Rear	1xRTT (RC3, SO32)	0.624
	Body & Hotspot	Rear	1xEVDO (Rel.0)	0.550
CDMA BC1	Head	Right Touch	1xRTT (RC3, SO55)	0.813
	Head	Left Touch	1xEVDO (Rel.0)	0.564
	Body & Hotspot	Rear	1xRTT (RC3, SO32) with headset	1.04
	Body & Hotspot	Rear	1xEVDO (Rel.0) with headset	0.918
LTE Band 13	Head	Left Touch	10 MHz (QPSK) RB 1/0	0.324
	Head	Left Touch	10 MHz (16QAM) RB 1/0	0.267
	Body & Hotspot	Rear	10 MHz (QPSK) RB 1/0	0.548
	Body & Hotspot	Rear	10 MHz (16QAM) RB 1/0	0.468
WiFi 2.4 GHz	Head	Right Touch	802.11b 1Mbps	0.132
	Body & Hotspot	Rear	802.11b 1Mbps	0.117
WiFi 5.2 GHz	Head	Left Touch	802.11a 6Mbps	0.852
	Body	Rear	802.11a 6Mbps with headset	0.164
WiFi 5.3 GHz	Head	Right Touch	802.11a 6Mbps	0.772
	Body	Rear	802.11a 6Mbps with headset	0.129
WiFi 5.5 GHz	Head	Right Touch	802.11a 6Mbps	0.374
	Body	Rear	802.11a 6Mbps	0.110
WiFi 5.8 GHz	Head	Right Tilt	802.11a 6Mbps	0.070
	Body	Rear	802.11a 6Mbps	0.149

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

Test Laboratory: UL CCS SAR Lab C

Date: 4/4/2012

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; $\sigma = 0.889$ mho/m; $\epsilon_r = 42.404$; $\rho = 1000$ kg/m³

DASY5 Configuration:

- Electronics: DAE3 Sn500; Calibrated: 7/14/2011
- 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

Right/Touch_GSM_Ch 190_w/Wireless Charging Cover/Area Scan (9x11x1): Measurement

grid: dx=15mm, dy=15mm

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

Maximum value of SAR (measured) = 0.364 mW/g

Right/Touch_GSM_Ch 190_w/Wireless Charging Cover/Zoom Scan (5x5x7)/Cube 0:

Measurement grid: dx=8mm, dy=8mm, dz=5mm

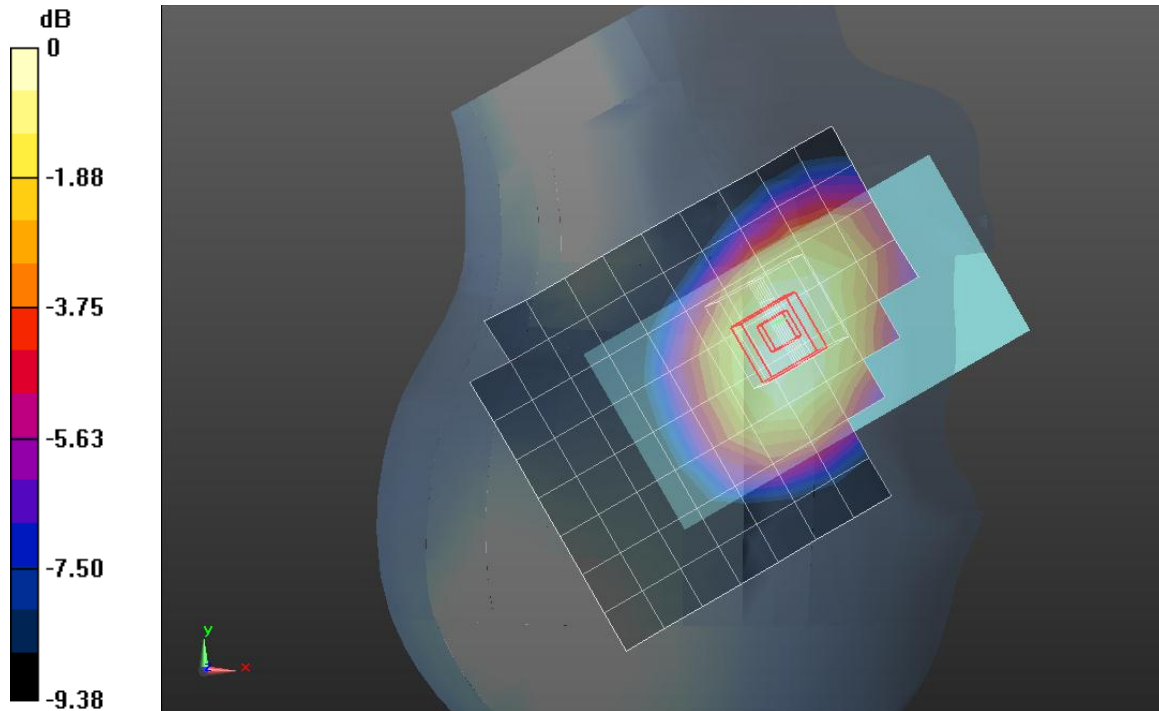
Reference Value = 20.689 V/m; Power Drift = 0.00073 dB

Peak SAR (extrapolated) = 0.4090

SAR(1 g) = 0.335 mW/g; SAR(10 g) = 0.257 mW/g

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

Maximum value of SAR (measured) = 0.369 mW/g



0 dB = 0.370mW/g = -8.64 dB mW/g

GSM850

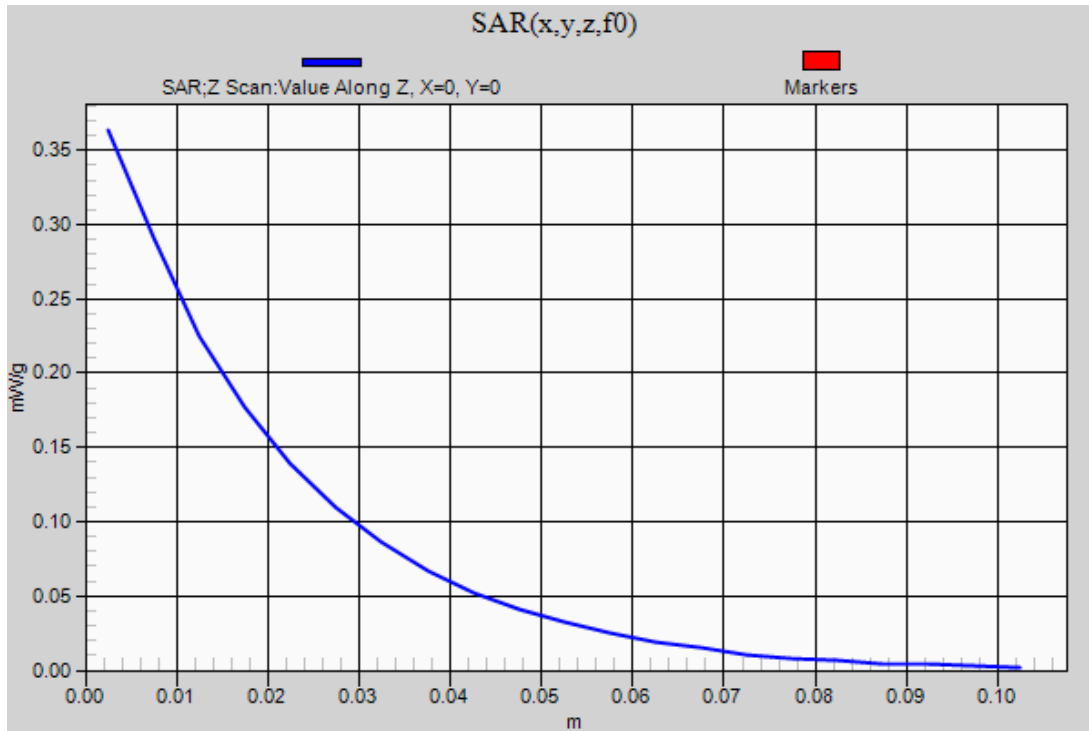
Frequency: 836.6 MHz; Duty Cycle: 1:8.00018

Right/Touch_GSM_Ch 190_wWireless Charging Cover/Z Scan (1x1x21): Measurement grid:

dx=20mm, dy=20mm, dz=5mm

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

Maximum value of SAR (measured) = 0.363 mW/g



Test Laboratory: UL CCS SAR Lab C

Date: 3/29/2012

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; $\sigma = 0.969$ mho/m; $\epsilon_r = 54.134$; $\rho = 1000$ kg/m³

DASY5 Configuration:

- Electronics: DAE3 Sn500; Calibrated: 7/14/2011
- 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 (A); Type: QDOVA001BB; Serial: 1120

Rear/GPRS 2 Slots_Ch 190/Area Scan (10x14x1): Measurement grid: dx=15mm, dy=15mm

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

Maximum value of SAR (measured) = 0.840 mW/g

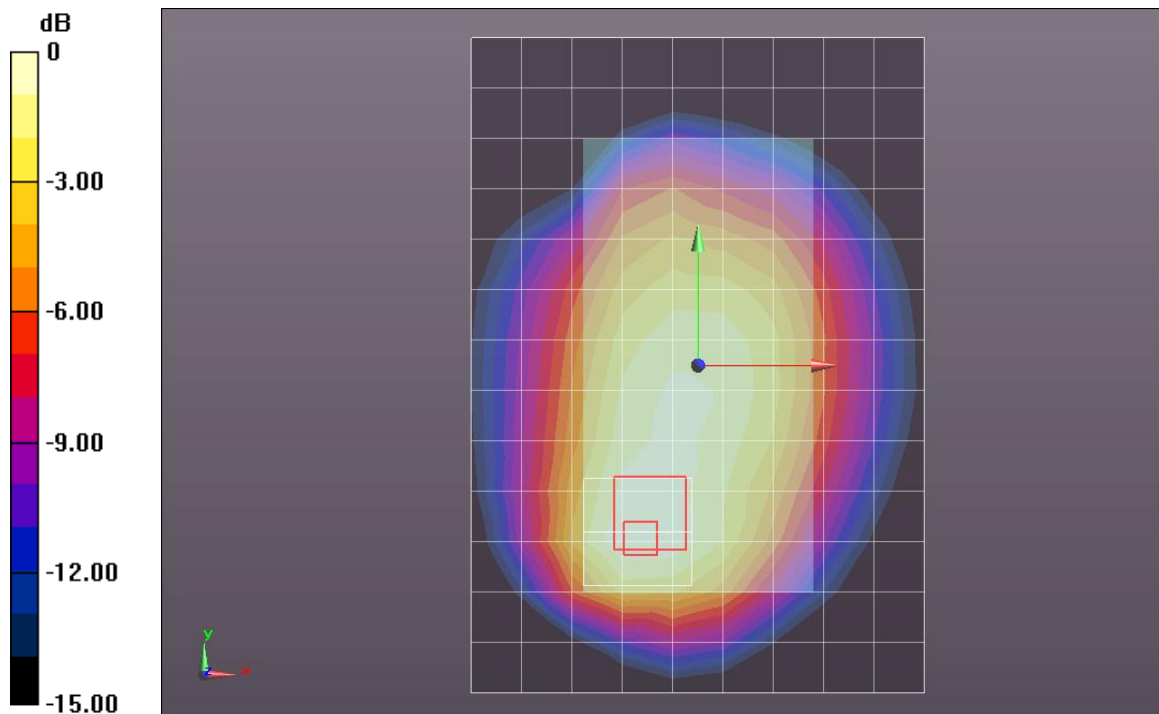
Rear/GPRS 2 Slots_Ch 190/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 29.777 V/m; Power Drift = -0.08 dB

Peak SAR (extrapolated) = 1.1240

SAR(1 g) = 0.706 mW/g; SAR(10 g) = 0.482 mW/g

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



0 dB = 0.840mW/g = -1.51 dB mW/g

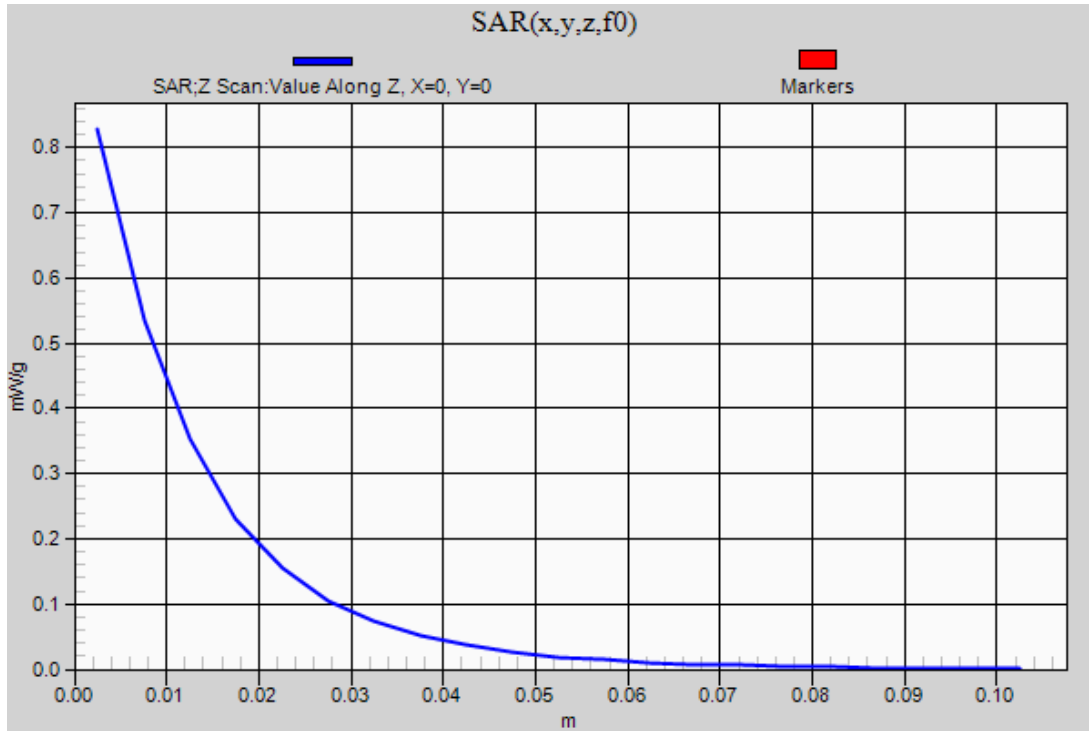
GSM850

Frequency: 836.6 MHz; Duty Cycle: 1:4.00037

Rear/GPRS 2 Slots_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) = 0.828 mW/g



Test Laboratory: UL CCS SAR Lab C

Date: 3/30/2012

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; $\sigma = 1.407$ mho/m; $\epsilon_r = 40.381$; $\rho = 1000$ kg/m³

DASY5 Configuration:

- Electronics: DAE3 Sn500; Calibrated: 7/14/2011
- Probe: EX3DV4 - SN3751; ConvF(7.33, 7.33, 7.33); Calibrated: 12/19/2011
- Sensor-Surface: 2.5mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Phantom: SAM; Type: QD000P40CD; Serial: 1632

Right/Touch_GSM_Ch 661_w/Wireless Charging Cover/Area Scan (9x11x1): Measurement

grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.332 mW/g

Right/Touch_GSM_Ch 661_w/Wireless Charging Cover/Zoom Scan (5x5x7)/Cube 0:

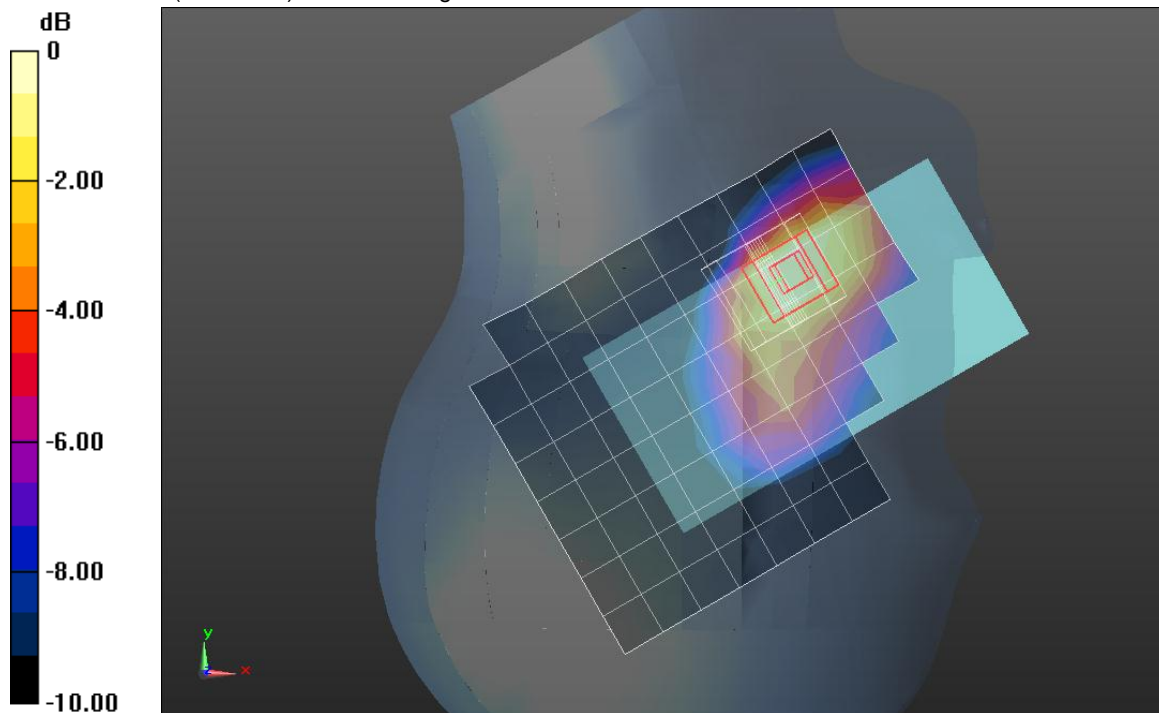
Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 15.408 V/m; Power Drift = -0.0077 dB

Peak SAR (extrapolated) = 0.4680

SAR(1 g) = 0.300 mW/g; SAR(10 g) = 0.185 mW/g

Maximum value of SAR (measured) = 0.369 mW/g



0 dB = 0.370mW/g = -8.64 dB mW/g

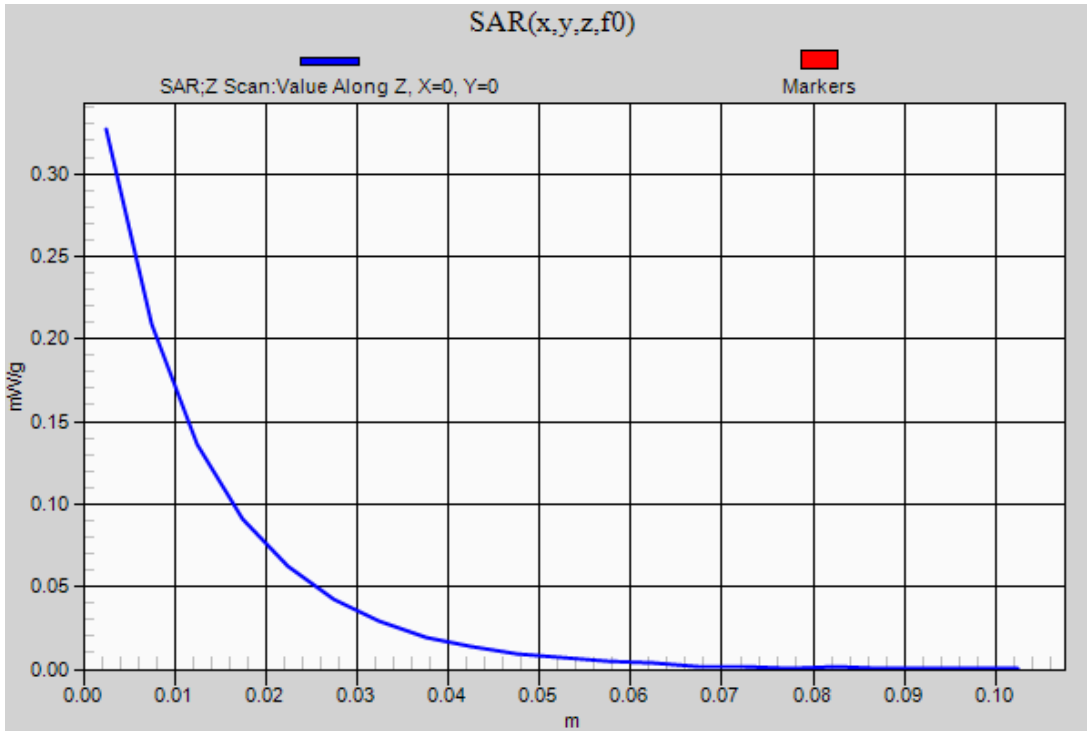
GSM1900

Frequency: 1880 MHz; Duty Cycle: 1:8.00018

Right/Touch_GSM_Ch 661_wWireless Charging Cover/Z Scan (1x1x21): Measurement grid:

dx=20mm, dy=20mm, dz=5mm

Maximum value of SAR (measured) = 0.327 mW/g



Test Laboratory: UL CCS SAR Lab C

Date: 4/4/2012

GSM1900

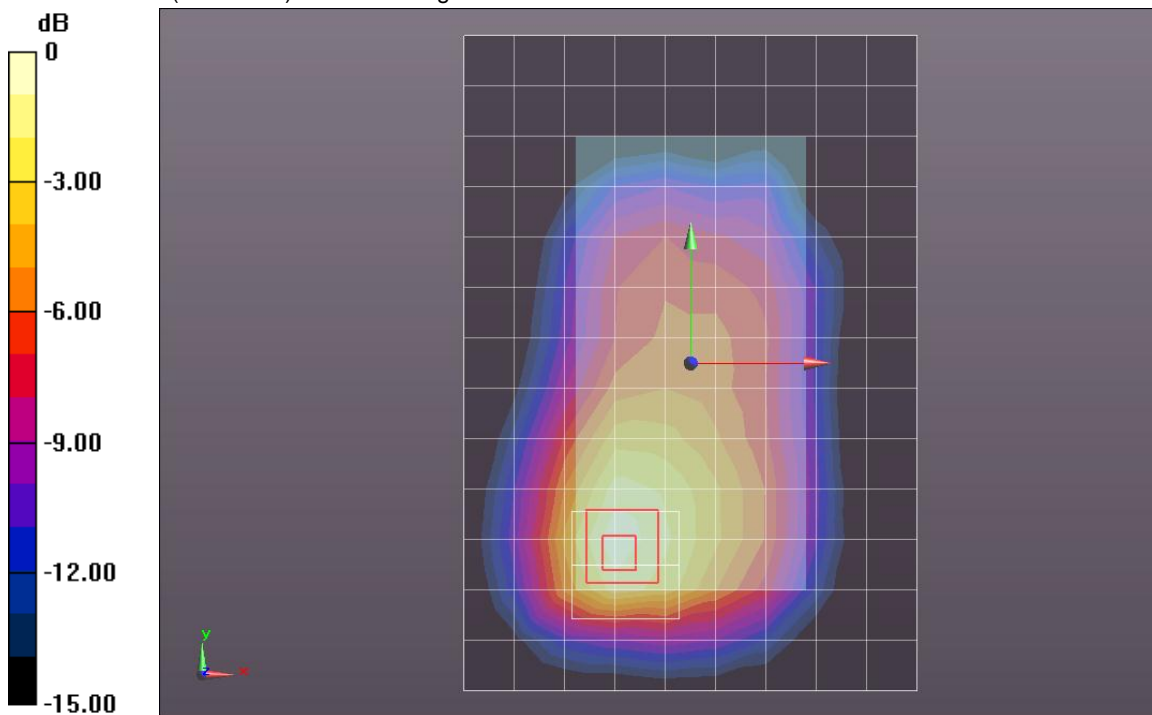
Frequency: 1880 MHz; Duty Cycle: 1:4.00037; Room Ambient Temperature: 24.0°C; Liquid Temperature: 23.0°C
Medium parameters used: $f = 1880 \text{ MHz}$; $\sigma = 1.502 \text{ mho/m}$; $\epsilon_r = 51.869$; $\rho = 1000 \text{ kg/m}^3$

DASY5 Configuration:

- Electronics: DAE3 Sn500; Calibrated: 7/14/2011
- 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 (B); Type: QDOVA001BB; Serial: 1121

Rear/GPRS 2 Slot_Ch 661_w/Headset/Area Scan (10x14x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.940 mW/g

Rear/GPRS 2 Slot_Ch 661_w/Headset/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 25.355 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 1.2890
SAR(1 g) = 0.771 mW/g; SAR(10 g) = 0.450 mW/g
Maximum value of SAR (measured) = 0.972 mW/g



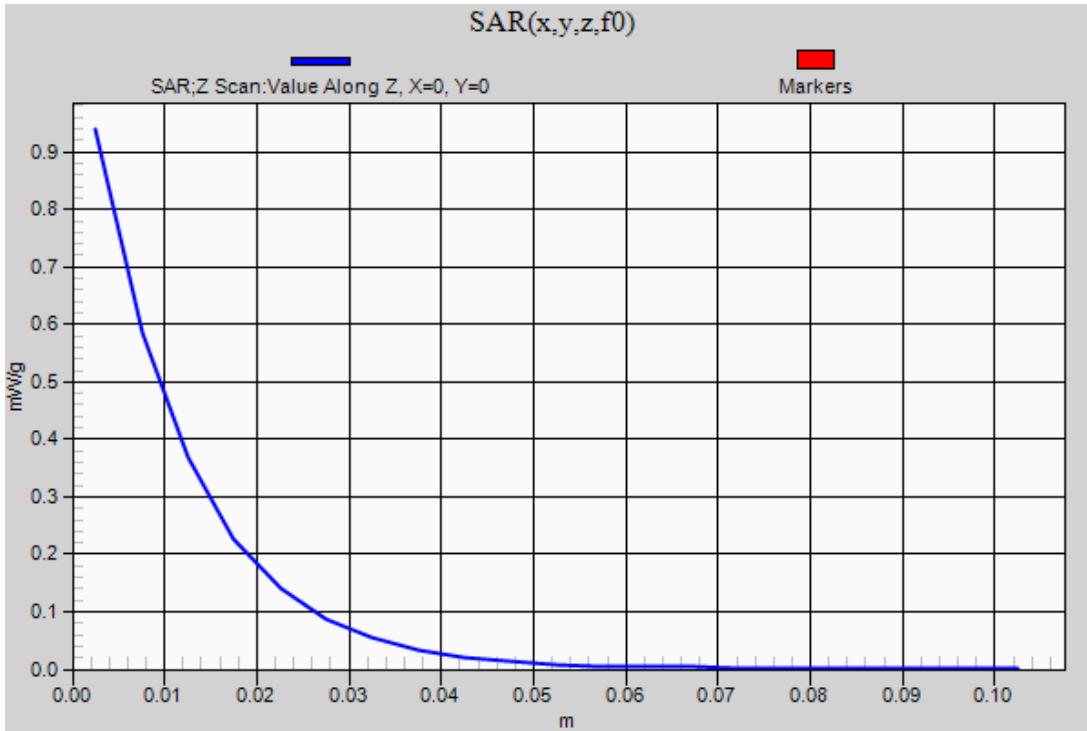
0 dB = 0.970mW/g = -0.26 dB mW/g

GSM1900

Frequency: 1880 MHz; Duty Cycle: 1:4.00037

Rear/GPRS 2 Slot_Ch 661_w/Headset/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm

Maximum value of SAR (measured) = 0.939 mW/g



Test Laboratory: UL CCS SAR Lab C

Date: 3/31/2012

WCDMA 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; $\sigma = 1.407$ mho/m; $\epsilon_r = 40.381$; $\rho = 1000$ kg/m³

DASY5 Configuration:

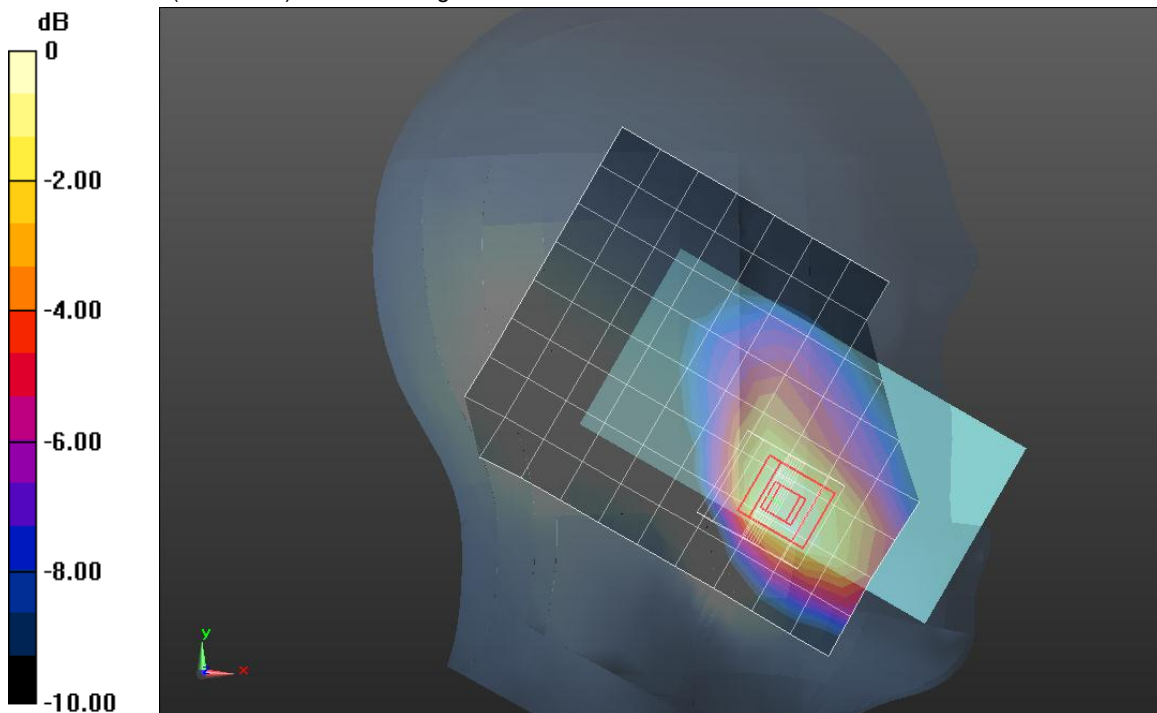
- Electronics: DAE3 Sn500; Calibrated: 7/14/2011
- Probe: EX3DV4 - SN3751; ConvF(7.33, 7.33, 7.33); Calibrated: 12/19/2011
- Sensor-Surface: 2.5mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Phantom: SAM; Type: QD000P40CD; Serial: 1632

Left/Touch_R99 RMC_Ch 9400_w/Wireless Charging Cover/Area Scan (9x11x1):

Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.445 mW/g

Left/Touch_R99 RMC_Ch 9400_w/Wireless Charging Cover/Zoom Scan (5x5x7)/Cube 0:

Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 17.854 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 0.6390
SAR(1 g) = 0.407 mW/g; SAR(10 g) = 0.251 mW/g
Maximum value of SAR (measured) = 0.505 mW/g

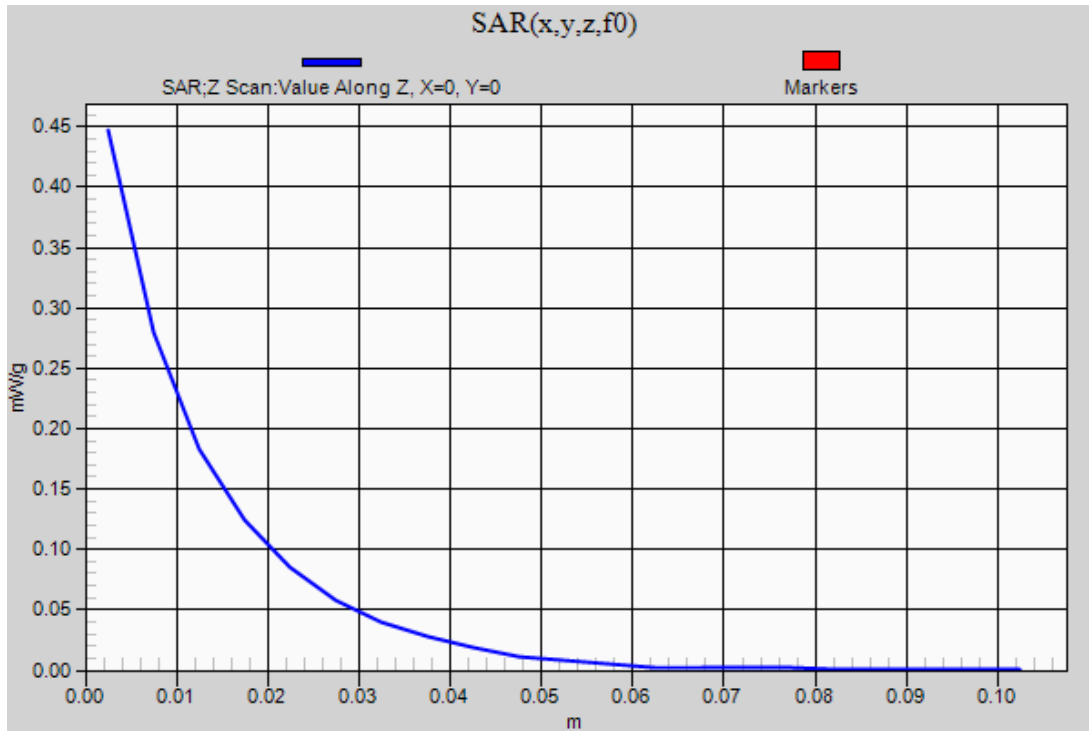


0 dB = 0.500mW/g = -6.02 dB mW/g

WCDMA Band II

Frequency: 1880 MHz; Duty Cycle: 1:1

Left/Touch_R99_RMC_Ch 9400_w/Wireless Charging Cover/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Maximum value of SAR (measured) = 0.447 mW/g



Test Laboratory: UL CCS SAR Lab C

Date: 4/3/2012

WCDMA Band II

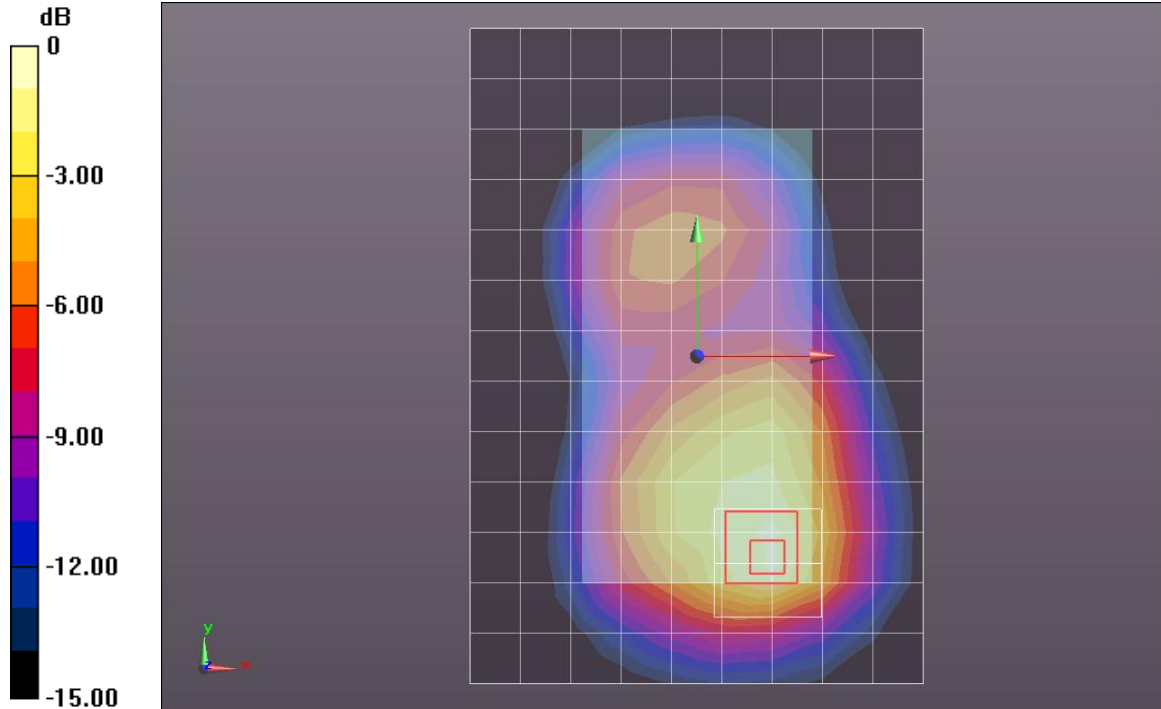
Frequency: 1880 MHz; Duty Cycle: 1:1; Room Ambient Temperature: 24.0°C; Liquid Temperature: 23.0°C
Medium parameters used: $f = 1880$ MHz; $\sigma = 1.482$ mho/m; $\epsilon_r = 51.046$; $\rho = 1000$ kg/m³

DASY5 Configuration:

- Electronics: DAE3 Sn500; Calibrated: 7/14/2011
- 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 (B); Type: QDOVA001BB; Serial: 1121

Rear/R99 RMC_Ch 9400_w/Headset/Area Scan (10x14x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.651 mW/g

Rear/R99 RMC_Ch 9400_w/Headset/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 21.331 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 1.0010
SAR(1 g) = 0.588 mW/g; SAR(10 g) = 0.344 mW/g
Maximum value of SAR (measured) = 0.765 mW/g



0 dB = 0.770mW/g = -2.27 dB mW/g

Test Laboratory: UL CCS SAR Lab C

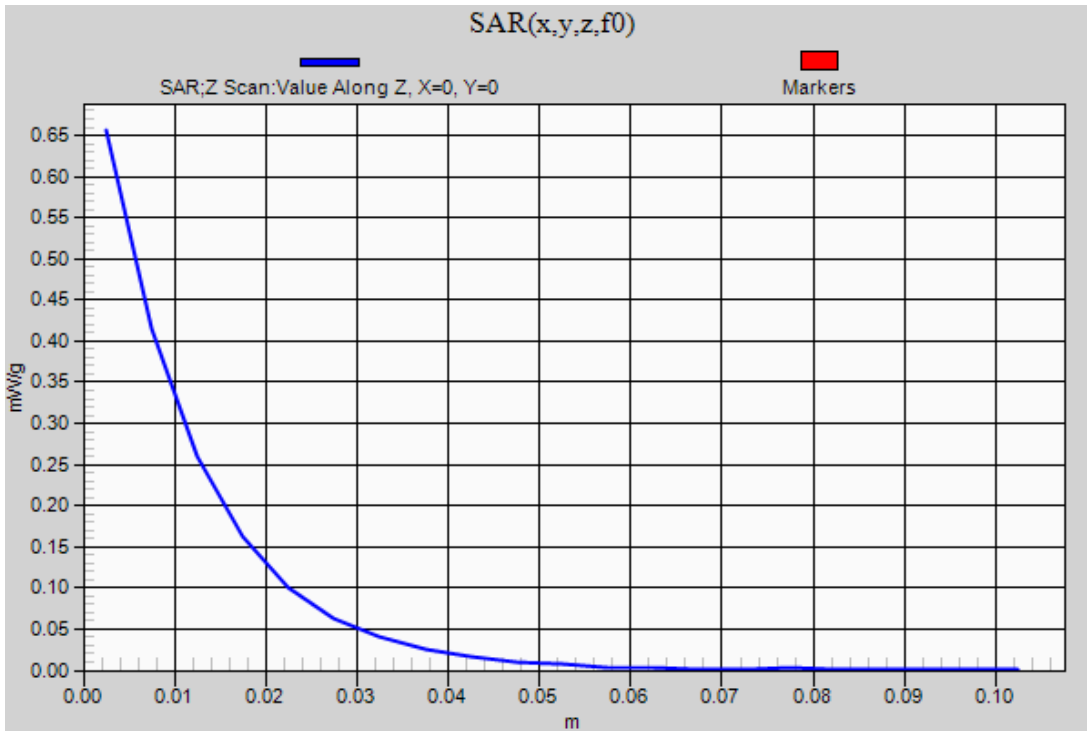
Date: 4/3/2012

WCDMA Band II

Frequency: 1880 MHz; Duty Cycle: 1:1

Rear/R99 RMC_Ch 9400_w/Headset/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm

Maximum value of SAR (measured) = 0.656 mW/g



Test Laboratory: UL CCS SAR Lab C

Date: 4/4/2012

CDMA BC0

Frequency: 836.52 MHz; Duty Cycle: 1:1; Room Ambient Temperature: 24.0°C; Liquid Temperature: 23.0°C
Medium parameters used (interpolated): $f = 836.52$ MHz; $\sigma = 0.889$ mho/m; $\epsilon_r = 42.405$; $\rho = 1000$ kg/m³

DASY5 Configuration:

- Electronics: DAE3 Sn500; Calibrated: 7/14/2011
- 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

Right/Touch_1xRTT_RC3 SO55_ch 384_w/Wireless Charging Cover/Area Scan (9x11x1):

Measurement grid: dx=15mm, dy=15mm

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

Maximum value of SAR (measured) = 0.534 mW/g

Right/Touch_1xRTT_RC3 SO55_ch 384_w/Wireless Charging Cover/Zoom Scan (5x5x7)/Cube 0:

Measurement grid: dx=8mm, dy=8mm, dz=5mm

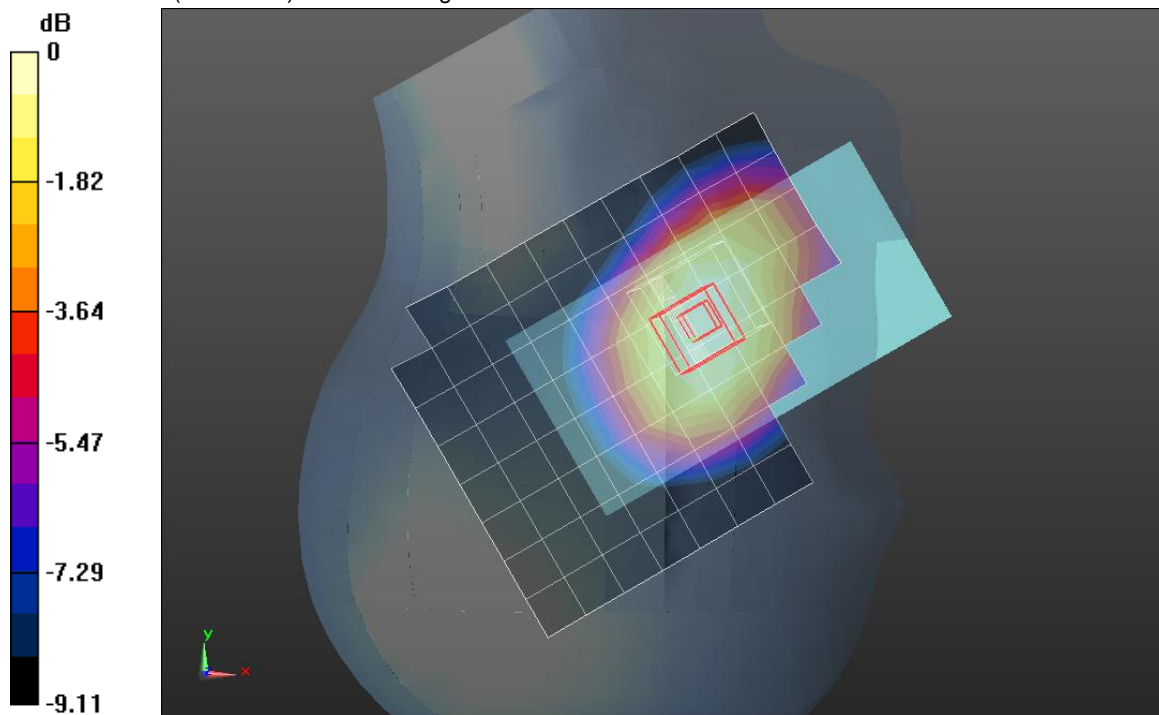
Reference Value = 25.053 V/m; Power Drift = 0.02 dB

Peak SAR (extrapolated) = 0.6030

SAR(1 g) = 0.497 mW/g; SAR(10 g) = 0.386 mW/g

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

Maximum value of SAR (measured) = 0.545 mW/g



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

Test Laboratory: UL CCS SAR Lab C

Date: 4/4/2012

CDMA BC0

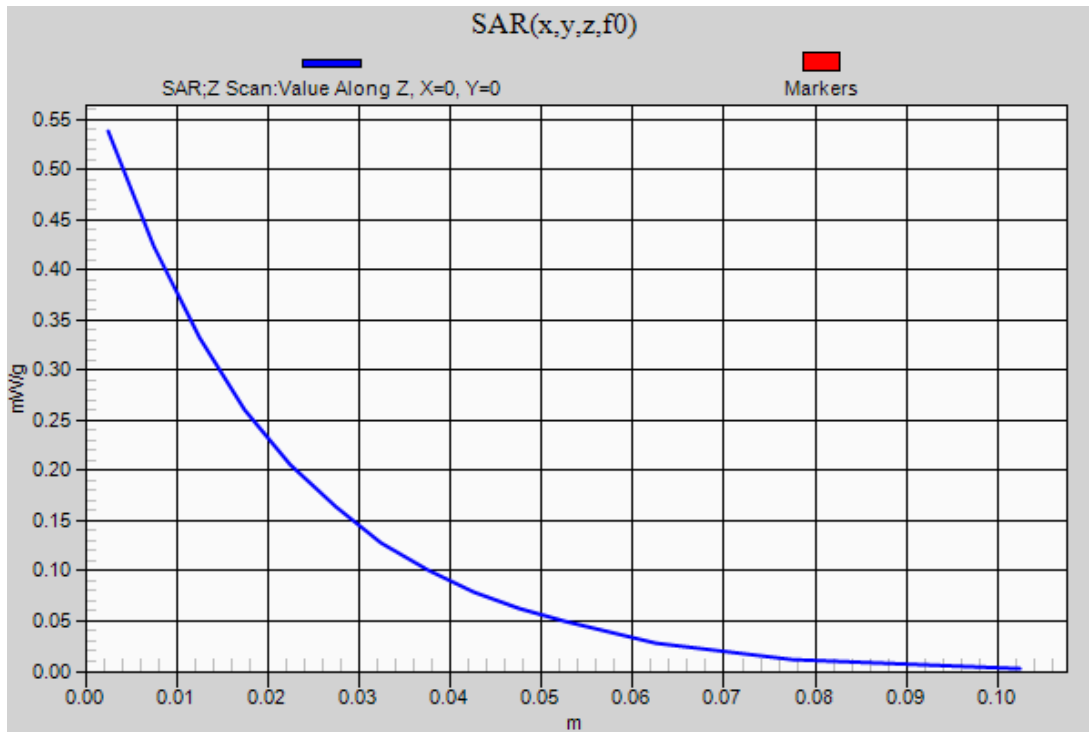
Frequency: 836.52 MHz; Duty Cycle: 1:1

Right/Touch_1xRTT_RC3 SO55_ch 384_w/Wireless Charging Cover/Z Scan (1x1x21):

Measurement grid: dx=20mm, dy=20mm, dz=5mm

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

Maximum value of SAR (measured) = 0.538 mW/g



Test Laboratory: UL CCS SAR Lab C

Date: 4/4/2012

CDMA BC0

Frequency: 836.52 MHz; Duty Cycle: 1:1; Room Ambient Temperature: 24.0°C; Liquid Temperature: 23.0°C
Medium parameters used (interpolated): $f = 836.52 \text{ MHz}$; $\sigma = 0.889 \text{ mho/m}$; $\epsilon_r = 42.405$; $\rho = 1000 \text{ kg/m}^3$

DASY5 Configuration:

- Electronics: DAE3 Sn500; Calibrated: 7/14/2011
- Probe: EX3DV4 - SN3751; ConvF(8.35, 8.35, 8.35); Calibrated: 12/19/2011
- Sensor-Surface: 2.5mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Phantom: SAM; Type: QD000P40CD; Serial: 1632

Left/Touch_1xEVDO_Rel. 0_ch 384_w/Wireless Charging Cover/Area Scan (9x11x1):

Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

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

Maximum value of SAR (measured) = 0.925 mW/g

Left/Touch_1xEVDO_Rel. 0_ch 384_w/Wireless Charging Cover/Zoom Scan

(5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

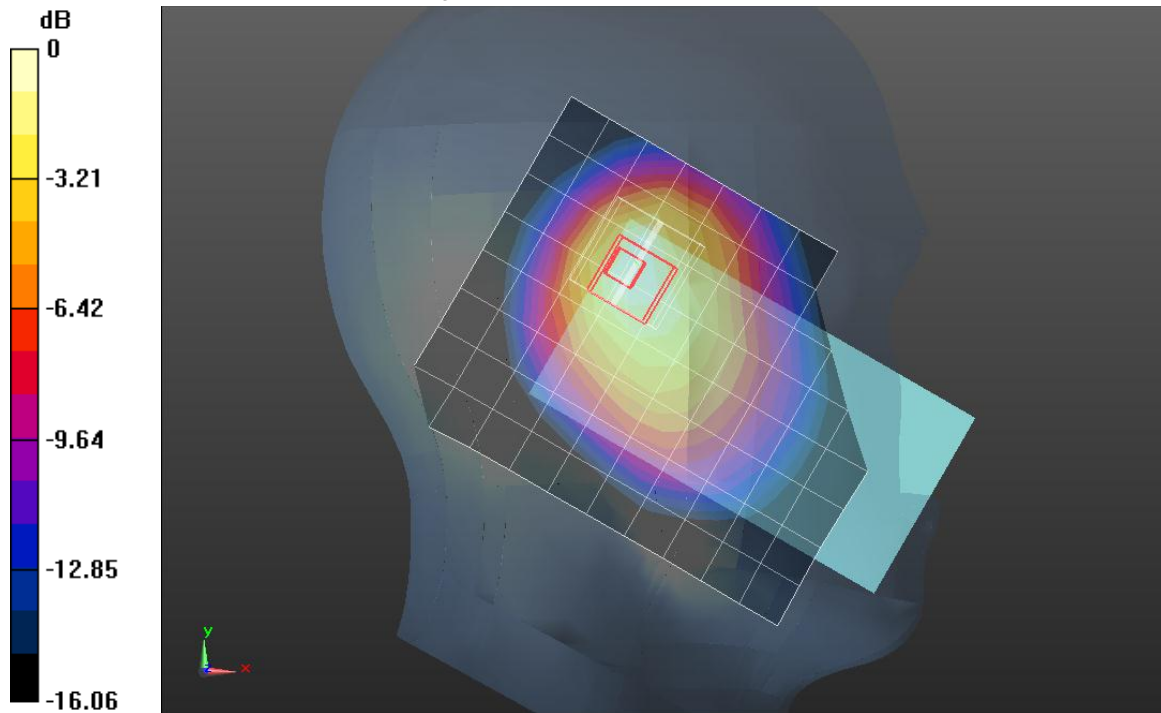
Reference Value = 33.126 V/m; Power Drift = 0.07 dB

Peak SAR (extrapolated) = 1.5100

SAR(1 g) = 0.763 mW/g; SAR(10 g) = 0.429 mW/g

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

Maximum value of SAR (measured) = 0.959 mW/g



0 dB = 0.960mW/g = -0.35 dB mW/g

CDMA BC0

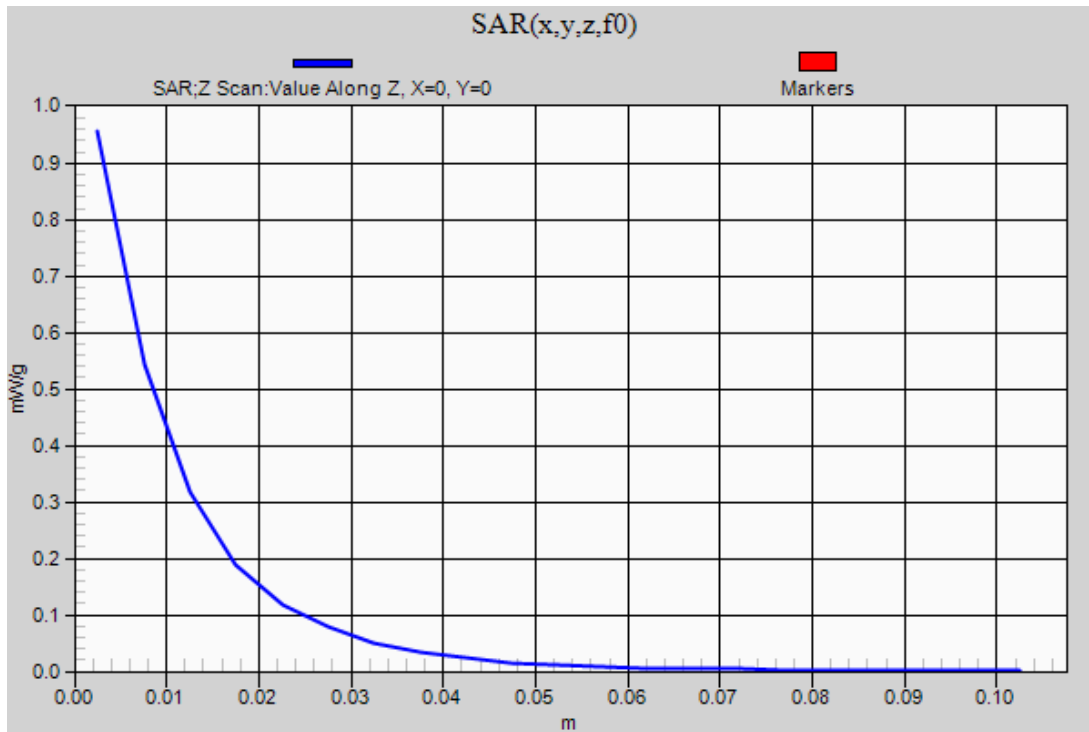
Frequency: 836.52 MHz; Duty Cycle: 1:1

Left/Touch_1xEVDO_Rel. 0_ch 384_w/Wireless Charging Cover/Z Scan (1x1x21):

Measurement grid: dx=20mm, dy=20mm, dz=5mm

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

Maximum value of SAR (measured) = 0.956 mW/g



Test Laboratory: UL CCS SAR Lab C

Date: 3/29/2012

CDMA BC0

Frequency: 836.52 MHz; Duty Cycle: 1:1; Room Ambient Temperature: 24.0°C; Liquid Temperature: 23.0°C
Medium parameters used (interpolated): $f = 836.52$ MHz; $\sigma = 0.969$ mho/m; $\epsilon_r = 54.135$; $\rho = 1000$ kg/m³

DASY5 Configuration:

- Electronics: DAE3 Sn500; Calibrated: 7/14/2011
- 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 (A); Type: QDOVA001BB; Serial: 1120

Rear/1xRTT_RC3_SO32_Ch 384/Area Scan (10x14x1): Measurement grid: dx=15mm, dy=15mm

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

Maximum value of SAR (measured) = 0.708 mW/g

Rear/1xRTT_RC3_SO32_Ch 384/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

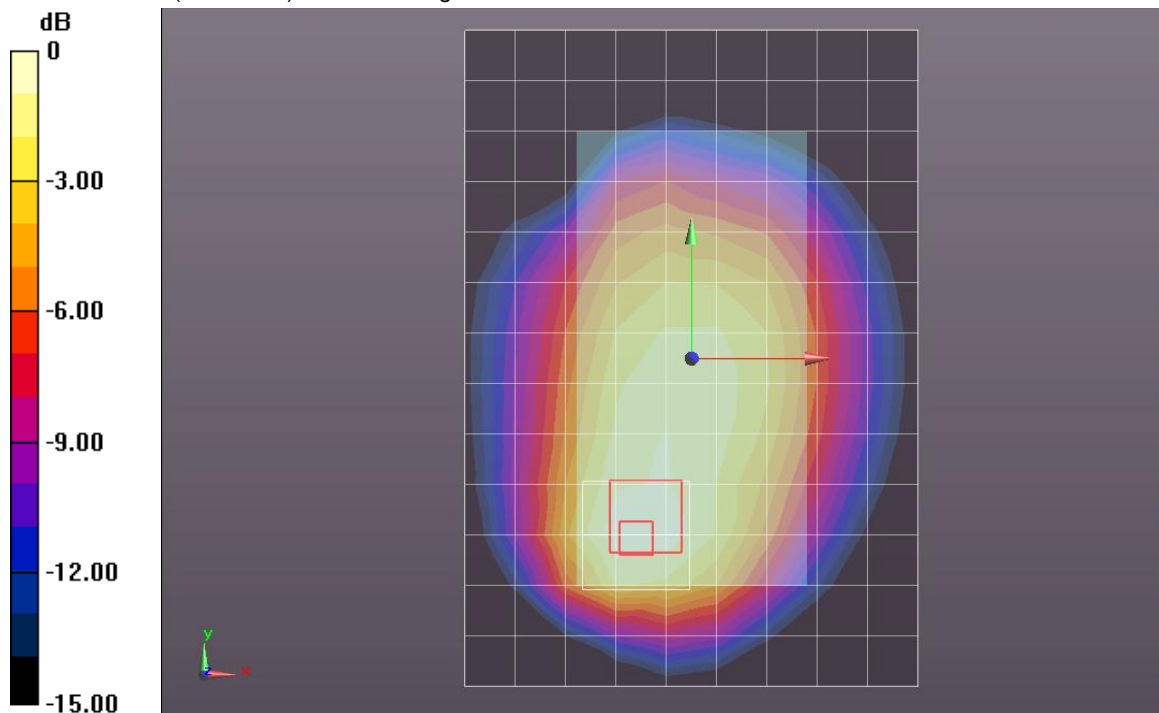
Reference Value = 27.530 V/m; Power Drift = -0.0019 dB

Peak SAR (extrapolated) = 1.0070

SAR(1 g) = 0.624 mW/g; SAR(10 g) = 0.422 mW/g

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

Maximum value of SAR (measured) = 0.748 mW/g



0 dB = 0.750mW/g = -2.50 dB mW/g

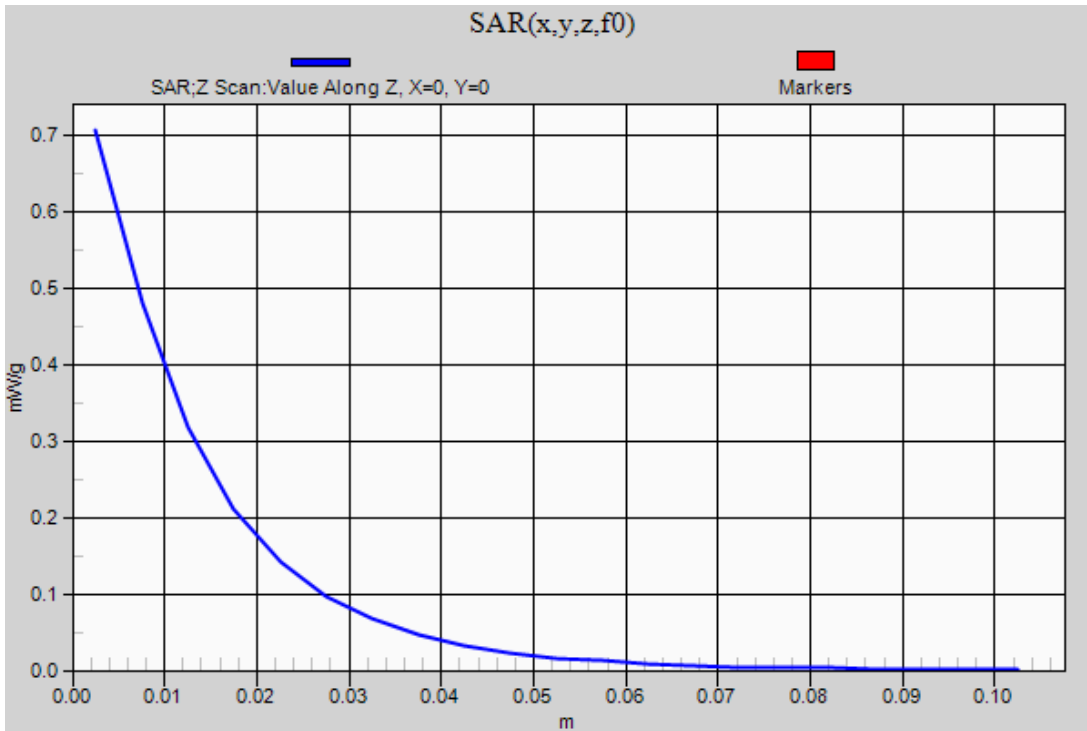
CDMA BC0

Frequency: 836.52 MHz; Duty Cycle: 1:1

Rear/1xRTT_RC3_SO32_Ch 384/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm

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

Maximum value of SAR (measured) = 0.708 mW/g



Test Laboratory: UL CCS SAR Lab C

Date: 3/29/2012

CDMA BC0

Frequency: 836.52 MHz; Duty Cycle: 1:1; Room Ambient Temperature: 24.0°C; Liquid Temperature: 23.0°C
Medium parameters used (interpolated): $f = 836.52$ MHz; $\sigma = 0.969$ mho/m; $\epsilon_r = 54.135$; $\rho = 1000$ kg/m³

DASY5 Configuration:

- Electronics: DAE3 Sn500; Calibrated: 7/14/2011
- 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 (A); Type: QDOVA001BB; Serial: 1120

Rear/1xEVDO_Rel. 0_Ch 384/Area Scan (10x14x1): Measurement grid: dx=15mm, dy=15mm

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

Maximum value of SAR (measured) = 0.689 mW/g

Rear/1xEVDO_Rel. 0_Ch 384/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

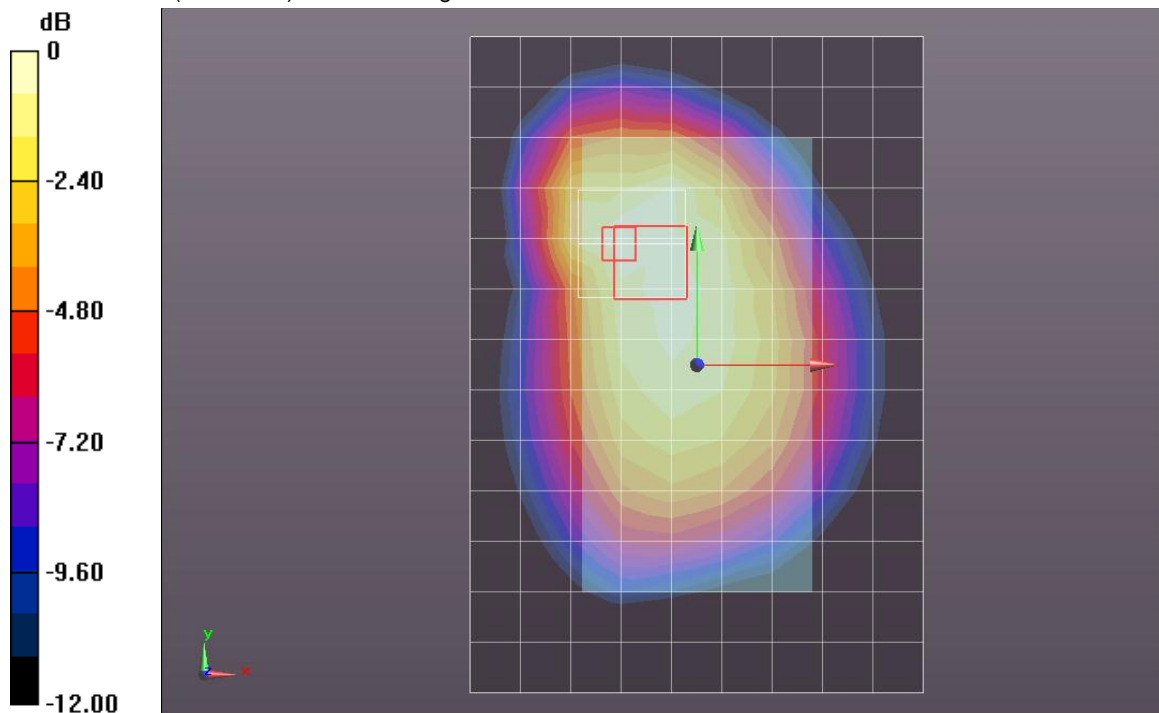
Reference Value = 27.015 V/m; Power Drift = 0.06 dB

Peak SAR (extrapolated) = 0.9270

SAR(1 g) = 0.550 mW/g; SAR(10 g) = 0.381 mW/g

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

Maximum value of SAR (measured) = 0.694 mW/g



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

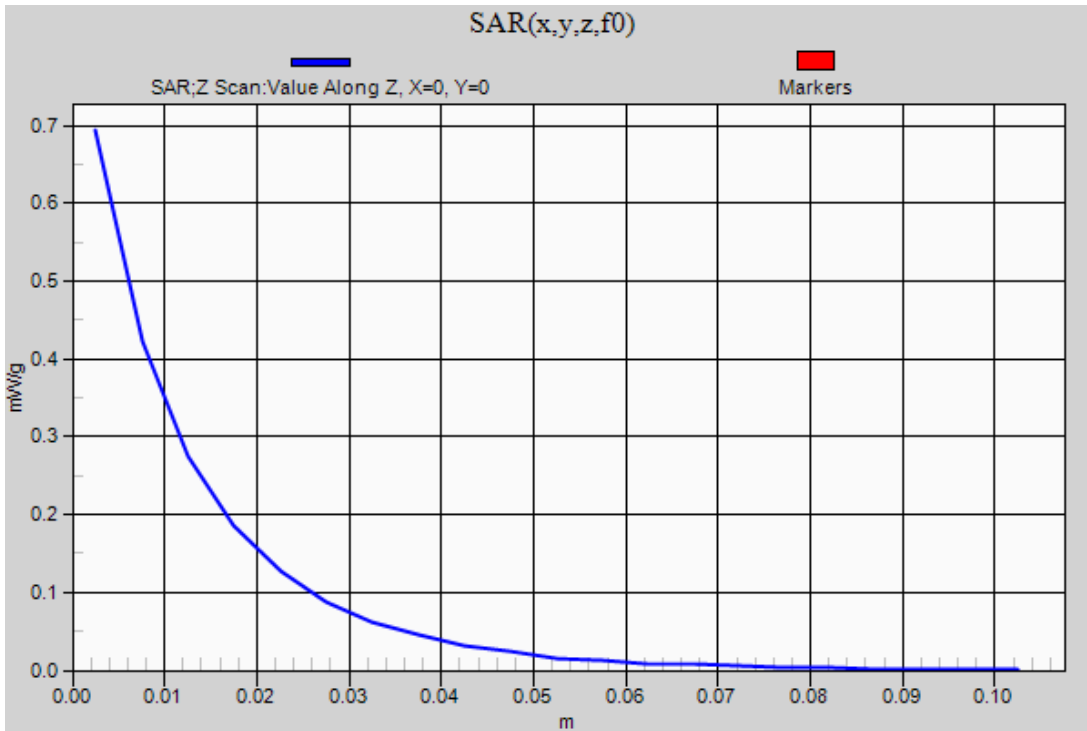
CDMA BC0

Frequency: 836.52 MHz; Duty Cycle: 1:1

Rear/1xEVDO_Rel. 0_Ch 384/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm

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

Maximum value of SAR (measured) = 0.694 mW/g



Test Laboratory: UL CCS SAR Lab C

Date: 3/30/2012

CDMA BC1

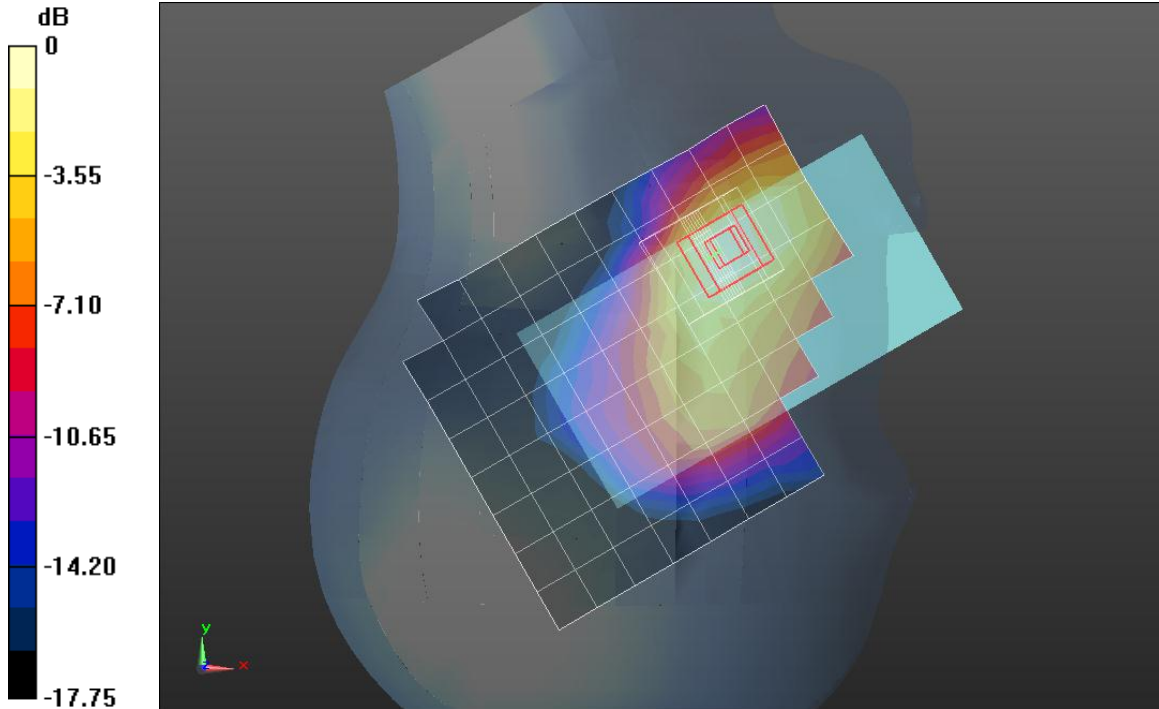
Frequency: 1880 MHz; Duty Cycle: 1:1; Room Ambient Temperature: 24.0°C; Liquid Temperature: 23.0°C
Medium parameters used: $f = 1880$ MHz; $\sigma = 1.407$ mho/m; $\epsilon_r = 40.381$; $\rho = 1000$ kg/m³

DASY5 Configuration:

- Electronics: DAE3 Sn500; Calibrated: 7/14/2011
- 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

Right/Touch_1xRTT_RC3 SO55_ch 600/Area Scan (9x11x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.848 mW/g

Right/Touch_1xRTT_RC3 SO55_ch 600/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 25.850 V/m; Power Drift = -0.11 dB
Peak SAR (extrapolated) = 1.2750
SAR(1 g) = 0.813 mW/g; SAR(10 g) = 0.499 mW/g
Maximum value of SAR (measured) = 1.001 mW/g



0 dB = 1.000mW/g = 0 dB mW/g

Test Laboratory: UL CCS SAR Lab C

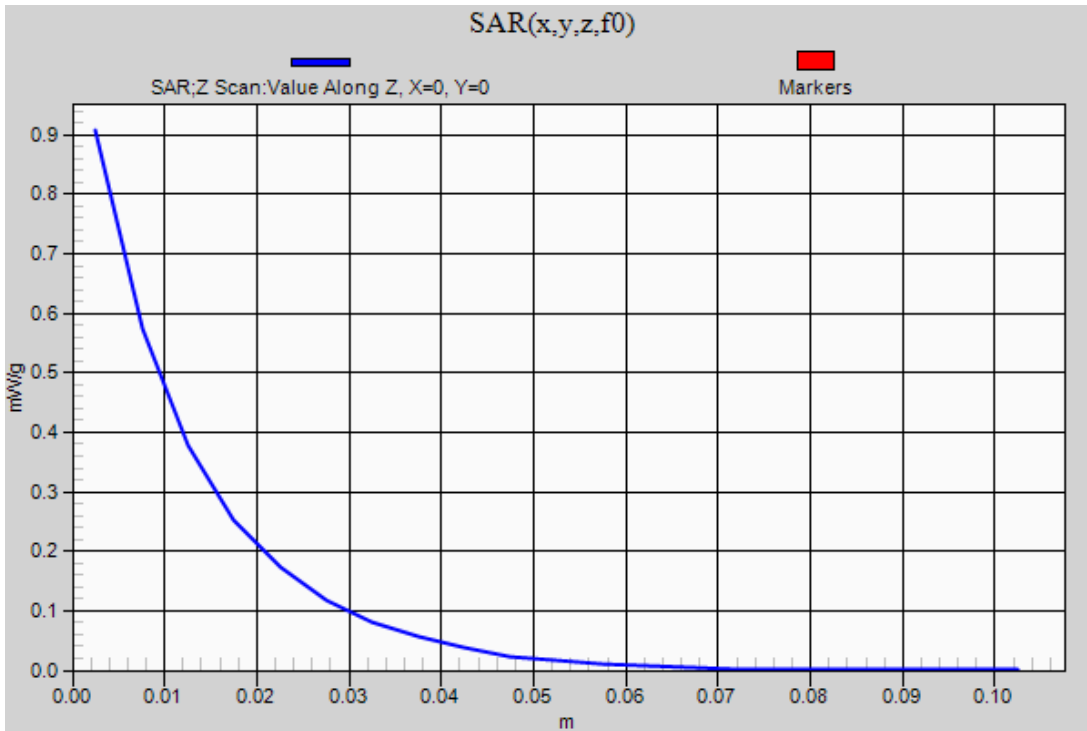
Date: 3/30/2012

CDMA BC1

Frequency: 1880 MHz; Duty Cycle: 1:1

Right/Touch_1xRTT_RC3 SO55_ch 600/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm

Maximum value of SAR (measured) = 0.907 mW/g



Test Laboratory: UL CCS SAR Lab C

Date: 3/30/2012

CDMA BC1

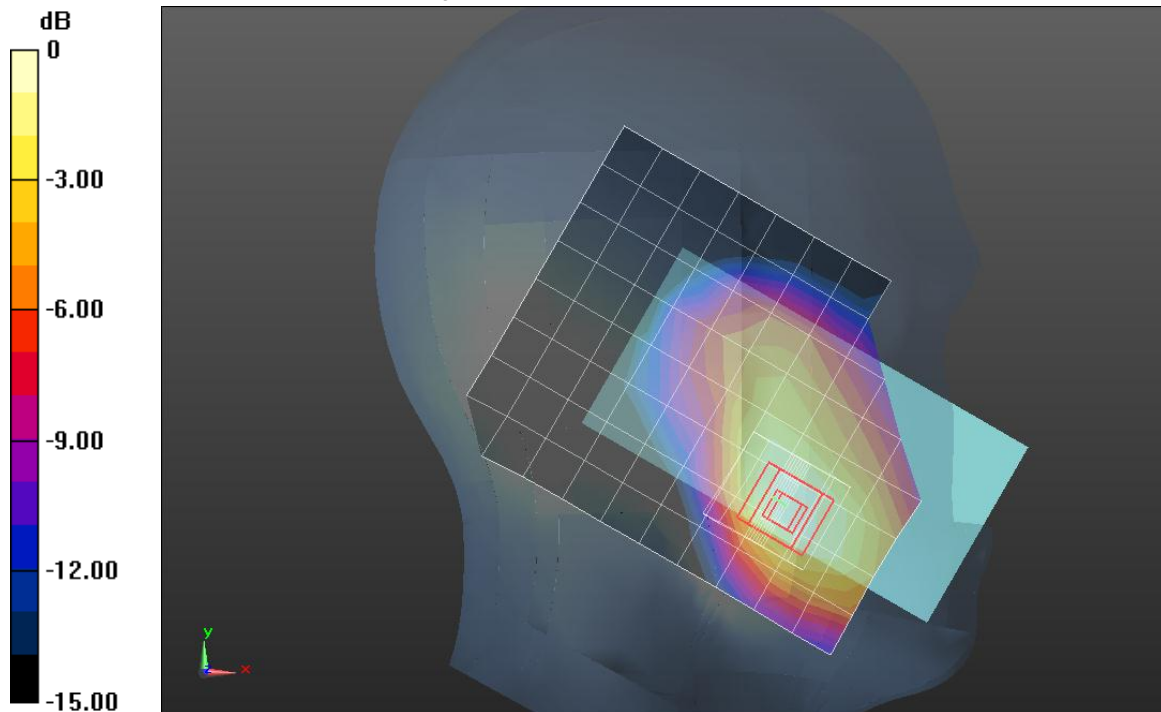
Frequency: 1880 MHz; Duty Cycle: 1:1; Room Ambient Temperature: 24.0°C; Liquid Temperature: 23.0°C
Medium parameters used: $f = 1880$ MHz; $\sigma = 1.407$ mho/m; $\epsilon_r = 40.381$; $\rho = 1000$ kg/m³

DASY5 Configuration:

- Electronics: DAE3 Sn500; Calibrated: 7/14/2011
- 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

Left/Touch_1xEVDO_Rel. 0_ch 600/Area Scan (9x11x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.608 mW/g

Left/Touch_1xEVDO_Rel. 0_ch 600/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 21.914 V/m; Power Drift = -0.10 dB
Peak SAR (extrapolated) = 0.8860
SAR(1 g) = 0.564 mW/g; SAR(10 g) = 0.350 mW/g
Maximum value of SAR (measured) = 0.682 mW/g



0 dB = 0.680mW/g = -3.35 dB mW/g

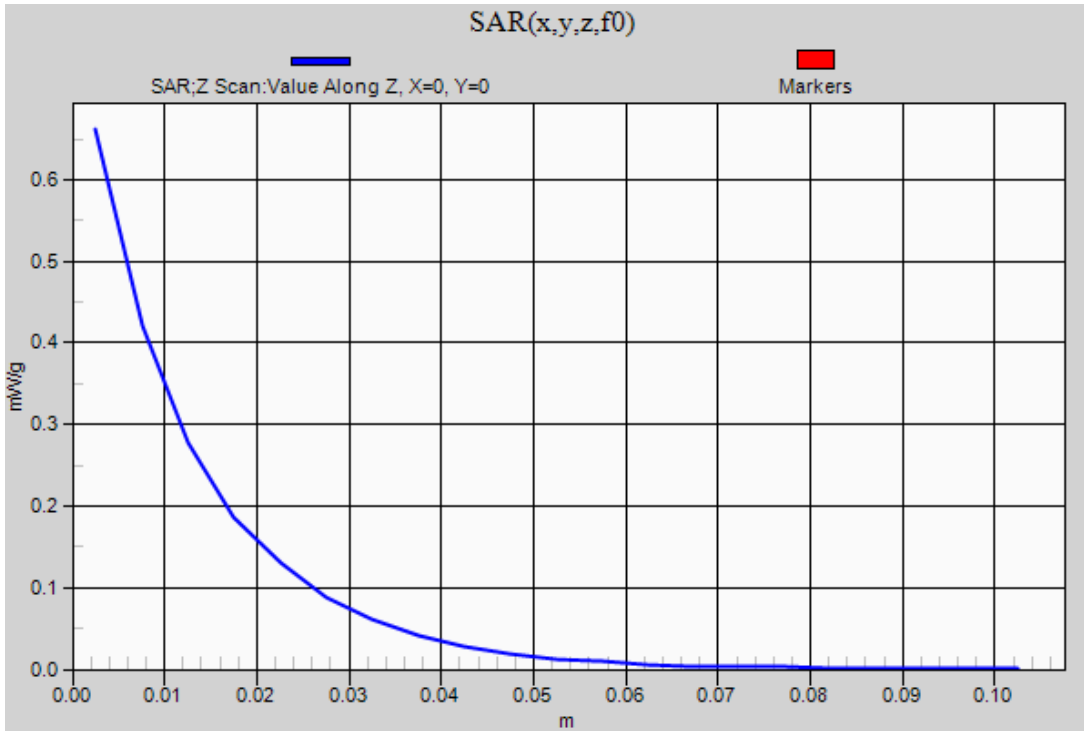
Test Laboratory: UL CCS SAR Lab C

Date: 3/30/2012

CDMA BC1

Frequency: 1880 MHz; Duty Cycle: 1:1

Left/Touch_1xEVDO_Rel. 0_ch 600/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Maximum value of SAR (measured) = 0.662 mW/g



Test Laboratory: UL CCS SAR Lab C

Date: 4/3/2012

CDMA BC1

Frequency: 1851.25 MHz; Duty Cycle: 1:1; Room Ambient Temperature: 24.0°C; Liquid Temperature: 23.0°C
Medium parameters used (interpolated): $f = 1851.25$ MHz; $\sigma = 1.45$ mho/m; $\epsilon_r = 51.134$; $\rho = 1000$ kg/m³

DASY5 Configuration:

- Electronics: DAE3 Sn500; Calibrated: 7/14/2011
- 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 (B); Type: QDOVA001BB; Serial: 1121

Rear/1xRTT_RC3_SO32_Ch 25_w/Headset/Area Scan (10x14x1): Measurement grid: dx=15mm, dy=15mm

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

Maximum value of SAR (measured) = 1.251 mW/g

Rear/1xRTT_RC3_SO32_Ch 25_w/Headset/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

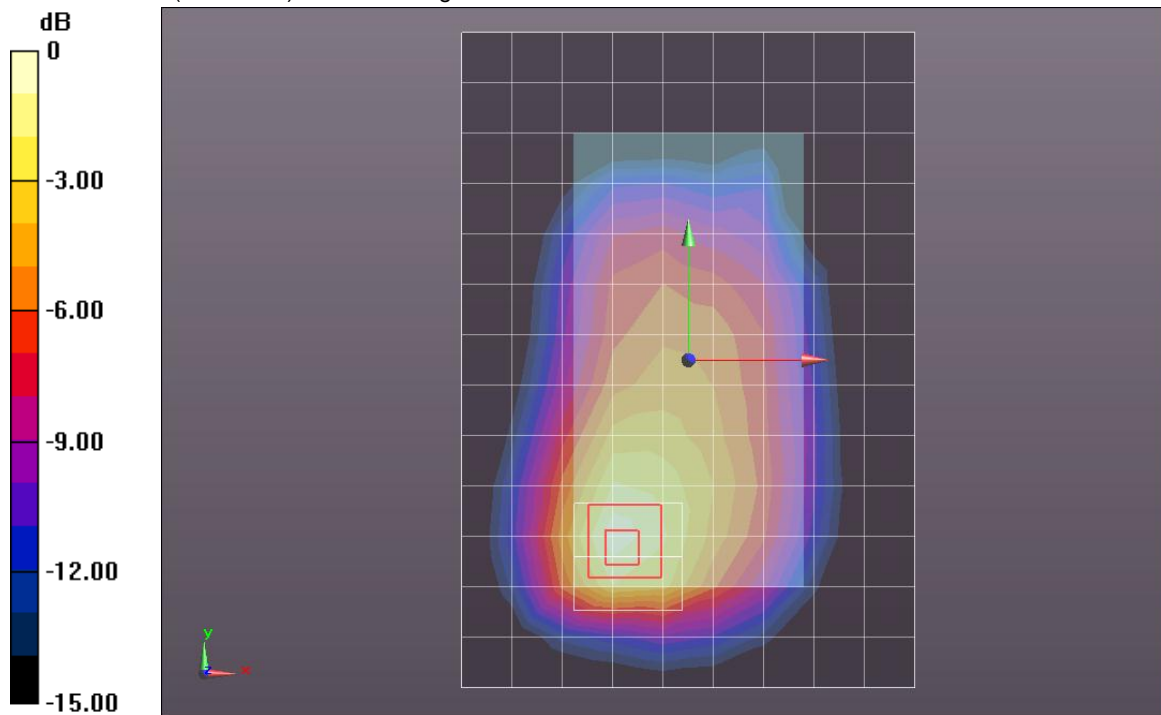
Reference Value = 29.794 V/m; Power Drift = 0.03 dB

Peak SAR (extrapolated) = 1.7520

SAR(1 g) = 1.04 mW/g; SAR(10 g) = 0.602 mW/g

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

Maximum value of SAR (measured) = 1.315 mW/g



0 dB = 1.320mW/g = 2.41 dB mW/g

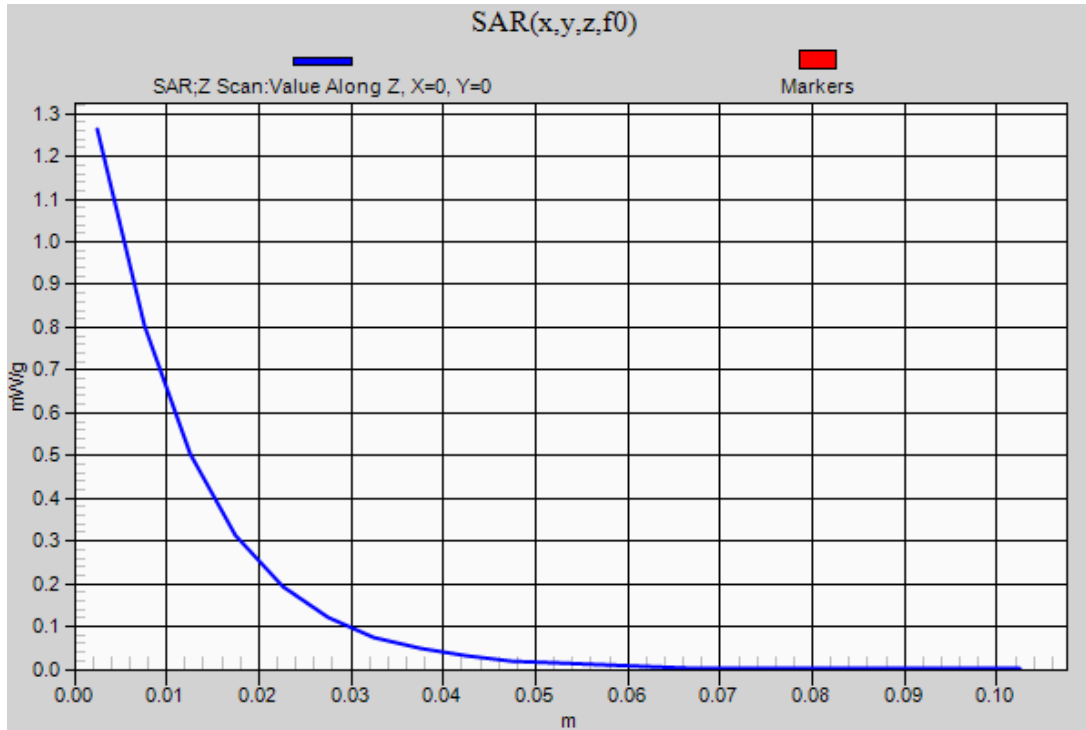
CDMA BC1

Frequency: 1851.25 MHz; Duty Cycle: 1:1

Rear/1xRTT_RC3_SO32_Ch 25_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) = 1.263 mW/g



Test Laboratory: UL CCS SAR Lab C

Date: 4/3/2012

CDMA BC1

Frequency: 1908.75 MHz; Duty Cycle: 1:1; Room Ambient Temperature: 24.0°C; Liquid Temperature: 23.0°C
Medium parameters used (interpolated): $f = 1908.75$ MHz; $\sigma = 1.515$ mho/m; $\epsilon_r = 50.951$; $\rho = 1000$ kg/m³

DASY5 Configuration:

- Electronics: DAE3 Sn500; Calibrated: 7/14/2011
- 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 (B); Type: QDOVA001BB; Serial: 1121

Rear/1xEVDO_Rel. 0_Ch 1175_w/Headset/Area Scan (10x14x1): Measurement grid: dx=15mm, dy=15mm

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

Maximum value of SAR (measured) = 1.037 mW/g

Rear/1xEVDO_Rel. 0_Ch 1175_w/Headset/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

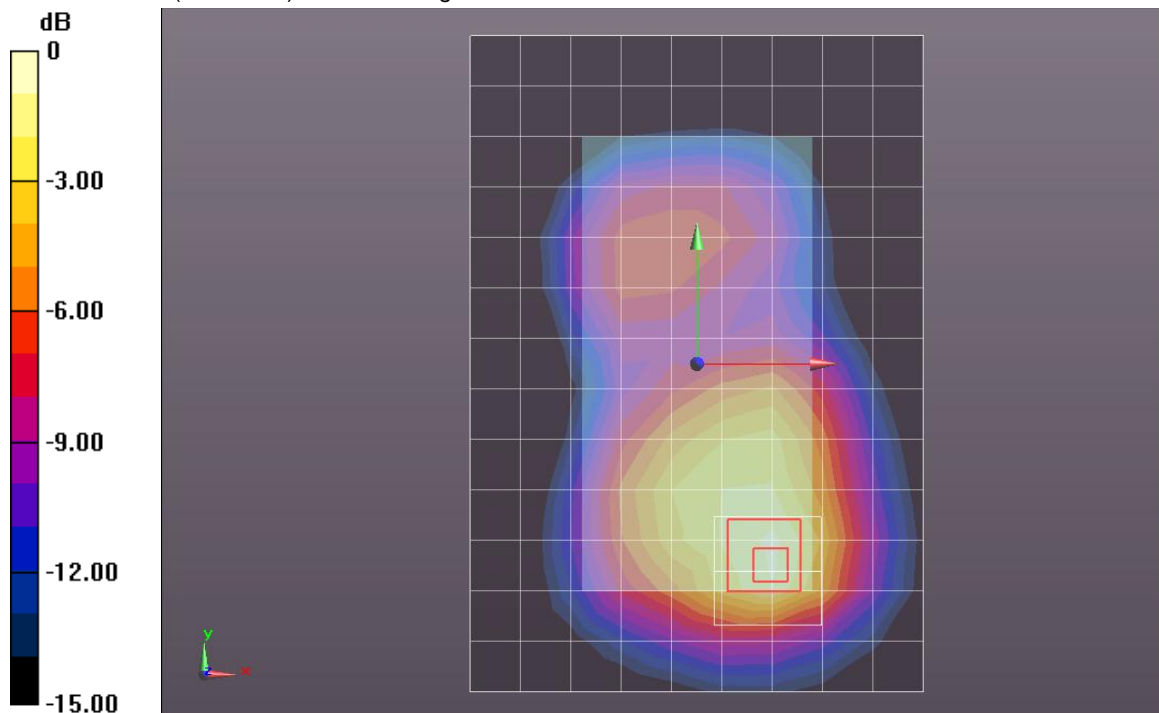
Reference Value = 26.586 V/m; Power Drift = -0.12 dB

Peak SAR (extrapolated) = 1.6200

SAR(1 g) = 0.918 mW/g; SAR(10 g) = 0.524 mW/g

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

Maximum value of SAR (measured) = 1.206 mW/g



0 dB = 1.210mW/g = 1.66 dB mW/g

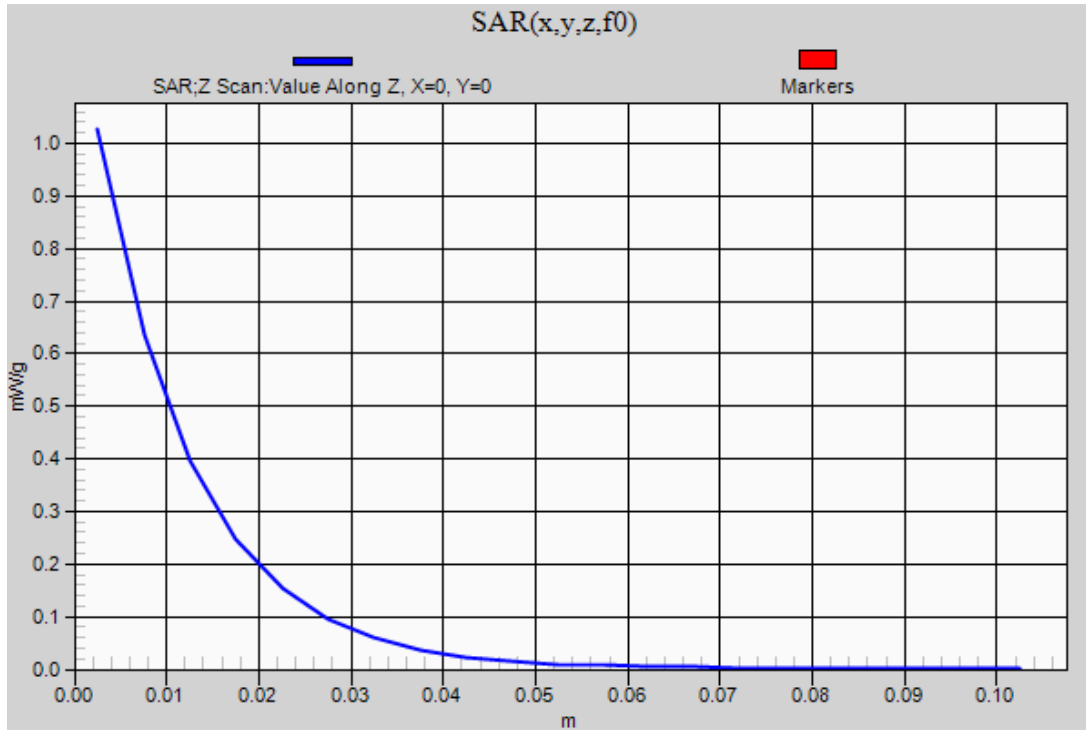
CDMA BC1

Frequency: 1908.75 MHz; Duty Cycle: 1:1

Rear/1xEVDO_Rel. 0_Ch 1175_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) = 1.026 mW/g



Test Laboratory: UL CCS SAR Lab A

Date: 3/27/2012

LTE Band 13

Frequency: 782 MHz; Duty Cycle: 1:1; Room Ambient Temperature: 24.0°C; Liquid Temperature: 23.0°C

Medium parameters used (interpolated): $f = 782 \text{ MHz}$; $\sigma = 0.932 \text{ mho/m}$; $\epsilon_r = 42.196$; $\rho = 1000 \text{ kg/m}^3$

DASY5 Configuration:

- Electronics: DAE4 Sn1239; Calibrated: 10/18/2011
- Probe: EX3DV4 - SN3772; ConvF(9.01, 9.01, 9.01); Calibrated: 2/16/2012
- Sensor-Surface: 2.5mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Phantom: SAM v5.0 (A); Type: QD000P40CC; Serial: 1602

Left/Touch_QPSK_RB 1/0_Ch 782/Area Scan (9x11x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

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

Maximum value of SAR (measured) = 0.356 mW/g

Left/Touch_QPSK_RB 1/0_Ch 782/Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

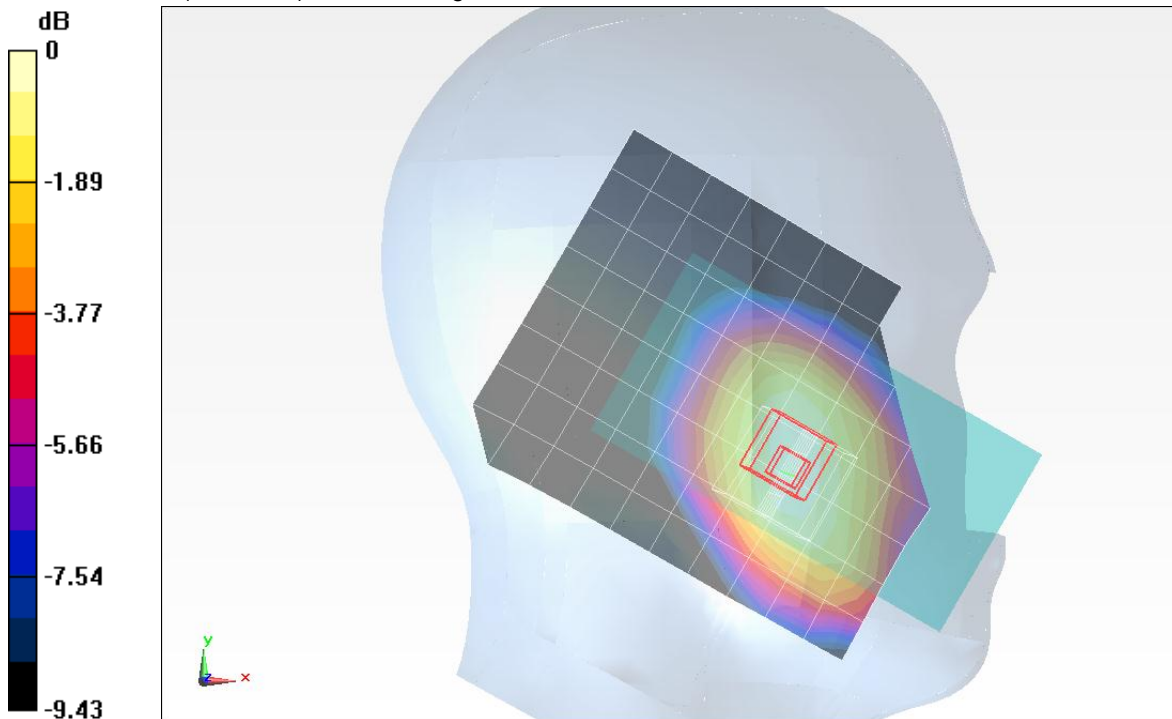
Reference Value = 19.723 V/m; Power Drift = 0.14 dB

Peak SAR (extrapolated) = 0.4060

SAR(1 g) = 0.324 mW/g; SAR(10 g) = 0.246 mW/g

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

Maximum value of SAR (measured) = 0.360 mW/g



0 dB = 0.360mW/g = -8.87 dB mW/g

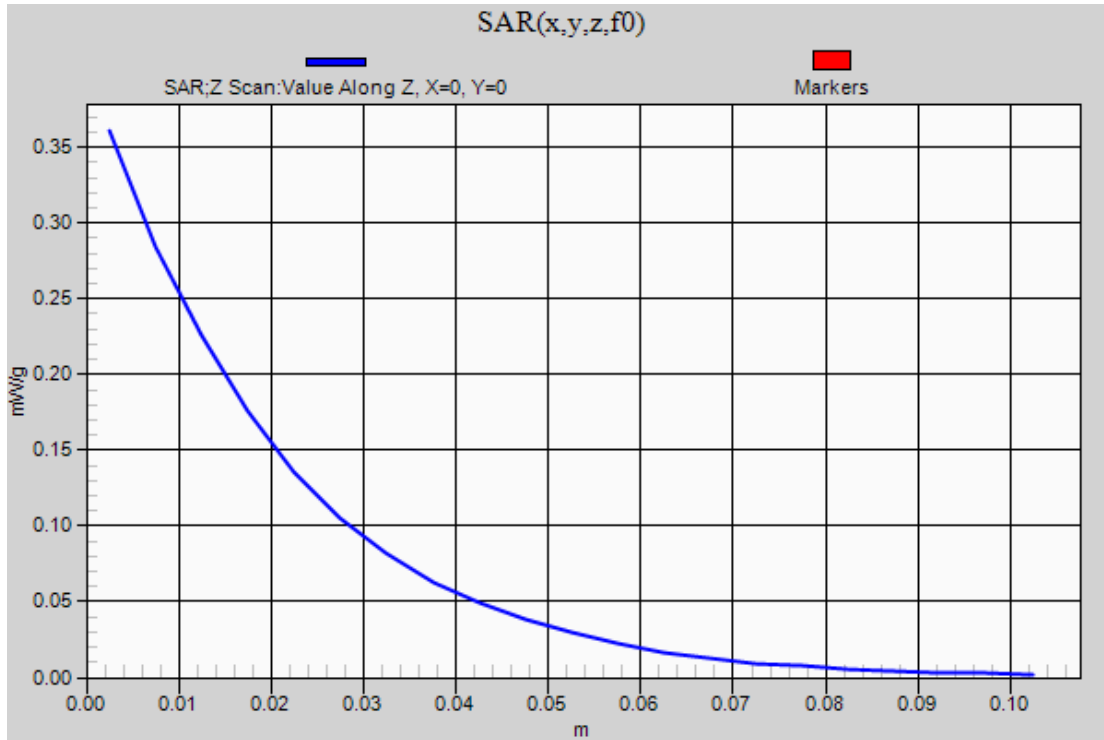
LTE Band 13

Frequency: 782 MHz; Duty Cycle: 1:1

Left/Touch_QPSK_RB 1/0_Ch 782/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm

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

Maximum value of SAR (measured) = 0.361 mW/g



Test Laboratory: UL CCS SAR Lab A

Date: 3/27/2012

LTE Band 13

Frequency: 782 MHz; Duty Cycle: 1:1; Room Ambient Temperature: 24.0°C; Liquid Temperature: 23.0°C
Medium parameters used (interpolated): $f = 782 \text{ MHz}$; $\sigma = 0.932 \text{ mho/m}$; $\epsilon_r = 42.196$; $\rho = 1000 \text{ kg/m}^3$

DASY5 Configuration:

- Electronics: DAE4 Sn1239; Calibrated: 10/18/2011
- Probe: EX3DV4 - SN3772; ConvF(9.01, 9.01, 9.01); Calibrated: 2/16/2012
- Sensor-Surface: 2.5mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Phantom: SAM v5.0 (A); Type: QD000P40CC; Serial: 1602

Left/Touch_16QAM_RB 1/0_Ch 782/Area Scan (9x11x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

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

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

Left/Touch_16QAM_RB 1/0_Ch 782/Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

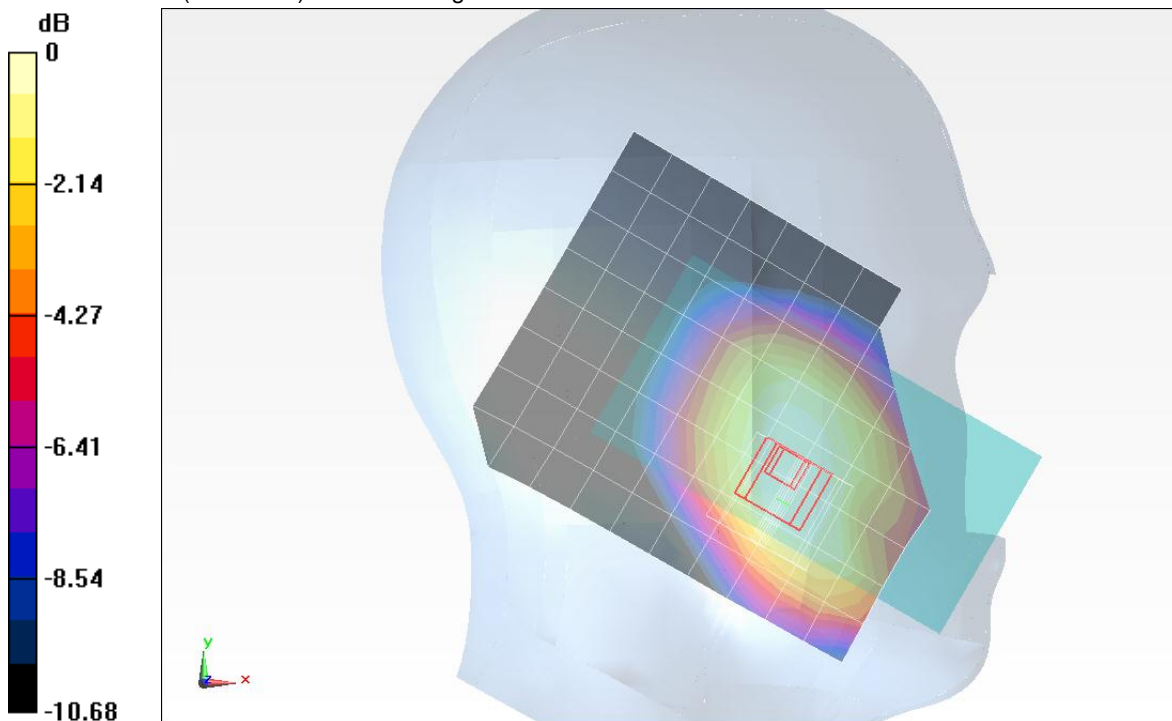
Reference Value = 18.575 V/m; Power Drift = -0.08 dB

Peak SAR (extrapolated) = 0.3440

SAR(1 g) = 0.267 mW/g; SAR(10 g) = 0.199 mW/g

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

Maximum value of SAR (measured) = 0.301 mW/g



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

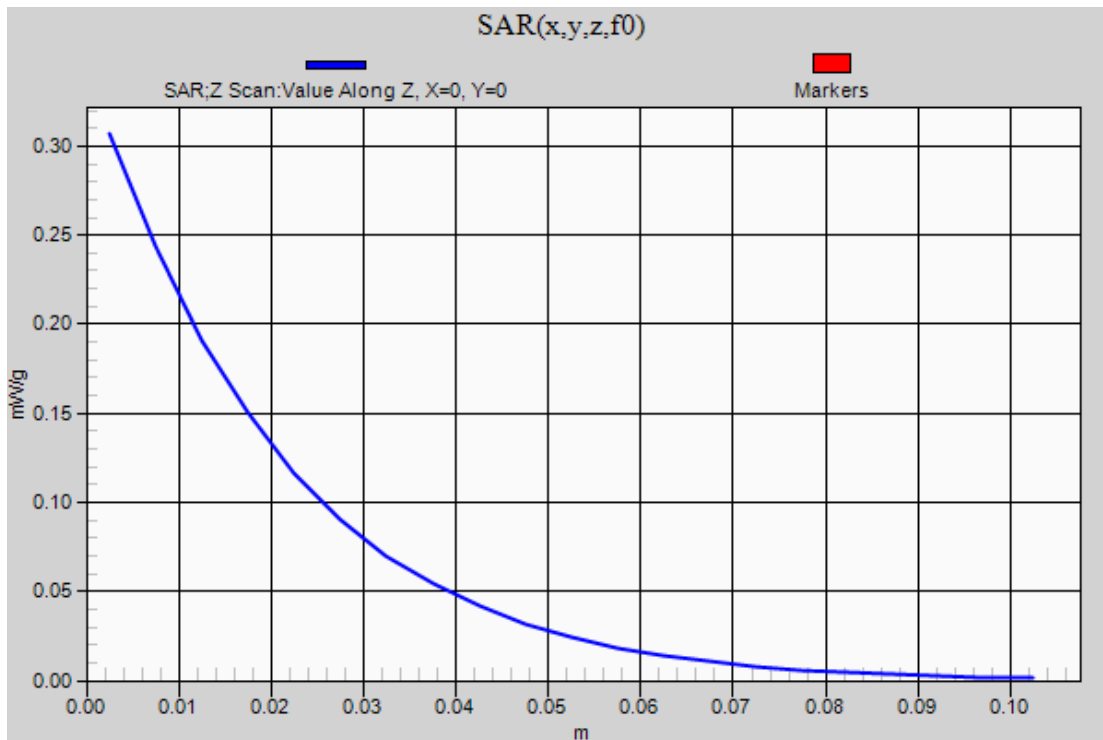
LTE Band 13

Frequency: 782 MHz; Duty Cycle: 1:1

Left/Touch_16QAM_RB 1/0_Ch 782/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm

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

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



Test Laboratory: UL CCS SAR Lab A

Date: 3/28/2012

LTE Band 13

Frequency: 782 MHz; Duty Cycle: 1:1; Room Ambient Temperature: 24.0°C; Liquid Temperature: 23.0°C
Medium parameters used (interpolated): $f = 782 \text{ MHz}$; $\sigma = 0.984 \text{ mho/m}$; $\epsilon_r = 55.26$; $\rho = 1000 \text{ kg/m}^3$

DASY5 Configuration:

- Electronics: DAE4 Sn1239; Calibrated: 10/18/2011
- Probe: EX3DV4 - SN3772; ConvF(8.94, 8.94, 8.94); Calibrated: 2/16/2012
- 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: 1118

Rear/QPSK_10mm Separation_RB 1/0_Ch 782/Area Scan (9x14x1): Measurement grid:

$dx=15\text{mm}$, $dy=15\text{mm}$

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

Maximum value of SAR (measured) = 0.701 mW/g

Rear/QPSK_10mm Separation_RB 1/0_Ch 782/Zoom Scan (5x5x7)/Cube 0: Measurement grid:

$dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

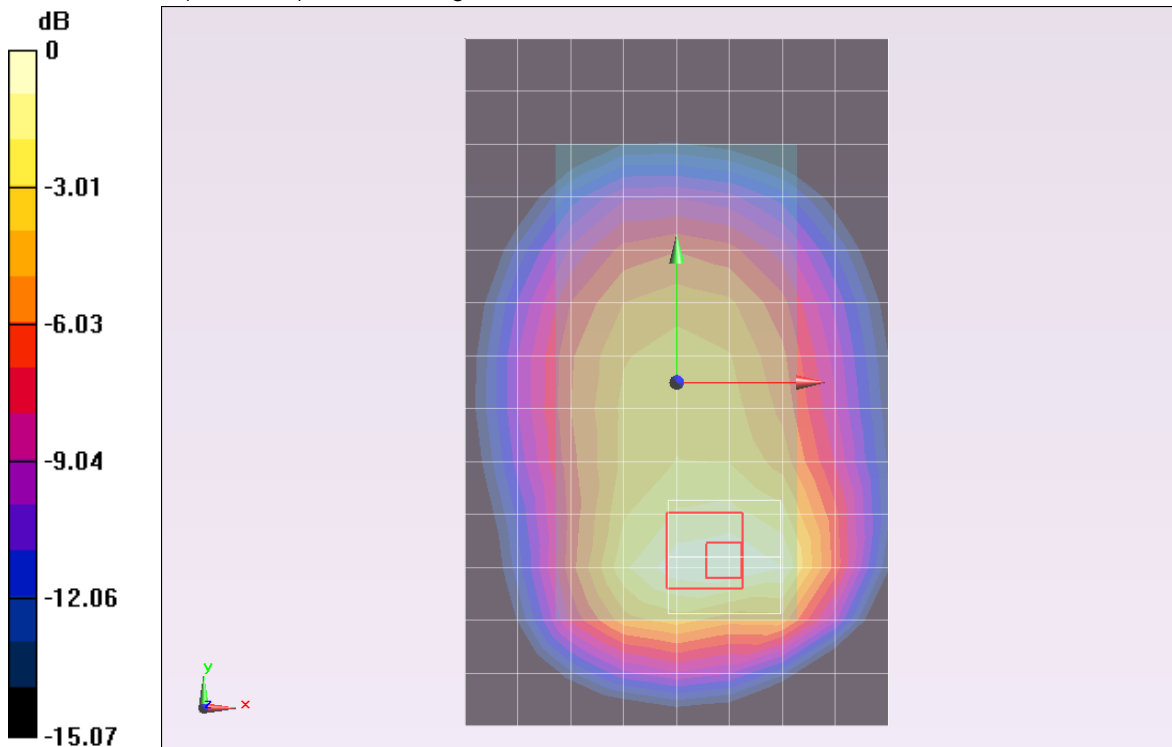
Reference Value = 26.941 V/m; Power Drift = -0.02 dB

Peak SAR (extrapolated) = 0.9190

SAR(1 g) = 0.548 mW/g; SAR(10 g) = 0.352 mW/g

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

Maximum value of SAR (measured) = 0.679 mW/g



0 dB = 0.680mW/g = -3.35 dB mW/g

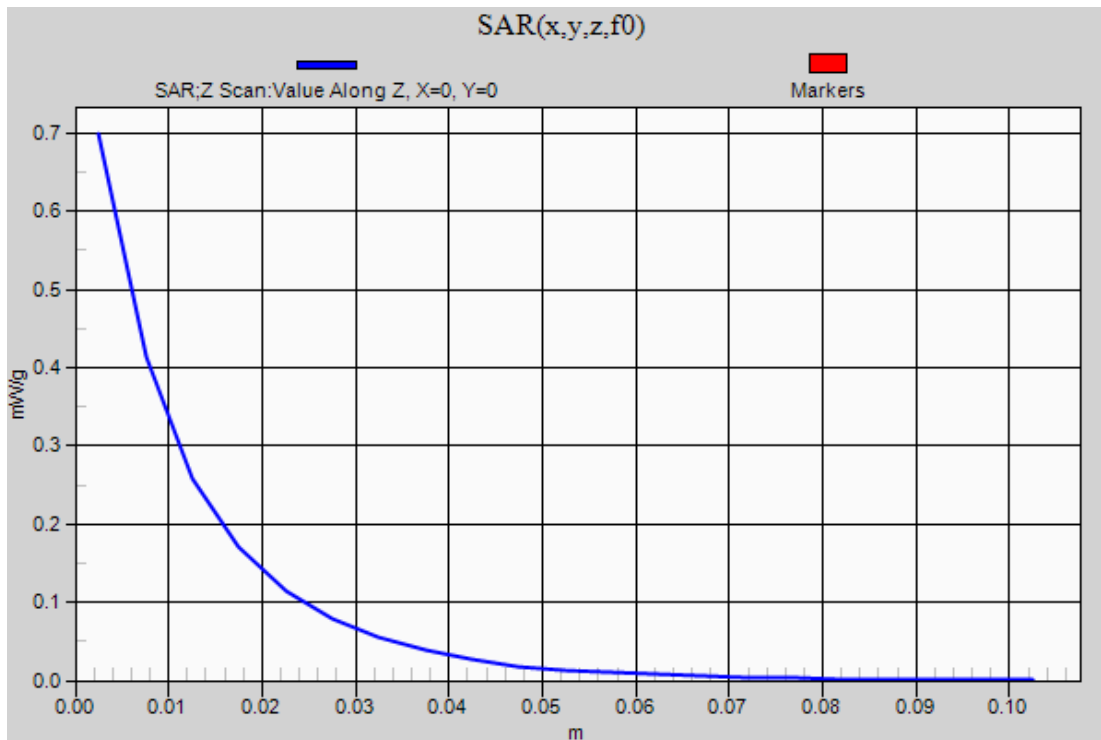
LTE Band 13

Frequency: 782 MHz; Duty Cycle: 1:1

Rear/QPSK_10mm Separation_RB 1/0_Ch 782/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm

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

Maximum value of SAR (measured) = 0.699 mW/g



Test Laboratory: UL CCS SAR Lab A

Date: 3/28/2012

LTE Band 13

Frequency: 782 MHz; Duty Cycle: 1:1; Room Ambient Temperature: 24.0°C; Liquid Temperature: 23.0°C
Medium parameters used (interpolated): $f = 782 \text{ MHz}$; $\sigma = 0.984 \text{ mho/m}$; $\epsilon_r = 55.26$; $\rho = 1000 \text{ kg/m}^3$

DASY5 Configuration:

- Electronics: DAE4 Sn1239; Calibrated: 10/18/2011
- Probe: EX3DV4 - SN3772; ConvF(8.94, 8.94, 8.94); Calibrated: 2/16/2012
- 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: 1118

Rear/16QAM_10mm Separation_RB 1/0_Ch 782/Area Scan (9x14x1): Measurement grid:

$dx=15\text{mm}$, $dy=15\text{mm}$

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

Maximum value of SAR (measured) = 0.587 mW/g

Rear/16QAM_10mm Separation_RB 1/0_Ch 782/Zoom Scan (5x5x7)/Cube 0: Measurement

grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

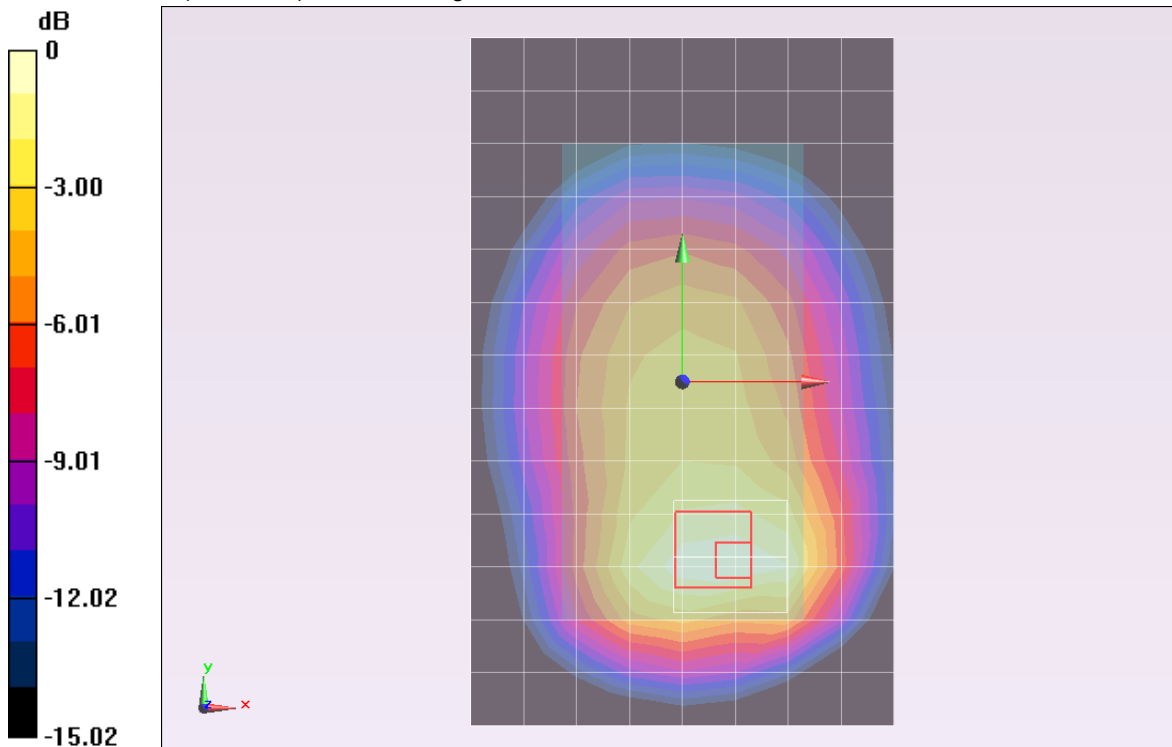
Reference Value = 24.872 V/m; Power Drift = -0.03 dB

Peak SAR (extrapolated) = 0.7800

SAR(1 g) = 0.468 mW/g; SAR(10 g) = 0.298 mW/g

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

Maximum value of SAR (measured) = 0.577 mW/g



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

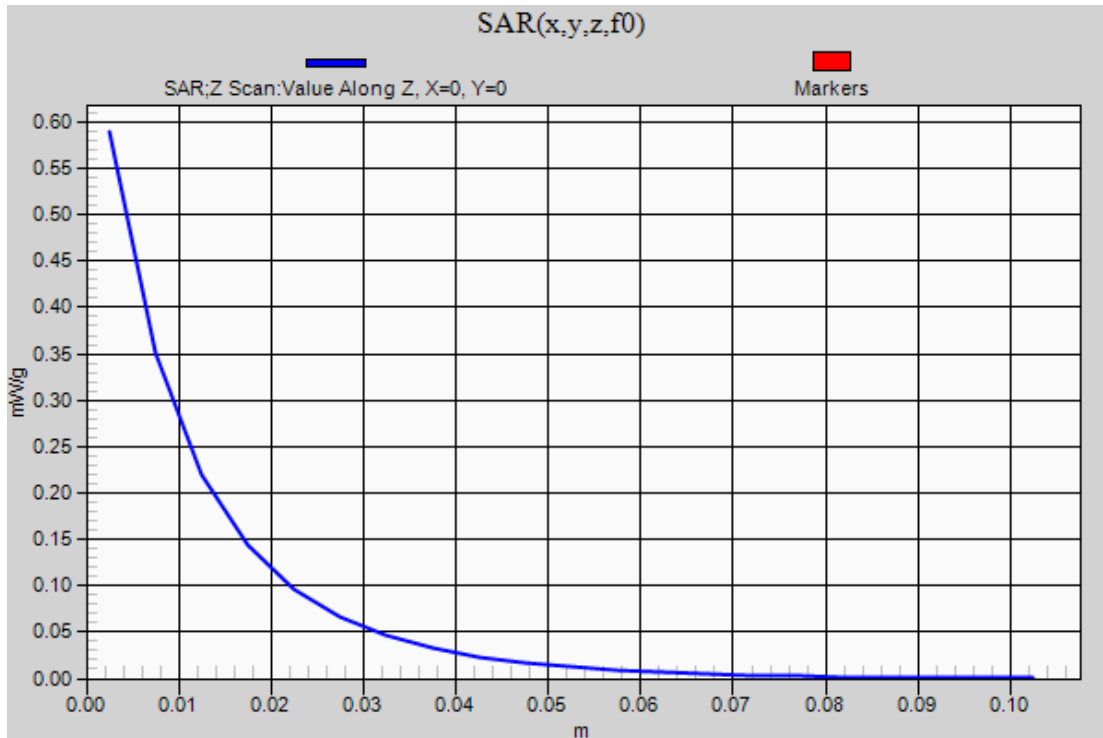
LTE Band 13

Frequency: 782 MHz; Duty Cycle: 1:1

Rear/16QAM_10mm Separation_RB 1/0_Ch 782/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm

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

Maximum value of SAR (measured) = 0.589 mW/g



Test Laboratory: UL CCS SAR Lab A

Date: 3/29/2012

WiFi 2.4GHz Band

Frequency: 2412 MHz; Duty Cycle: 1:1; Room Ambient Temperature: 24.0°C; Liquid Temperature: 23.0°C
Medium parameters used (interpolated): $f = 2412$ MHz; $\sigma = 1.749$ mho/m; $\epsilon_r = 37.997$; $\rho = 1000$ kg/m³

DASY5 Configuration:

- Electronics: DAE4 Sn1239; Calibrated: 10/18/2011
- Probe: EX3DV4 - SN3772; ConvF(6.64, 6.64, 6.64); Calibrated: 2/16/2012
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Phantom: SAM v5.0 (A); Type: QD000P40CC; Serial: 1602

Right/Touch_802.11b, ch 1/Area Scan (9x11x1): Measurement grid: dx=15mm, dy=15mm

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

Maximum value of SAR (measured) = 0.165 mW/g

Right/Touch_802.11b, ch 1/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

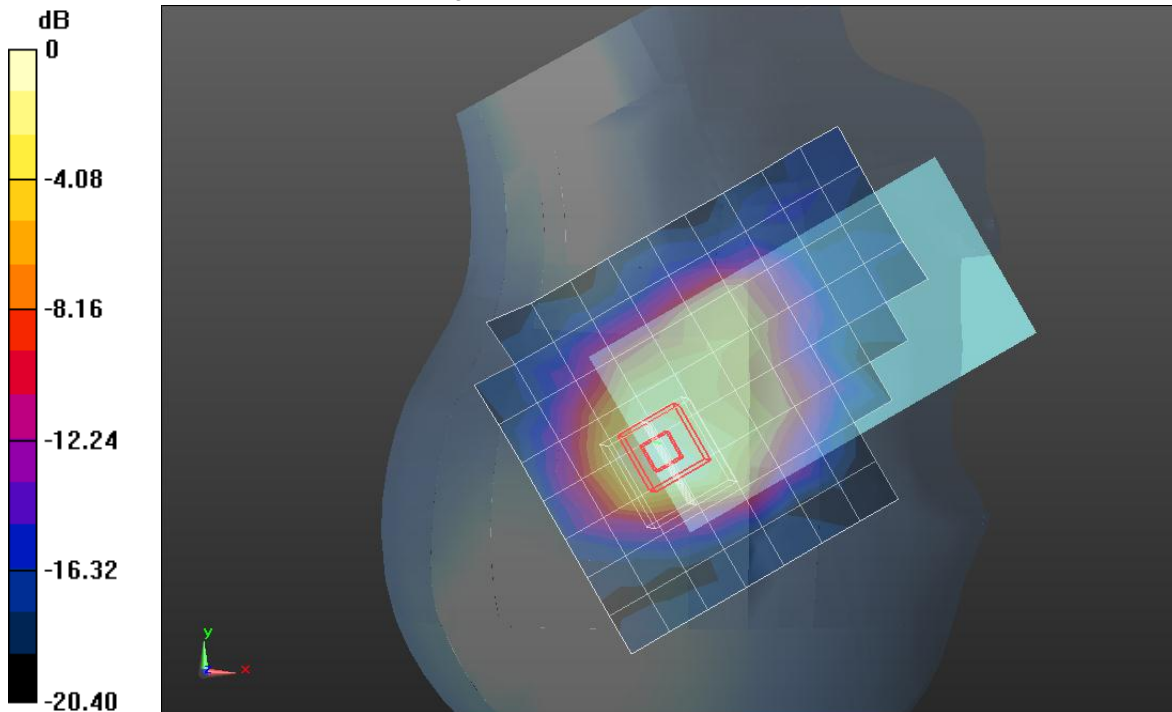
Reference Value = 8.838 V/m; Power Drift = -0.0016 dB

Peak SAR (extrapolated) = 0.2820

SAR(1 g) = 0.132 mW/g; SAR(10 g) = 0.065 mW/g

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

Maximum value of SAR (measured) = 0.173 mW/g



0 dB = 0.170mW/g = -15.39 dB mW/g

Test Laboratory: UL CCS SAR Lab A

Date: 3/29/2012

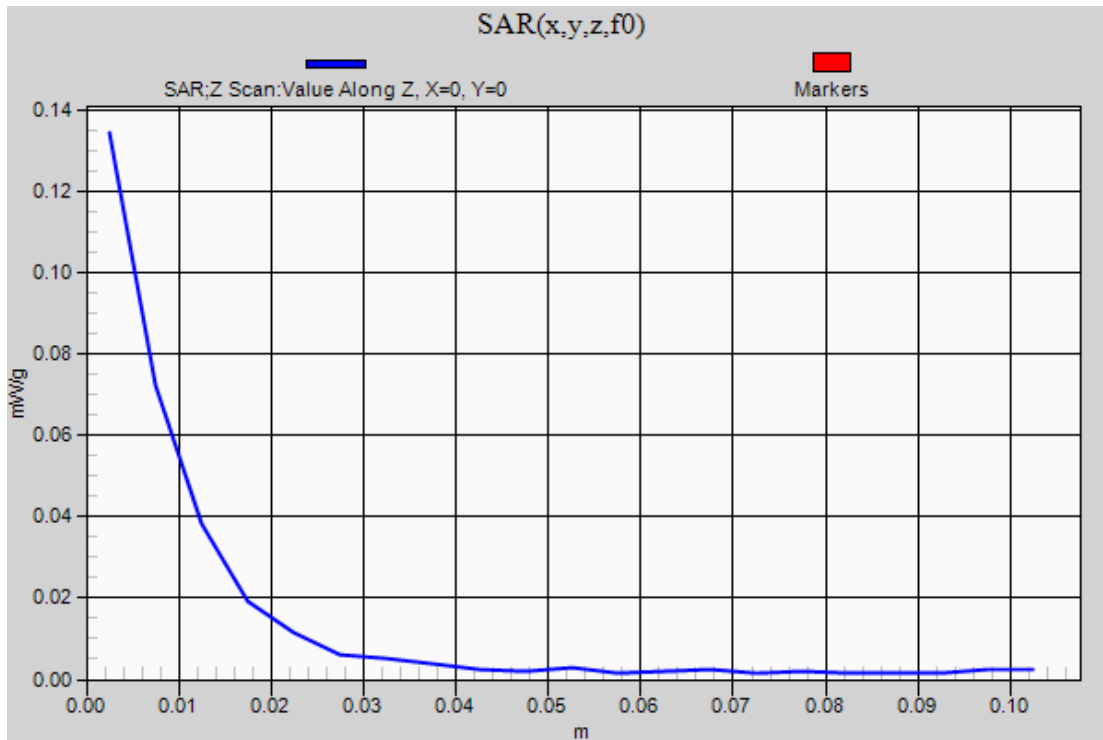
WiFi 2.4GHz Band

Frequency: 2412 MHz; Duty Cycle: 1:1

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

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

Maximum value of SAR (measured) = 0.134 mW/g



WiFi 2.4GHz Band

Frequency: 2412 MHz; Duty Cycle: 1:1; Room Ambient Temperature: 24.0°C; Liquid Temperature: 23.0°C
Medium parameters used (interpolated): $f = 2412$ MHz; $\sigma = 1.853$ mho/m; $\epsilon_r = 50.832$; $\rho = 1000$ kg/m³

DASY5 Configuration:

- Electronics: DAE4 Sn1239; Calibrated: 10/18/2011
- Probe: EX3DV4 - SN3772; ConvF(6.65, 6.65, 6.65); Calibrated: 2/16/2012
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Phantom: ELI v5.0 (B); Type: QDOVA001BB; Serial: 1118

Rear/802.11b, ch 1/Area Scan (9x14x1): Measurement grid: dx=15mm, dy=15mm

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

Maximum value of SAR (measured) = 0.116 mW/g

Rear/802.11b, ch 1/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

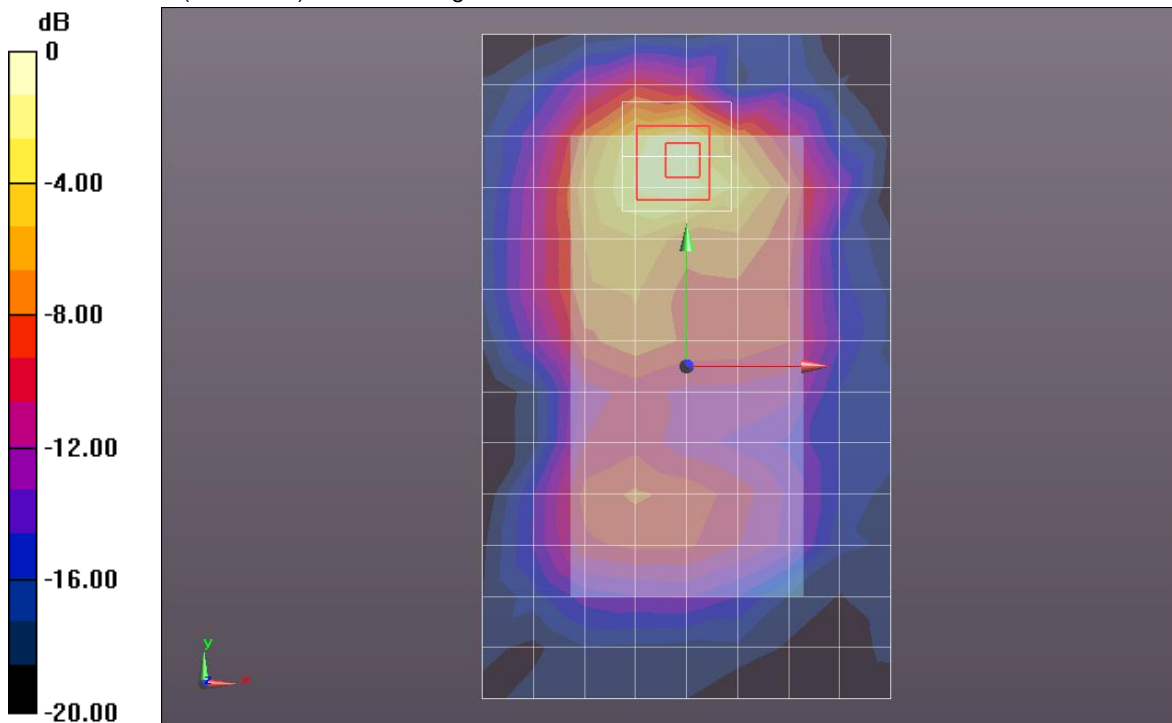
Reference Value = 7.984 V/m; Power Drift = -0.03 dB

Peak SAR (extrapolated) = 0.2220

SAR(1 g) = 0.117 mW/g; SAR(10 g) = 0.059 mW/g

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

Maximum value of SAR (measured) = 0.157 mW/g



0 dB = 0.160mW/g = -15.92 dB mW/g

Test Laboratory: UL CCS SAR Lab A

Date: 3/29/2012

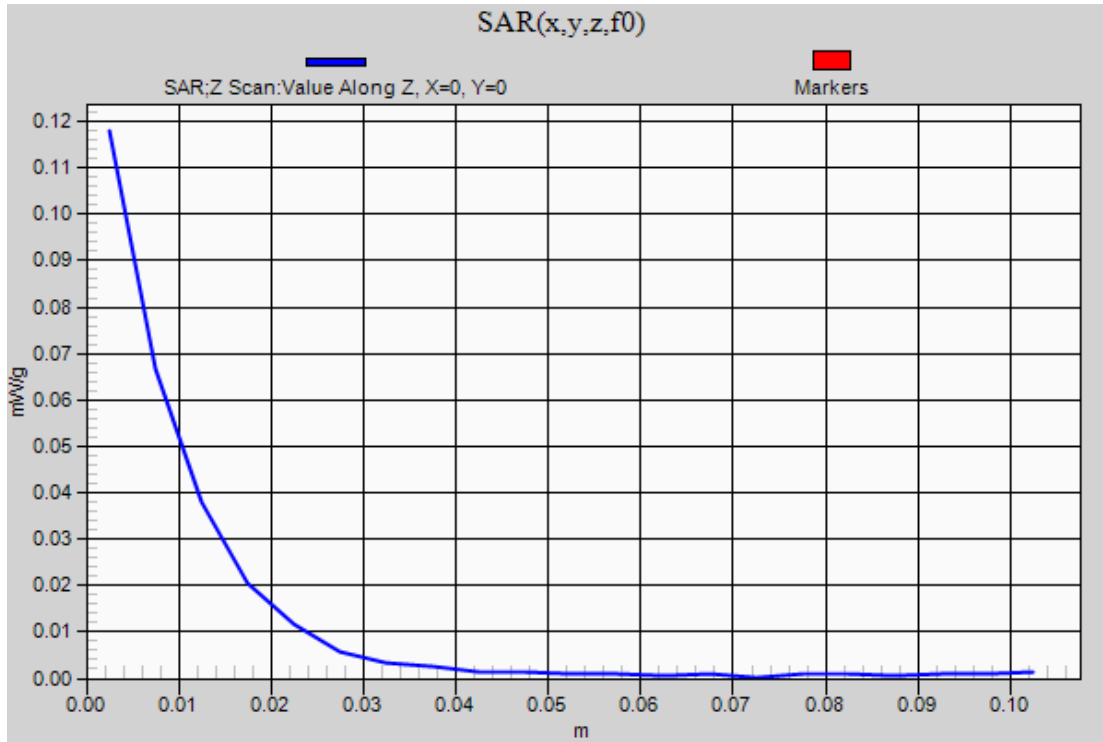
WiFi 2.4GHz Band

Frequency: 2412 MHz; Duty Cycle: 1:1

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

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

Maximum value of SAR (measured) = 0.118 mW/g



Test Laboratory: UL CCS SAR Lab A

Date: 4/2/2012

WiFi 5GHz Bands

Frequency: 5180 MHz; Duty Cycle: 1:1; Room Ambient Temperature: 25.0°C; Liquid Temperature: 24.0°C
Medium parameters used: $f = 5180 \text{ MHz}$; $\sigma = 4.74 \text{ mho/m}$; $\epsilon_r = 35.205$; $\rho = 1000 \text{ kg/m}^3$

DASY5 Configuration:

- Electronics: DAE4 Sn1239; Calibrated: 10/18/2011
- Probe: EX3DV4 - SN3772; ConvF(4.88, 4.88, 4.88); Calibrated: 2/16/2012
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Phantom: SAM v5.0 (A); Type: QD000P40CC; Serial: 1602

LHS/Touch_Ch 36/Area Scan (13x16x1): Measurement grid: $dx=10\text{mm}$, $dy=10\text{mm}$

Maximum value of SAR (measured) = 1.517 mW/g

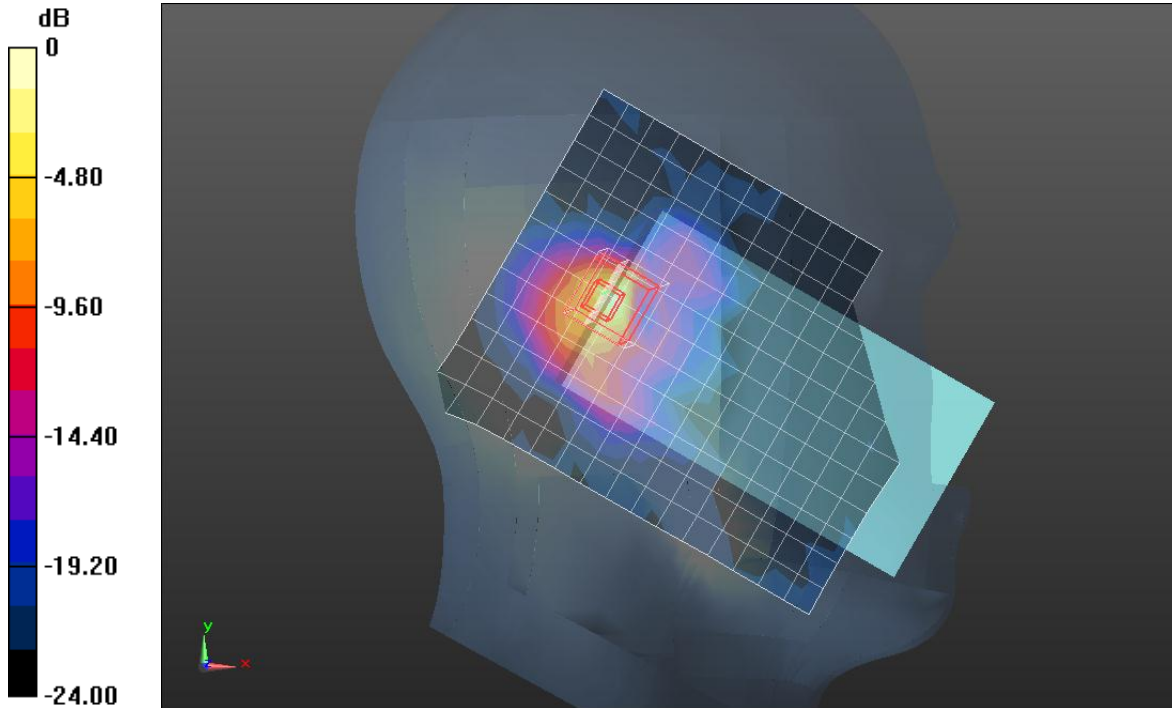
LHS/Touch_Ch 36/Zoom Scan (7x7x9)/Cube 0: Measurement grid: $dx=4\text{mm}$, $dy=4\text{mm}$, $dz=2.5\text{mm}$

Reference Value = 13.312 V/m; Power Drift = 0.15 dB

Peak SAR (extrapolated) = 3.9960

SAR(1 g) = 0.852 mW/g; SAR(10 g) = 0.189 mW/g

Maximum value of SAR (measured) = 1.580 mW/g



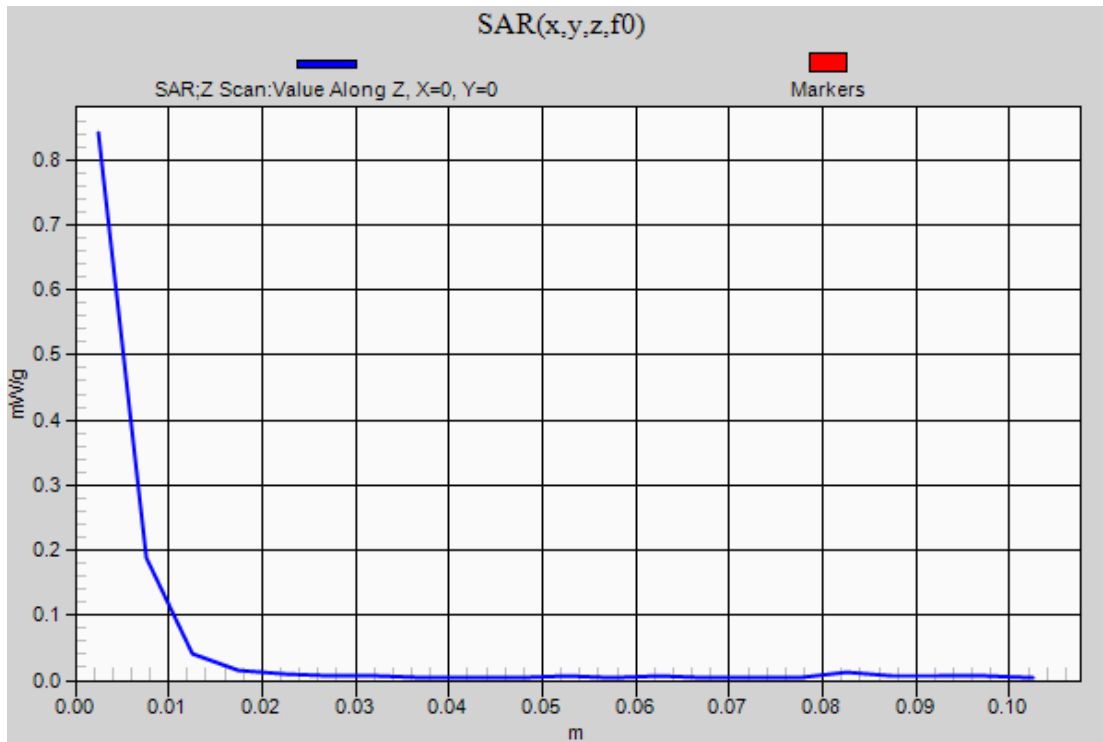
0 dB = 1.580mW/g = 3.97 dB mW/g

WiFi 5GHz Bands

Frequency: 5180 MHz; Duty Cycle: 1:1

LHS/Touch_Ch 36/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm

Maximum value of SAR (measured) = 0.841 mW/g



WiFi 5GHz Bands

Frequency: 5180 MHz; Duty Cycle: 1:1; Room Ambient Temperature: 25.0°C; Liquid Temperature: 24.0°C
Medium parameters used: $f = 5180$ MHz; $\sigma = 5.275$ mho/m; $\epsilon_r = 50.644$; $\rho = 1000$ kg/m³

DASY5 Configuration:

- Electronics: DAE4 Sn1239; Calibrated: 10/18/2011
- Probe: EX3DV4 - SN3772; ConvF(4.17, 4.17, 4.17); Calibrated: 2/16/2012
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Phantom: ELI v5.0 (A); Type: QDOVA001BB; Serial: 1119

Rear/802.11a, Ch 36_w/Headset/Area Scan (13x20x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 0.277 mW/g

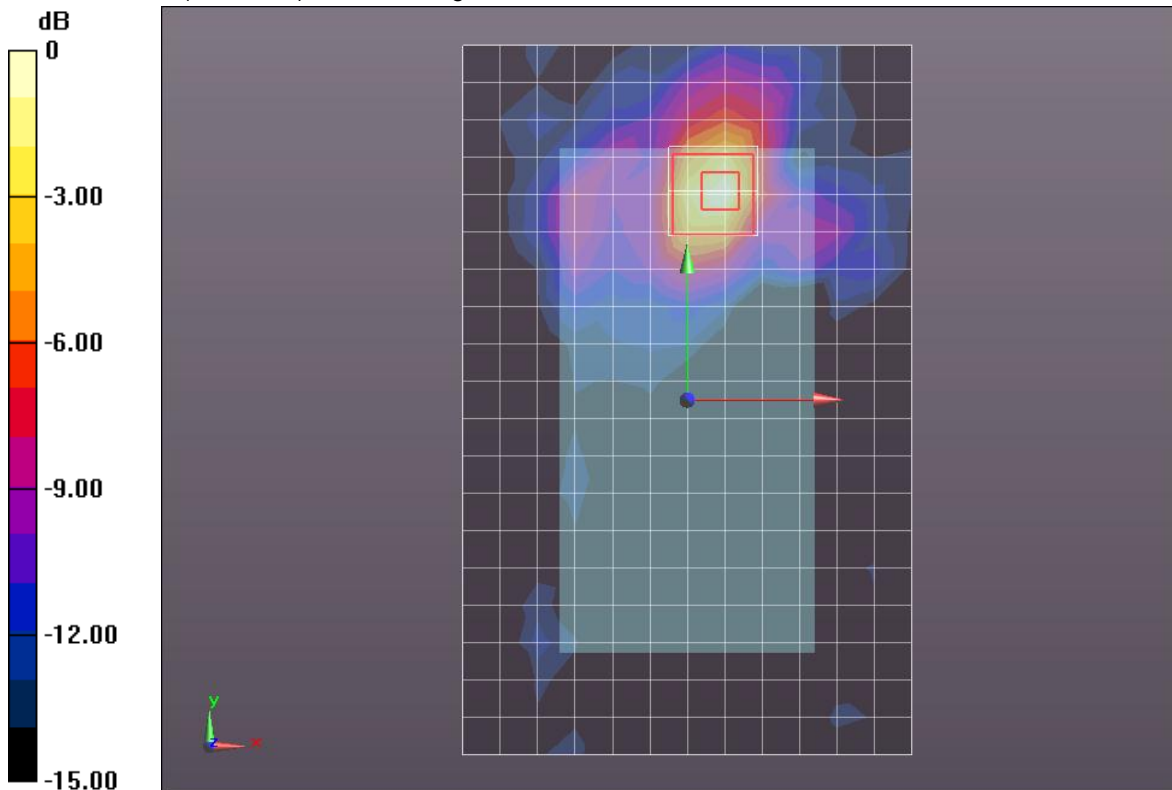
Rear/802.11a, Ch 36_w/Headset/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 7.920 V/m; Power Drift = 0.12 dB

Peak SAR (extrapolated) = 0.5280

SAR(1 g) = 0.164 mW/g; SAR(10 g) = 0.053 mW/g

Maximum value of SAR (measured) = 0.274 mW/g

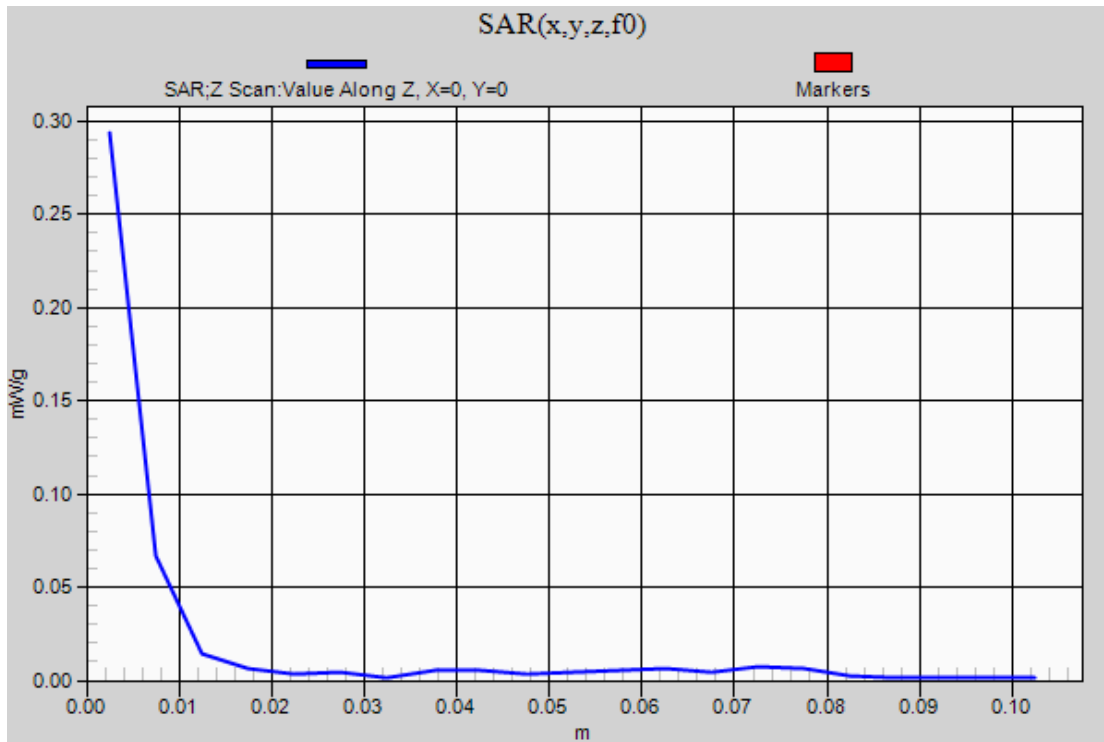


0 dB = 0.270mW/g = -11.37 dB mW/g

WiFi 5GHz Bands

Frequency: 5180 MHz; Duty Cycle: 1:1

Rear/802.11a, Ch 36_w/Headset/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Maximum value of SAR (measured) = 0.294 mW/g



Test Laboratory: UL CCS SAR Lab A

Date: 4/4/2012

WiFi 5GHz Bands

Frequency: 5320 MHz; Duty Cycle: 1:1; Room Ambient Temperature: 25.0°C; Liquid Temperature: 24.0°C
Medium parameters used: $f = 5320$ MHz; $\sigma = 4.872$ mho/m; $\epsilon_r = 35.734$; $\rho = 1000$ kg/m³

DASY5 Configuration:

- Electronics: DAE4 Sn1239; Calibrated: 10/18/2011
- Probe: EX3DV4 - SN3772; ConvF(4.62, 4.62, 4.62); Calibrated: 2/16/2012
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Phantom: SAM v5.0 (A); Type: QD000P40CC; Serial: 1602

RHS/Touch_Ch 64/Area Scan (13x16x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (measured) = 1.009 mW/g

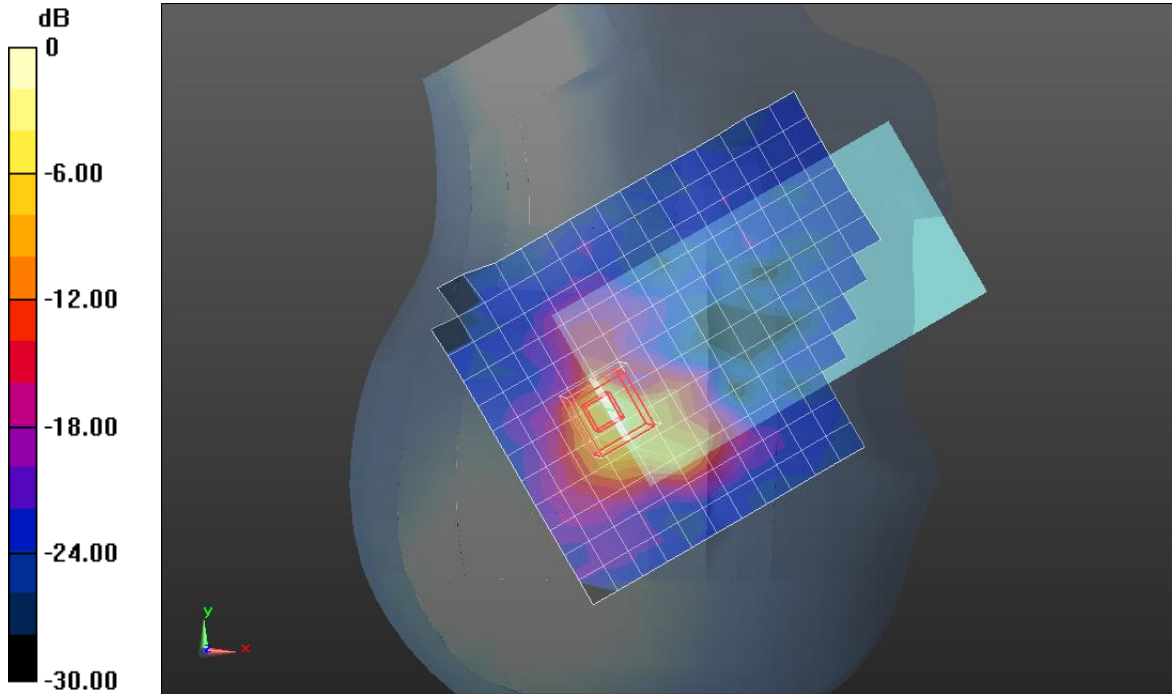
RHS/Touch_Ch 64/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 15.485 V/m; Power Drift = -0.08 dB

Peak SAR (extrapolated) = 3.8020

SAR(1 g) = 0.772 mW/g; SAR(10 g) = 0.181 mW/g

Maximum value of SAR (measured) = 1.551 mW/g



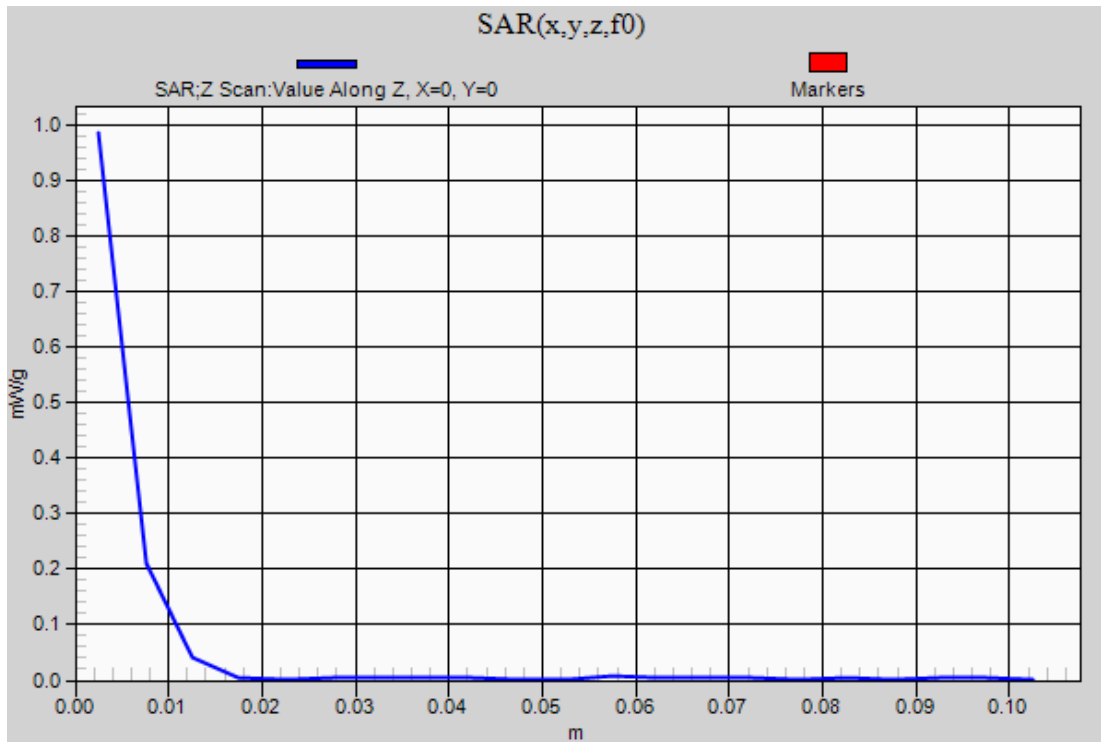
0 dB = 1.550mW/g = 3.81 dB mW/g

WiFi 5GHz Bands

Frequency: 5320 MHz; Duty Cycle: 1:1

RHS/Touch_Ch 64/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm

Maximum value of SAR (measured) = 0.984 mW/g



WiFi 5GHz Bands

Frequency: 5320 MHz; Duty Cycle: 1:1; Room Ambient Temperature: 25.0°C; Liquid Temperature: 24.0°C
Medium parameters used: $f = 5320$ MHz; $\sigma = 5.256$ mho/m; $\epsilon_r = 50.569$; $\rho = 1000$ kg/m³

DASY5 Configuration:

- Electronics: DAE4 Sn1239; Calibrated: 10/18/2011
- Probe: EX3DV4 - SN3772; ConvF(3.99, 3.99, 3.99); Calibrated: 2/16/2012
- 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: 1119

Rear/802.11a, Ch 64_w/Headset/Area Scan (13x20x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 0.209 mW/g

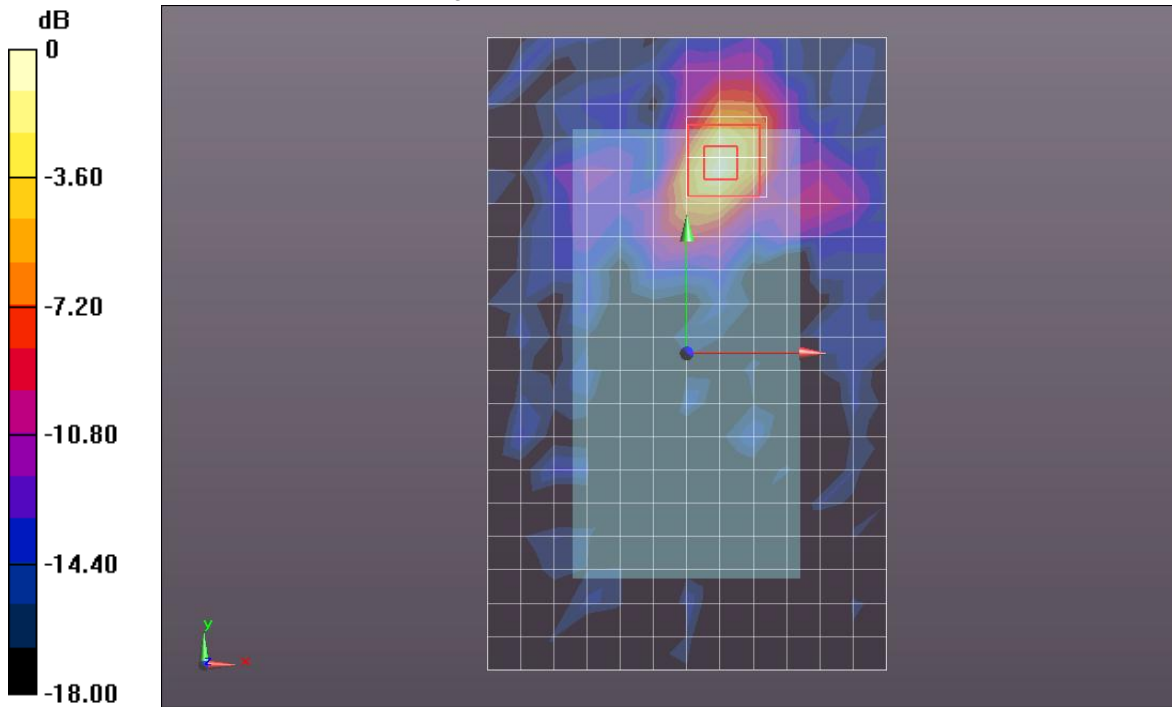
Rear/802.11a, Ch 64_w/Headset/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 7.016 V/m; Power Drift = -0.06 dB

Peak SAR (extrapolated) = 0.4060

SAR(1 g) = 0.129 mW/g; SAR(10 g) = 0.039 mW/g

Maximum value of SAR (measured) = 0.220 mW/g

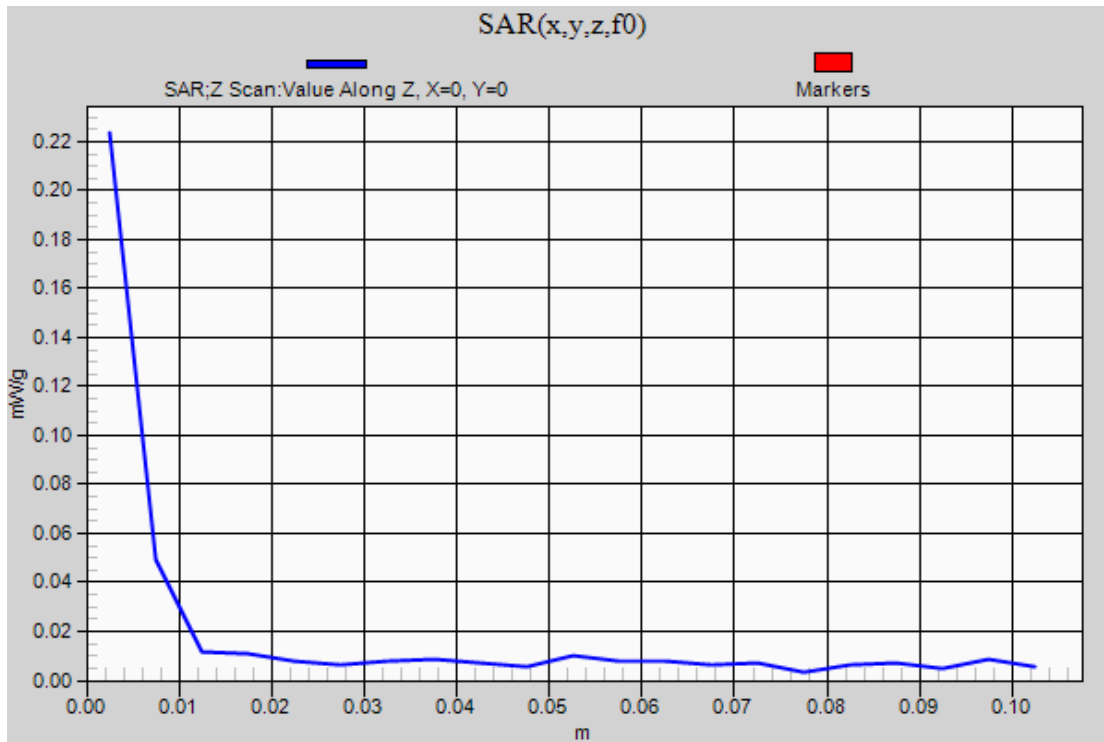


0 dB = 0.220mW/g = -13.15 dB mW/g

WiFi 5GHz Bands

Frequency: 5320 MHz; Duty Cycle: 1:1

Rear/802.11a, Ch 64_w/Headset/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Maximum value of SAR (measured) = 0.223 mW/g



Test Laboratory: UL CCS SAR Lab A

Date: 4/3/2012

WiFi 5GHz Bands

Frequency: 5580 MHz; Duty Cycle: 1:1; Room Ambient Temperature: 25.0°C; Liquid Temperature: 24.0°C
Medium parameters used: $f = 5580$ MHz; $\sigma = 5.172$ mho/m; $\epsilon_r = 35.247$; $\rho = 1000$ kg/m³

DASY5 Configuration:

- Electronics: DAE4 Sn1239; Calibrated: 10/18/2011
- Probe: EX3DV4 - SN3772; ConvF(4.25, 4.25, 4.25); Calibrated: 2/16/2012
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Phantom: SAM v5.0 (A); Type: QD000P40CC; Serial: 1602

RHS/Touch_Ch 116/Area Scan (13x16x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (measured) = 0.524 mW/g

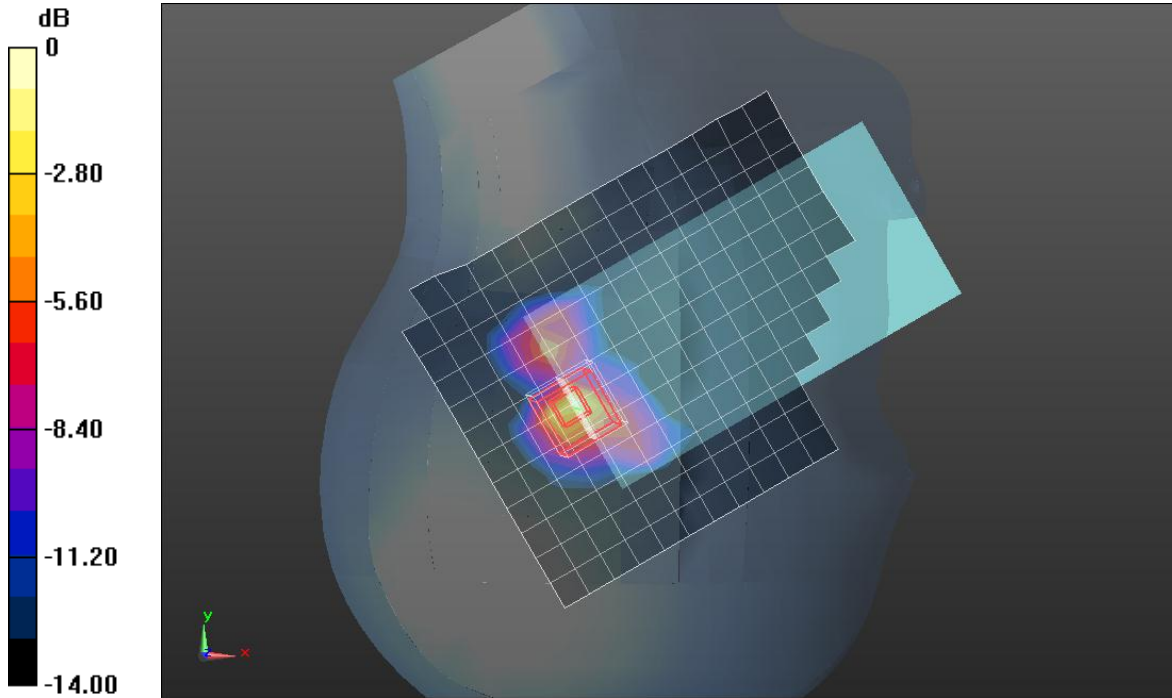
RHS/Touch_Ch 116/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 10.914 V/m; Power Drift = 0.11 dB

Peak SAR (extrapolated) = 1.6900

SAR(1 g) = 0.374 mW/g; SAR(10 g) = 0.100 mW/g

Maximum value of SAR (measured) = 0.694 mW/g



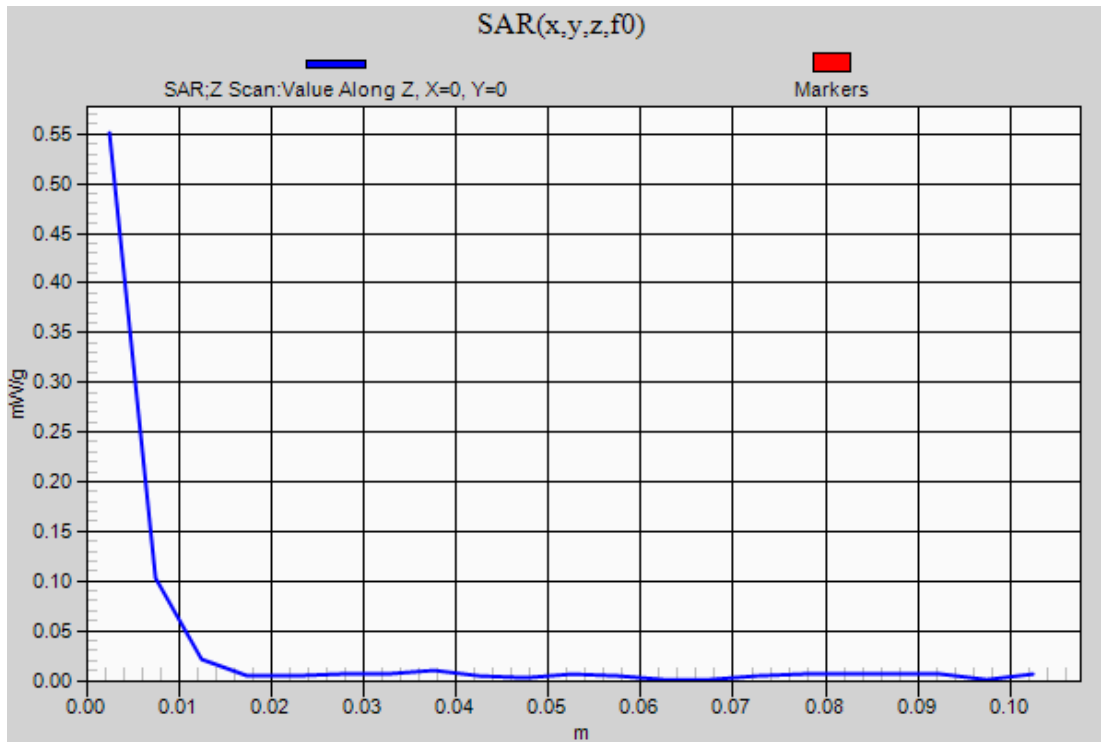
0 dB = 0.700mW/g = -3.10 dB mW/g

WiFi 5GHz Bands

Frequency: 5580 MHz; Duty Cycle: 1:1

RHS/Touch_Ch 116/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm

Maximum value of SAR (measured) = 0.551 mW/g



WiFi 5GHz Bands

Frequency: 5580 MHz; Duty Cycle: 1:1; Room Ambient Temperature: 25.0°C; Liquid Temperature: 24.0°C
Medium parameters used: $f = 5580$ MHz; $\sigma = 5.59$ mho/m; $\epsilon_r = 50.164$; $\rho = 1000$ kg/m³

DASY5 Configuration:

- Electronics: DAE4 Sn1239; Calibrated: 10/18/2011
- Probe: EX3DV4 - SN3772; ConvF(3.26, 3.26, 3.26); Calibrated: 2/16/2012
- 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: 1119

Rear/802.11a, Ch 116/Area Scan (13x20x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (measured) = 0.206 mW/g

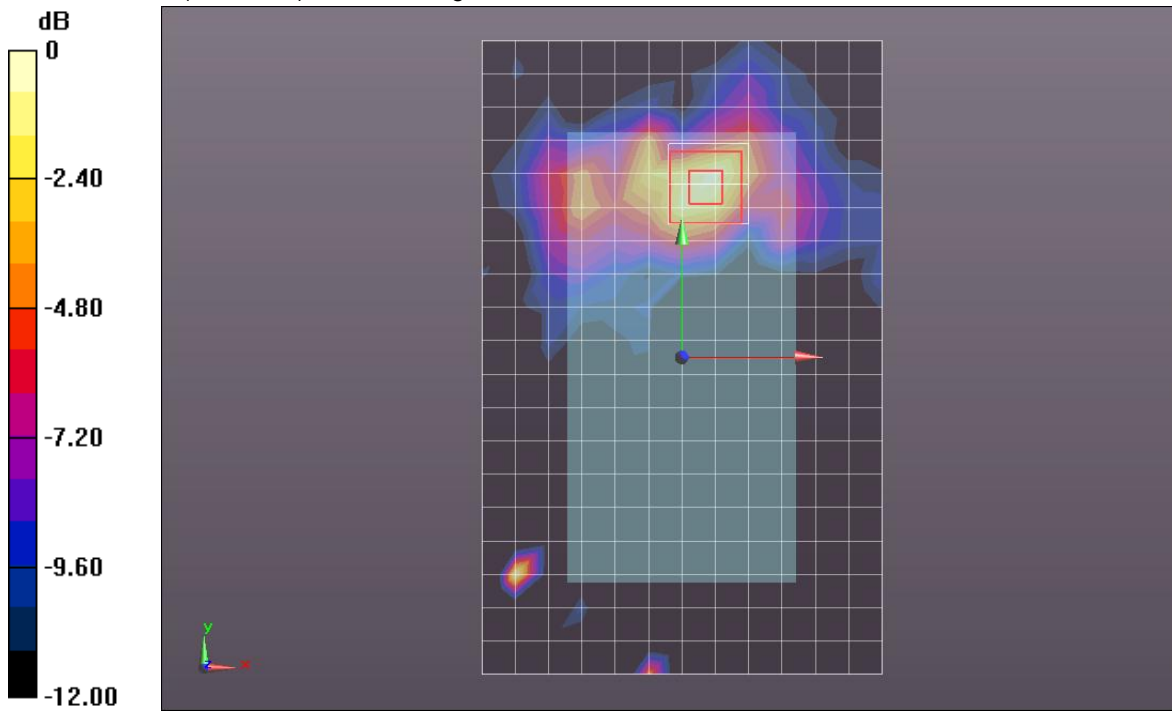
Rear/802.11a, Ch 116/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 1.286 V/m; Power Drift = -0.02 dB

Peak SAR (extrapolated) = 0.3700

SAR(1 g) = 0.110 mW/g; SAR(10 g) = 0.042 mW/g

Maximum value of SAR (measured) = 0.191 mW/g



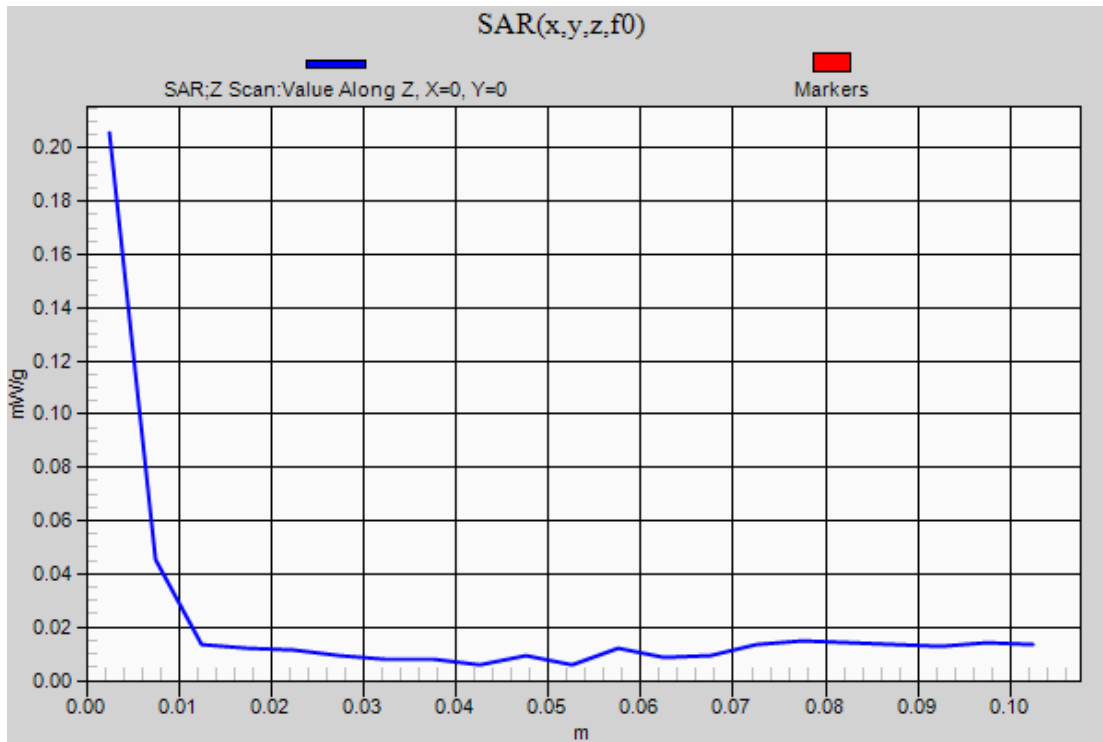
0 dB = 0.190mW/g = -14.42 dB mW/g

WiFi 5GHz Bands

Frequency: 5580 MHz; Duty Cycle: 1:1

Rear/()802.11a, Ch 116 /Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm

Maximum value of SAR (measured) = 0.186 mW/g



Test Laboratory: UL CCS SAR Lab A

Date: 4/3/2012

WiFi 5GHz Bands

Frequency: 5825 MHz; Duty Cycle: 1:1; Room Ambient Temperature: 25.0°C; Liquid Temperature: 24.0°C
Medium parameters used: $f = 5825$ MHz; $\sigma = 5.462$ mho/m; $\epsilon_r = 34.115$; $\rho = 1000$ kg/m³

DASY5 Configuration:

- Electronics: DAE4 Sn1239; Calibrated: 10/18/2011
- Probe: EX3DV4 - SN3772; ConvF(4.31, 4.31, 4.31); Calibrated: 2/16/2012
- Sensor-Surface: 2.5mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Phantom: SAM v5.0 (A); Type: QD000P40CC; Serial: 1602

RHS/Tilt_Ch 165/Area Scan (13x16x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (measured) = 0.063 mW/g

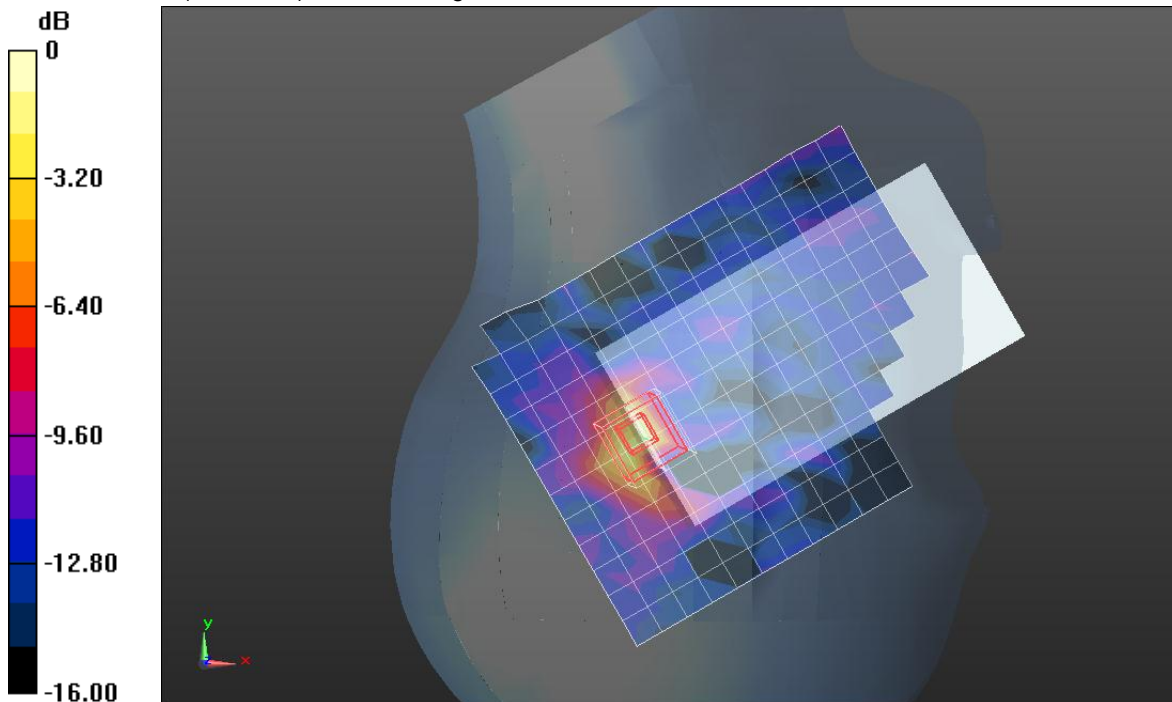
RHS/Tilt_Ch 165/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 2.997 V/m; Power Drift = 0.17 dB

Peak SAR (extrapolated) = 0.8170

SAR(1 g) = 0.070 mW/g; SAR(10 g) = 0.013 mW/g

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



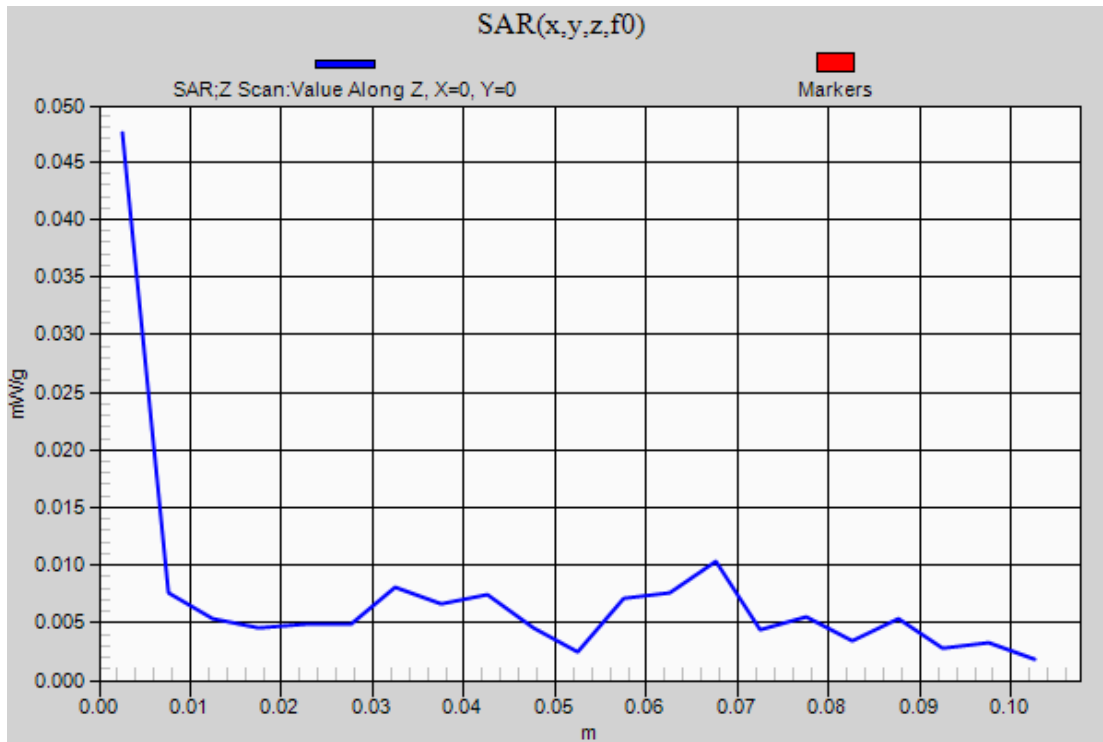
0 dB = 0.100mW/g = -20.00 dB mW/g

WiFi 5GHz Bands

Frequency: 5825 MHz; Duty Cycle: 1:1

RHS/Tilt_Ch 165/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm

Maximum value of SAR (measured) = 0.047 mW/g



WiFi 5GHz Bands

Frequency: 5825 MHz; Duty Cycle: 1:1; Room Ambient Temperature: 25.0°C; Liquid Temperature: 24.0°C
Medium parameters used: $f = 5825 \text{ MHz}$; $\sigma = 6.195 \text{ mho/m}$; $\epsilon_r = 49.752$; $\rho = 1000 \text{ kg/m}^3$

DASY5 Configuration:

- Electronics: DAE4 Sn1239; Calibrated: 10/18/2011
- Probe: EX3DV4 - SN3772; ConvF(3.58, 3.58, 3.58); Calibrated: 2/16/2012
- 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: 1119

Rear/802.11a, Ch 165/Area Scan (13x20x1): Measurement grid: $dx=10\text{mm}$, $dy=10\text{mm}$

Maximum value of SAR (measured) = 0.158 mW/g

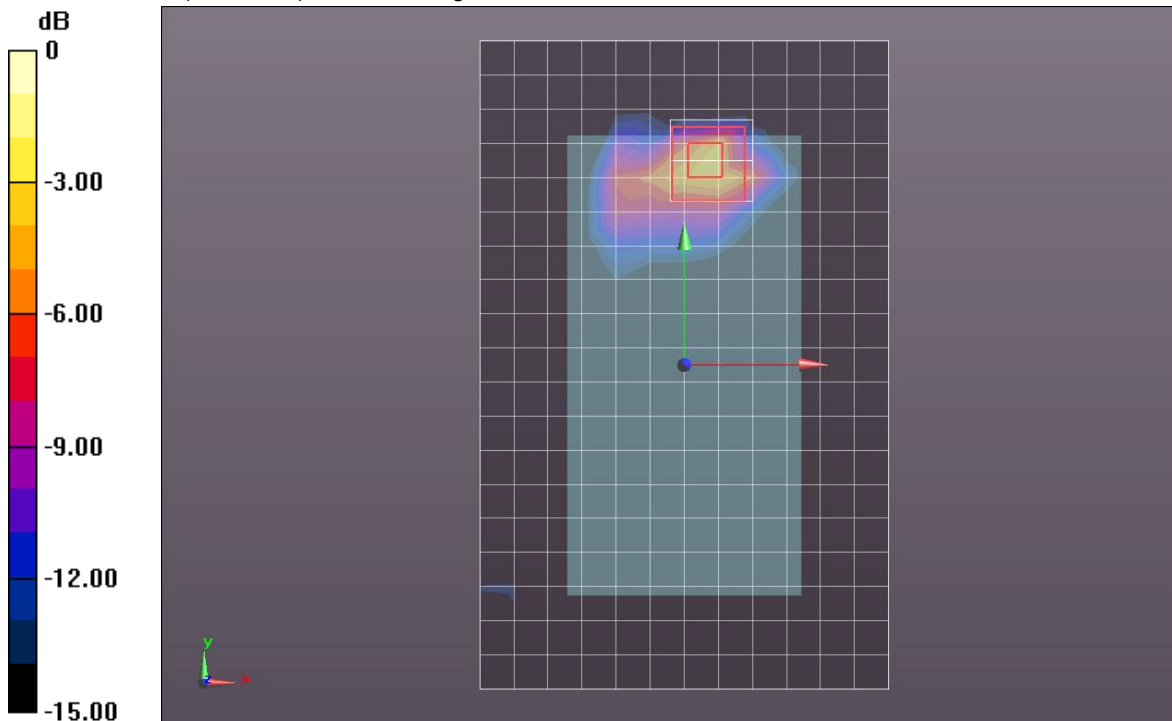
Rear/802.11a, Ch 165/Zoom Scan (7x7x9)/Cube 0: Measurement grid: $dx=4\text{mm}$, $dy=4\text{mm}$, $dz=2.5\text{mm}$

Reference Value = 5.466 V/m; Power Drift = -0.14 dB

Peak SAR (extrapolated) = 0.6700

SAR(1 g) = 0.149 mW/g; SAR(10 g) = 0.039 mW/g

Maximum value of SAR (measured) = 0.354 mW/g



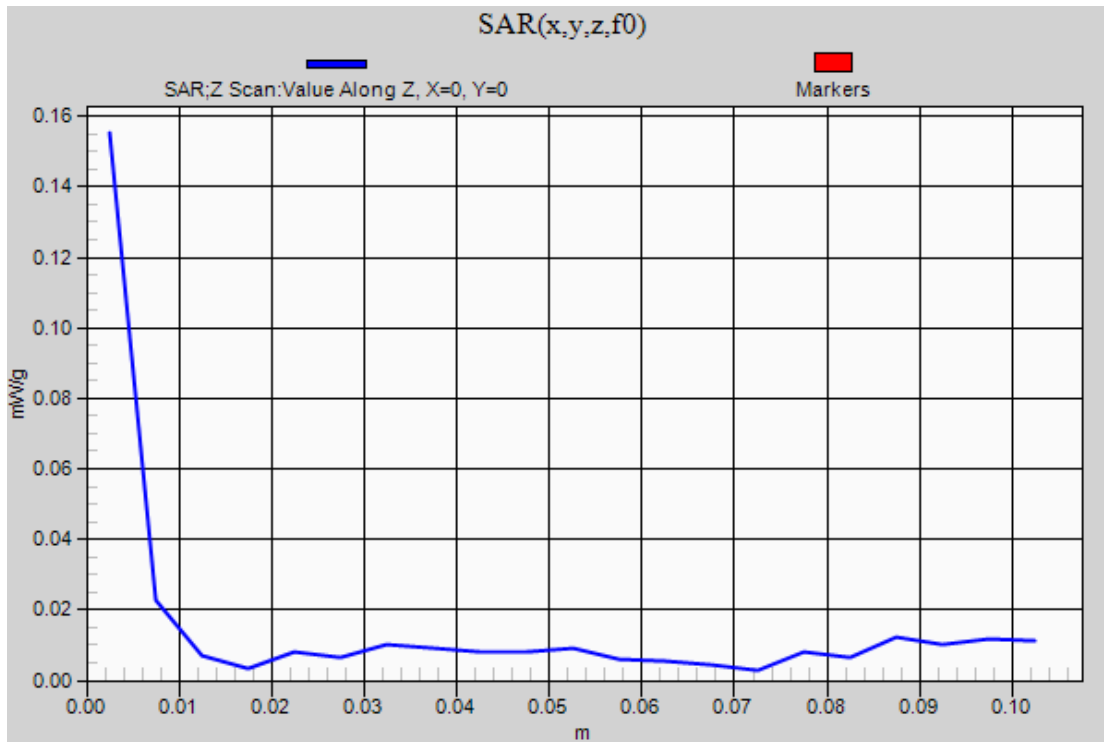
0 dB = 0.350mW/g = -9.12 dB mW/g

WiFi 5GHz Bands

Frequency: 5825 MHz; Duty Cycle: 1:1

Rear/802.11a, Ch 165/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm

Maximum value of SAR (measured) = 0.155 mW/g



15. Simultaneous Transmission SAR Analysis

As its max average power is 7.08 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

15.1. Head Exposure Conditions

15.1.1. Sum of the SAR for W-CDMA & Wi-Fi

Test Position	Voice	Data	Σ 1-g SAR (mW/g)
	W-CDMA Band II	WiFi 2.4 GHz	
Left Touch	0.407	0.110	0.517
Left Tilt	0.088	0.101	0.189
Right Touch	0.185	0.132	0.317
Right Tilt	0.079	0.104	0.183

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.

15.1.2.Sum of the SAR for SV-DO & Wi-Fi

Test Position	Voice		Data			Σ 1-g SAR (mW/g)
	CDMA BC0 1xRTT	CDMA BC1 1xRTT	CDMA BC0 1xEVDO	CDMA BC1 1xEVDO	WiFi 2.4 GHz	
Left Touch	0.391		0.763		0.110	1.264
	0.391			0.564	0.110	1.065
		0.408	0.763		0.110	1.281
		0.408		0.564	0.110	1.082
Left Tilt	0.225		0.477		0.101	0.803
	0.225			0.180	0.101	0.506
		0.163	0.477		0.101	0.741
		0.163		0.180	0.101	0.444
Right Touch	0.497		0.518		0.132	1.147
	0.497			0.236	0.132	0.865
		0.813	0.518		0.132	1.463
		0.813		0.236	0.132	1.181
RightTilt	0.270		0.313		0.104	0.687
	0.270			0.119	0.104	0.493
		0.224	0.313		0.104	0.641
		0.224		0.119	0.104	0.447

SAR to Peak Location Separation Ratio (SPLSR)

As the Sum of the SAR is <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.

15.1.3. Sum of the SAR for SV-LTE & Wi-Fi

Test Position	Voice		Data		Σ 1-g SAR (mW/g)
	CDMA BC0 1xRTT	CDMA BC1 1xRTT	LTE Band 13	WiFi 2.4 GHz	
Left Touch	0.391		0.324	0.110	0.825
		0.408	0.324	0.110	0.842
Left Tilt	0.225		0.186	0.101	0.512
		0.163	0.186	0.101	0.450
Right Touch	0.497		0.241	0.132	0.870
		0.813	0.241	0.132	1.186
RightTilt	0.270		0.117	0.104	0.491
		0.224	0.117	0.104	0.445

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.

15.2. Body Exposure Conditions

15.2.1. Sum of the SAR for GSM, WCDMA & Wi-Fi

Test Position	Data				Σ 1-g SAR (mW/g)
	GSM850	GSM1900	WCDMA Band II	WiFi 2.4 GHz	
Rear	0.706			0.117	0.823
		0.771		0.117	0.888
			0.588	0.117	0.705
Front	0.469			0.032	0.501
		0.527		0.032	0.559
			0.406	0.032	0.438
Edge 1	NA			0.060	NA
		NA		0.060	NA
			NA	0.060	NA
Edge 2	0.381			NA	NA
		0.295		NA	NA
			NA	NA	NA
Edge 3	0.179			NA	NA
		0.210		NA	NA
			0.248	NA	NA
Edge 4	NA			0.012	0.012
		NA		0.012	0.012
			0.214	0.012	0.226

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.

15.2.2. Sum of the SAR for SV-DO & Wi-Fi

Test Position	Voice		Data			Σ 1-g SAR (mW/g)
	CDMA BC0 1xRTT	CDMA BC1 1xRTT	CDMA BC0 1xEVDO	CDMA BC1 1xEVDO	WiFi 2.4 GHz	
Rear	0.624		0.550		0.117	1.291
	0.624			0.918	0.117	1.659
		1.04	0.550		0.117	1.707
		1.04		0.918	0.117	2.075
Front	0.425		0.215		0.032	0.672
	0.425			0.547	0.032	1.004
		0.831	0.215		0.032	1.078
		0.831		0.547	0.032	1.410
Edge 1	NA		0.127		0.060	0.187
	NA			NA	NA	NA
		NA	0.127		0.060	0.187
		NA		NA	0.060	NA
Edge 2	0.336		0.290		NA	NA
	0.336			NA	NA	NA
		0.494	0.290		NA	NA
		0.494		NA	NA	NA
Edge 3	0.174		NA		NA	NA
	0.174			0.296	NA	NA
		0.348	NA		NA	NA
		0.348		0.296	NA	NA
Edge 4	NA		NA		0.012	0.012
	NA			0.325	0.012	0.337
		NA	NA		0.012	0.012
		NA		0.325	0.012	0.337

SAR to Peak Location Separation Ratio (SPLSR)

Case #	Test Position	Worst-case combination					Σ 1-g SAR (mW/g)	Calculated distance (cm)	SPLSR	Figure
		CDMA BC0 1xRTT	CDMA BC1 1xRTT	CDMA BC0 1xEVDO	CDMA BC1 1xEVDO	WiFi 2.4 GHz				
1	Rear	0.624			0.918	0.117	1.659			
		0.624				0.117	0.741	12.02	0.062	1
					0.918	0.117	1.035	12.35	0.084	2
		0.624			0.918		1.542	4.08	0.378	3
2	Rear		1.04	0.550		0.117	1.707			
			1.04			0.117	1.157	12.06	0.096	4
				0.550		0.117	0.667	2.65	0.252	5
			1.04	0.550			1.590	10.14	0.157	6
			1.04		0.918	0.117	2.075			
			1.04			0.117	1.157	12.06	0.096	4
3	Rear				0.918	0.117	1.035	12.35	0.084	2
					0.918		1.958	4.22	0.464	7
			1.04		0.918					

Conclusion:

- Simultaneous transmission SAR measurement (Volume Scan) is required for Cases #1 and #3 because the sum of the 1-g SAR is > 1.6 W/kg for each of these cases and the SPLSR for at least one combination of antenna pairing within each case is > 0.3
- Simultaneous transmission SAR measurement (Volume Scan) is not required for Case #2 despite its sum of the 1-g SAR being > 1.6 W/kg because the SPLSR for each combination of antenna pairing within is < 0.3.

15.2.3. Sum of the SAR for SV-LTE & Wi-Fi

Test Position	Voice		Data		Σ 1-g SAR (mW/g)
	CDMA BC0 1xRTT	CDMA BC1 1xRTT	LTE Band 13	WiFi 2.4 GHz	
Rear	0.624		0.548	0.117	1.289
		1.04	0.548	0.117	1.705
Front	0.425		0.328	0.032	0.785
		0.831	0.328	0.032	1.191
Edge 1	NA		NA	0.060	NA
		NA	NA	0.060	NA
Edge 2	0.336		NA	NA	NA
		0.494	NA	NA	NA
Edge 3	0.174		0.187	NA	0.361
		0.348	0.187	NA	0.535
Edge 4	NA		0.364	0.012	0.376
		NA	0.364	0.012	0.376

SAR to Peak Location Separation Ratio (SPLSR)

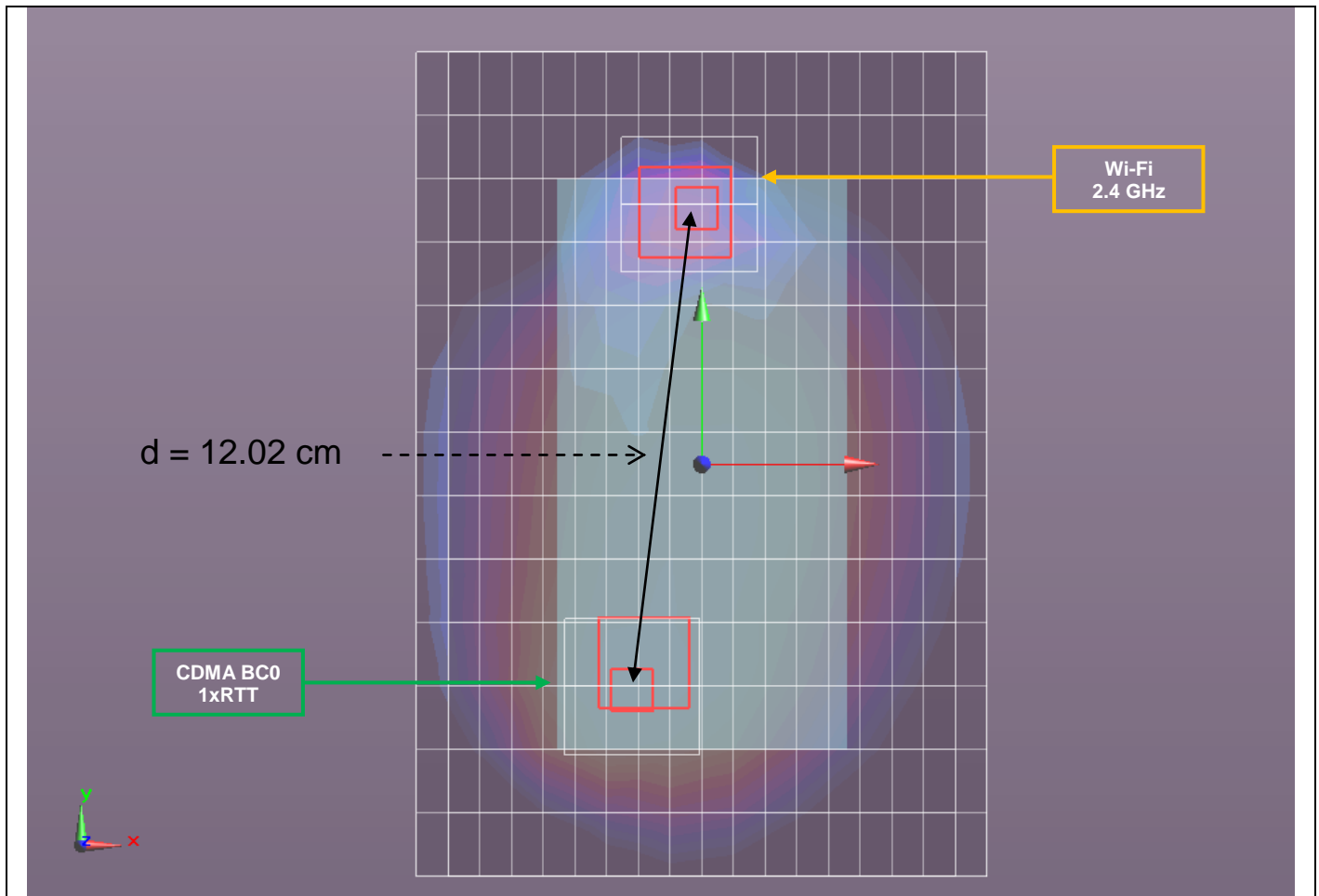
Case #	Test Position	Worst-case combination				Σ 1-g SAR (mW/g)	Calculated distance (cm)	SPLSR	Figure
		CDMA BC0 1xRTT	CDMA BC1 1xRTT	LTE Band 13	WiFi 2.4 GHz				
4	Rear		1.040	0.548	0.117	1.705			
			1.040		0.117	1.157	12.06	0.096	4
				0.548	0.117	0.665	11.75	0.057	8
			1.040	0.548		1.588	3.96	0.401	9

Conclusion:

- Simultaneous transmission SAR measurement (Volume Scan) is required for Case #4 because the Sum of the 1-g SAR is > 1.6 W/kg and the SPLSR for at least one combination of antenna pairing within is > 0.3

15.3. SAR Peak Location Separation Distance Calculations and Figures

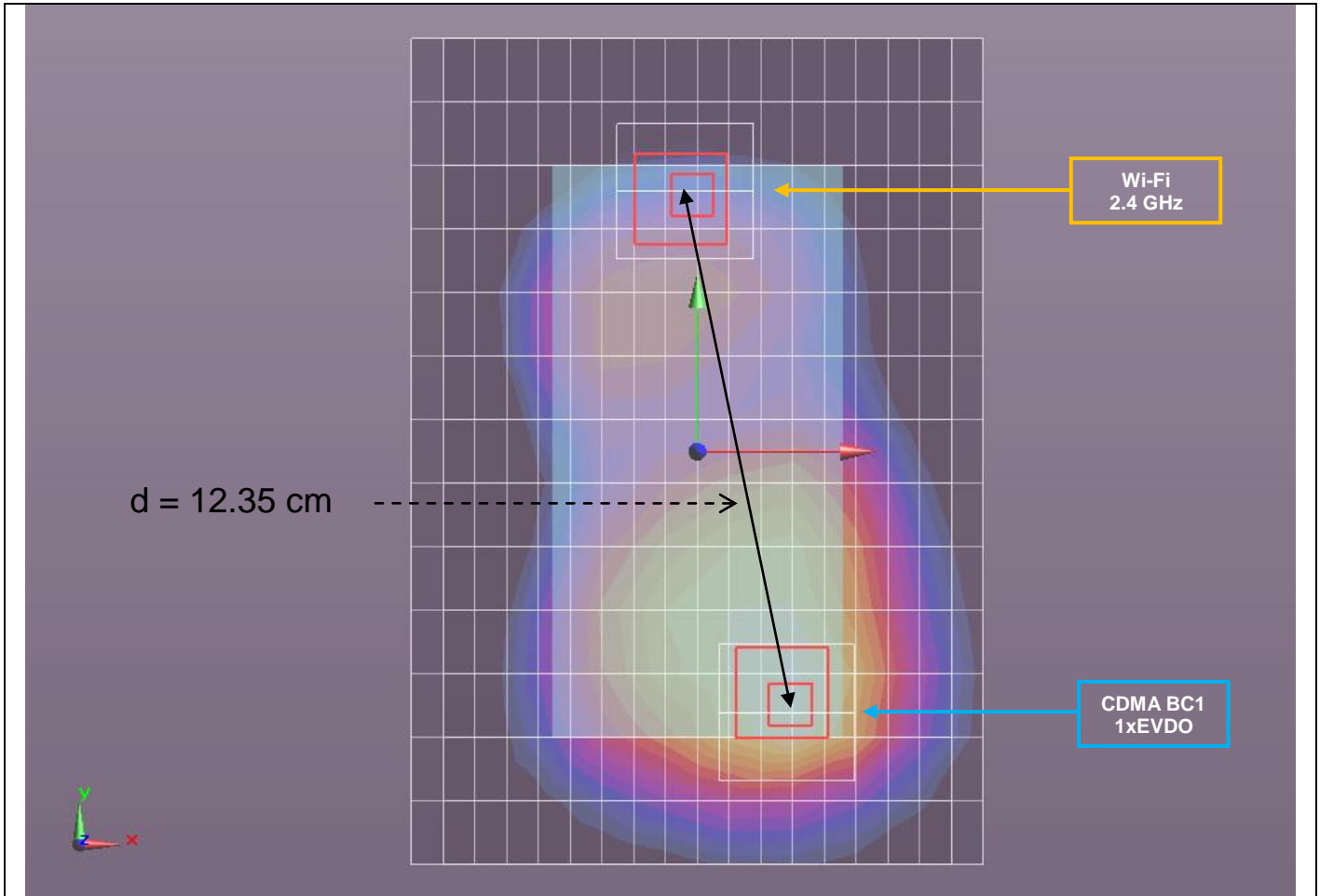
Figure (1)



Mode	Peak SAR mW/g	X m	Y m	Z m
CDMA BC0, 1xRTT	1.01	-0.0181	-0.0573	-0.185
WiFi 2.4 GHz	0.222	0.0002	0.0615	-0.182
d: Calculated distance (cm)				
12.02				

Note: $d = \text{SQRT}((X1-X2)^2+(Y1-Y2)^2+(Z1-Z2)^2)$

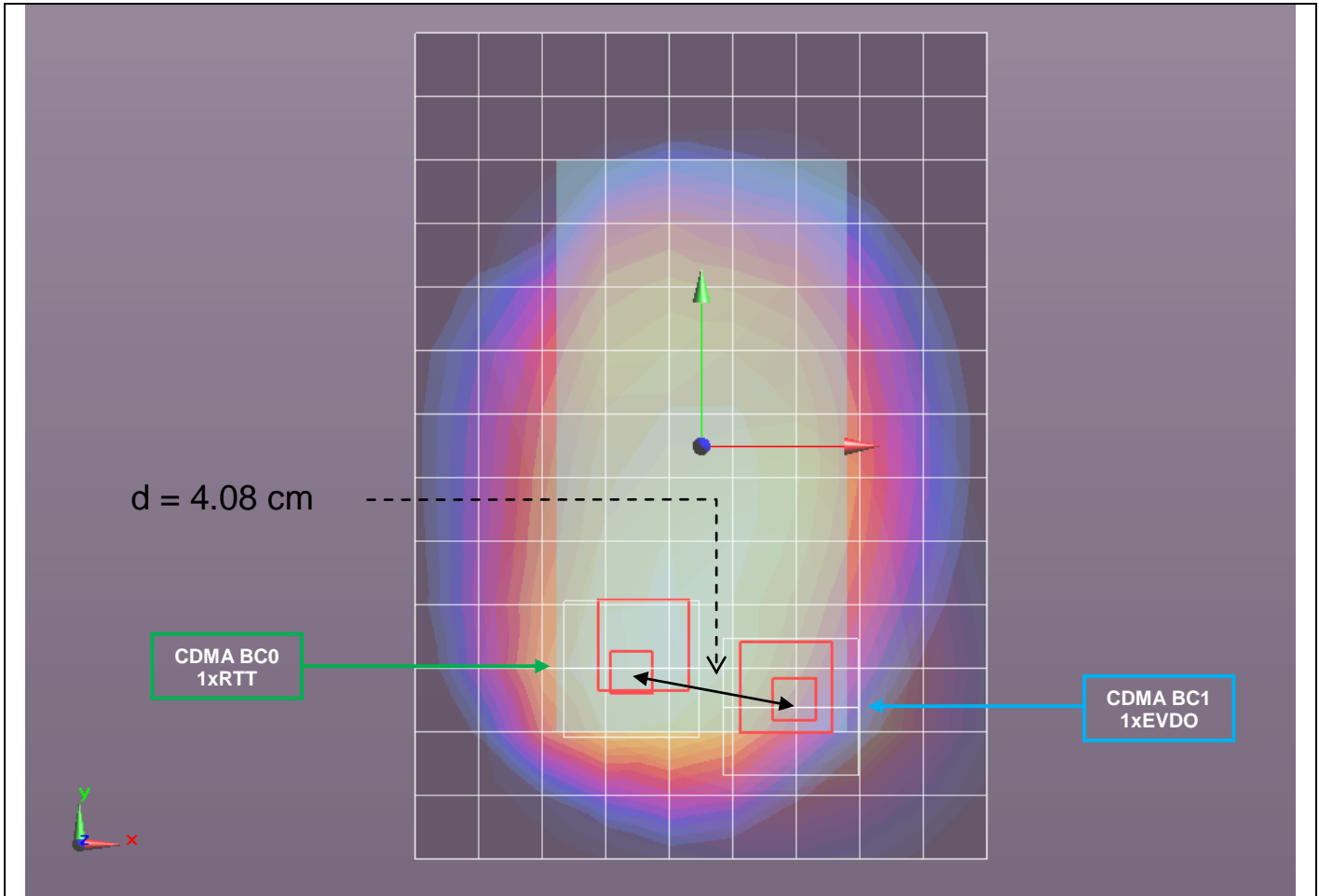
Figure (2)



Mode	Peak SAR mW/g	X m	Y m	Z m
CDMA BC1, 1xEVDO	1.62	0.0226	-0.0599	-0.185
WiFi 2.4 GHz	0.222	0.0002	0.0615	-0.182
d: Calculated distance (cm)				
12.35				

Note: $d = \text{SQRT}((X1-X2)^2+(Y1-Y2)^2+(Z1-Z2)^2)$

Figure (3)

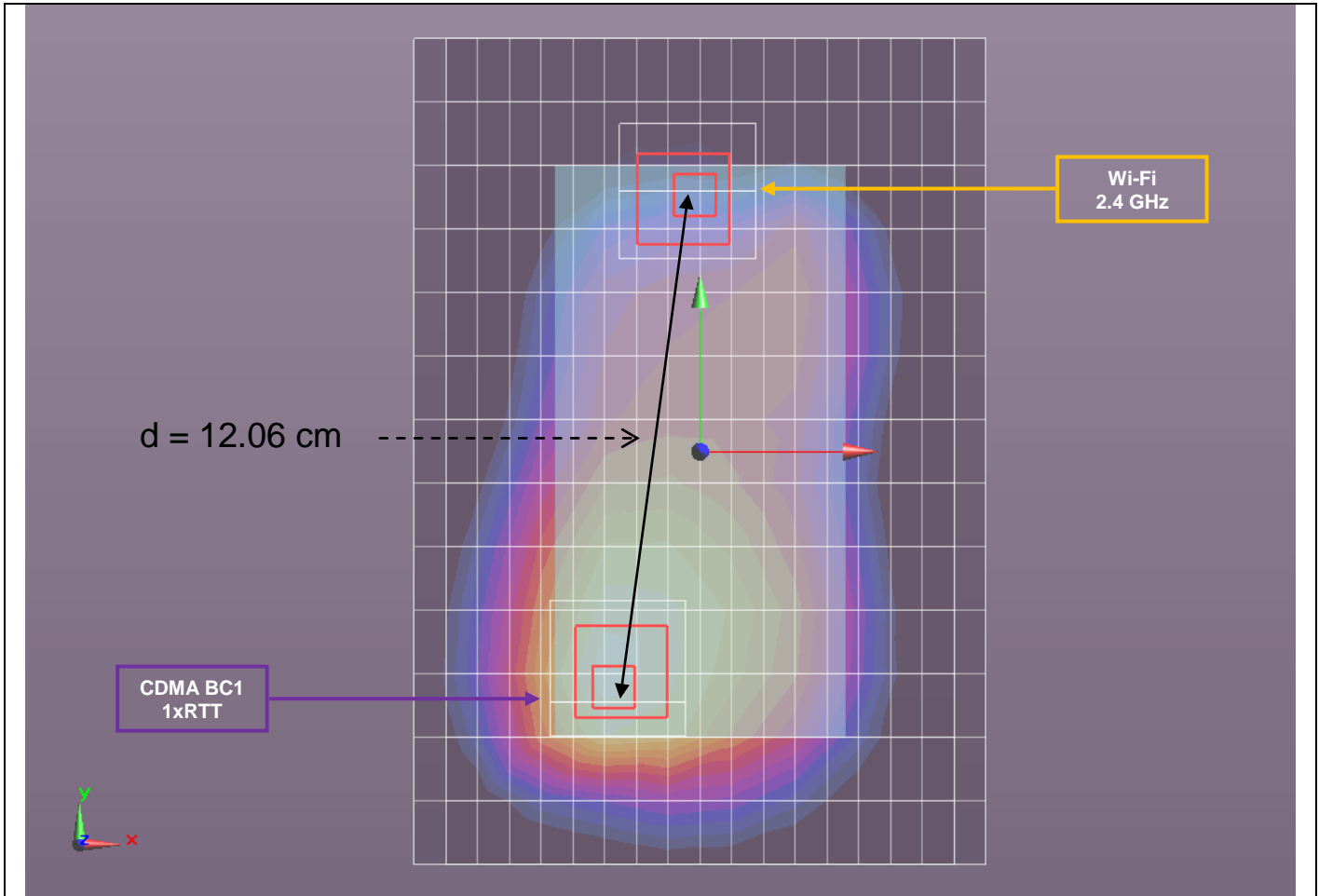


Mode	Peak SAR mW/g	X m	Y m	Z m
CDMA BC0, 1xRTT	1.01	-0.0181	-0.0573	-0.185
CDMA BC1, 1xEVDO	1.62	0.0226	-0.0599	-0.185

d: Calculated distance (cm)	
4.08	

Note: $d = \text{SQRT}((X1-X2)^2+(Y1-Y2)^2+(Z1-Z2)^2)$

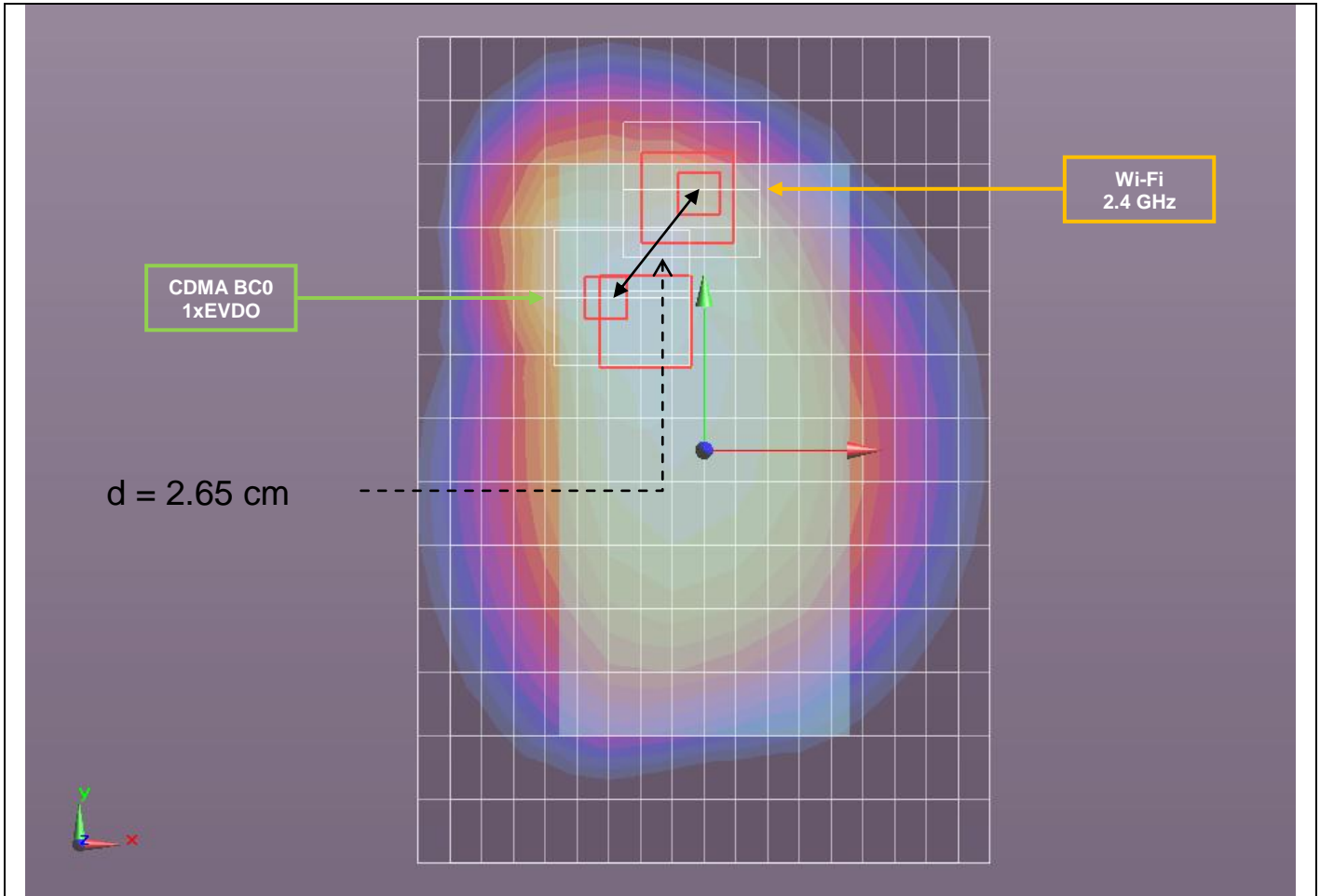
Figure (4)



Mode	Peak SAR	X	Y	Z
	mW/g	m	m	m
CDMA BC1, 1xRTT	1.62	-0.0195	-0.0574	-0.186
WiFi 2.4 GHz	0.222	0.0002	0.0615	-0.182
d: Calculated distance (cm)				
12.06				

Note: $d = \text{SQRT}((X1-X2)^2+(Y1-Y2)^2+(Z1-Z2)^2)$

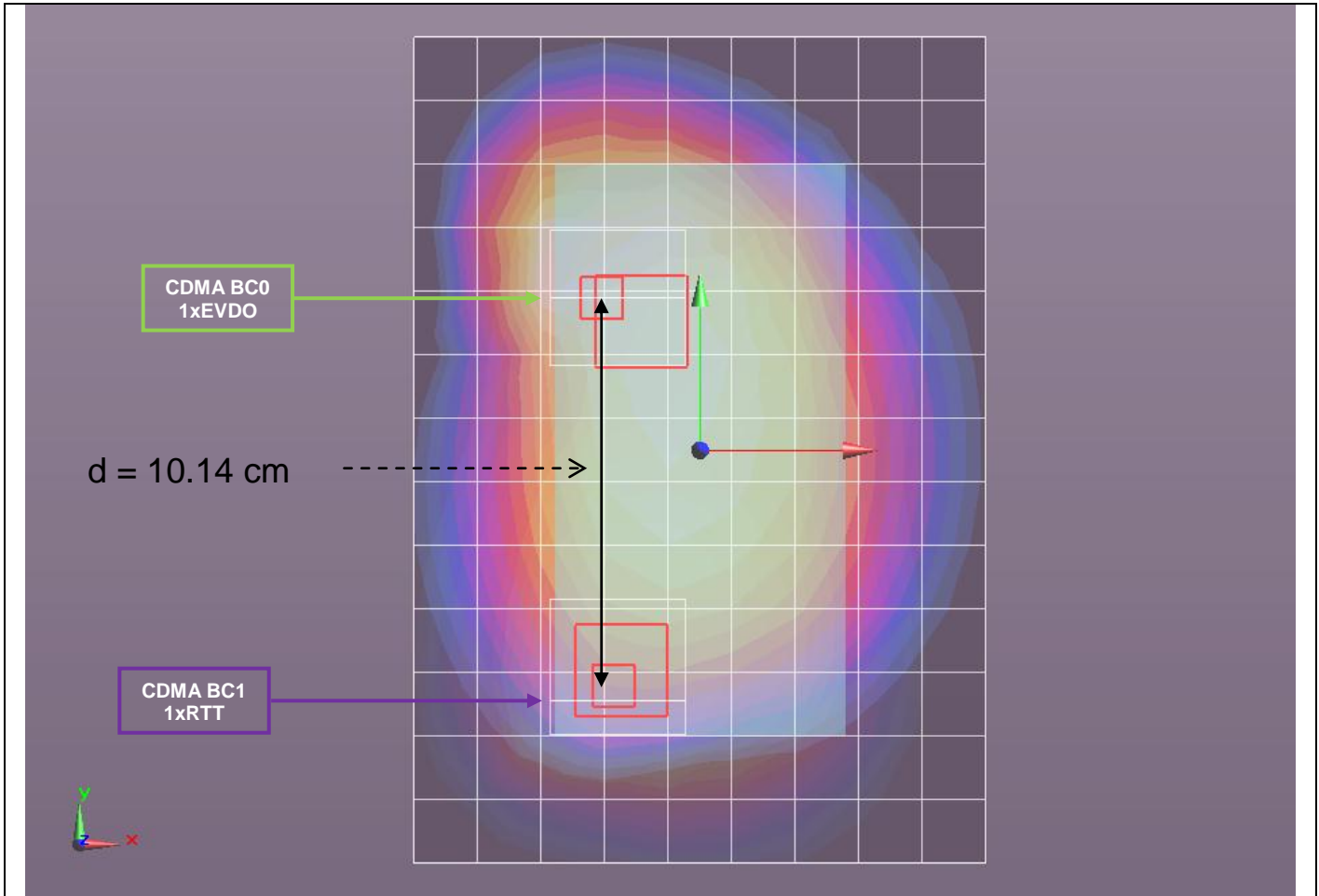
Figure (5)



Mode	Peak SAR mW/g	X m	Y m	Z m
CDMA BC0, 1xEVDO	0.927	-0.0195	0.044	-0.185
WiFi 2.4 GHz	0.222	0.0002	0.0615	-0.182
d: Calculated distance (cm)				
2.65				

Note: $d = \text{SQRT}((X1-X2)^2+(Y1-Y2)^2+(Z1-Z2)^2)$

Figure (6)

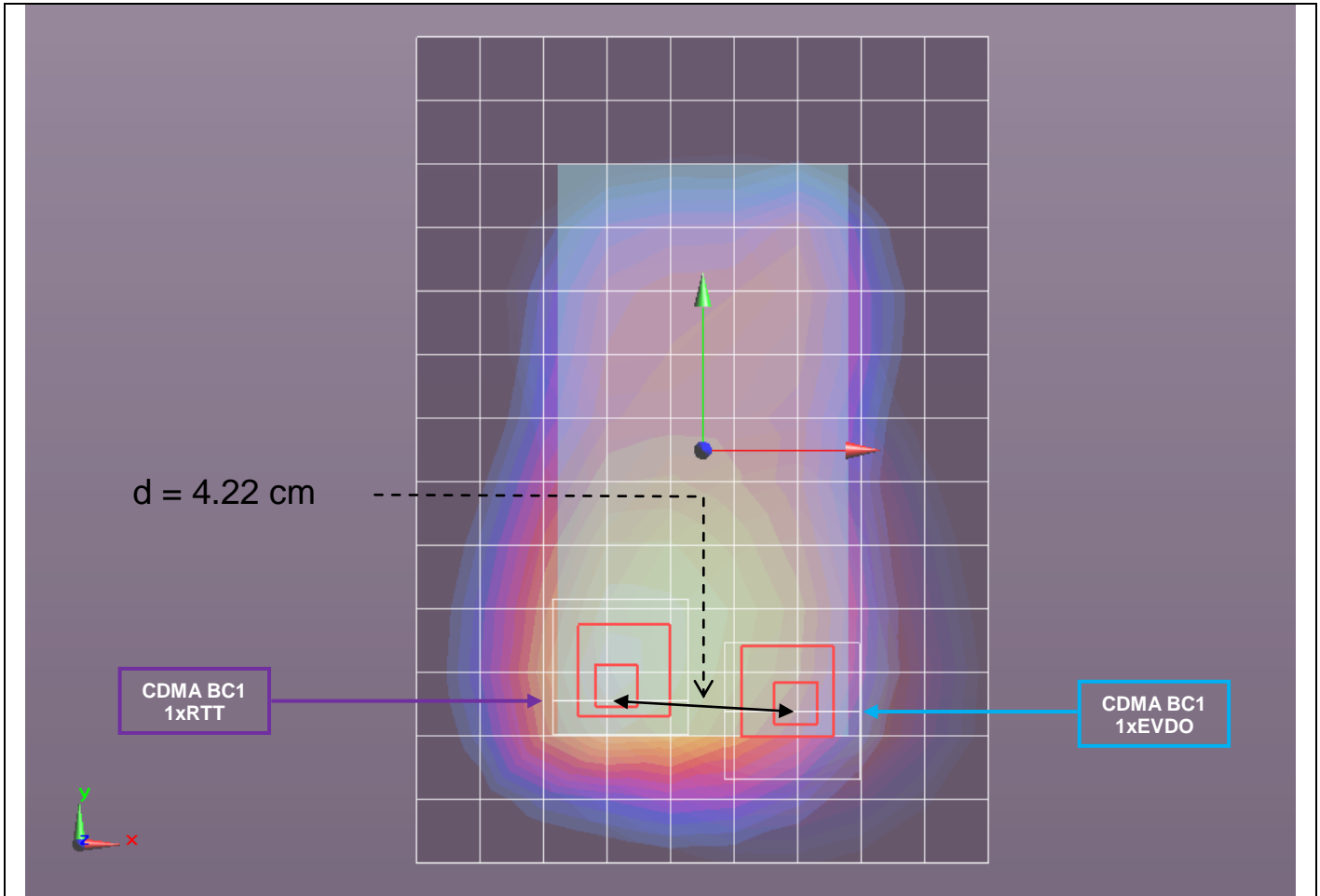


Mode	Peak SAR mW/g	X m	Y m	Z m
CDMA BC1, 1xRTT	1.62	-0.0195	-0.0574	-0.186
CDMA BC0, 1xEVDO	0.927	-0.0195	0.044	-0.185

d: Calculated distance (cm)	
10.14	

Note: $d = \text{SQRT}((X1-X2)^2+(Y1-Y2)^2+(Z1-Z2)^2)$

Figure (7)

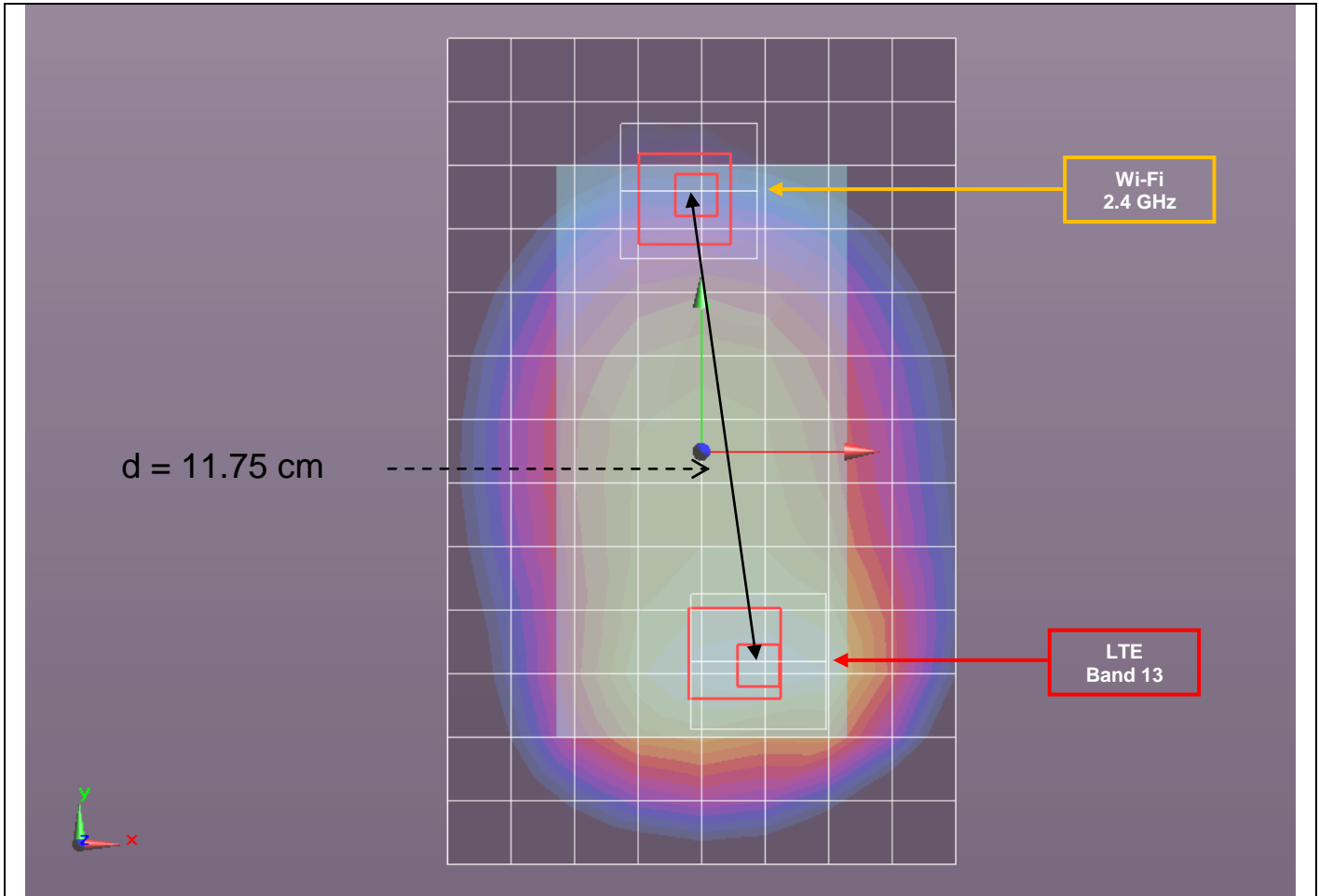


Mode	Peak SAR mW/g	X m	Y m	Z m
CDMA BC1, 1xRTT	1.62	-0.0195	-0.0574	-0.186
CDMA BC1, 1xEVDO	1.62	0.0226	-0.0599	-0.185

d: Calculated distance (cm)
4.22

Note: $d = \text{SQRT}((X1-X2)^2+(Y1-Y2)^2+(Z1-Z2)^2)$

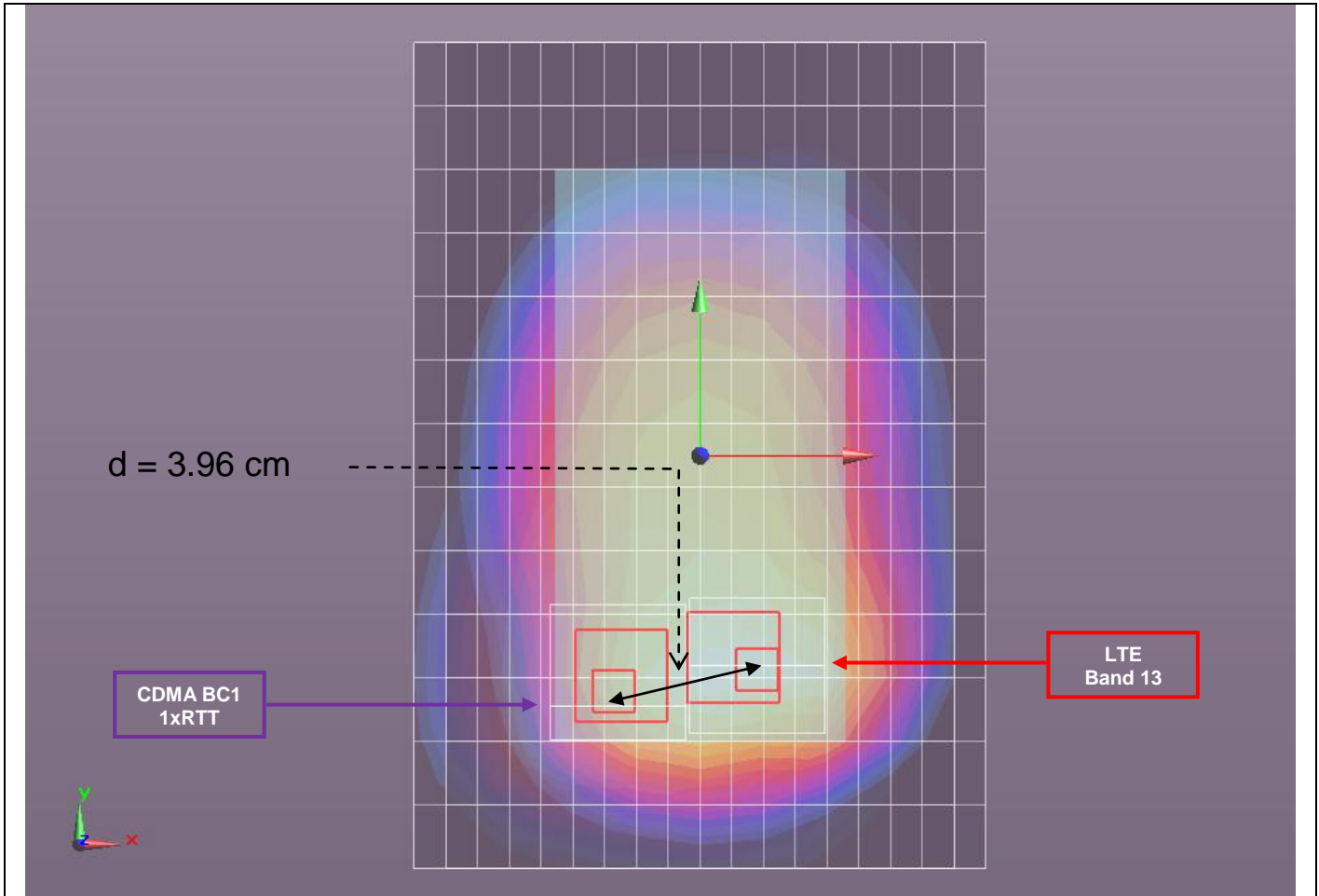
Figure (8)



Mode	Peak SAR mW/g	X m	Y m	Z m
LTE Band 13	0.919	0.0199	-0.0543	-0.183
WiFi 2.4 GHz	0.222	0.0002	0.0615	-0.182
d: Calculated distance (cm)				
11.75				

Note: $d = \text{SQRT}((X1-X2)^2+(Y1-Y2)^2+(Z1-Z2)^2)$

Figure (9)



Mode	Peak SAR mW/g	X m	Y m	Z m
CDMA BC1, 1xRTT	1.62	-0.0195	-0.0574	-0.186
LTE Band 13	0.919	0.0199	-0.0543	-0.183

d: Calculated distance (cm)	
3.96	

Note: $d = \text{SQRT}((X1-X2)^2+(Y1-Y2)^2+(Z1-Z2)^2)$

15.4. Multi-Band Combined Volume Scan Results

Case #	Test position	Modes/Bands	Standalone Results		Multi-Band Combined Results ^{2,3}
			Zoom Scan	Volume Scan ¹	
1	Rear	CDMA BC0 1xRTT	0.624	0.616	1.15
		CDMA BC1 1xEVDO	0.918	0.923	
		WiFi 2.4GHz	0.117	0.109	
3	Rear	CDMA BC1 1xRTT	1.04	1.03	1.35
		CDMA BC1 1xEVDO	0.918	0.923	
		WiFi 2.4GHz	0.117	0.109	
4	Rear	CDMA BC1 1xRTT	1.04	1.03	1.26
		LTE Band 13	0.548	0.547	
		WiFi 2.4GHz	0.117	0.109	

Note(s):

1. See Appendix 16.10_SAR Test Plots for Standalone Volume Scans.
2. See Appendix 16.11_SAR Test Plots for SV-DO Multi-Band Combined Volume Scans (Case #1 and Case #3)
3. See Appendix 16.12_SAR Test Plots for SV-LTE Multi-Band Combined Volume Scans (Case #4)

16. Appendixes

Refer to separated files for the following appendixes.

- 16.1. System Performance Check Plots
- 16.2. SAR Test Plots for GSM850
- 16.3. SAR Test Plots for GSM1900
- 16.4. SAR Test Plots for W-CDMA (UMTS) Band II
- 16.5. SAR Test Plots for CDMA BC0
- 16.6. SAR Test Plots for CDMA BC1
- 16.7. SAR Test Plots for LTE Band 13
- 16.8. SAR Test Plots for Wi-Fi 2.4 GHz Band
- 16.9. SAR Test Plots for Wi-Fi 5 GHz Bands
- 16.10. SAR Test Plots for Standalone Volume Scans
- 16.11. SAR Test Plots for SV-DO Multi-Band Combined Volume Scans
- 16.12. SAR Test Plots for SV-LTE Multi-Band Combined Volume Scans
- 16.13. Calibration Certificate for E-Field Probe EX3DV4 - SN 3772
- 16.14. Calibration Certificate for E-Field Probe EX3DV4 - SN 3751
- 16.15. Calibration Certificate for D750V3 - SN 1019
- 16.16. Calibration Certificate for D835V2 - SN 4d002
- 16.17. Calibration Certificate for D1900V2 - SN 5d043
- 16.18. Calibration Certificate for D2450V2 - SN 748
- 16.19. Calibration Certificate for D5GHzV2 - SN 1075