FCC OET BULLETIN 65 SUPPLEMENT C 01-01

IEEE Std 1528-2003 and 1528a-2005

SAR EVALUATION REPORT

For

A tablet (PAD) computer, contains 802.11a/b/g/n, BT4.0 and LTE+UMTS transceiver (radio module) Devices

Model: TP00045A1
FCC ID: PU5-TP00045A1TS

Report Number: 12U14546-3
Issue Date: 11/20/2012

Prepared for

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NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
--	10/20/2012	Initial Issue	--

Table of Contents

1. Attestation of Test Results

Applicant	Lenovo US		
DUT description	A tablet (PAD) computer, contains 802.11a/b/g/n, BT4.0 and LTE+UMTS transceiver (radio module) Devices		
Model	TP00045A1TS		
Test device is	An identical prototype		
Device category	Portable		
Exposure category	General Population/Uncontrolled Exposure		
Date tested	9/18/2012 – 10/16/2012		
FCC Rule Parts	Freq. Range	Highest 1-g SAR	Limit
22H	824 - 849	0.878 W/kg (Rear 20°Tilt@Edge 1 w/0 mm distance)	1.6 W/kg
24E	1850 -1910	1.030 W/kg (Rear 20°Tilt@Edge 1 w/0 mm distance)	
27 (LTE Band 4)	1715 - 1750	1.430 W/kg (Rear 20°Tilt@Edge 1 w/0 mm distance)	
27 (LTE Band 17)	709 - 711	0.775 W/kg (Rear/Bottom, w/0 mm distance)	
15.247	2412 - 2462	0.947 W/kg (Rear/Bottom, w/0 mm distance)	
15.407	5150 - 5250	0.916 W/kg (Rear/Bottom, w/0 mm distance)	
	5250 - 5350	1.030 W/kg (Rear/Bottom, w/0 mm distance)	
	5500 - 5700	1.360 W/kg (Rear 20°Tilt@Edge 1 w/0 mm distance)	
15.247	5725 - 5850	1.280 W/kg (Rear/Bottom, w/0 mm distance)	
Simultaneous transmission condition:		2.946 W/kg (The highest SAR across exposure conditions but SPLSR < 0.3)	
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:

Dave Weaver
Program Manager
UL CCS

Tested By:

Kent Huang
SAR Engineer
UL CCS

2. Test Methodology

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

- 447498 D01 Mobile Portable RF Exposure v04
- 941225 D01 SAR test for 3G devices v02
- 941225 D02 Guidance for 3GPP R6 and R7 HSPA v02v01
- 941225 D05 SAR for LTE Devices v01
- 941225 D06 Hot Spot SAR v01
- 248227 D01 SAR meas for 802 11abg v01r02
- 865664 SAR 3 to 6 GHz Rev SAR measurement procedures for transmitters operating in the 3 to 6 GHz range
- Power Reduction by Sensing (April/October 2012 TCB Workshop SAR Updates)

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	MY48360228	11	28	2012
ESA Series Network Analyzer	Agilent	E5071B	MY42100131	2	11	2013
Synthesized Signal Generator	HP	8665B	3438A00633	2	22	2013
E-Field Probe	SPEAG	EX3DV4	3749	1	27	2013
E-Field Probe	SPEAG	EX3DV4	3686	2	16	2013
Thermometer	ERTCO	639-1S	8350	7	30	2013
Data Acquisition Electronics	SPEAG	DAE3	500	6	13	2013
Data Acquisition Electronics	SPEAG	DAE4	1259	2	13	2013
System Validation Dipole	SPEAG	D750V3	1024	4	4	2013
System Validation Dipole	SPEAG	D835V2	4d117	4	10	2013
System Validation Dipole	SPEAG	D1750V2	1050	4	19	2013
System Validation Dipole	SPEAG	D1900V2	5d043	11	10	2012
System Validation Dipole	SPEAG	D2450V2	748	2	7	2013
System Validation Dipole	SPEAG	D5GHzV2	1075	2	14	2013
Power Meter	Agilent	N1912A	MY50001018	8	10	2013
Power Sensor A	Agilent	N10149	MY52200012	7	24	2013
Power Sensor B	Agilent	N10149	MY52020011	1	17	2013
Power Meter	HP	438A	3513U04320	9	17	2013
Power Sensor A	HP	8481A	2237A31744	8	17	2013
Power Sensor B	HP	8481A	3318A95392	8	17	2013
Amplifier	MITEQ	4D00400600-50-30P	1622052	N/A		
Directional coupler	Werlatone	C8060-102	2149	N/A		
Synthesized Signal Generator	HP	8665B	3744A01084	5	3	2013
Power Meter	HP	438A	2822A05684	10	7	2013
Power Sensor A	HP	8481A	2702A66876	8	1	2013
Power Sensor B	HP	8482A	2349A08568	4	14	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

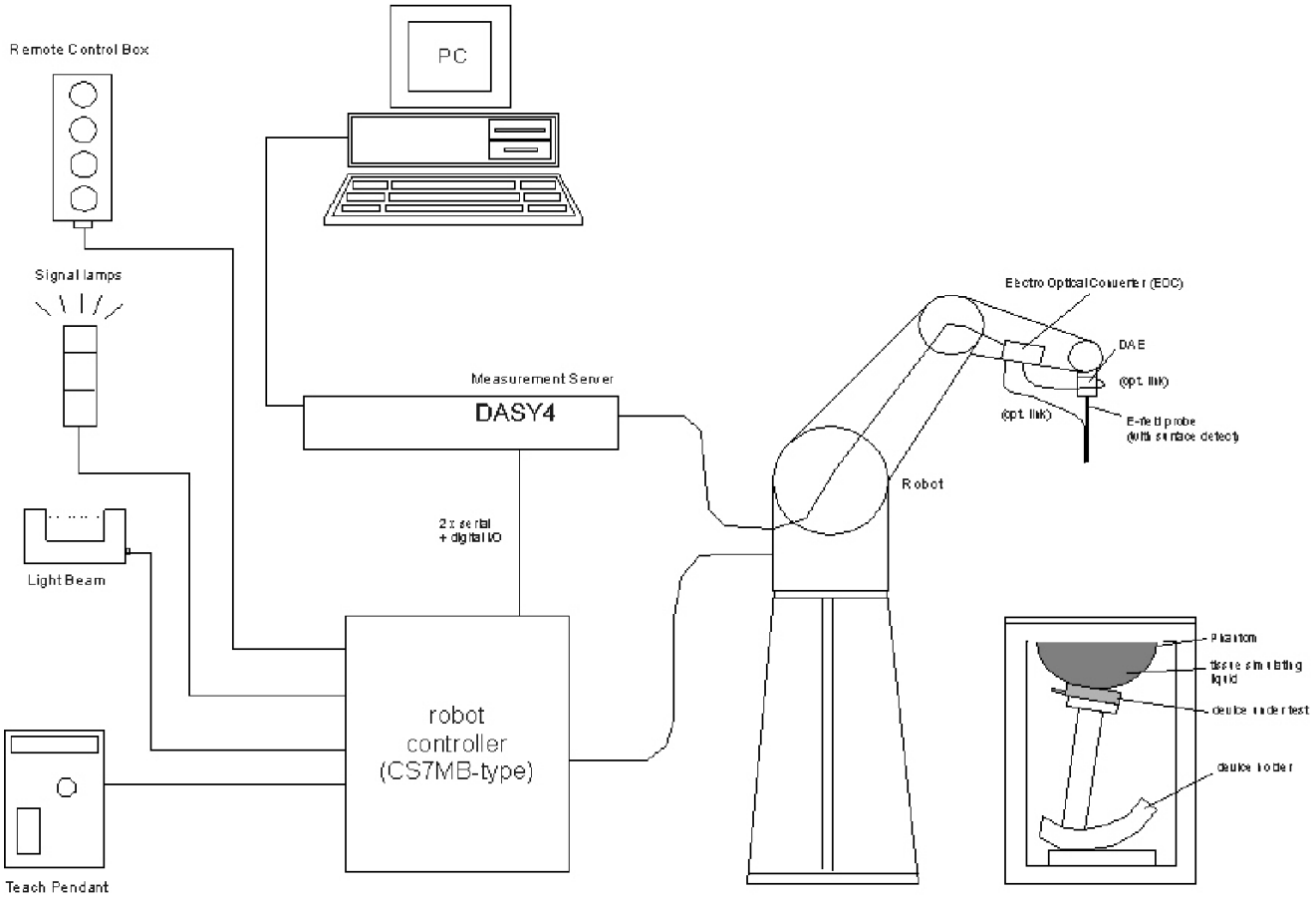
Component	Error, %	Distribution	Divisor	Sensitivity	U (Xi), %
Measurement System					
Probe Calibration (k=1)	**6.00**	Normal	1	1	6.00
Axial Isotropy	1.15	Rectangular	1.732	0.7071	0.47
Hemispherical Isotropy	2.30	Rectangular	1.732	0.7071	0.94
Boundary Effect	0.90	Rectangular	1.732	1	0.52
Probe Linearity	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	**-4.20**	Normal	1	0.64	-2.69
Liquid Permittivity - deviation from target	5.00	Rectangular	1.732	0.6	1.73
Liquid Permittivity - measurement uncertainty	**3.51**	Normal	1	0.6	2.11
				Combined Standard Uncertainty Uc(y) =	10.32
				Expanded Uncertainty U, Coverage Factor = 2, > 95 % Confidence =	20.64 %
				Expanded Uncertainty U, Coverage Factor = 2, > 95 % Confidence =	1.63 dB

Measurement uncertainty for 3 to 6 GHz averaged over 1 gram

Component	Error, %	Distribution	Divisor	Sensitivity	U (Xi), %
Measurement System					
Probe Calibration (k=1)	**6.55**	Normal	1	1	6.55
Axial Isotropy	1.15	Rectangular	1.732	0.7071	0.47
Hemispherical Isotropy	2.30	Rectangular	1.732	0.7071	0.94
Boundary Effect	0.90	Rectangular	1.732	1	0.52
Probe Linearity	3.45	Rectangular	1.732	1	1.99
System Detection Limits	1.00	Rectangular	1.732	1	0.58
Readout Electronics	1.00	Normal	1	1	1.00
Response Time	0.80	Rectangular	1.732	1	0.46
Integration Time	2.60	Rectangular	1.732	1	1.50
RF Ambient Conditions - Noise	3.00	Rectangular	1.732	1	1.73
RF Ambient Conditions - Reflections	3.00	Rectangular	1.732	1	1.73
Probe Positioner Mechanical Tolerance	0.40	Rectangular	1.732	1	0.23
Probe Positioning with respect to Phantom	2.90	Rectangular	1.732	1	1.67
Extrapolation, Interpolation and Integration	3.90	Rectangular	1.732	1	2.25
Test Sample Related					
Test Sample Positioning	1.10	Normal	1	1	1.10
Device Holder Uncertainty	3.60	Normal	1	1	3.60
Output Power Variation - SAR Drift	5.00	Rectangular	1.732	1	2.89
Phantom and Tissue Parameters					
Phantom Uncertainty (shape and thickness)	4.00	Rectangular	1.732	1	2.31
Liquid Conductivity - deviation from target	5.00	Rectangular	1.732	0.64	1.85
Liquid Conductivity - measurement	**4.20**	Normal	1	0.64	2.69
Liquid Permittivity - deviation from target	10.00	Rectangular	1.732	0.6	3.46
Liquid Permittivity - measurement uncertainty	**4.29**	Normal	1	0.6	2.57
				Combined Standard Uncertainty Uc(y), %:	11.09
				Expanded Uncertainty U, Coverage Factor = 1.96, > 95 % Confidence =	21.74 %
				Expanded Uncertainty U, Coverage Factor = 1.96, > 95 % Confidence =	1.71 dB

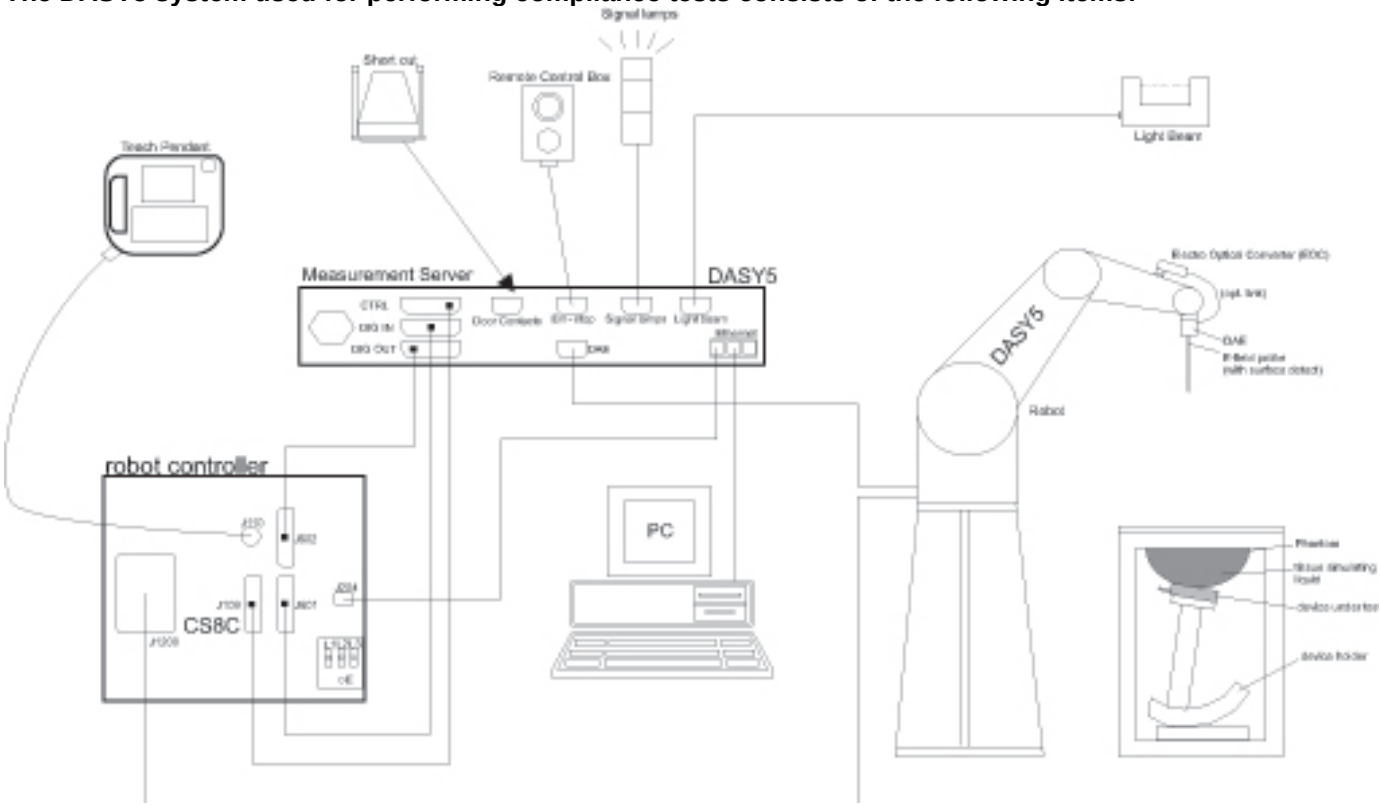
5. Measurement System Description and Setup

The DASY4 system used for performing compliance tests consists of the following items:



- A standard high precision 6-axis robot (Stäubli RX family) with controller, teach pendant and software. An arm extension for accommodating the data acquisition electronics (DAE).
- A dosimetric probe, i.e., an isotropic E-field probe optimized and calibrated for usage in tissue simulating liquid.
- 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 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.
- A probe alignment unit which improves the (absolute) accuracy of the probe positioning.
- A computer operating Windows XP.
- DASY software.
- Remote controls with teach pendant and additional circuitry for robot safety such as warning lamps, etc.
- The SAM twin phantom enabling testing left-hand and right-hand usage.
- The device holder for handheld mobile phones.
- Tissue simulating liquid mixed according to the given recipes.
- Validation dipole kits allowing validating the proper functioning of the system.

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



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

6. SAR Measurement Procedures

6.1. Normal SAR Measurement Procedure

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

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

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

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

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

6.2. Volume Scan Procedures

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

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

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

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

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

7. Device Under Test

A tablet (PAD) computer, contains 802.11a/b/g/n, BT4.0 and LTE+UMTS transceiver (radio module) Devices Models: TP00045A1 LTE+UMTS transmitter: Sierra Model: EM7700 Wi-Fi transmitter: Intel Model: 62205ANSFF		
Normal operation	Body (Rear/Bottom and each edge): Multiple display orientations supporting both portrait and landscape configurations	
Device Dimension (mm)	295 mm(L) x 188 mm(W) x 11 mm (H)	
Antenna Tested	Manufacturer	Part number
	Wistron Neweb Corporation	Wi-Fi Main Antenna: (P/N:25.90AFI.001)
	Wistron Neweb Corporation	Wi-Fi Aux. Antenna: (P/N:25.90AFJ.001)
	Amphenol	WWAN Main Antenna: (P/N: 25.90AFG.001)
	Amphenol	WWAN Aux. Antenna: (P/N: 25.90AGD.001)

7.1. Band and Air Interfaces

Air Interfaces	- W-CDMA (UMTS) Rel 99, HSDPA (Rel 7, CAT 14), HSUPA (Rel 6, CAT 6) - LTE Band 4 & 17 (QPSK & 16 QAM) - 802.11a/b/g/n HT20, HT40 - Bluetooth Ver. 4.0
Tx Frequency Bands	- W-CDMA (UMTS) Band V: 824 - 849 MHz - W-CDMA (UMTS) Band II: 1850 - 1910 MHz - LTE Band 4: 1715 - 1750 MHz - LTE Band 17: 709 - 711 MHz - 802.11a/b/g/n: 2412 - 2462 MHz - 5180 - 5240 MHz - 5260 - 5320 MHz - 5500 - 5700 MHz - 5745 - 5825 MHz Note: There are two antennas for Wi-Fi. Both antennas can transmit 2.4GHz and 5GHz bands. The Wi-Fi and BT can transmit simultaneously. The BT has a separate antenna. - Bluetooth: 2402 - 2480 MHz Note: Bluetooth operation is provided by the installation of a module (FCC ID QDS-BRCM1067) and is not part of the DUT's FCC ID for this application.

7.2. Accessories

A docking station or keyboard with stand are available for this device.

Both accessories restrict the DUT to being used upright (edge 3 to the user). Use of the docking station or keyboard with stand will increase the separation distance between the edge 3 and the user by the thickness of the accessory. Edge 3 SAR measurements were performed at zero separation distance which constitutes the most conservative scenario. Additional testing with the docking station or keyboard with stand was considered unnecessary.

7.3. Simultaneous Transmission

No.	Conditions	Head	Body	Hotspot
1	W-CDMA (UMTS) Band V+ Wi-Fi 2.4GHz	☐	☒	☒
2	W-CDMA (UMTS) Band V+ Wi-Fi 5GHz	☐	☒	☐
3	W-CDMA (UMTS) Band II+ Wi-Fi 2.4GHz	☐	☒	☒
4	W-CDMA (UMTS) Band II+ Wi-Fi 5GHz	☐	☒	☐
5	W-CDMA (UMTS) Band V+ BT	☐	☒	☐
6	W-CDMA (UMTS) Band II+ BT	☐	☒	☐
7	LTE Band 4 + Wi-Fi 2.4GHz	☐	☒	☒
8	LTE Band 4 + Wi-Fi 5GHz	☐	☒	☐
9	LTE Band 17 + Wi-Fi 2.4GHz	☐	☒	☒
10	LTE Band 17 + Wi-Fi 5GHz	☐	☒	☐
11	LTE Band 4 + BT	☐	☒	☐
12	LTE Band 17 + BT	☐	☒	☐
13	Wi-Fi 5GHz Bands + BT	☐	☒	☐
14	Wi-Fi 2.4GHz Bands + BT	☐	☒	☐

Note(s):

1. As the tablet has been assessed in accordance with KDB 447498, which has more conservative measurement distances than KDB 941225, further assessment in accordance with KDB 941225 is judged unnecessary.

7.4. Hotspot (Wireless router) Exposure Condition

The device is capable of personal hotspot mode. The hotspot mode can be enabled by the user.
As the DUT has a form factor >9 cm x 5 cm the hotspot procedures from 941225 D06 Hot Spot SAR v01 do not apply.

7.5. KDB 941225 D05 SAR for LTE Devices v01

As per 3GPP TS 36.101 v10.3.0 (2011-09), Release 10.4

<table>
<tr><th>Item</th><th>Description</th><th colspan="2">Information</th></tr>
<tr><td>1</td><td>Identify the operating frequency range of each LTE transmission band used by the device</td><td>Band 17:
Tx: 704 – 716 MHz
Rx: 734 – 746 MHz</td><td>Band 4:
Tx 1710 – 1755 MHz
Rx 2100 – 2155 MHz</td></tr>
<tr><td>2</td><td>Identify the channel bandwidths used in each frequency band; 1.4, 3, 5, 10, 15, 20 MHz etc</td><td colspan="2">Band 4: 10MHz
Band 17: 10 MHz</td></tr>
<tr><td>3</td><td>Identify the high, middle and low (H, M, L) channel numbers and frequencies in each LTE frequency band</td><td colspan="2">
<table>
<tr><td rowspan="3">Band 4</td><td>Channel Bandwidth</td></tr>
<tr><td>10 MHz</td></tr>
<tr><td>Ch. # / Freq. (MHz)</td></tr>
<tr><td>Low</td><td>20000/1715</td></tr>
<tr><td>Mid</td><td>20175/1732.5</td></tr>
<tr><td>High</td><td>20350/1750</td></tr>
<tr><td rowspan="3">Band 17</td><td>Channel Bandwidth</td></tr>
<tr><td>10 MHz</td></tr>
<tr><td>Ch. # / Freq. (MHz)</td></tr>
<tr><td>Low</td><td>23780/709</td></tr>
<tr><td>Mid</td><td>23790/710</td></tr>
<tr><td>High</td><td>23800/711</td></tr>
</table>
</td></tr>
<tr><td>4</td><td>Specify the UE category and uplink modulations used</td><td colspan="2">UE Category: 3
Uplink Modulations: QPSK, 16QAM</td></tr>
<tr><td>5</td><td>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.</td><td colspan="2">A Single antenna is used for LTE and other wireless modes (UMTS) for both Transmit and Receive.</td></tr>
<tr><td>6</td><td>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.</td><td colspan="2">Data Only device.
Exposure Conditions:
• Body – Rear/Bottom and Top-edge (Edge 1) of the DUT at a separation distance of 0 cm from the flat phantom.
• With Proximity Sensor Power back-off disabled
○ Rear/ Bottom of the DUT at the separation distance of 14 mm to the flat phantom.
○ Top-edge (Edge 1) of the DUT at the separation distance of 14 mm to the flat phantom.</td></tr>
<tr><td>7</td><td>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.</td><td colspan="2">As per 3GPP TS 36.101 v10.3.0 (2011-09), Release 10.4
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 and is mandatory when power reduction due to proximity sensor activation is disabled.
MPR is disabled when power reduction due to proximity sensor activation is enabled.
A-MPR is supported by design, but is disabled for SAR testing.
A-MPR is disabled, by using Network Setting value of NS_01.</td></tr>
</table>

KDB 941225 D05 SAR for LTE Devices v01 (Continued)

<table>
<tr><th>Item</th><th>Description</th><th colspan="2">Information</th></tr>
<tr><td>8</td><td>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</td><td colspan="2">Refer to
• Section 10.3 (LTE Band 4)
• Section 10.4 (LTE Band 17)</td></tr>
<tr><td rowspan="12">9</td><td rowspan="12">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</td><td>Band</td><td>Transmit Frequencies</td></tr>
<tr><td rowspan="2">802.11a/b/g/n</td><td>2412 – 2472 MHz</td></tr>
<tr><td>5150 – 5850 MHz</td></tr>
<tr><td>Bluetooth</td><td>2402 – 2480 MHz</td></tr>
<tr><td>Mode</td><td>Uplink Modulations</td></tr>
<tr><td>UMTS Rel 99</td><td>BPSK, QPSK</td></tr>
<tr><td>HSDPA (Rel 7, CAT 14)</td><td>BPSK, QPSK</td></tr>
<tr><td>HSUPA (Rel 6, CAT 6)</td><td>BPSK, QPSK</td></tr>
<tr><td>HSPA+ (Rel 6, CAT 6)</td><td>BPSK, QPSK</td></tr>
<tr><td>802.11a/b/g/n</td><td>DSSS CCK, OFDM</td></tr>
<tr><td>Bluetooth 4.0</td><td>DQPSK, 8DPSK, GFSK</td></tr>
<tr><td colspan="2">Data Only device.
Exposure Conditions:
• Body – Rear/Bottom and Top-edge (Edge 1) of the DUT at a separation distance of 0 cm from the flat phantom.
• With Proximity Sensor Power back-off disabled
○ Rear/Bottom surface of the DUT at the separation distance of 14 mm to the flat phantom.
○ Top-edge (Edge 1) of the DUT at the separation distance of 14 mm to the flat phantom.</td></tr>
<tr><td>10</td><td>Include the maximum average conducted output power measured for the other wireless mode and frequency bands</td><td colspan="2">Refer to section 10.1,10.2, 10.5 and 10.6</td></tr>
<tr><td>11</td><td>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.)</td><td colspan="2">• WWAN Radio (UMTS/ LTE) can transmit simultaneously with Wi-Fi 2.4GHz/BT Radio.
• Wi-Fi 2.4GHz Radio can transmit simultaneously with Bluetooth Radio.
• Wi-Fi 5GHz Radio can transmit simultaneously with Bluetooth Radio.</td></tr>
</table>

KDB 941225 D05 SAR for LTE Devices v01 (Continued)

Item	Description	Information
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	Yes. A Proximity sensor for cellular power reduction is implemented in the device to address RF exposure compliance when the cellular antenna is positioned close to the user's body or other objects.
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	The transmit power cap normally enabled by the proximity sensor, can be disabled by using a series of test commands which are only available in development software. The software provided on production units will not allow the proximity sensor or the power cap to be disabled.
14	When appropriate, include a SAR test plan proposal with respect to the above	
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

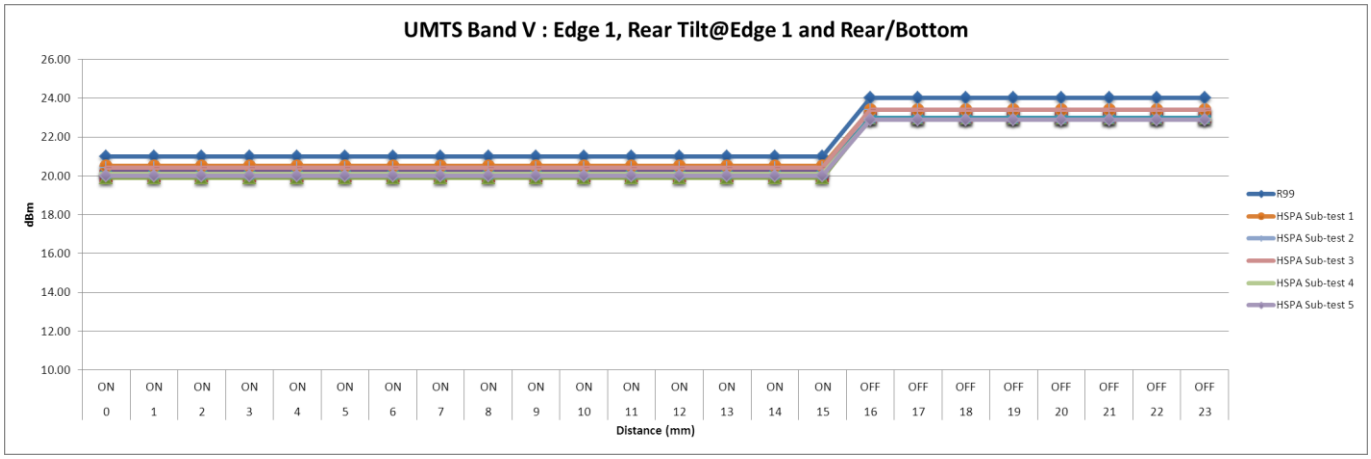
7.6. Power Reduction Implementation

When a proximity sensor is enabled, system will reduce the WWAN module TX power. The proximity sensor covers the Rear/Bottom and Top-edge (Edge 1) of the DUT and the trigger distances are:

- 15 mm from Rear/Bottom of the DUT
- 15 mm from Top-edge (Edge 1) of the DUT

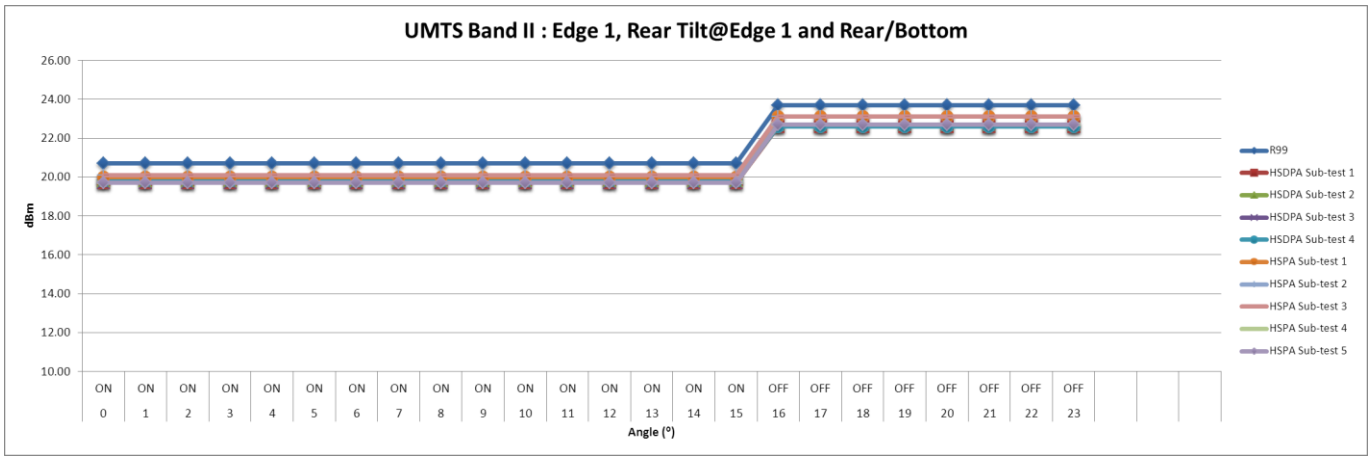
7.7. Summary Table of Power Reduction dB Levels per Mode & Band

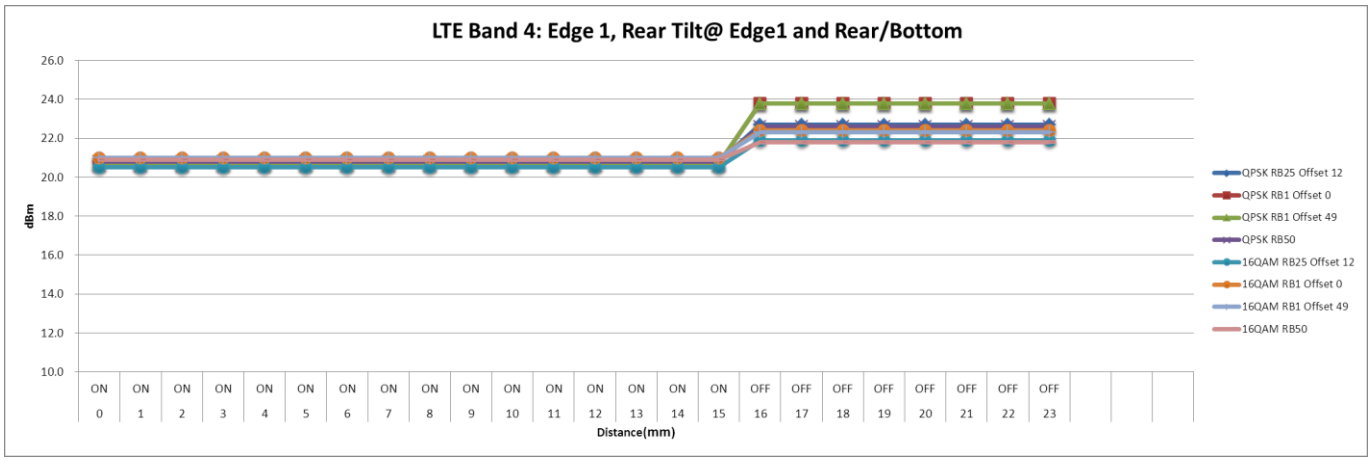
Edge 1, Rear Tilt@ Edge 1 and Rear/Bottom (UMTS Band V)																									
Distance (mm):	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Proximity sensor with reduced power activation:	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
R99	21.00	21.00	21.00	21.00	21.00	21.00	21.00	21.00	21.00	21.00	21.00	21.00	21.00	21.00	21.00	21.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00
HSDPA Sub-test 1	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00
HSDPA Sub-test 2	19.90	19.90	19.90	19.90	19.90	19.90	19.90	19.90	19.90	19.90	19.90	19.90	19.90	19.90	19.90	19.90	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00
HSDPA Sub-test 3	20.20	20.20	20.20	20.20	20.20	20.20	20.20	20.20	20.20	20.20	20.20	20.20	20.20	20.20	20.20	20.20	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00
HSDPA Sub-test 4	20.10	20.10	20.10	20.10	20.10	20.10	20.10	20.10	20.10	20.10	20.10	20.10	20.10	20.10	20.10	20.10	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00
HSPA Sub-test 1	20.50	20.50	20.50	20.50	20.50	20.50	20.50	20.50	20.50	20.50	20.50	20.50	20.50	20.50	20.50	20.50	23.40	23.40	23.40	23.40	23.40	23.40	23.40	23.40
HSPA Sub-test 2	20.40	20.40	20.40	20.40	20.40	20.40	20.40	20.40	20.40	20.40	20.40	20.40	20.40	20.40	20.40	20.40	23.40	23.40	23.40	23.40	23.40	23.40	23.40	23.40
HSPA Sub-test 3	20.40	20.40	20.40	20.40	20.40	20.40	20.40	20.40	20.40	20.40	20.40	20.40	20.40	20.40	20.40	20.40	23.40	23.40	23.40	23.40	23.40	23.40	23.40	23.40
HSPA Sub-test 4	20.10	20.10	20.10	20.10	20.10	20.10	20.10	20.10	20.10	20.10	20.10	20.10	20.10	20.10	20.10	20.10	22.90	22.90	22.90	22.90	22.90	22.90	22.90	22.90
HSPA Sub-test 5	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	22.90	22.90	22.90	22.90	22.90	22.90	22.90	22.90



Summary Table of Power Reduction dB Levels per Mode & Band (continued)

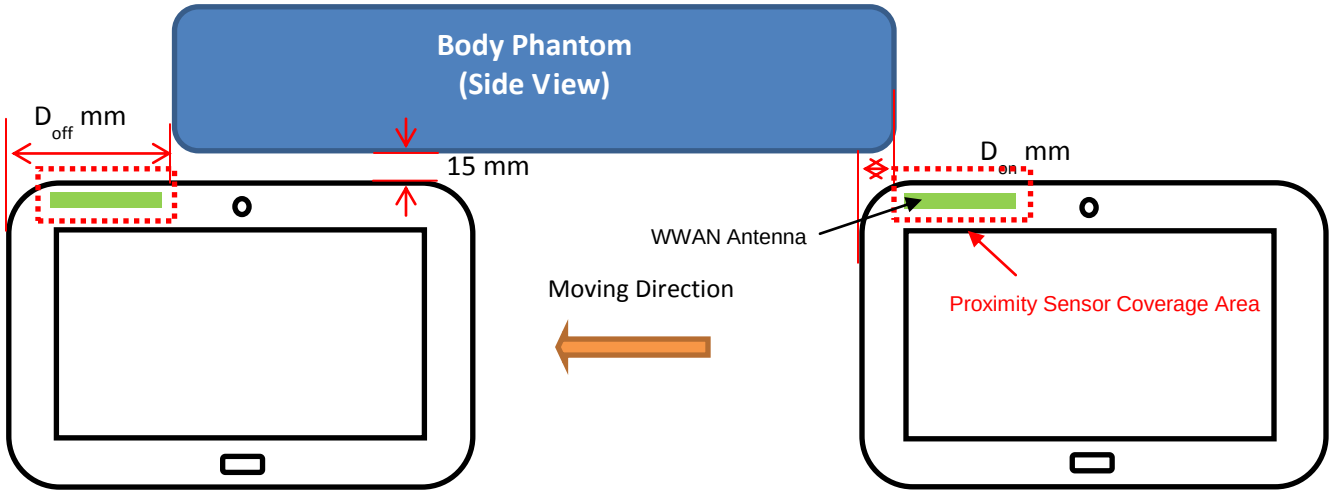
Edge 1, Rear Tilt@ Edge 1 and Rear/Bottom (UMTS Band II)																								
Distance (mm):	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Proximity sensor with reduced power activation:	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
R99	20.70	20.70	20.70	20.70	20.70	20.70	20.70	20.70	20.70	20.70	20.70	20.70	20.70	20.70	20.70	20.70	23.70	23.70	23.70	23.70	23.70	23.70	23.70	23.70
HSDPA Sub-test 1	19.70	19.70	19.70	19.70	19.70	19.70	19.70	19.70	19.70	19.70	19.70	19.70	19.70	19.70	19.70	19.70	22.60	22.60	22.60	22.60	22.60	22.60	22.60	22.60
HSDPA Sub-test 2	19.80	19.80	19.80	19.80	19.80	19.80	19.80	19.80	19.80	19.80	19.80	19.80	19.80	19.80	19.80	19.80	22.70	22.70	22.70	22.70	22.70	22.70	22.70	22.70
HSDPA Sub-test 3	19.70	19.70	19.70	19.70	19.70	19.70	19.70	19.70	19.70	19.70	19.70	19.70	19.70	19.70	19.70	19.70	22.70	22.70	22.70	22.70	22.70	22.70	22.70	22.70
HSDPA Sub-test 4	19.80	19.80	19.80	19.80	19.80	19.80	19.80	19.80	19.80	19.80	19.80	19.80	19.80	19.80	19.80	19.80	22.60	22.60	22.60	22.60	22.60	22.60	22.60	22.60
HSPA Sub-test 1	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	23.10	23.10	23.10	23.10	23.10	23.10	23.10	23.10
HSPA Sub-test 2	20.10	20.10	20.10	20.10	20.10	20.10	20.10	20.10	20.10	20.10	20.10	20.10	20.10	20.10	20.10	20.10	23.10	23.10	23.10	23.10	23.10	23.10	23.10	23.10
HSPA Sub-test 3	20.10	20.10	20.10	20.10	20.10	20.10	20.10	20.10	20.10	20.10	20.10	20.10	20.10	20.10	20.10	20.10	23.10	23.10	23.10	23.10	23.10	23.10	23.10	23.10
HSPA Sub-test 4	19.70	19.70	19.70	19.70	19.70	19.70	19.70	19.70	19.70	19.70	19.70	19.70	19.70	19.70	19.70	19.70	22.70	22.70	22.70	22.70	22.70	22.70	22.70	22.70
HSPA Sub-test 5	19.70	19.70	19.70	19.70	19.70	19.70	19.70	19.70	19.70	19.70	19.70	19.70	19.70	19.70	19.70	19.70	22.70	22.70	22.70	22.70	22.70	22.70	22.70	22.70
Edge 1, Rear Tilt@ Edge 1 and Rear/Base (LTE Band 4)																								
Distance (mm):	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Proximity sensor with reduced power activation:	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
QPSK RB25 Offset 12	20.8	20.8	20.8	20.8	20.8	20.8	20.8	20.8	20.8	20.8	20.8	20.8	20.8	20.8	20.8	20.8	22.7	22.7	22.7	22.7	22.7	22.7	22.7	22.7
QPSK RB1 Offset 0	20.7	20.7	20.7	20.7	20.7	20.7	20.7	20.7	20.7	20.7	20.7	20.7	20.7	20.7	20.7	20.7	23.8	23.8	23.8	23.8	23.8	23.8	23.8	23.8
QPSK RB1 Offset 49	20.7	20.7	20.7	20.7	20.7	20.7	20.7	20.7	20.7	20.7	20.7	20.7	20.7	20.7	20.7	20.7	23.8	23.8	23.8	23.8	23.8	23.8	23.8	23.8
QPSK RB50	20.8	20.8	20.8	20.8	20.8	20.8	20.8	20.8	20.8	20.8	20.8	20.8	20.8	20.8	20.8	20.8	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6
16QAM RB25 Offset 12	20.5	20.5	20.5	20.5	20.5	20.5	20.5	20.5	20.5	20.5	20.5	20.5	20.5	20.5	20.5	20.5	21.9	21.9	21.9	21.9	21.9	21.9	21.9	21.9
16QAM RB1 Offset 0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	22.4	22.4	22.4	22.4	22.4	22.4	22.4	22.4
16QAM RB1 Offset 49	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	22.3	22.3	22.3	22.3	22.3	22.3	22.3	22.3
16QAM RB50	20.9	20.9	20.9	20.9	20.9	20.9	20.9	20.9	20.9	20.9	20.9	20.9	20.9	20.9	20.9	20.9	21.8	21.8	21.8	21.8	21.8	21.8	21.8	21.8





8. Sensor Coverage Area

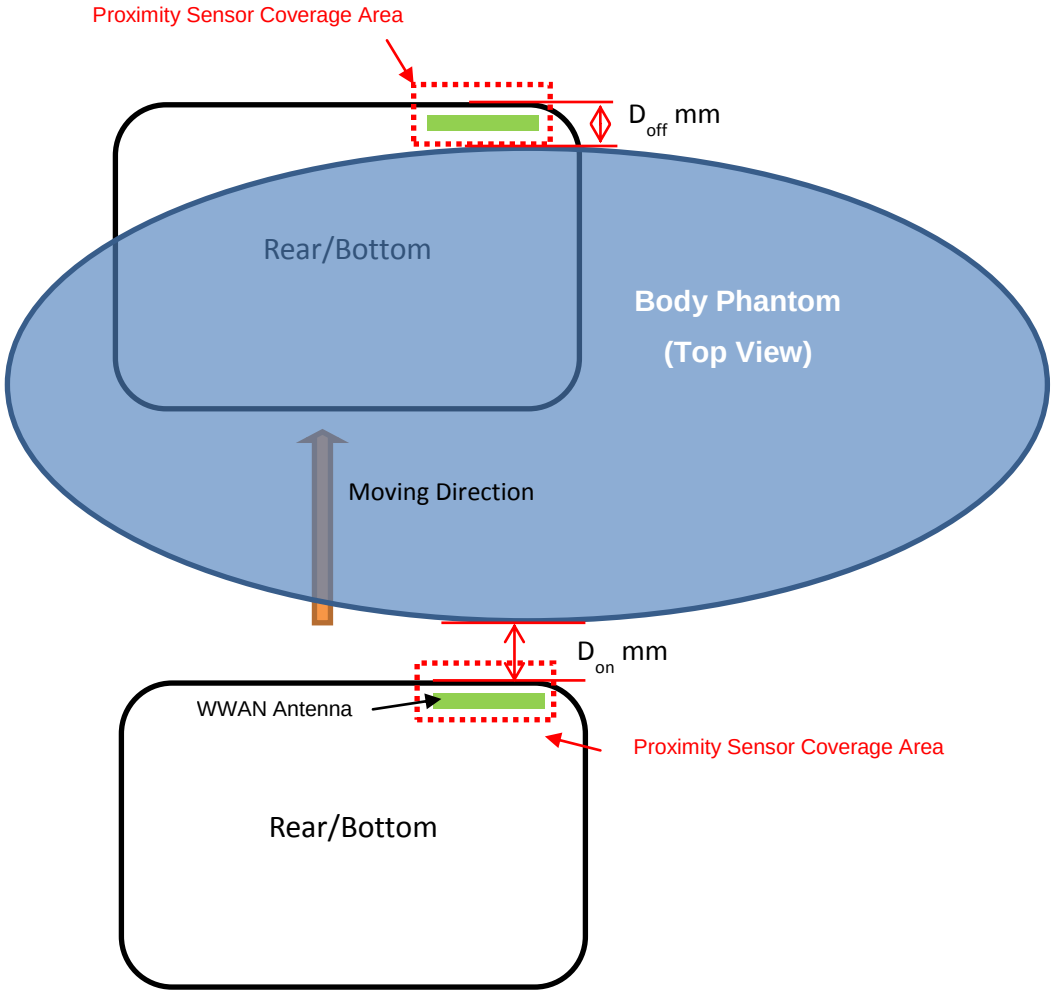
8.1. Edge Coverage



The DUT is positioned perpendicular to the phantom with the test separation distance, 14 mm, away from the phantom. The DUT is moved laterally to find the distance of triggering sensor on and off

- The minimum distance from the secondary portrait (Edge 4) to the edge of body phantom to trigger proximity sensor on, D_{on}, is 15 mm.
- The minimum distance from the secondary portrait (Edge 4) to the edge of body phantom to trigger proximity sensor off, D_{off}, is 130 mm.

8.2. Rear/Bottom Coverage



The DUT is positioned under the phantom with the test separation distance, 14 mm, away from the phantom. The DUT is moved laterally to find the distance of triggering sensor on and off

- The minimum distance from the secondary landscape (Edge 1) to the edge of body phantom to trigger proximity sensor on, D_{on}, is 15 mm.
- The minimum distance from the secondary landscape (Edge 1) to the edge of body phantom to trigger proximity sensor off, D_{off}, is 15 mm.

9. Summary of Test Configurations

The following test configurations are based on KDB 447498 4) b) Tablet Mode

9.1. Body Exposure Conditions for WWAN & LTE

Test Configurations	Antenna-to-edge/surface	SAR Required	Note
Rear/Bottom	<25 mm	Yes	
Rear 20° Tilt (Tilt @Edge1)	< 25 mm	Yes	
Edge 1	3.5 mm	Yes	
Edge 2	198 mm	No	This is not the most conservative antenna-to-user distance at edge mode as per KDB 447498 4) b) ii) (2)
Edge 3	175 mm	No	This is not the most conservative antenna-to-user distance at edge mode as per KDB 447498 4) b) ii) (2)
Edge 4	30 mm	No	This is not the most conservative antenna-to-user distance at edge mode as per KDB 447498 4) b) ii) (2)

9.2. Body Exposure Conditions for Wi-Fi (Main Antenna)

Test Configurations	Antenna-to-edge/surface	SAR Required	Note
Rear/Bottom	< 25 mm	Yes	
Rear 20° Tilt (Tilt @Edge1)	< 25 mm	Yes	
Edge 1	3.5 mm	Yes	
Edge 2	48 mm	No	This is not the most conservative antenna-to-user distance at edge mode as per KDB 447498 4) b) ii) (2)
Edge 3	172 mm	No	This is not the most conservative antenna-to-user distance at edge mode as per KDB 447498 4) b) ii) (2)
Edge 4	223 mm	No	This is not the most conservative antenna-to-user distance at edge mode as per KDB 447498 4) b) ii) (2)

9.3. Body Exposure Conditions for Wi-Fi (Aux Antenna)

Test Configurations	Antenna-to-edge/surface	SAR Required	Note
Rear/Bottom	< 25 mm	Yes	
Rear 20° Tilt (Tilt @Edge1)	< 25 mm	Yes	
Edge 1	133 mm	No	This is not the most conservative antenna-to-user distance at edge mode as per KDB 447498 4) b) ii) (2)
Edge 2	3.5 mm	Yes	
Edge 3	31 mm	No	This is not the most conservative antenna-to-user distance at edge mode as per KDB 447498 4) b) ii) (2)
Edge 4	282 mm	No	This is not the most conservative antenna-to-user distance at edge mode as per KDB 447498 4) b) ii) (2)

9.4. Rear 20° Tilt testing justification

The rear of the DUT has a 20° bevel along each edge. As a result the most conservative antenna-to-user distance occurs when the beveled edge is placed directly against the user's body. Testing with the beveled edge placed directly against the phantom was considered necessary to ensure compliance.

10. RF Output Power Measurement

10.1. WCDMA (UMTS) Band V

Target Power: 23 dBm (W/o Pwr back-off)
20 dBm (W/ Pwr back-off)
Tune-up Tolerance: -1.0dB / +1.0dB

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
	βc/βd	8/15

Results

Band	Mode	UL Ch No.	Freq. (MHz)	Tx Conducted Pwr (dBm)	
				W/o Pwr back-off	W/ Pwr back-off
W-CDMA (UMTS) Band V	Rel 99 (RMC, 12.2 kbps)	4132	826.4	24.0	21.0
		4183	836.6	23.8	21.0
		4233	846.6	23.8	21.0

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			
	βc	2/15	12/15	15/15	15/15
	βd	15/15	15/15	8/15	4/15
	Bd (SF)	64			
	βc/βd	2/15	12/15	15/8	15/4
	βhs	4/15	24/15	30/15	30/15
	CM (dB)	0	1	1.5	1.5
HSDPA Specific Settings	D_{ACK}	8			
	D_{NAK}	8			
	DCQI	8			
	Ack-Nack repetition factor	3			
	CQI Feedback (Table 5.2B.4)	4ms			
	CQI Repetition Factor (Table 5.2B.4)	2			
	Ahs =βhs/βc	30/15			

Results

Band	Mode	UL Ch No.	Freq. (MHz)	Tx Conducted Pwr (dBm)	
				W/o Pwr back-off	W/ Pwr back-off
W-CDMA (UMTS) Band V	Subtest 1	4132	826.4	23.0	20.0
		4183	836.6	22.8	19.9
		4233	846.6	22.9	20.0
	Subtest 2	4132	826.4	23.0	19.9
		4183	836.6	22.8	20.0
		4233	846.6	22.9	19.9
	Subtest 3	4132	826.4	23.0	20.2
		4183	836.6	22.8	20.0
		4233	846.6	22.9	19.9
	Subtest 4	4132	826.4	23.0	20.1
		4183	836.6	22.8	19.9
		4233	846.6	22.9	20.0

Note(s):

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

HSPA (HSDPA & HSUPA)

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

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

Results

Band	Mode	UL Ch No.	Freq. (MHz)	Tx Conducted Pwr (dBm)	
				W/o Pwr back-off	W/ Pwr back-off
WCDMA (UMTS) Band V	Subtest 1	4132	826.4	23.4	20.5
		4183	836.6	23.3	20.3
		4233	846.6	23.1	20.3
	Subtest 2	4132	826.4	23.4	20.4
		4183	836.6	23.3	20.3
		4233	846.6	23.2	20.3
	Subtest 3	4132	826.4	23.4	20.5
		4183	836.6	23.3	20.4
		4233	846.6	23.2	20.3
	Subtest 4	4132	826.4	22.9	20.0
		4183	836.6	22.9	20.1
		4233	846.6	22.9	20.0
	Subtest 5	4132	826.4	22.9	20.0
		4183	836.6	22.7	19.7
		4233	846.6	22.8	19.9

Note(s):

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

HSPA+

Since 16QAM is not used for uplink, the uplink Category and release is same as HSUPA, i.e., CAT 6 Rel 6. Therefore, the RF conducted power is not measured.

10.2. WCDMA (UMTS) Band II

Target Power: 23 dBm (W/o Pwr back-off)
20 dBm (W/ Pwr back-off)
Tune-up Tolerance: -1.0dB / +0.5dB

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
	βc/βd	8/15

Results

Band	Mode	UL Ch No.	Freq. (MHz)	Tx Conducted Pwr (dBm)	
				W/o Pwr back-off	W/ Pwr back-off
UMTS (WCDMA) Band II	Rel 99 (RMC, 12.2 kbps)	9262	1852.4	23.7	20.6
		9400	1880.0	23.7	20.6
		9538	1907.6	23.7	20.7

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			
	βc	2/15	12/15	15/15	15/15
	βd	15/15	15/15	8/15	4/15
	Bd (SF)	64			
	βc/βd	2/15	12/15	15/8	15/4
	βhs	4/15	24/15	30/15	30/15
	CM (dB)	0	1	1.5	1.5
HSDPA Specific Settings	D_{ACK}	8			
	D_{NAK}	8			
	DCQI	8			
	Ack-Nack repetition factor	3			
	CQI Feedback (Table 5.2B.4)	4ms			
	CQI Repetition Factor (Table 5.2B.4)	2			
	Ahs =βhs/βc	30/15			

Results

Band	Mode	UL Ch No.	Freq. (MHz)	Tx Conducted Pwr (dBm)	
				W/o Pwr back-off	W/ Pwr back-off
W-CDMA (UMTS) Band II	Subtest 1	9262	1852.4	22.6	19.7
		9400	1880.0	22.4	19.5
		9538	1907.6	22.4	19.5
	Subtest 2	9262	1852.4	22.7	19.8
		9400	1880.0	22.5	19.5
		9538	1907.6	22.6	19.5
	Subtest 3	9262	1852.4	22.7	19.7
		9400	1880.0	22.5	19.5
		9538	1907.6	22.6	19.5
	Subtest 4	9262	1852.4	22.6	19.8
		9400	1880.0	22.6	19.4
		9538	1907.6	22.6	19.5

Note(s):

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

HSPA (HSDPA & HSUPA)

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

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

Results

Band	Mode	UL Ch No.	Freq. (MHz)	Tx Conducted Pwr (dBm)	
				W/o Pwr back-off	W/ Pwr back-off
WCDMA (UMTS) Band II	Subtest 1	9262	1852.4	23.1	20.0
		9400	1880.0	23.1	20.0
		9538	1907.6	23.0	20.0
	Subtest 2	9262	1852.4	23.1	20.1
		9400	1880.0	23.0	20.0
		9538	1907.6	23.1	20.0
	Subtest 3	9262	1852.4	23.1	20.1
		9400	1880.0	23.0	20.0
		9538	1907.6	23.0	20.1
	Subtest 4	9262	1852.4	22.7	19.7
		9400	1880.0	22.5	19.6
		9538	1907.6	22.5	19.5
	Subtest 5	9262	1852.4	22.7	19.7
		9400	1880.0	22.5	19.5
		9538	1907.6	22.5	19.5

Note(s):

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

HSPA+

Since 16QAM is not used for uplink, the uplink Category and release is same as HSUPA, i.e., CAT 6 Rel 6. Therefore, the RF conducted power is not measured.

10.3. LTE Band 4

Target Power: 23 dBm (W/o Pwr back-off)
20 dBm (W/ Pwr back-off)
Tune-up Tolerance: -1.0dB / +1.0dB

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 6.6.3.3.2	13	10	Table 6.2.4-2	Table 6.2.4-2
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.

Results

Band	BW (MHz)	Ch	Freq. (MHz)	Mode	UL RB Allocation	UL RB Offset	Target MPR	Meas. MPR	Avg Pwr (dBm)	
									W/o Pwr back-off	*W/ Pwr back-off
4	10	20000	1715.0	QPSK	25	12	1	1	22.9	20.8
					1	0	0	0	23.7	20.7
					1	49	0	0	23.7	20.7
					50	0	1	1	22.7	20.9
				16QAM	25	12	2	2	21.8	20.7
					1	0	1	1	22.9	21.0
					1	49	1	1	23.0	21.0
					50	0	2	2	21.7	20.8
		20175	1732.5	QPSK	25	12	1	1	22.7	20.8
					1	0	0	0	23.8	20.7
					1	49	0	0	23.8	20.7
					50	0	1	1	22.6	20.8
				16QAM	25	12	2	2	21.9	20.5
					1	0	1	1	22.4	21.0
					1	49	1	1	22.3	21.0
					50	0	2	2	21.8	20.9
		20350	1750.0	QPSK	25	12	1	1	22.9	20.9
					1	0	0	0	23.8	20.9
					1	49	0	0	23.8	20.8
					50	0	1	1	22.6	20.7
				16QAM	25	12	2	2	22.0	21.0
					1	0	1	1	22.6	20.3
					1	49	1	1	22.6	20.3
					50	0	2	2	21.8	20.8

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.

Band	BW (MHz)	Ch	Freq. (MHz)	Mode	UL RB Allocation	UL RB Start	Target MPR	Meas. MPR	Avg Pwr (dBm)	
									W/o Pwr back-off	*W/ Pwr back-off
4	5	19975	1712.5	QPSK	12	6	1	1	22.1	19.3
					1	0	0	0	23.1	19.5
					1	24	0	0	23.2	19.4
					25	0	1	1	22.1	19.4
				16QAM	12	6	2	2	21.1	19.3
					1	0	1	1	22.1	19.2
					1	24	1	1	22.0	19.2
					25	0	2	2	21.4	19.7
		20175	1732.5	QPSK	12	6	1	1	22.3	19.5
					1	0	0	0	23.3	19.7
					1	24	0	0	23.3	19.6
					25	0	1	1	22.3	19.6
				16QAM	12	6	2	2	21.1	19.4
					1	0	1	1	22.1	19.3
					1	24	1	1	22.0	19.2
					25	0	2	2	21.6	19.7
		20375	1752.5	QPSK	12	6	1	1	22.1	19.4
					1	0	0	0	23.3	19.6
					1	24	0	0	23.3	19.6
					25	0	1	1	22.3	19.5
				16QAM	12	6	2	2	21.2	19.3
					1	0	1	1	22.1	19.2
					1	24	1	1	22.0	19.2
					25	0	2	2	21.6	19.8

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.

10.4. LTE Band 17

Target Power: 23 dBm
Tune-up Tolerance: -1.0dB / +1.0dB

Power back-off due to proximity sensor is not implemented for LTE band 17.

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 6.6.3.3.2	13	10	Table 6.2.4-2	Table 6.2.4-2
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.

Results

Band	BW (MHz)	Ch	Freq. (MHz)	Mode	UL RB Allocation	UL RB Offset	Target MPR	Meas. MPR	Avg Pwr (dBm)	
									W/o Pwr back-off	*W/ Pwr back-off
17	10	23780	709.0	QPSK	25	12	1	1	22.6	N.A
					1	0	0	0	23.9	N.A
					1	49	0	0	23.7	N.A
					50	0	1	1	22.5	N.A
				16QAM	25	12	2	2	21.8	N.A
					1	0	1	1	22.4	N.A
					1	49	1	1	22.4	N.A
					50	0	2	2	21.7	N.A
		23790	710.0	QPSK	25	12	1	1	22.7	N.A
					1	0	0	0	23.8	N.A
					1	49	0	0	23.7	N.A
					50	0	1	1	22.6	N.A
				16QAM	25	12	2	2	21.7	N.A
					1	0	1	1	23.0	N.A
					1	49	1	1	23.0	N.A
					50	0	2	2	21.6	N.A
		23800	711.0	QPSK	25	12	1	1	22.7	N.A
					1	0	0	0	23.9	N.A
					1	49	0	0	23.8	N.A
					50	0	1	1	22.5	N.A
				16QAM	25	12	2	2	21.9	N.A
					1	0	1	1	22.5	N.A
					1	49	1	1	22.4	N.A
					50	0	2	2	21.7	N.A

Results

Band	BW (MHz)	Ch	Freq. (MHz)	Mode	UL RB Allocation	UL RB Start	Target MPR	Meas. MPR	Avg Pwr (dBm)	
									W/o Pwr back-off	*W/ Pwr back-off
17	5	23755	706.5	QPSK	12	6	1	1	22.6	N.A
					1	0	0	0	23.7	N.A
					1	24	0	0	23.6	N.A
					25	0	1	1	22.7	N.A
				16QAM	12	6	2	2	21.6	N.A
					1	0	1	1	22.2	N.A
					1	24	1	2	22.1	N.A
					25	0	2	2	21.9	N.A
		23790	710.0	QPSK	12	6	1	1	22.2	N.A
					1	0	0	0	23.7	N.A
					1	24	0	0	23.5	N.A
					25	0	1	1	22.4	N.A
				16QAM	12	6	2	2	21.2	N.A
					1	0	1	2	21.3	N.A
					1	24	1	2	22.2	N.A
					25	0	2	2	21.8	N.A
		23825	713.5	QPSK	12	6	1	1	22.4	N.A
					1	0	0	0	22.6	N.A
					1	24	0	0	22.9	N.A
					25	0	1	0	22.5	N.A
				16QAM	12	6	2	2	21.4	N.A
					1	0	1	1	22.2	N.A
					1	24	1	1	22.4	N.A
					25	0	2	1	21.8	N.A

Note(s):

10.5. Wi-Fi (2.4 GHz Band)

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.

The target powers indicated in the following table are absolute maximums.

Band (MHz)	Mode	Data rate (Mbps)	Ch #	Freq. (MHz)	Target Pwr (dBm)		Avg. Pwr (dBm)	
					Main	Aux	Main	Aux
2.4	802.11b 1 Tx	1	1	2412	15.5		15.5	
			6	2437	15.5		15.5	
			11	2462	15.5		15.5	
			1	2412		15.5		15.4
			6	2437		15.5		15.5
			11	2462		15.5		15.4
	802.11g 1 Tx	6	1	2412	14.0		13.9	
			2	2417	16.0		15.8	
			6	2437	16.0		15.8	
			10	2457	16.5		16.5	
			11	2462	14.0		13.9	
			1	2412		14.0		13.9
			2	2417		16.0		15.9
			6	2437		16.0		15.9
			10	2457		16.5		16.3
			11	2462		14.0		14.0
	802.11n (HT20) 1 Tx	6.5	1	2412	13.0		13.0	
			2	2417	16.0		15.9	
			6	2437	16.0		16.0	
			10	2457	16.0		15.9	
			11	2462	12.5		12.5	
			1	2412		13.0		13.0
			2	2417		16.0		15.9
			6	2437		16.0		16.0
			10	2457		16.0		15.9
			11	2462		12.5		12.3
	802.11n (HT20) 2 Tx	13	1	2412	11.0	11.0	10.9	10.8
			2	2417	13.0	13.0	13.0	12.9
			6	2437	13.0	13.0	13.0	12.9
			10	2457	13.0	13.0	12.9	13.0
			11	2462	11.0	11.0	10.9	11.0
	802.11n (HT40) 1 Tx	13.5	3	2422	9.0		9.0	
			4	2427	10.5		10.4	
			5	2432	12.5		12.3	
			7	2442	12.5		12.5	
			8	2447	10.5		10.5	
			9	2452	9.5		9.5	
			3	2422		9.0		8.9
			4	2427		10.5		10.4
			5	2432		12.5		12.4
			7	2442		12.5		12.5
			8	2447		10.5		10.4
			9	2452		9.5		9.4
	802.11n (HT40) 2 Tx	27	3	2422	8.0	8.0	7.9	7.9
			4	2427	9.5	9.5	9.4	9.5
			5	2432	11.5	11.5	11.4	11.5
			7	2442	11.5	11.5	11.5	11.4
			8	2447	9.5	9.5	9.5	9.4
			9	2452	8.5	8.5	8.5	8.3

Note(s):

SAR is not required for 802.11g/HT20/HT40 channels when the maximum average output power is less than 1/4 dB higher than that measured on the corresponding 802.11b channels. As per KDB 248227

10.6. Wi-Fi (5 GHz Bands)

Mode		Band	GHz	Channel	"Default Test Channels"	
					802.11a	
802.11a	UNII (15.407)	5.2 GHz	5.180	36	√	
			5.200	40		*
			2.220	44		*
			5.240	48	√	
		5.3 GHz	5.260	52	√	
			5.280	56		*
			5.300	60		*
			5.320	64	√	
		5.5 GHz	5.500	100		
			5.520	104	√	
			5.540	108		*
			5.560	112		*
			5.580	116	√	
			5.600	120		*
			5.620	124	√	
			5.640	128		*
			5.660	132		*
			5.680	136	√	
			5.700	140		*
	DTS (15.247)	5.8 GHz	5.745	149	√	
			5.765	153		*
			5.785	157	√	
			5.805	161		*
			5.825	165	√	

√ = "default test channels"

* = possible 802.11a channels with maximum average output > 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.

The target powers indicated in the following tables are absolute maximums.

Band (MHz)	Mode	Data rate (Mbps)	Ch #	Freq. (MHz)	Target Pwr (dBm)		Avg Pwr (dBm)	
					Main	Aux	Main	Aux
5.2	802.11a 1 Tx	1	36	5180	15.5		15.4	
			40	5200	15.5		15.4	
			44	5220	15.5		15.4	
			48	5240	15.5		15.4	
			36	5180		15.5		15.3
			40	5200		15.5		15.5
			44	5220		15.5		15.4
			48	5240		15.5		15.5
	802.11n (HT20) 1 Tx	6.5	36	5180	15.0		14.8	
			40	5200	15.0		14.8	
			48	5240	15.0		14.9	
			36	5180		15.0		15.0
			40	5200		15.0		15.0
			48	5240		15.0		15.0
	802.11n (HT20) 2 Tx	13	36	5180	13.0	13.0	12.7	12.9
			40	5200	13.0	13.0	13.0	12.8
			48	5240	13.0	13.0	13.0	13.0
	802.11n (HT40) 1 Tx	13.5	38	5190	10.5		10.5	
			46	5230	10.5		10.5	
			38	5190		10.5		10.5
			46	5230		10.5		10.4
	802.11n (HT40) 2 Tx	27	38	5190	9.0	9.0	9.0	8.7
			46	5230	9.0	9.0	9.0	9.0

Band (MHz)	Mode	Data rate (Mbps)	Ch #	Freq. (MHz)	Target Pwr (dBm)		Avg Pwr (dBm)	
					Main	Aux	Main	Aux
5.3	802.11a 1 Tx	1	52	5260	15.0		15.0	
			56	5280	15.0		15.0	
			60	5300	15.0		14.9	
			64	5320	15.0		14.8	
			52	5260		15.0		15.0
			56	5280		15.0		14.8
			60	5300		15.0		15.0
			64	5320		15.0		14.9
	802.11n (HT20) 1 Tx	6.5	52	5260	15.5		15.5	
			60	5300	15.5		15.5	
			64	5320	15.5		15.4	
			52	5260		15.5		15.5
			60	5300		15.5		15.3
			64	5320		15.5		15.5
	802.11n (HT20) 2 Tx	13	52	5260	13.0	13.0	13.0	13.0
			60	5300	13.0	13.0	13.0	12.9
			64	5320	13.0	13.0	13.0	13.0
	802.11n (HT40) 1 Tx	13.5	54	5270	11.0		10.9	
			62	5310	11.0		11.0	
			54	5270		11.0		11.0
			62	5310		11.0		11.0
	802.11n (HT40) 2 Tx	27	54	5270	9.5	9.5	9.5	9.5
			62	5310	9.5	9.5	9.4	9.5

Band (MHz)	Mode	Data rate (Mbps)	Ch #	Freq. (MHz)	Target Pwr (dBm)		Avg Pwr (dBm)	
					Main	Aux	Main	Aux
5.5	802.11a 1 Tx	1	100	5500	16.0		16.0	
			104	5520	16.0		15.9	
			108	5540	16.0		15.7	
			112	5560	16.0		15.9	
			116	5580	16.0		16.0	
			120	5600	16.0		15.9	
			124	5620	16.0		15.9	
			128	5640	16.0		15.8	
			132	5660	16.0		15.8	
			136	5680	16.0		15.8	
			140	5700	15.5		15.4	
			100	5500		16.0		15.8
			104	5520		16.0		16.0
			108	5540		16.0		15.9
			112	5560		16.0		16.0
			116	5580		16.0		16.0
			120	5600		16.0		15.9
			124	5620		16.0		16.0
			128	5640		16.0		16.0
			132	5660		16.0		16.0
			136	5680		16.0		16.0
			140	5700		15.5		15.5
	802.11n (HT20) 1 Tx	6.5	100	5500	16.0		15.9	
			120	5600	16.0		15.8	
			140	5700	15.5		15.4	
			100	5500		16.0		15.9
			120	5600		16.0		15.9
			140	5700		15.5		15.5
	802.11n (HT20) 2 Tx	13	100	5500	13.0	13.0	12.9	13.0
			120	5600	13.0	13.0	12.8	12.9
			140	5700	13.5	13.5	13.4	13.5
	802.11n (HT40) 1 Tx	13.5	102	5510	13.5		13.4	
			118	5590	13.5		13.3	
			134	5670	15.5		15.5	
			102	5510		13.5		13.4
			118	5590		15.5		15.5
			134	5670		15.5		15.5
	802.11n (HT40) 2 Tx	27	102	5510	12.5	12.5	12.4	12.5
			118	5590	13.0	13.0	13.0	13.0
			134	5670	13.0	13.0	12.9	13.0

Band (MHz)	Mode	Data rate (Mbps)	Ch #	Freq. (MHz)	Target Pwr (dBm)		Avg Pwr (dBm)	
					Main	Aux	Main	Aux
5.8	802.11a 1 Tx	1	149	5745	16.5		16.5	
			153	5765	16.5		16.5	
			157	5785	16.5		16.5	
			161	5805	16.5		16.5	
			165	5825	16.5		16.5	
			149	5745		16.5		16.5
			153	5765		16.5		16.5
			157	5785		16.5		16.5
			161	5805		16.5		16.5
			165	5825		16.5		16.5
	802.11n (HT20) 1 Tx	6.5	149	5745	15.5		15.5	
			157	5785	15.5		15.4	
			161	5805	15.5		15.5	
			149	5745		16.0		15.9
			157	5785		16.0		16.0
			161	5805		16.0		15.9
	802.11n (HT20) 2 Tx	13	149	5745	16.5	16.5	16.5	16.4
			157	5785	16.5	16.5	16.5	16.5
			161	5805	16.5	16.5	16.5	16.5
	802.11n (HT40) 1 Tx	13.5	151	5755	15.5		16.5	
			159	5795	15.5		16.5	
			151	5755		16.0		16.0
			159	5795		16.0		15.9
	802.11n (HT40) 2Tx	27	151	5755	16.5	16.5	16.5	16.5
			159	5795	16.5	16.5	16.5	16.5

Note(s):

SAR is not required for 802.11HT20/HT40 channels when the maximum average output power is less than 1/4 dB higher than that measured on the corresponding 802.11a channels. As per KDB 248227

10.7. Bluetooth

Version4.0, Power class: 2 (2.5 mW/4 dBm)

Mode	Channel #	Freq. (MHz)	Measured Avg Pwr(dBm)
GFSK	0	2402	0.41
	39	2441	0.91
	78	2480	0.62
8-PSK	0	2402	1.68
	39	2441	2.19
	78	2480	1.31
V4.0 LE, GFSK	0	2402	0.88
	19	2440	1.40
	38	2480	1.13

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^2O	Water, 35 – 58%
Sucrese	Sugar, white, refined, 40-60%
NaCl	Sodium Chloride, 0-6%
Hydroxyethel-cellulsoe	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-methyyl-3(2H)-isothiazolone, 0.1-0.7%

MSL/HSL1750 (Body and Head liquids for 1700 – 1800 MHz)

Item	Head Tissue Simulation Liquids HSL1750 Muscle (body) Tissue Simulation Liquids MSL1750
Type No	SL AAM 175
Manufacturer	SPEAG
-The item is composed of the following ingredients:	
H^2O	Water, 52 – 75%
C8H18O3	Diethylene glycol monobutyl ether (DGBE), 25-48%
NaCl	Sodium Chloride, <1.0%

Simulating Liquids for 5 GHz, Manufactured by SPEAG

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

11.2. Tissue Dielectric Parameter Check Results

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

Date	Freq. (MHz)	Liquid Parameters			Measured	Target	Delta (%)	Limit ±(%)
09/18/2012	Body 1900	e'	51.8441	Relative Permittivity (ϵ_r):	51.84	53.30	-2.73	5
		e''	14.2127	Conductivity (σ):	1.50	1.52	-1.22	5
	Body 1850	e'	52.0269	Relative Permittivity (ϵ_r):	52.03	53.30	-2.39	5
		e''	14.1565	Conductivity (σ):	1.46	1.52	-4.20	5
	Body 1880	e'	51.9962	Relative Permittivity (ϵ_r):	52.00	53.30	-2.45	5
		e''	14.2653	Conductivity (σ):	1.49	1.52	-1.89	5
	Body 1910	e'	51.9131	Relative Permittivity (ϵ_r):	51.91	53.30	-2.60	5
		e''	14.3353	Conductivity (σ):	1.52	1.52	0.16	5
09/19/2012	Body 1750	e'	52.9381	Relative Permittivity (ϵ_r):	52.94	53.44	-0.94	5
		e''	15.5652	Conductivity (σ):	1.51	1.49	1.91	5
	Body 1710	e'	53.1210	Relative Permittivity (ϵ_r):	53.12	53.54	-0.79	5
		e''	15.4154	Conductivity (σ):	1.47	1.46	0.29	5
	Body 1715	e'	53.0824	Relative Permittivity (ϵ_r):	53.08	53.53	-0.84	5
		e''	15.4154	Conductivity (σ):	1.47	1.46	0.37	5
	Body 1730	e'	53.0525	Relative Permittivity (ϵ_r):	53.05	53.49	-0.82	5
		e''	15.5126	Conductivity (σ):	1.49	1.47	1.25	5
09/20/2012	Body 1750	e'	55.3178	Relative Permittivity (ϵ_r):	55.32	53.44	3.51	5
		e''	15.6129	Conductivity (σ):	1.52	1.49	2.22	5
	Body 1710	e'	55.3765	Relative Permittivity (ϵ_r):	55.38	53.54	3.42	5
		e''	15.5763	Conductivity (σ):	1.48	1.46	1.33	5
	Body 1715	e'	55.3853	Relative Permittivity (ϵ_r):	55.39	53.53	3.46	5
		e''	15.5411	Conductivity (σ):	1.48	1.46	1.19	5
	Body 1730	e'	55.2845	Relative Permittivity (ϵ_r):	55.28	53.49	3.35	5
		e''	15.5625	Conductivity (σ):	1.50	1.47	1.57	5
09/21/2012	Body 750	e'	54.1929	Relative Permittivity (ϵ_r):	54.19	55.55	-2.44	5
		e''	22.5707	Conductivity (σ):	0.94	0.96	-2.27	5
	Body 775	e'	53.9269	Relative Permittivity (ϵ_r):	53.93	55.45	-2.75	5
		e''	22.2624	Conductivity (σ):	0.96	0.97	-0.59	5
	Body 790	e'	53.8021	Relative Permittivity (ϵ_r):	53.80	55.39	-2.87	5
		e''	22.3490	Conductivity (σ):	0.98	0.97	1.61	5
09/24/2012	Body 835	e'	54.0638	Relative Permittivity (ϵ_r):	54.06	55.20	-2.06	5
		e''	21.1581	Conductivity (σ):	0.98	0.97	1.27	5
	Body 820	e'	54.2976	Relative Permittivity (ϵ_r):	54.30	55.28	-1.77	5
		e''	21.2208	Conductivity (σ):	0.97	0.97	-0.09	5
	Body 850	e'	54.0493	Relative Permittivity (ϵ_r):	54.05	55.16	-2.01	5
		e''	21.0508	Conductivity (σ):	0.99	0.99	0.79	5
09/25/2012	Body 835	e'	54.0545	Relative Permittivity (ϵ_r):	54.05	55.20	-2.08	5
		e''	21.3814	Conductivity (σ):	0.99	0.97	2.34	5
	Body 820	e'	54.2110	Relative Permittivity (ϵ_r):	54.21	55.28	-1.93	5
		e''	21.2539	Conductivity (σ):	0.97	0.97	0.06	5
	Body 850	e'	53.9774	Relative Permittivity (ϵ_r):	53.98	55.16	-2.14	5
		e''	21.1443	Conductivity (σ):	1.00	0.99	1.24	5

Date	Freq. (MHz)	Liquid Parameters			Measured	Target	Delta (%)	Limit ±(%)
10/02/2012	Body 5180	e'	47.5259	Relative Permittivity (εr):	47.53	49.05	-3.10	10
		e''	18.7804	Conductivity (σ):	5.41	5.27	2.61	5
	Body 5200	e'	47.4865	Relative Permittivity (εr):	47.49	49.02	-3.13	10
		e''	18.6873	Conductivity (σ):	5.40	5.29	2.05	5
	Body 5500	e'	46.9668	Relative Permittivity (εr):	46.97	48.61	-3.39	10
		e''	19.0257	Conductivity (σ):	5.82	5.64	3.08	5
	Body 5800	e'	46.4800	Relative Permittivity (εr):	46.48	48.20	-3.57	10
		e''	19.2766	Conductivity (σ):	6.22	6.00	3.61	5
	Body 5825	e'	46.3217	Relative Permittivity (εr):	46.32	48.20	-3.90	10
		e''	19.2641	Conductivity (σ):	6.24	6.00	3.99	5
10/03/2012	Body 5180	e'	47.5755	Relative Permittivity (εr):	47.58	49.05	-3.00	10
		e''	18.1014	Conductivity (σ):	5.21	5.27	-1.10	5
	Body 5200	e'	47.5072	Relative Permittivity (εr):	47.51	49.02	-3.09	10
		e''	18.0716	Conductivity (σ):	5.23	5.29	-1.31	5
	Body 5500	e'	47.2018	Relative Permittivity (εr):	47.20	48.61	-2.90	10
		e''	18.2268	Conductivity (σ):	5.57	5.64	-1.25	5
	Body 5800	e'	46.5903	Relative Permittivity (εr):	46.59	48.20	-3.34	10
		e''	18.5044	Conductivity (σ):	5.97	6.00	-0.54	5
	Body 5825	e'	46.6169	Relative Permittivity (εr):	46.62	48.20	-3.28	10
		e''	18.4916	Conductivity (σ):	5.99	6.00	-0.18	5
10/05/2012	Body 5180	e'	47.7431	Relative Permittivity (εr):	47.74	49.05	-2.66	10
		e''	18.5269	Conductivity (σ):	5.34	5.27	1.23	5
	Body 5200	e'	47.8864	Relative Permittivity (εr):	47.89	49.02	-2.31	10
		e''	18.5588	Conductivity (σ):	5.37	5.29	1.35	5
	Body 5500	e'	47.2074	Relative Permittivity (εr):	47.21	48.61	-2.89	10
		e''	18.9217	Conductivity (σ):	5.79	5.64	2.52	5
	Body 5800	e'	46.7064	Relative Permittivity (εr):	46.71	48.20	-3.10	10
		e''	19.1828	Conductivity (σ):	6.19	6.00	3.11	5
	Body 5825	e'	46.7329	Relative Permittivity (εr):	46.73	48.20	-3.04	10
		e''	19.3036	Conductivity (σ):	6.25	6.00	4.20	5
10/08/2012	Body 5180	e'	47.8478	Relative Permittivity (εr):	47.85	49.05	-2.44	10
		e''	17.5815	Conductivity (σ):	5.06	5.27	-3.94	5
	Body 5200	e'	47.6778	Relative Permittivity (εr):	47.68	49.02	-2.74	10
		e''	17.5736	Conductivity (σ):	5.08	5.29	-4.03	5
	Body 5500	e'	47.2818	Relative Permittivity (εr):	47.28	48.61	-2.74	10
		e''	17.8892	Conductivity (σ):	5.47	5.64	-3.08	5
	Body 5800	e'	46.7999	Relative Permittivity (εr):	46.80	48.20	-2.90	10
		e''	18.1008	Conductivity (σ):	5.84	6.00	-2.71	5
	Body 5825	e'	46.7946	Relative Permittivity (εr):	46.79	48.20	-2.92	10
		e''	18.1497	Conductivity (σ):	5.88	6.00	-2.03	5

Date	Freq. (MHz)	Liquid Parameters			Measured	Target	Delta (%)	Limit ±(%)
10/09/2012	Body 5180	e'	48.9988	Relative Permittivity (ϵ_r):	49.00	49.05	-0.10	10
		e"	18.0718	Conductivity (σ):	5.21	5.27	-1.26	5
	Body 5200	e'	48.9511	Relative Permittivity (ϵ_r):	48.95	49.02	-0.14	10
		e"	17.8015	Conductivity (σ):	5.15	5.29	-2.79	5
	Body 5500	e'	48.3826	Relative Permittivity (ϵ_r):	48.38	48.61	-0.47	10
		e"	18.4982	Conductivity (σ):	5.66	5.64	0.22	5
	Body 5800	e'	47.8655	Relative Permittivity (ϵ_r):	47.87	48.20	-0.69	10
		e"	18.6415	Conductivity (σ):	6.01	6.00	0.20	5
	Body 5825	e'	47.8334	Relative Permittivity (ϵ_r):	47.83	48.20	-0.76	10
		e"	18.6797	Conductivity (σ):	6.05	6.00	0.84	5
10/10/2012	Body 5180	e'	51.1506	Relative Permittivity (ϵ_r):	51.15	49.05	4.29	10
		e"	18.1539	Conductivity (σ):	5.23	5.27	-0.81	5
	Body 5200	e'	51.1146	Relative Permittivity (ϵ_r):	51.11	49.02	4.27	10
		e"	18.0163	Conductivity (σ):	5.21	5.29	-1.62	5
	Body 5500	e'	50.4387	Relative Permittivity (ϵ_r):	50.44	48.61	3.76	10
		e"	18.5260	Conductivity (σ):	5.67	5.64	0.37	5
	Body 5800	e'	50.1322	Relative Permittivity (ϵ_r):	50.13	48.20	4.01	10
		e"	18.7813	Conductivity (σ):	6.06	6.00	0.95	5
	Body 5825	e'	49.8570	Relative Permittivity (ϵ_r):	49.86	48.20	3.44	10
		e"	18.8619	Conductivity (σ):	6.11	6.00	1.82	5
10/11/2012	Body 5180	e'	48.5402	Relative Permittivity (ϵ_r):	48.54	49.05	-1.03	10
		e"	18.5325	Conductivity (σ):	5.34	5.27	1.26	5
	Body 5200	e'	48.4660	Relative Permittivity (ϵ_r):	48.47	49.02	-1.13	10
		e"	18.3026	Conductivity (σ):	5.29	5.29	-0.05	5
	Body 5500	e'	47.7768	Relative Permittivity (ϵ_r):	47.78	48.61	-1.72	10
		e"	18.8417	Conductivity (σ):	5.76	5.64	2.08	5
	Body 5800	e'	47.5436	Relative Permittivity (ϵ_r):	47.54	48.20	-1.36	10
		e"	19.1382	Conductivity (σ):	6.17	6.00	2.87	5
	Body 5825	e'	47.1536	Relative Permittivity (ϵ_r):	47.15	48.20	-2.17	10
		e"	19.1487	Conductivity (σ):	6.20	6.00	3.37	5
10/12/2012	Body 2450	e'	51.5918	Relative Permittivity (ϵ_r):	51.59	52.70	-2.10	5
		e"	14.0560	Conductivity (σ):	1.91	1.95	-1.80	5
	Body 2410	e'	51.8598	Relative Permittivity (ϵ_r):	51.86	52.76	-1.70	5
		e"	13.9902	Conductivity (σ):	1.87	1.91	-1.72	5
	Body 2435	e'	51.6604	Relative Permittivity (ϵ_r):	51.66	52.73	-2.02	5
		e"	14.0433	Conductivity (σ):	1.90	1.93	-1.54	5
	Body 2475	e'	51.2778	Relative Permittivity (ϵ_r):	51.28	52.67	-2.64	5
		e"	14.1671	Conductivity (σ):	1.95	1.99	-1.79	5
10/15/2012	Body 2450	e'	51.5253	Relative Permittivity (ϵ_r):	51.53	52.70	-2.23	5
		e"	14.4291	Conductivity (σ):	1.97	1.95	0.80	5
	Body 2410	e'	51.7895	Relative Permittivity (ϵ_r):	51.79	52.76	-1.84	5
		e"	14.3781	Conductivity (σ):	1.93	1.91	1.01	5
	Body 2435	e'	51.6535	Relative Permittivity (ϵ_r):	51.65	52.73	-2.03	5
		e"	14.3871	Conductivity (σ):	1.95	1.93	0.87	5
	Body 2475	e'	51.3909	Relative Permittivity (ϵ_r):	51.39	52.67	-2.43	5
		e"	14.6359	Conductivity (σ):	2.01	1.99	1.46	5
10/16/2012	Body 2450	e'	52.5180	Relative Permittivity (ϵ_r):	52.52	52.70	-0.35	5
		e"	14.6865	Conductivity (σ):	2.00	1.95	2.60	5
	Body 2410	e'	52.5496	Relative Permittivity (ϵ_r):	52.55	52.76	-0.40	5
		e"	14.5434	Conductivity (σ):	1.95	1.91	2.17	5
	Body 2435	e'	52.5012	Relative Permittivity (ϵ_r):	52.50	52.73	-0.43	5
		e"	14.6220	Conductivity (σ):	1.98	1.93	2.52	5
	Body 2475	e'	52.3744	Relative Permittivity (ϵ_r):	52.37	52.67	-0.56	5
		e"	14.7409	Conductivity (σ):	2.03	1.99	2.19	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 ±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)	Target SAR Values (mW/g)		
				1g/10g	Head	Body
D750V3	1024	04/04/12	750	1g	8.36	8.76
				10g	5.49	5.80
D835V2	4d117	04/10/12	835	1g	9.38	9.52
				10g	6.15	6.31
D1750V2	1050	04/19/12	1750	1g	35.9	36.9
				10g	19.1	19.9
D1900V2	5d043	11/10/11	1900	1g	10.8	42.0
				10g	21.2	22.0
D2450V2	748	02/07/12	2450	1g	53.6	50.8
				10g	24.8	23.6
D5GHzV2	1075	02/14/12	5200	1g	79.7	72.8
				10g	22.9	20.5
			5500	1g	86.1	77.7
				10g	24.5	21.7
			5800	1g	79.4	72.4
				10g	22.7	20.2

12.3. System Performance Check Result

Date Tested	System Dipole		T.S. Liquid	SAR Measured (Normalized to 1 W)		Target (Ref. Value)	Delta (%)	Tolerance (%)
	Type	Serial No.						
9/18/2012	D1900V2	5d043	Body	1g	41.4	42.0	-1.43	±10
				10g	21.5	22.0	-2.27	
9/19/2012	D1750V2	1050	Body	1g	37.8	36.9	2.44	±10
				10g	20.1	19.9	1.01	
9/20/2012	D1750V2	1050	Body	1g	37.4	36.9	1.36	±10
				10g	19.8	19.9	-0.50	
9/21/2012	D750V3	1024	Body	1g	8.59	8.76	-1.94	±10
				10g	5.74	5.80	-1.03	
9/24/2012	D835V2	4d117	Body	1g	10.0	9.52	5.04	±10
				10g	6.6	6.31	4.44	
9/25/2012	D835V2	4d117	Body	1g	10.1	9.52	6.09	±10
				10g	6.7	6.31	5.86	
10/2/2012	D5GHzV2 (5.2GHz)	1075	Body	1g	78.1	72.8	7.28	±10
				10g	22.0	20.5	7.32	
10/3/2012	D5GHzV2 (5.2GHz)	1075	Body	1g	71.8	72.8	-1.37	±10
				10g	20.2	20.5	-1.46	
10/5/2012	D5GHzV2 (5.2GHz)	1075	Body	1g	76.2	72.8	4.67	±10
				10g	21.7	20.5	5.85	
10/8/2012	D5GHzV2 (5.2GHz)	1075	Body	1g	72.6	72.8	-0.27	±10
				10g	20.6	20.5	0.49	
10/9/2012	D5GHzV2 (5.5GHz)	1075	Body	1g	79.90	77.70	2.83	±10
				10g	22.50	21.7	3.69	
10/10/2012	D5GHzV2 (5.5GHz)	1075	Body	1g	72.60	77.70	-6.56	±10
				10g	21.10	21.7	-2.76	
10/11/2012	D5GHzV2 (5.8GHz)	1075	Body	1g	71.20	72.40	-1.66	±10
				10g	20.10	20.2	-0.50	
10/12/2012	2450V2	748	Body	1g	51.60	50.80	1.57	±10
				10g	24.20	23.6	2.54	
10/15/2012	2450V2	748	Body	1g	51.90	50.80	2.17	±10
				10g	23.80	23.6	0.85	
10/16/2012	2450V2	748	Body	1g	51.50	50.80	1.38	±10
				10g	23.70	23.6	0.42	

13. SAR Test Results

13.1. W-CDMA (UMTS) Band V

Test mode reduction considerations

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

Body SAR W/ Pwr back off

Test Position	Mode	Dist. (mm)	Ch #.	Freq. (MHz)	Frame Avg. Power (dBm)		SAR (mW/g)		Note
					Tune-up limit	Measured	Measured	Scaled	
Rear/Bottom	Rel 99 RMC 12.2kbps	0	4132	826.40	21.0	21.0	0.828		
			4183	836.60	21.0	21.0	0.856		
			4233	846.60	21.0	21.0	0.830		
Rear 20° Tilt (Tilt @Edge1)	Rel 99 RMC 12.2kbps	0	4132	826.40	21.0	21.0	**0.878**		
			4183	836.60	21.0	21.0	0.851		
			4233	846.60	21.0	21.0	0.834		
Edge 1	Rel 99 RMC 12.2kbps	0	4132	826.40	21.0	21.0			1
			4183	836.60	21.0	21.0	0.481		
			4233	846.60	21.0	21.0			1

Body SAR W/o Pwr back off

Test Position	Mode	Dist. (mm)	Ch #.	Freq. (MHz)	Frame Avg. Power (dBm)		SAR (mW/g)		Note
					Tune-up limit	Measured	Measured	Scaled	
Rear/Bottom	Rel 99 RMC 12.2kbps	14	4132	826.40	24.0	24.0			1
			4183	836.60	24.0	23.8	0.219	0.229	
			4233	846.60	24.0	23.8			1
Edge 1	Rel 99 RMC 12.2kbps	14	4132	826.40	24.0	24.0			1
			4183	836.60	24.0	23.8	0.228	0.239	
			4233	846.60	24.0	23.8			1

Note(s):

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

13.2. W-CDMA (UMTS) Band II

Test mode reduction considerations

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

Body SAR W/ Pwr back off

Test Position	Mode	Dist. (mm)	Ch #.	Freq. (MHz)	Frame Avg. Power (dBm)		SAR (mW/g)		Note
					Tune-up Limit	Measured	Measured	Scaled	
Rear/Bottom	Rel 99 RMC 12.2kbps	0	9262	1852.40	21.0	20.6			1
			9400	1880.00	21.0	20.6	0.469	0.514	
			9538	1907.60	21.0	20.7			1
Rear 20° Tilt (Tilt @Edge1)	Rel 99 RMC 12.2kbps	0	9262	1852.40	21.0	20.6	0.598	0.656	
			9400	1880.00	21.0	20.6	0.767	0.841	
			9538	1907.60	21.0	20.7	**1.030**	1.104	
Edge 1	Rel 99 RMC 12.2kbps	0	9262	1852.40	21.0	20.6			1
			9400	1880.00	21.0	20.6	0.443	0.486	
			9538	1907.60	21.0	20.7			1

Body SAR W/o Pwr back off

Test Position	Mode	Dist. (mm)	Ch #.	Freq. (MHz)	Frame Avg. Power (dBm)		SAR (mW/g)		Note
					Tune-up Limit	Measured	Measured	Scaled	
Rear/Bottom	Rel 99 RMC 12.2kbps	14	9262	1852.40	24.0	23.7			1
			9400	1880.00	24.0	23.7	0.104	0.111	
			9538	1907.60	24.0	23.7			1
Edge 1	Rel 99 RMC 12.2kbps	14	9262	1852.40	24.0	23.7			1
			9400	1880.00	24.0	23.7	0.194	0.208	
			9538	1907.60	24.0	23.7			1

Note(s):

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

13.3. LTE Band 4

Test mode reduction considerations

Test reduction for LTE SAR is based on KDB 941225 D05 SAR for LTE Devices v01.

Testing for 100% RB allocation is not required because the SAR value for 50% RB allocation is ≤ 1.45 W/kg.

Testing was only performed on the middle channel because the output power variance over /middle/high channels is ≤ ½ dB and the measured SAR for the middle channel is ≤ 0.8 W/kg.

Body SAR W/ Pwr back off

Test Position	Mode	Dist. (mm)	UL Ch #.	Freq. (MHz)	UL RB Allocation	UL RB Offset	Power (dBm)		SAR (mW/g)		Note
							Tune-up Limit	Measured	Measured	Scaled	
Rear/Bottom	QPSK	0	20000	1715.0	25	12	21	20.8			1
					1	0	21	20.7			1
					1	49	21	20.7			1
					50	0	21	20.9			1
	16QAM	0			25	12	21	20.7			1
					1	0	21	21.0			1
					1	49	21	21.0			1
					50	0	21	20.8			1
	QPSK	0	20175	1732.5	25	12	21	20.8	0.679	0.711	
					1	0	21	20.7	0.716	0.767	
					1	49	21	20.7	0.655	0.702	
					50	0	21	20.8			1
	16QAM	0			25	12	21	20.5	0.685	0.769	
					1	0	21	21.0	0.674		
					1	49	21	21.0	0.615		
					50	0	21	20.9			1
	QPSK	0	20350	1750.0	25	12	21	20.9			1
					1	0	21	20.9			1
					1	49	21	20.8			1
					50	0	21	20.7			1
	16QAM	0			25	12	21	21.0			1
					1	0	21	20.3			1
					1	49	21	20.3			1
					50	0	21	20.8			1
Rear 20° Tilt (Tilt @Edge1)	QPSK	0	20000	1715.0	25	12	21	20.8	**1.430**	1.497	
					1	0	21	20.7	1.420	1.522	
					1	49	21	20.7	1.310	1.404	
					50	0	21	20.9	1.380	1.412	
	16QAM	0			25	12	21	20.7	1.310	1.404	
					1	0	21	21.0	1.370		
					1	49	21	21.0	1.300		
					50	0	21	20.8			1
	QPSK	0	20175	1732.5	25	12	21	20.8	1.130	1.183	
					1	0	21	20.7	1.190	1.275	
					1	49	21	20.7	1.080	1.157	
					50	0	21	20.8			1
	16QAM	0			25	12	21	20.5			1
					1	0	21	21.0			1
					1	49	21	21.0			1
					50	0	21	20.9			1
	QPSK	0	20350	1750.0	25	12	21	20.9	0.967	0.990	
					1	0	21	20.9	1.020	1.044	
					1	49	21	20.8	0.939	0.983	
					50	0	21	20.7			1
	16QAM	0			25	12	21	21.0			1
					1	0	21	20.3			1
					1	49	21	20.3			1
					50	0	21	20.8			1

Note(s):

1. The test reduction for LTE SAR is based on KDB 941225 D05 SAR for LTE Devices v01.

Body SAR W/ Pwr back off (Continued)

Test Position	Mode	Dist. (mm)	UL Ch #.	Freq. (MHz)	UL RB Allocation	UL RB Offset	Power (dBm)		SAR (mW/g)		Note
							Tune-up Limit	Mesured	Measured	Scaled	
Edge 1	QPSK	0	20000	1715.0	25	12	21	20.8			1
					1	0	21	20.7			1
					1	49	21	20.7			1
					50	0	21	20.9			1
	16QAM	0			25	12	21	20.7			1
					1	0	21	21.0			1
					1	49	21	21.0			1
					50	0	21	20.8			1
	QPSK	0	20175	1732.5	25	12	21	20.8	0.582	0.609	
					1	0	21	20.7	0.594	0.636	
					1	49	21	20.7	0.559	0.599	
					50	0	21	20.8			1
	16QAM	0			25	12	21	20.5	0.617	0.692	
					1	0	21	21.0	0.564		
					1	49	21	21.0	0.539		
					50	0	21	20.9			1
	QPSK	0	20350	1750.0	25	12	21	20.9			1
					1	0	21	20.9			1
					1	49	21	20.8			1
					50	0	21	20.7			1
	16QAM	0			25	12	21	21.0			1
					1	0	21	20.3			1
					1	49	21	20.3			1
					50	0	21	20.8			1

Note(s):

1. The test reduction for LTE SAR is based on KDB 941225 D05 SAR for LTE Devices v01.

Body SAR W/o Pwr back off

Test Position	Mode	Dist. (mm)	UL Ch #.	Freq. (MHz)	UL RB Allocation	UL RB Offset	Power (dBm)		SAR (mW/g)		Note
							Tune-up Limit	Measured	Measured	Scaled	
Rear/Bottom	QPSK	14	20000	1715.0	25	12	23	22.9			1
					1	0	24	23.7			1
					1	49	24	23.7			1
					50	0	23	22.7			1
	16QAM	14			25	12	22	21.8			1
					1	0	23	22.9			1
					1	49	23	23.0			1
					50	0	22	21.7			1
	QPSK	14	20175	1732.5	25	12	23	22.7	0.105	0.112	
					1	0	24	23.8	0.136	0.144	
					1	49	24	23.8	0.125	0.132	
					50	0	23	22.6			1
	16QAM	14			25	12	22	21.9	0.078	0.080	
					1	0	23	22.4	0.109	0.127	
					1	49	23	22.3	0.104	0.121	
					50	0	22	21.8			1
	QPSK	14	20350	1750.0	25	12	23	22.9			1
					1	0	24	23.8			1
					1	49	24	23.8			1
					50	0	23	22.6			1
	16QAM	14			25	12	22	22.0			1
					1	0	23	22.4			1
					1	49	23	22.4			1
					50	0	22	21.8			1
Edge 1	QPSK	14	20000	1715.0	25	12	23	22.9			1
					1	0	24	23.7			1
					1	49	24	23.7			1
					50	0	23	22.7			1
	16QAM	14			25	12	22	21.8			1
					1	0	23	22.9			1
					1	49	23	23.0			1
					50	0	22	21.7			1
	QPSK	14	20175	1732.5	25	12	23	22.7	0.147	0.157	
					1	0	24	23.8	0.200	0.212	
					1	49	24	23.8	0.170	0.179	
					50	0	23	22.6			1
	16QAM	14			25	12	22	21.9	0.107	0.110	
					1	0	23	22.4	0.164	0.190	
					1	49	23	22.3	0.134	0.156	
					50	0	22	21.8			1
	QPSK	14	20350	1750.0	25	12	23	22.9			1
					1	0	24	23.8			1
					1	49	24	23.8			1
					50	0	23	22.6			1
	16QAM	14			25	12	22	22.0			1
					1	0	23	22.4			1
					1	49	23	22.4			1
					50	0	22	21.8			1

Note(s):

1. The test reduction for LTE SAR is based on KDB 941225 D05 SAR for LTE Devices v01.

13.4. LTE Band 17

Test mode reduction considerations

Test reduction for LTE SAR is based on KDB 941225 D05 SAR for LTE Devices v01.

Testing for 100% RB allocation is not required because the SAR value for 50% RB allocation is ≤ 1.45 W/kg.

Testing was only performed on the middle channel because the output power variance over /middle/high channels is ≤ ½ dB and the measured SAR for the middle channel is ≤ 0.8 W/kg.

Body SAR W/o Pwr back off

Test Position	Mode	Dist. (mm)	UL Ch #.	Freq. (MHz)	UL RB Allocation	UL RB Offset	Power (dBm)		SAR (mW/g)		Note
							Tune-up Limit	Measured	Measured	Scaled	
Rear/Bottom	QPSK	0	23780	709.0	25	12	23	22.6			1
					1	0	24	23.9			1
					1	49	24	23.7			1
					50	0	23	22.5			1
	16QAM	0			25	12	22	21.8			1
					1	0	23	22.4			1
					1	49	23	22.4			1
					50	0	22	21.7			1
	QPSK	0	23790	710.0	25	12	23	22.7	0.554	0.598	
					1	0	24	23.8	**0.775**	0.813	
					1	49	24	23.7	0.652	0.694	
					50	0	23	22.6			1
	16QAM	0			25	12	22	21.7	0.429	0.455	
					1	0	23	23.0	0.576		
					1	49	23	23.0	0.491		
					50	0	22	21.6			1
	QPSK	0	23800	711.0	25	12	23	22.7			1
					1	0	24	23.9			1
					1	49	24	23.8			1
					50	0	23	22.5			1
	16QAM	0			25	12	22	21.9			1
					1	0	23	22.5			1
					1	49	23	22.4			1
					50	0	22	21.7			1
Rear 20° Tilt (Tilt @Edge1)	QPSK	0	23780	709.0	25	12	23	22.6			1
					1	0	24	23.9			1
					1	49	24	23.7			1
					50	0	23	22.5			1
	16QAM	0			25	12	22	21.8			1
					1	0	23	22.4			1
					1	49	23	22.4			1
					50	0	22	21.7			1
	QPSK	0	23790	710.0	25	12	23	22.7	0.521	0.562	
					1	0	24	23.8	0.748	0.785	
					1	49	24	23.7	0.640	0.681	
					50	0	23	22.6			1
	16QAM	0			25	12	22	21.7	0.426	0.452	
					1	0	23	23.0	0.576		
					1	49	23	23.0	0.492		
					50	0	22	21.6			1
	QPSK	0	23800	711.0	25	12	23	22.7			1
					1	0	24	23.9			1
					1	49	24	23.8			1
					50	0	23	22.5			1
	16QAM	0			25	12	22	21.9			1
					1	0	23	22.5			1
					1	49	23	22.4			1
					50	0	22	21.7			1

Note(s):

1. The test reduction for LTE SAR is based on KDB 941225 D05 SAR for LTE Devices v01.

Body SAR W/o Pwr back off (Continued)

Test Position	Mode	Dist. (mm)	UL Ch #.	Freq. (MHz)	UL RB Allocation	UL RB Offset	Power (dBm)		SAR (mW/g)		Note
							Tun-up Limt	Measured	Measured	Scaled	
Edge 1	QPSK	0	23780	709.0	25	12	23	22.6			1
					1	0	24	23.9			1
					1	49	24	23.7			1
					50	0	23	22.5			1
	16QAM	0			25	12	22	21.8			1
					1	0	23	22.4			1
					1	49	23	22.4			1
					50	0	22	21.7			1
	QPSK	0	23790	710.0	25	12	23	22.7	0.385	0.415	
					1	0	24	23.8	0.496	0.521	
					1	49	24	23.7	0.433	0.461	
					50	0	23	22.6			1
	16QAM	0			25	12	22	21.7	0.290	0.308	
					1	0	23	23.0	0.388		
					1	49	23	23.0	0.348		
					50	0	22	21.6			1
	QPSK	0	23800	711.0	25	12	23	22.7			1
					1	0	24	23.9			1
					1	49	24	23.8			1
					50	0	23	22.5			1
	16QAM	0			25	12	22	21.9			1
					1	0	23	22.5			1
					1	49	23	22.4			1
					50	0	22	21.7			1

Note(s):

1. The test reduction for LTE SAR is based on KDB 941225 D05 SAR for LTE Devices v01.

13.5. Wi-Fi (2.4GHz Band)

Test Reduction Consideration

SAR is not required for 802.11g/n (HT20/HT40) channels when the maximum average output power is less than 1/4 dB higher than that measured on the corresponding 802.11b channels as per KDB 248227.

Test Position	Mode	Antenna	Dist. (mm)	Ch #.	Freq. (MHz)	Target Power (dBm)	Measured Power (dBm)	Measured 1g SAR (W/kg)	Scaled 1g SAR (W/kg)	Note
Rear/Bottom	802.11b	Main	0	1	2412.0	15.5	15.5			1
				6	2437.0	15.5	15.5	0.647		
				11	2462.0	15.5	15.5			1
	802.11g	Main	0	2	2417.0	16.0	15.9	0.703	0.719	
				6	2437.0	16.0	16.0	0.699		
				10	2457.0	16.5	16.5	**0.947**		
Rear 20° Tilt (Tilt @Edge1)	802.11b	Main	0	1	2412.0	15.5	15.5			1
				6	2437.0	15.5	15.5	0.607		
				11	2462.0	15.5	15.5			1
	802.11g	Main	0	2	2417.0	16.0	15.9	0.667	0.683	
				6	2437.0	16.0	16.0	0.679		
				10	2457.0	16.5	16.5	0.831		
Edge 1	802.11b	Main	0	1	2412.0	15.5	15.5			1
				6	2437.0	15.5	15.5	0.703		
				11	2462.0	15.5	15.5			1
	802.11g	Main	0	2	2417.0	16.0	15.9	0.696	0.712	
				6	2437.0	16.0	16.0	0.723		
				10	2457.0	16.5	16.5	0.922		

Test Position	Mode	Antenna	Dist. (mm)	Ch #.	Freq. (MHz)	Target Power (dBm)	Measured Power (dBm)	Measured 1g SAR (W/kg)	Scaled 1g SAR (W/kg)	Note
Rear/Bottom	802.11b	Aux	0	1	2412.0	15.5	15.4			1
				6	2437.0	15.5	15.5	0.541		
				11	2462.0	15.5	15.5			1
	802.11g	Aux	0	2	2417.0	16.0	16.0			1
				6	2437.0	16.0	16.0			1
				10	2457.0	16.6	16.5	0.630	0.645	
Rear 20° Tilt (Tilt @Edge2)	802.11b	Aux	0	1	2412.0	15.6	15.4			1
				6	2437.0	15.6	15.5	0.682	0.698	
				11	2462.0	15.5	15.5			1
	802.11g	Aux	0	2	2417.0	16.0	16.0	0.564		
				6	2437.0	16.0	16.0	0.609		
				10	2457.0	16.6	16.5	0.829	0.848	
Edge 2	802.11b	Aux	0	1	2412.0	15.6	15.4			1
				6	2437.0	15.6	15.5	0.683	0.699	
				11	2462.0	15.5	15.5			1
	802.11g	Aux	0	2	2417.0	16.0	16.0			1
				6	2437.0	16.0	16.0			1
				10	2457.0	16.6	16.5	0.452	0.463	

Note(s):

1. For frequency bands with an operating range of < 100 MHz, when the SAR 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)

13.6. Wi-Fi (5GHz Bands)

Test Reduction Consideration

SAR is not required for 802.11n (HT20/HT40) channels when the maximum average output power is less than 1/4 dB higher than that measured on the corresponding 802.11a channels as per KDB 248227.

5.2GHz Band

Test Position	Mode	Antenna	Dist. (mm)	Ch #.	Freq. (MHz)	Target Power (dBm)	Measured Power (dBm)	Measured 1g SAR (W/kg)	Scaled 1g SAR (W/kg)
Rear/Bottom	802.11a	Main	0	36	5180.0	15.5	15.4	0.910	0.931
				48	5240.0	15.5	15.4	**0.916**	0.937
Rear 20° Tilt (Tilt @Edge1)	802.11a	Main	0	36	5180.0	15.5	15.4	0.875	0.895
				48	5240.0	15.5	15.4	0.908	0.929
Edge 1	802.11a	Main	0	36	5180.0	15.5	15.4	0.701	0.717
				48	5240.0	15.5	15.4	0.851	0.871
Test Position	Mode	Antenna	Dist. (mm)	Ch #.	Freq. (MHz)	Target Power (dBm)	Measured Power (dBm)	Measured 1g SAR (W/kg)	Scaled 1g SAR (W/kg)
Rear/Bottom	802.11a	Aux	0	36	5180.0	15.5	15.3	0.773	0.809
				48	5240.0	15.5	15.5	0.747	
Rear 20° Tilt (Tilt @Edge2)	802.11a	Aux	0	36	5180.0	15.5	15.3	0.807	0.845
				48	5240.0	15.5	15.5	0.785	
Edge 2	802.11a	Aux	0	36	5180.0	15.5	15.3	0.372	0.390
				48	5240.0	15.5	15.5	0.386	

5.3GHz Band

Test Position	Mode	Antenna	Dist. (mm)	Ch #.	Freq. (MHz)	Target Power (dBm)	Measured Power (dBm)	Measured 1g SAR (W/kg)	Scaled 1g SAR (W/kg)
Rear/Bottom	802.11a	Main	0	52	5260.0	15.0	15.0	0.851	0.851
				64	5320.0	15.0	14.8	0.809	0.847
	802.11n HT20	Main	0	52	5260.0	15.5	15.5	0.911	
				64	5320.0	15.5	15.4	0.862	0.882
Rear 20° Tilt (Tilt @Edge1)	802.11a	Main	0	52	5260.0	15.0	15.0	0.810	
				64	5320.0	15.0	14.8	0.786	0.823
	802.11n HT20	Main	0	52	5260.0	15.5	15.5	0.913	
				64	5320.0	15.5	15.4	0.801	0.820
Edge 1	802.11a	Main	0	52	5260.0	15.0	15.0	0.570	
				64	5320.0	15.0	14.8	0.628	0.658
	802.11n HT20	Main	0	52	5260.0	15.5	15.5	0.700	
				64	5320.0	15.5	15.4	0.764	0.782
Test Position	Mode	Antenna	Dist. (mm)	Ch #.	Freq. (MHz)	Target Power (dBm)	Measured Power (dBm)	Measured 1g SAR (W/kg)	Scaled 1g SAR (W/kg)
Rear/Bottom	802.11a	Aux	0	52	5260.0	15.0	15.0	0.920	
				64	5320.0	15.0	14.9	0.827	0.846
	802.11n HT20	Aux	0	52	5260.0	15.5	15.5	**1.030**	
				64	5320.0	15.5	15.5	0.901	
Rear 20° Tilt (Tilt @Edge2)	802.11a	Aux	0	52	5260.0	15.0	15.0	0.751	
				64	5320.0	15.0	14.9	0.694	0.710
	802.11n HT20	Aux	0	52	5260.0	15.5	15.5	0.834	
				64	5320.0	15.5	15.5	0.786	
Edge 2	802.11a	Aux	0	52	5260.0	15.0	15.0	0.425	
				64	5320.0	15.0	14.9	0.399	0.408
	802.11n HT20	Aux	0	52	5260.0	15.5	15.5	0.474	
				64	5320.0	15.5	15.5	0.428	

5.5GHz Band

Test Position	Mode	Antenna	Dist. (mm)	Ch #.	Freq. (MHz)	Target Power (dBm)	Measured Power (dBm)	Measured 1g SAR (W/kg)	Scaled 1g SAR (W/kg)
Rear/Bottom	802.11a	Main	0	104	5520.0	16.0	15.9	0.940	0.962
				116	5580.0	16.0	16.0	1.010	
				124	5620.0	16.0	15.9	0.918	0.939
				136	5680.0	16.0	15.8	1.020	1.068
Rear 20° Tilt (Tilt @Edge1)	802.11a	Main	0	104	5520.0	16.0	15.9	1.320	1.351
				116	5580.0	16.0	16.0	1.270	
				124	5620.0	16.0	15.9	1.340	1.371
				136	5680.0	16.0	15.8	**1.360**	1.424
Edge 1	802.11a	Main	0	104	5520.0	16.0	15.9	1.080	1.105
				116	5580.0	16.0	16.0	1.160	
				124	5620.0	16.0	15.9	1.130	1.156
				136	5680.0	16.0	15.8	0.940	0.984
Test Position	Mode	Antenna	Dist. (mm)	Ch #.	Freq. (MHz)	Target Power (dBm)	Measured Power (dBm)	Measured 1g SAR (W/kg)	Scaled 1g SAR (W/kg)
Rear/Bottom	802.11a	Aux	0	104	5520.0	16.0	16.0	0.837	
				116	5580.0	16.0	16.0	0.843	
				124	5620.0	16.0	16.0	0.936	
				136	5680.0	16.0	16.0	0.914	
Rear 20° Tilt (Tilt @Edge2)	802.11a	Aux	0	104	5520.0	16.0	16.0	0.709	
				116	5580.0	16.0	16.0	0.721	
				124	5620.0	16.0	16.0	0.722	
				136	5680.0	16.0	16.0	0.723	
Edge 2	802.11a	Aux	0	104	5520.0	16.0	16.0	0.534	
				116	5580.0	16.0	16.0	0.706	
				124	5620.0	16.0	16.0	0.868	
				136	5680.0	16.0	16.0	0.845	

5.8GHz Band

Test Position	Mode	Antenna	Dist. (mm)	Ch #.	Freq. (MHz)	Target Power (dBm)	Measured Power (dBm)	Measured 1g SAR (W/kg)	Scaled 1g SAR (W/kg)
Rear/Bottom	802.11a	Main	0	149	5745.0	16.5	16.5	**1.280**	
				157	5785.0	16.5	16.5	1.220	
				165	5825.0	16.5	16.5	1.160	
Rear 20° Tilt (Tilt @Edge1)	802.11a	Main	0	149	5745.0	16.5	16.5	1.080	
				157	5785.0	16.5	16.5	1.030	
				165	5825.0	16.5	16.5	1.100	
Edge 1	802.11a	Main	0	149	5745.0	16.5	16.5	1.220	
				157	5785.0	16.5	16.5	1.250	
				165	5825.0	16.5	16.5	1.170	

Test Position	Mode	Antenna	Dist. (mm)	Ch #.	Freq. (MHz)	Target Power (dBm)	Measured Power (dBm)	Measured 1g SAR (W/kg)	Scaled 1g SAR (W/kg)
Rear/Bottom	802.11a	Aux	0	149	5745.0	16.5	16.5	0.442	
				157	5785.0	16.5	16.5	0.537	
				165	5825.0	16.5	16.5	0.542	
Rear 20° Tilt (Tilt @Edge2)	802.11a	Aux	0	149	5745.0	16.5	16.5	0.456	
				157	5785.0	16.5	16.5	0.378	
				165	5825.0	16.5	16.5	0.369	
Edge 2	802.11a	Aux	0	149	5745.0	16.5	16.5	0.579	
				157	5785.0	16.5	16.5	0.472	
				165	5825.0	16.5	16.5	0.404	

14. Summary of Highest SAR Values

Results for highest Body SAR values for each frequency band and mode

Technology/Band	Test configuration	Mode	Highest Measured 1g-SAR (W/kg)
W-CDMA (UMTS) Band V	Rear 20º Tilt @Edge1	Rel 99 RMC 12.2kbps	0.878
W-CDMA (UMTS) Band II	Rear 20º Tilt @Edge1	Rel 99 RMC 12.2kbps	1.030
LTE band 4	Rear 20º Tilt @Edge1	10 MHz (QPSK) RB 1/0	1.430
LTE band 17	Rear Bottom	10 MHz (QPSK) RB 1/0	0.775
WiFi 2.4 GHz	Rear Bottom	802.11b 1Mbps	0.947
WiFi 5.2 GHz	Rear Bottom	802.11a 6Mbps	0.916
WiFi 5.3 GHz	Rear Bottom	802.11a 6Mbps	1.030
WiFi 5.5 GHz	Rear 20º Tilt @Edge1	802.11a 6Mbps	1.360
WiFi 5.8 GHz	Rear Bottom	802.11a 6Mbps	1.280

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

Test Laboratory: UL CCS SAR Lab D Date/Time: 9/24/2012

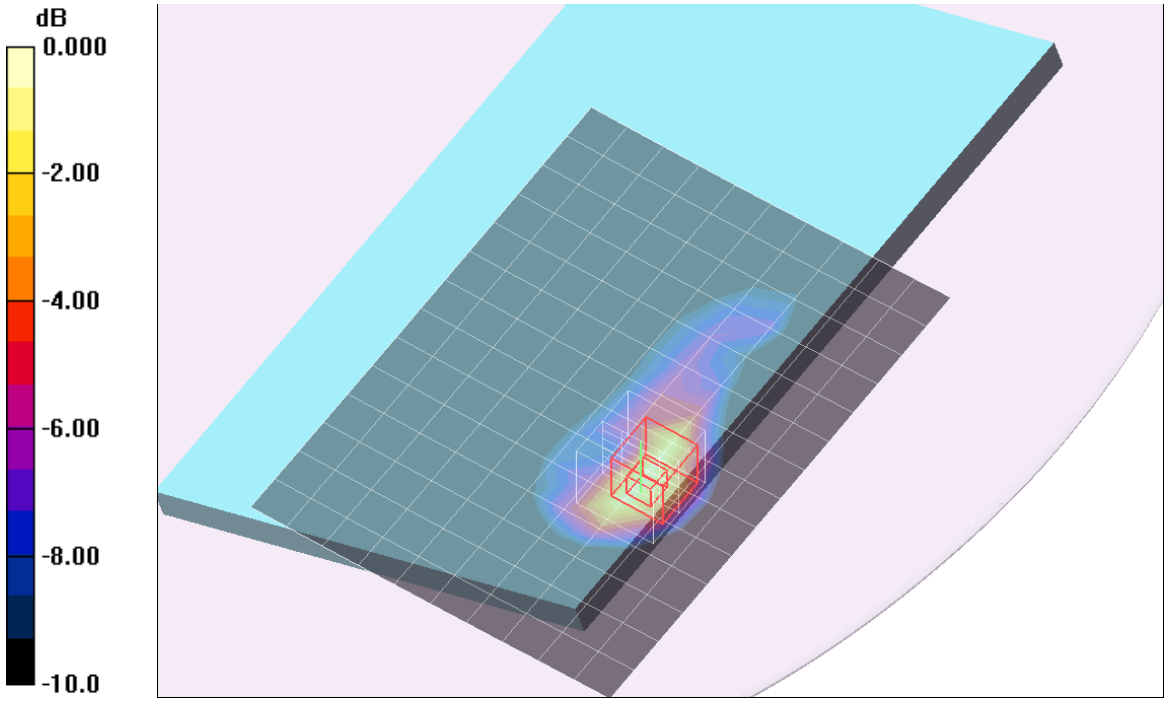
W-CDMA Band V

Frequency: 826.4 MHz; Duty Cycle: 1:1; Room Ambient Temperature: 24.0°C; Liquid Temperature: 23.0°C
Medium parameters used (interpolated): f = 826.4 MHz; σ = 0.988 mho/m; ε_r = 54.3; ρ = 1000 kg/m^3 ;
DASY4 Configuration:
- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Electronics: DAE3 Sn500; Calibrated: 6/13/2012
- Probe: EX3DV4 - SN3749; ConvF(8.84, 8.84, 8.84); Calibrated: 1/27/2012
- Sensor-Surface: 2.5mm (Mechanical Surface Detection (Locations From Previous Scan Used))Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BB; Serial: SN:1017

Rear 20 deg Tilt /Rel.99/Ch4132/Area Scan (11x15x1): Measurement grid: dx=15mm, dy=15mm
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.02 mW/g

Rear 20 deg Tilt /Rel.99/Ch4132/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 33.7 V/m; Power Drift = -0.083 dB
Peak SAR (extrapolated) = 1.63 W/kg
SAR(1 g) = 0.878 mW/g; SAR(10 g) = 0.460 mW/g

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.19 mW/g



0 dB = 1.19mW/g

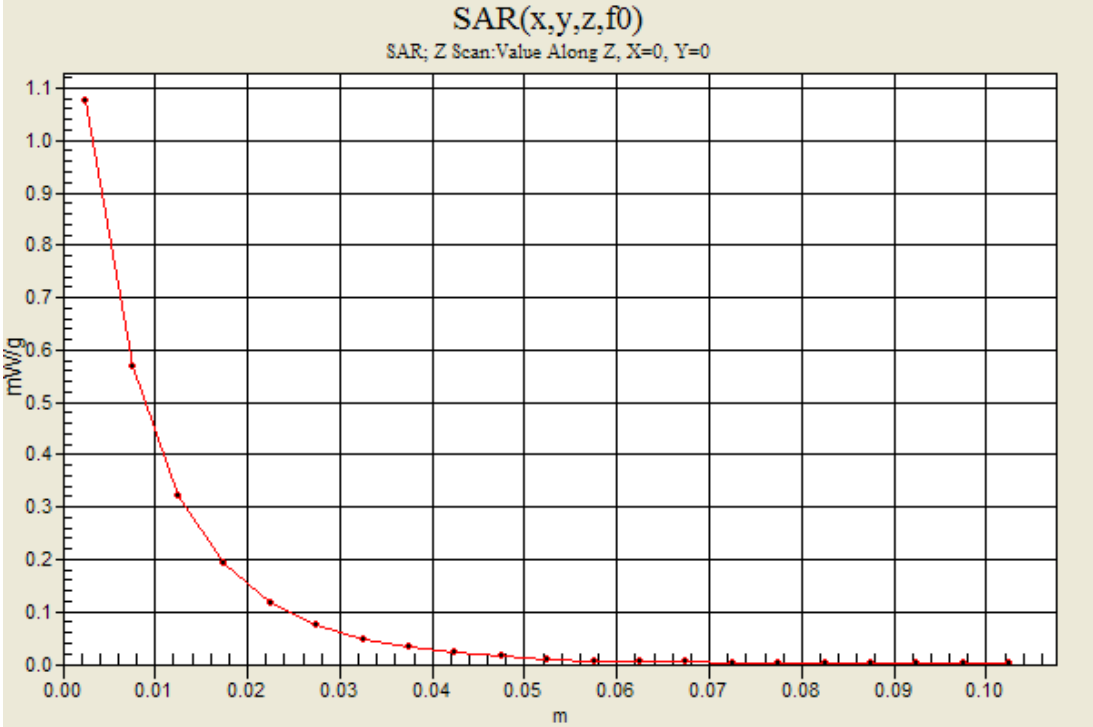
Test Laboratory: UL CCS SAR Lab D
Date/Time: 9/24/2012 10:49:43 AM

W-CDMA Band V

Frequency: 826.4 MHz; Duty Cycle: 1:1

Rear 20 deg Tilt /Rel.99/Ch4132/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.08 mW/g



Test Laboratory: UL CCS SAR Lab D Date/Time: 9/18/2012

W-CDMA Band II

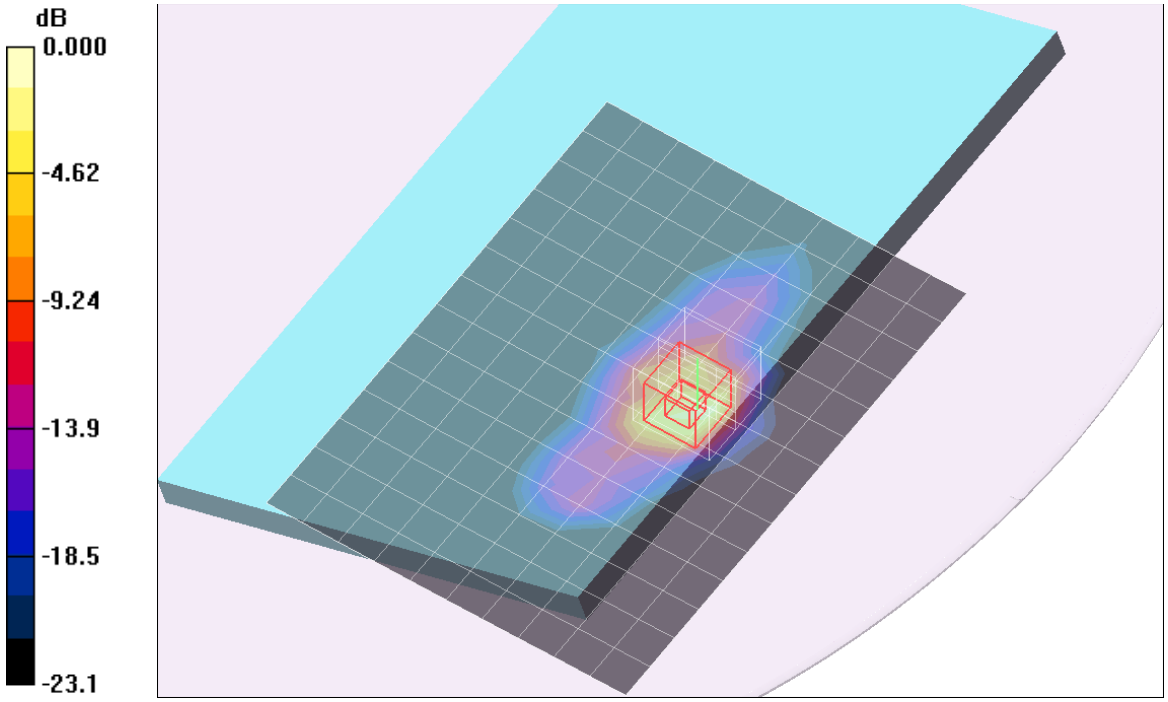
Frequency: 1907.6 MHz; Duty Cycle: 1:1; Room Ambient Temperature: 24.0°C; Liquid Temperature: 23.0°C
Medium parameters used (interpolated): f = 1907.6 MHz; σ = 1.52 mho/m; ε_r = 51.9; ρ = 1000 kg/m^3 ;
DASY4 Configuration:
- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Electronics: DAE3 Sn500; Calibrated: 6/13/2012
- Probe: EX3DV4 - SN3749; ConvF(6.97, 6.97, 6.97); Calibrated: 1/27/2012
- Sensor-Surface: 2.5mm (Mechanical Surface Detection (Locations From Previous Scan Used))Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BB; Serial: SN:1017

Rear 20 deg Tilt@Edge 1/Rel.99/Ch9538/Area Scan (11x15x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.724 mW/g

Rear 20 deg Tilt@Edge 1/Rel.99/Ch9538/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 19.4 V/m; Power Drift = 0.11 dB
Peak SAR (extrapolated) = 2.33 W/kg
SAR(1 g) = 1.03 mW/g; SAR(10 g) = 0.409 mW/g
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.17 mW/g



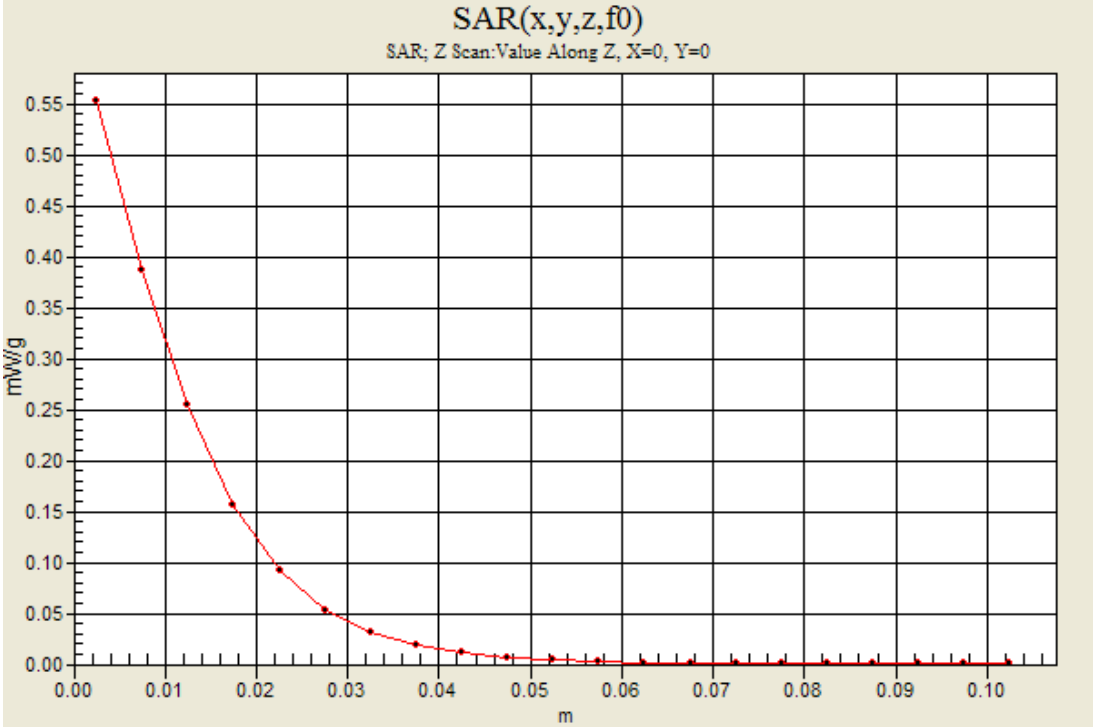
0 dB = 1.17mW/g

Test Laboratory: UL CCS SAR Lab D Date/Time: 9/18/2012

W-CDMA Band II

Frequency: 1907.6 MHz; Duty Cycle: 1:1

Rear 20 deg Tilt@Edge 1/Rel.99/Ch9538/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.553 mW/g



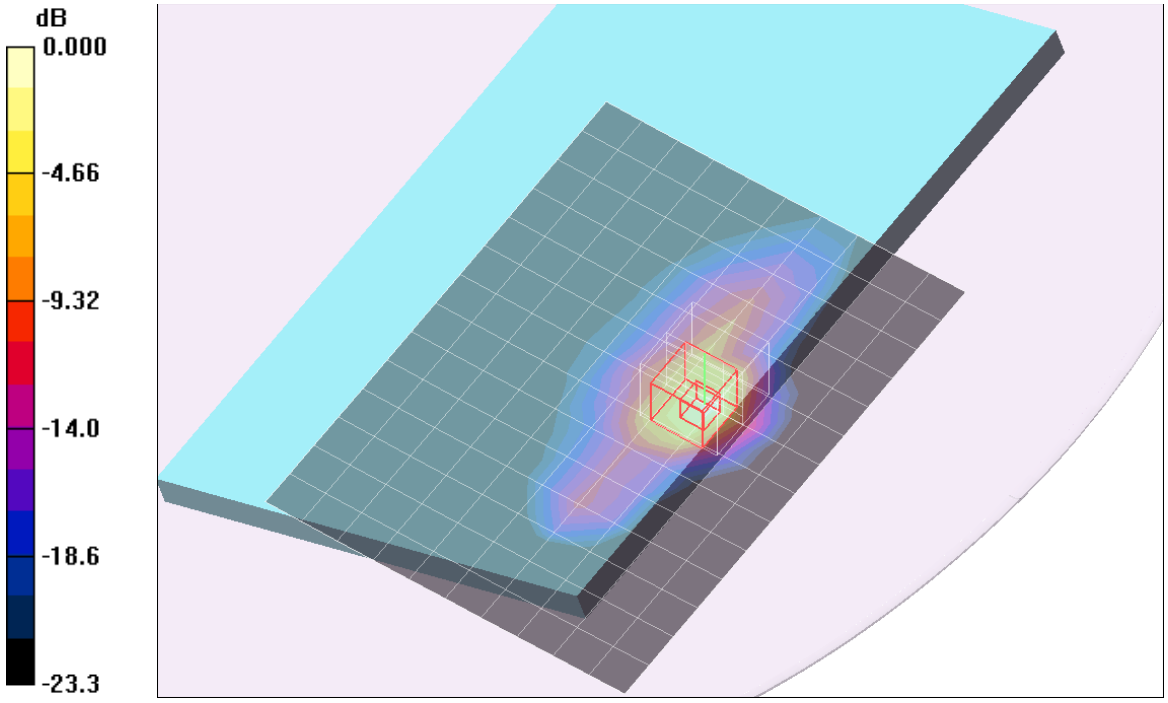
Test Laboratory: UL CCS SAR Lab D Date/Time: 9/19/2012

LTE Band 4

Frequency: 1715 MHz; Duty Cycle: 1:1; Room Ambient Temperature: 24.0°C; Liquid Temperature: 23.0°C
Medium parameters used: f = 1715 MHz; σ = 1.48 mho/m; ε_r = 53.1; ρ = 1000 kg/m^3 ;
DASY4 Configuration:
- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Electronics: DAE3 Sn500; Calibrated: 6/13/2012
- Probe: EX3DV4 - SN3749; ConvF(7.23, 7.23, 7.23); Calibrated: 1/27/2012
- Sensor-Surface: 2.5mm (Mechanical Surface Detection (Locations From Previous Scan Used))Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BB; Serial: SN:1017

Rear Tilt@Edge 1/QPSK RB25_12/Ch20000/Area Scan (11x15x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 2.06 mW/g

Rear Tilt@Edge 1/QPSK RB25_12/Ch20000/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 35.8 V/m; Power Drift = 0.156 dB
Peak SAR (extrapolated) = 3.08 W/kg
SAR(1 g) = 1.43 mW/g; SAR(10 g) = 0.616 mW/g
Maximum value of SAR (measured) = 2.20 mW/g



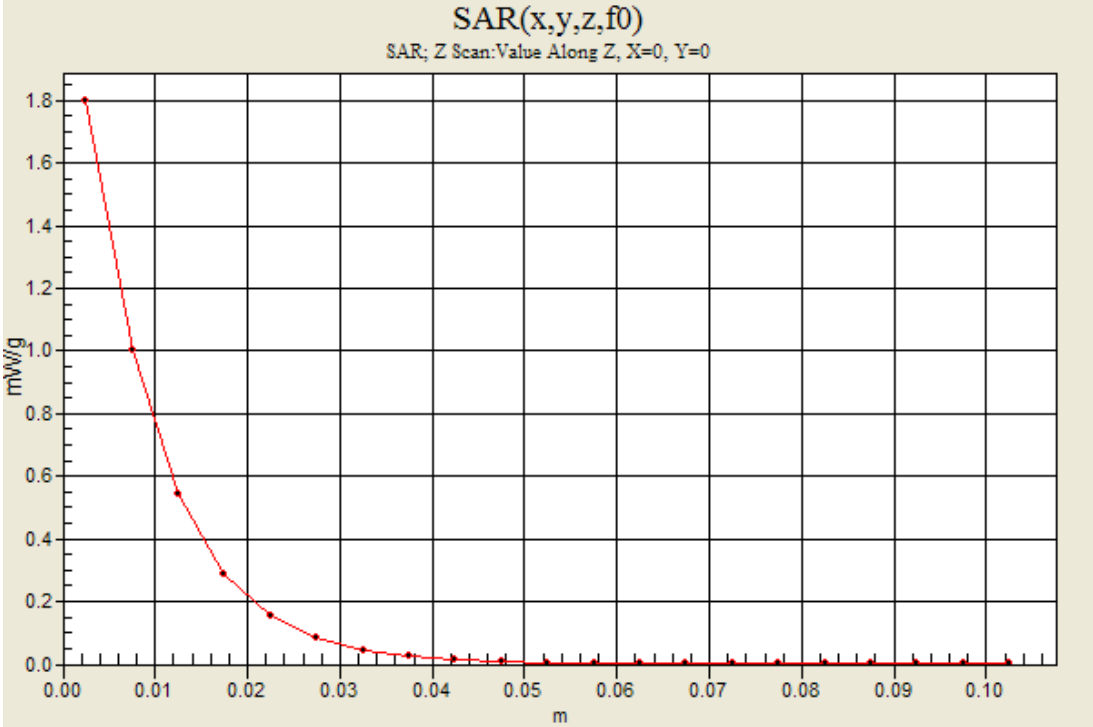
0 dB = 2.20mW/g

Test Laboratory: UL CCS SAR Lab D Date/Time: 9/19/2012

LTE Band 4

Frequency: 1715 MHz; Duty Cycle: 1:1

Rear Tilt@Edge 1/QPSK RB25_12/Ch20000/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Maximum value of SAR (measured) = 1.80 mW/g



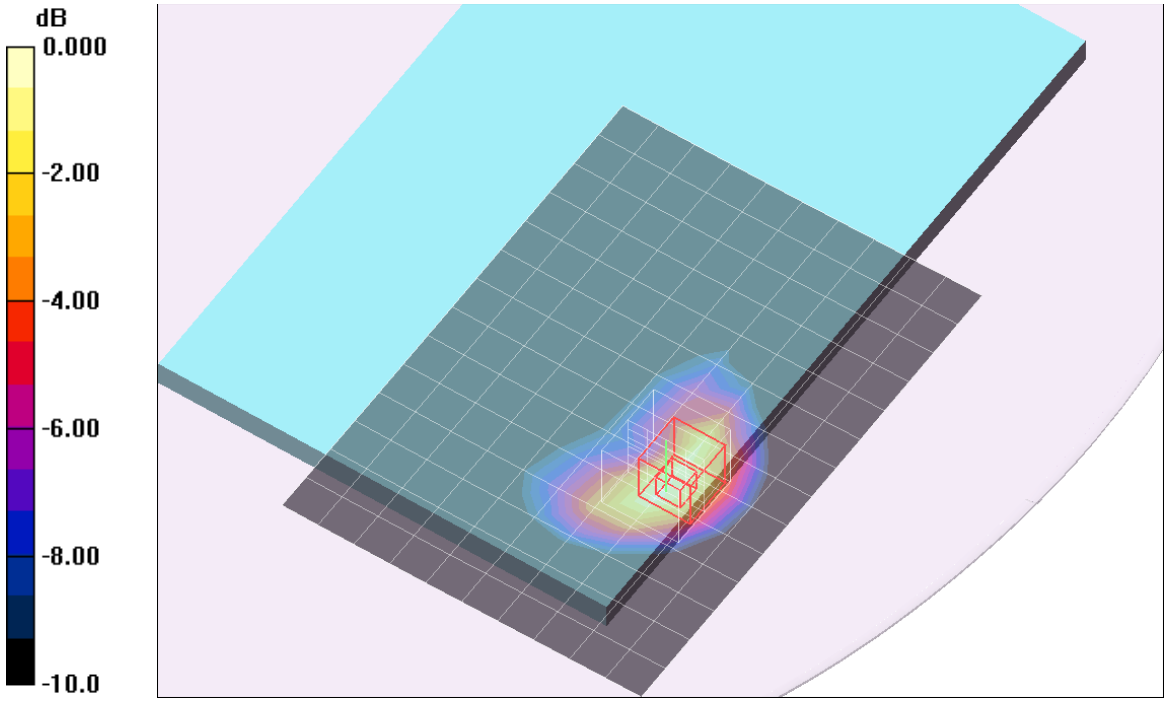
Test Laboratory: UL CCS SAR Lab D Date/Time: 9/21/2012

LTE Band 17

Frequency: 710 MHz; Duty Cycle: 1:1; Room Ambient Temperature: 24.0°C; Liquid Temperature: 23.0°C
Medium parameters used: f = 710 MHz; σ = 0.909 mho/m; ε_r = 54.4; ρ = 1000 kg/m^3 ;
DASY4 Configuration:
- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Electronics: DAE3 Sn500; Calibrated: 6/13/2012
- Probe: EX3DV4 - SN3749; ConvF(8.97, 8.97, 8.97); Calibrated: 1/27/2012
- Sensor-Surface: 2.5mm (Mechanical Surface Detection (Locations From Previous Scan Used))Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BB; Serial: SN:1017

Rear Touch/QPSK RB1_0/Ch23790/Area Scan (11x15x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.969 mW/g

Rear Touch/QPSK RB1_0/Ch23790/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 33.5 V/m; Power Drift = -0.015 dB
Peak SAR (extrapolated) = 1.39 W/kg
SAR(1 g) = 0.775 mW/g; SAR(10 g) = 0.435 mW/g
Maximum value of SAR (measured) = 1.04 mW/g



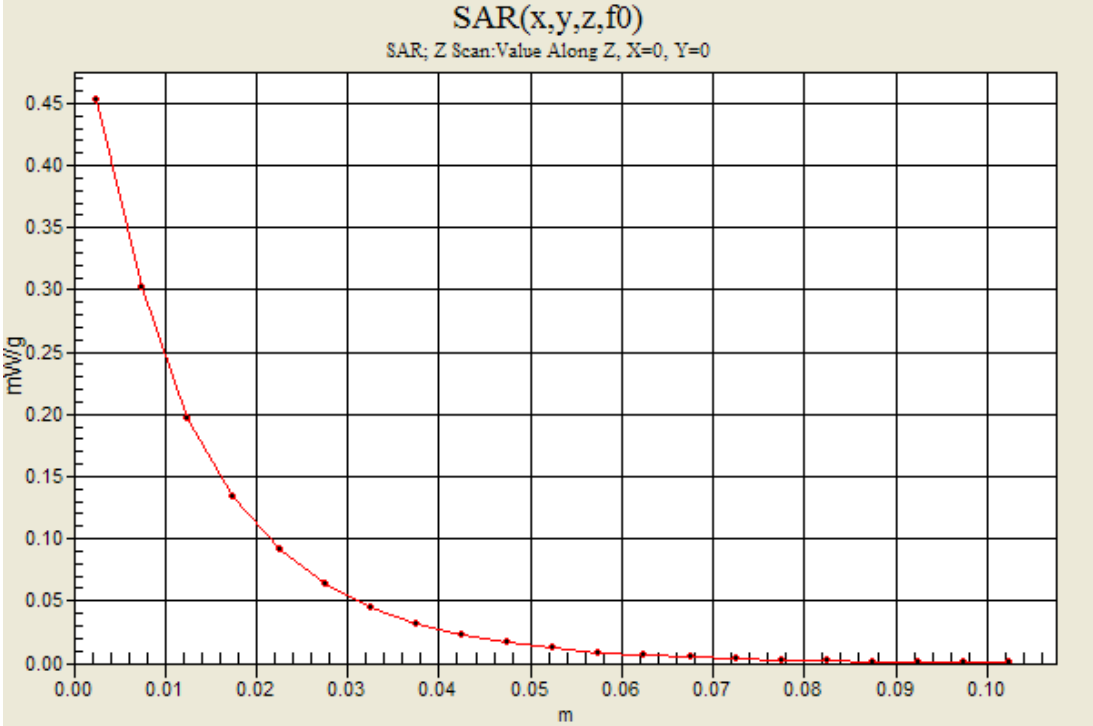
0 dB = 1.04mW/g

Test Laboratory: UL CCS SAR Lab D
Date/Time: 9/21/2012

LTE Band 17

Frequency: 710 MHz; Duty Cycle: 1:1

Rear Touch/QPSK RB1_0/Ch23790/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Maximum value of SAR (measured) = 0.453 mW/g



Test Laboratory: UL CCS SAR Lab B Date: 10/10/2012

WiFi 2.4GHz Band

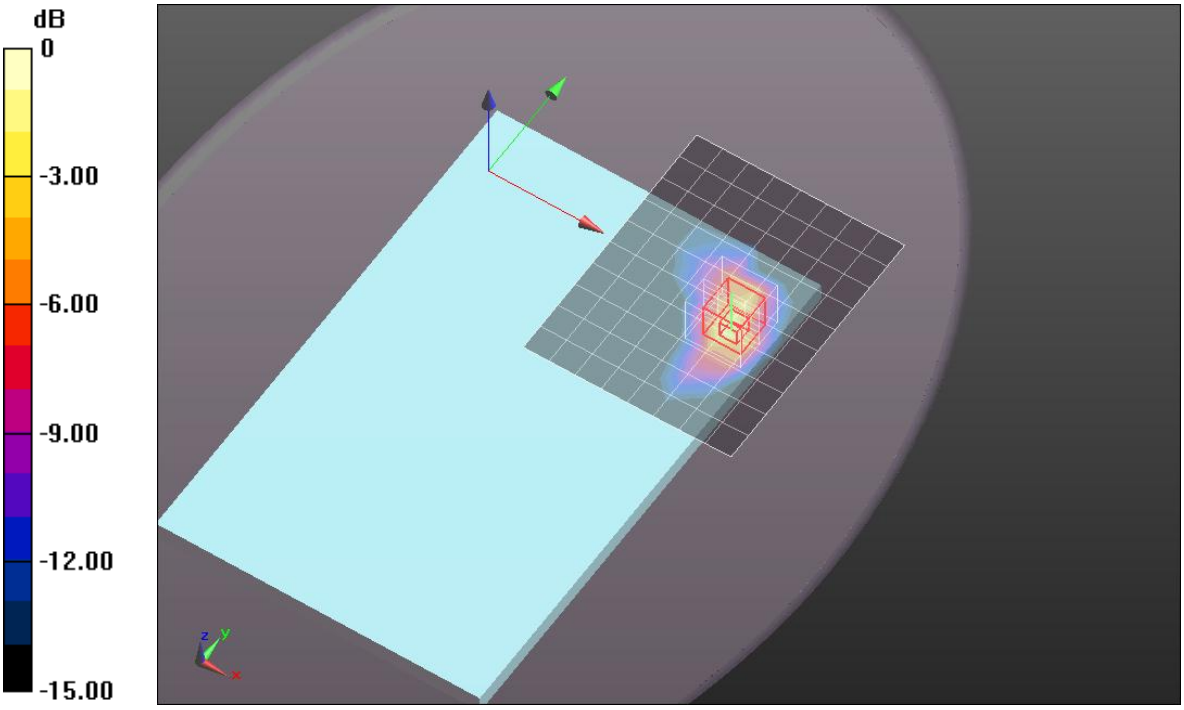
Frequency: 2457 MHz; Duty Cycle: 1:1; Room Ambient Temperature: 24.0°C; Liquid Temperature: 23.0°C
Medium parameters used (interpolated): f = 2457 MHz; σ = 1.928 mho/m; ε_r = 51.476; ρ = 1000 kg/m^3
DASY5 Configuration:
- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Electronics: DAE4 Sn1259; Calibrated: 2/13/2012
- Probe: EX3DV4 - SN3686; ConvF(6.7, 6.7, 6.7); Calibrated: 2/16/2012
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Phantom: ELI v5.0 (B); Type: QDOVA001BB; Serial: 1118

Rear/Touch/Main Ant/802.11g/Ch 10/Area Scan (9x11x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.046 mW/g

Rear/Touch/Main Ant/802.11g/Ch 10/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 23.468 V/m; Power Drift = -0.09 dB
Peak SAR (extrapolated) = 2.2360
SAR(1 g) = 0.947 mW/g; SAR(10 g) = 0.394 mW/g
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.472 mW/g



0 dB = 1.470mW/g = 3.35 dB mW/g

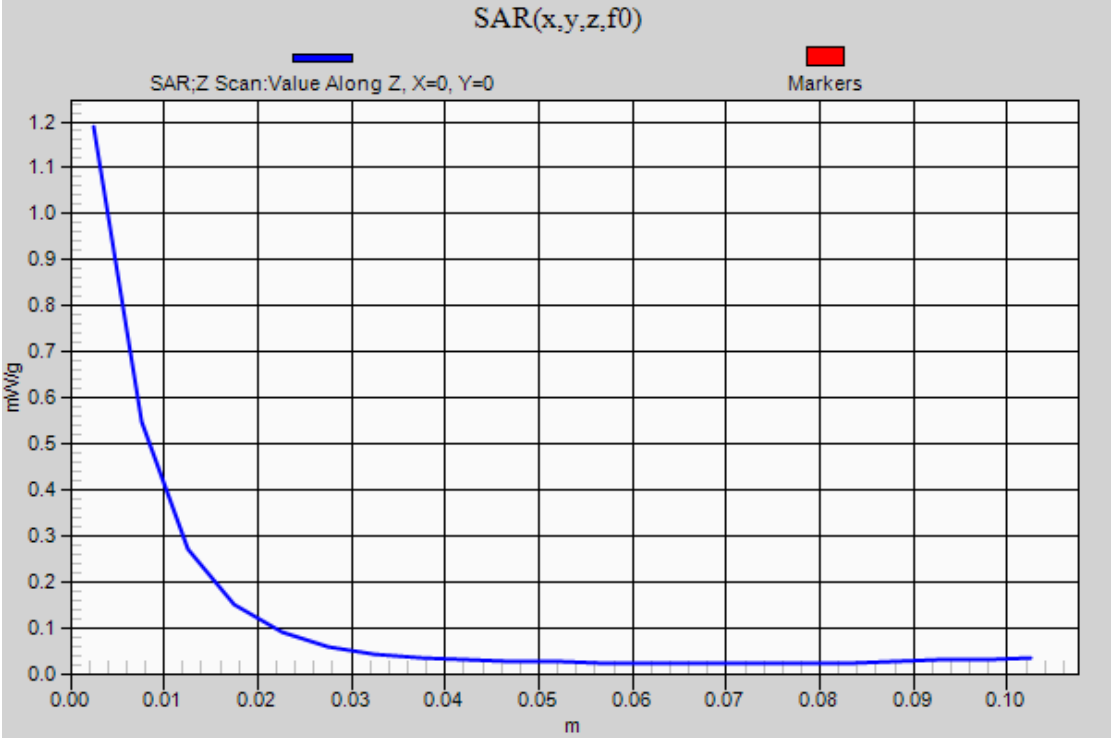
Test Laboratory: UL CCS SAR Lab B Date: 10/10/2012

WiFi 2.4GHz Band

Frequency: 2457 MHz; Duty Cycle: 1:1

Rear/Touch/Main Ant/802.11g/Ch 10/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.189 mW/g



Test Laboratory: UL CCS SAR Lab B Date: 10/2/2012

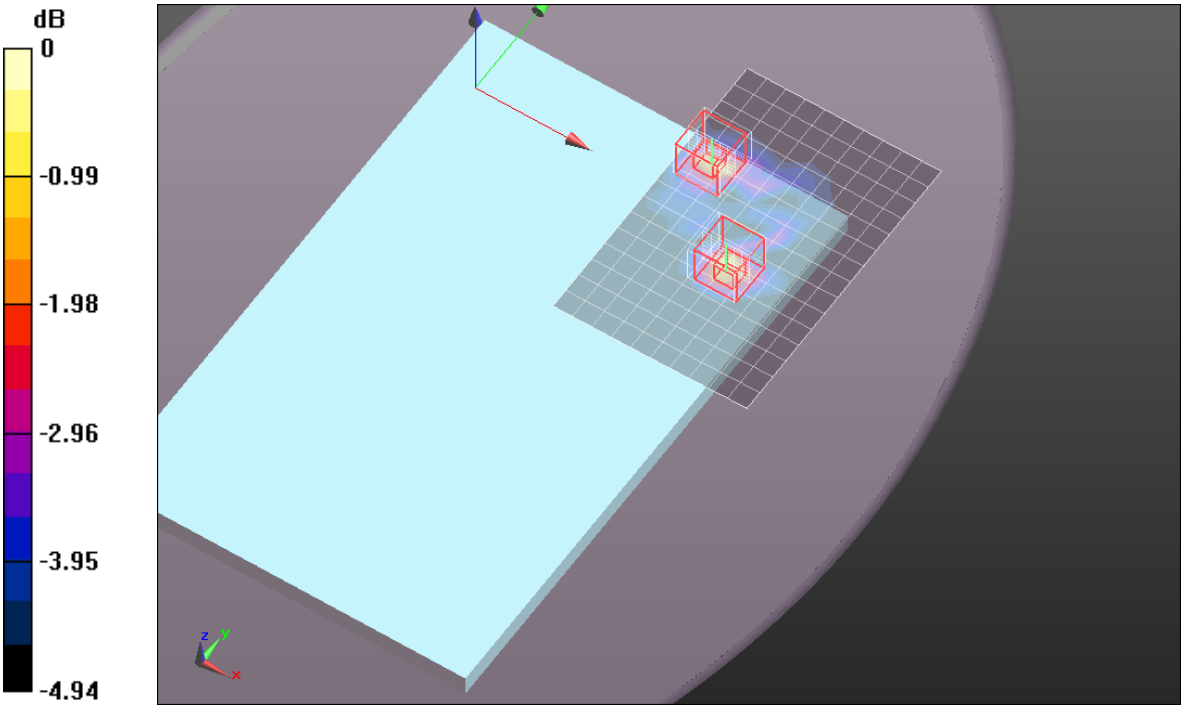
WiFi 5.2 GHz Band

Frequency: 5240 MHz; Duty Cycle: 1:1; Room Ambient Temperature: 25.0°C; Liquid Temperature: 24.0°C
Medium parameters used: f = 5240 MHz; σ = 5.462 mho/m; ε_r = 47.476; ρ = 1000 kg/m^3
DASY5 Configuration:
- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Electronics: DAE4 Sn1259; Calibrated: 2/13/2012
- Probe: EX3DV4 - SN3686; ConvF(4.04, 4.04, 4.04); Calibrated: 2/16/2012
- Sensor-Surface: 2.5mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Phantom: ELI v5.0 (B); Type: QDOVA001BB; Serial: 1118

Rear/Touch/802.11a/Main Ant/Ch 48/Area Scan (11x16x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 0.901 mW/g

Rear/Touch/802.11a/Main Ant/Ch 48/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 14.150 V/m; Power Drift = -0.10 dB
Peak SAR (extrapolated) = 5.2900
SAR(1 g) = 0.916 mW/g; SAR(10 g) = 0.487 mW/g
Maximum value of SAR (measured) = 1.392 mW/g

Rear/Touch/802.11a/Main Ant/Ch 48/Zoom Scan 2 (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 14.150 V/m; Power Drift = -0.10 dB
Peak SAR (extrapolated) = 2.6440
SAR(1 g) = 0.739 mW/g; SAR(10 g) = 0.472 mW/g
Maximum value of SAR (measured) = 1.005 mW/g



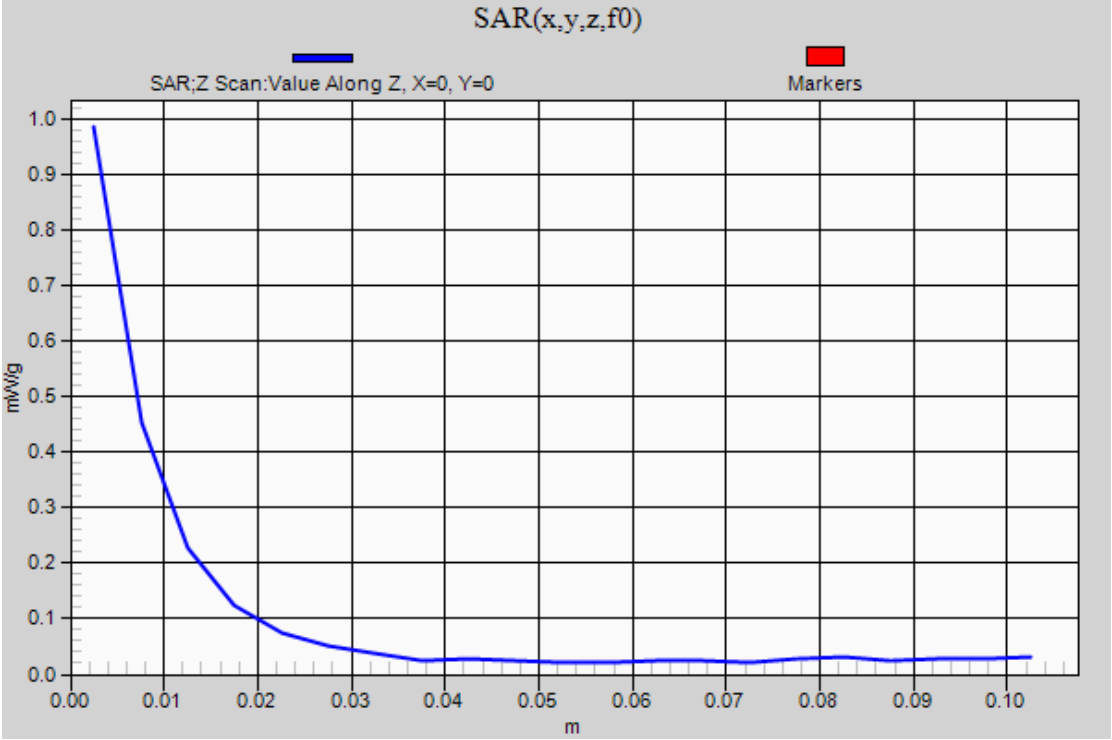
0 dB = 1.000mW/g = 0 dB mW/g

Test Laboratory: UL CCS SAR Lab B Date: 10/2/2012

WiFi 5.2 GHz Band

Frequency: 5240 MHz; Duty Cycle: 1:1

Rear/Touch/802.11a/Main Ant/Ch 48/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Maximum value of SAR (measured) = 0.984 mW/g



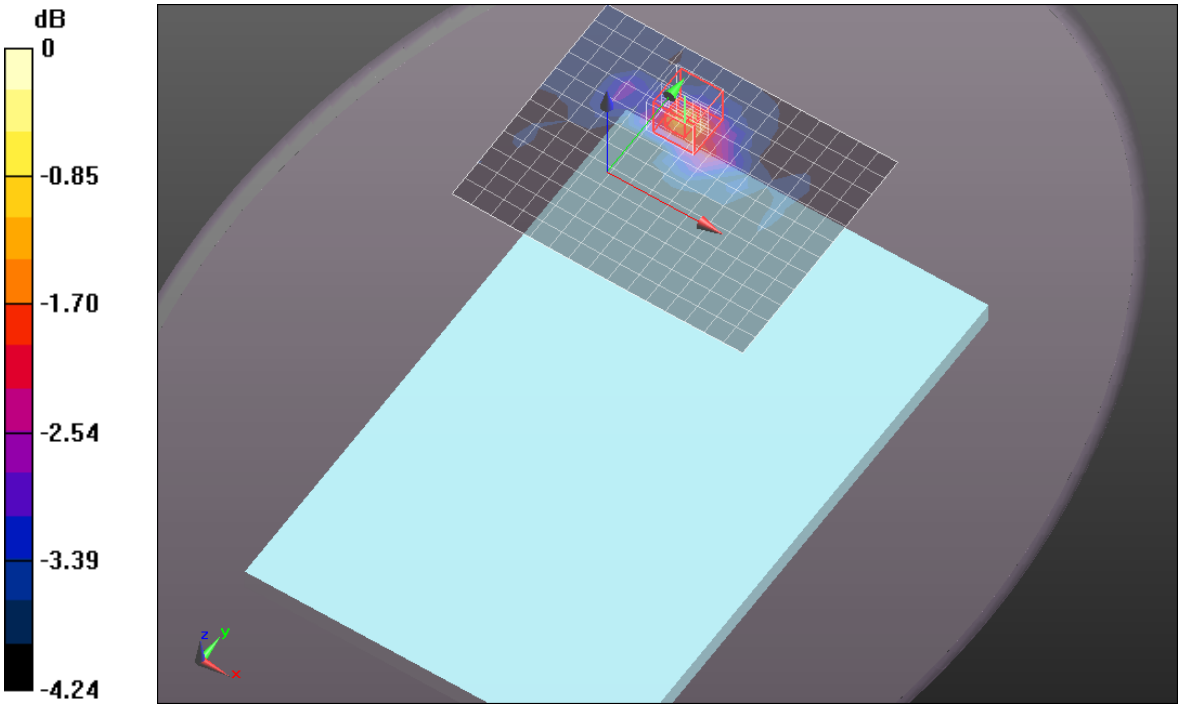
Test Laboratory: UL CCS SAR Lab B Date: 10/8/2012

WiFi 5.3 GHz Band

Frequency: 5260 MHz; Duty Cycle: 1:1; Room Ambient Temperature: 25.0°C; Liquid Temperature: 24.0°C
Medium parameters used: f = 5260 MHz; σ = 5.411 mho/m; ε_r = 47.657; ρ = 1000 kg/m^3
DASY5 Configuration:
- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Electronics: DAE4 Sn1259; Calibrated: 2/13/2012
- Probe: EX3DV4 - SN3686; ConvF(3.8, 3.8, 3.8); Calibrated: 2/16/2012
- Sensor-Surface: 2.5mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Phantom: ELI v5.0 (B); Type: QDOVA001BB; Serial: 1118

Rear/Touch/802.11n HT20/Aux Ant/Ch 52/Area Scan (16x13x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 1.179 mW/g

Rear/Touch/802.11n HT20/Aux Ant/Ch 52/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 16.035 V/m; Power Drift = 0.0013 dB
Peak SAR (extrapolated) = 2.5150
SAR(1 g) = 1.03 mW/g; SAR(10 g) = 0.727 mW/g
Maximum value of SAR (measured) = 1.342 mW/g



0 dB = 1.340mW/g = 2.54 dB mW/g

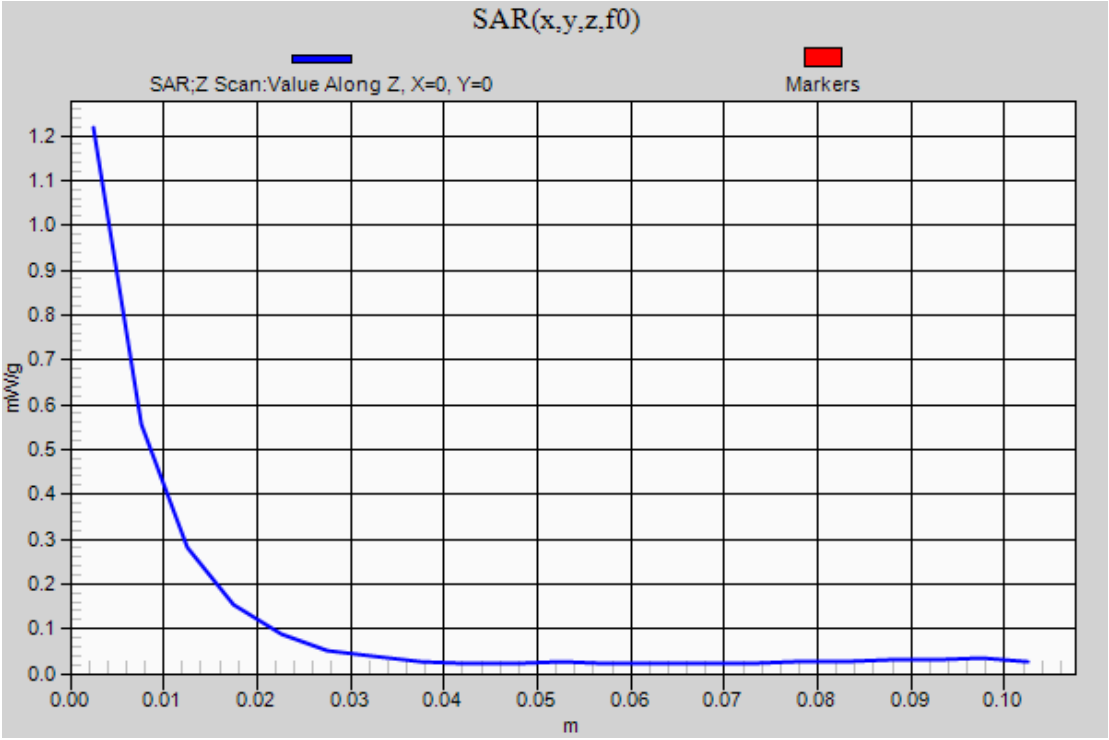
Test Laboratory: UL CCS SAR Lab B Date: 10/8/2012

WiFi 5.3 GHz Band

Frequency: 5260 MHz; Duty Cycle: 1:1

Rear/Touch/802.11n HT20/Aux Ant/Ch 52/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm

Maximum value of SAR (measured) = 1.217 mW/g



Test Laboratory: UL CCS SAR Lab B Date: 10/10/2012

WiFi 5.5 GHz Band

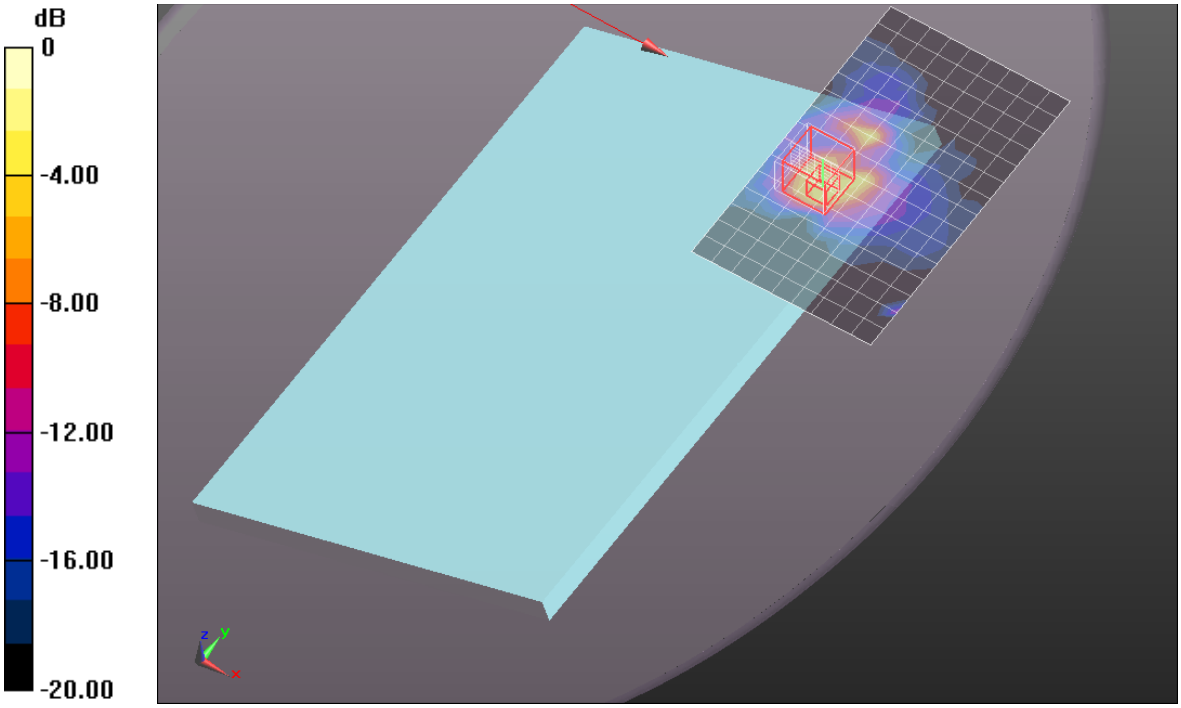
Frequency: 5680 MHz; Duty Cycle: 1:1; Room Ambient Temperature: 25.0°C; Liquid Temperature: 24.0°C
Medium parameters used: f = 5680 MHz; σ = 5.904 mho/m; ε_r = 50.201; ρ = 1000 kg/m^3
DASY5 Configuration:
- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Electronics: DAE4 Sn1259; Calibrated: 2/13/2012
- Probe: EX3DV4 - SN3686; ConvF(3.44, 3.44, 3.44); Calibrated: 2/16/2012
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Phantom: ELI v5.0 (B); Type: QDOVA001BB; Serial: 1118

Rear/20 deg. tilt @ Edge 1/802.11a/Main Ant/Ch 136/Area Scan (10x16x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (measured) = 1.051 mW/g

Rear/20 deg. tilt @ Edge 1/802.11a/Main Ant/Ch 136/Zoom Scan (7x7x9)/Cube 0:

Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 1.584 V/m; Power Drift = -0.14 dB
Peak SAR (extrapolated) = 8.7830
SAR(1 g) = 1.36 mW/g; SAR(10 g) = 0.314 mW/g
Maximum value of SAR (measured) = 2.632 mW/g



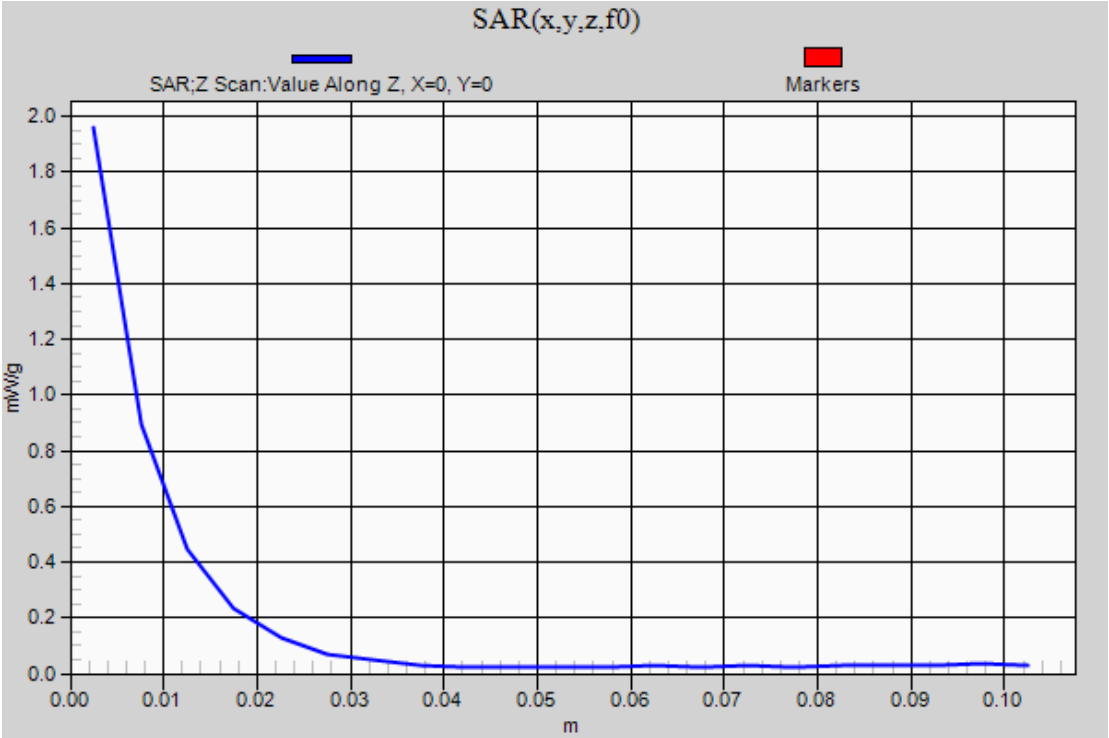
0 dB = 2.630mW/g = 8.40 dB mW/g

Test Laboratory: UL CCS SAR Lab B Date: 10/10/2012

WiFi 5.5 GHz Band

Frequency: 5680 MHz; Duty Cycle: 1:1

Rear/20 deg. tilt @ Edge 1/802.11a/Main Ant/Ch 136/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Maximum value of SAR (measured) = 1.960 mW/g



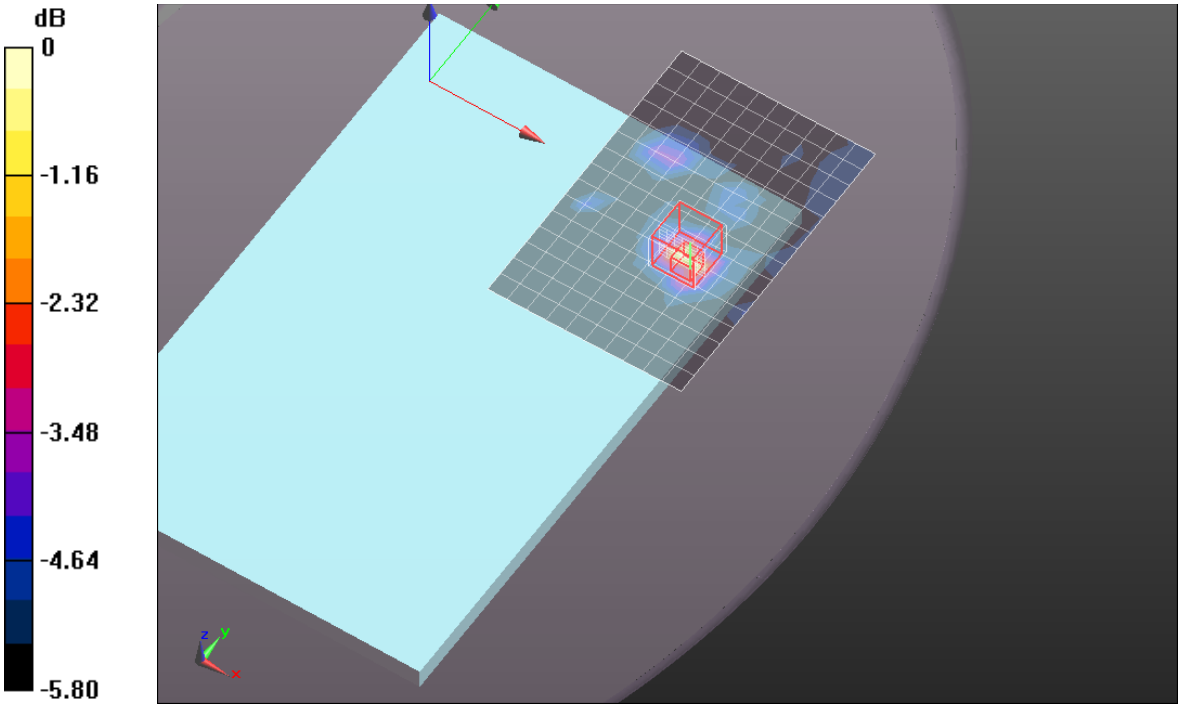
Test Laboratory: UL CCS SAR Lab B Date: 10/11/2012

WiFi 5.8 GHz Band

Frequency: 5745 MHz; Duty Cycle: 1:1; Room Ambient Temperature: 25.0°C; Liquid Temperature: 24.0°C
Medium parameters used: f = 5745 MHz; σ = 6.117 mho/m; ε_r = 47.469; ρ = 1000 kg/m^3
DASY5 Configuration:
- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Electronics: DAE4 Sn1259; Calibrated: 2/13/2012
- Probe: EX3DV4 - SN3686; ConvF(3.57, 3.57, 3.57); Calibrated: 2/16/2012
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Phantom: ELI v5.0 (B); Type: QDOVA001BB; Serial: 1118

Rear/Touch/802.11a/Main Ant/Ch 149/Area Scan (11x16x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 1.594 mW/g

Rear/Touch/802.11a/Main Ant/Ch 149/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 9.716 V/m; Power Drift = 0.09 dB
Peak SAR (extrapolated) = 6.5600
SAR(1 g) = 1.28 mW/g; SAR(10 g) = 0.735 mW/g
Maximum value of SAR (measured) = 1.854 mW/g



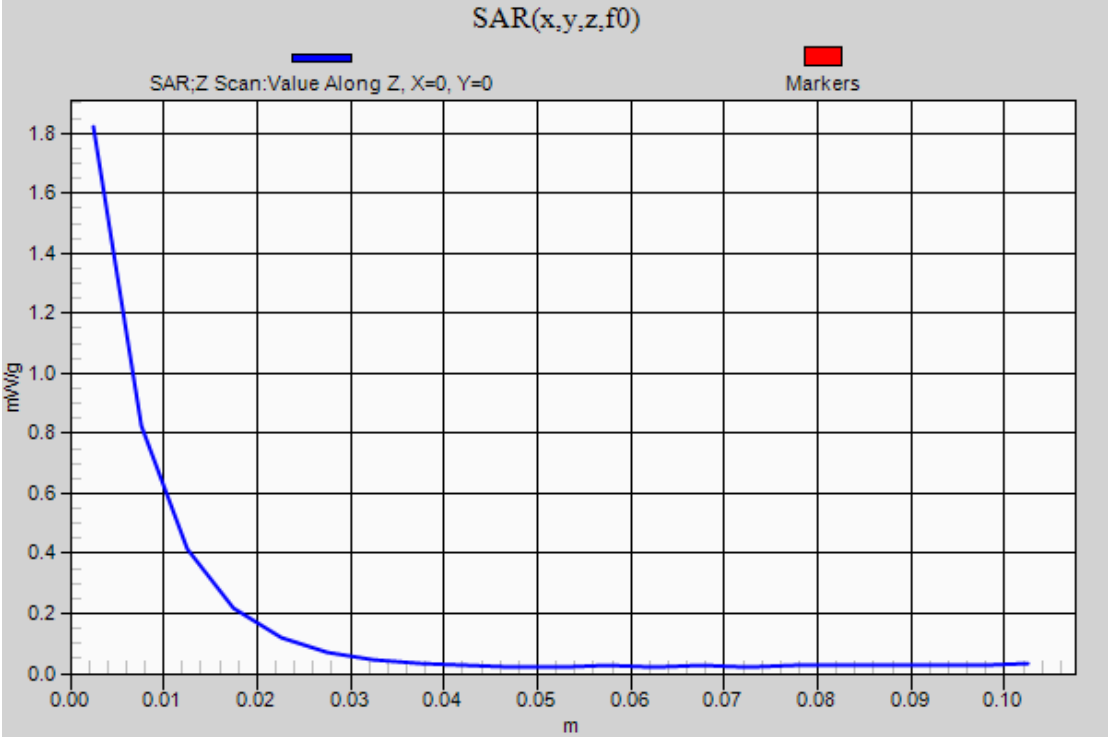
0 dB = 1.850mW/g = 5.34 dB mW/g

Test Laboratory: UL CCS SAR Lab B Date: 10/11/2012

WiFi 5.8 GHz Band

Frequency: 5745 MHz; Duty Cycle: 1:1

Rear/Touch/802.11a/Main Ant/Ch 149/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Maximum value of SAR (measured) = 1.821 mW/g



15. Simultaneous Transmission SAR Analysis

As Bluetooth's max average power is 2.19 mW [<60/f(GHz) mW] standalone SAR is not required. Therefore, Bluetooth simultaneous transmission SAR evaluation with Wi-Fi and WWAN is not required.

15.1. Wi-Fi Simultaneous Transmission Analysis

Standalone testing of the 802.11n (HT20 and HT40) 2Tx (MIMO) modes was not performed based upon the test exclusion guidelines in KDB 248227. However as simultaneous transmission between the WLAN main and aux antennas is possible simultaneous transmission SAR analysis is required.

As the 802.11a, b and g output power is higher than the 802.11n output power it was judged that performing the simultaneous transmission SAR analysis using the 802.11a, b and g SAR data could be considered a worst case situation. If the DUT is compliant using the 802.11a, b and g SAR data then 802.11n 2Tx can be presumed compliant too.

15.2. Sum of the 1g SAR for Body Exposure Condition

Sum of the SAR with Scaled Values

Test Position	W-CDMA (UMTS) Band V	W-CDMA (UMTS) Band II	LTE Band 4	LTE Band 17	WiFi 2.4GHz Band		∑ 1-g SAR (mW/g)	Note
					Main	Aux		
Rear/Bottom	0.856				0.947		1.803	
		0.514			0.947		1.461	
			0.769		0.947		1.716	
				0.813	0.947		1.760	
	0.856					0.645	1.501	
		0.514				0.645	1.159	
			0.769			0.645	1.414	
				0.813		0.645	1.458	
	0.856				0.947	0.645	2.448	
		0.514			0.947	0.645	2.106	
			0.769		0.947	0.645	2.361	
				0.813	0.947	0.645	2.405	
Rear 20° Tilt (Tilt @Edge1)	0.878				0.831		1.709	
		1.104			0.831		1.935	
			1.522		0.831		2.353	
				0.785	0.831		1.616	
Edge 1	0.481				0.922		1.403	
		0.486			0.922		1.408	
			0.692		0.922		1.614	
				0.521	0.922		1.443	

Test Position	W-CDMA (UMTS) Band V	W-CDMA (UMTS) Band II	LTE Band 4	LTE Band 17	WiFi 5.2GHz Band		∑ 1-g SAR (mW/g)	Note
					Main	Aux		
Rear/Bottom	0.856				0.937		1.793	
		0.514			0.937		1.452	
			0.769		0.937		1.706	
				0.813	0.937		1.751	
	0.856					0.809	1.665	
		0.514				0.809	1.323	
			0.769			0.809	1.578	
				0.813		0.809	1.622	
	0.856				0.937	0.809	2.602	
		0.514			0.937	0.809	2.261	
			0.769		0.937	0.809	2.515	
				0.813	0.937	0.809	2.560	
Rear 20° Tilt (Tilt @Edge1)	0.878				0.929		1.807	
		1.104			0.929		2.033	
			1.522		0.929		2.451	
				0.785	0.929		1.714	
Edge 1	0.481				0.871		1.352	
		0.486			0.871		1.357	
			0.692		0.871		1.563	
				0.521	0.871		1.391	

1. Where the ∑ 1-g SAR exceeds 1.6mW/g SPLSR calculations will determine if further Simultaneous transmission SAR measurements (Volume Scan) are required.
2. Simultaneous transmission SAR measurement (Volume Scan) is not required when the ∑ 1-g SAR is < 1.6 mW/g

Test Position	W-CDMA (UMTS) Band V	W-CDMA (UMTS) Band II	LTE Band 4	LTE Band 17	WiFi 5.3GHz Band		∑ 1-g SAR (mW/g)	Note
					Main	Aux		
Rear/Bottom	0.856				0.911		1.767	
		0.514			0.911		1.425	
			0.769		0.911		1.680	
				0.813	0.911		1.724	
	0.856					1.030	1.886	
		0.514				1.030	1.544	
			0.769			1.030	1.799	
				0.813		1.030	1.843	
	0.856				0.911	1.030	2.797	
		0.514			0.911	1.030	2.455	
			0.769		0.911	1.030	2.710	
				0.813	0.911	1.030	2.754	
Rear 20° Tilt (Tilt @Edge1)	0.878				0.913		1.791	
		1.104			0.913		2.017	
			1.522		0.913		2.435	
				0.785	0.913		1.698	
Edge 1	0.481				0.782		1.263	
		0.486			0.782		1.268	
			0.692		0.782		1.474	
				0.521	0.782		1.302	

Test Position	W-CDMA (UMTS) Band V	W-CDMA (UMTS) Band II	LTE Band 4	LTE Band 17	WiFi 5.5GHz Band		∑ 1-g SAR (mW/g)	Note
					Main	Aux		
Rear/Bottom	0.856				1.010		1.866	
		0.514			1.010		1.524	
			0.769		1.010		1.779	
				0.813	1.010		1.823	
	0.856					0.936	1.792	
		0.514				0.936	1.450	
			0.769			0.936	1.705	
				0.813		0.936	1.749	
	0.856				1.010	0.936	2.802	
		0.514			1.010	0.936	2.460	
			0.769		1.010	0.936	2.715	
				0.813	1.010	0.936	2.759	
Rear 20° Tilt (Tilt @Edge1)	0.878				1.424		2.302	
		1.104			1.424		2.528	
			1.522		1.424		2.946	
				0.785	1.424		2.209	
Edge 1	0.481				1.160		1.641	
		0.486			1.160		1.646	
			0.692		1.160		1.852	
				0.521	1.160		1.681	

Test Position	W-CDMA (UMTS) Band V	W-CDMA (UMTS) Band II	LTE Band 4	LTE Band 17	WiFi 5.8GHz Band		∑ 1-g SAR (mW/g)	Note
					Main	Aux		
Rear/Bottom	0.856				1.280		2.136	
		0.514			1.280		1.794	
			0.769		1.280		2.049	
				0.813	1.280		2.093	
	0.856					0.542	1.398	
		0.514				0.542	1.056	
			0.769			0.542	1.311	
				0.813		0.542	1.355	
	0.856				1.280	0.542	2.678	
		0.514			1.280	0.542	2.336	
			0.769		1.280	0.542	2.591	
				0.813	1.280	0.542	2.635	
Rear 20° Tilt (Tilt @Edge1)	0.878				1.100		1.978	
		1.104			1.100		2.204	
			1.522		1.100		2.622	
				0.785	1.100		1.885	
Edge 1	0.481				1.250		1.731	
		0.486			1.250		1.736	
			0.692		1.250		1.942	
				0.521	1.250		1.771	

1. Where the ∑ 1-g SAR exceeds 1.6mW/g SPLSR calculations will determine if further Simultaneous transmission SAR measurements (Volume Scan) are required.
2. Simultaneous transmission SAR measurement (Volume Scan) is not required when the ∑ 1-g SAR is < 1.6 mW/g

15.3. SAR to Peak Location Separation Ratio (SPLSR) for WWAN and Wi-Fi 2.4GHz

Test Position	Worst-case combination						∑ 1-g SAR (mW/g)	Calculated distance (cm)	SPLSR	Figure
	W-CDMA Band V	W-CDMA Band II	LTE Band 4	LTE Band 17	WiFi 2.4GHz Band					
					Main	Aux				
Rear/Bottom	0.856				0.947		1.803	18.76	0.096	
			0.769		0.947		1.716	16.06	0.107	1
				0.813	0.947		1.760	19.32	0.091	
Rear 20° Tilt (Tilt @Edge1)	0.878				0.831		1.709	20.88	0.082	
		1.104			0.831		1.935	17.72	0.109	
			1.522		0.831		2.353	17.78	0.132	2
				0.785	0.831		1.616	20.91	0.077	
Edge 1			0.692		0.922		1.614	15.84	0.102	3

Conclusions:
Simultaneous transmission SAR measurement (Volume Scan) is not required because the SAR to peak location separation ratios is < 0.3.

15.4. SAR to Peak Location Separation Ratio (SPLSR) for WWAN and Wi-Fi 5.2GHz

Test Position	Worst-case combination						∑ 1-g SAR (mW/g)	Calculated distance (cm)	SPLSR	Figure
	W-CDMA Band V	W-CDMA Band II	LTE Band 4	LTE Band 17	WiFi 5.2GHz Band					
					Main	Aux				
Rear/Bottom	0.856				0.937		1.793	17.920	0.100	
			0.769		0.937		1.706	15.220	0.112	4
				0.813	0.937		1.750	18.480	0.095	
	0.856					0.809	1.665	27.740	0.060	5
				0.813		0.809	1.622	28.220	0.057	
					0.937	0.809	1.746	12.870	0.136	6
Rear 20° Tilt (Tilt @Edge1)	0.878				0.929		1.807	18.340	0.099	
		1.104			0.929		2.033	15.040	0.135	
			1.522		0.929		2.451	14.750	0.166	7
				0.785	0.929		1.714	18.330	0.094	

Conclusions:
Simultaneous transmission SAR measurement (Volume Scan) is not required because the SAR to peak location separation ratios is < 0.3.

15.5. SAR to Peak Location Separation Ratio (SPLSR) for WWAN and Wi-Fi 5.3GHz

Test Position	Worst-case combination						Σ 1-g SAR (mW/g)	Calculated distance (cm)	SPLSR	Figure
	W-CDMA Band V	W-CDMA Band II	LTE Band 4	LTE Band 17	WiFi 5.3GHz Band					
					Main	Aux				
Rear/Bottom	0.856				0.911		1.767	17.92	0.099	
			0.769		0.911		1.680	15.22	0.110	8
				0.813	0.911		1.724	18.48	0.093	
	0.856					1.030	1.886	28.08	0.067	
			0.769			1.030	1.799	25.74	0.070	9
				0.813		1.030	1.843	28.57	0.065	
					0.911	1.030	1.941	7.700	0.252	10
Rear 20° Tilt (Tilt @Edge1)	0.878				0.913		1.791	18.29	0.098	
		1.104			0.913		2.017	14.97	0.135	
			1.522		0.913		2.435	14.69	0.166	11
				0.785	0.913		1.698	18.26	0.093	

Conclusions:

Simultaneous transmission SAR measurement (Volume Scan) is not required because the SAR to peak location separation ratios is < 0.3.

15.6. SAR to Peak Location Separation Ratio (SPLSR) for WWAN and Wi-Fi 5.5GHz

Test Position	Worst-case combination						∑ 1-g SAR (mW/g)	Calculated distance (cm)	SPLSR	Figure
	W-CDMA Band V	W-CDMA Band II	LTE Band 4	LTE Band 17	WiFi 5.5GHz Band					
					Main	Aux				
Rear/Bottom	0.856				1.010		1.866	17.87	0.104	
			0.769		1.010		1.779	15.16	0.117	12
				0.813	1.010		1.823	18.43	0.099	
	0.856					0.936	1.792	26.86	0.067	
			0.769			0.936	1.705	24.49	0.070	13
				0.813		0.936	1.749	27.36	0.064	
					1.010	0.936	1.946	13.37	0.146	14
Rear 20° Tilt (Tilt @Edge1)	0.878				1.424		2.302	18.37	0.125	
		1.104			1.424		2.528	15.09	0.168	
			1.522		1.424		2.946	14.78	0.199	15
				0.785	1.424		2.209	18.36	0.120	
Edge 1	0.481				1.160		1.641	19.39	0.085	
		0.486			1.160		1.646	16.26	0.101	
			0.692		1.160		1.852	16.5	0.112	16
				0.521	1.160		1.681	18.98	0.089	

Conclusions:

Simultaneous transmission SAR measurement (Volume Scan) is not required because the SAR to peak location separation ratios is < 0.3.

15.7. SAR to Peak Location Separation Ratio (SPLSR) for WWAN and Wi-Fi 5.8GHz

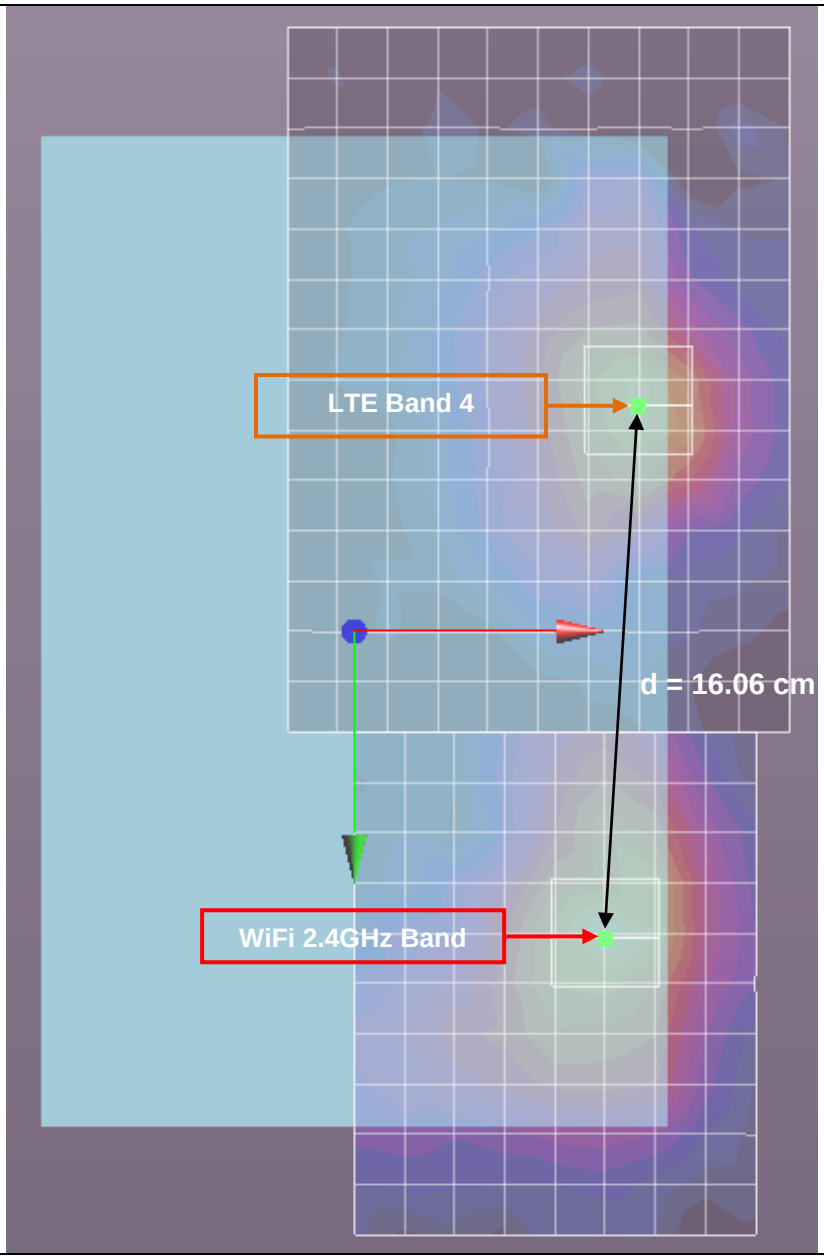
Test Position	Worst-case combination						∑ 1-g SAR (mW/g)	Calculated distance (cm)	SPLSR	Figure
	W-CDMA Band V	W-CDMA Band II	LTE Band 4	LTE Band 17	WiFi 5.8GHz Band					
					Main	Aux				
Rear/Bottom	0.856				1.280		2.136	19.83	0.108	
		0.514			1.280		1.794	16.95	0.106	
			0.769		1.280		2.049	15.53	0.132	17
				0.813	1.280		2.093	20.36	0.103	
					1.280	0.542	1.822	13.82	0.132	18
Rear 20° Tilt (Tilt @Edge1)	0.878				1.100		1.978	18.4	0.108	
		1.104			1.100		2.204	15.19	0.145	
			1.522		1.100		2.622	14.85	0.177	19
				0.785	1.100		1.885	18.42	0.102	
Edge 1	0.481				1.250		1.731	18.84	0.092	
		0.486			1.250		1.736	15.72	0.110	
			0.692		1.250		1.942	16	0.121	20
				0.521	1.250		1.771	17.83	0.099	

Conclusions:

Simultaneous transmission SAR measurement (Volume Scan) is not required because the SAR to peak location separation ratios is < 0.3.

SAR Peak Location Separation Distance

Figure (1)



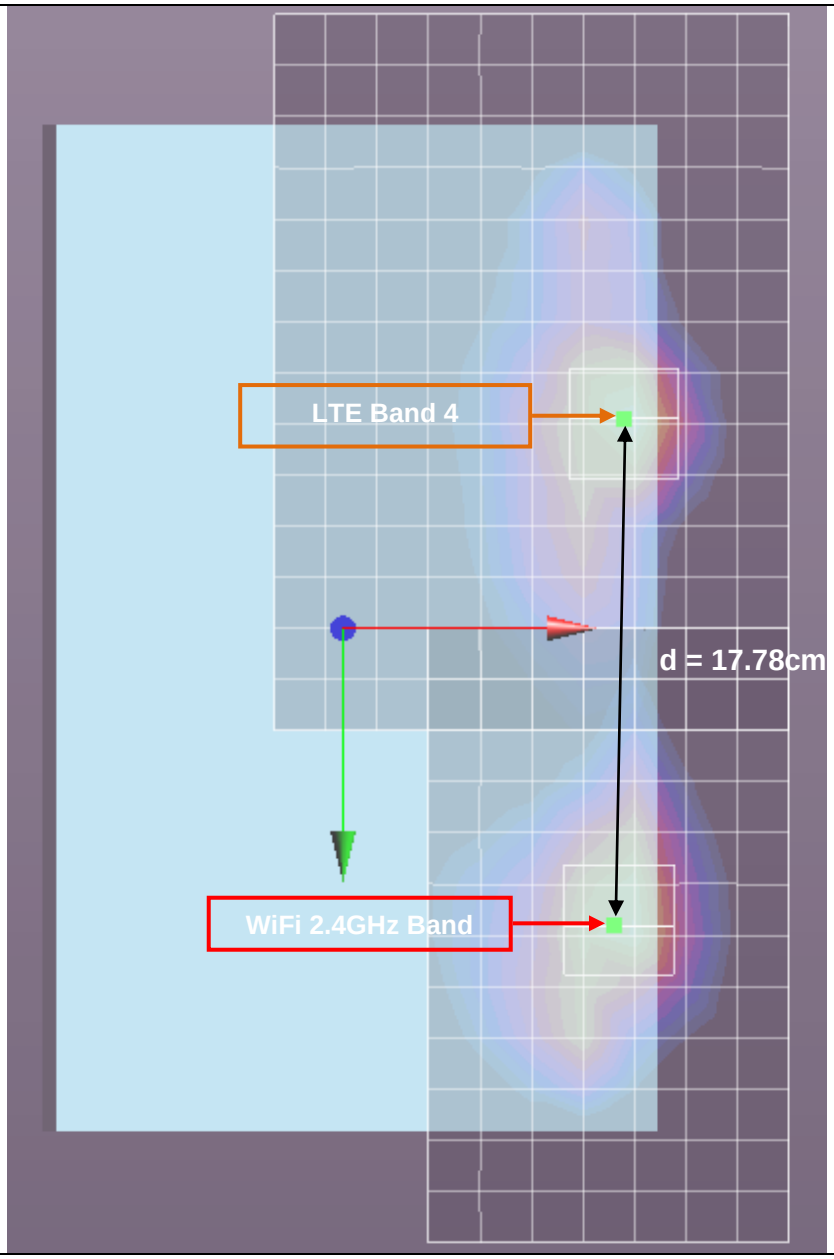
Mode	Peak SAR	X	Y	Z
	mW/g	m	m	m
LTE Band 4	1.38	0.085	-0.0674	-0.18
WiFi 2.4GHz Band	2.24	0.078	0.093	-0.184

Separation distance (cm)
16.06

Note: SQRT((X1-X2)^2+(Y1-Y2)^2+(Z1-Z2)^2)

SAR Peak Location Separation Distance

Figure (2)



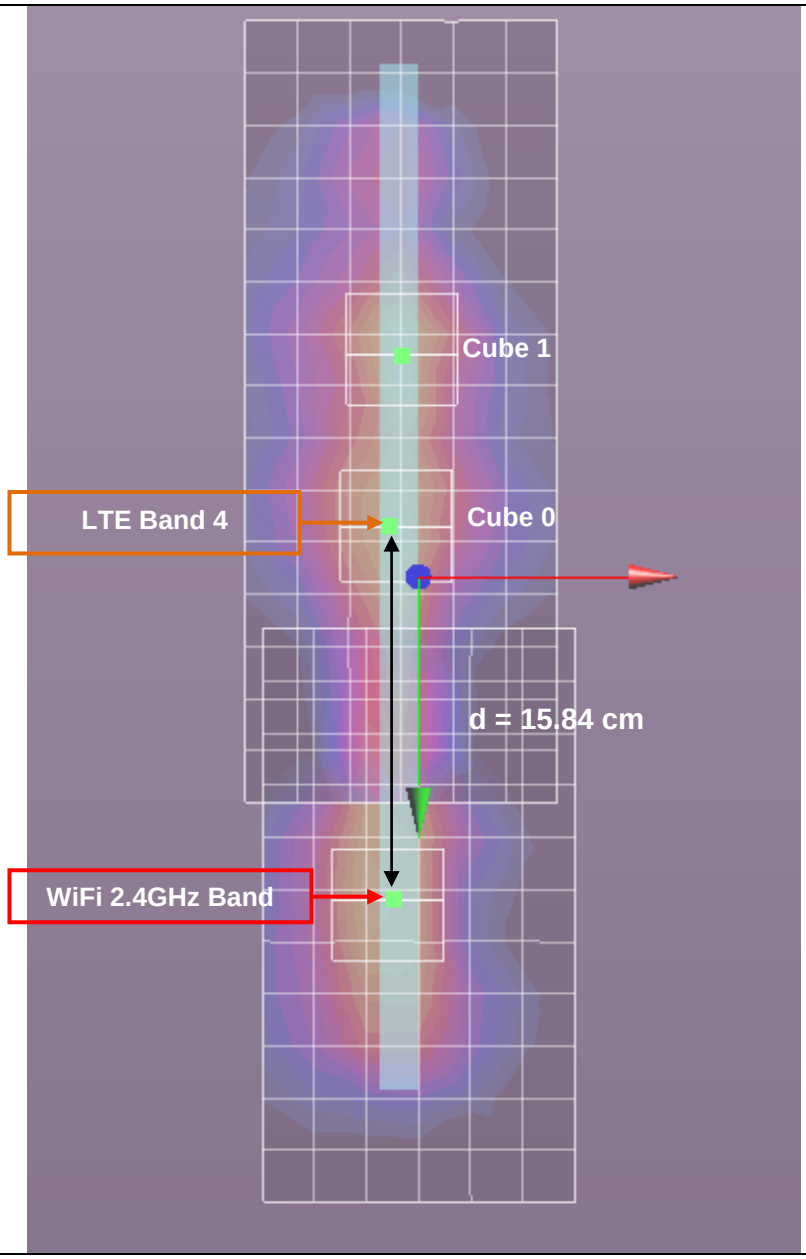
Mode	Peak SAR	X	Y	Z
	mW/g	m	m	m
LTE Band 4	2.99	0.082	-0.0616	-0.18
WiFi 2.4GHz Band	1.97	-0.011	0.0899	-0.184

Separation distance (cm)
17.78

Note: SQRT((X1-X2)^2+(Y1-Y2)^2+(Z1-Z2)^2)

SAR Peak Location Separation Distance

Figure (3)



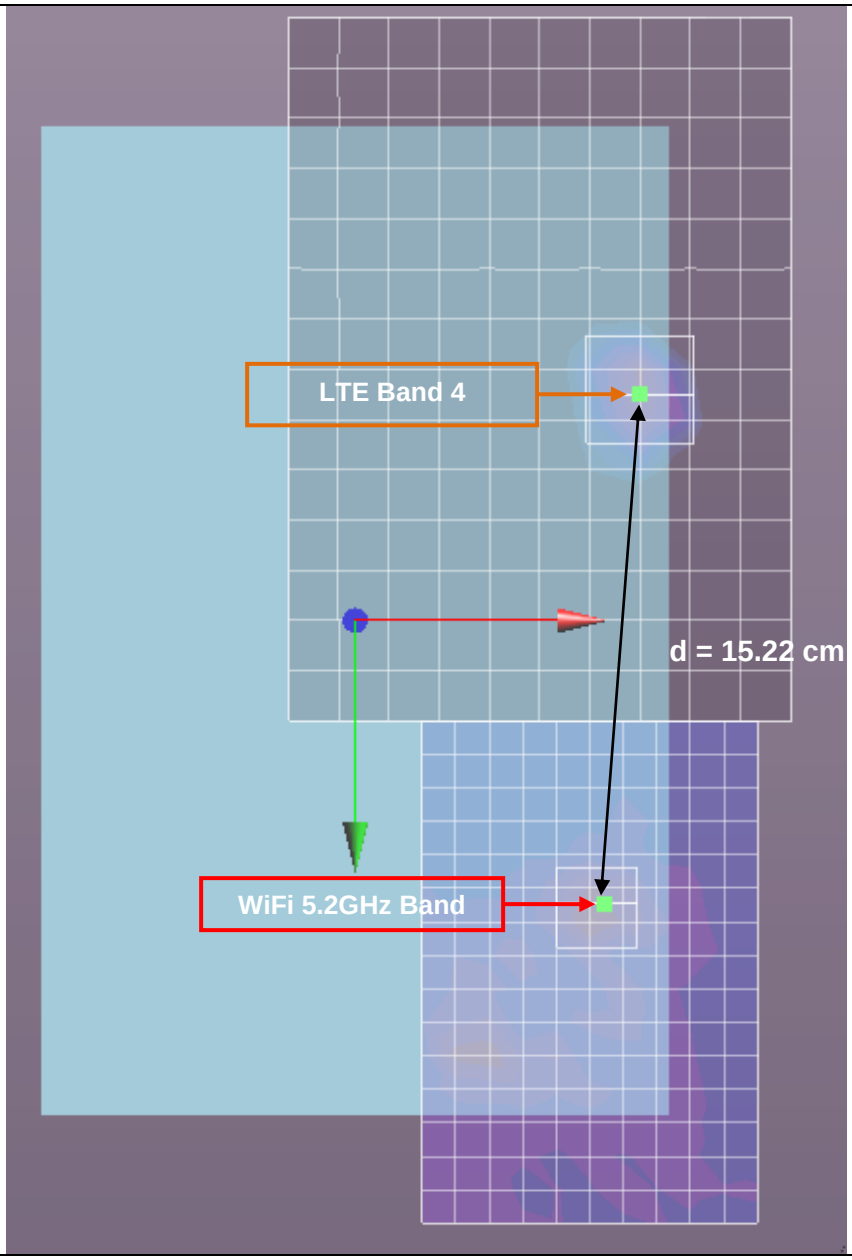
Mode	Peak SAR	X	Y	Z
	mW/g	m	m	m
LTE Band 4	1.41	-0.00496	-0.0639	-0.181
WiFi 2.4GHz Band	2.22	-0.0061	0.0945	-0.184
WiFi 2.4GHz Band	2.22	-0.0061	0.0945	-0.184

Separation distance (cm)
15.84

Note: SQRT((X1-X2)^2+(Y1-Y2)^2+(Z1-Z2)^2)

SAR Peak Location Separation Distance

Figure (4)



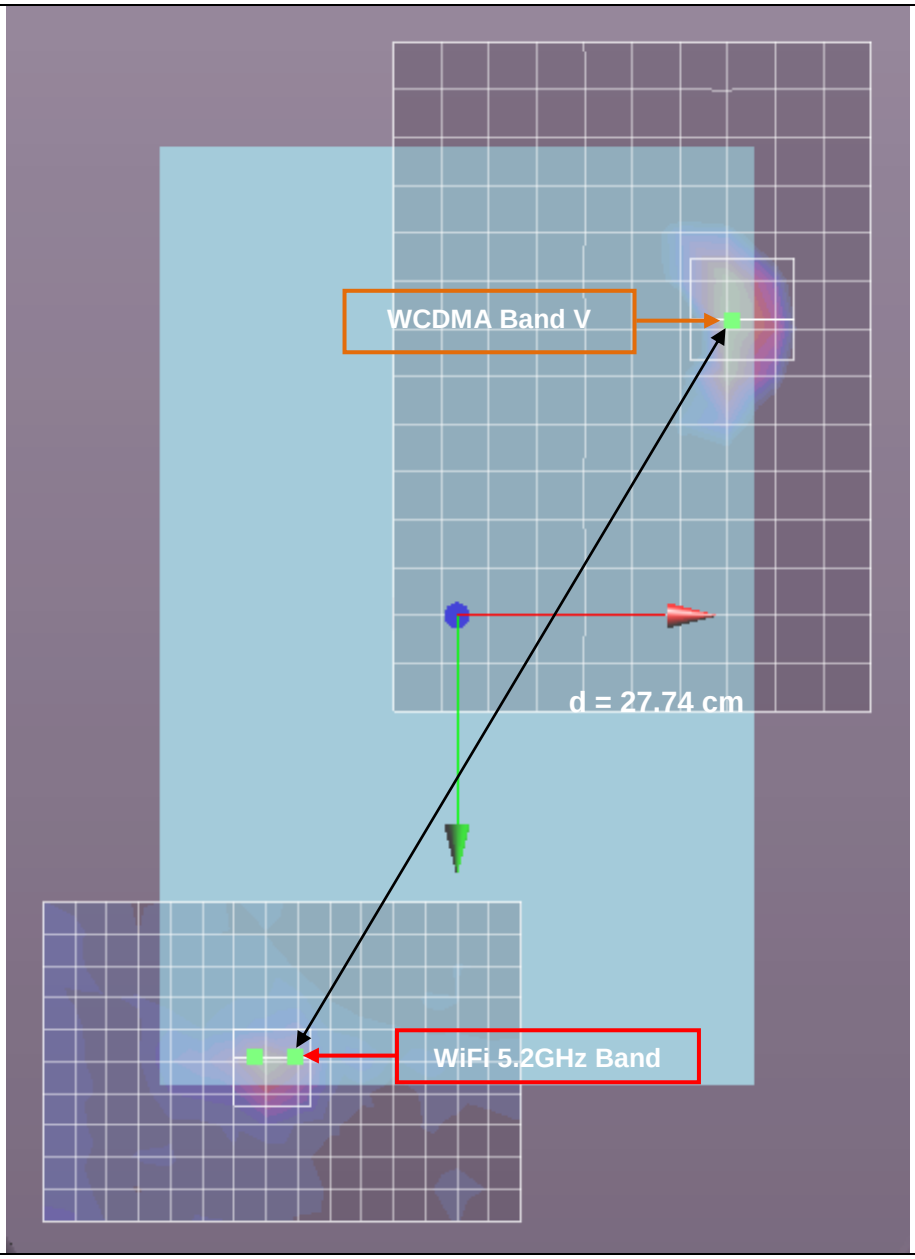
Mode	Peak SAR	X	Y	Z
	mW/g	m	m	m
LTE Band 4	1.38	0.085	-0.0674	-0.18
WiFi 5.2GHz Band	5.29	0.0744	0.0844	-0.183

Separation distance (cm)
15.22

Note: SQRT((X1-X2)^2+(Y1-Y2)^2+(Z1-Z2)^2)

SAR Peak Location Separation Distance

Figure (5)



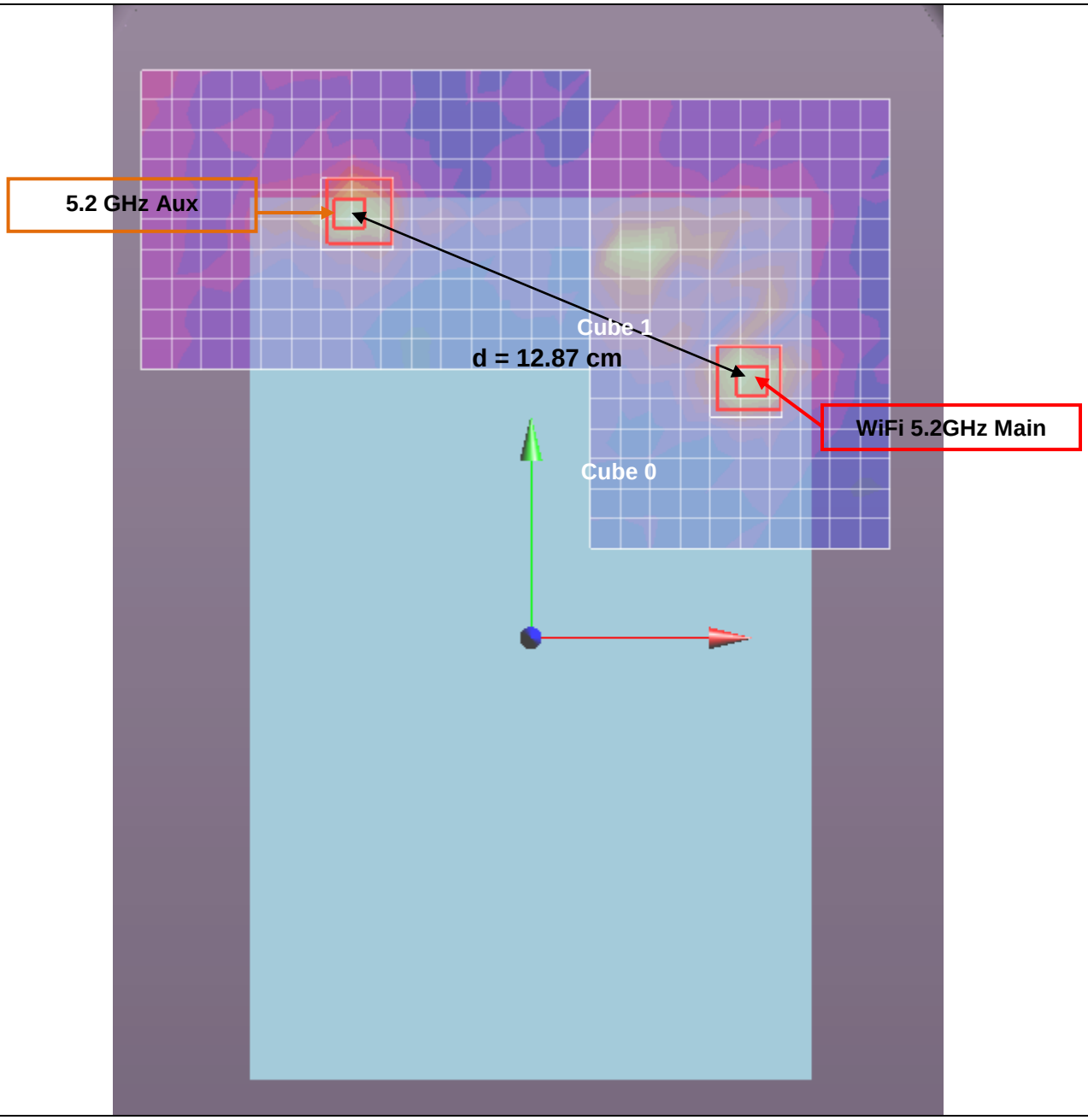
Mode	Peak SAR	X	Y	Z
	mW/g	m	m	m
WCDMA Band V	1.6	0.0863	-0.0944	-0.18
WiFi 5.2GHz Band	2.42	-0.0636	0.139	-0.183

Separation distance (cm)
27.74

Note: SQRT((X1-X2)^2+(Y1-Y2)^2+(Z1-Z2)^2)

SAR Peak Location Separation Distance

Figure (6)



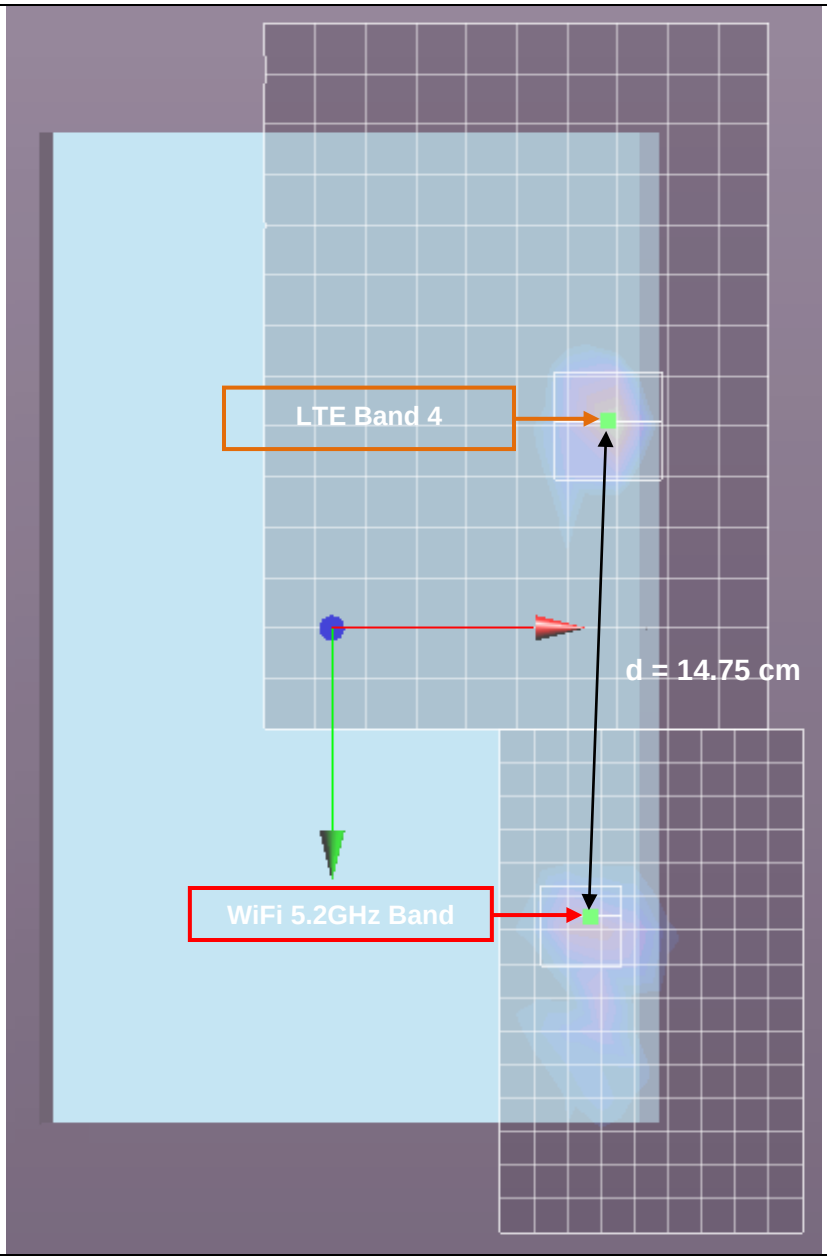
Mode	Peak SAR	X	Y	Z
	mW/g	m	m	m
WiFi 5.2GHz Band (Main Ant.)	5.29	0.0744	0.0844	-0.183
WiFi 5.2GHz Band Aux Ant.)	0.423	-0.046	0.13	-0.183

Separation distance (cm)
12.87

Note: SQRT((X1-X2)^2+(Y1-Y2)^2+(Z1-Z2)^2)

SAR Peak Location Separation Distance

Figure (7)



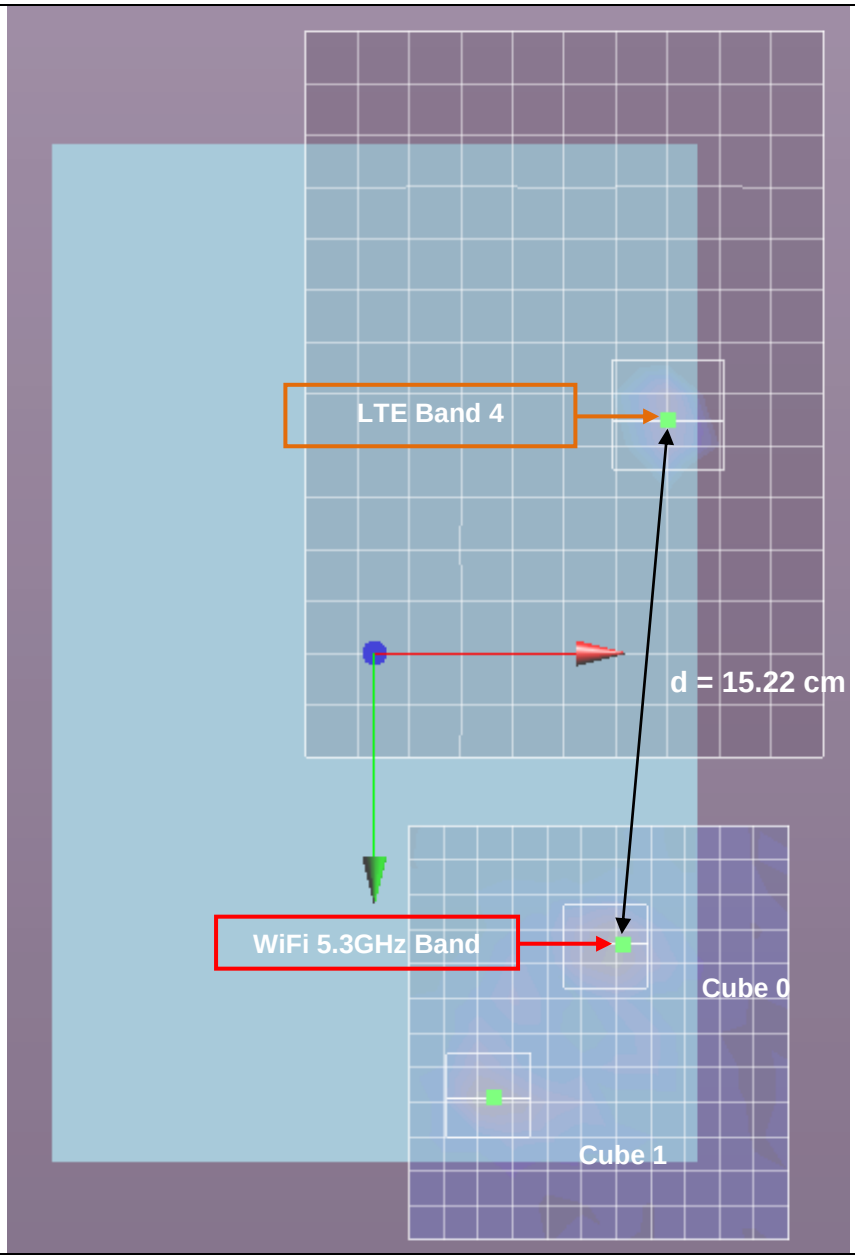
Mode	Peak SAR	X	Y	Z
	mW/g	m	m	m
LTE Band 4	2.99	0.082	-0.0616	-0.18
WiFi 5.2GHz Band	4.82	0.0772	0.0858	-0.183

Separation distance (cm)
14.75

Note: SQRT((X1-X2)^2+(Y1-Y2)^2+(Z1-Z2)^2)

SAR Peak Location Separation Distance

Figure (8)



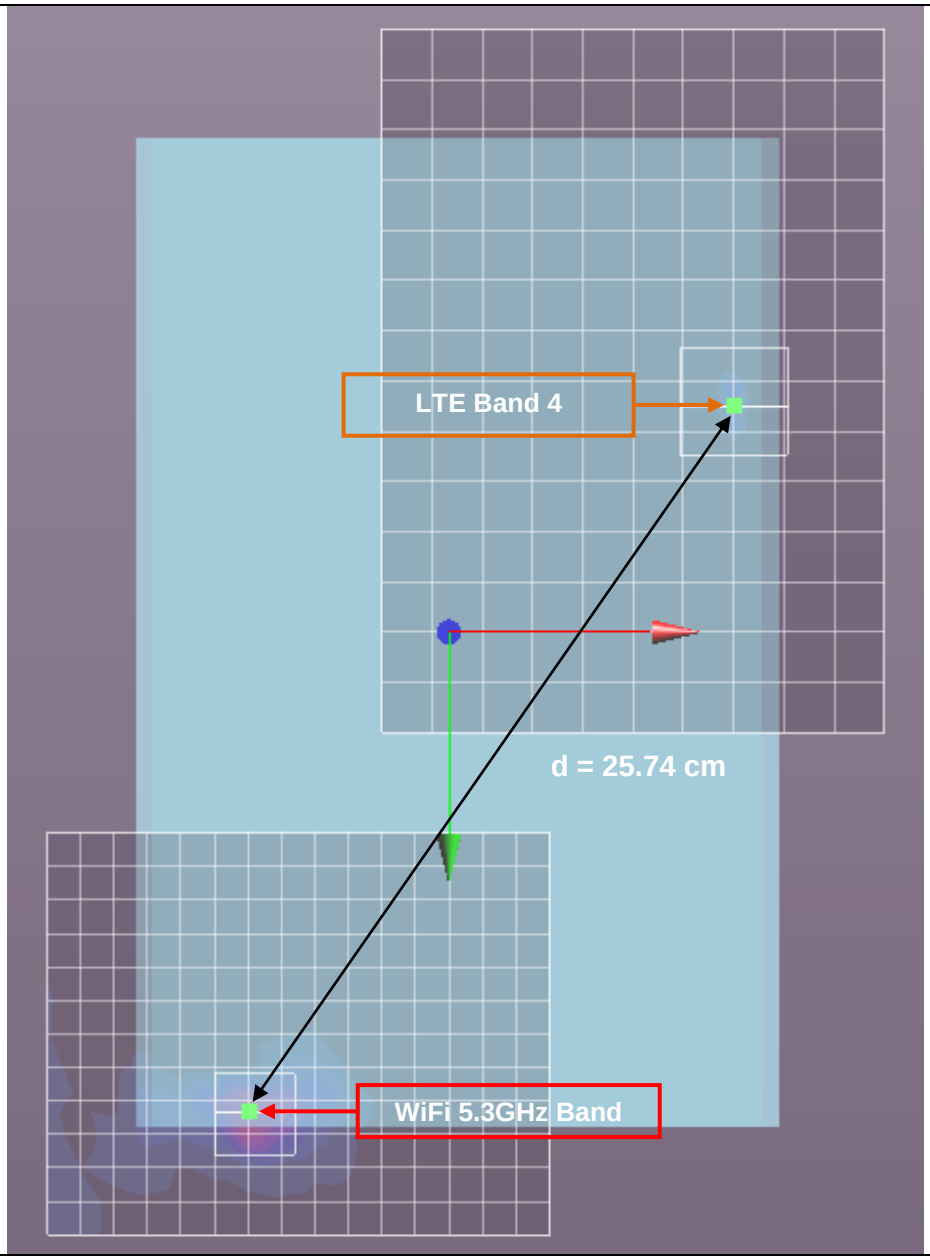
Mode	Peak SAR	X	Y	Z
	mW/g	m	m	m
LTE Band 4	1.38	0.085	-0.0674	-0.18
WiFi 5.3GHz Band	3.43	0.0718	0.0842	-0.183

Separation distance (cm)
15.22

Note: SQRT((X1-X2)^2+(Y1-Y2)^2+(Z1-Z2)^2)

SAR Peak Location Separation Distance

Figure (9)



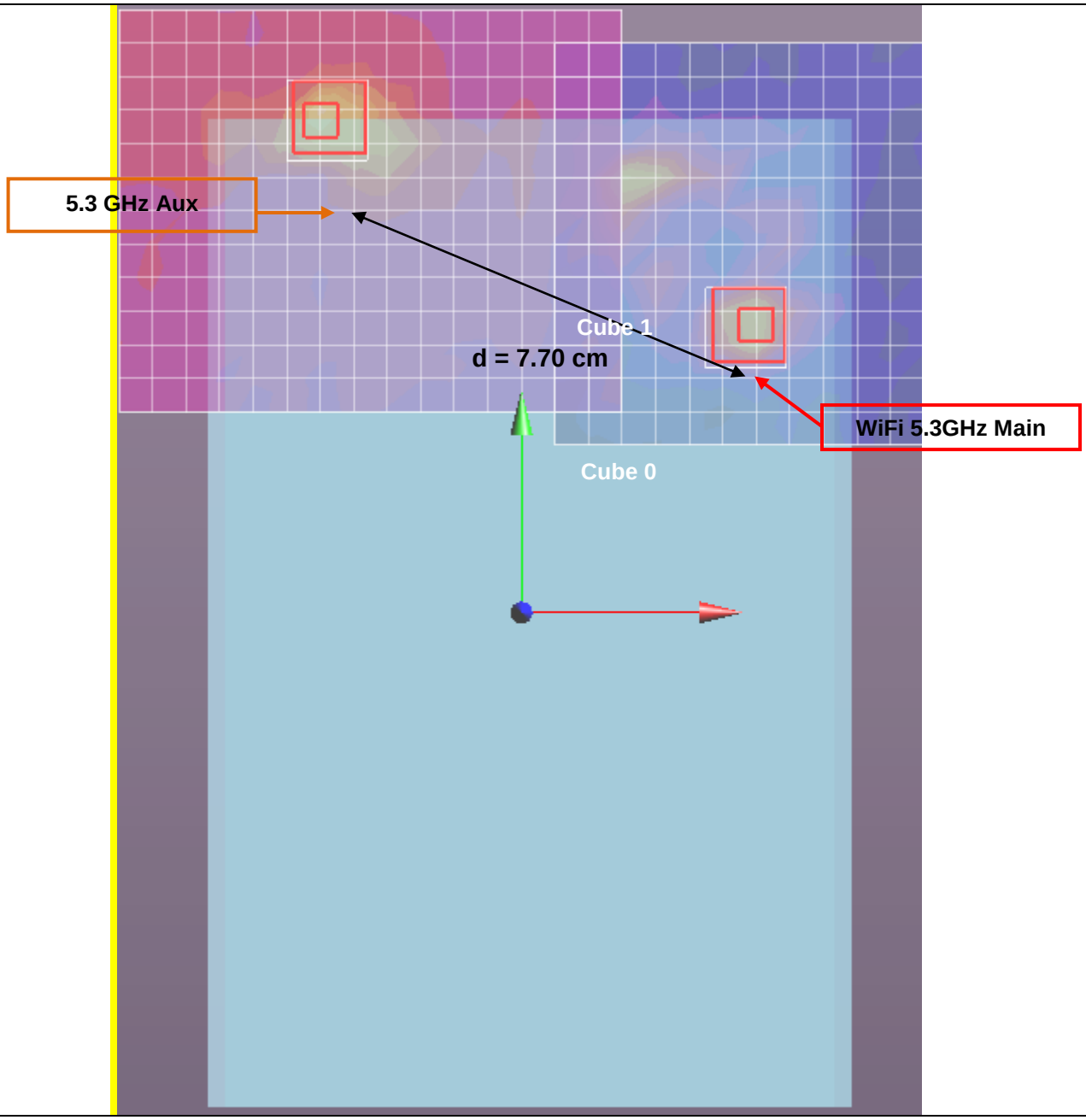
Mode	Peak SAR	X	Y	Z
	mW/g	m	m	m
LTE Band 4	1.38	0.085	-0.0674	-0.18
WiFi 5.3GHz Band	2.51	-0.0604	0.145	-0.183

Separation distance (cm)
25.74

Note: SQRT((X1-X2)^2+(Y1-Y2)^2+(Z1-Z2)^2)

SAR Peak Location Separation Distance

Figure (10)



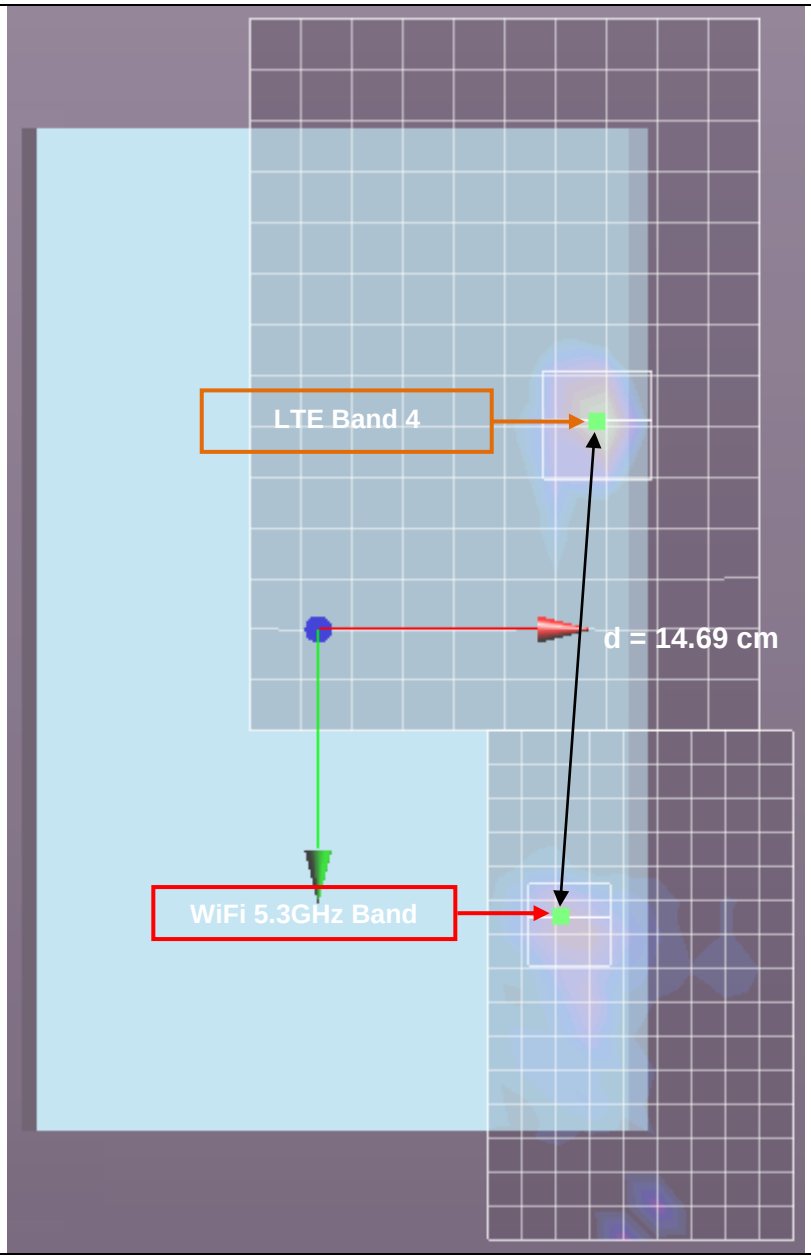
Mode	Peak SAR	X	Y	Z
	mW/g	m	m	m
WiFi 5.3GHz Band (Main Ant.)	3.43	0.0718	0.0842	-0.183
WiFi 5.3GHz Band Aux Ant.)	0.295	0.011	0.037	-0.184

Separation distance (cm)
7.70

Note: SQRT((X1-X2)^2+(Y1-Y2)^2+(Z1-Z2)^2)

SAR Peak Location Separation Distance

Figure (11)



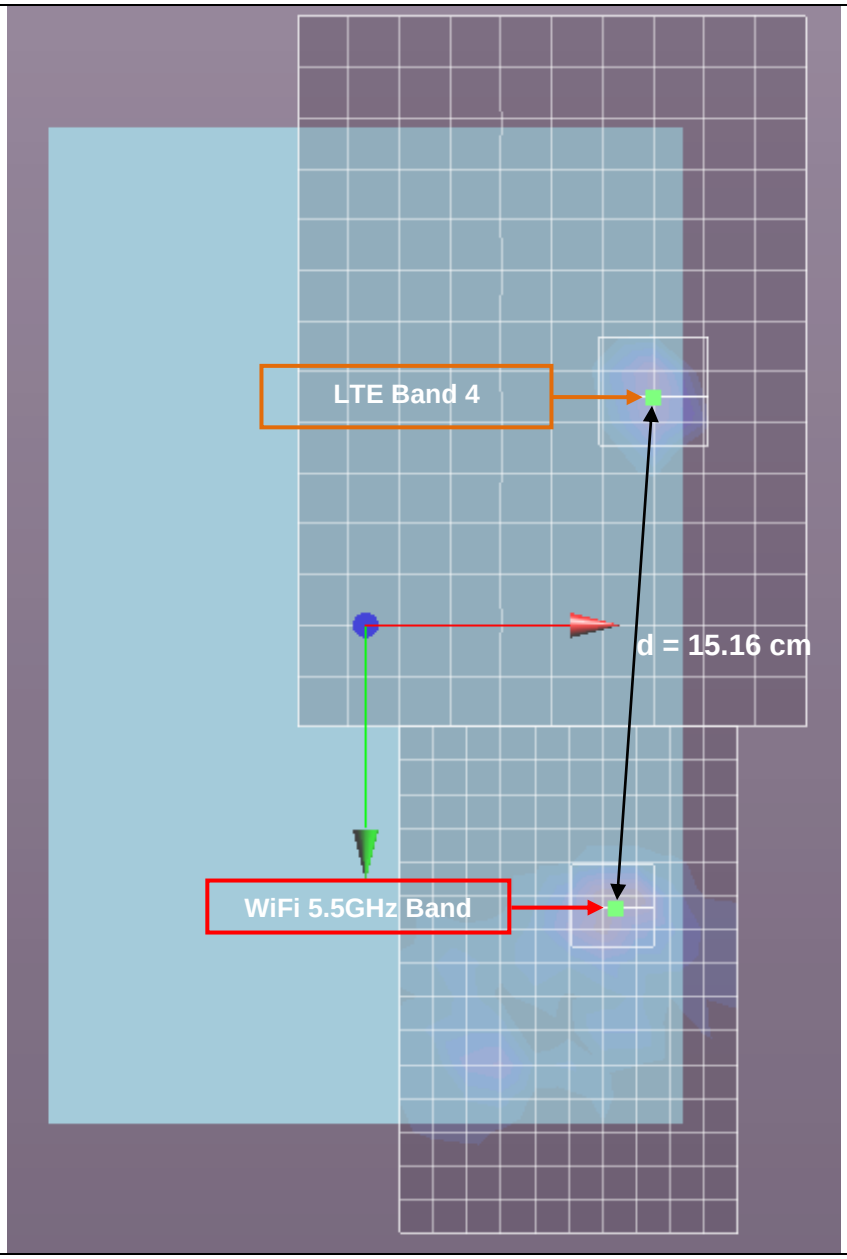
Mode	Peak SAR	X	Y	Z
	mW/g	m	m	m
LTE Band 4	2.99	0.082	-0.0616	-0.18
WiFi 5.3GHz Band	4.16	0.0726	0.085	-0.183

Separation distance (cm)
14.69

Note: SQRT((X1-X2)^2+(Y1-Y2)^2+(Z1-Z2)^2)

SAR Peak Location Separation Distance

Figure (12)



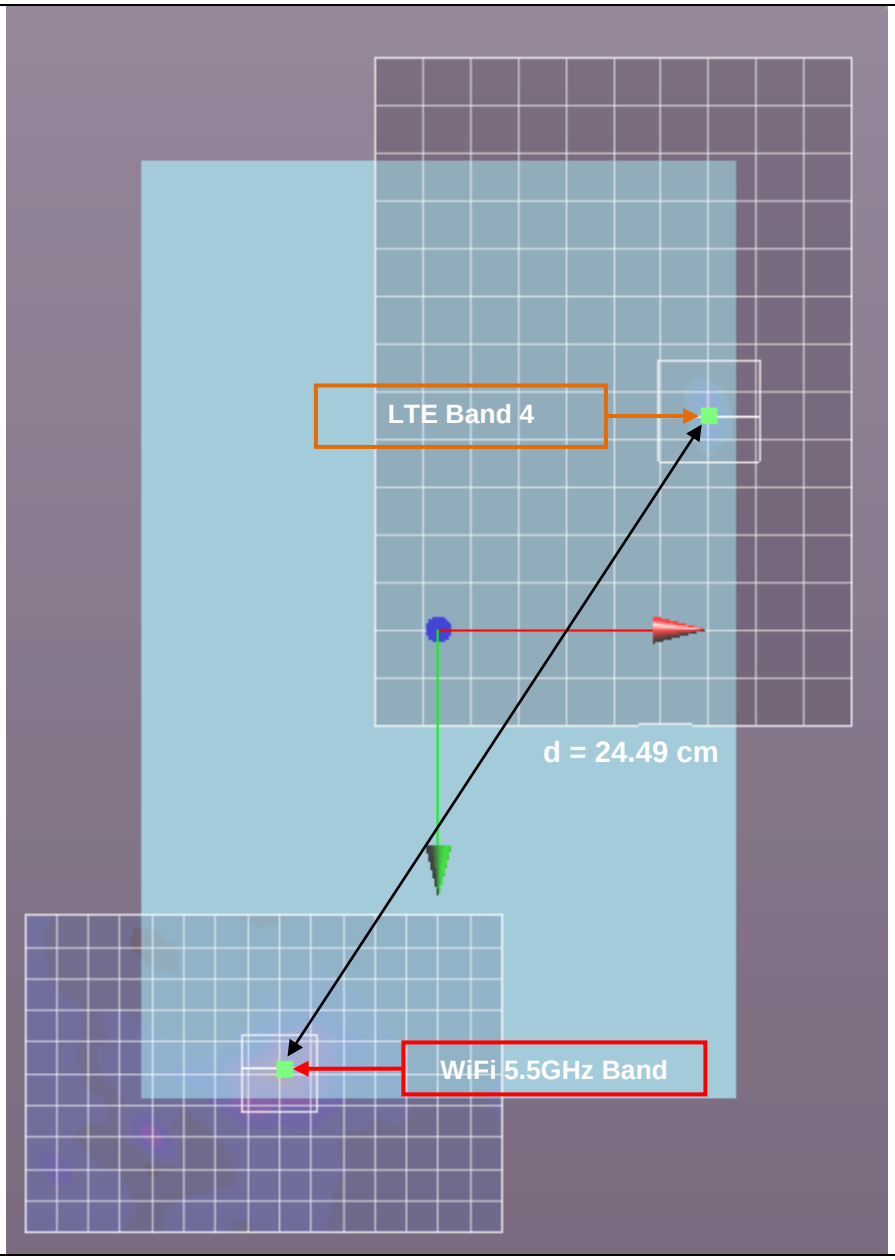
Mode	Peak SAR	X	Y	Z
	mW/g	m	m	m
LTE Band 4	1.38	0.085	-0.0674	-0.18
WiFi 5.5GHz Band	4.79	0.0738	0.0838	-0.183

Separation distance (cm)
15.16

Note: SQRT((X1-X2)^2+(Y1-Y2)^2+(Z1-Z2)^2)

SAR Peak Location Separation Distance

Figure (13)



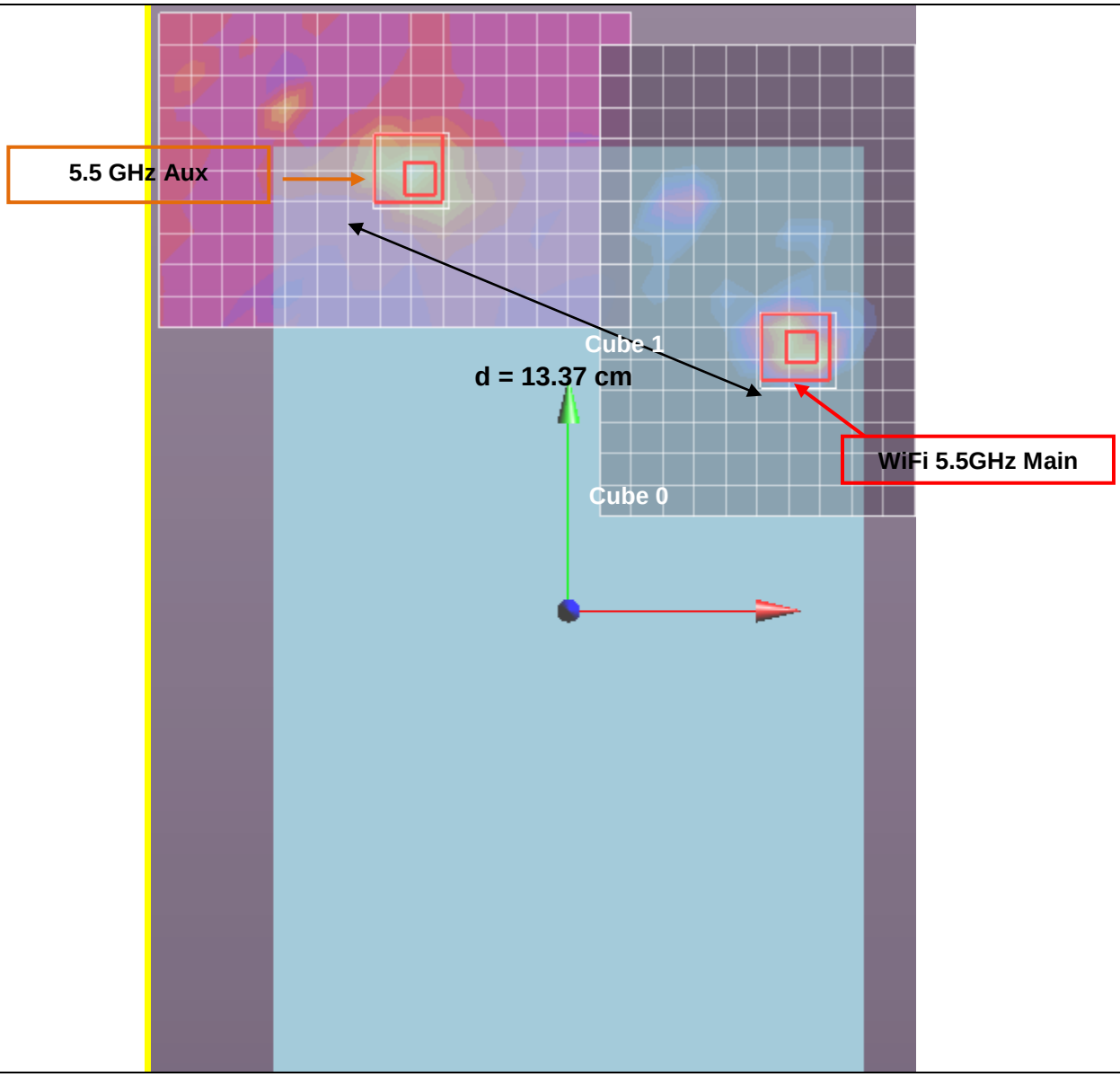
Mode	Peak SAR	X	Y	Z
	mW/g	m	m	m
LTE Band 4	1.38	0.085	-0.0674	-0.18
WiFi 5.5GHz Band	3.1	-0.0484	0.138	-0.183

Separation distance (cm)
24.49

Note: SQRT((X1-X2)^2+(Y1-Y2)^2+(Z1-Z2)^2)

SAR Peak Location Separation Distance

Figure (14)



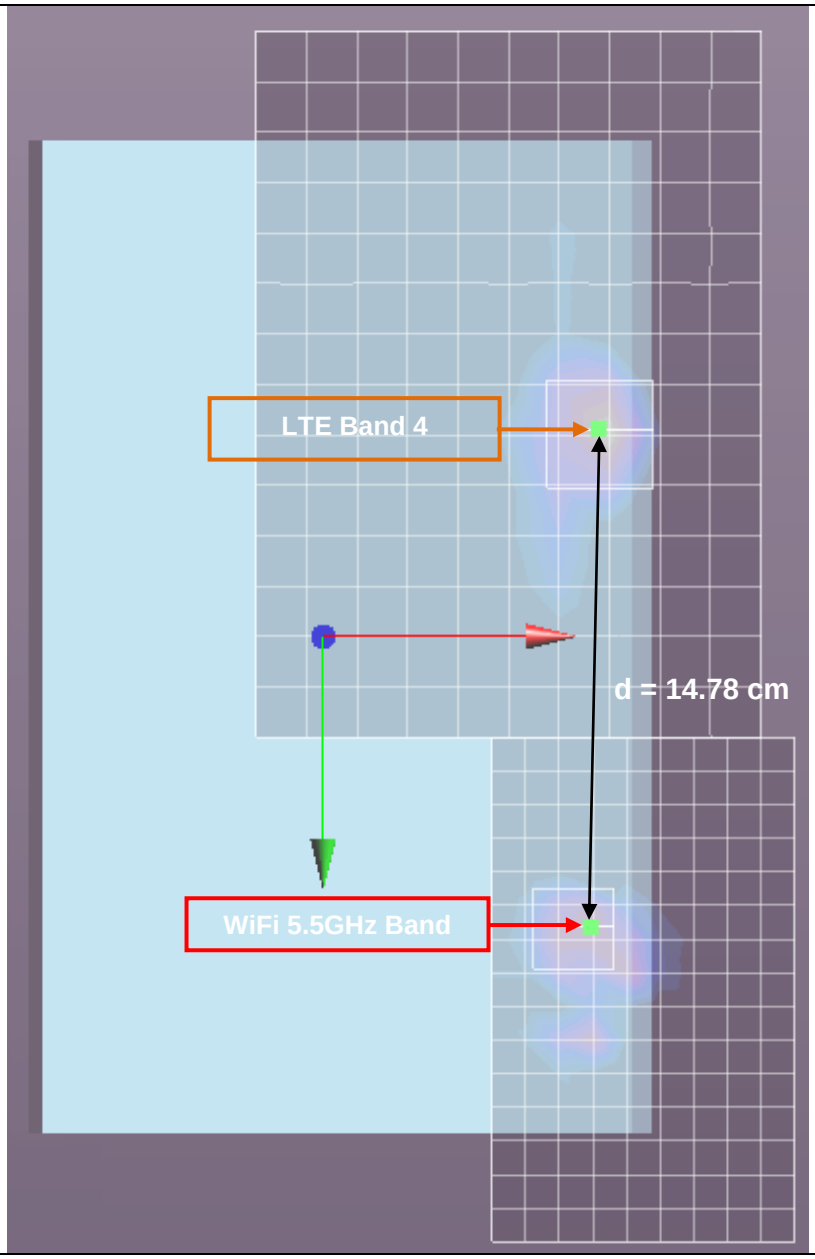
Mode	Peak SAR	X	Y	Z
	mW/g	m	m	m
WiFi 5.5GHz Band (Main Ant.)	4.79	0.0738	0.0838	-0.183
WiFi 5.5GHz Band Aux Ant.)	3.1	-0.0484	0.138	-0.183

Separation distance (cm)
13.37

Note: SQRT((X1-X2)^2+(Y1-Y2)^2+(Z1-Z2)^2)

SAR Peak Location Separation Distance

Figure (15)



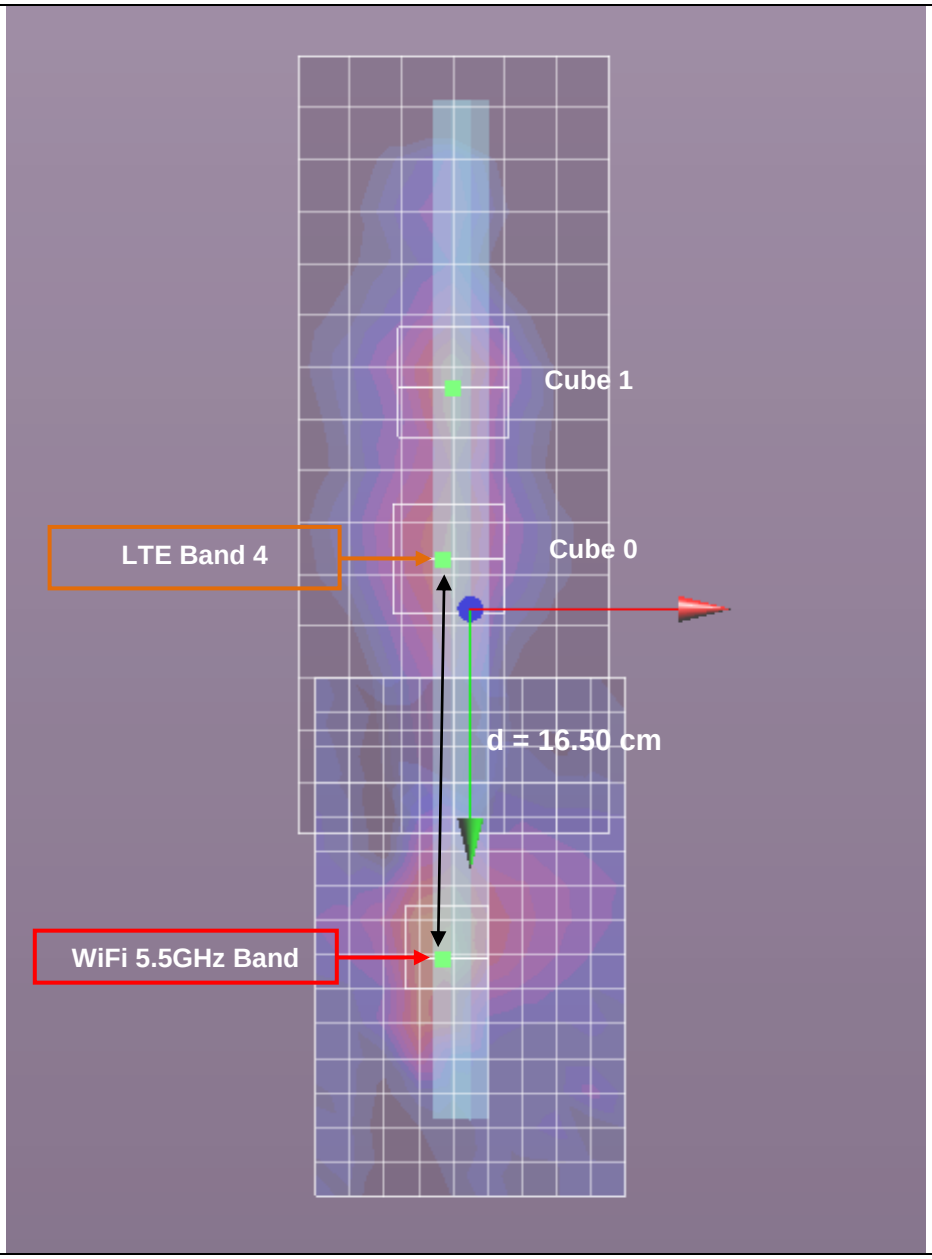
Mode	Peak SAR	X	Y	Z
	mW/g	m	m	m
LTE Band 4	2.99	0.082	-0.0616	-0.18
WiFi 5.5GHz Band	8.78	0.0796	0.0862	-0.183

Separation distance (cm)
14.78

Note: SQRT((X1-X2)^2+(Y1-Y2)^2+(Z1-Z2)^2)

SAR Peak Location Separation Distance

Figure (16)



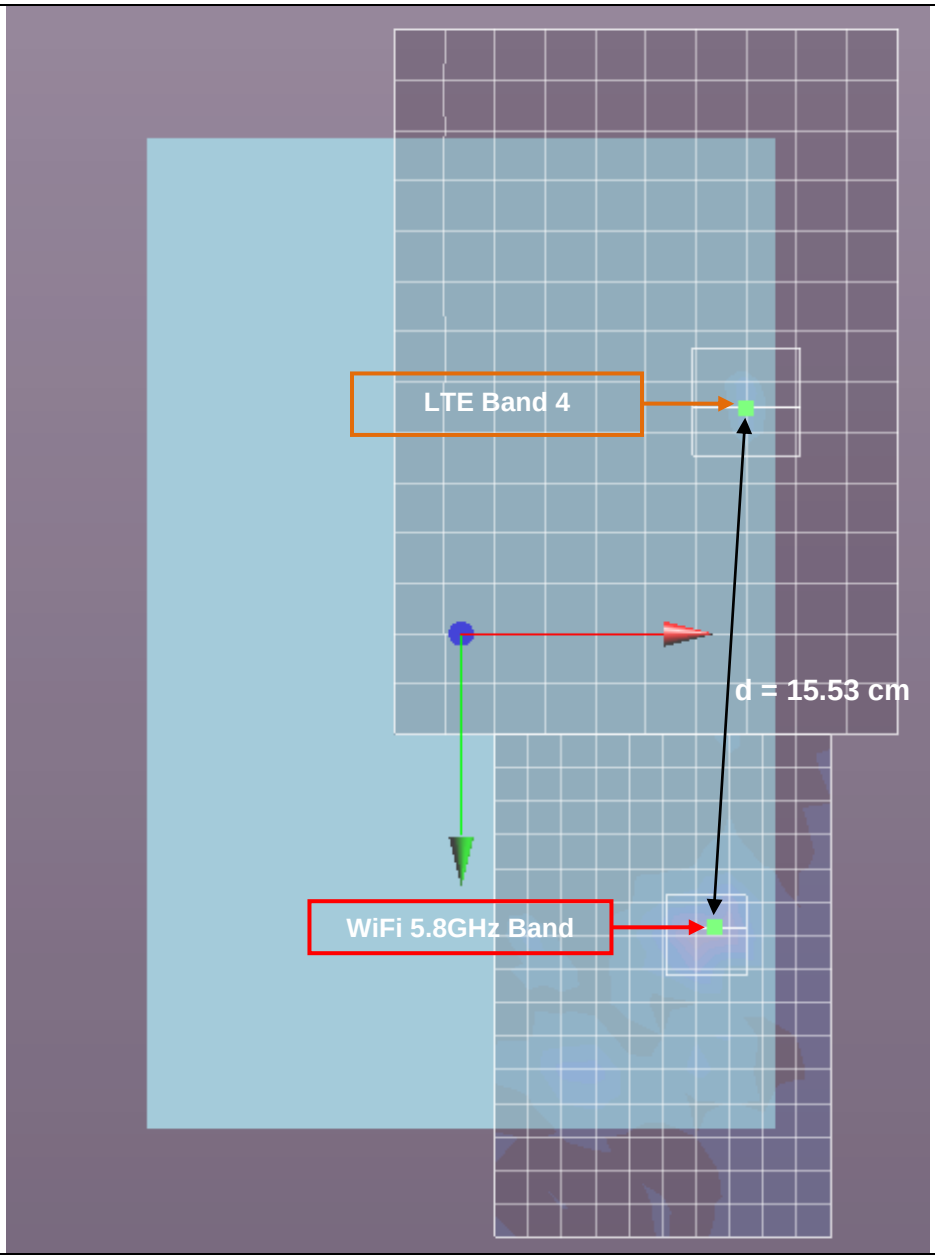
Mode	Peak SAR	X	Y	Z
	mW/g	m	m	m
LTE Band 4	1.41	-0.00496	-0.0639	-0.181
WiFi 5.5GHz Band	7.68	-0.0078	0.101	-0.184

Separation distance (cm)
16.50

Note: SQRT((X1-X2)^2+(Y1-Y2)^2+(Z1-Z2)^2)

SAR Peak Location Separation Distance

Figure (17)



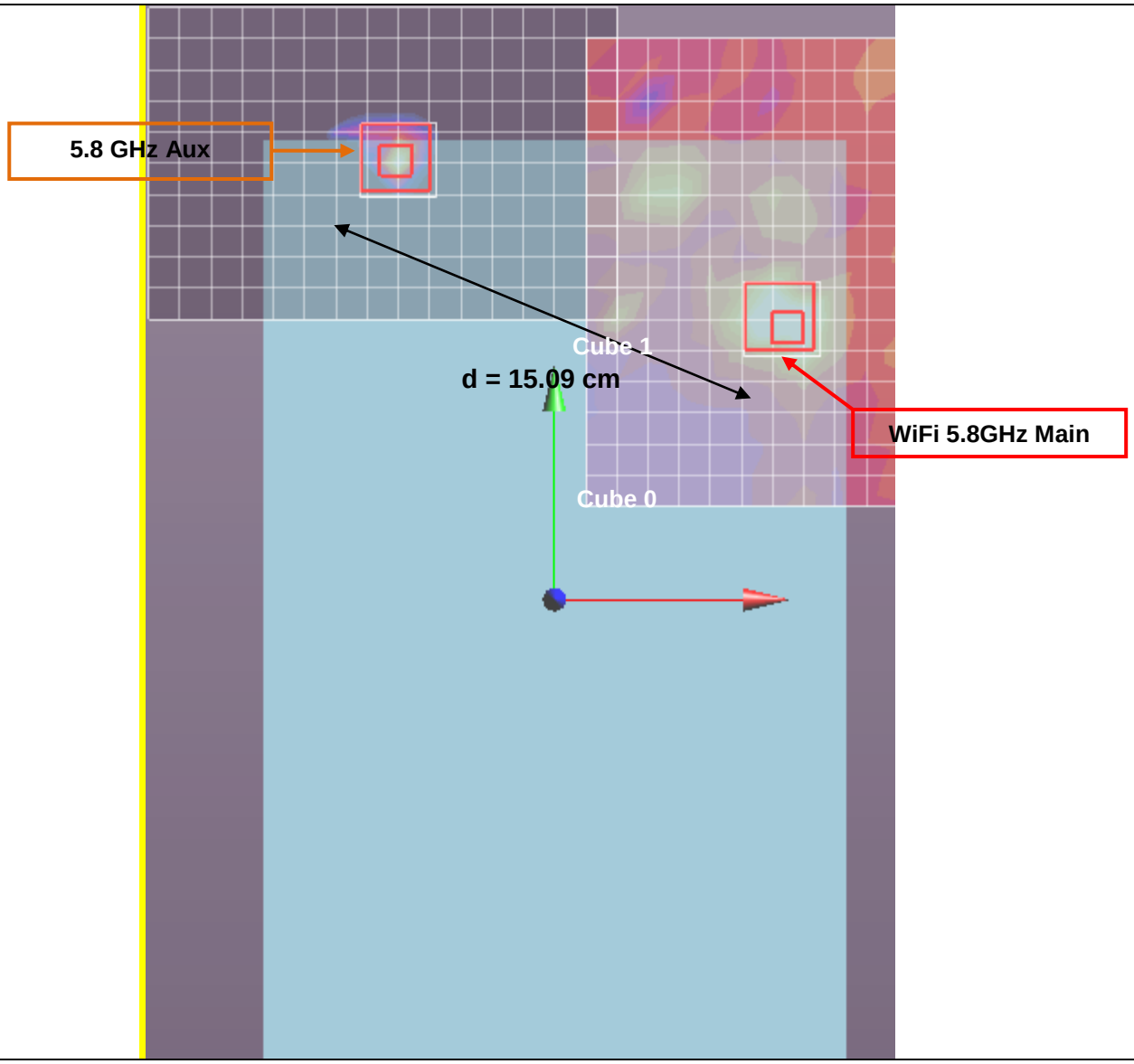
Mode	Peak SAR	X	Y	Z
	mW/g	m	m	m
LTE Band 4	1.38	0.085	-0.0674	-0.18
WiFi 5.8GHz Band	6.56	0.0754	0.0876	-0.183

Separation distance (cm)
15.53

Note: SQRT((X1-X2)^2+(Y1-Y2)^2+(Z1-Z2)^2)

SAR Peak Location Separation Distance

Figure (18)



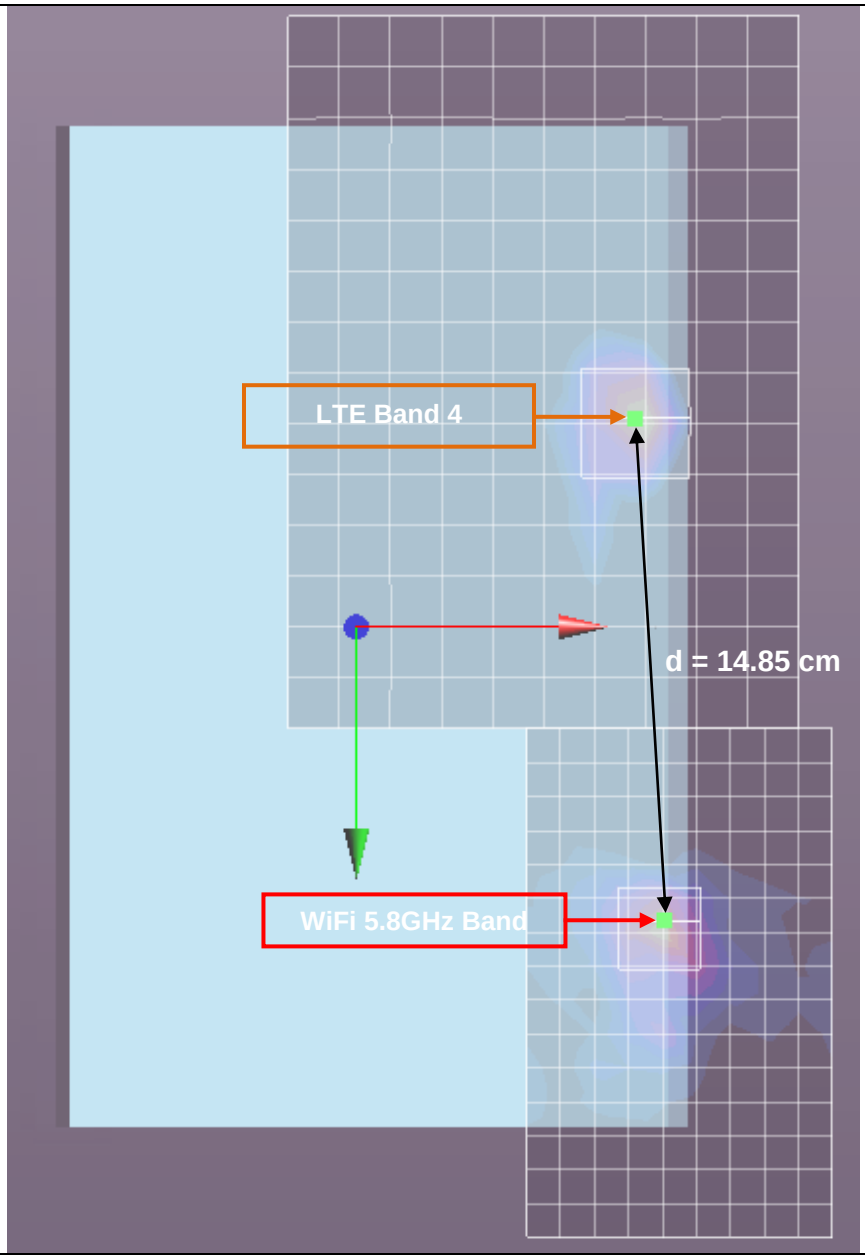
Mode	Peak SAR	X	Y	Z
	mW/g	m	m	m
WiFi 5.8GHz Band (Main Ant.)	6.56	0.0754	0.0876	-0.183
WiFi 5.8GHz Band (Aux Ant.)	2.09	-0.0516	0.142	-0.182

Separation distance (cm)
13.82

Note: SQRT((X1-X2)^2+(Y1-Y2)^2+(Z1-Z2)^2)

SAR Peak Location Separation Distance

Figure (19)



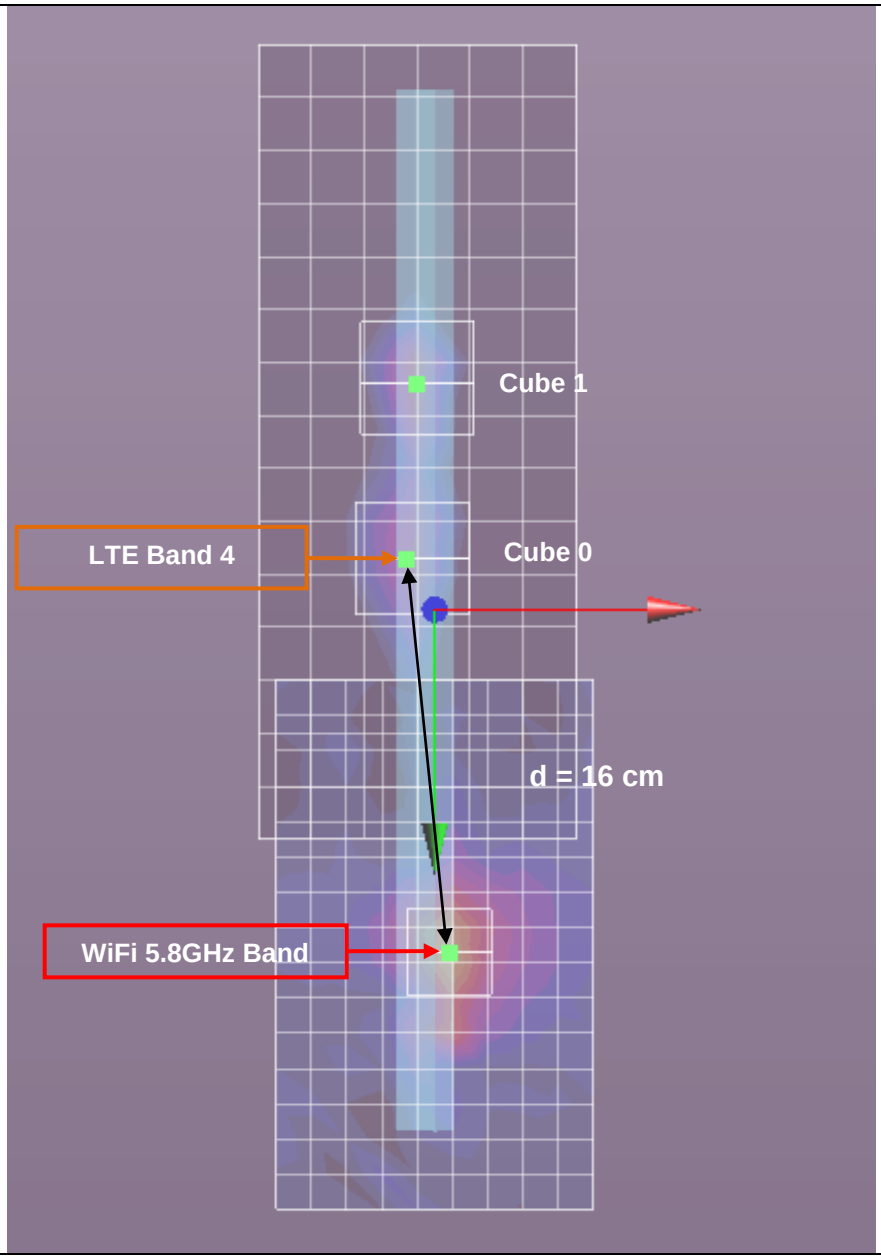
Mode	Peak SAR	X	Y	Z
	mW/g	m	m	m
LTE Band 4	2.99	0.082	-0.0616	-0.18
WiFi 5.8GHz Band	5.38	0.0906	0.0866	-0.182

Separation distance (cm)
14.85

Note: SQRT((X1-X2)^2+(Y1-Y2)^2+(Z1-Z2)^2)

SAR Peak Location Separation Distance

Figure (20)



Mode	Peak SAR	X	Y	Z
	mW/g	m	m	m
LTE Band 4	1.41	-0.00496	-0.0639	-0.181
WiFi 5.8GHz Band	5.73	0.004	0.0958	-0.184

Separation distance (cm)
16.00

Note: SQRT((X1-X2)^2+(Y1-Y2)^2+(Z1-Z2)^2)

16. Appendixes

Refer to separated files for the following appendixes.

16.1. System Performance Check Plots

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

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

16.4. SAR Test Plots for LTE Band 4

16.5. SAR Test Plots for LTE Band 17

16.6. SAR Test Plots for Wi-Fi 2.4 GHz Band

16.7. SAR Test Plots for Wi-Fi 5 GHz Bands

16.8. Calibration Certificate for E-Field Probe EX3DV4 - SN 3749

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

16.10. Calibration Certificate for D750V3 - SN 1024

16.11. Calibration Certificate for D835V2 - SN 4d117

16.12. Calibration Certificate for D1750V2 - SN 1050

16.13. Calibration Certificate for D1900V2 - SN 5d043

16.14. Calibration Certificate for D2450V2 - SN 748

16.15. Calibration Certificate for D5GHzV2 - SN 1075