



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

SAR EVALUATION REPORT

For
**Cellular/PCS CDMA/EVDO/GSM/GPRS/EDGE, PCS WCDMA/HSPA and AWS LTE Phone with
Bluetooth, WLAN, & NFC**

**Model: LG-VS950, VS950, LGVS950
FCC ID: ZNFVS950**

**Report Number: 12U14455-21
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Table of Contents

1. Attestation of Test Results	6
2. Test Methodology	7
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 1-g 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 Exposure Condition for WWAN, LTE and WiFi.....	19
9.2. Body Exposure Conditions for GSM850/1900/W-CDMA Band II/CDMA (BC0/BC1) 1xRTT.....	19
9.3. Body Exposure Conditions for CDMA (BC0/BC1), 1xEVDO	19
9.4. Body Exposure Conditions for LTE Band 13	20
9.5. Body Exposure Conditions for WiFi.....	20
10. RF Output Power Measurement.....	21
10.1. GSM850.....	21
10.2. GSM1900.....	22
10.3. W-CDMA Band II	23
10.4. CDMA BC0	27
10.5. CDMA BC1	28
10.6. LTE Band 13.....	29
10.7. Power Reduction for SV-DO	31
10.8. Power Reduction for SV-LTE Band 13.....	31
10.9. Wi-Fi (2.4 GHz)	32

10.10.	Bluetooth	32
11.	Tissue Dielectric Properties	33
11.1.	Composition of Ingredients for the Tissue Material Used in the SAR Tests	34
11.2.	Tissue Dielectric Parameter Check Results.....	35
12.	System Performance Check.....	39
12.1.	System Performance Check Measurement Conditions	39
12.2.	Reference SAR Values for System Performance Check	39
12.3.	System Performance Check Results	40
13.	SAR Test Results	41
13.1.	GSM850.....	41
13.1.1.	Head SAR	41
13.1.2.	Body SAR	41
13.2.	GSM1900.....	42
13.2.1.	Head SAR	42
13.2.2.	Body SAR	42
13.3.	W-CDMA Band II	43
13.3.1.	Head SAR.....	43
13.3.2.	Body & Hotspot SAR.....	43
13.4.	CDMA BC0	44
13.4.1.	Head SAR	44
13.4.2.	Body & Hotspot SAR.....	45
13.5.	CDMA BC1	46
13.5.1.	Head SAR	46
13.5.2.	Body & Hotspot SAR.....	47
13.6.	LTE Band 13.....	48
13.6.1.	Head SAR.....	48
13.6.2.	Body & Hotspot SAR.....	49
	Wi-Fi (2.4 GHz Band)	50
13.6.3.	Head SAR	50
13.6.4.	Body & Hotspot SAR.....	50
14.	Summary of Highest SAR Values	51
14.1.	Scaling of standalone SAR measurements.....	51
14.2.	SAR Plots (from Summary of Highest SAR Values)	52
15.	Simultaneous Transmission SAR Analysis	88
15.1.	Scaling of Simultaneous Transmission SAR measurements	88

15.2.	<i>Head Exposure Conditions</i>	88
15.2.1.	Sum of the SAR for GSM, W-CDMA, & WiFi	88
15.2.2.	Sum of the SAR for SV-DO & Wi-Fi	89
15.2.3.	Sum of the SAR for SV-LTE & WiFi	90
15.3.	<i>Body Exposure Conditions</i>	91
15.3.1.	Sum of the SAR for WCDMA & WiFi	91
15.3.2.	Sum of the SAR for SV-DO & WiFi	92
15.3.3.	Sum of the SAR for SV-LTE & WiFi	93
15.4.	<i>SAR Peak Location Separation Distance Calculations and Figures</i>	94
15.5.	<i>Multi-Band Volume Scan Combined Results</i>	105
16.	Appendixes	106
16.1.	<i>System Performance Check Plots</i>	106
16.2.	<i>SAR Test Plots for GSM850</i>	106
16.3.	<i>SAR Test Plots for GSM1900</i>	106
16.4.	<i>SAR Test Plots for W-CDMA (UMTS) Band II</i>	106
16.5.	<i>SAR Test Plots for CDMA BC0</i>	106
16.6.	<i>SAR Test Plots for CDMA BC1</i>	106
16.7.	<i>SAR Test Plots for LTE Band 13</i>	106
16.8.	<i>SAR Test Plots for WiFi 2.4 GHz Band</i>	106
16.9.	<i>SAR test plots for SV-LTE Volume Scans</i>	106
16.10.	<i>SAR test plots for SV-LTE Multi band results</i>	106
16.11.	<i>Calibration Certificate for E-Field Probe EX3DV4 - SN 3773</i>	106
16.12.	<i>Calibration Certificate for D750V3 - SN 1019</i>	106
16.13.	<i>Calibration Certificate for D835V2 - SN 4d002</i>	106
16.14.	<i>Calibration Certificate for D1900V2 - SN 5d043</i>	106
16.15.	<i>Calibration Certificate for D2450V2 - SN 748</i>	106
17.	External Photos	107
18.	Antenna Locations & Separation Distances	108
19.	Setup Photos	110

1. Attestation of Test Results

Applicant	LG ELECTRONICS MOBILECOMM U.S.A., INC.	
DUT description	Cellular/PCS CDMA/EVDO/GSM/GPRS/EDGE, PCS WCDMA/HSPA and AWS LTE Phone with Bluetooth, WLAN, & NFC	
Model	LG-VS950, VS950, LGVS950	
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	05/30/2012 – 6/11/2012	
Applicable Standards		Test Results
FCC OET Bulletin 65 Supplement C 01-01, IEEE Std 1528-2003		Pass
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. Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by UL CCS and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL CCS will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, any agency of the Federal Government, or any agency of any government (NIST Handbook 150, Annex A). This report is written to support regulatory compliance of the applicable standards stated above.		
Approved & Released For UL CCS By:		Tested By:
		
David Weaver Staff Engineer Compliance Certification Services (UL CCS)		Elijah Garcia Laboratory Technician I 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
- 248227 D01 SAR meas for 802 11abg v01r02
- 941225 D01 SAR test for 3G devices v02
- 941225 D03 SAR Test Reduction GSM GPRS EDGE v01
- 941225 D05 SAR for LTE Devices v01
- 941225 D06 Hot Spot SAR v01
- PBA: 181634

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	2013
Thermometer	ERTCO	639-1S	1718	7	19	2012
Data Acquisition Electronics	SPEAG	DAE4	1258	3	8	2013
System Validation Dipole	SPEAG	D750V3	1019	2	9	2013
System Validation Dipole	SPEAG	D835V2	4d117	4	10	2013
System Validation Dipole	SPEAG	D1900V2	5d043	11	10	2012
System Validation Dipole	SPEAG	D2450V2	748	2	7	2013
Power Meter	HP	437B	3125U16345	5	22	2013
Power Sensor	HP	8481A	2702A60780	5	22	2013
Amplifier	MITEQ	4D00400600-50-30P	1620606	N/A		
Directional coupler	Werlatone	C8060-102	2141	N/A		

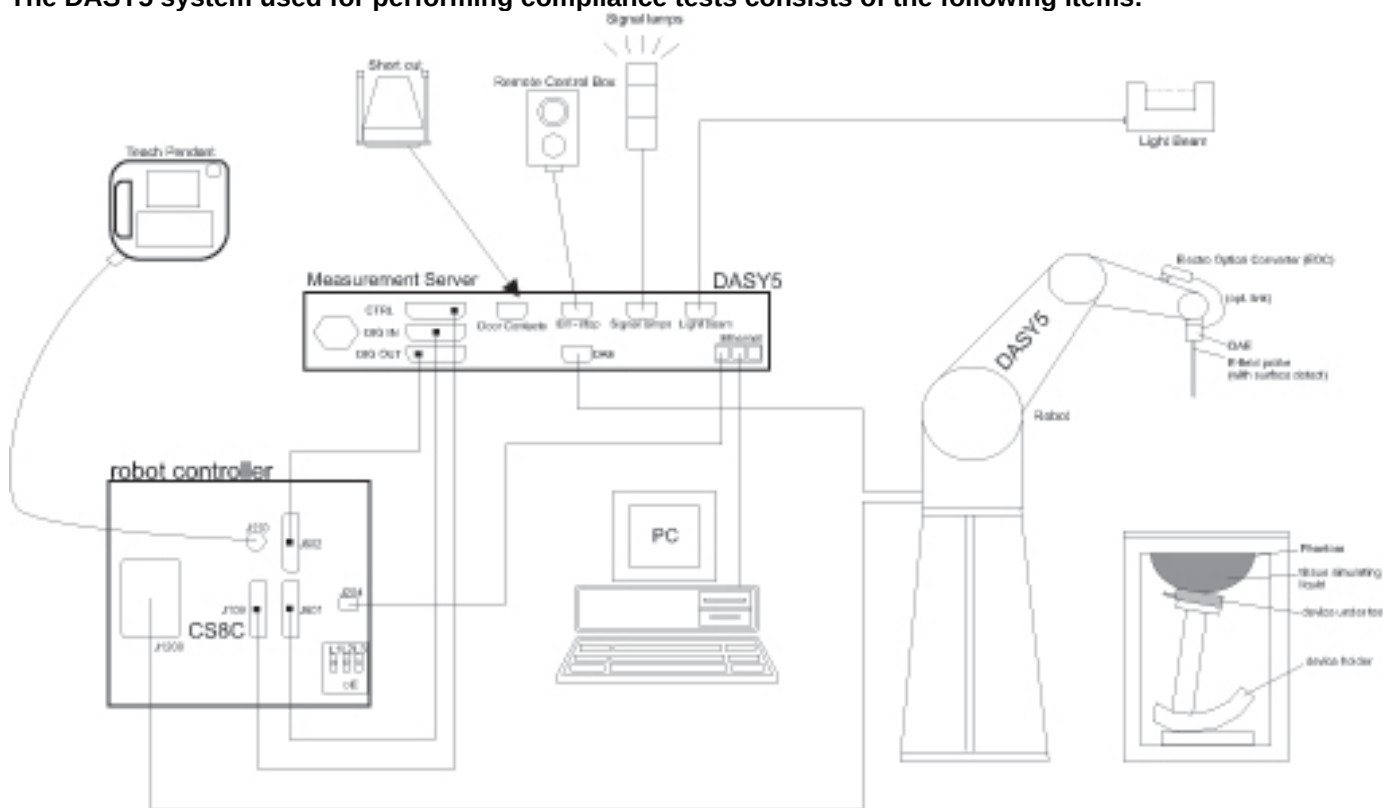
4.2. Measurement Uncertainty

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

Component	Error, %	Distribution	Divisor	Sensitivity	U (Xi), %
Measurement System					
Probe Calibration (k=1)	6.00	Normal	1	1	6.00
Axial Isotropy	1.15	Rectangular	1.732	0.7071	0.47
Hemispherical Isotropy	2.30	Rectangular	1.732	0.7071	0.94
Boundary Effect	0.90	Rectangular	1.732	1	0.52
Probe Linearity	3.45	Rectangular	1.732	1	1.99
System Detection Limits	1.00	Rectangular	1.732	1	0.58
Readout Electronics	0.30	Normal	1	1	0.30
Response Time	0.80	Rectangular	1.732	1	0.46
Integration Time	2.60	Rectangular	1.732	1	1.50
RF Ambient Conditions - Noise	3.00	Rectangular	1.732	1	1.73
RF Ambient Conditions - Reflections	3.00	Rectangular	1.732	1	1.73
Probe Positioner Mechanical Tolerance	0.40	Rectangular	1.732	1	0.23
Probe Positioning with respect to Phantom	2.90	Rectangular	1.732	1	1.67
Extrapolation, Interpolation and Integration	1.00	Rectangular	1.732	1	0.58
Test Sample Related					
Test Sample Positioning	2.90	Normal	1	1	2.90
Device Holder Uncertainty	3.60	Normal	1	1	3.60
Output Power Variation - SAR Drift	5.00	Rectangular	1.732	1	2.89
Phantom and Tissue Parameters					
Phantom Uncertainty (shape and thickness)	4.00	Rectangular	1.732	1	2.31
Liquid Conductivity - deviation from target	5.00	Rectangular	1.732	0.64	1.85
Liquid Conductivity - measurement	-4.88	Normal	1	0.64	-3.12
Liquid Permittivity - deviation from target	5.00	Rectangular	1.732	0.6	1.73
Liquid Permittivity - measurement uncertainty	-4.12	Normal	1	0.6	-2.47
Combined Standard Uncertainty $U_c(y)$ =					10.52
Expanded Uncertainty U, Coverage Factor = 2, > 95 % Confidence =					21.05 %
Expanded Uncertainty U, Coverage Factor = 2, > 95 % Confidence =					1.66 dB

5. Measurement System Description and Setup

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



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

6. SAR Measurement Procedure

6.1. Normal SAR Measurement Procedure

Step 1: Power Reference Measurement

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

Step 2: Area Scan

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

Step 3: Zoom Scan

Zoom Scans are used to assess the peak spatial SAR values within a cubic averaging volume containing 1 g and 10 g of simulated tissue. The Zoom Scan measures $\geq 7 \times 7 \times 9$ (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 1-g SAR

Worst Case SAR data for each Frequency Band

FCC Rule Parts	Freq. Range	Highest 1-g SAR	Limit
22	824-849 MHz	Head: 0.375 W/kg (Left Touch) (1xEV-DO) Body & Hotspot: 0.820 W/kg (Rear w/ 10mm distance) (1xRTT) w/ headset	1.6 W/kg
24	1850-1910 MHz	Head: 0.538 W/kg (Left Touch) (1xEV-DO) Body & Hotspot: 0.984 W/kg (Rear w/ 10mm distance) (1xRTT)	
27 (LTE Band 13)	777-787 MHz	Head: 0.147 W/kg (Left Touch) Body & Hotspot: 0.720 W/kg (Rear w/ 10 mm distance)	
15.247	2412-2462 MHz	Head: 0.173 W/kg (Right Touch) Body & Hotspot: 0.155 W/kg (Rear w/ 10 mm distance)	
Simultaneous transmission condition		1.495 W/kg (Sec. 15.2.2) (The highest SAR across exposure conditions)	

8. Device Under Test

Cellular/PCS CDMA/EVDO/GSM/GPRS/EDGE, PCS WCDMA/HSPA and AWS LTE Phone with Bluetooth, WLAN , & NFC
Model: LG-VS950, VS950, LGVS950

Normal operation	- 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	1. Headset

8.1. Band and Air Interfaces

Tx Frequency Bands	- 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 - 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.

8.3. Simultaneous Transmission

* Simultaneous Transmission Senario

No.	Capable TX Configuration	CDMA 1xRTT	CDMA EVDO	LTE	GSM Voice	GSM GPRS/EDGE	WCDMA	WiFi 2.4Ghz
1	CDMA 1xRTT		O	O	X	X	X	O
2	CDMA EVDO	O		X	X	X	X	O
3	LTE	O	X		X	X	X	O
4	GSM voice	X	X	X		X	X	O
5	GSM GPRS/EDGE	X	X	X	X		X	X
6	WCDMA	X	X	X	X	X		O
7	WiFi 2.4Ghz	O	O	O	O	X	O	
8	Bluetooth 2.4Ghz	SAR testing is not required						
9	NFC	SAR testing is not required						

* Worst Case Simultaneous SAR Cases

No.	Capable TX Configuration	Head SAR	Body SAR	Hotspot SAR	Power Reduction (EVDO)	Power Reduction (LTE)	Note
1	GSM 850 Voice + WiFi 2.4Ghz	O	X	X	X	X	GSM voice + WiFi
2	GSM 1900 Voice + WiFi 2.4Ghz	O	X	X	X	X	GSM voice + WiFi
3	GSM 850 GPRS/EDGE	X	O	X	X	X	GSM GPRS/EDGE
4	GSM 1900 GPRS/EDGE	X	O	X	X	X	GSM GPRS/EDGE
5	WCDMA 1900 + WiFi 2.4Ghz	O	O	O	X	X	WCDMA + WiFi
6	CDMA BC0 1xRTT + CDMA BC0 EvDO + WiFi 2.4Ghz	O	O	O	O	X	WiFi Hotspot + SVDO
7	CDMA BC0 1xRTT + CDMA BC1 EvDO + WiFi 2.4Ghz	O	O	O	O	X	WiFi Hotspot + SVDO
8	CDMA BC0 1xRTT + LTE B13 + WiFi 2.4Ghz	O	O	O	X	O	WiFi Hotspot + SVLTE
9	CDMA BC1 1xRTT + CDMA BC0 EvDO+ WiFi 2.4Ghz	O	O	O	O	X	WiFi Hotspot + SVDO
10	CDMA BC1 1xRTT + CDMA BC1 EvDO+ WiFi 2.4Ghz	O	O	O	O	X	WiFi Hotspot + SVDO
11	CDMA BC1 1xRTT + LTE B13+ WiFi 2.4Ghz	O	O	O	X	O	WiFi Hotspot + SVLTE
* Hotspot suppot : LTE, WCDMA, CDMA 1xRTT and EvDO [GPRS/EDGE is not supported Hotspot] * SVLTE, SVDO is supported * BT and NFC SAR testing is not required							

O = Can Transmit Simultaneously
X = Cannot Transmit Simultaneously

Notes:

1. WiFi 2.4 GHz and BT cannot transmit simultaneously

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(VS950) 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 the Section of 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 the Section of the antenna distance document for definition of edges and test positions, and the Section 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 6.2.3-1: Maximum Power Reduction (MPR) for Power Class 3 <table><tr><th rowspan="2">Modulation</th><th colspan="6">Channel bandwidth / Transmission bandwidth (RB)</th><th rowspan="2">MPR (dB)</th></tr><tr><th>1.4 MHz</th><th>3.0 MHz</th><th>5 MHz</th><th>10 MHz</th><th>15 MHz</th><th>20 MHz</th></tr><tr><td>QPSK</td><td>> 5</td><td>> 4</td><td>> 8</td><td>> 12</td><td>> 16</td><td>> 18</td><td>≤ 1</td></tr><tr><td>16 QAM</td><td>≤ 5</td><td>≤ 4</td><td>≤ 8</td><td>≤ 12</td><td>≤ 16</td><td>≤ 18</td><td>≤ 1</td></tr><tr><td>16 QAM</td><td>> 5</td><td>> 4</td><td>> 8</td><td>> 12</td><td>> 16</td><td>> 18</td><td>≤ 2</td></tr></table> MPR is permanently built-in by design. A-MPR was disabled	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
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																																	
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 the Section of the 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 & antenna separation distance. 2) WiFi 2.4GHz - Exposure Conditions: Head/Body SAR required * WiFi 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 the section of 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 the section of Simultaneous Transmission																
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 SVDO Mode <table border="1"> <thead> <tr> <th>Mode</th><th>CDMA Current Voice Power for BC0 & BC1 (1xRTT target Power = BC0 24.3dBm) (1xRTT target Power = BC1 23.7dBm)</th><th>CDMA EVDO Max. Power for BC0 & BC1 (EVDO target Power = 23.7dBm)</th></tr> </thead> <tbody> <tr> <td rowspan="2">SVDO</td><td>P < 15.5 dBm</td><td>23.7dBm(Limited)</td></tr> <tr> <td>P ≥ 15.5 dBm</td><td>18.7dBm(Limited)</td></tr> </tbody> </table> 2. Power Reduction operation table for SVLTE Mode <table border="1"> <thead> <tr> <th>Mode</th><th>CDMA Current Voice Power for BC0 & BC1 (1xRTT target Power = BC0 24.3dBm) (1xRTT target Power = BC1 23.7dBm)</th><th>LTE Max. Power for BC13 (LTE target Power = 22.8dBm)</th></tr> </thead> <tbody> <tr> <td rowspan="2">SVLTE</td><td>P < 18.5 dBm</td><td>22.8dBm(Limited)</td></tr> <tr> <td>P ≥ 18.5 dBm</td><td>18.8dBm(Limited)</td></tr> </tbody> </table>	Mode	CDMA Current Voice Power for BC0 & BC1 (1xRTT target Power = BC0 24.3dBm) (1xRTT target Power = BC1 23.7dBm)	CDMA EVDO Max. Power for BC0 & BC1 (EVDO target Power = 23.7dBm)	SVDO	P < 15.5 dBm	23.7dBm(Limited)	P ≥ 15.5 dBm	18.7dBm(Limited)	Mode	CDMA Current Voice Power for BC0 & BC1 (1xRTT target Power = BC0 24.3dBm) (1xRTT target Power = BC1 23.7dBm)	LTE Max. Power for BC13 (LTE target Power = 22.8dBm)	SVLTE	P < 18.5 dBm	22.8dBm(Limited)	P ≥ 18.5 dBm	18.8dBm(Limited)
Mode	CDMA Current Voice Power for BC0 & BC1 (1xRTT target Power = BC0 24.3dBm) (1xRTT target Power = BC1 23.7dBm)	CDMA EVDO Max. Power for BC0 & BC1 (EVDO target Power = 23.7dBm)																
SVDO	P < 15.5 dBm	23.7dBm(Limited)																
	P ≥ 15.5 dBm	18.7dBm(Limited)																
Mode	CDMA Current Voice Power for BC0 & BC1 (1xRTT target Power = BC0 24.3dBm) (1xRTT target Power = BC1 23.7dBm)	LTE Max. Power for BC13 (LTE target Power = 22.8dBm)																
SVLTE	P < 18.5 dBm	22.8dBm(Limited)																
	P ≥ 18.5 dBm	18.8dBm(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 Exposure Condition for WWAN, LTE and WiFi

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

9.2. Body Exposure Conditions for GSM850/1900/W-CDMA Band II/CDMA (BC0/BC1) 1xRTT

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 antenna to the edge is > 2.5 cm as per KDB 941225 D06 Hot Spot SAR v01
Edge 2	9 mm	Yes	
Edge 3	2 mm	Yes	
Edge 4	33 mm	No	SAR is not required because the distance from the antenna to the edge is > 2.5 cm as per KDB 941225 D06 Hot Spot SAR v01

9.3. Body Exposure Conditions for CDMA (BC0/BC1), 1xEVDO

Test Configurations	Antenna-to-edge/surface	SAR Required	Note
Rear	< 25 mm	Yes	
Front	< 25 mm	Yes	
Edge 1	3.5 mm	Yes	
Edge 2	1.8 mm	Yes	
Edge 3	90 mm	No	SAR is not required because the distance from the antenna to the edge is > 2.5 cm as per KDB 941225 D06 Hot Spot SAR v01
Edge 4	68.2 mm	No	Ditto

9.4. Body Exposure Conditions for LTE Band 13

Test Configurations	Antenna-to-edge/surface	SAR Required	Note
Rear	< 25 mm	Yes	
Front	< 25 mm	Yes	
Edge 1	124 mm	No	SAR is not required because the distance from the antenna to the edge is > 2.5 cm as per KDB 941225 D06 Hot Spot SAR v01
Edge 2	66 mm	No	Ditto
Edge 3	2 mm	Yes	
Edge 4	9 mm	Yes	

9.5. Body Exposure Conditions for WiFi

Test Configurations	Antenna-to-edge/surface	SAR Required	Note
Rear	< 25 mm	Yes	
Front	< 25 mm	Yes	
Edge 1	4.5 mm	Yes	
Edge 2	32.8 mm	No	SAR is not required because the distance from the antenna to the edge is > 2.5 cm as per KDB 941225 D06 Hot Spot SAR v01
Edge 3	119 mm	No	Ditto
Edge 4	34.7 mm	No	Ditto

10. RF Output Power Measurement

10.1. GSM850

Target Power: GSM 32.3 dBm
 GPRS 1 slot 32.3 dBm
 GPRS 2 slot 31.0 dBm
 EGPRS 1 slot 26.3 dBm
 EGPRS 2 slot 25.0 dBm
 Tune-up Tolerance: +0.7 dB /-1.5dB

GSM (GMSK) Voice Mode

Band	Ch No.	Freq. (MHz)	Avg burst Pwr (dBm)
850	128	824.2	32.52
	190	836.6	32.47
	251	848.8	32.45

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	32.49	23.5	31.3	25.3
	190	836.6	32.50	23.5	31.3	25.3
	251	848.8	32.46	23.4	31.1	25.1

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	26.80	17.8	25.34	19.3
	190	836.6	26.80	17.8	25.20	19.2
	251	848.8	26.80	17.8	25.38	19.4

Notes:

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

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

10.2. GSM1900

Target Power: GSM 29.0 dBm

GPRS 1 slot 29.0 dBm

GPRS 2 slot 28.0 dBm

EGPRS 1 slot 25.3 dBm

EGPRS 2 slot 24.0 dBm

Tune-up Tolerance: +0.7 dB /-1.5dB

GSM (GMSK) Voice Mode

Band	Ch No.	Freq. (MHz)	Avg burst Pwr (dBm)
1900	512	1850.2	29.1
	661	1880.0	29.2
	810	1909.8	29.2

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	29.2	20.2	28.1	22.1
	661	1880.0	29.3	20.3	28.3	22.3
	810	1909.8	29.2	20.2	28.3	22.3

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	25.4	16.4	24.3	18.3
	661	1880.0	25.6	16.6	24.5	18.5
	810	1909.8	25.6	16.6	24.4	18.4

Notes:

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

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

10.3. W-CDMA Band II

Target Power: 22.5 dBm

Tune-up Tolerance: +0.7 dB

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	22.7
		9400	1880.0	23.0
		9538	1907.6	22.7

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
HSDPA Specific Settings	CM (dB)	0	1	1.5	1.5
	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} = β_{hs}/β_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	22.8
		9400	1880.0	0	0	22.9
		9538	1907.6	0	0	22.8
	Subtest 2	9262	1852.4	0	0	22.8
		9400	1880.0	0	0	23.0
		9538	1907.6	0	0	22.8
	Subtest 3	9262	1852.4	0.5	0.5	22.3
		9400	1880.0	0.5	0.5	22.5
		9538	1907.6	0.5	0.4	22.3
	Subtest 4	9262	1852.4	0.5	0.5	22.3
		9400	1880.0	0.5	0.6	22.4
		9538	1907.6	0.5	0.4	22.3

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.
- *: Please refer to the separately attached document *MPR HSUPA Issue_ZNFVS950* for a detailed explanation/justification from the manufacturer on why MPR was not implemented for this particular mode on this device.

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 47/15	56/75	134/15
	CM (dB)	1.0	3.0	2.0	3.0	1.0
	MPR (dB)	0	2	1	2	0
HSDPA Specific Settings	DACK	8				
	DNAK	8				
	DCQI	8				
	Ack-Nack repetition factor	3				
	CQI Feedback (Table 5.2B.4)	4ms				
	CQI Repetition Factor (Table 5.2B.4)	2				
	Ahs = β_{hs}/β_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	0.0	22.8
	9400	1880.0	0	0.2	22.8
	9538	1907.6	0	0.1	22.7
Subtest 2	9262	1852.4	2	0.1	22.7
	9400	1880.0	2	0.3	22.7
	9538	1907.6	2	-0.1	22.8
Subtest 3	9262	1852.4	1	0.5	22.4
	9400	1880.0	1	0.6	22.4
	9538	1907.6	1	0.4	22.4
Subtest 4	9262	1852.4	2	0.0	22.8
	9400	1880.0	2	0.2	22.8
	9538	1907.6	2	0.0	22.7
Subtest 5	9262	1852.4	0	0.5	22.4
	9400	1880.0	0	0.6	22.4
	9538	1907.6	0	0.4	22.3

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 $\leq 75\%$ of the SAR limit.
- *: Please refer to the separately attached document *MPR HSUPA Issue_ZNFVS950* 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

Target Power: 24.3 dBm

Tune-up Tolerance: +0.7 dB

CDMA			Avg Pwr (dBm)		
			RC1 - SO55	RC3 - SO55	RC3 - SO32
Band	Ch	Freq. (MHz)	(Loopback)	(Loopback)	(+F-SCH)
BC 0	1013	824.7	24.90	24.71	24.69
	384	836.52	25.00	24.90	24.88
	777	848.31	24.82	24.81	24.74

1xEv-Do Rel. 0

Target Power: 23.7 dBm

Tune-up Tolerance: +0.7 dB

Band	FTAP Rate	RTAP Rate	Channel	f (MHz)	Avg Pwr (dBm)
BC0	307.2 kbps (2 slot, QPSK)	153.6 kbps	1013	824.7	24.21
			384	836.52	24.33
			777	848.31	24.00

1xEv-Do Rev. A

Target Power: 23.7 dBm

Tune-up Tolerance: +0.7 dB

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	24.00
			384	836.52	24.10
			777	848.31	24.13

10.5. CDMA BC1

1xRTT

Target Power: 23.7 dBm

Tune-up Tolerance: +0.7 dB

CDMA			Avg Pwr (dBm)		
			RC1 - SO55	RC3 - SO55	RC3 - SO32
Band	Ch	Freq. (MHz)	(Loopback)	(Loopback)	(+F-SCH)
BC 1	25	1851.25	24.21	24.30	24.20
	600	1880	24.30	24.20	24.20
	1175	1908.75	24.20	24.29	24.18

1xEv-Do Rel. 0

Target Power: 23.7 dBm

Tune-up Tolerance: +0.7 dB

Band	FTAP Rate	RTAP Rate	Channel	f (MHz)	Avg Pwr (dBm)
BC1	307.2 kbps (2 slot, QPSK)	153.6 kbps	25	1851.25	24.20
			600	1880	24.15
			1175	1908.75	24.20

1xEv-Do Rev. A

Target Power: 23.7 dBm

Tune-up Tolerance: +0.7 dB

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	24.13
			600	1880	24.23
			1175	1908.75	24.20

10.6. LTE Band 13

Target Power: 22.8 dBm

Tune-up Tolerance: +0.7 dB

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	22.5
				1	0	0	0	23.5
				1	49	0	0	23.4
				50	0	1	1	22.4
			16QAM	25	12	2	2	21.4
				1	0	1	1	22.4
				1	49	1	1	22.5
				50	0	2	2	21.5

Note(s):

* When the power reduction due to proximity sensor is activated, the maximum conducted power is reduced, but the MPR for different resource block configurations/allocations is disabled.

10.7. Power Reduction for SV-DO

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

UPDATED 6-3-2012

R & S CMU200 #1		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	24.3	24.2	24.3	24.4	24.2	24.2
	16	19.3	19.4	19.0	19.2	19.3	19.2
384	15	24.3	24.3	24.4	24.2	24.2	24.3
	16	19.2	19.2	19.4	19.3	19.1	19.1
777	15	24.3	24.3	24.4	24.1	24.3	24.2
	16	19.1	19.1	19.1	19.2	19.3	19.1

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

R & S CMU200 #1		R&S CMU 200					
CDMA BC1 1xRTT		BC0 1xEVDO			BC1 1xEVDO		
		Output Power [dBm]			Output Power [dBm]		
Ch. #	Output Power [dBm]	1013.0	384.0	777.0	25.0	600.0	1175.0
25	15	24.4	24.3	24.4	24.2	24.2	24.2
	16	19.1	19.1	19.1	19.3	19.1	19.2
600	15	24.3	24.3	24.4	24.1	24.3	24.2
	16	19.3	19.3	19.4	19.3	19.4	19.1
1175	15	24.2	24.3	24.3	24.2	24.2	24.3
	16	19.1	19.1	19.0	19.3	19.3	19.2

10.8. Power Reduction for SV-LTE Band 13

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

UPDATED 6-03-2012

CH 5230									
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	23.5	23.4	22.5	22.4	22.5	22.4	21.4	21.4
	19	19.4	19.4	19.4	19.3	19.3	19.4	19.4	19.5
384	18	23.4	23.2	22.5	22.4	22.3	22.5	21.5	21.4
	19	19.3	19.4	19.4	19.2	19.2	19.3	19.4	19.4
777	18	23.4	23.2	22.5	22.4	22.4	22.5	21.4	21.4
	19	19.4	19.4	19.3	19.2	19.2	19.3	19.3	19.5

CDMA 1xRTT (BC0) 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	23.4	23.2	22.5	22.4	22.3	22.4	21.4	21.5
	19	19.2	19.4	19.5	19.3	19.2	19.4	19.4	19.4
600	18	23.4	23.4	22.4	22.5	22.4	22.4	21.4	21.4
	19	19.3	19.3	19.4	19.2	19.2	19.3	19.4	19.4
1175	18	23.4	23.2	22.5	22.4	22.4	22.4	21.5	21.4
	19	19.4	19.3	19.3	19.2	19.3	19.4	19.5	19.4

10.9. Wi-Fi (2.4 GHz)

Required Test Channels per KDB 248227 D01

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

Notes:

√ = "default test channels"

▽ = possible 802.11g channels with maximum average output ¼ dB ≥ the "default test channels"

[#] = when output power is reduced for channel 1 and /or 11 to meet restricted band requirements the highest output channels closest to each of these channels should be tested.

Output power table

Band (MHz)	Mode	Ch #	Freq. (MHz)	Measured Avg Pwr(dBm) from original project	Measured Avg Pwr(dBm)	Target Power Maximum
2.4	802.11b	1	2412	12.4	12.4	14
		6	2437	12.7	12.7	
		11	2462	12.8	12.8	
	802.11g	1	2412	12.3	12.3	14
		6	2437	12.5	12.5	
		11	2462	12.7	12.7	
	802.11n (HT20)	1	2412	11.1	11.1	13
		6	2437	11.5	11.5	
		11	2462	11.2	11.2	

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. Bluetooth

Mode	Channel #	Freq. (MHz)	Conducted Avg Power	
			(dBm)	(mW)
GFSK	0	2402	10.3	10.72
	39	2441	10.1	10.23
	78	2480	9.2	8.32
8PSK	0	2402	8.0	6.31
	39	2441	7.9	6.17
	78	2480	6.9	4.90

Note(s):

According to KDB 648474, Table 2, Unlicensed transmitters

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

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

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%

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 $\pm$ (%)
05/30/2012	Head 835	e'	42.1139	Relative Permittivity (ϵ_r):	42.11	41.50	1.48	5
		e''	19.0676	Conductivity (σ):	0.89	0.90	-1.64	5
	Head 825	e'	42.2637	Relative Permittivity (ϵ_r):	42.26	41.58	1.65	5
		e''	19.0876	Conductivity (σ):	0.88	0.90	-2.59	5
	Head 850	e'	41.8920	Relative Permittivity (ϵ_r):	41.89	41.50	0.94	5
		e''	19.0273	Conductivity (σ):	0.90	0.92	-1.72	5
05/30/2012	Body 835	e'	54.5670	Relative Permittivity (ϵ_r):	54.57	55.20	-1.15	5
		e''	21.3359	Conductivity (σ):	0.99	0.97	2.12	5
	Body 820	e'	54.7599	Relative Permittivity (ϵ_r):	54.76	55.28	-0.94	5
		e''	21.3877	Conductivity (σ):	0.98	0.97	0.69	5
	Body 850	e'	54.3805	Relative Permittivity (ϵ_r):	54.38	55.16	-1.41	5
		e''	21.2825	Conductivity (σ):	1.01	0.99	1.90	5
05/31/2012	Body 1900	e'	51.1222	Relative Permittivity (ϵ_r):	51.12	53.30	-4.09	5
		e''	14.4588	Conductivity (σ):	1.53	1.52	0.49	5
	Body 1850	e'	51.3091	Relative Permittivity (ϵ_r):	51.31	53.30	-3.74	5
		e''	14.2941	Conductivity (σ):	1.47	1.52	-3.26	5
	Body 1880	e'	51.1771	Relative Permittivity (ϵ_r):	51.18	53.30	-3.98	5
		e''	14.3892	Conductivity (σ):	1.50	1.52	-1.04	5
05/31/2012	Body 1910	e'	51.1053	Relative Permittivity (ϵ_r):	51.11	53.30	-4.12	5
		e''	14.4975	Conductivity (σ):	1.54	1.52	1.29	5
05/31/2012	Head 1900	e'	40.4062	Relative Permittivity (ϵ_r):	40.41	40.00	1.02	5
		e''	13.4695	Conductivity (σ):	1.42	1.40	1.64	5
	Head 1850	e'	40.6098	Relative Permittivity (ϵ_r):	40.61	40.00	1.52	5
		e''	13.3003	Conductivity (σ):	1.37	1.40	-2.28	5
	Head 1880	e'	40.4651	Relative Permittivity (ϵ_r):	40.47	40.00	1.16	5
		e''	13.4025	Conductivity (σ):	1.40	1.40	0.07	5
06/01/2012	Head 1910	e'	40.3845	Relative Permittivity (ϵ_r):	40.38	40.00	0.96	5
		e''	13.5000	Conductivity (σ):	1.43	1.40	2.41	5
06/01/2012	Body 1900	e'	52.9429	Relative Permittivity (ϵ_r):	52.94	53.30	-0.67	5
		e''	14.3029	Conductivity (σ):	1.51	1.52	-0.59	5
	Body 1850	e'	53.1277	Relative Permittivity (ϵ_r):	53.13	53.30	-0.32	5
		e''	14.1368	Conductivity (σ):	1.45	1.52	-4.33	5
	Body 1880	e'	53.0131	Relative Permittivity (ϵ_r):	53.01	53.30	-0.54	5
		e''	14.2347	Conductivity (σ):	1.49	1.52	-2.10	5
06/01/2012	Body 1910	e'	52.9096	Relative Permittivity (ϵ_r):	52.91	53.30	-0.73	5
		e''	14.3325	Conductivity (σ):	1.52	1.52	0.14	5

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

Date	Freq. (MHz)	Liquid Parameters			Measured	Target	Delta (%)	Limit ±(%)
06/02/2012	Head 1900	e'	39.6987	Relative Permittivity (ε _r):	39.70	40.00	-0.75	5
		e''	13.2262	Conductivity (σ):	1.40	1.40	-0.19	5
	Head 1850	e'	39.8987	Relative Permittivity (ε _r):	39.90	40.00	-0.25	5
		e''	13.0835	Conductivity (σ):	1.35	1.40	-3.87	5
	Head 1880	e'	39.7724	Relative Permittivity (ε _r):	39.77	40.00	-0.57	5
		e''	13.1671	Conductivity (σ):	1.38	1.40	-1.69	5
	Head 1910	e'	39.6588	Relative Permittivity (ε _r):	39.66	40.00	-0.85	5
		e''	13.2537	Conductivity (σ):	1.41	1.40	0.54	5
06/04/2012	Head 835	e'	42.1335	Relative Permittivity (ε _r):	42.13	41.50	1.53	5
		e''	18.6177	Conductivity (σ):	0.86	0.90	-3.96	5
	Head 825	e'	42.2645	Relative Permittivity (ε _r):	42.26	41.58	1.65	5
		e''	18.6387	Conductivity (σ):	0.86	0.90	-4.88	5
	Head 850	e'	41.9143	Relative Permittivity (ε _r):	41.91	41.50	1.00	5
		e''	18.5817	Conductivity (σ):	0.88	0.92	-4.02	5
06/04/2012	Body 835	e'	53.1824	Relative Permittivity (ε _r):	53.18	55.20	-3.66	5
		e''	21.2629	Conductivity (σ):	0.99	0.97	1.77	5
	Body 820	e'	53.5451	Relative Permittivity (ε _r):	53.55	55.28	-3.13	5
		e''	21.4112	Conductivity (σ):	0.98	0.97	0.80	5
	Body 850	e'	53.1824	Relative Permittivity (ε _r):	53.18	55.16	-3.58	5
		e''	21.2629	Conductivity (σ):	1.00	0.99	1.80	5
06/05/2012	Body 1900	e'	52.1676	Relative Permittivity (ε _r):	52.17	53.30	-2.12	5
		e''	14.3588	Conductivity (σ):	1.52	1.52	-0.20	5
	Body 1850	e'	52.3537	Relative Permittivity (ε _r):	52.35	53.30	-1.78	5
		e''	14.2235	Conductivity (σ):	1.46	1.52	-3.74	5
	Body 1880	e'	52.2300	Relative Permittivity (ε _r):	52.23	53.30	-2.01	5
		e''	14.3064	Conductivity (σ):	1.50	1.52	-1.61	5
	Body 1910	e'	52.1444	Relative Permittivity (ε _r):	52.14	53.30	-2.17	5
		e''	14.3908	Conductivity (σ):	1.53	1.52	0.55	5
06/05/2012	Head 1900	e'	40.1016	Relative Permittivity (ε _r):	40.10	40.00	0.25	5
		e''	13.5499	Conductivity (σ):	1.43	1.40	2.25	5
	Head 1850	e'	40.3193	Relative Permittivity (ε _r):	40.32	40.00	0.80	5
		e''	13.4242	Conductivity (σ):	1.38	1.40	-1.36	5
	Head 1880	e'	40.1940	Relative Permittivity (ε _r):	40.19	40.00	0.49	5
		e''	13.4994	Conductivity (σ):	1.41	1.40	0.80	5
	Head 1910	e'	40.0616	Relative Permittivity (ε _r):	40.06	40.00	0.15	5
		e''	13.5739	Conductivity (σ):	1.44	1.40	2.97	5

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

Date	Freq. (MHz)		Liquid Parameters	Measured	Target	Delta (%)	Limit ±(%)
06/06/2012	Head 750	e'	41.4253 Relative Permittivity (ϵ_r):	41.43	41.96	-1.28	5
		e''	21.1072 Conductivity (σ):	0.88	0.89	-1.44	5
	Head 780	e'	41.0896 Relative Permittivity (ϵ_r):	41.09	41.81	-1.72	5
		e''	20.8743 Conductivity (σ):	0.91	0.90	1.11	5
	Head 790	e'	40.9875 Relative Permittivity (ϵ_r):	40.99	41.76	-1.84	5
		e''	20.8193 Conductivity (σ):	0.91	0.90	2.05	5
06/07/2012	Body 700	e'	57.4941 Relative Permittivity (ϵ_r):	57.49	55.74	3.15	5
		e''	23.9607 Conductivity (σ):	0.93	0.96	-2.78	5
	Body 710	e'	57.3916 Relative Permittivity (ϵ_r):	57.39	55.70	3.04	5
		e''	23.8490 Conductivity (σ):	0.94	0.96	-1.93	5
	Body 750	e'	56.9849 Relative Permittivity (ϵ_r):	56.98	55.55	2.59	5
		e''	23.4044 Conductivity (σ):	0.98	0.96	1.34	5
06/08/2012	Body 2450	e'	53.9207 Relative Permittivity (ϵ_r):	53.92	52.70	2.32	5
		e''	14.6269 Conductivity (σ):	1.99	1.95	2.18	5
	Body 2410	e'	53.9939 Relative Permittivity (ϵ_r):	53.99	52.76	2.34	5
		e''	14.4348 Conductivity (σ):	1.93	1.91	1.41	5
	Body 2435	e'	53.9610 Relative Permittivity (ϵ_r):	53.96	52.73	2.34	5
		e''	14.5630 Conductivity (σ):	1.97	1.93	2.10	5
06/08/2012	Body 2475	e'	53.8508 Relative Permittivity (ϵ_r):	53.85	52.67	2.24	5
		e''	14.7399 Conductivity (σ):	2.03	1.99	2.18	5
	Head 2450	e'	40.6587 Relative Permittivity (ϵ_r):	40.66	39.20	3.72	5
		e''	13.2293 Conductivity (σ):	1.80	1.80	0.12	5
	Head 2410	e'	40.7673 Relative Permittivity (ϵ_r):	40.77	39.28	3.79	5
		e''	13.0768 Conductivity (σ):	1.75	1.76	-0.46	5
06/08/2012	Head 2435	e'	40.7065 Relative Permittivity (ϵ_r):	40.71	39.24	3.75	5
		e''	13.1766 Conductivity (σ):	1.78	1.78	0.09	5
	Head 2460	e'	40.6315 Relative Permittivity (ϵ_r):	40.63	39.19	3.69	5
		e''	13.2658 Conductivity (σ):	1.81	1.81	0.21	5
	Body 835	e'	53.4665 Relative Permittivity (ϵ_r):	53.47	55.20	-3.14	5
		e''	21.5402 Conductivity (σ):	1.00	0.97	3.10	5
06/09/2012	Body 820	e'	53.6448 Relative Permittivity (ϵ_r):	53.64	55.28	-2.95	5
		e''	21.6005 Conductivity (σ):	0.98	0.97	1.69	5
	Body 850	e'	53.2996 Relative Permittivity (ϵ_r):	53.30	55.16	-3.37	5
		e''	21.4734 Conductivity (σ):	1.01	0.99	2.81	5

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

Date	Freq. (MHz)	Liquid Parameters			Measured	Target	Delta (%)	Limit ±(%)
06/09/2012	Body 1900	e'	51.4184	Relative Permittivity (ϵ_r):	51.42	53.30	-3.53	5
		e''	14.4243	Conductivity (σ):	1.52	1.52	0.25	5
	Body 1850	e'	51.6555	Relative Permittivity (ϵ_r):	51.66	53.30	-3.09	5
		e''	14.3091	Conductivity (σ):	1.47	1.52	-3.16	5
	Body 1880	e'	51.5060	Relative Permittivity (ϵ_r):	51.51	53.30	-3.37	5
		e''	14.3706	Conductivity (σ):	1.50	1.52	-1.17	5
	Body 1910	e'	51.3851	Relative Permittivity (ϵ_r):	51.39	53.30	-3.59	5
		e''	14.4544	Conductivity (σ):	1.54	1.52	0.99	5
06/11/2012	Body 700	e'	56.2637	Relative Permittivity (ϵ_r):	56.26	55.74	0.94	5
		e''	23.8246	Conductivity (σ):	0.93	0.96	-3.33	5
	Body 710	e'	56.1595	Relative Permittivity (ϵ_r):	56.16	55.70	0.82	5
		e''	23.7157	Conductivity (σ):	0.94	0.96	-2.47	5
	Body 750	e'	55.7674	Relative Permittivity (ϵ_r):	55.77	55.55	0.40	5
		e''	23.3106	Conductivity (σ):	0.97	0.96	0.94	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	4d117	4/10/12	835	1g	9.40	9.84
				10g	6.16	6.48
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

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.						
5/30/2012	D835V2	4d117	Body	1g	9.83	9.84	-0.10	±10
				10g	6.45	6.48	-0.46	
5/30/2012	D835V2	4d117	Head	1g	9.19	9.4	-2.23	±10
				10g	5.99	6.16	-2.76	
5/31/2012	D1900V2	5d043	Body	1g	41.7	42	-0.71	±10
				10g	22.3	22	1.36	
5/31/2012	D1900V2	5d043	Head	1g	39.4	40.8	-3.43	±10
				10g	20.8	21.2	-1.89	
6/1/2012	D1900V2	5d043	Body	1g	42.9	42	2.14	±10
				10g	23.0	22	4.55	
6/2/2012	D1900V2	5d043	Head	1g	39.2	40.8	-3.92	±10
				10g	20.6	21.2	-2.83	
6/4/2012	D835V2	4d117	Head	1g	9.53	9.4	1.38	±10
				10g	6.24	6.16	1.30	
6/4/2012	D835V2	4d117	Body	1g	10.10	9.84	2.64	±10
				10g	6.59	6.48	1.70	
6/6/2012	D1900V2	5d043	Body	1g	41.5	42	-1.19	±10
				10g	22.2	22	0.91	
6/5/2012	D1900V2	5d043	Head	1g	41.8	40.8	2.45	±10
				10g	22.1	21.2	4.25	
6/6/2012	D750V3	1019	Head	1g	8.76	8.64	1.39	±10
				10g	5.47	5.64	-3.01	
6/7/2012	D750V3	1019	Body	1g	8.43	8.84	-4.64	±10
				10g	5.33	5.84	-8.73	
6/8/2012	D2450V2	748	Body	1g	50.70	50.8	-0.20	±10
				10g	23.50	23.6	-0.42	
6/8/2012	D2450V2	748	Head	1g	50.9	53.6	-5.04	±10
				10g	23.2	24.8	-6.45	
6/9/2012	D835V2	4d117	Body	1g	9.46	9.84	-3.86	±10
				10g	6.20	6.48	-4.32	
6/9/2012	D1900V2	5d043	Body	1g	41.8	42	-0.48	±10
				10g	22.1	22	0.45	
6/11/2012	D750V3	1019	Body	1g	9.17	8.84	3.73	±10
				10g	5.81	5.84	-0.51	

13. SAR Test Results

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	Voice	128	824.20	32.5			1
		190	836.60	32.5	0.192	0.152	
		251	848.80	32.5			1
Left Tilt (15°)	Voice	128	824.20	32.5			1
		190	836.60	32.5	0.113	0.090	
		251	848.80	32.5			1
Right Touch	Voice	128	824.20	32.5			1
		190	836.60	32.5	0.140	0.110	
		251	848.80	32.5			1
Right Tilt (15°)	Voice	128	824.20	32.5			1
		190	836.60	32.5	0.108	0.083	
		251	848.80	32.5			1

13.1.2. Body SAR

Test Position	Mode	Dist. (mm)	Ch #.	Freq. (MHz)	Avg Pwr (dBm)	SAR (mW/g)		Note
						1-g	10-g	
Rear	GPRS 2 slots	10	128	824.20	31.3			1
			190	836.60	31.3	0.721	0.486	
			190	836.60	31.3	0.777	0.495	2
			251	848.80	31.1			1
Front	GPRS 2 slots	10	128	824.20	31.3			1
			190	836.60	31.3	0.394	0.295	
			251	848.80	31.1			1

GPRS/EDGE is not supported Hotspot function

Note(s):

- SAR test was performed in the middle channel only as the measured level was < 50% of the SAR limit as stated in FCC "Public Notice DA 02-1438" by the SCC-34/SC-2. Testing in the low and high channel is optional.
- With headset attached.

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	Voice	512	1850.2	29.1			1
		661	1880.0	29.2	0.086	0.054	
		810	1909.8	29.2			1
Left Tilt (15°)	Voice	512	1850.2	29.1			1
		661	1880.0	29.2	0.074	0.044	
		810	1909.8	29.2			1
Right Touch	Voice	512	1850.2	29.1			1
		661	1880.0	29.2	0.204	0.130	
		810	1909.8	29.2			1
Right Tilt (15°)	Voice	512	1850.2	29.1			1
		661	1880.0	29.2	0.058	0.034	
		810	1909.8	29.2			1

13.2.2. Body SAR

Test Position	Mode	Dist. (mm)	Ch #.	Freq. (MHz)	Avg Pwr (dBm)	SAR (mW/g)		Note
						1-g	10-g	
Rear	GPRS 2 slots	10	512	1850.2	28.1			1
			661	1880.0	28.3	0.432	0.231	
			661	1880.0	28.3	0.447	0.237	2
			810	1909.8	28.3			1
Front	GPRS 2 slots	10	512	1850.2	28.1			1
			661	1880.0	28.3	0.220	0.132	
			810	1909.8	28.3			1

GPRS/EDGE is not supported Hotspot function

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.

13.3. W-CDMA Band II

Test 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	22.7			1
		9400	1880.0	23.0	0.163	0.106	
		9538	1907.6	22.7			1
Left Tilt (15°)	Rel 99 RMC 12.2kbps	9262	1852.4	22.7			1
		9400	1880.0	23.0	0.213	0.123	
		9538	1907.6	22.7			1
Right Touch	Rel 99 RMC 12.2kbps	9262	1852.4	22.7			1
		9400	1880.0	23.0	0.522	0.331	
		9538	1907.6	22.7			1
Right Tilt (15°)	Rel 99 RMC 12.2kbps	9262	1852.4	22.7			1
		9400	1880.0	23.0	0.157	0.094	
		9538	1907.6	22.7			1

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	22.7			1
			9400	1880.0	23.0	0.496	0.278	
			9400	1880.0	23.0	0.499	0.280	2
			9538	1907.6	22.7			1
Front	Rel 99 RMC 12.2kbps	10	9262	1852.4	22.7			1
			9400	1880.0	23.0	0.327	0.208	
			9538	1907.6	22.7			1
Edge 1	Rel 99 RMC 12.2kbps	10	9262	1852.4	22.7			3
			9400	1880.0	23.0			3
			9538	1907.6	22.7			3
Edge 2	Rel 99 RMC 12.2kbps	10	9262	1852.4	22.7			1
			9400	1880.0	23.0	0.272	0.163	
			9538	1907.6	22.7			1
Edge 3	Rel 99 RMC 12.2kbps	10	9262	1852.4	22.7			1
			9400	1880.0	23.0	0.358	0.218	
			9538	1907.6	22.7			1
Edge 4	Rel 99 RMC 12.2kbps	10	9262	1852.4	22.7			3
			9400	1880.0	23.0			3
			9538	1907.6	22.7			3

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. 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	24.7			1
		384	836.5	24.9	0.333	0.265	
		777	848.3	24.8			1
Left Tilt (15°)	1xRTT (RC3 SO55)	1013	824.7	24.7			1
		384	836.5	24.9	0.216	0.170	
		777	848.3	24.8			1
Right Touch	1xRTT (RC3 SO55)	1013	824.7	24.7			1
		384	836.5	24.9	0.302	0.229	
		777	848.3	24.8			1
Right Tilt (15°)	1xRTT (RC3 SO55)	1013	824.7	24.7			1
		384	836.5	24.9	0.205	0.158	
		777	848.3	24.8			1
Test Position	Mode	Ch #.	Freq. (MHz)	Avg Pwr (dBm)	SAR (mW/g)		Note
					1-g	10-g	
Left Touch	1xEVDO (Rel. 0)	1013	824.7	24.2			1
		384	836.5	24.3	0.375	0.230	
		777	848.3	24.0			1
Left Tilt (15°)	1xEVDO (Rel. 0)	1013	824.7	24.2			1
		384	836.5	24.3	0.323	0.218	
		777	848.3	24.0			1
Right Touch	1xEVDO (Rel. 0)	1013	824.7	24.2			1
		384	836.5	24.3	0.194	0.132	
		777	848.3	24.0			1
Right Tilt (15°)	1xEVDO (Rel. 0)	1013	824.7	24.2			1
		384	836.5	24.3	0.168	0.119	
		777	848.3	24.0			1

Note(s):

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

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	24.7	0.782	0.529	
			384	836.5	24.9	0.763	0.520	
			777	848.3	24.7	0.806	0.527	
			777	848.3	24.7	0.820	0.514	2
Front	1xRTT (RC3 SO32)	10	1013	824.7	24.7			1
			384	836.5	24.9	0.476	0.357	
			777	848.3	24.7			1
Edge 1	1xRTT (RC3 SO32)	10	1013	824.7	24.7			3
			384	836.5	24.9			3
			777	848.3	24.7			3
Edge 2	1xRTT (RC3 SO32)	10	1013	824.7	24.7			1
			384	836.5	24.9	0.177	0.123	
			777	848.3	24.7			1
Edge 3	1xRTT (RC3 SO32)	10	1013	824.7	24.7			1
			384	836.5	24.9	0.190	0.109	
			777	848.3	24.7			1
Edge 4	1xRTT (RC3 SO32)	10	1013	824.7	24.7			3
			384	836.5	24.9			3
			777	848.3	24.7			3
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	24.3			1
			384	836.5	24.4	0.515	0.301	
			384	836.5	24.4	0.520	0.304	2
			777	848.3	24.2			1
Front	1xEVDO (Rel. 0)	10	1013	824.7	24.3			1
			384	836.5	24.4	0.187	0.127	
			777	848.3	24.2			1
Edge 1	1xEVDO (Rel. 0)	10	1013	824.7	24.3			1
			384	836.5	24.4	0.115	0.079	
			777	848.3	24.2			1
Edge 2	1xEVDO (Rel. 0)	10	1013	824.7	24.3			1
			384	836.5	24.4	0.196	0.109	
			777	848.3	24.2			1
Edge 3	1xEVDO (Rel. 0)	10	1013	824.7	24.3			3
			384	836.5	24.4			3
			777	848.3	24.2			3
Edge 4	1xEVDO (Rel. 0)	10	1013	824.7	24.3			3
			384	836.5	24.4			3
			777	848.3	24.2			3

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. 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	24.3			1
		600	1880.00	24.2	0.206	0.131	
		1175	1908.75	24.3			1
Left Tilt (15°)	1xRTT (RC3 SO55)	25	1851.25	24.3			1
		600	1880.00	24.2	0.249	0.146	
		1175	1908.75	24.3			1
Right Touch	1xRTT (RC3 SO55)	25	1851.25	24.3			1
		600	1880.00	24.2	0.506	0.318	
		1175	1908.75	24.3			1
Right Tilt (15°)	1xRTT (RC3 SO55)	25	1851.25	24.3			1
		600	1880.00	24.2	0.185	0.112	
		1175	1908.75	24.3			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	24.2			1
		600	1880.00	24.2	0.538	0.270	
		1175	1908.75	24.2			1
Left Tilt (15°)	1xEVDO (Rel. 0)	25	1851.25	24.2			1
		600	1880.00	24.2	0.292	0.149	
		1175	1908.75	24.2			1
Right Touch	1xEVDO (Rel. 0)	25	1851.25	24.2			1
		600	1880.00	24.2	0.173	0.102	
		1175	1908.75	24.2			1
Right Tilt (15°)	1xEVDO (Rel. 0)	25	1851.25	24.2			1
		600	1880.00	24.2	0.085	0.050	
		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.

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	24.2	0.970	0.524	
			600	1880.00	24.2	0.984	0.520	
			600	1880.00	24.2	0.936	0.495	2
			1175	1908.75	24.2	0.921	0.485	
Front	1xRTT (RC3 SO32)	10	25	1851.25	24.2			1
			600	1880.00	24.2	0.419	0.265	
			1175	1908.75	24.2			1
Edge 1	1xRTT (RC3 SO32)	10	25	1851.25	24.2			3
			600	1880.00	24.2			3
			1175	1908.75	24.2			3
Edge 2	1xRTT (RC3 SO32)	10	25	1851.25	24.2			1
			600	1880.00	24.2	0.344	0.208	
			1175	1908.75	24.2			1
Edge 3	1xRTT (RC3 SO32)	10	25	1851.25	24.2			1
			600	1880.00	24.2	0.347	0.185	
			1175	1908.75	24.2			1
Edge 4	1xRTT (RC3 SO32)	10	25	1851.25	24.2			3
			600	1880.00	24.2			3
			1175	1908.75	24.2			3
Test Position	Mode	Dist. (mm)	Ch #.	Freq. (MHz)	Avg Pwr (dBm)	SAR (mW/g)		Note
						1-g	10-g	
Rear	1xEVDO (Rel. 0)	10	25	1851.25	24.2	0.697	0.374	
			600	1880.00	24.3	0.822	0.439	
			600	1880.00	24.3	0.819	0.437	2
			1175	1908.75	24.2	0.710	0.377	
Front	1xEVDO (Rel. 0)	10	25	1851.25	24.2			1
			600	1880.00	24.3	0.171	0.097	
			1175	1908.75	24.2			1
Edge 1	1xEVDO (Rel. 0)	10	25	1851.25	24.2			1
			600	1880.00	24.3	0.065	0.037	
			1175	1908.75	24.2			1
Edge 2	1xEVDO (Rel. 0)	10	25	1851.25	24.2			1
			600	1880.00	24.3	0.461	0.253	
			1175	1908.75	24.2			1
Edge 3	1xEVDO (Rel. 0)	10	25	1851.25	24.2			3
			600	1880.00	24.3			3
			1175	1908.75	24.2			3
Edge 4	1xEVDO (Rel. 0)	10	25	1851.25	24.2			3
			600	1880.00	24.3			3
			1175	1908.75	24.2			3

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. 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	22.5	0.104	0.077	
				1	0	0	23.5	0.117	0.088	
				1	49	0	23.4	0.147	0.100	
				50	0	1	22.4			1
	16QAM	23230	782.0	25	12	1	21.4	0.083	0.062	
				1	0	0	22.4	0.088	0.066	
				1	49	0	22.5	0.118	0.088	
				50	0	1	21.5			1
Left Tilt (15°)	QPSK	23230	782.0	25	12	1	22.5	0.059	0.047	
				1	0	0	23.5	0.075	0.060	
				1	49	0	23.4	0.096	0.077	
				50	0	1	22.4			1
	16QAM	23230	782.0	25	12	1	21.4	0.047	0.037	
				1	0	0	22.4	0.057	0.046	
				1	49	0	22.5	0.079	0.063	
				50	0	1	21.5			1
Right Touch	QPSK	23230	782.0	25	12	1	22.5	0.078	0.062	
				1	0	0	23.5	0.102	0.082	
				1	49	0	23.4	0.118	0.095	
				50	0	1	22.4			1
	16QAM	23230	782.0	25	12	1	21.4	0.063	0.050	
				1	0	0	22.4	0.078	0.063	
				1	49	0	22.5	0.096	0.076	
				50	0	1	21.5			1
Right Tilt (15°)	QPSK	23230	782.0	25	12	1	22.5	0.037	0.031	
				1	0	0	23.5	0.054	0.044	
				1	49	0	23.4	0.067	0.055	
				50	0	1	22.4			1
	16QAM	23230	782.0	25	12	1	21.4	0.029	0.024	
				1	0	0	22.4	0.041	0.033	
				1	49	0	22.5	0.052	0.042	
				50	0	1	21.5			1

Note(s):

- Testing for 100% RB allocation is not required because the SAR value for 50% RB allocation is $\leq 1.45\text{W/Kg}$, as per KDB 941225 D05 SAR for LTE Devices v01

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	22.5	0.575	0.358	
					1	0	0	23.5	0.720	0.439	
					1	49	0	23.4	0.699	0.436	
					1	0	0	23.5	0.706	0.437	2
	16QAM	10	23230	782.0	50	0	1	22.4			1
					25	12	1	21.4	0.471	0.289	
					1	0	0	22.4	0.586	0.353	
					1	49	0	22.5	0.590	0.357	
Front	QPSK	10	23230	782.0	50	0	1	21.5			1
					25	12	1	22.5	0.232	0.151	
					1	0	0	23.5	0.262	0.169	
					1	49	0	23.4	0.260	0.168	
	16QAM	10	23230	782.0	50	0	1	22.4			1
					25	12	1	21.4	0.193	0.124	
					1	0	0	22.4	0.207	0.133	
					1	49	0	22.5	0.214	0.137	
Edge 3	QPSK	10	23230	782.0	50	0	1	21.5			1
					25	12	1	22.5	0.272	0.176	
					1	0	0	23.5	0.334	0.217	
					1	49	0	23.4	0.240	0.151	
	16QAM	10	23230	782.0	50	0	1	22.4			1
					25	12	1	21.4	0.217	0.141	
					1	0	0	22.4	0.250	0.164	
					1	49	0	22.5	0.193	0.123	
Edge 4	QPSK	10	23230	782.0	50	0	1	21.5			1
					25	12	1	22.5	0.135	0.093	
					1	0	0	23.5	0.137	0.094	
					1	49	0	23.4	0.193	0.133	
	16QAM	10	23230	782.0	50	0	1	22.4			1
					25	12	1	21.4	0.107	0.073	
					1	0	0	22.4	0.107	0.073	
					1	49	0	22.5	0.152	0.105	
					50	0	1	21.5			1

Note(s):

- Testing for 100% RB allocation is not required because the SAR value for 50% RB allocation is $\leq 1.45\text{W/Kg}$, as per KDB 941225 D05 SAR for LTE Devices v01
- With headset attached.

Wi-Fi (2.4 GHz Band)

13.6.3. 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	12.4			
		6	2437	12.7			
		11	2462	12.8	0.155	0.072	
Left Tilt (15°)	802.11b	1	2412	12.4			
		6	2437	12.7			
		11	2462	12.8	0.158	0.075	
Right Touch	802.11b	1	2412	12.4			
		6	2437	12.7			
		11	2462	12.8	0.173	0.081	
Right Tilt (15°)	802.11b	1	2412	12.4			
		6	2437	12.7			
		11	2462	12.8	0.170	0.080	

13.6.4. 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	12.4			1
			6	2437	12.7			1
			11	2462	12.8	0.149	0.073	
			11	2462	12.8	0.155	0.076	2
Front	802.11b	10	1	2412	12.4			1
			6	2437	12.7			1
			11	2462	12.8	0.056	0.028	
Edge 1	802.11b	10	1	2412	12.4			1
			6	2437	12.7			1
			11	2462	12.8	0.077	0.040	
Edge 2	802.11b	10	1	2412	12.4			3
			6	2437	12.7			3
			11	2462	12.8			3
Edge 3	802.11b	10	1	2412	12.4			3
			6	2437	12.7			3
			11	2462	12.8			3
Edge 4	802.11b	10	1	2412	12.4			3
			6	2437	12.7			3
			11	2462	12.8			3

Note(s):

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

14. Summary of Highest SAR Values

Results for highest SAR values for each frequency band and mode

Technology/Band	Test configuration		Mode	Highest 1g SAR (W/kg)
GSM850	Head	Left Touch	GSM	0.192
	Body	Rear	GPRS 2 slot with headset	0.777
GSM1900	Head	Right Touch	GSM	0.204
	Body	Rear	GPRS 2 slot with headset	0.447
WCDMA (UMTS) band II	Head	Right Touch	Rel 99 RMC 12.2kbps	0.522
	Body & Hotspot	Rear	Rel 99 RMC 12.2kbps with headset	0.499
CDMA BC0	Head	Left Touch	1xRTT (RC3, SO55)	0.333
	Head	Left Touch	1xEVDO (Rel.0)	0.375
	Body & Hotspot	Rear	1xRTT (RC3, SO32) with headset	0.820
	Body & Hotspot	Rear	1xEVDO (Rel.0)with headset	0.520
CDMA BC1	Head	Right Touch	1xRTT (RC3, SO55)	0.506
	Head	Left Touch	1xEVDO (Rel.0)	0.538
	Body & Hotspot	Rear	1xRTT (RC3, SO32)	0.984
	Body & Hotspot	Rear	1xEVDO (Rel.0)	0.822
LTE band 13	Head	Left Touch	10 MHz (QPSK) RB 1/49	0.147
	Body & Hotspot	Rear	10 MHz (QPSK) RB 1/0	0.720
WiFi 2.4 GHz	Head	Right Touch	802.11b 1Mbps	0.173
	Body & Hotspot	Rear	802.11b 1Mbps with headset	0.155

14.1. Scaling of standalone SAR measurements

The scaling of the standalone SAR measurements to compensate for the difference between the measured output power and the maximum value indicated in the tune-up procedure was considered unnecessary. The maximum difference between any of the power measurements and the corresponding maximum possible power allowed by the tune-up procedure, for any of the transmitters, was 1.9 dB. Only SAR measurements above 1.033 W/kg could exceed 1.6 W/kg as a result of scaling to accommodate this 1.6dB difference. The worst case standalone SAR measurement is 0.984 W/kg.

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

Test Laboratory: UL CCS SAR Lab A

Date: 5/31/2012

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; $\sigma = 0.887$ mho/m; $\epsilon_r = 42.09$; $\rho = 1000$ kg/m³
DASY5 Configuration:

- Electronics: DAE4 Sn1258; Calibrated: 3/8/2012
- Probe: EX3DV4 - SN3772; ConvF(8.67, 8.67, 8.67); Calibrated: 2/16/2012
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Phantom: SAM v5.0 (A); Type: QD000P40CC; Serial: 1602

LHS/Touch_GSM ch 190/Area Scan (9x13x1): Measurement grid: dx=15mm, dy=15mm

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

Maximum value of SAR (measured) = 0.210 mW/g

LHS/Touch_GSM ch 190/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

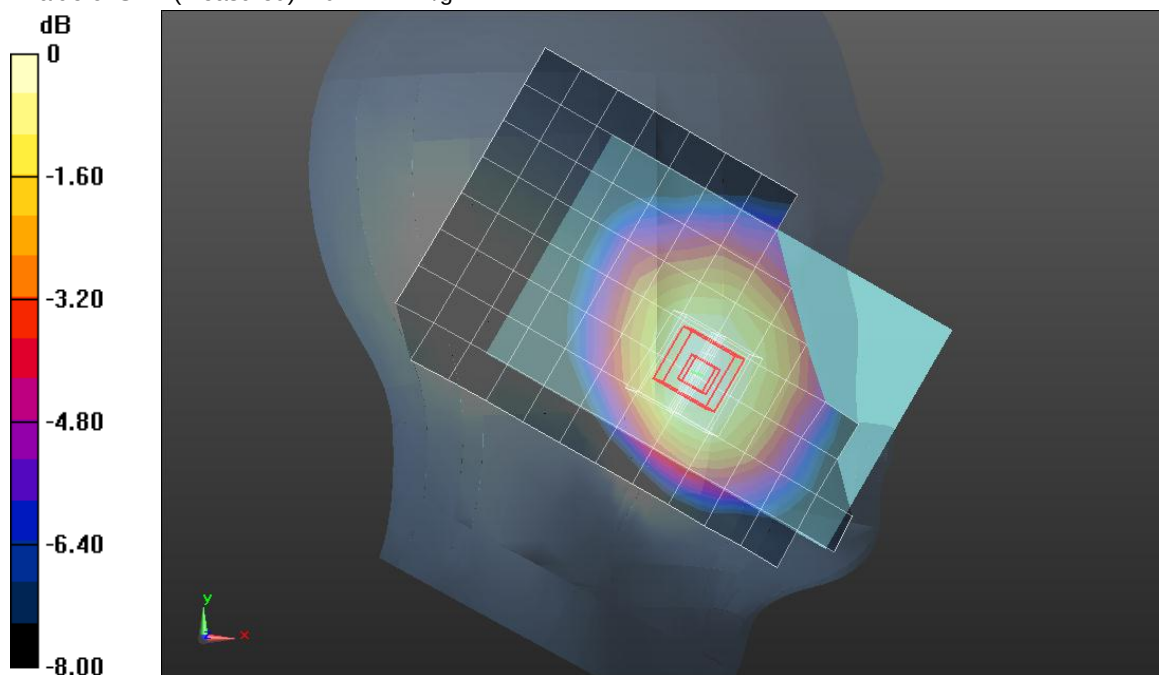
Reference Value = 15.594 V/m; Power Drift = -0.03 dB

Peak SAR (extrapolated) = 0.2330

SAR(1 g) = 0.192 mW/g; SAR(10 g) = 0.152 mW/g

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

Maximum value of SAR (measured) = 0.212 mW/g



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

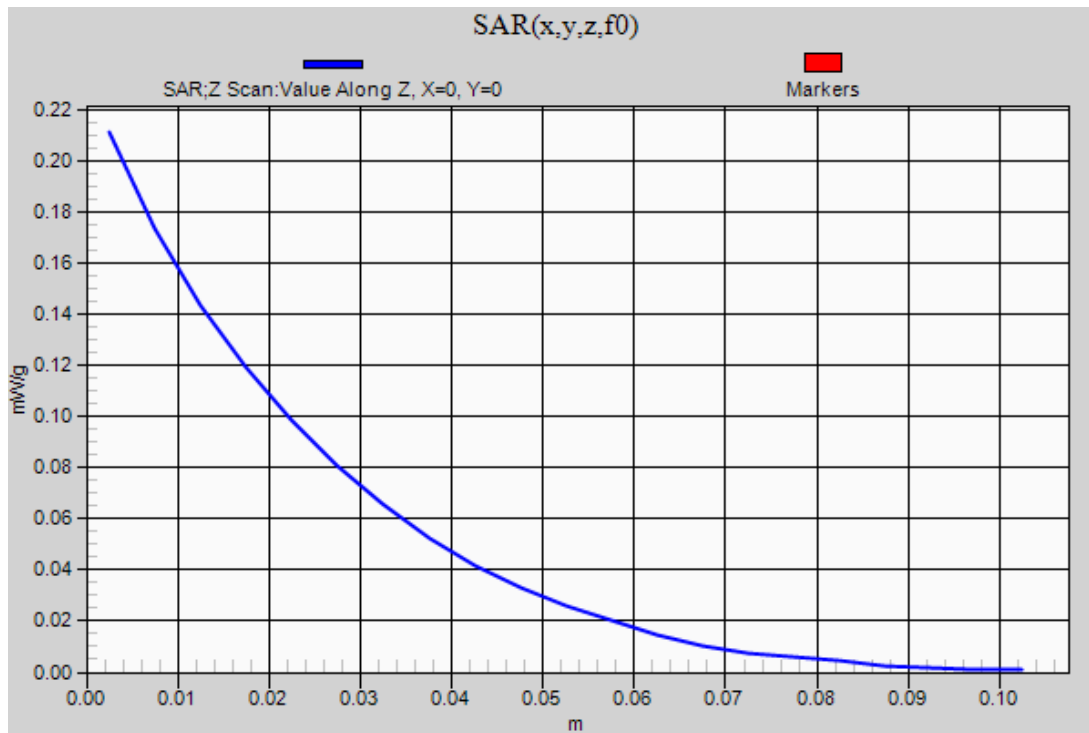
GSM850

Frequency: 836.6 MHz; Duty Cycle: 1:8.00018

LHS/Touch_GSM 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) = 0.211 mW/g



GSM850

Frequency: 836.6 MHz; Duty Cycle: 1:4.00037; Room Ambient Temperature: 24.0°C; Liquid Temperature: 23.0°C
Medium parameters used (interpolated): $f = 836.6$ MHz; $\sigma = 0.995$ mho/m; $\epsilon_r = 53.407$; $\rho = 1000$ kg/m³

DASY5 Configuration:

- Electronics: DAE4 Sn1258; Calibrated: 3/8/2012
- Probe: EX3DV4 - SN3772; ConvF(8.89, 8.89, 8.89); Calibrated: 2/16/2012
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Phantom: ELI v5.0 (A); Type: QDOVA001BB; Serial: 1120

Rear/GPRS 2 slot, ch 190 w/handset/Area Scan (10x13x1): Measurement grid: dx=15mm, dy=15mm

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

Maximum value of SAR (measured) = 0.892 mW/g

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

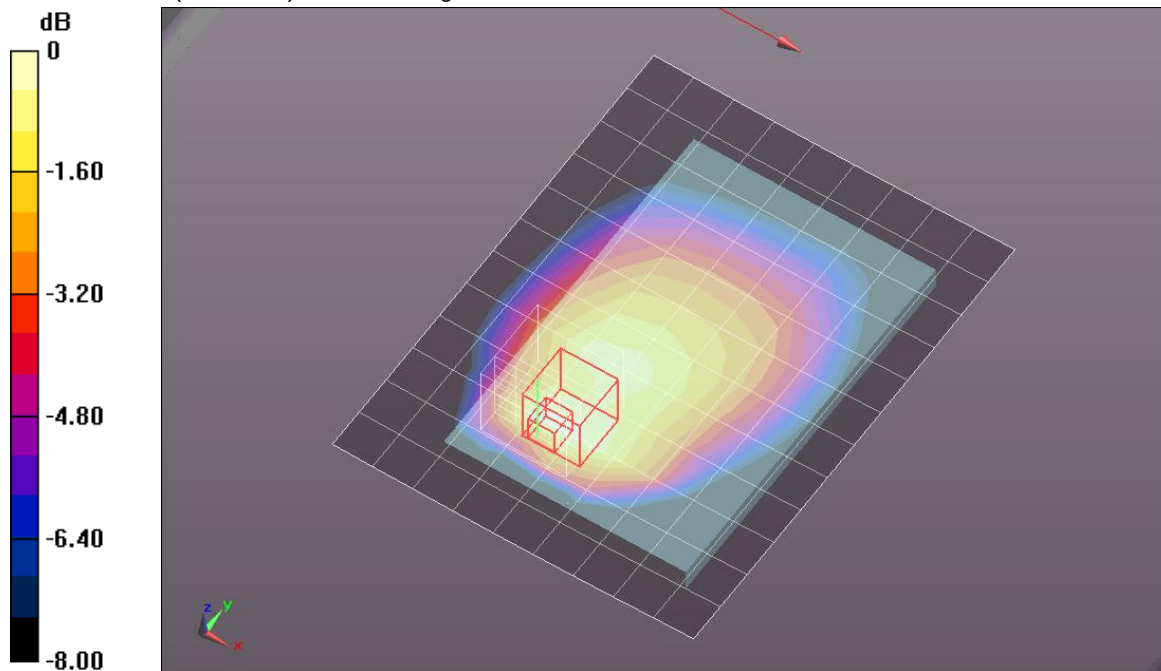
Reference Value = 30.132 V/m; Power Drift = 0.04 dB

Peak SAR (extrapolated) = 1.3100

SAR(1 g) = 0.777 mW/g; SAR(10 g) = 0.495 mW/g

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

Maximum value of SAR (measured) = 0.955 mW/g



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

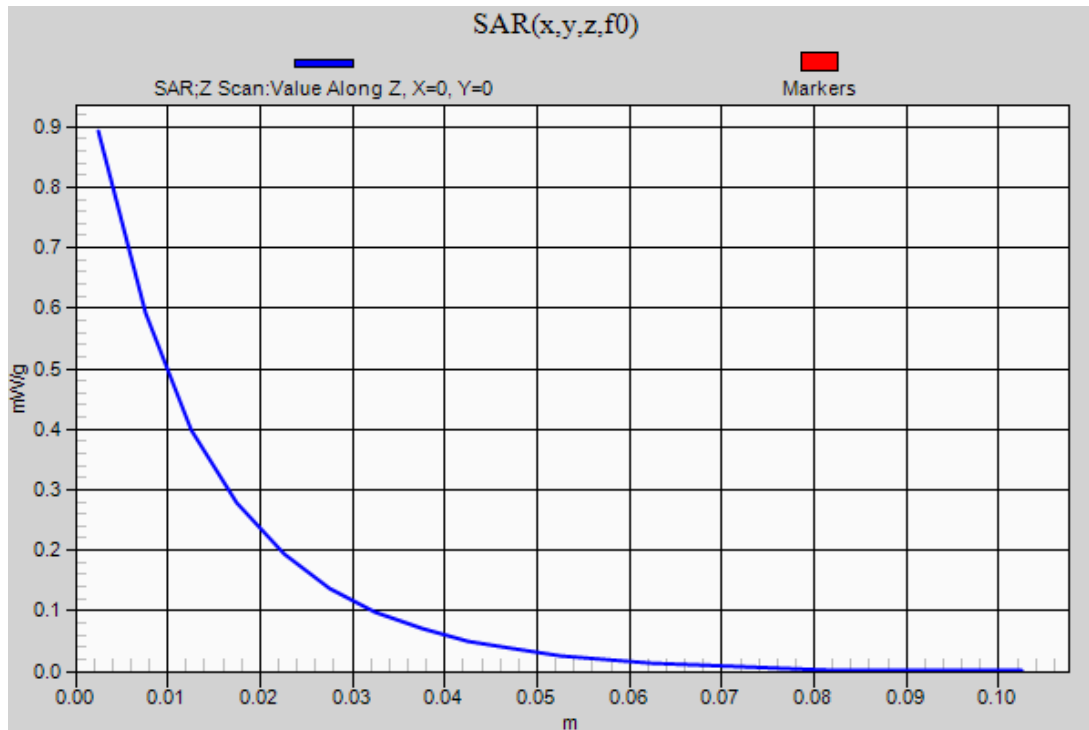
GSM850

Frequency: 836.6 MHz; Duty Cycle: 1:4.00037

Rear/GPRS 2 slot, ch 190 w/handset/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 0.892 mW/g



GSM1900

Frequency: 1880 MHz; Duty Cycle: 1:8.00018; Room Ambient Temperature: 24.0°C; Liquid Temperature: 23.0°C
Medium parameters used: $f = 1880$ MHz; $\sigma = 1.402$ mho/m; $\epsilon_r = 40.465$; $\rho = 1000$ kg/m³

DASY5 Configuration:

- Electronics: DAE4 Sn1258; Calibrated: 3/8/2012
- Probe: EX3DV4 - SN3772; ConvF(7.59, 7.59, 7.59); Calibrated: 2/16/2012
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Phantom: SAM v5.0 (B); Type: QD000P40CD; Serial: 1628

RHS/Touch_GSM ch 661/Area Scan (9x13x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.235 mW/g

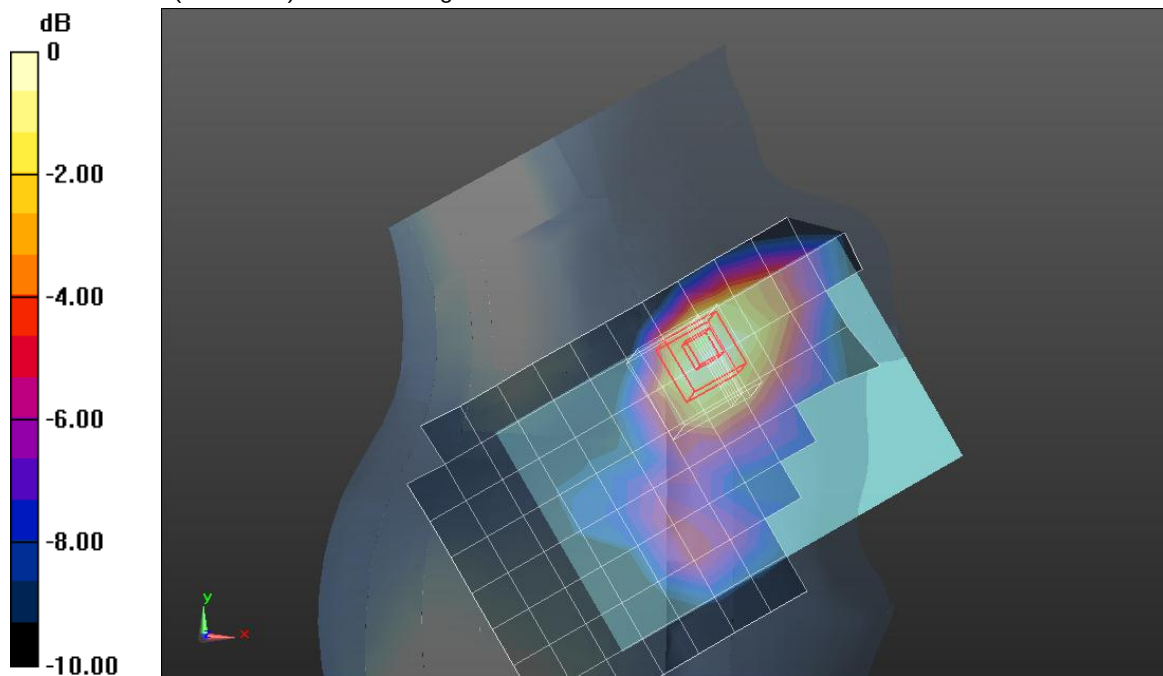
RHS/Touch_GSM ch 661/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 12.679 V/m; Power Drift = 0.12 dB

Peak SAR (extrapolated) = 0.2990

SAR(1 g) = 0.204 mW/g; SAR(10 g) = 0.130 mW/g

Maximum value of SAR (measured) = 0.242 mW/g



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

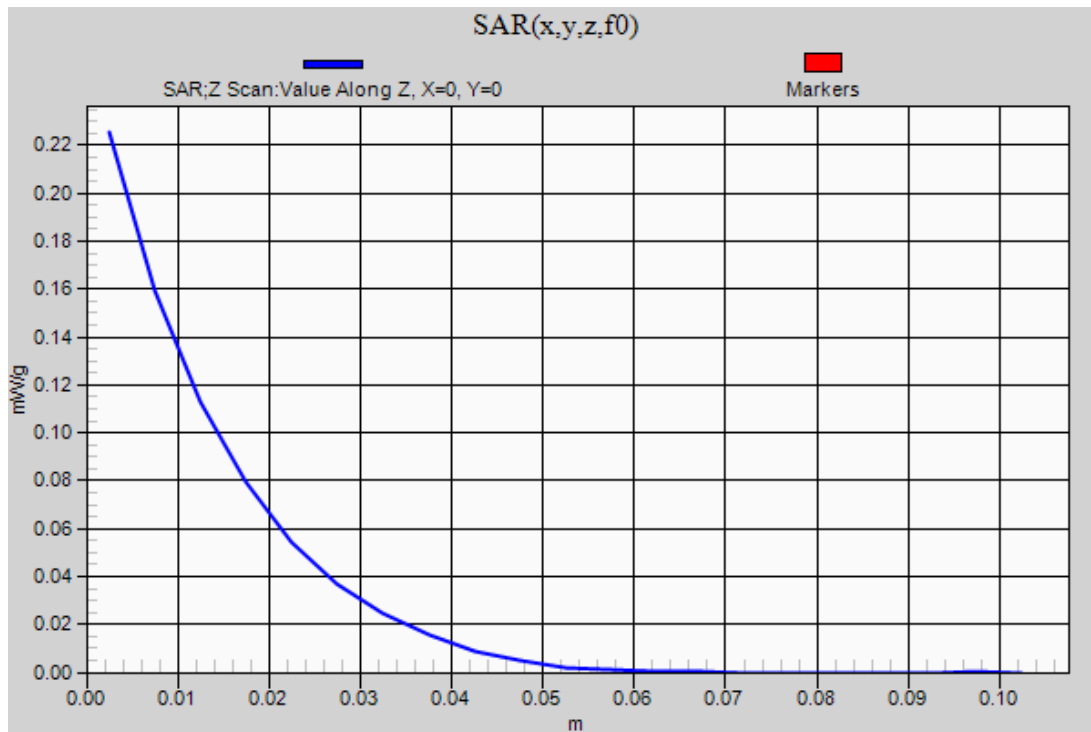
Test Laboratory: UL CCS SAR Lab A

Date: 5/31/2012

GSM1900

Frequency: 1880 MHz; Duty Cycle: 1:8.00018

RHS/Touch_GSM ch 661/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Maximum value of SAR (measured) = 0.225 mW/g



GSM1900

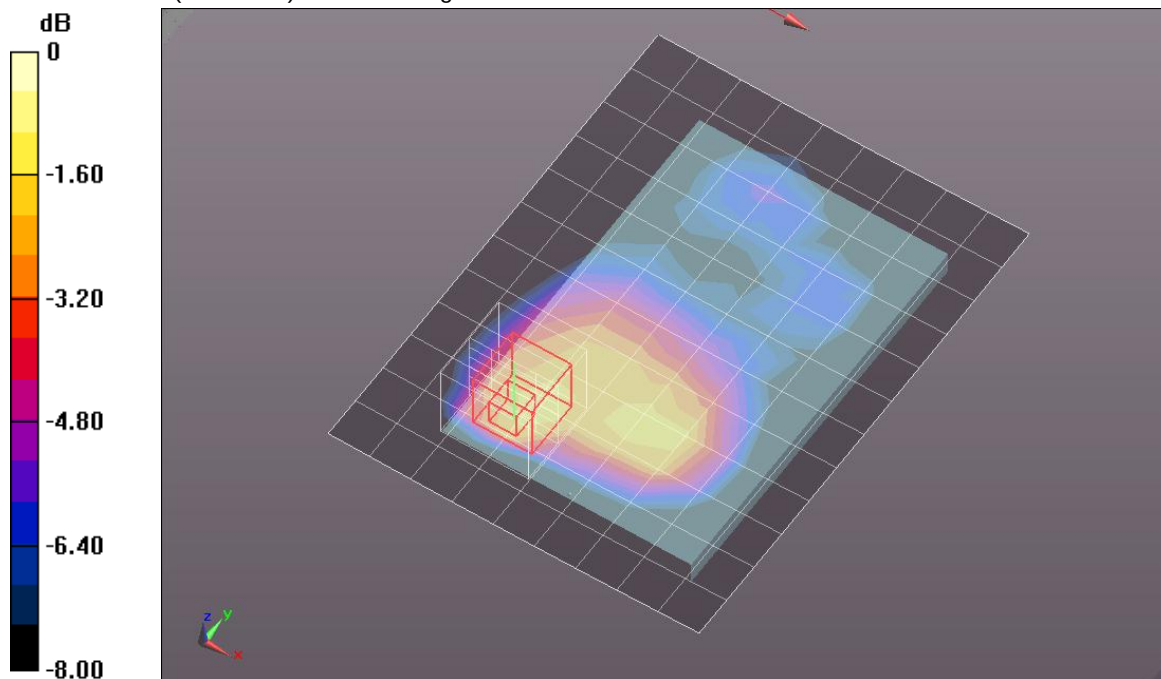
Frequency: 1880 MHz; Duty Cycle: 1:4.00037; Room Ambient Temperature: 24.0°C; Liquid Temperature: 23.0°C
Medium parameters used: $f = 1880$ MHz; $\sigma = 1.505$ mho/m; $\epsilon_r = 51.177$; $\rho = 1000$ kg/m³

DASY5 Configuration:

- Electronics: DAE4 Sn1258; Calibrated: 3/8/2012
- Probe: EX3DV4 - SN3772; ConvF(7.23, 7.23, 7.23); 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: 1099

Rear/GPRS 2 slot, ch 661 w/handset/Area Scan (10x13x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.418 mW/g

Rear/GPRS 2 slot, ch 661 w/handset/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 17.193 V/m; Power Drift = -0.12 dB
Peak SAR (extrapolated) = 0.8100
SAR(1 g) = 0.447 mW/g; SAR(10 g) = 0.237 mW/g
Maximum value of SAR (measured) = 0.612 mW/g



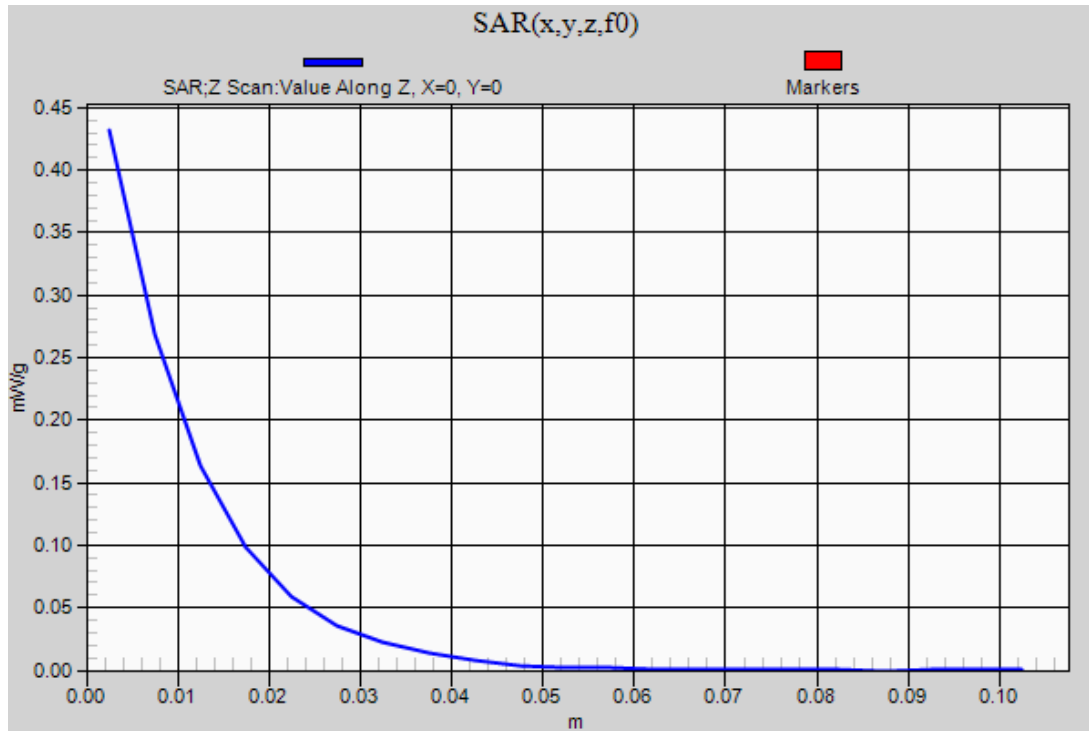
0 dB = 0.610mW/g = -4.29 dB mW/g

GSM1900

Frequency: 1880 MHz; Duty Cycle: 1:4.00037

Rear/GPRS 2 slot, ch 661 w/handset/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm

Maximum value of SAR (measured) = 0.432 mW/g



W-CDMA Band II

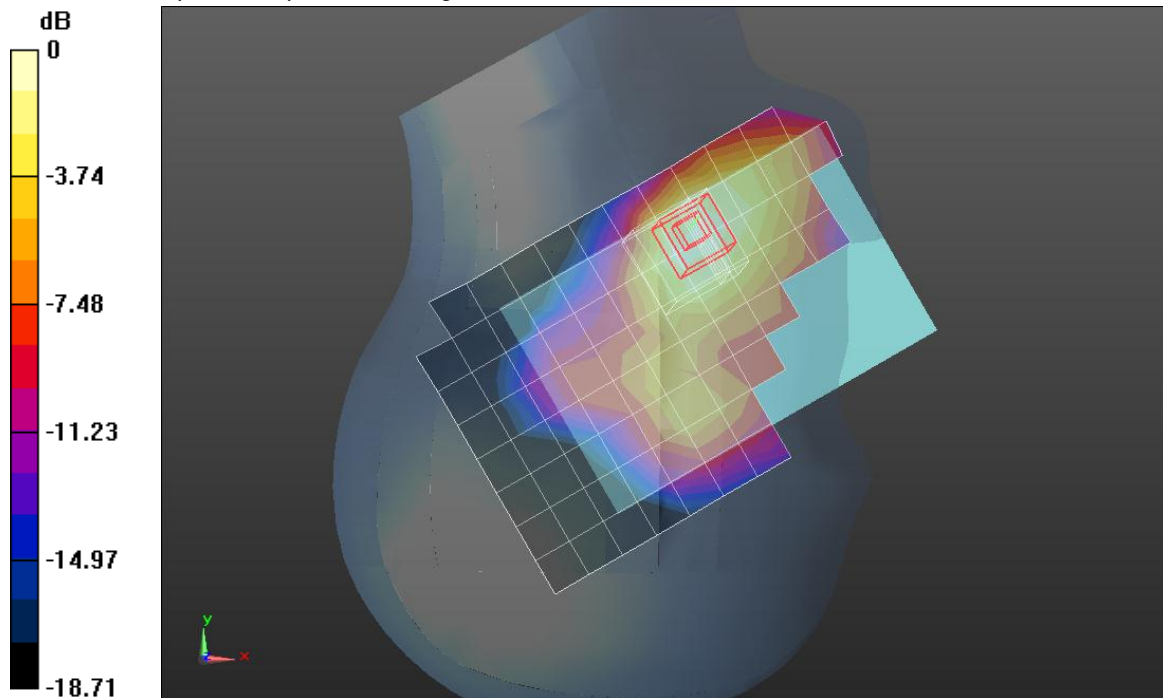
Frequency: 1880 MHz; Duty Cycle: 1:1; Room Ambient Temperature: 24.0°C; Liquid Temperature: 23.0°C
Medium parameters used: $f = 1880$ MHz; $\sigma = 1.412$ mho/m; $\epsilon_r = 40.194$; $\rho = 1000$ kg/m³

DASY5 Configuration:

- Electronics: DAE4 Sn1258; Calibrated: 3/8/2012
- Probe: EX3DV4 - SN3772; ConvF(7.59, 7.59, 7.59); Calibrated: 2/16/2012
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Phantom: SAM v5.0 (B); Type: QD000P40CD; Serial: 1628

RHS/Touch_R99, ch 9400/Area Scan (9x13x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.587 mW/g

RHS/Touch_R99, ch 9400/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 20.169 V/m; Power Drift = 0.06 dB
Peak SAR (extrapolated) = 0.7610
SAR(1 g) = 0.522 mW/g; SAR(10 g) = 0.331 mW/g
Maximum value of SAR (measured) = 0.613 mW/g



0 dB = 0.610mW/g = -4.29 dB mW/g

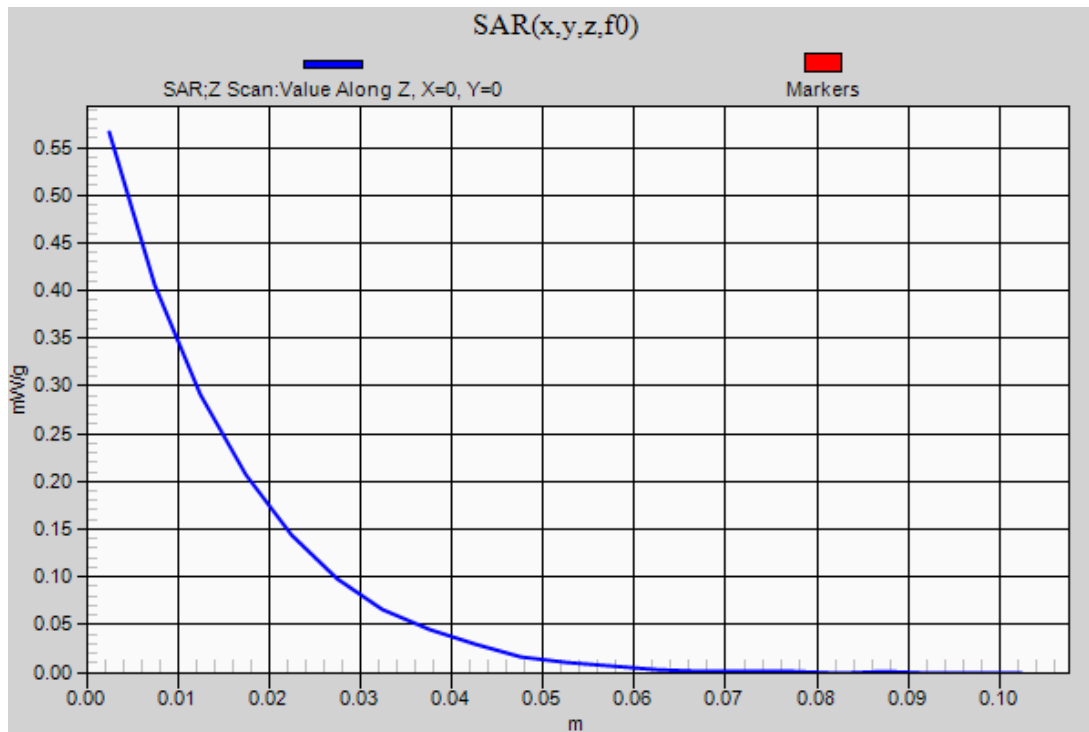
Test Laboratory: UL CCS SAR Lab A

Date: 6/5/2012

W-CDMA Band II

Frequency: 1880 MHz; Duty Cycle: 1:1

RHS/Touch_R99, ch 9400/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Maximum value of SAR (measured) = 0.566 mW/g



W-CDMA Band II

Frequency: 1880 MHz; Duty Cycle: 1:1; Room Ambient Temperature: 24.0°C; Liquid Temperature: 23.0°C

Medium parameters used: $f = 1880$ MHz; $\sigma = 1.496$ mho/m; $\epsilon_r = 52.23$; $\rho = 1000$ kg/m³

DASY5 Configuration:

- Electronics: DAE4 Sn1258; Calibrated: 3/8/2012

- Probe: EX3DV4 - SN3772; ConvF(7.23, 7.23, 7.23); 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: 1099

Rear/R99, ch 9400 w/headset/Area Scan (10x13x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.564 mW/g

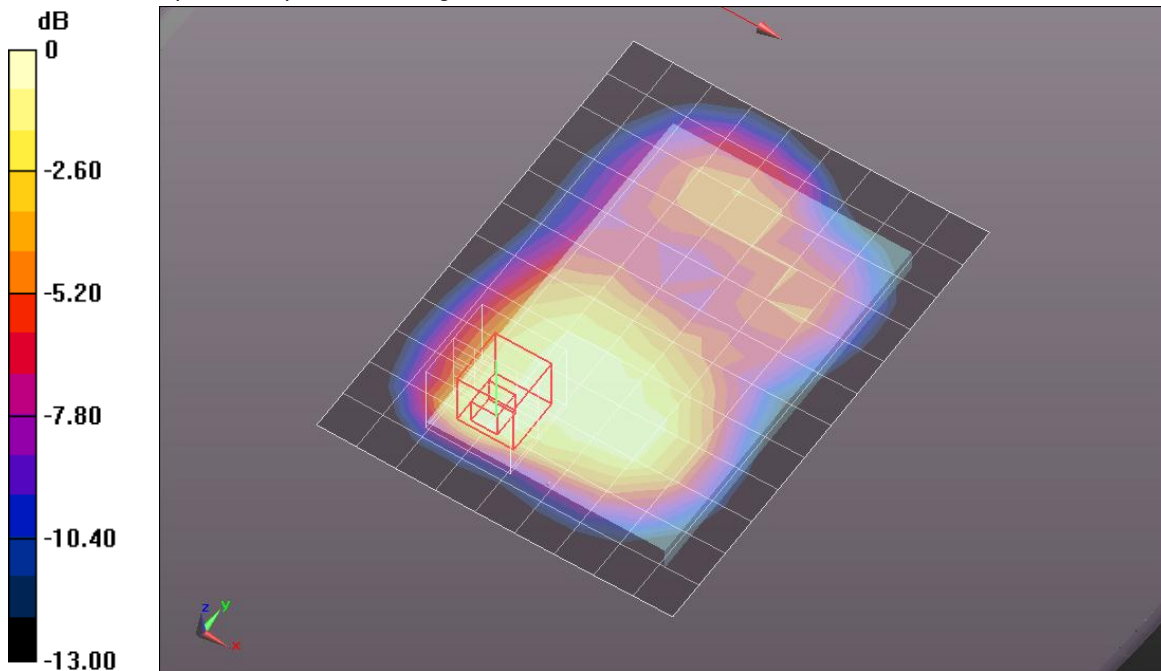
Rear/R99, ch 9400 w/headset/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 19.221 V/m; Power Drift = 0.18 dB

Peak SAR (extrapolated) = 0.8650

SAR(1 g) = 0.499 mW/g; SAR(10 g) = 0.280 mW/g

Maximum value of SAR (measured) = 0.666 mW/g



0 dB = 0.670mW/g = -3.48 dB mW/g

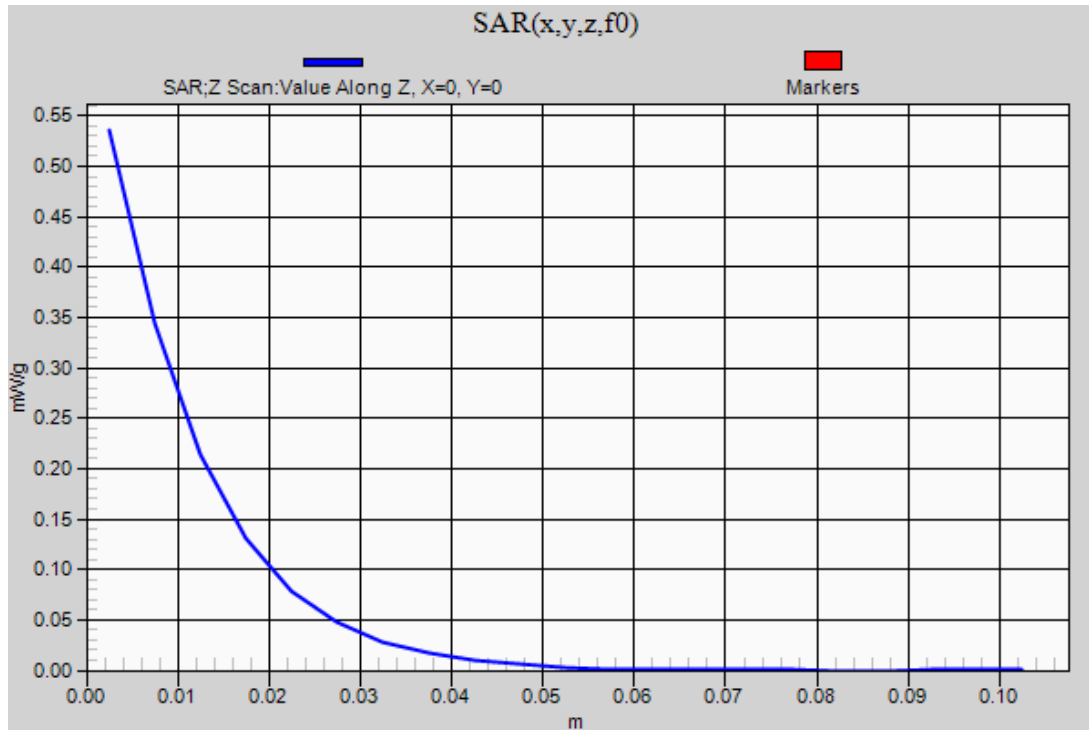
Test Laboratory: UL CCS SAR Lab A

Date: 6/5/2012

W-CDMA Band II

Frequency: 1880 MHz; Duty Cycle: 1:1

Rear/R99, ch 9400 w/headset/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Maximum value of SAR (measured) = 0.536 mW/g



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; $\sigma = 0.866$ mho/m; $\epsilon_r = 42.113$; $\rho = 1000$ kg/m³

DASY5 Configuration:

- Electronics: DAE4 Sn1258; Calibrated: 3/8/2012
- Probe: EX3DV4 - SN3772; ConvF(8.67, 8.67, 8.67); Calibrated: 2/16/2012
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Phantom: SAM v5.0 (A); Type: QD000P40CC; Serial: 1602

LHS/Touch_1xRTT RC3 SO55, ch 384/Area Scan (9x13x1): Measurement grid: dx=15mm, dy=15mm

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

Maximum value of SAR (measured) = 0.379 mW/g

LHS/Touch_1xRTT RC3 SO55, ch 384/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

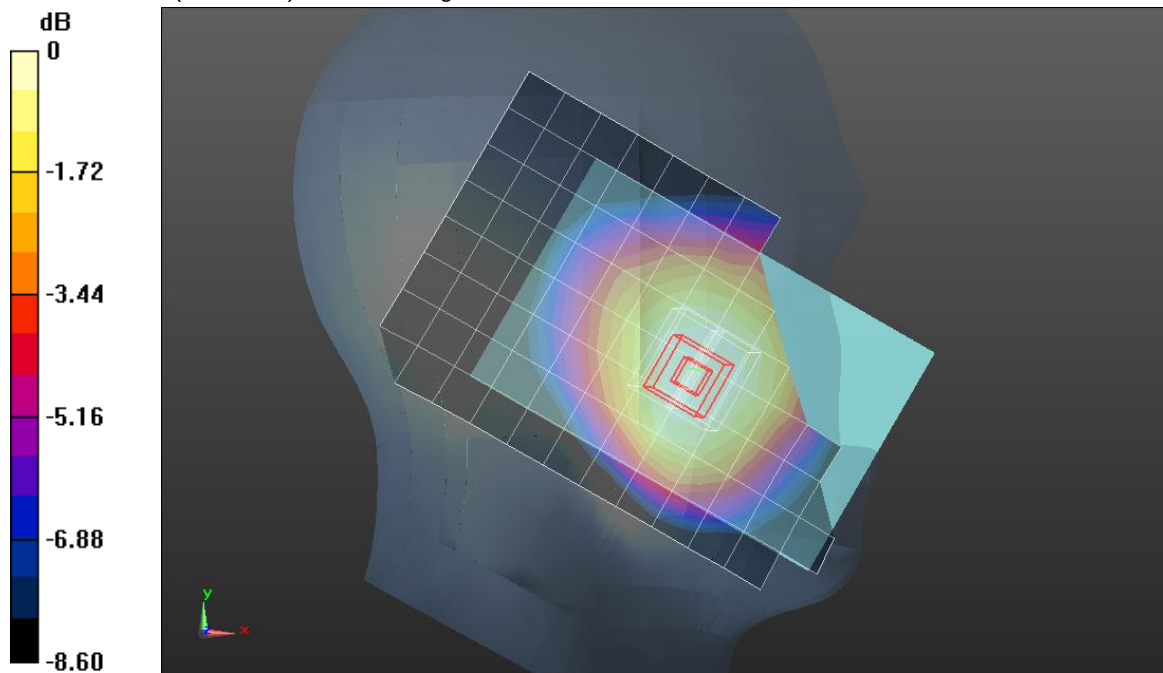
Reference Value = 20.761 V/m; Power Drift = 0.0026 dB

Peak SAR (extrapolated) = 0.4040

SAR(1 g) = 0.333 mW/g; SAR(10 g) = 0.265 mW/g

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

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



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

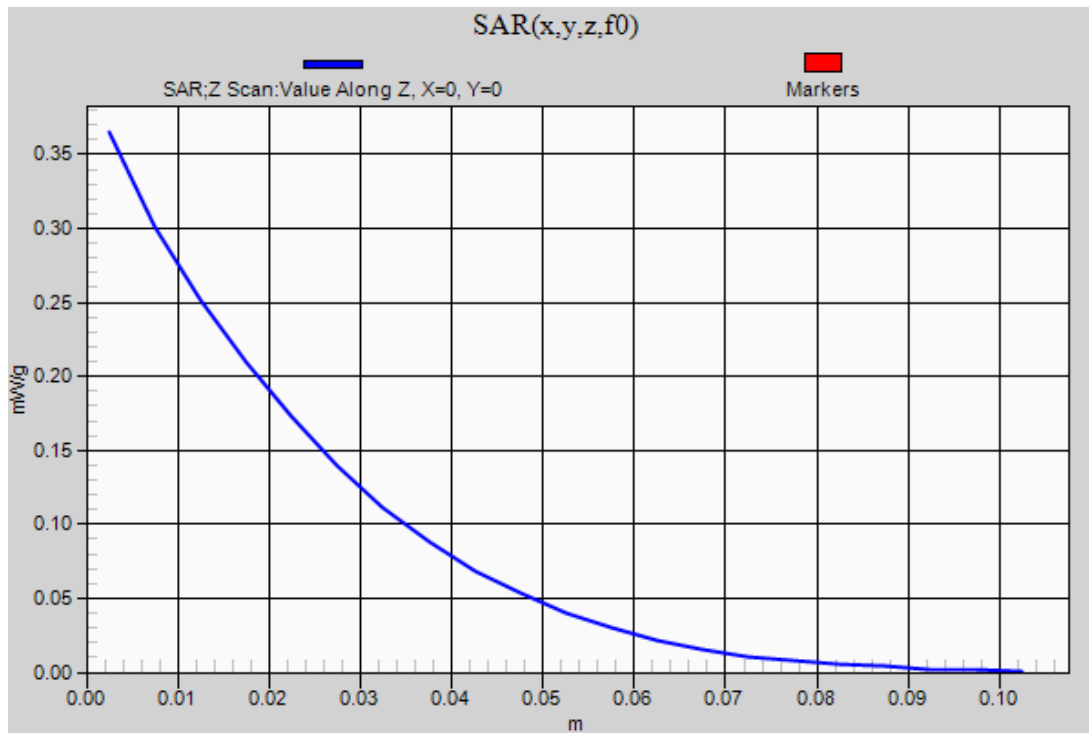
CDMA BC0

Frequency: 836.52 MHz; Duty Cycle: 1:1

LHS/Touch_1xRTT RC3 SO55, 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) = 0.365 mW/g



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; $\sigma = 0.866$ mho/m; $\epsilon_r = 42.113$; $\rho = 1000$ kg/m³

DASY5 Configuration:

- Electronics: DAE4 Sn1258; Calibrated: 3/8/2012
- Probe: EX3DV4 - SN3772; ConvF(8.67, 8.67, 8.67); Calibrated: 2/16/2012
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Phantom: SAM v5.0 (A); Type: QD000P40CC; Serial: 1602

LHS/Touch_1xEVDO Rel 0, ch 384/Area Scan (9x13x1): Measurement grid: dx=15mm, dy=15mm

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

Maximum value of SAR (measured) = 0.429 mW/g

LHS/Touch_1xEVDO Rel 0, ch 384/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

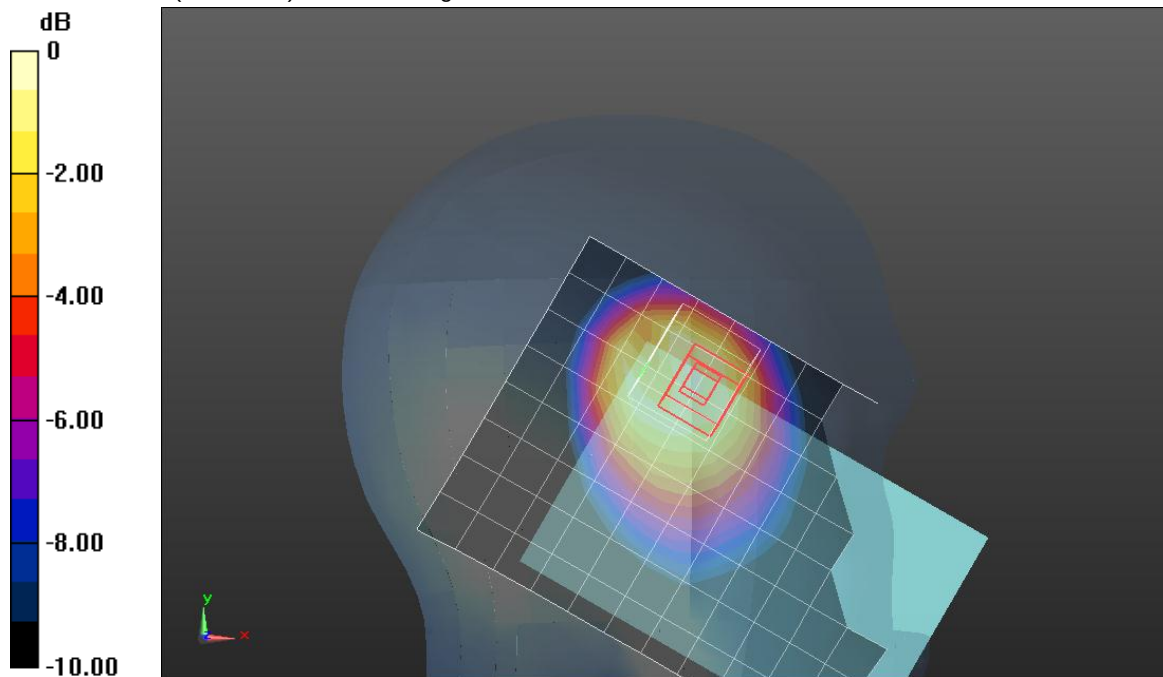
Reference Value = 22.642 V/m; Power Drift = 0.05 dB

Peak SAR (extrapolated) = 0.7800

SAR(1 g) = 0.375 mW/g; SAR(10 g) = 0.230 mW/g

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

Maximum value of SAR (measured) = 0.485 mW/g



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

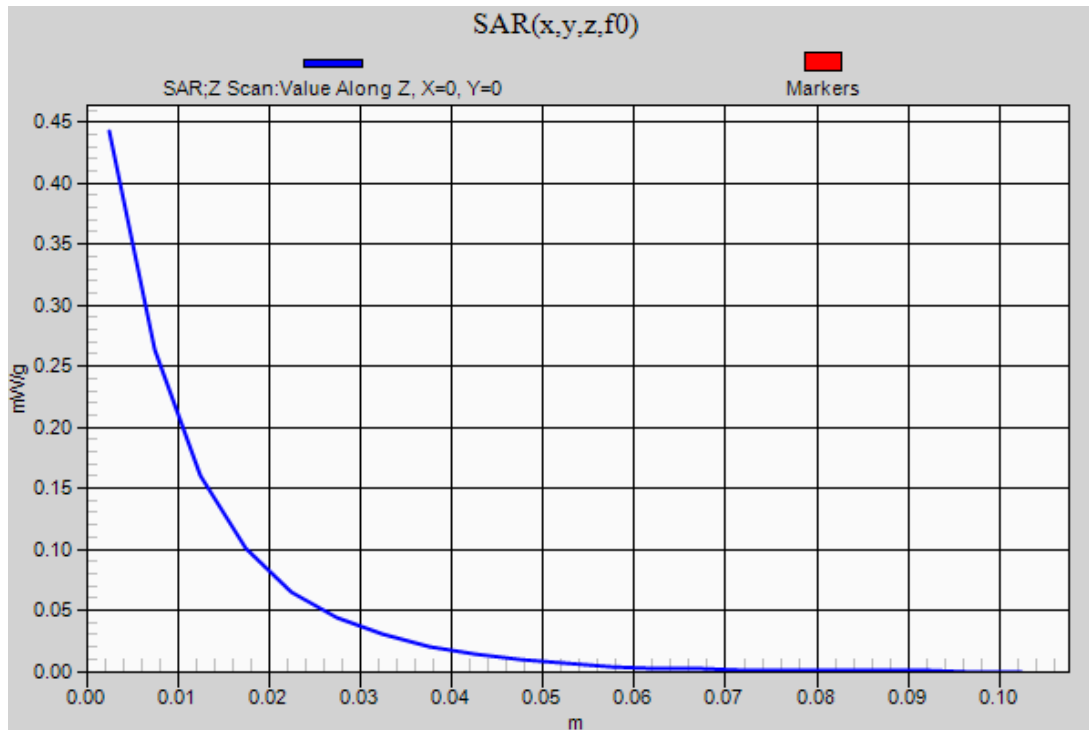
CDMA BC0

Frequency: 836.52 MHz; Duty Cycle: 1:1

LHS/Touch_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) = 0.442 mW/g



CDMA BC0

Frequency: 848.31 MHz; Duty Cycle: 1:1; Room Ambient Temperature: 24.0°C; Liquid Temperature: 23.0°C
Medium parameters used (interpolated): $f = 848.31$ MHz; $\sigma = 1.004$ mho/m; $\epsilon_r = 53.206$; $\rho = 1000$ kg/m³

DASY5 Configuration:

- Electronics: DAE4 Sn1258; Calibrated: 3/8/2012
- Probe: EX3DV4 - SN3772; ConvF(8.89, 8.89, 8.89); 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/1xRTT RC3 SO32, ch 777 w/headset/Area Scan (10x13x1): Measurement grid: dx=15mm, dy=15mm

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

Maximum value of SAR (measured) = 0.978 mW/g

Rear/1xRTT RC3 SO32, ch 777 w/headset/Zoom Scan (5x5x7)/Cube 0: Measurement grid:

dx=8mm, dy=8mm, dz=5mm

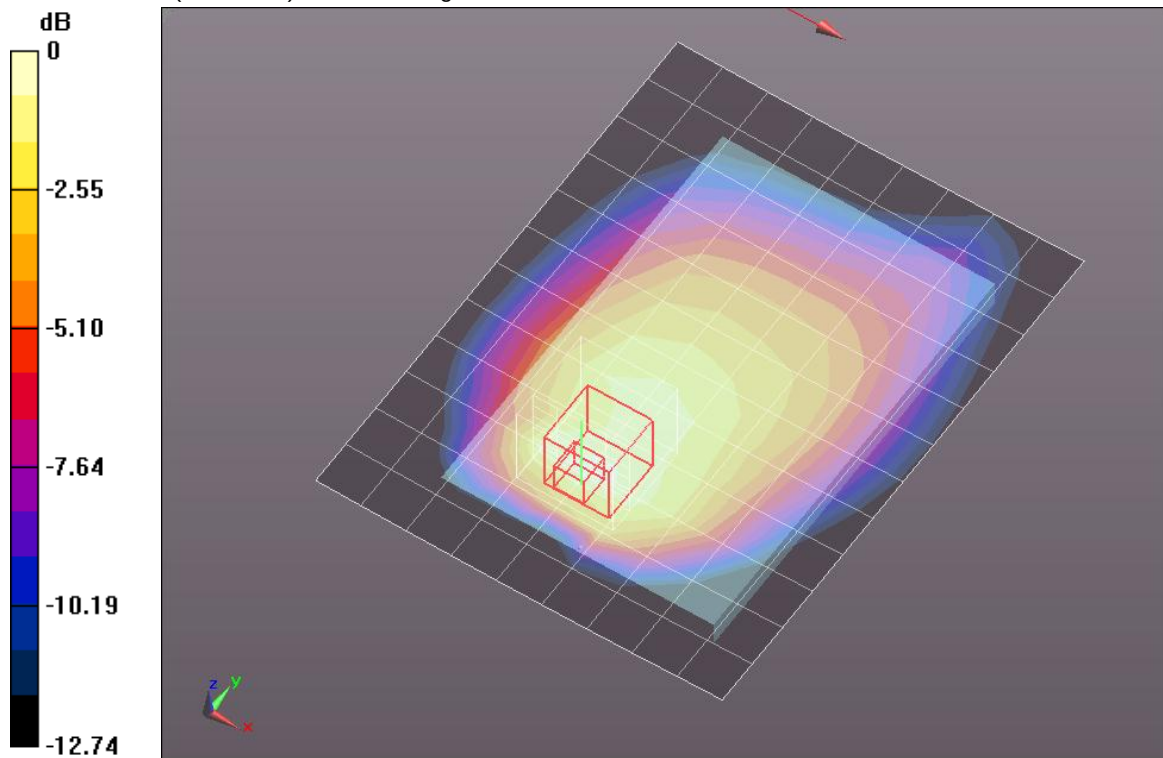
Reference Value = 31.312 V/m; Power Drift = 0.02 dB

Peak SAR (extrapolated) = 1.3820

SAR(1 g) = 0.820 mW/g; SAR(10 g) = 0.514 mW/g

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

Maximum value of SAR (measured) = 1.052 mW/g



0 dB = 1.050mW/g = 0.42 dB mW/g

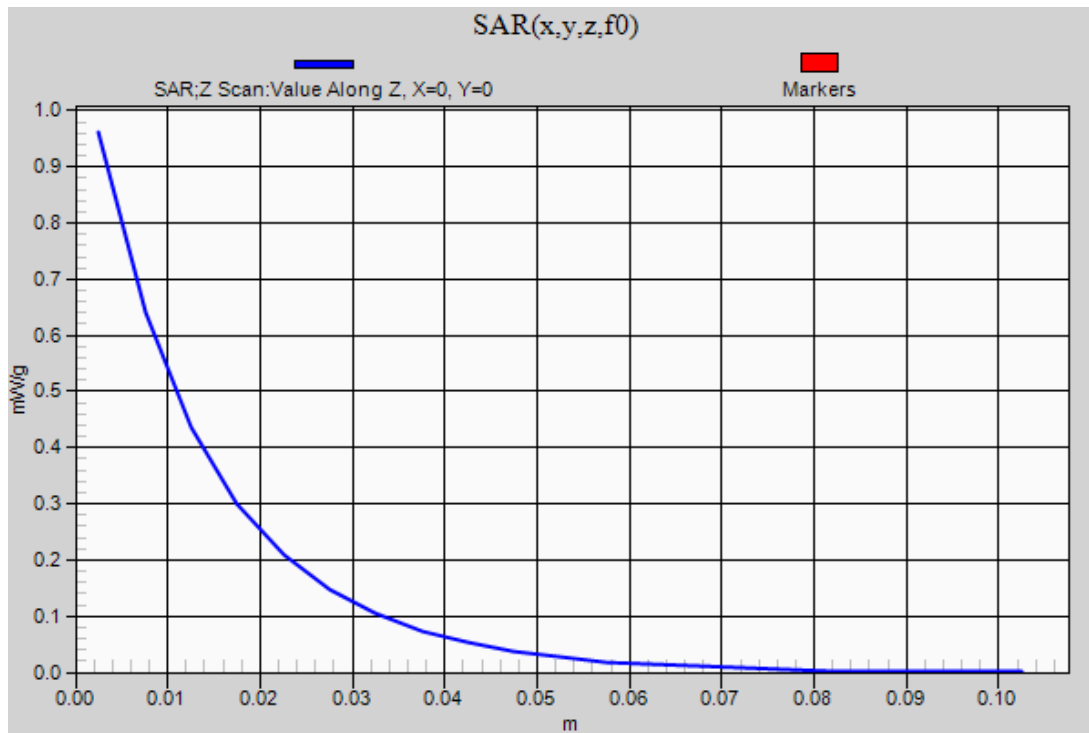
CDMA BC0

Frequency: 848.31 MHz; Duty Cycle: 1:1

Rear/1xRTT RC3 SO32, ch 777 w/headset/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm

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

Maximum value of SAR (measured) = 0.961 mW/g



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; $\sigma = 0.993$ mho/m; $\epsilon_r = 53.358$; $\rho = 1000$ kg/m³

DASY5 Configuration:

- Electronics: DAE4 Sn1258; Calibrated: 3/8/2012
- Probe: EX3DV4 - SN3772; ConvF(8.89, 8.89, 8.89); 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/1xEVDO Rel 0, ch 384 w/headset/Area Scan (10x13x1): Measurement grid: dx=15mm, dy=15mm

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

Maximum value of SAR (measured) = 0.651 mW/g

Rear/1xEVDO Rel 0, ch 384 w/headset/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

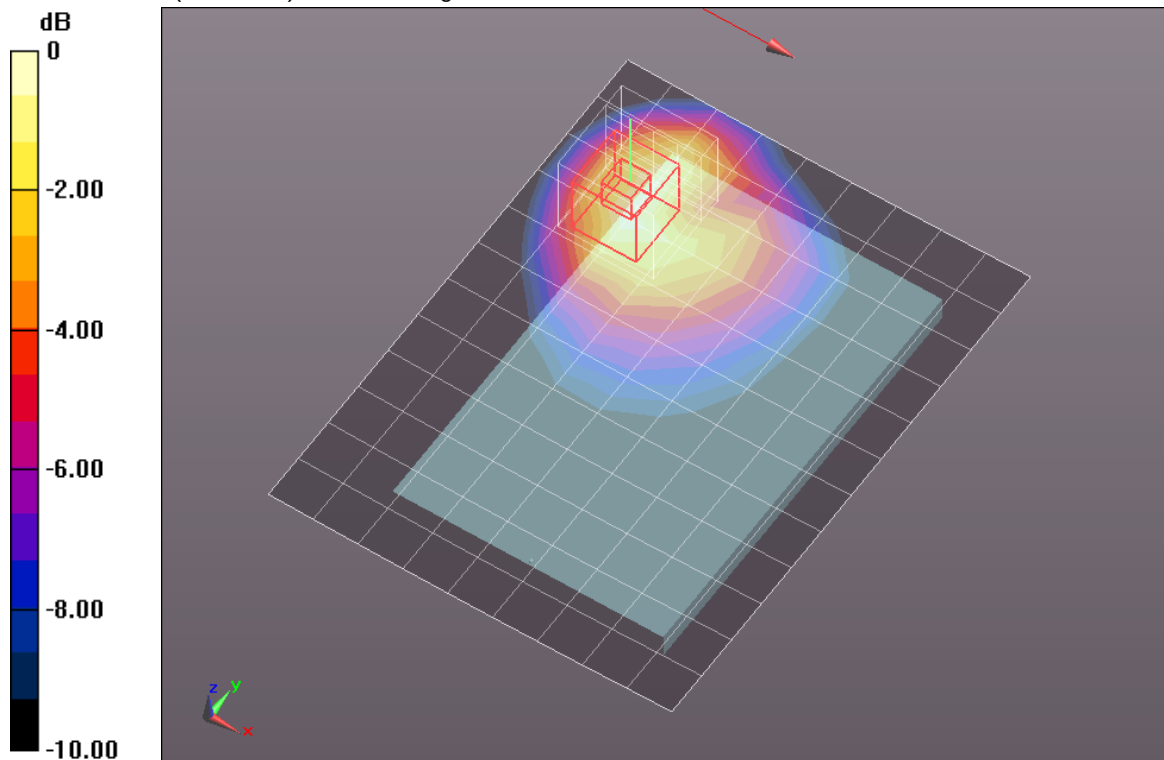
Reference Value = 25.792 V/m; Power Drift = 0.09 dB

Peak SAR (extrapolated) = 0.9340

SAR(1 g) = 0.520 mW/g; SAR(10 g) = 0.304 mW/g

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

Maximum value of SAR (measured) = 0.672 mW/g



0 dB = 0.670mW/g = -3.48 dB mW/g

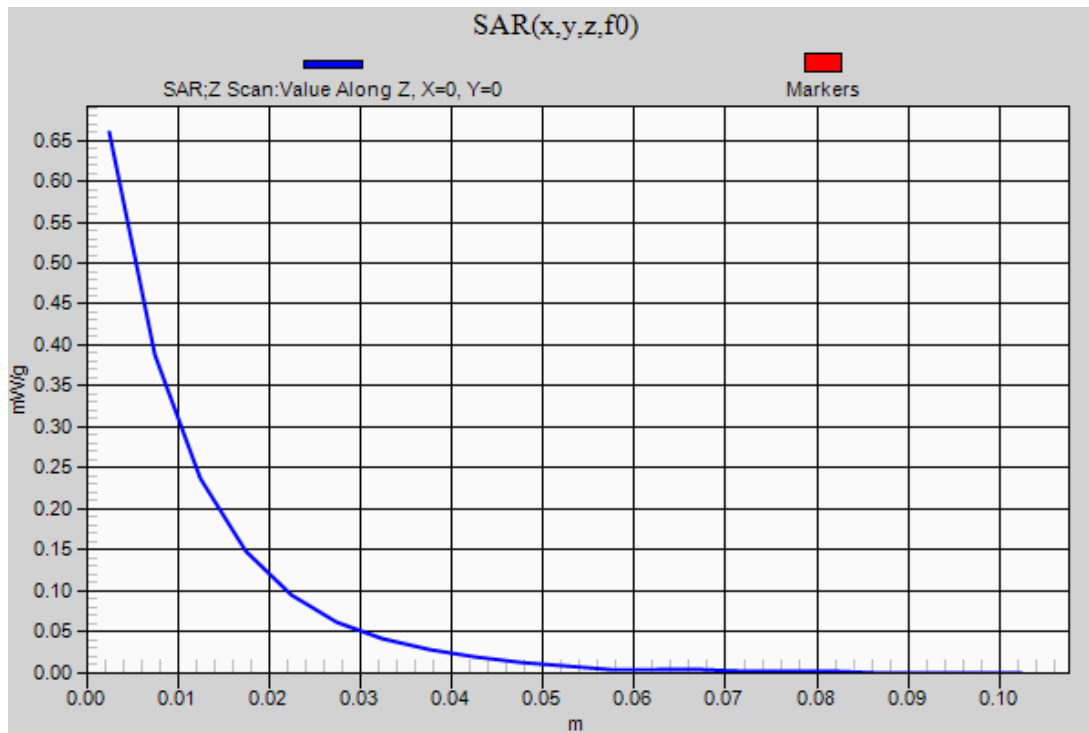
CDMA BC0

Frequency: 836.52 MHz; Duty Cycle: 1:1

Rear/1xEVDO Rel 0, ch 384 w/headset/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm

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

Maximum value of SAR (measured) = 0.660 mW/g



CDMA BC1

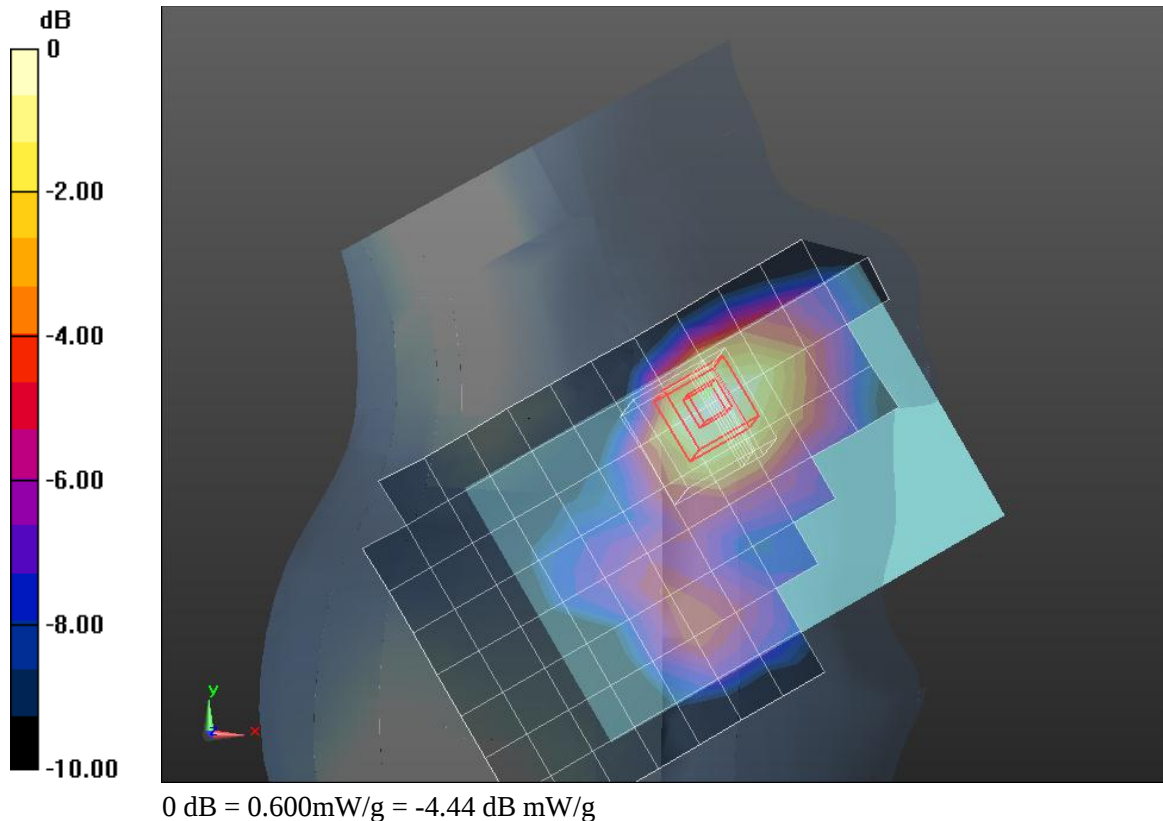
Frequency: 1880 MHz; Duty Cycle: 1:1; Room Ambient Temperature: 24.0°C; Liquid Temperature: 23.0°C
Medium parameters used: $f = 1880$ MHz; $\sigma = 1.377$ mho/m; $\epsilon_r = 39.772$; $\rho = 1000$ kg/m³

DASY5 Configuration:

- Electronics: DAE4 Sn1258; Calibrated: 3/8/2012
- Probe: EX3DV4 - SN3772; ConvF(7.59, 7.59, 7.59); Calibrated: 2/16/2012
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Phantom: SAM v5.0 (B); Type: QD000P40CD; Serial: 1628

RHS/Touch_1xRTT RC3 SO55, ch 600/Area Scan (9x13x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.613 mW/g

RHS/Touch_1xRTT RC3 SO55, ch 600/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 20.935 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 0.7620
SAR(1 g) = 0.506 mW/g; SAR(10 g) = 0.318 mW/g
Maximum value of SAR (measured) = 0.595 mW/g



Test Laboratory: UL CCS SAR Lab A

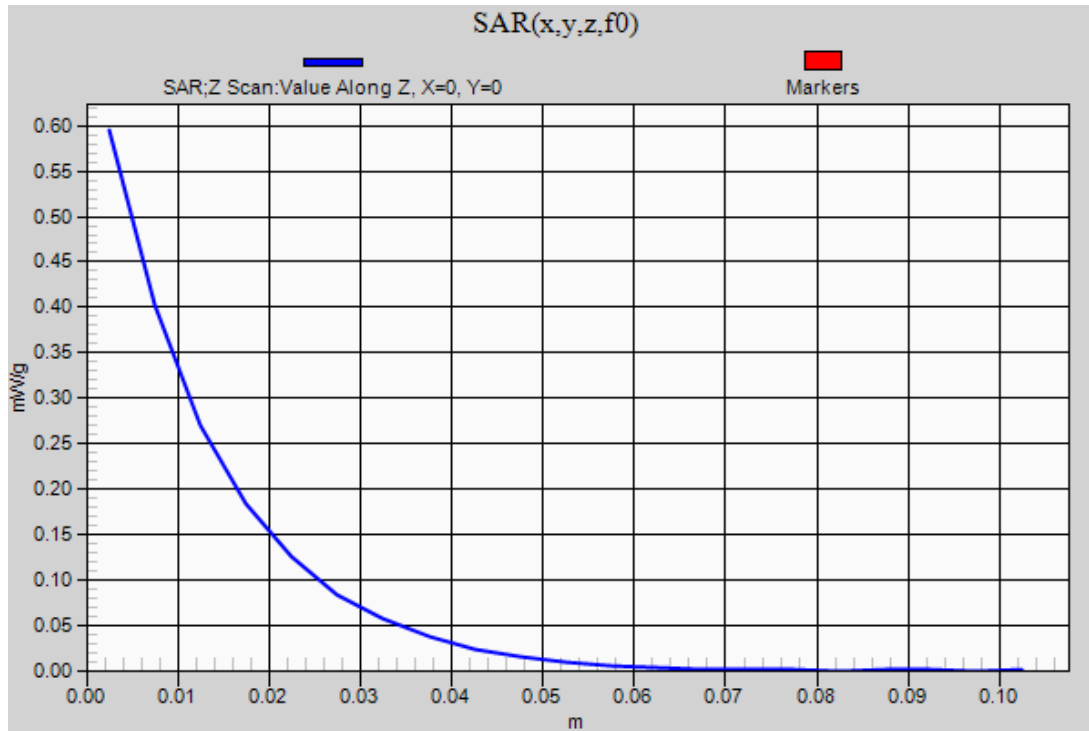
Date: 6/2/2012

CDMA BC1

Frequency: 1880 MHz; Duty Cycle: 1:1

RHS/Touch_1xRTT RC3 SO55, ch 600/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm

Maximum value of SAR (measured) = 0.595 mW/g



CDMA BC1

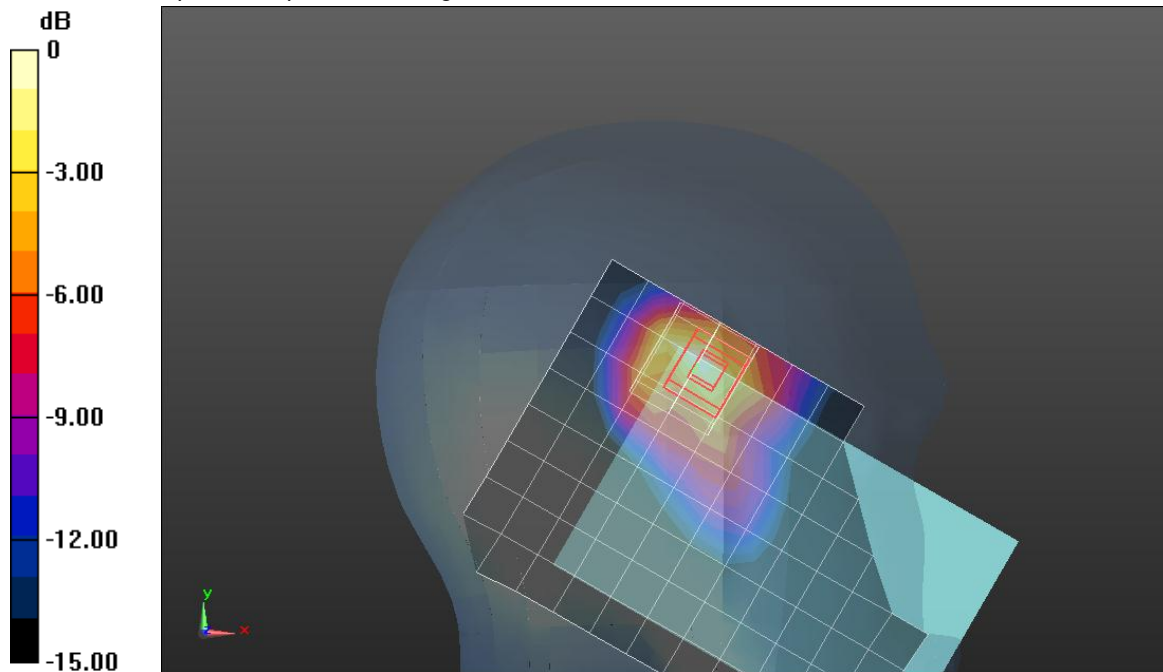
Frequency: 1880 MHz; Duty Cycle: 1:1; Room Ambient Temperature: 24.0°C; Liquid Temperature: 23.0°C
Medium parameters used: $f = 1880$ MHz; $\sigma = 1.377$ mho/m; $\epsilon_r = 39.772$; $\rho = 1000$ kg/m³

DASY5 Configuration:

- Electronics: DAE4 Sn1258; Calibrated: 3/8/2012
- Probe: EX3DV4 - SN3772; ConvF(7.59, 7.59, 7.59); Calibrated: 2/16/2012
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Phantom: SAM v5.0 (B); Type: QD000P40CD; Serial: 1628

LHS/Touch_1xEVDO Rel 0, ch 600/Area Scan (9x13x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.775 mW/g

LHS/Touch_1xEVDO Rel 0, ch 600/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 22.930 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 1.0150
SAR(1 g) = 0.538 mW/g; SAR(10 g) = 0.270 mW/g
Maximum value of SAR (measured) = 0.741 mW/g



0 dB = 0.740mW/g = -2.62 dB mW/g

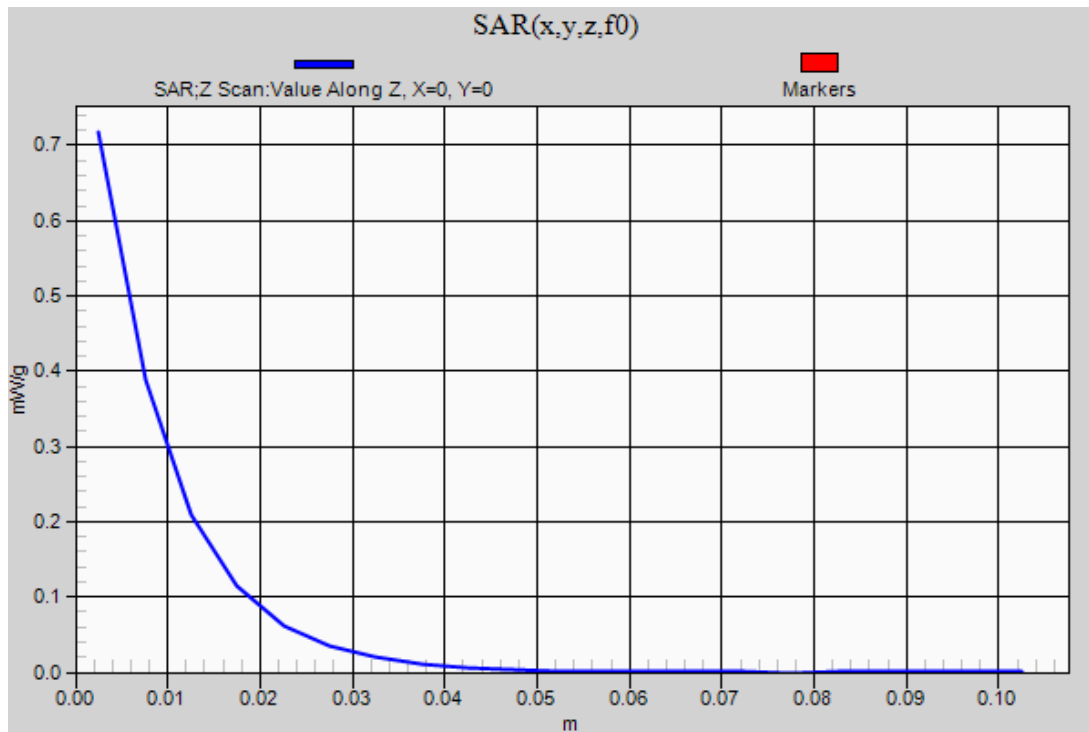
Test Laboratory: UL CCS SAR Lab A

Date: 6/2/2012

CDMA BC1

Frequency: 1880 MHz; Duty Cycle: 1:1

LHS/Touch_1xEVDO Rel 0, ch 600/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Maximum value of SAR (measured) = 0.717 mW/g



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; $\sigma = 1.505$ mho/m; $\epsilon_r = 51.177$; $\rho = 1000$ kg/m³

DASY5 Configuration:

- Electronics: DAE4 Sn1258; Calibrated: 3/8/2012
- Probe: EX3DV4 - SN3772; ConvF(7.23, 7.23, 7.23); Calibrated: 2/16/2012
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Phantom: ELI v5.0 (B); Type: QDOVA001BB; Serial: 1099

Rear/1xRTT RC3 SO32, ch 600/Area Scan (10x13x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.978 mW/g

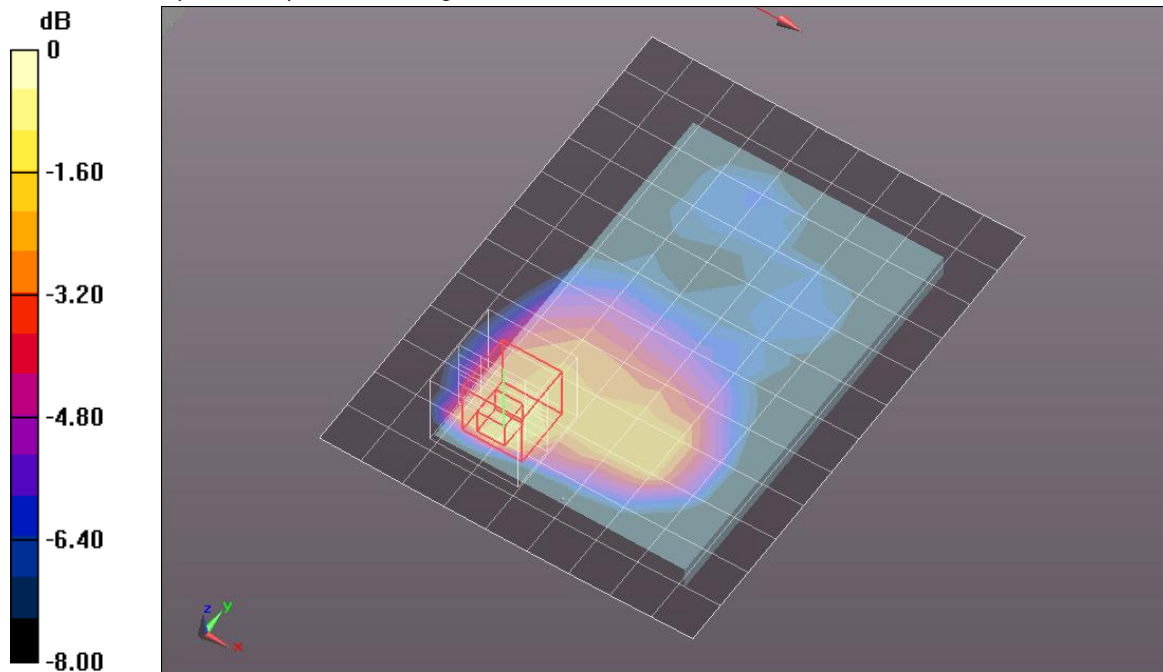
Rear/1xRTT RC3 SO32, ch 600/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 25.630 V/m; Power Drift = 0.18 dB

Peak SAR (extrapolated) = 1.7900

SAR(1 g) = 0.984 mW/g; SAR(10 g) = 0.520 mW/g

Maximum value of SAR (measured) = 1.370 mW/g



0 dB = 1.370mW/g = 2.73 dB mW/g

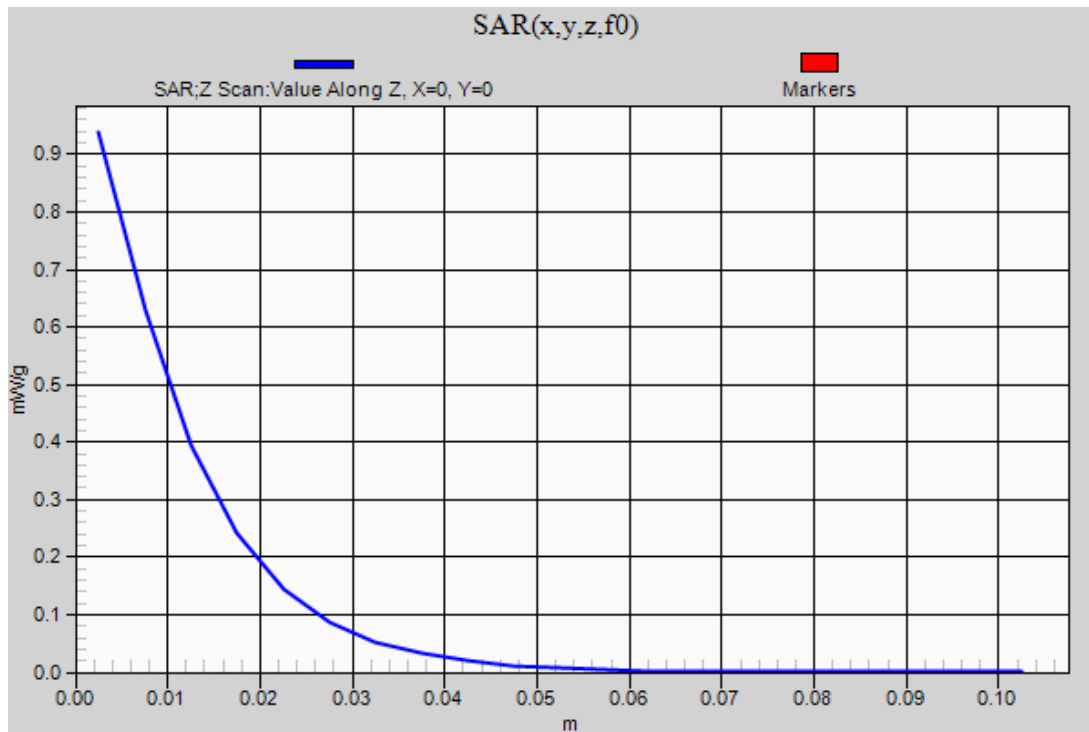
Test Laboratory: UL CCS SAR Lab A

Date: 6/1/2012

CDMA BC1

Frequency: 1880 MHz; Duty Cycle: 1:1

Rear/1xRTT RC3 SO32, ch 600/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Maximum value of SAR (measured) = 0.938 mW/g



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; $\sigma = 1.489$ mho/m; $\epsilon_r = 53.013$; $\rho = 1000$ kg/m³

DASY5 Configuration:

- Electronics: DAE4 Sn1258; Calibrated: 3/8/2012
- Probe: EX3DV4 - SN3772; ConvF(7.23, 7.23, 7.23); Calibrated: 2/16/2012
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Phantom: ELI v5.0 (B); Type: QDOVA001BB; Serial: 1099

Rear/1xEVDO Rel 0, ch 600/Area Scan (10x13x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 1.033 mW/g

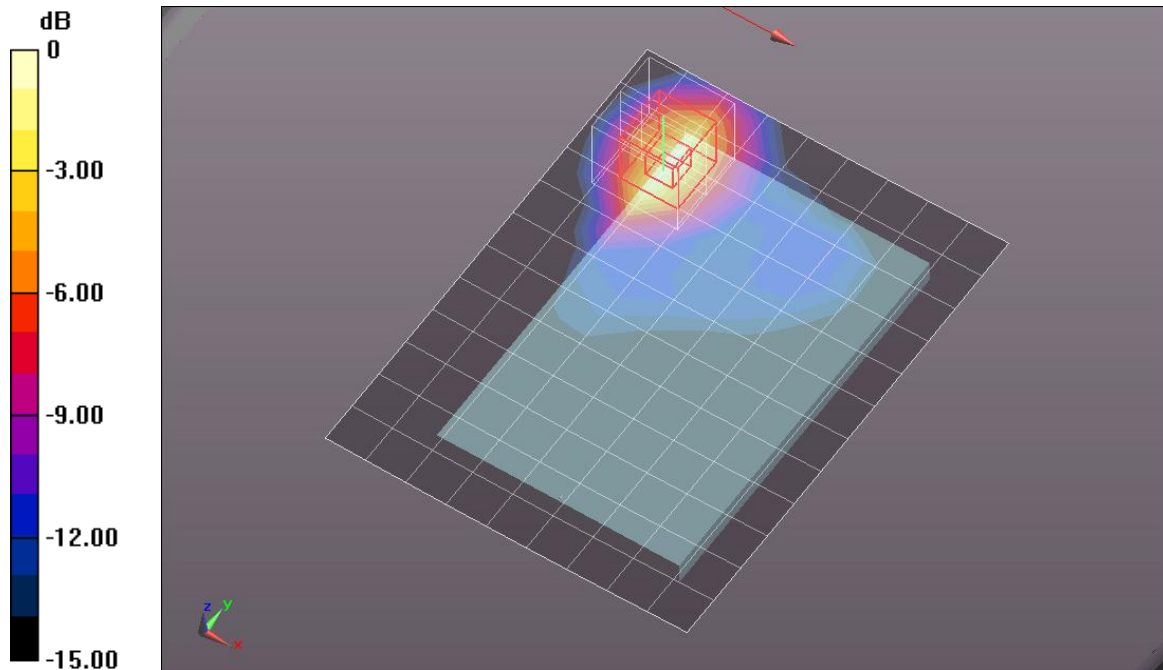
Rear/1xEVDO Rel 0, ch 600/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 27.239 V/m; Power Drift = -0.11 dB

Peak SAR (extrapolated) = 1.3500

SAR(1 g) = 0.822 mW/g; SAR(10 g) = 0.439 mW/g

Maximum value of SAR (measured) = 1.056 mW/g



0 dB = 1.060mW/g = 0.51 dB mW/g

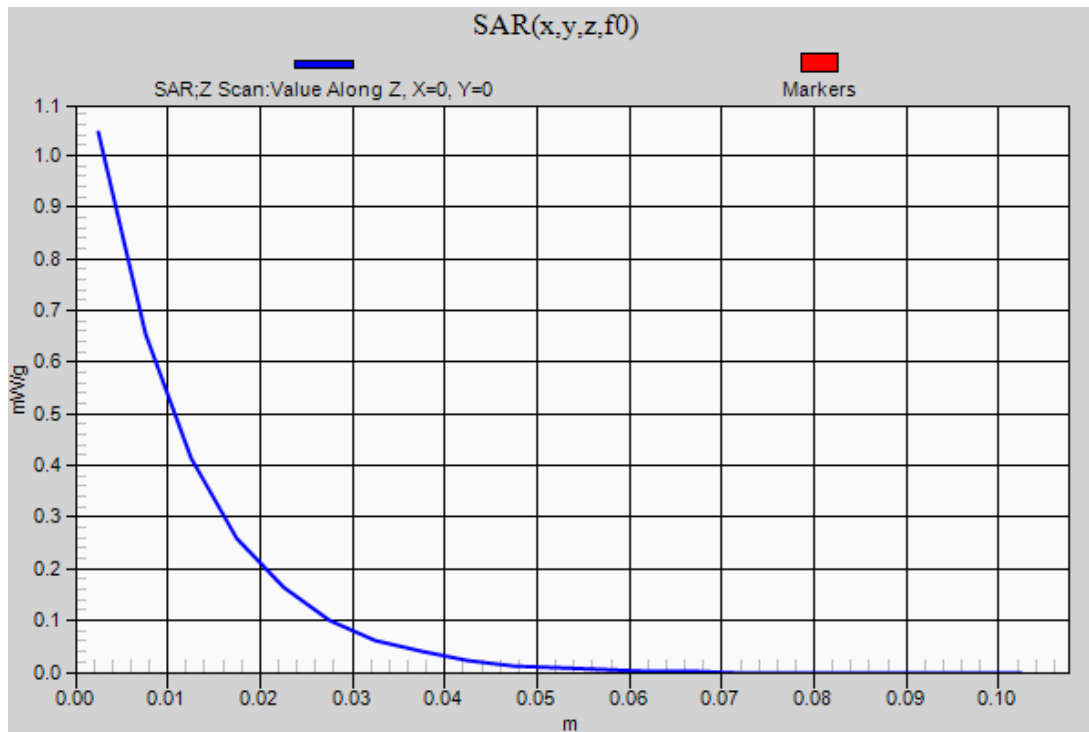
Test Laboratory: UL CCS SAR Lab A

Date: 6/1/2012

CDMA BC1

Frequency: 1880 MHz; Duty Cycle: 1:1

Rear/1xEVDO Rel 0, ch 600/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Maximum value of SAR (measured) = 1.045 mW/g



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): $f = 782$ MHz; $\sigma = 0.908$ mho/m; $\epsilon_r = 41.071$; $\rho = 1000$ kg/m³

DASY5 Configuration:

- Electronics: DAE4 Sn1258; Calibrated: 3/8/2012
- 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

LHS/Touch_10MHz QPSK_RB1/49_Ch M/Area Scan (9x13x1): Measurement grid: dx=15mm, dy=15mm

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

Maximum value of SAR (measured) = 0.164 mW/g

LHS/Touch_10MHz QPSK_RB1/49_Ch M/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

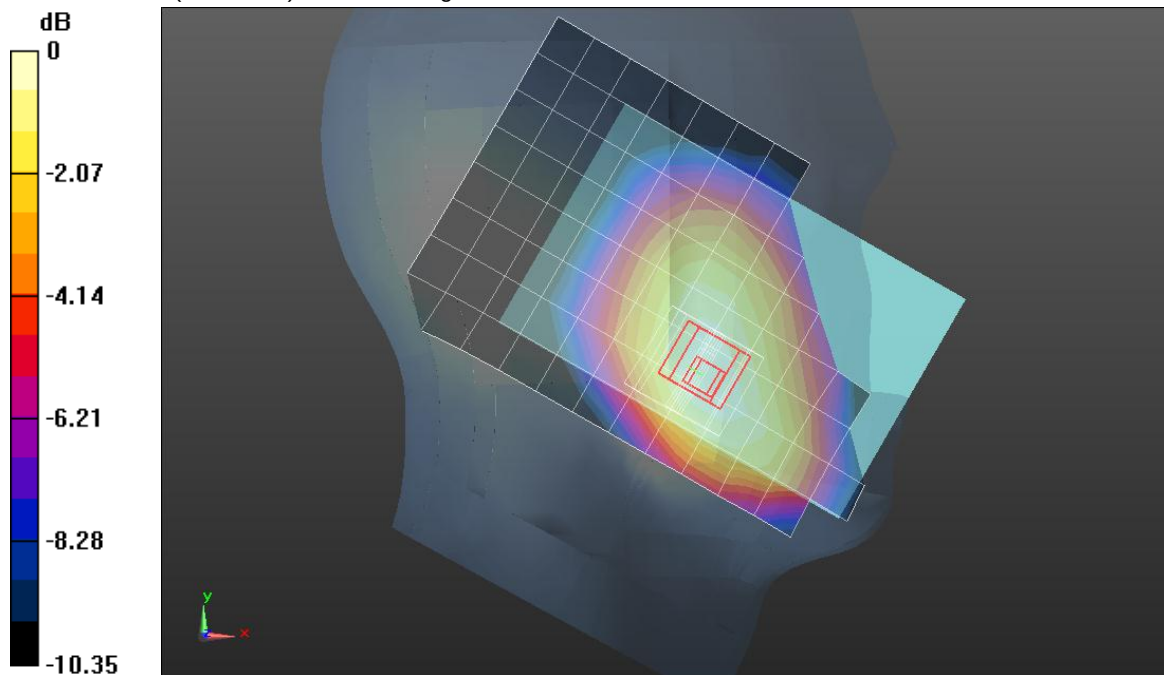
Reference Value = 13.503 V/m; Power Drift = 0.10 dB

Peak SAR (extrapolated) = 0.1890

SAR(1 g) = 0.147 mW/g; SAR(10 g) = 0.110 mW/g

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

Maximum value of SAR (measured) = 0.166 mW/g



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

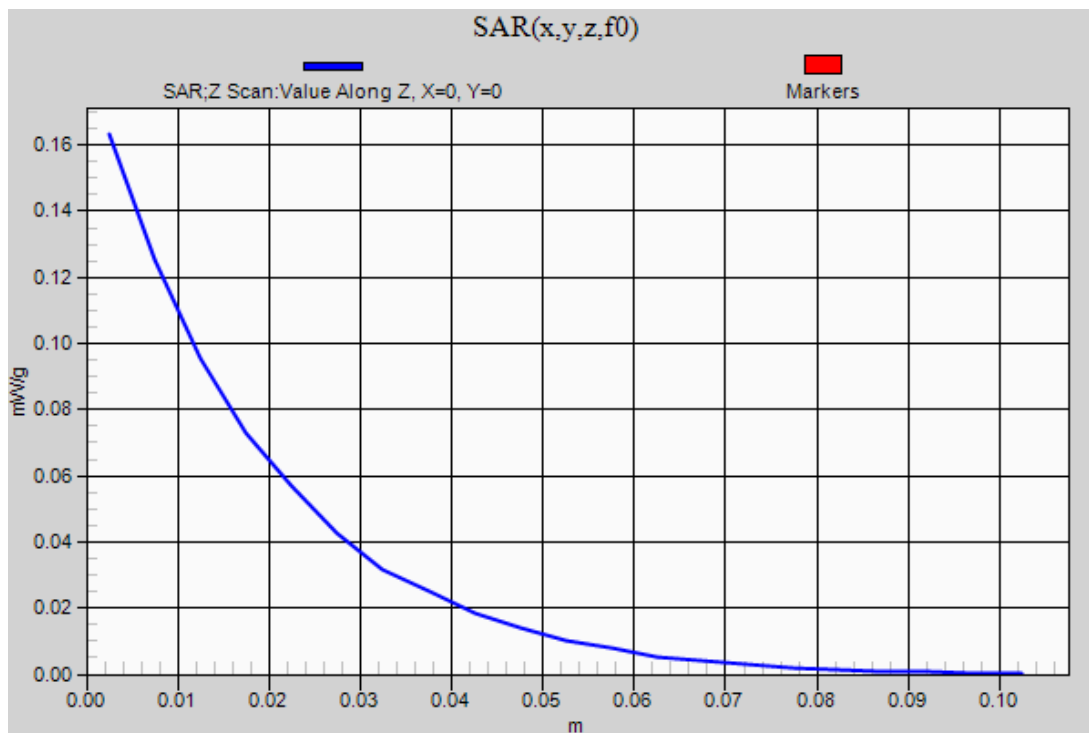
LTE Band 13

Frequency: 782 MHz; Duty Cycle: 1:1

LHS/Touch_10MHz QPSK_RB1/49_Ch M/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm

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

Maximum value of SAR (measured) = 0.163 mW/g



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): $f = 782$ MHz; $\sigma = 1.009$ mho/m; $\epsilon_r = 56.773$; $\rho = 1000$ kg/m³

DASY5 Configuration:

- Electronics: DAE4 Sn1258; Calibrated: 3/8/2012

- 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 (A); Type: QDOVA001BB; Serial: 1120

Rear/10MHz QPSK_RB1/0_Ch M/Area Scan (10x13x1): Measurement grid: dx=15mm, dy=15mm

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

Maximum value of SAR (measured) = 0.882 mW/g

Rear/10MHz QPSK_RB1/0_Ch M/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

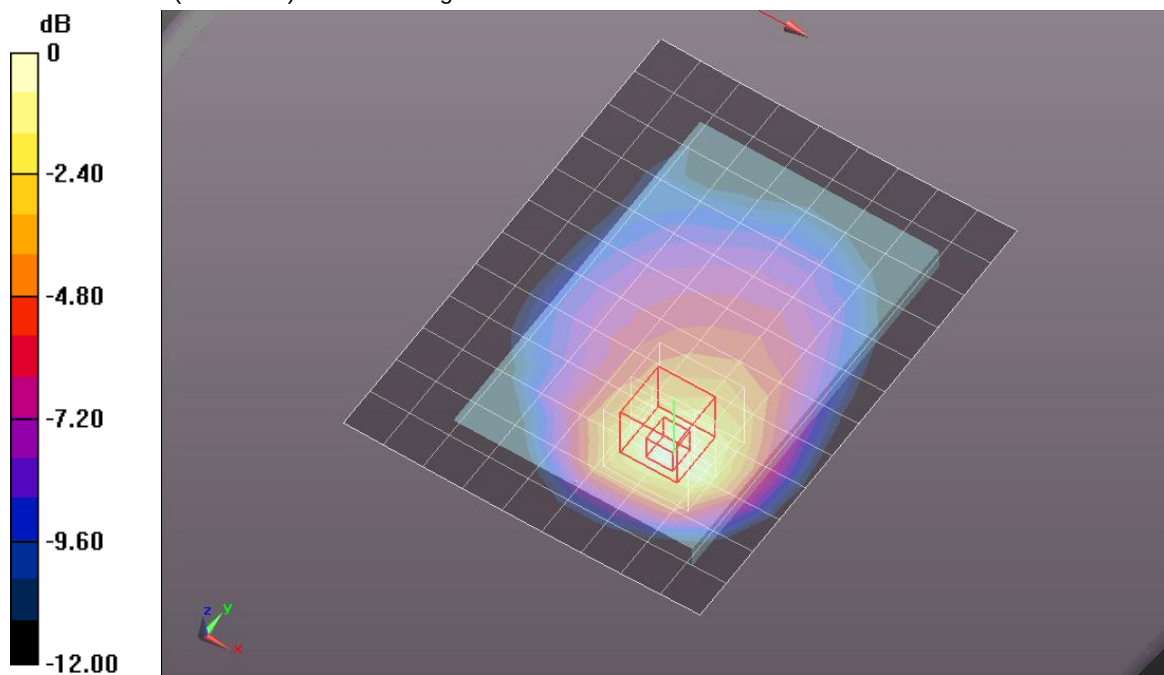
Reference Value = 30.234 V/m; Power Drift = -0.01 dB

Peak SAR (extrapolated) = 1.2800

SAR(1 g) = 0.720 mW/g; SAR(10 g) = 0.439 mW/g

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

Maximum value of SAR (measured) = 0.946 mW/g



0 dB = 0.950mW/g = -0.45 dB mW/g

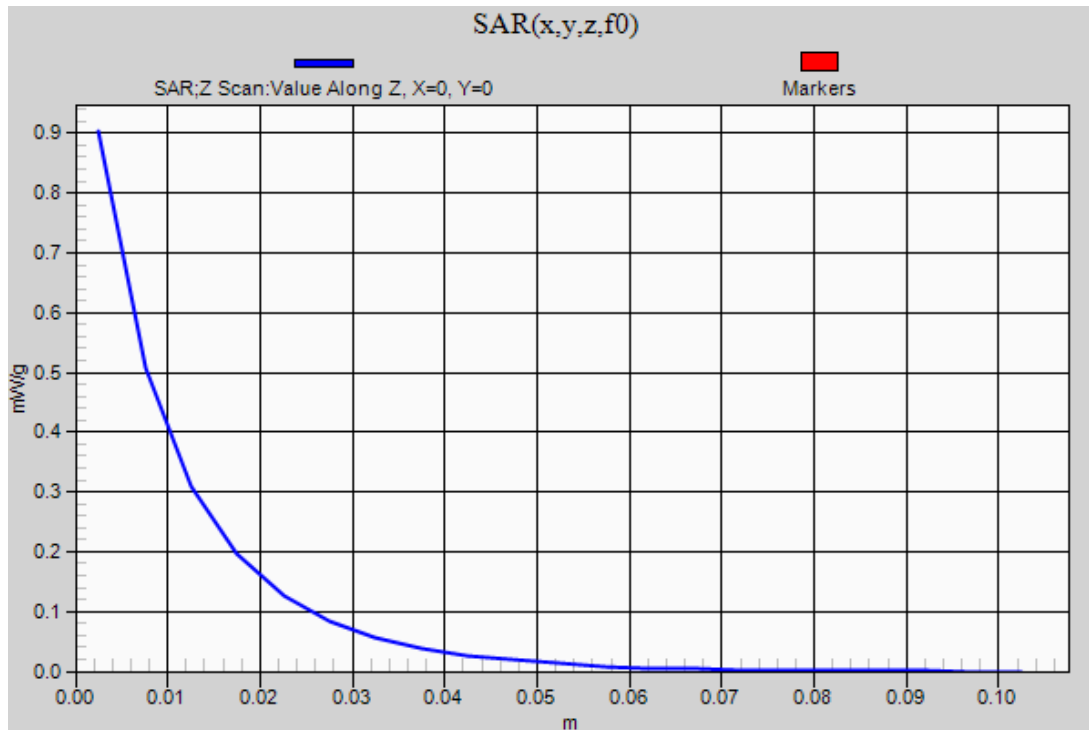
LTE Band 13

Frequency: 782 MHz; Duty Cycle: 1:1

Rear/10MHz QPSK_RB1/0_Ch M/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 0.903 mW/g



WiFi 2.4GHz

Frequency: 2462 MHz; Duty Cycle: 1:1; Room Ambient Temperature: 24.0°C; Liquid Temperature: 23.0°C
Medium parameters used (interpolated): $f = 2462$ MHz; $\sigma = 1.818$ mho/m; $\epsilon_r = 40.626$; $\rho = 1000$ kg/m³

DASY5 Configuration:

- Electronics: DAE4 Sn1258; Calibrated: 3/8/2012
- 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

RHS/Touch, ch 11/Area Scan (8x13x1): Measurement grid: dx=15mm, dy=15mm

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

Maximum value of SAR (measured) = 0.179 mW/g

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

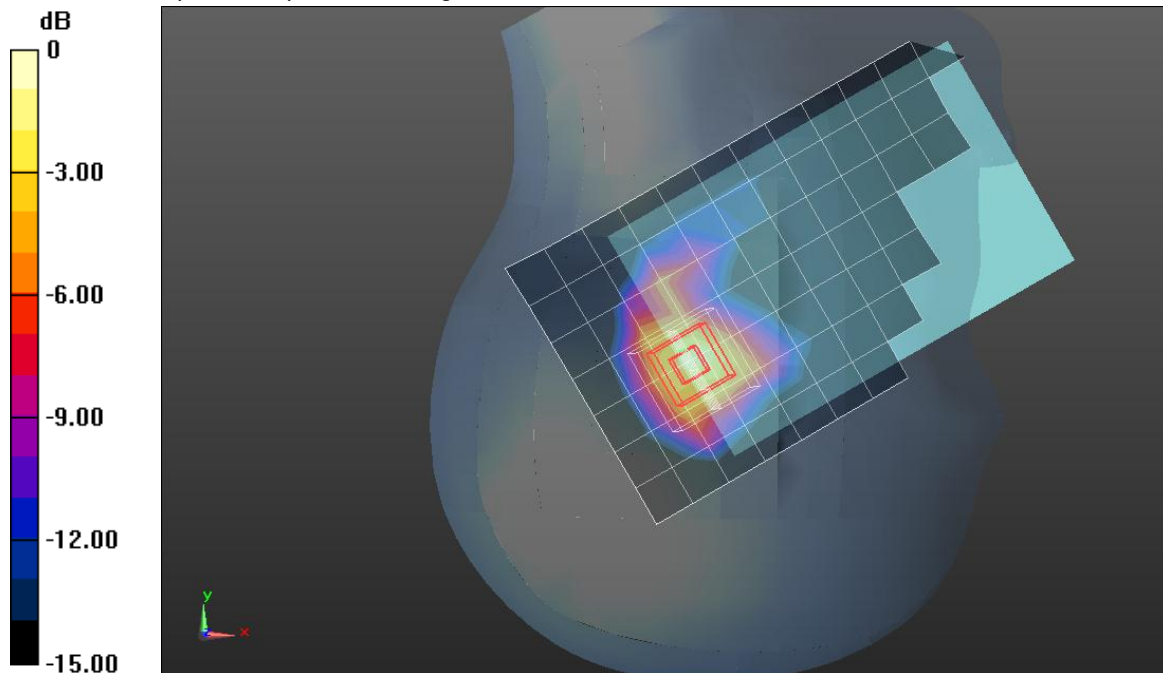
Reference Value = 10.228 V/m; Power Drift = -0.04 dB

Peak SAR (extrapolated) = 0.3460

SAR(1 g) = 0.173 mW/g; SAR(10 g) = 0.081 mW/g

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

Maximum value of SAR (measured) = 0.232 mW/g



0 dB = 0.230mW/g = -12.77 dB mW/g

Test Laboratory: UL CCS SAR Lab A

Date: 6/8/2012

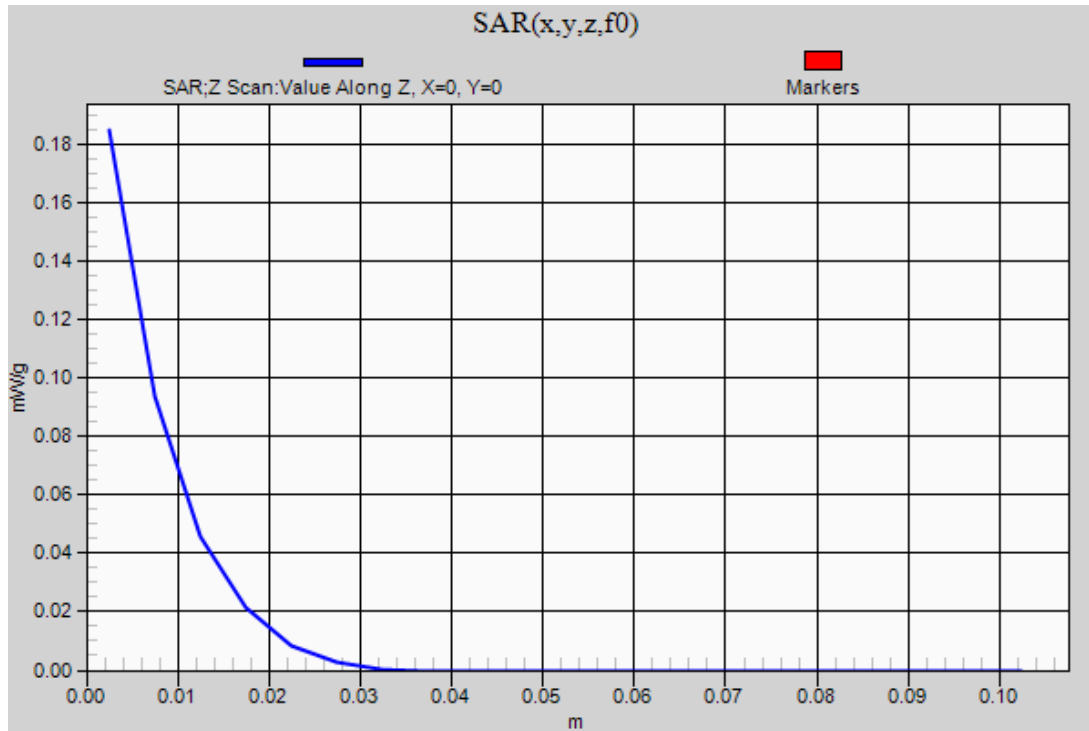
WiFi 2.4GHz

Frequency: 2462 MHz; Duty Cycle: 1:1

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

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

Maximum value of SAR (measured) = 0.185 mW/g



WiFi 2.4GHz

Frequency: 2462 MHz; Duty Cycle: 1:1; Room Ambient Temperature: 24.0°C; Liquid Temperature: 23.0°C
Medium parameters used (interpolated): $f = 2462$ MHz; $\sigma = 2.011$ mho/m; $\epsilon_r = 53.89$; $\rho = 1000$ kg/m³

DASY5 Configuration:

- Electronics: DAE4 Sn1258; Calibrated: 3/8/2012
- Probe: EX3DV4 - SN3772; ConvF(6.65, 6.65, 6.65); 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: 1099

Rear/Ch 11 w/handset/Area Scan (10x13x1): Measurement grid: dx=15mm, dy=15mm

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

Maximum value of SAR (measured) = 0.205 mW/g

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

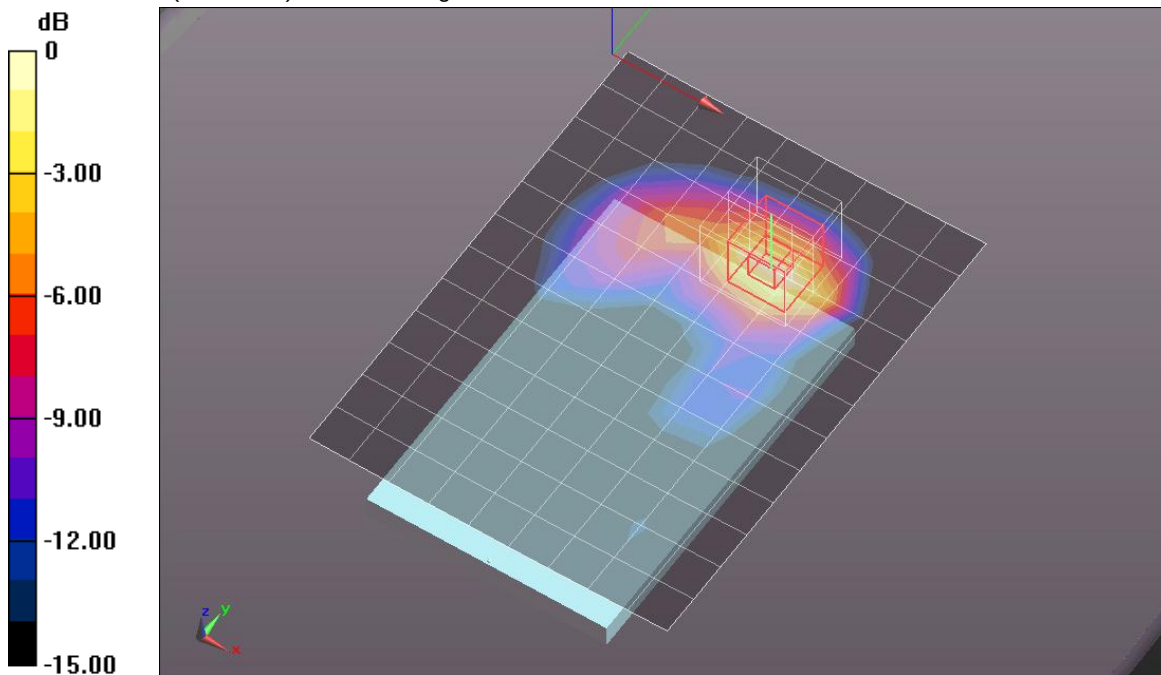
Reference Value = 10.056 V/m; Power Drift = 0.03 dB

Peak SAR (extrapolated) = 0.3040

SAR(1 g) = 0.155 mW/g; SAR(10 g) = 0.076 mW/g

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

Maximum value of SAR (measured) = 0.211 mW/g



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

Test Laboratory: UL CCS SAR Lab A

Date: 6/8/2012

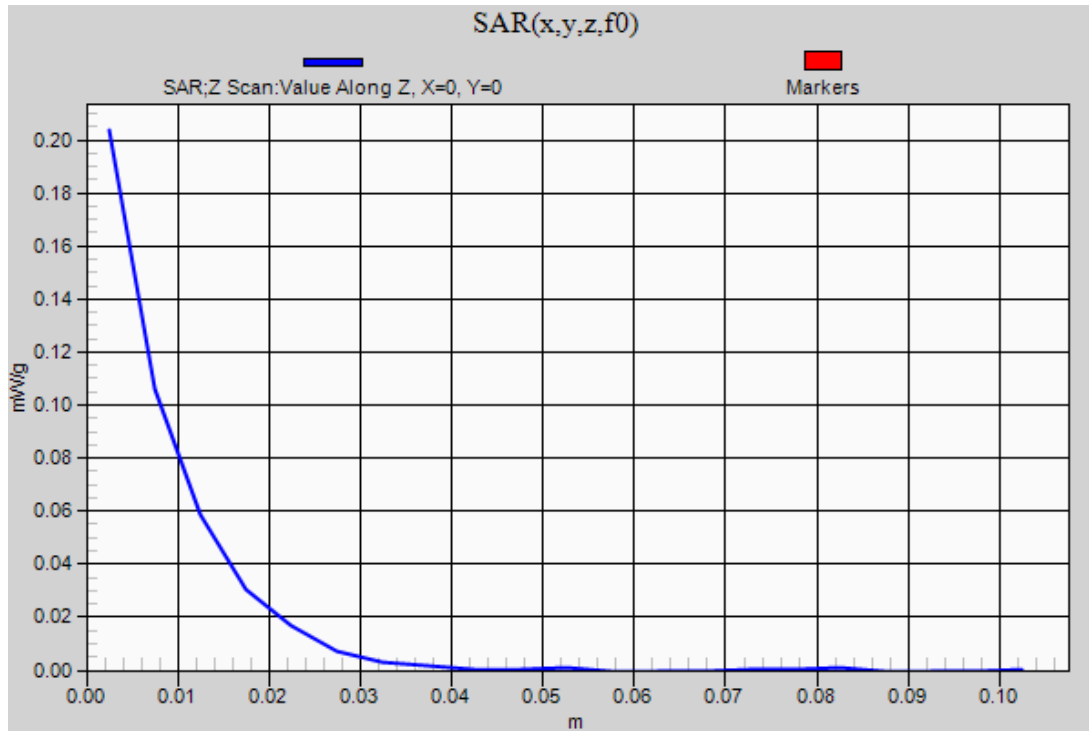
WiFi 2.4GHz

Frequency: 2462 MHz; Duty Cycle: 1:1

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

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

Maximum value of SAR (measured) = 0.204 mW/g



15. Simultaneous Transmission SAR Analysis

As its max average power is 10.72 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. Scaling of Simultaneous Transmission SAR measurements

The scaling of the summed SAR measurements to compensate for the difference between the measured output power and the maximum value indicated in the tune-up procedure was applied only to the summed values that exceeded 1.033 W/kg. The maximum difference between any of the power measurements and the corresponding maximum possible power allowed by the tune-up procedure, for any of the transmitters, was 1.9dB. Only SAR measurements above 1.033W/kg could exceed 1.6 W/kg as a result of scaling to accommodate this 1.9dB difference.

If the scaled summed SAR measurements exceeded 1.6 W/kg then an SPLSR assessment was performed using the unscaled SAR measurements. Using the worst case power correction of 1.9 dB the scaling of the SPLSR results need only be applied to SPLSR values above 0.2.

15.2. Head Exposure Conditions

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

Test Position	Voice			Data	Σ 1-g SAR (mW/g)
	GSM 850	GSM 1900	W-CDMA Band II	WiFi 2.4 GHz	
Left Touch	0.192			0.155	0.347
		0.086		0.155	0.241
			0.163	0.155	0.318
Left Tilt	0.113			0.158	0.271
		0.074		0.158	0.232
			0.213	0.158	0.371
Right Touch	0.140			0.173	0.313
		0.204		0.173	0.377
			0.522	0.173	0.695
Right Tilt	0.108			0.170	0.278
		0.058		0.170	0.228
			0.157	0.170	0.327

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	
Left Touch	0.333		0.375		0.155	0.863
	0.333			0.538	0.155	1.026
		0.206	0.375		0.155	0.736
		0.206		0.538	0.155	0.899
Left Tilt	0.216		0.323		0.158	0.697
	0.216			0.292	0.158	0.666
		0.249	0.323		0.158	0.730
		0.249		0.292	0.158	0.699
Right Touch	0.302		0.194		0.173	0.669
	0.302			0.173	0.173	0.648
		0.506	0.194		0.173	0.873
		0.506		0.173	0.173	0.852
RightTilt	0.205		0.168		0.170	0.543
	0.205			0.085	0.170	0.460
		0.185	0.168		0.170	0.523
		0.185		0.085	0.170	0.440

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.

15.2.3.Sum of the SAR for SV-LTE & WiFi

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	0.333		0.147	0.155	0.635
		0.206	0.147	0.155	0.508
Left Tilt	0.216		0.096	0.158	0.470
		0.249	0.096	0.158	0.503
Right Touch	0.302		0.118	0.173	0.593
		0.506	0.118	0.173	0.797
RightTilt	0.205		0.067	0.170	0.442
		0.185	0.067	0.170	0.422

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.

15.3. Body Exposure Conditions

15.3.1. Sum of the SAR for WCDMA & WiFi

Test Position	Data		Σ 1-g SAR (mW/g)
	WCDMA Band II	WiFi 2.4 GHz	
Rear	0.499	0.155	0.654
Front	0.327	0.056	0.383
Edge 1	0	0.077	0.077
Edge 2	0.272	0	0.272
Edge 3	0.358	0	0.358
Edge 4	0	0	0

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.

15.3.2. Sum of the SAR for SV-DO & WiFi

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	0.82		0.520		0.155	1.495
	0.82			0.822	0.155	1.797
		0.984	0.520		0.155	1.659
		0.984		0.822	0.155	1.961
Front	0.476		0.187		0.056	0.719
	0.476			0.171	0.056	0.703
		0.419	0.187		0.056	0.662
		0.419		0.171	0.056	0.646
Edge 1	0		0.115		0.077	0.192
	0			0.065	0.077	0.142
		0	0.115		0.077	0.192
		0		0.065	0.077	0.142
Edge 2	0.177		0.196		0	0.373
	0.177			0.461	0	0.638
		0.344	0.196		0	0.540
		0.344		0.461	0	0.805
Edge 3	0.19		0		0	0.190
	0.19			0	0	0.190
		0.347	0		0	0.347
		0.347		0	0	0.347
Edge 4	0		0		0	0
	0			0	0	0
		0	0		0	0
		0		0	0	0

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	0.820		0.520		0.155	1.495			
		0.820				0.155	0.975	12.55	0.078	1
				0.520		0.155	0.675	5.95	0.113	5
		0.820		0.520			1.340	10.8	0.124	11
2	Rear	0.820			0.822	0.155	1.797			
		0.820				0.155	0.975	12.55	0.078	1
					0.822	0.155	0.977	5.44	0.180	2
		0.820			0.822		1.642	10.79	0.152	3
3	Rear		0.984	0.520		0.155	1.659			
			0.984			0.155	1.139	13.42	0.085	4
				0.520		0.155	0.675	5.95	0.113	5
			0.984	0.520			1.504	10.99	0.137	6
4	Rear		0.984		0.822	0.155	1.961			
			0.984			0.155	1.139	13.42	0.085	4
					0.822	0.155	0.977	5.44	0.180	2
			0.984		0.822		1.806	11.03	0.164	7

Conclusion:

- Simultaneous transmission SAR measurement (Volume Scan) is not required because the sum of the 1-g SAR is < 1.6 W/kg and the SPLSR for at least one antenna pairing combination is < 0.3.

15.3.3. Sum of the SAR for SV-LTE & WiFi

Test Position	Voice		Data		Σ 1-g SAR (mW/g)
	CDMA BC0 1xRTT	CDMA BC1 1xRTT	LTE Band 13	WiFi 2.4 GHz	
Rear	0.820		0.720	0.155	1.695
		0.984	0.720	0.155	1.859
Front	0.476		0.262	0.056	0.794
		0.419	0.262	0.056	0.737
Edge 1	0		0	0.077	0.077
		0	0	0.077	0.077
Edge 2	0.177		0	0	0.177
		0.344	0	0	0.344
Edge 3	0.190		0.334	0	0.524
		0.347	0.334	0	0.681
Edge 4	0		0.193	0	0.193
		0	0.193	0	0.193

SAR to Peak Location Separation Ratio (SPLSR)

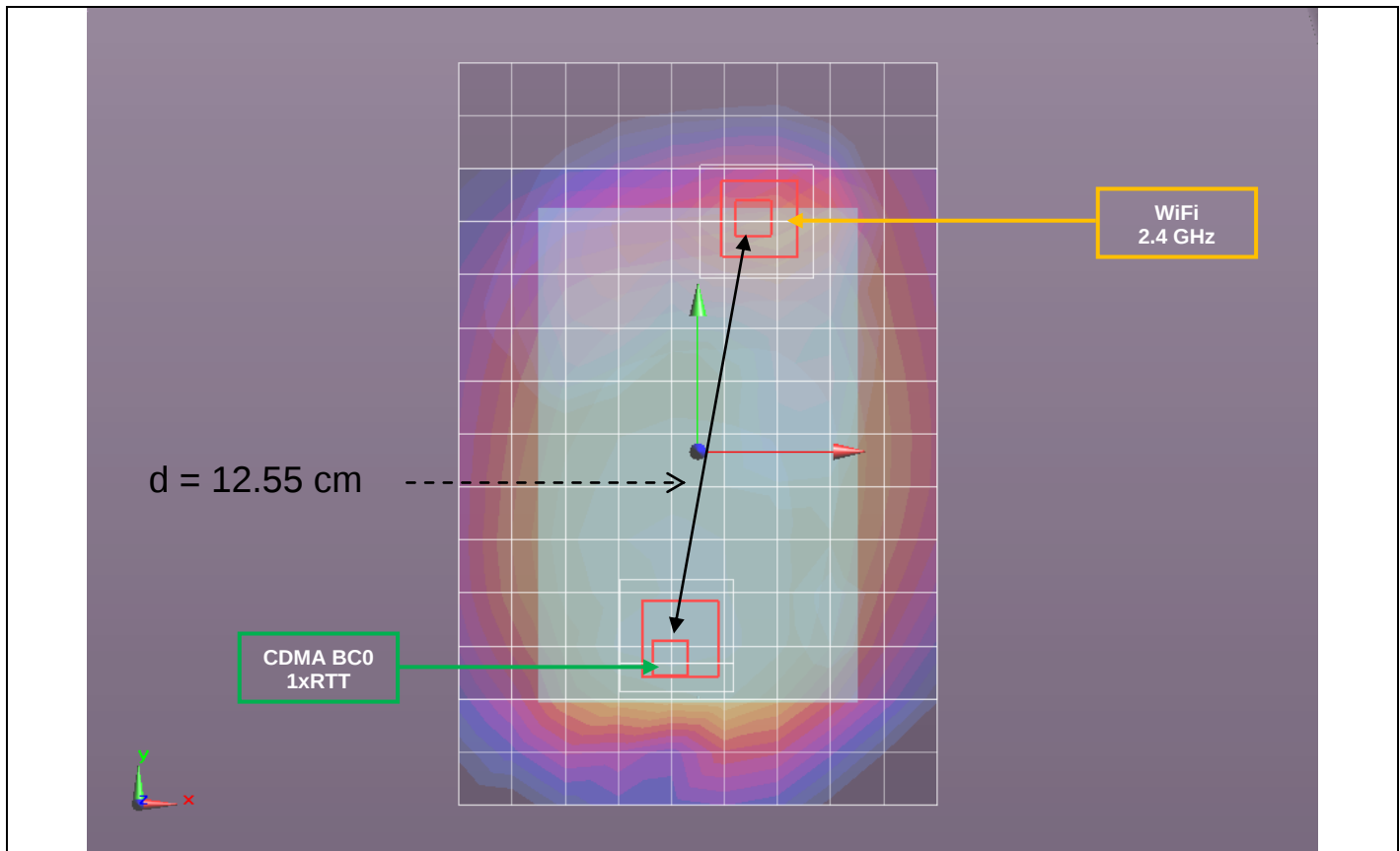
Case #	Test Position	Worst-case combination				Σ 1-g SAR (mW/g)	Calculated distance (cm)	SPLSR	Figure
		CDMA BC0 1xRTT	CDMA BC1 1xRTT	LTE Band 13	WiFi 2.4 GHz				
4	Rear	0.820		0.720	0.155	1.695			
		0.820			0.155	0.975	12.55	0.078	1
				0.720	0.155	0.875	11.79	0.074	8
		0.820		0.720		1.540	3.69	0.417	9
5	Rear		0.984	0.720	0.155	1.859			
			0.984		0.155	1.139	13.42	0.085	4
				0.720	0.155	0.875	11.79	0.074	8
			0.984	0.720		1.704	5.46	0.312	10

Conclusion:

- Simultaneous transmission SAR measurement (Volume Scan) is required for Cases #4 and #5 because the sum of the 1-g SAR is > 1.6 W/kg and the SPLSR for at least one antenna pairing combination is > 0.3.

15.4. SAR Peak Location Separation Distance Calculations and Figures

Figure (1)



Mode	Peak SAR mW/g	X m	Y m	Z m
CDMA BC0, 1xRTT	1.38	-0.0092	-0.0584	-0.186
WiFi 2.4 GHz	0.304	0.0133	0.065	-0.182

d: Calculated distance (cm)
12.55

The Peak Location Separation Distance is computed by using the formula below:

$$\sqrt{(X1-X2)^2+(Y1-Y2)^2+(Z1-Z2)^2}$$

Figure (2)

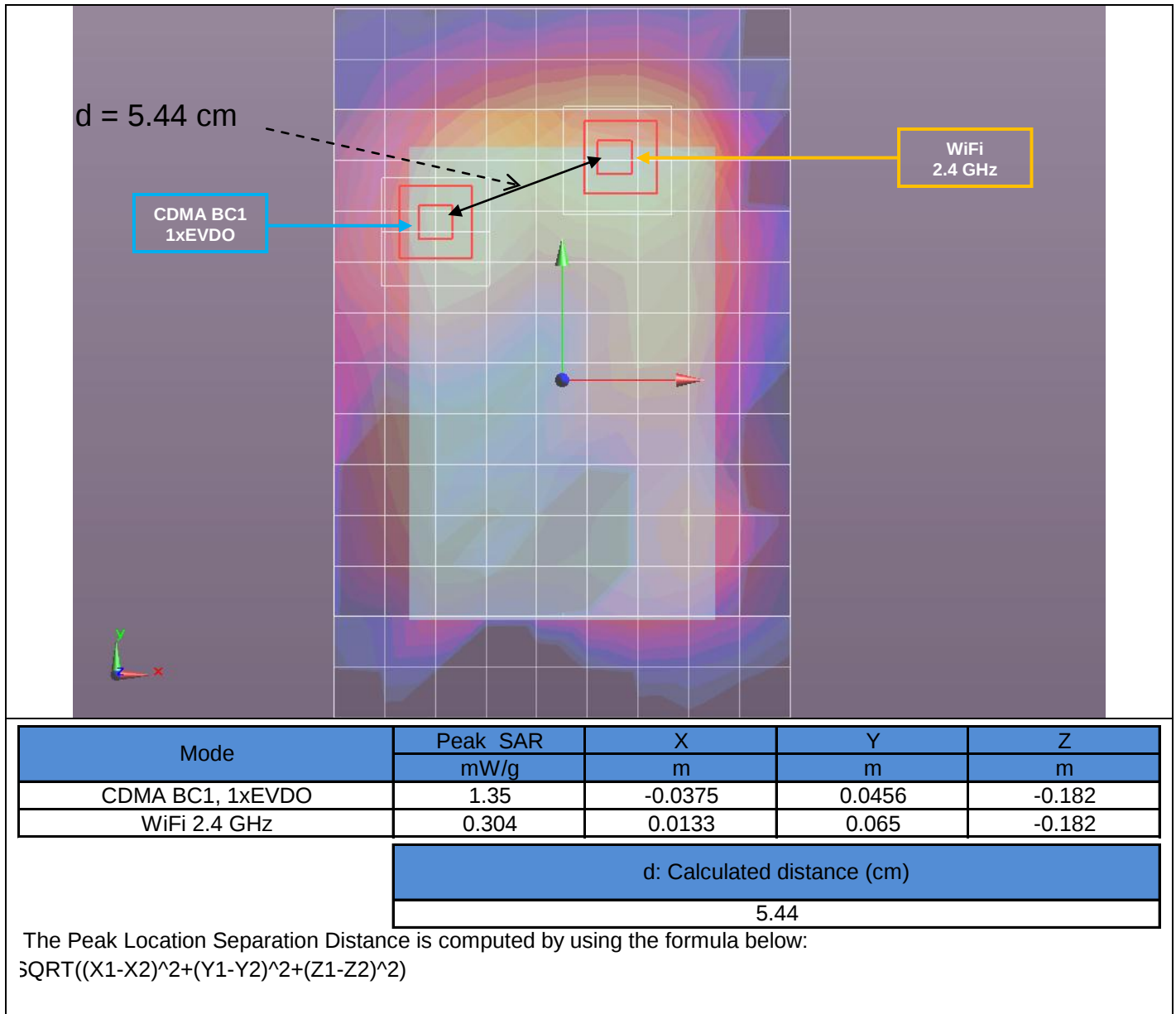
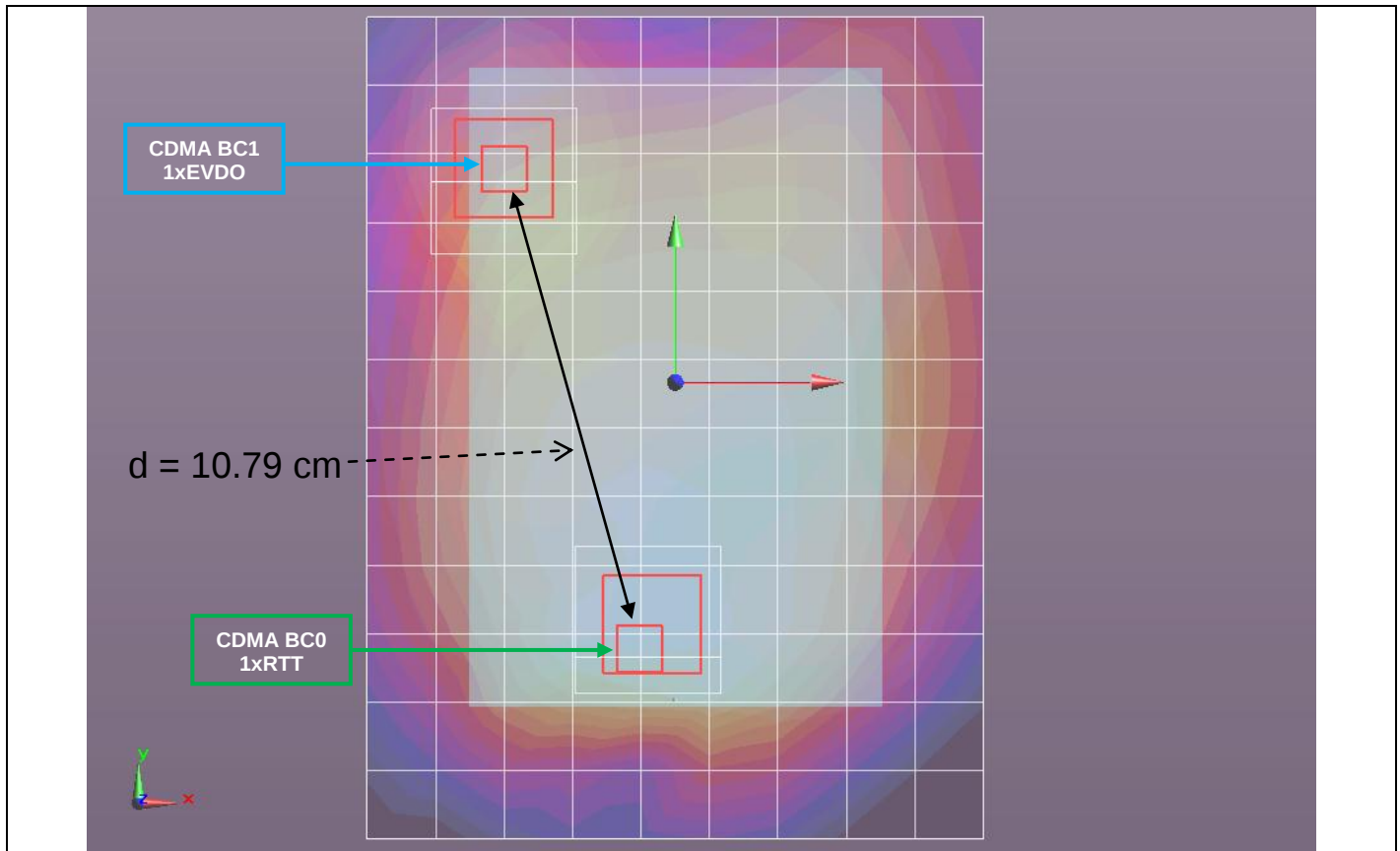


Figure (3)



Mode	Peak SAR	X	Y	Z
	mW/g	m	m	m
CDMA BC0, 1xRTT	1.38	-0.0092	-0.0584	-0.186
CDMA BC1, 1xEVDO	1.35	-0.0375	0.0456	-0.182

d: Calculated distance (cm)

10.79

The Peak Location Separation Distance is computed by using the formula below:

$$\sqrt[3]{QRT((X1-X2)^2+(Y1-Y2)^2+(Z1-Z2)^2)}$$

Figure (4)

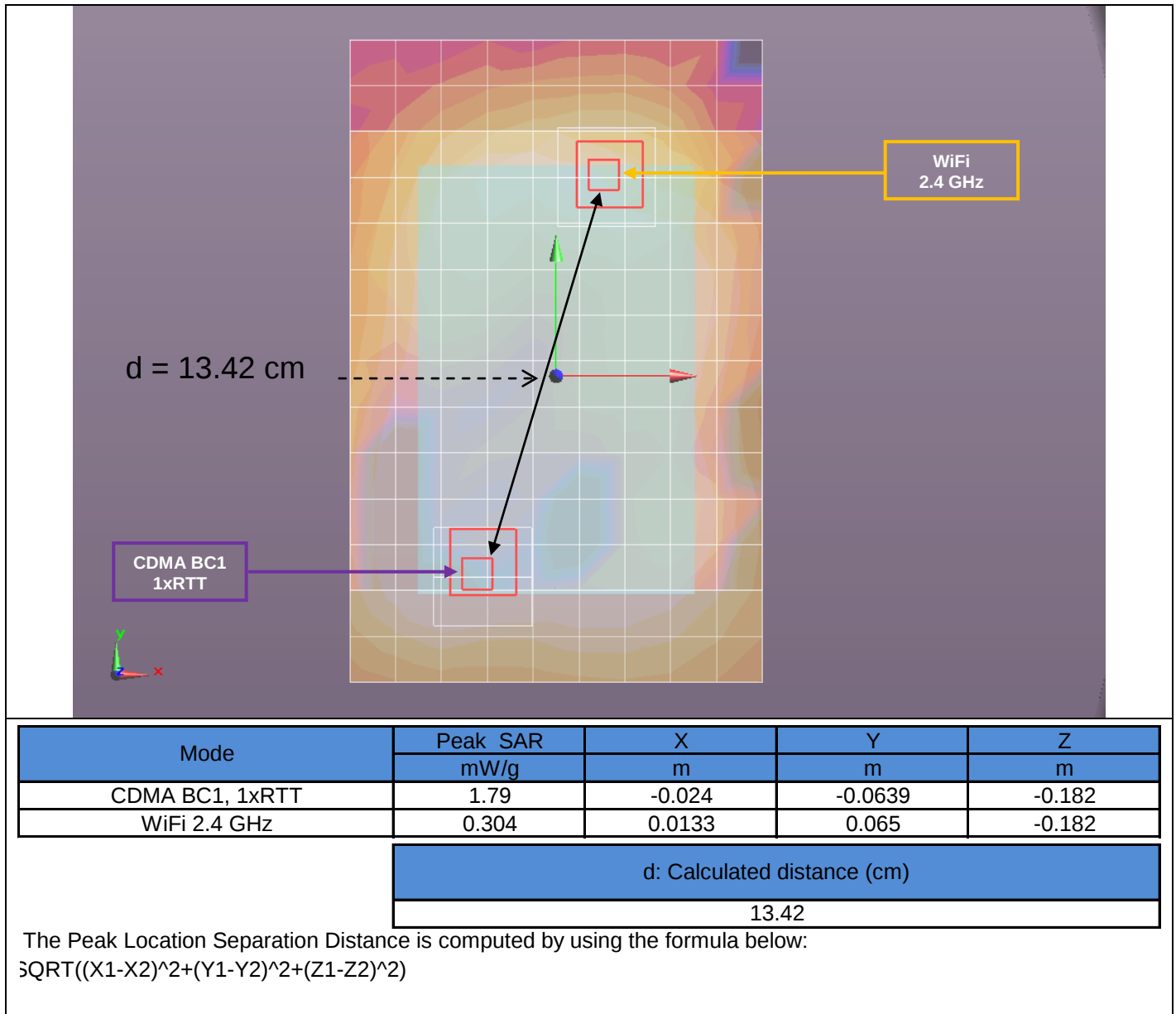


Figure (5)

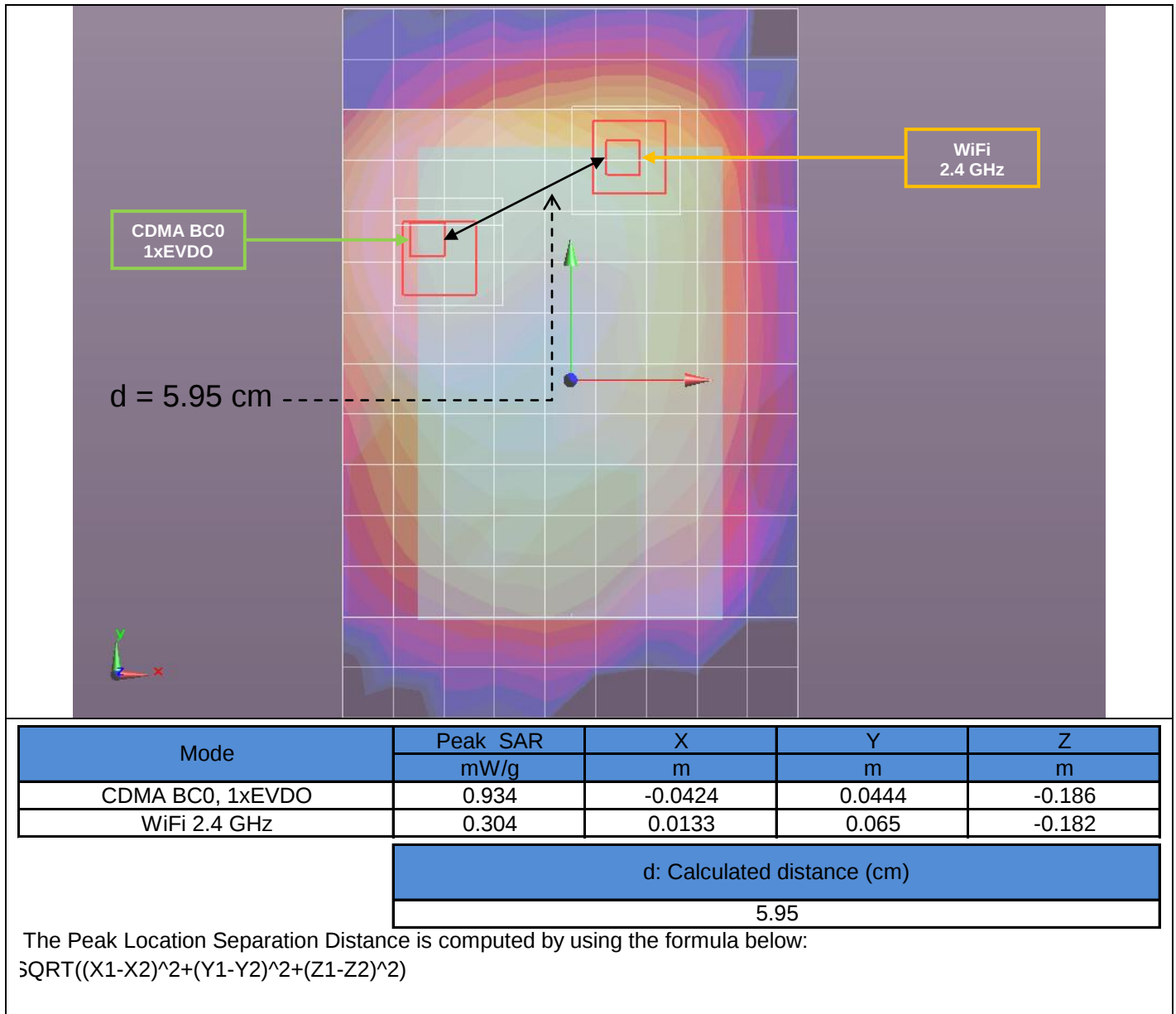


Figure (6)

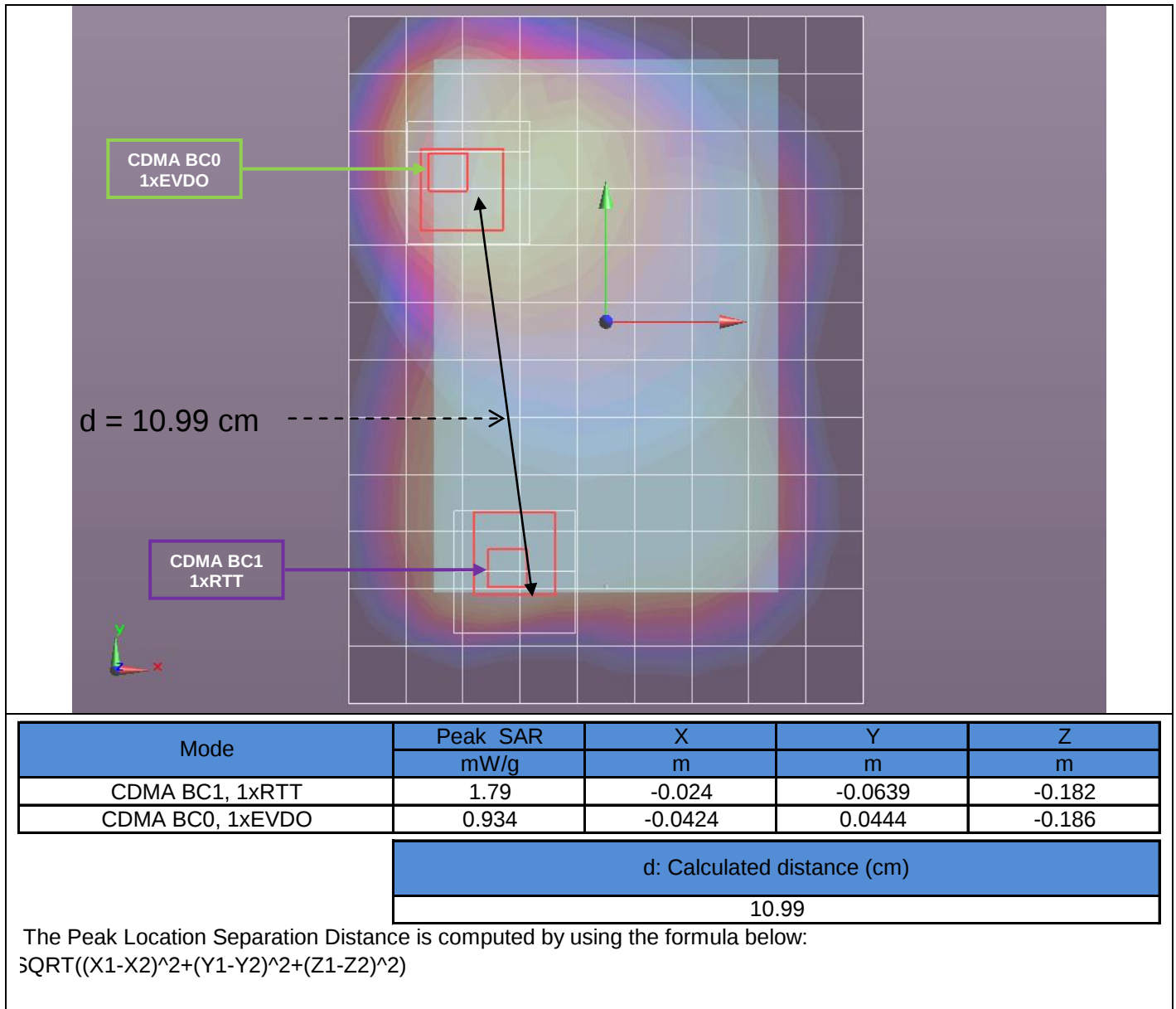


Figure (7)

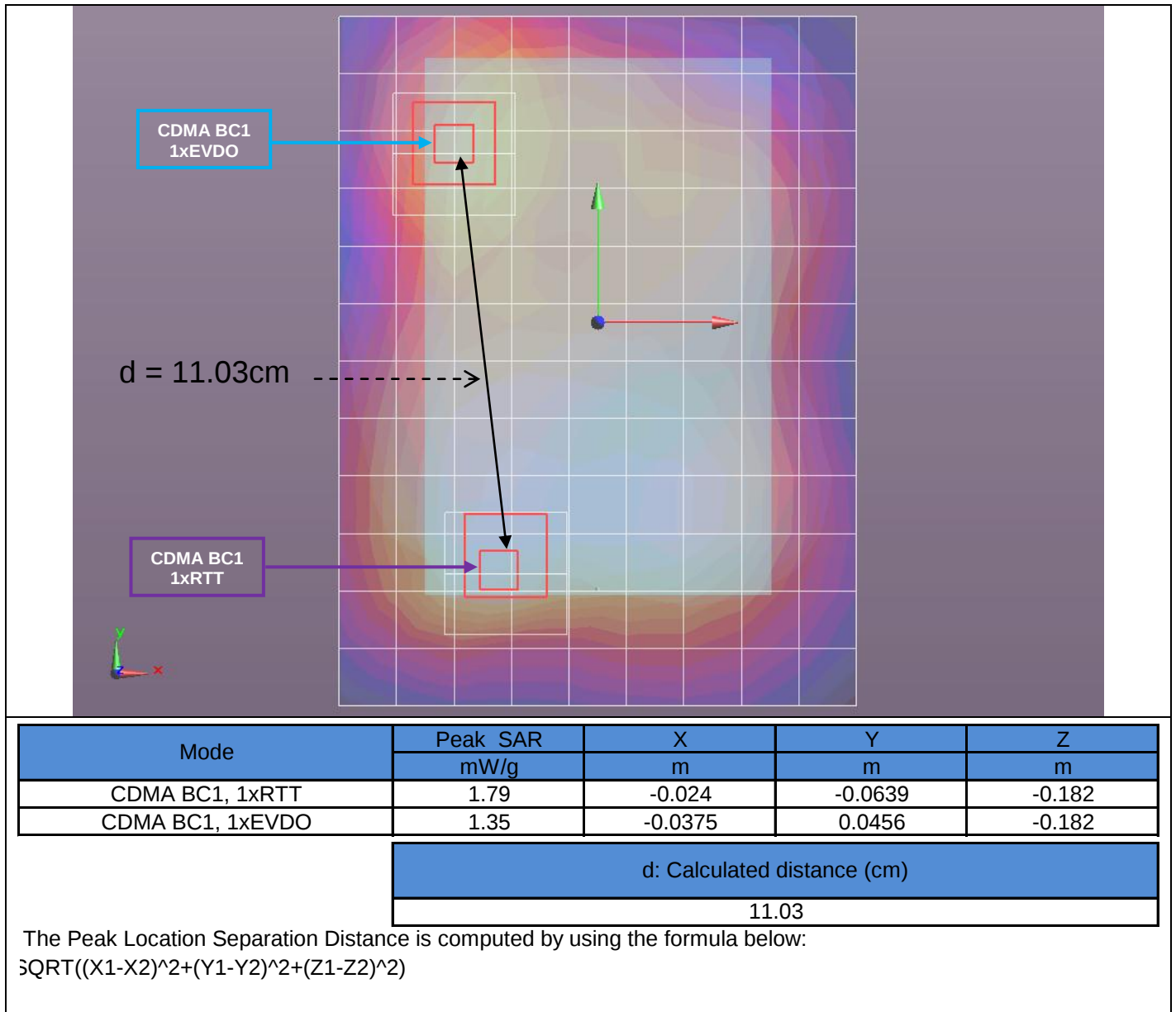


Figure (8)

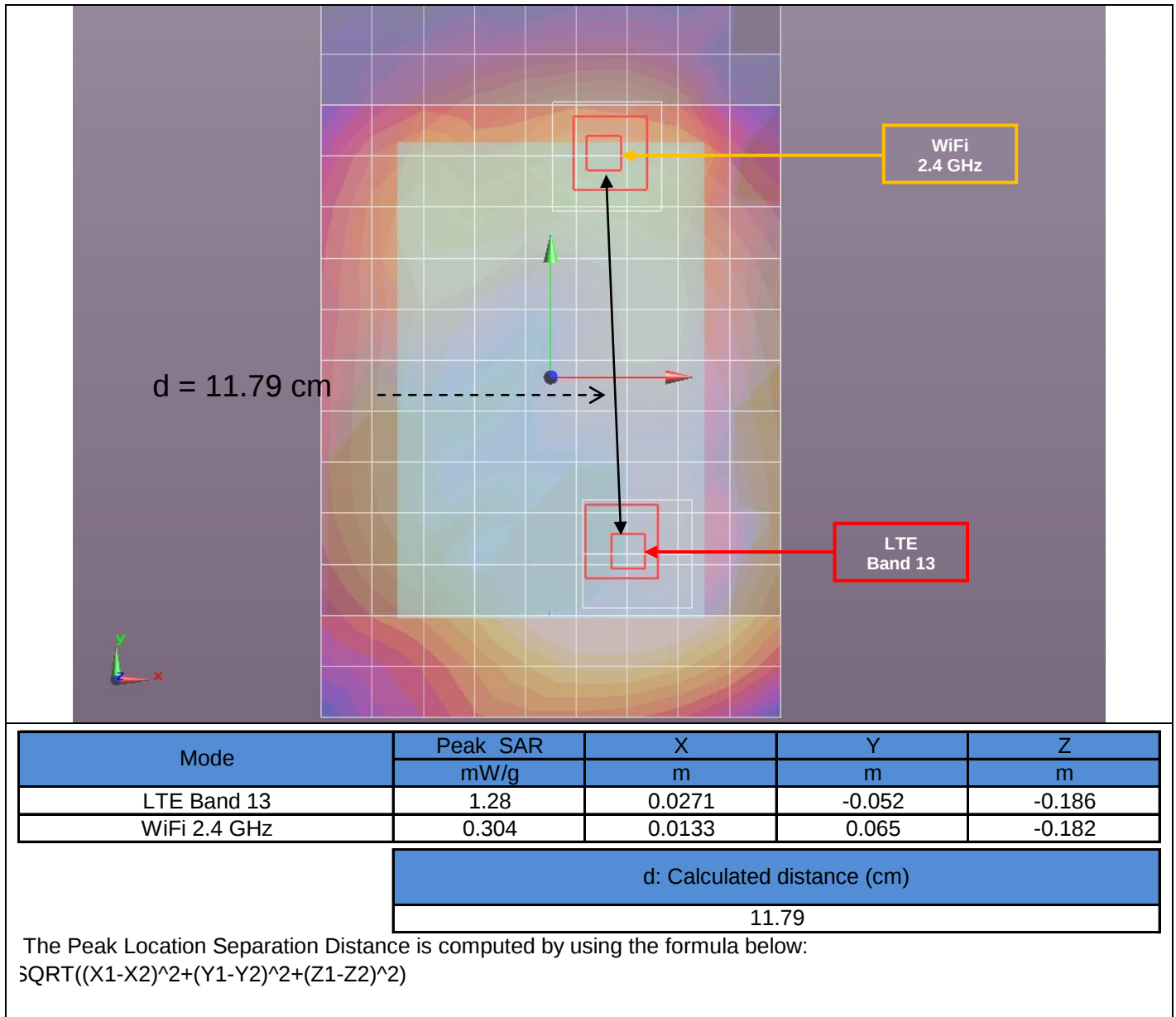


Figure (9)

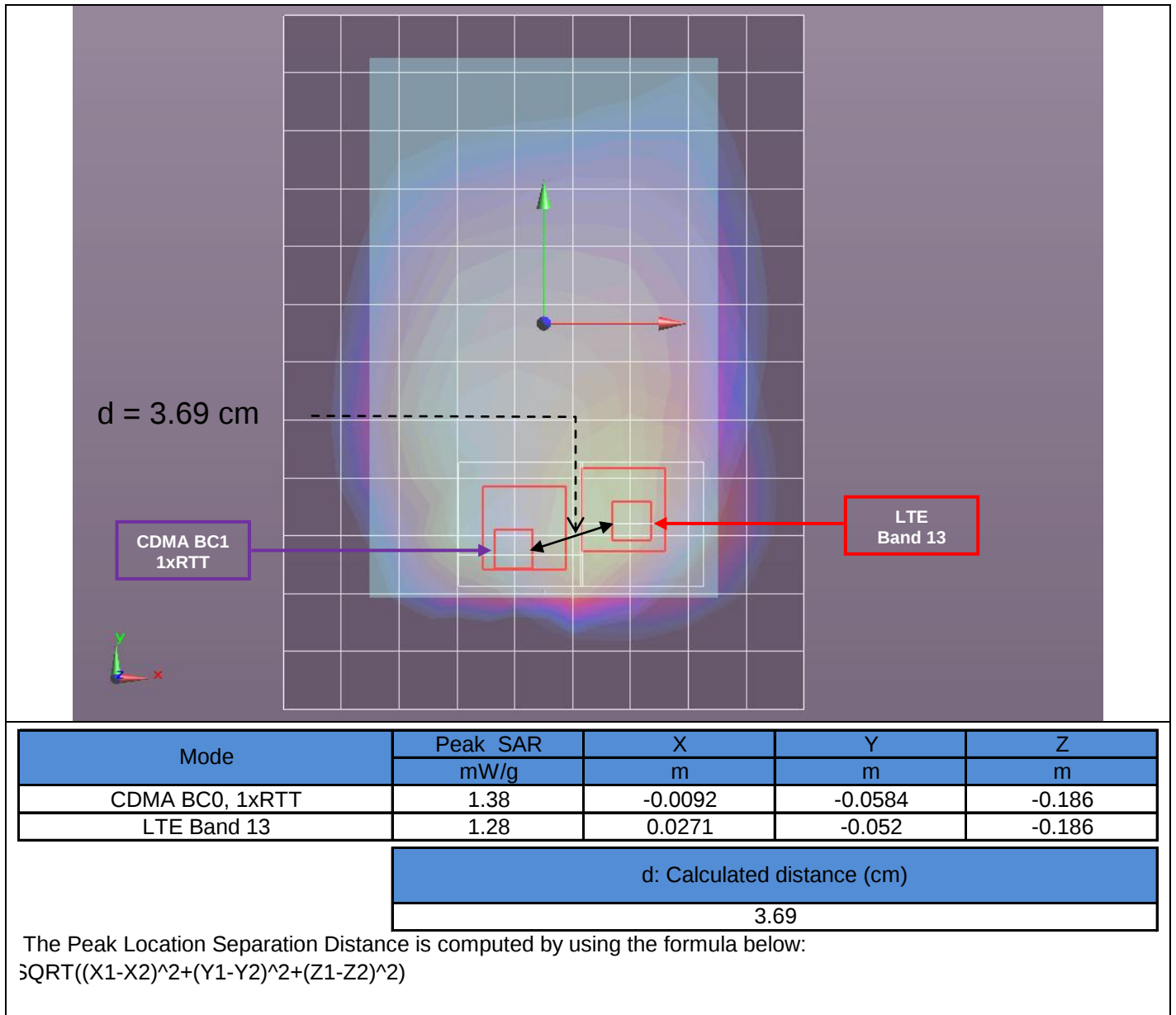


Figure (10)

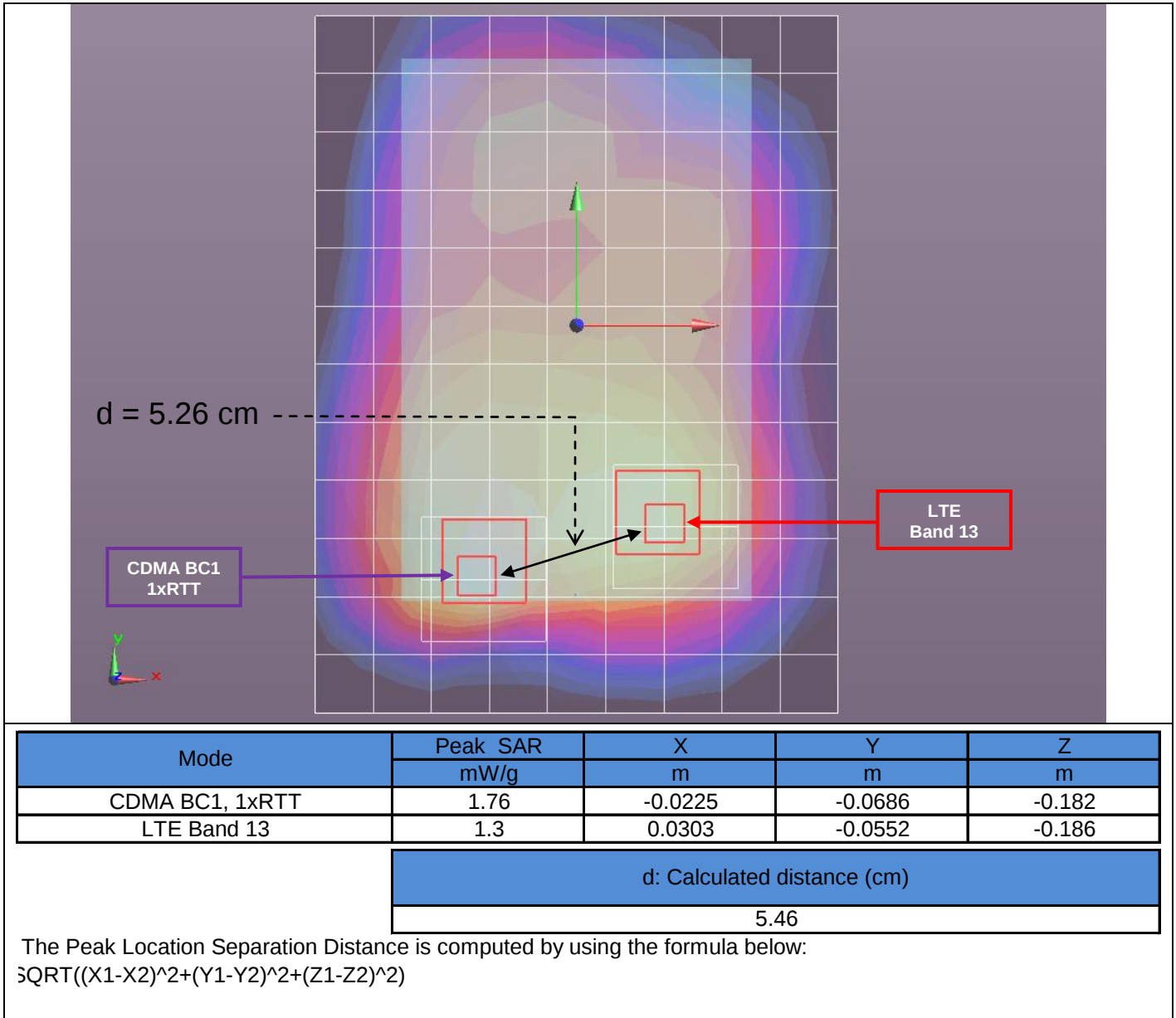
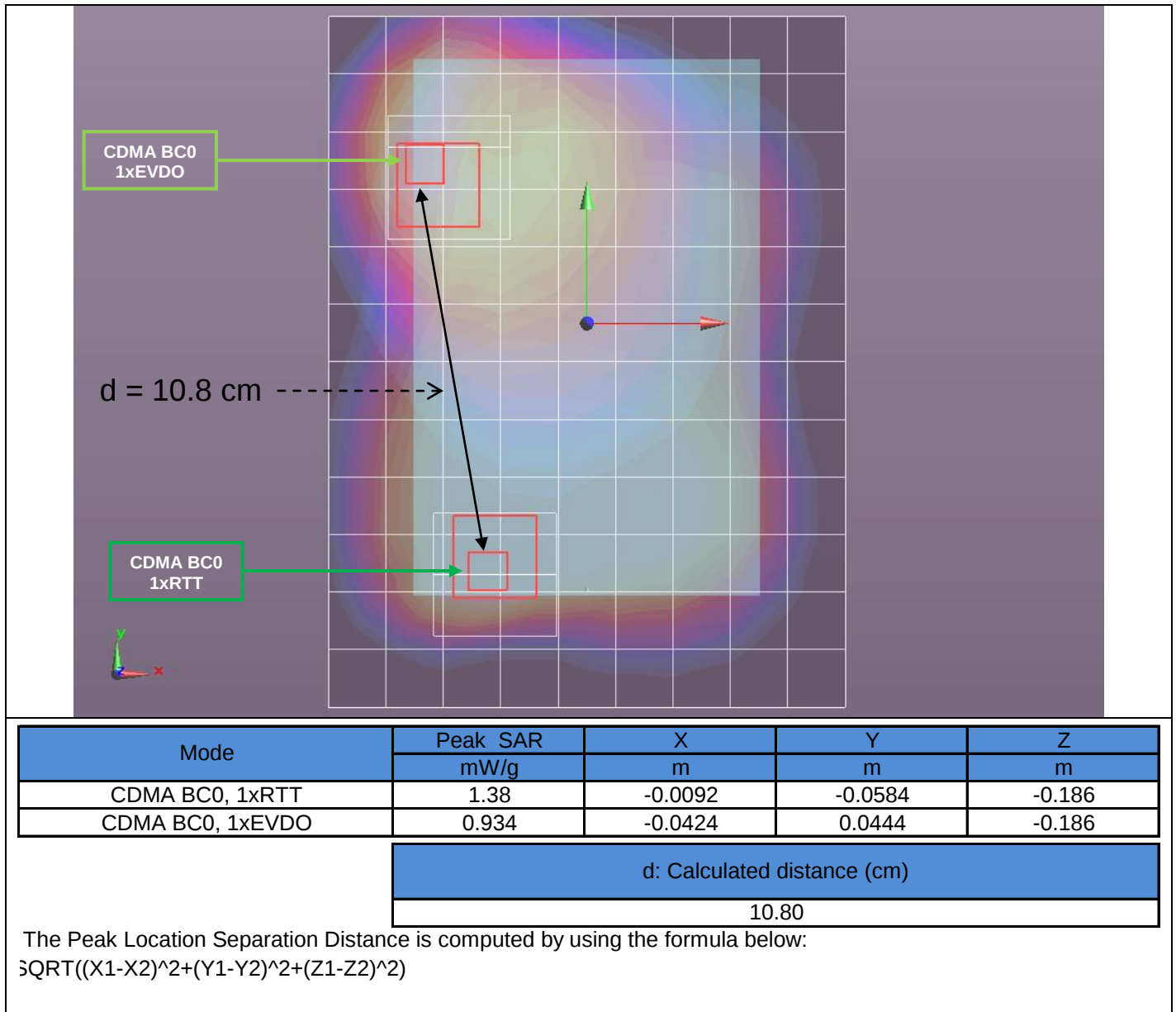


Figure (11)



15.5. Multi-Band Volume Scan Combined Results

Case #	Test position	Multi-band	Standalone Results		Multi-Band Combined Results
			Zoom Scan	Volume Scan	
4	Rear	CDMA BC0 1xRTT	0.840	0.805	1.24
		LTE Band 13	0.710	0.707	
		WiFi 2.4GHz	0.153	0.154	
5	Rear	CDMA BC1 1xRTT	0.971	0.976	1.40
		LTE Band 13	0.710	0.707	
		WiFi 2.4GHz	0.153	0.154	

Note(s):

1. See Appendix 16.9_SAR test plots for SV-LTE volume scans.
2. See Appendix 16.10_SAR test plots for SV-LTE Multi band results

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 WiFi 2.4 GHz Band**
- 16.9. SAR test plots for SV-LTE Volume Scans**
- 16.10. SAR test plots for SV-LTE Multi band results**
- 16.11. Calibration Certificate for E-Field Probe EX3DV4 - SN 3773**
- 16.12. Calibration Certificate for D750V3 - SN 1019**
- 16.13. Calibration Certificate for D835V2 - SN 4d002**
- 16.14. Calibration Certificate for D1900V2 - SN 5d043**
- 16.15. Calibration Certificate for D2450V2 - SN 748**