FCC OET BULLETIN 65 SUPPLEMENT C 01-01
IEEE 1528:2003
RSS-102 Issue 4, March 2010
IEC 62209-2:2010

SAR EVALUATION REPORT

For
Apple iPad

MODEL: A1430
FCC ID: BCGA1430
IC: 579C-A1430

REPORT NUMBER: 11U14054-4

ISSUE DATE: February 13, 2012

Prepared for
APPLE INC.
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CUPERTINO, CA 95014-2084

Prepared by
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NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
--	January 24, 2012	Initial Issue	--
B	February 13, 2012	Added another footnote under Section 13.8 per FCC's request	Sunny Shih

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1. Attestation of Test Results

Applicant:	APPLE INC.		
EUT description:	The Apple iPad, Model A1430 is a tablet device with iPod functions (music, application support, and video), 802.11a/b/g/n radio, Bluetooth radio functions, and cellular using the GSM 2G/3G/LTE data radio functions.		
Model number:	A1430		
Device category:	Portable		
Exposure category:	General Population/Uncontrolled Exposure		
Date tested:	October 10 – December 21, 2011 and January 10, 2012		
FCC Rule Parts	Freq. Range [MHz]	Highest 1-g SAR (W/kg)	Limit (W/kg)
22H	824-849	1.00 W/kg (Body_ Rear w/ 11 mm distance)	1.6
24E	1850-1910	1.18 W/kg (Body_ Rear w/ 0 mm distance)	
27 (LTE Band 4)	1715 - 1750	1.18 W/kg (Body_ Rear w/ 0 mm distance)	
27 (LTE Band 17)	709-711	1.17 W/kg (Body_ Rear w/ 0 mm distance)	
15.247	2412-2462	1.19 W/kg (Body_ Bottom w/ 0 mm distance)	
	5725-5850	1.11 W/kg (Body_ Bottom w/ 0 mm distance)	
15.407	5150-5250	0.52 W/kg (Body_ Bottom w/ 0 mm distance)	
	5250-5350	1.00 W/kg (Body_ Bottom w/ 0 mm distance)	
	5500-5700	0.95 W/kg (Body_ Bottom w/ 0 mm distance)	
Applicable Standards			Test Results
FCC OET Bulletin 65 Supplement C 01-01, IEEE 1528:2003, RSS-102 Issue 4, March 2010 and IEC 62209-2:2010			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:

Sunny Shih

Sunny Shih
Engineering Team Leader
Compliance Certification Services (UL CCS)

Tested By:

Devin Chang

Devin Chang
SAR Engineer
Compliance Certification Services (UL CCS)

2. Test Methodology

The tests documented in this report were performed in accordance with FCC OET Bulletin 65 Supplement C 01-01, IEEE 1528:2003, RSS-102 Issue 4, March 2010, IEC 62209-2:2010 and the following KDB Test 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 D03 SAR Test Reduction GSM GPRS EDGE v01
- 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 2011 TCB Workshop SAR Updates)

Testing is performed per FCC's guidance KDB # 716718.

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 utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's 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		
Synthesized Signal Generator	HP	83732B	US34490599	7	14	2012
E-Field Probe	SPEAG	EX3DV4	3772	5	3	2012
E-Field Probe	SPEAG	EX3DV4	3749	12	13	2011
E-Field Probe	SPEAG	EX3DV4	3686	1	24	2012
E-Field Probe	SPEAG	EX3DV4	3772	5	3	2012
Thermometer	ERTCO	639-1S	1718	7	19	2012
Data Acquisition Electronics	SPEAG	DAE3	500	7	14	2012
Data Acquisition Electronics	SPEAG	DAE4	1259	5	3	2012
System Validation Dipole	SPEAG	D750V3	1019	12	16	2011
System Validation Dipole	SPEAG	D750V3	1024	4	20	2012
System Validation Dipole	SPEAG	D835V2	4d117	4	15	2012
System Validation Dipole	SPEAG	D1750V2	1050	4	19	2012
System Validation Dipole	SPEAG	D1900V2	5d140	4	18	2012
System Validation Dipole	SPEAG	*D2450V2	706	4	19	2012
System Validation Dipole	SPEAG	D5GHzV2	1003	8	23	2012
Power Meter	HP	437B	3125U16345	5	13	2012
Power Sensor	HP	8481A	2702A60780	5	13	2012
Radio Communication Tester	R&S	CMU200	838114/032	3	1	2012
Radio Communication Tester	R&S	CMW500	20-316567	12	17	2011
Amplifier	MITEQ	4D00400600-50-30P	1620606	N/A		
Directional coupler	Werlatone	C8060-102	2141	N/A		

Notes:

*Per KDB 450824 D02 requirements for dipole calibration, UL CCS has adopted two years calibration intervals. On annual basis, each measurement dipole has been evaluated and is in compliance with the following criteria:

1. There is no physical damage on the dipole
2. System validation with specific dipole is within 10% of calibrated value.
3. Return-loss is within 20% of calibrated measurement. (See Appendix “18.16_Calibration Certificate - Validation Dipole D2450V2 - SN 706” with extended cal. data)
4. Impedance is within 5Ω of calibrated measurement (See Appendix “18.16_Calibration Certificate - Validation Dipole D2450V2 - SN 706” with extended cal. data)

4.2. Measurement Uncertainty

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

Component	error, %	Probe Distribution	Divisor	Sensitivity	U (Xi), %
Measurement System					
Probe Calibration (k=1)	5.50	Normal	1	1	5.50
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	-4.95	Normal	1	0.64	-3.17
Liquid Permittivity - deviation from target	5.00	Rectangular	1.732	0.6	1.73
Liquid Permittivity - measurement uncertainty	-4.83	Normal	1	0.6	-2.90
				Combined Standard Uncertainty Uc(y) =	10.37
				Expanded Uncertainty U, Coverage Factor = 2, > 95 % Confidence = 20.74	%
				Expanded Uncertainty U, Coverage Factor = 2, > 95 % Confidence = 1.64	dB

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	4.80	Normal	1	0.64	3.07
Liquid Permittivity - deviation from target	10.00	Rectangular	1.732	0.6	3.46
Liquid Permittivity - measurement uncertainty	-4.44	Normal	1	0.6	-2.66
				Combined Standard Uncertainty Uc(y), %:	11.21
				Expanded Uncertainty U, Coverage Factor = 1.96, > 95 % Confidence = 21.98	%
				Expanded Uncertainty U, Coverage Factor = 1.96, > 95 % Confidence = 1.73	dB

5. Equipment Under Test

The Apple iPad, Model A1430 is a tablet device with iPod functions (music, application support, and video), 802.11a/b/g/n radio, Bluetooth radio functions, and cellular using the GSM 2G/3G/LTE data radio functions. Model: A1430	
Normal operation:	Body and Wireless Router (Hotspot)
Antenna-to-antenna and antenna-to-edges' separation distances:	Please refer to Section 19 Antenna Locations & Separation Distances
Proximity Sensor for Power Reduction:	There is no proximity sensor for power reduction for WiFi/BT Antenna. The proximity sensor for power reduction is applied to Primary Cellular Antenna only. Trigger Distance: o 0-11 mm from Rear, o 0-14 mm from Top-edge of device.
Simultaneous Transmission:	• WWAN Radio (GPRS/EGPRS/UMTS/LTE) can transmit simultaneously with WiFi/BT Radio. • WiFi 2.4GHz Radio cannot transmit simultaneously with Bluetooth Radio. • WiFi 5GHz Radio can transmit simultaneously with Bluetooth Radio. Due to Bluetooth's maximum output is < 60/f(GHz) mW and standalone SAR is not required, Bluetooth is not considered as co-located transmitters with other radio. Bluetooth's max. output power: 15.49 mW.

5.1. 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="3">Information</th></tr>
<tr><td>1</td><td>Identify the operating frequency range of each LTE transmission band used by the device</td><td colspan="2">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="3">5 MHz, 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="3">
<table>
<tr><th rowspan="3">Band 4</th><th colspan="2">Channel Bandwidth</th></tr>
<tr><th>10 MHz</th><th>5 MHz</th></tr>
<tr><th>Ch. # / Freq. (MHz)</th><th>Ch. # / Freq. (MHz)</th></tr>
<tr><td>Low</td><td>20000/1715</td><td>19975/1712.5</td></tr>
<tr><td>Mid</td><td>20175/1732.5</td><td>20175/1732.5</td></tr>
<tr><td>High</td><td>20350/1750</td><td>20375/1752.5</td></tr>
<tr><th rowspan="3">Band 17</th><th colspan="2">Channel Bandwidth</th></tr>
<tr><th>10 MHz</th><th>5 MHz</th></tr>
<tr><th>Ch. # / Freq. (MHz)</th><th>Ch. # / Freq. (MHz)</th></tr>
<tr><td>Low</td><td>23780/709</td><td>23755/706.5</td></tr>
<tr><td>Mid</td><td>23790/710</td><td>23790/710</td></tr>
<tr><td>High</td><td>23800/711</td><td>23825/713.5</td></tr>
</table>
</td></tr>
<tr><td>4</td><td>Specify the UE category and uplink modulations used</td><td colspan="3">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="3">A Single antenna is used for LTE and other wireless modes (GPRS/EGPRS/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="3">Data Only device.
Exposure Conditions:
Body – Rear, Bottom, Left-edge, Top-edge, and Right-edge of the DUT at a separation distance of 0 cm from the flat phantom.
With Proximity Sensor Power back-off disabled
Rear of the DUT at the separation distance of 11 mm to the flat phantom.
Top-edge of the DUT at the separation distance of 14 mm to the flat phantom.
Top-edge/Right Corner of the DUT at the separation angle of 15 degrees 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="3">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.
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 7.3</td></tr>
<tr><td rowspan="15">9</td><td rowspan="15">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>Cellular Band</td><td>824 – 849 MHz</td></tr>
<tr><td>US PCS Band</td><td>1850 – 1910 MHz</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>GPRS/EGPRS</td><td>GMSK, 8PSK</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>DC-HSDPA (Rel 8, CAT 24)</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 LE</td><td>DQPSK, 8DPSK, GFSK</td></tr>
<tr><td colspan="2">Data Only device.
Exposure Conditions:
• Body – Rear, Bottom, Left-edge, Top-edge, and Right-edge of the DUT at a separation distance of 0 cm from the flat phantom.
• With Proximity Sensor Power back-off disabled
○ Rear surface of the DUT at the separation distance of 11 mm to the flat phantom.
○ Top-edge of the DUT at the separation distance of 14 mm to the flat phantom.
○ Top-edge/Right Corner of the DUT at the separation angle of 15 degrees 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 7.1, 7.2, 7.4 and 7.5</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 (GPRS/EGPRS/UMTS/ LTE) can transmit simultaneously with WiFi/BT Radio.
• WiFi 2.4GHz Radio cannot transmit simultaneously with Bluetooth Radio.
• WiFi 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	Included in the KDB 716718
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

5.2. Personal Hotspot Mode

The device is capable of personal hotspot mode. The hotspot mode can be enabled by the users by the following this sequence of soft-keys; Settings > General > Network > Enable Personal Hotspot.

WiFi Hotspot mode permits the device to share its cellular data connection with other 2.4 GHz WiFi-enabled devices (channels 1 - 11). WiFi Hotspot mode is not supported in 5.0 GHz WiFi band.

As the tablet has a diagonal size of greater than 20 cm, and in accordance with FCC training provided in October 2011 (TCBC Workshop) hot spot SAR is not required for this device.

5.3. Description of Antennas

The device has two cellular antennas located on the top-edge of the device. The Primary Cellular Antenna is located on the top-edge of the device on the right side of the front camera and to the left side of the power button. The Secondary Cellular Antenna is located on the top-edge of the device, on the left side of the front camera.

The Primary Antenna is, by design, capable of cellular transmission and reception, and the Secondary Antenna is only capable of cellular reception only. WiFi 2.4GHz cannot transmit simultaneously with Bluetooth. WiFi 5.0GHz can transmit simultaneously with Bluetooth.

Antenna	Antenna Use	Antenna Type	Transmit/Receive	Tx Bands
1	Primary	PIFA	Transmit and Receive	704 – 716 MHz, 824 – 849 MHz, 1710 – 1755 MHz, 1850 – 1910 MHz
2	Secondary	PIFA	Receive Only	
3	WiFi/BT	PIFA	802.11a/b/g/n, Bluetooth.	2400 - 2485 MHz, 5150 - 5350 MHz, 5500 - 5700 MHz, 5725 - 5850 MHz

5.4. Simultaneous Transmission Conditions

This device is capable of transmitting simultaneously in certain allowed configurations. These configurations are defined in this section.

The primary cellular antenna can transmit simultaneously with the WiFi/Bluetooth Antenna.

Bluetooth and 2.4GHz WiFi time-share the same antenna and cannot transmit simultaneously. 5.0 GHz WiFi can transmit simultaneously with Bluetooth.

The Wireless Router (hotspot) permits the device to share its cellular data connection with other 2.4 GHz WiFi-enabled devices (channels 1 - 11). WiFi Hotspot mode is NOT supported in 5 GHz WiFi band.

DTM and SVLTE are NOT supported features on this device in any mode.

WWAN & LTE + WiFi

User usage	SAR Test distance	Mode	Mode of Operation	Band	LTE	GPRS/ EGPRS	WCDMA	HSDPA	HSUPA	HSPA+	DC-HSDPA	WiFi 2.4 GHz	WiFi 5.0 GHz	BT 2.4GHz
Body SAR	0cm, Conservative distance with power back-off disabled	Cellular + 2.4GHz WiFi	LTE [a1]	Band 17	Yes	No	No	No	No	No	No	Yes	No	No
			LTE [a1]	Band 4	Yes	No	No	No	No	No	No		No	No
			GPRS [b1]	850	No	Yes	No	No	No	No	No		No	No
			GPRS [b1]	1900	No	Yes	No	No	No	No	No		No	No
			WCDMA [c1]	835	No	No	Yes	No	No	No	No		No	No
			WCDMA [c1]	1900	No	No	Yes	No	No	No	No		No	No
			HSDPA [d1]	835	No	No	No	Yes	No	No	No		No	No
			HSDPA [d1]	1900	No	No	No	Yes	No	No	No		No	No
			HSUPA [e1]	835	No	No	No	No	Yes	No	No		No	No
			HSUPA [e1]	1900	No	No	No	No	Yes	No	No		No	No
			HSPA+ [f1]	835	No	No	No	No	No	Yes	No		No	No
			HSPA+ [f1]	1900	No	No	No	No	No	Yes	No		No	No
			DC-HSDPA [g1]	835	No	No	No	No	No	No	Yes		No	No
			DC-HSDPA [g1]	1900	No	No	No	No	No	No	Yes		No	No
		Cellular + 5.0GHz WiFi	LTE [a1]	Band 17	Yes	No	No	No	No	No	No	No	Yes	No
			LTE [a1]	Band 4	Yes	No	No	No	No	No	No	No		No
			GPRS [b1]	850	No	Yes	No	No	No	No	No	No		No
			GPRS [b1]	1900	No	Yes	No	No	No	No	No	No		No
			WCDMA [c1]	835	No	No	Yes	No	No	No	No	No		No
			WCDMA [c1]	1900	No	No	Yes	No	No	No	No	No		No
			HSDPA [d1]	835	No	No	No	Yes	No	No	No	No		No
			HSDPA [d1]	1900	No	No	No	Yes	No	No	No	No		No
			HSUPA [e1]	835	No	No	No	No	Yes	No	No	No		No
			HSUPA [e1]	1900	No	No	No	No	Yes	No	No	No		No
			HSPA+ [f1]	835	No	No	No	No	No	Yes	No	No		No
			HSPA+ [f1]	1900	No	No	No	No	No	Yes	No	No		No
			DC-HSDPA [g1]	835	No	No	No	No	No	No	Yes	No		No
			DC-HSDPA [g1]	1900	No	No	No	No	No	No	Yes	No		No

Cellular + Bluetooth and Cellular + WiFi + Bluetooth

User usage	SAR Test distance	Mode	Mode of Operation	Band	LTE	GPRS/ EGPRS	WCDMA	HSDPA	HSUPA	HSPA+	DC-HSDPA	WiFi 2.4 GHz	WiFi 5.0 GHz[i1]	BT 2.4GHz[i1]
Body SAR	0cm, Conservative distance with power back-off disabled	Cellular + Bluetooth	LTE [a1]	Band 17	Yes	No	No	No	No	No	No	No	No	Yes
			LTE [a1]	Band 4	Yes	No	No	No	No	No	No	No	No	
			GPRS [b1]	850	No	Yes	No	No	No	No	No	No	No	
			GPRS [b1]	1900	No	Yes	No	No	No	No	No	No	No	
			WCDMA[c1]	835	No	No	Yes	No	No	No	No	No	No	
			WCDMA [c1]	1900	No	No	Yes	No	No	No	No	No	No	
			HSDPA[d1]	835	No	No	No	Yes	No	No	No	No	No	
			HSDPA[d1]	1900	No	No	No	Yes	No	No	No	No	No	
			HSUPA[e1]	835	No	No	No	No	Yes	No	No	No	No	
			HSUPA[e1]	1900	No	No	No	No	Yes	No	No	No	No	
			HSPA+ [f1]	835	No	No	No	No	No	Yes	No	No	No	
			HSPA+ [f1]	1900	No	No	No	No	No	Yes	No	No	No	
			DC-HSDPA[g1]	835	No	No	No	No	No	No	Yes	No	No	
			DC-HSDPA[g1]	1900	No	No	No	No	No	No	Yes	No	No	
		Cellular + 5.0GHz WiFi + Bluetooth	LTE [a1]	Band 17	Yes	No	No	No	No	No	No	No	Yes	Yes
			LTE [a1]	Band 4	Yes	No	No	No	No	No	No	No		
			GPRS [b1]	850	No	Yes	No	No	No	No	No	No		
			GPRS [b1]	1900	No	Yes	No	No	No	No	No	No		
			WCDMA[c1]	835	No	No	Yes	No	No	No	No	No		
			WCDMA [c1]	1900	No	No	Yes	No	No	No	No	No		
			HSDPA[d1]	835	No	No	No	Yes	No	No	No	No		
			HSDPA[d1]	1900	No	No	No	Yes	No	No	No	No		
			HSUPA[e1]	835	No	No	No	No	Yes	No	No	No		
			HSUPA[e1]	1900	No	No	No	No	Yes	No	No	No		
			HSPA+ [f1]	835	No	No	No	No	No	Yes	No	No		
			HSPA+ [f1]	1900	No	No	No	No	No	Yes	No	No		
			DC-HSDPA[g1]	835	No	No	No	No	No	No	Yes	No		
			DC-HSDPA[g1]	1900	No	No	No	No	No	No	Yes	No		

Notes:

a1 – Per KDB 941225 D05 SAR for LTE Devices v01,

- Since, the SAR value is less than 1.45 W/kg, SAR for 100% RB allocation and QPSK modulation is not evaluated. See test results in section 13.5 and 13.6.
- SAR evaluation for 5MHz channel bandwidth is not performed, because the maximum average conducted output power of a 5 MHz channel bandwidth is within 0.5 dB of the average conducted output power measured for the 10 MHz channel bandwidth. See conducted power results in section 7.3. Additionally, the SAR for 10 MHz channel bandwidth for all RB configurations is less than 1.45 W/kg. See test results in section 13.5 and 13.6.

b1 – Per KDB 941225 D03 SAR Test Reduction GSM/GPRS/EDGE vo1,

- Refer to conducted power results in section 7.1.

c1 – Per KDB 941225 D01 SAR Test for 3G devices v02, SAR for body exposure configurations in data modes is measured using a 12.2 kbps RMC with TPC bits configured to all “1’s”. Also, see conducted power results in

section 7.2.

d1 – Per KDB 941225 D01 Body SAR is not required for handsets with HSDPA capabilities 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 and the maximum SAR for 12.2 kbps RMC is ≤ 75% of the SAR limit. Also, see conducted power results in section 7.2.

e1 – Per 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 12.2 kbps RMC is ≤ 75% of the SAR limit. Also, see conducted power results in section 7.2.

f1 – In HSPA+ implementation of this device, 16QAM is not used for uplink. The uplink Category and release number is same as HSUPA, i.e., CAT 6 Rel 6. Therefore, Body SAR is evaluation is not required. Also see note e1.

g1 –In DC-HSDPA implementation of this device, the uplink parameters are the same as HSDPA. No additional channels and modulations (16 QAM, and 64 QAM) are supported in uplink. The difference is only in the downlink parameters, where two carriers are supported. HSDPA settings were used on uplink.

h1 – 5.0 GHz WiFi can transmit simultaneously with Bluetooth.

6. Proximity Sensor Operation

A Proximity sensor for power reduction is implemented in this device to address RF exposure compliance when the cellular antenna is positioned close to the user's body. The sensor mechanical structure is designed to fit within the enclosure design used in this device and also extended around the edge and top of the antenna element in order to optimize sensitivity in these orientations. This design combines the antenna and proximity sensor into a single FPC (Flexible Printed Circuit).

6.1. Description

The device, model A1430, utilizes a capacitive proximity sensor built into the plastic area that houses the cellular radio antenna. This area can be found on the top edge and the front/Rears of the device, when the device is oriented in the portrait orientation and the I/O port is at the bottom. The purpose of the proximity sensor is to cap the transmitter output power when the device's cellular antenna is proximate to the human body.

For design and testing purposes Top-Edge, Front Surface, and Rear are chosen as the dimensions of interest. The minimum detection distances for these dimensions are: 14 mm (Top-Edge), 14mm (Front), and 11 mm (Rear)

6.2. Test and Calibration of the Proximity Sensor

Every unit from the production line is calibrated and tested to ensure that its operation meets or exceeds the expected detection sensitivity and performance.

An expected capacitance range is programmed in each device, and if the measured capacitance is outside the range during operation of the device, the proximity sensor is triggered and transmits power is capped.

Certain objects may trigger the transmitter output power cap at greater distances. The transmitter output power is capped at different levels depending on the cellular band and modulation in operation.

6.3. Proximity Sensor Detection Area

The proximity sensor is combined with the primary antenna in a single FPC (Flexible Printed Circuit), therefore, the proximity sensor occupies the same area as the primary antenna.

Refer to section 19 for location of proximity sensor

The conservation distance at which proximity sensor is triggered when the

- Top-edge of the device is 14 mm from the phantom.
- Front of the device is 14 mm from the phantom.
- Rear of the device is 11 mm from the phantom.

The following tables show the proximity sensor status as a function of distance from the relevant surfaces of the device.

Proximity Sensor Status Table - Top Edge/Right edge mode in conservative Proximity Sensor Operation

Distance to Top-edge/Right edge of DUT (mm)	10.00	11.00	12.00	13.00	14.00	15.00	16.00	17.00
Proximity Sensor Status	ON	ON	ON	ON	ON	OFF	OFF	OFF

Proximity Sensor Status Table - Rear in conservative Proximity Sensor Operation

Distance to Rear of DUT (mm)	8.00	9.00	10.00	11.00	12.00	13.00	14.00	15.00
Proximity Sensor Status	ON	ON	ON	ON	OFF	OFF	OFF	OFF

Proximity Sensor Status Table – Front Surface in conservative Proximity Sensor Operation

Distance to Front Surface of DUT (mm)	10.00	11.00	12.00	13.00	14.00	15.00	16.00	17.00
Proximity Sensor Status	ON	ON	ON	ON	ON	OFF	OFF	OFF

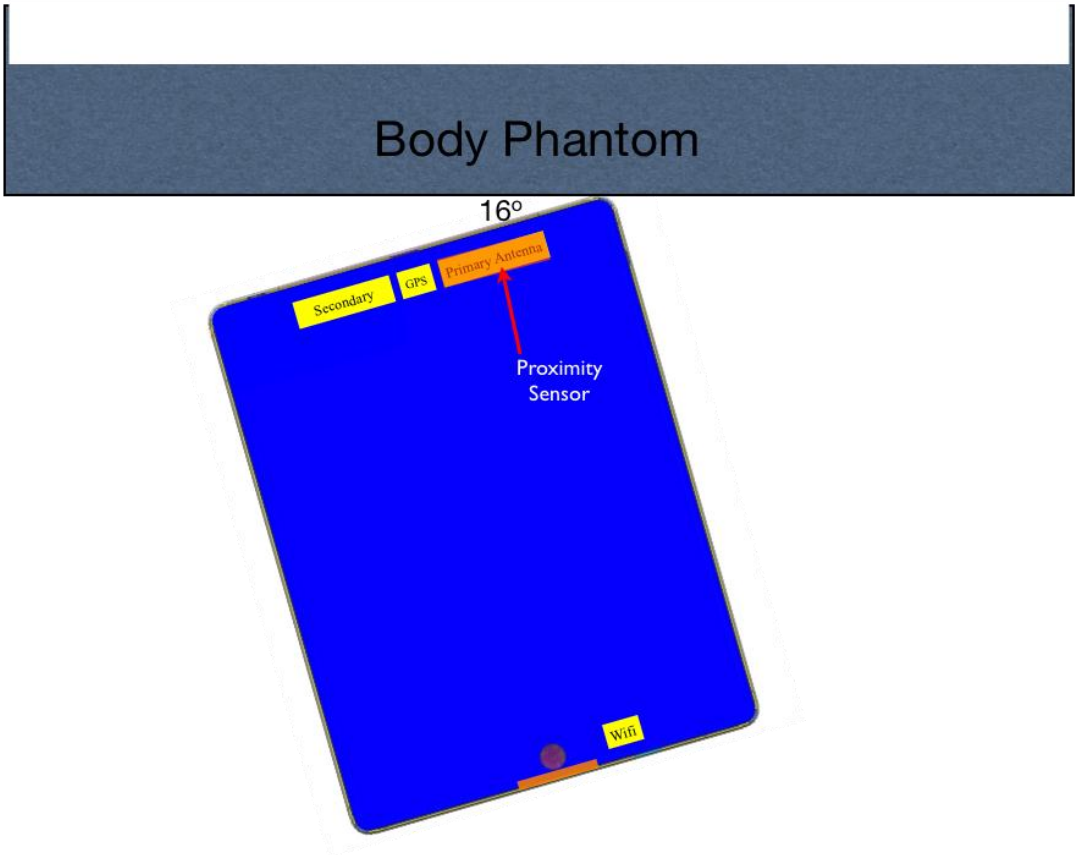
Since the primary antenna is 35.1mm from the edge of the device, additional testing is performed to evaluate the coverage of the proximity sensor detection area.

6.4. Coverage at the Corner of the DUT

To evaluate the proximity sensor coverage at the top right corner of the device, the angle at which proximity sensor stop triggering is determined. In this case, the conservative angle at which proximity sensor stops triggering is at 16°.

Proximity Sensor Status Table – Top Edge/Right corner in conservative Proximity Sensor Operation

Angle of Top-edge/Right corner of DUT (°)	0	5	10	15	16	20	25	30	35	40	45
Proximity Sensor Status	ON	ON	ON	ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF



The proximity sensor coverage at the Rear Surface/Right-corner of the device is determined by changing the angle of the device relative to the phantom and observing the angle at which the proximity sensor is no longer triggered. In this case, the conservative angle at which proximity sensor stops triggering is at 20°.

6.5. Special Development Software

During the 14 mm (Top-Edge), Rear (11mm), and 15° angle (0mm) the transmit power cap normally enabled by the proximity sensor, was disabled using a series of test commands which are only available in development software. The proximity sensor or the power reduction can't be intentionally or unintentionally turned-off by the user. The software provided on production units will not allow the proximity sensor or the power cap to be disabled.

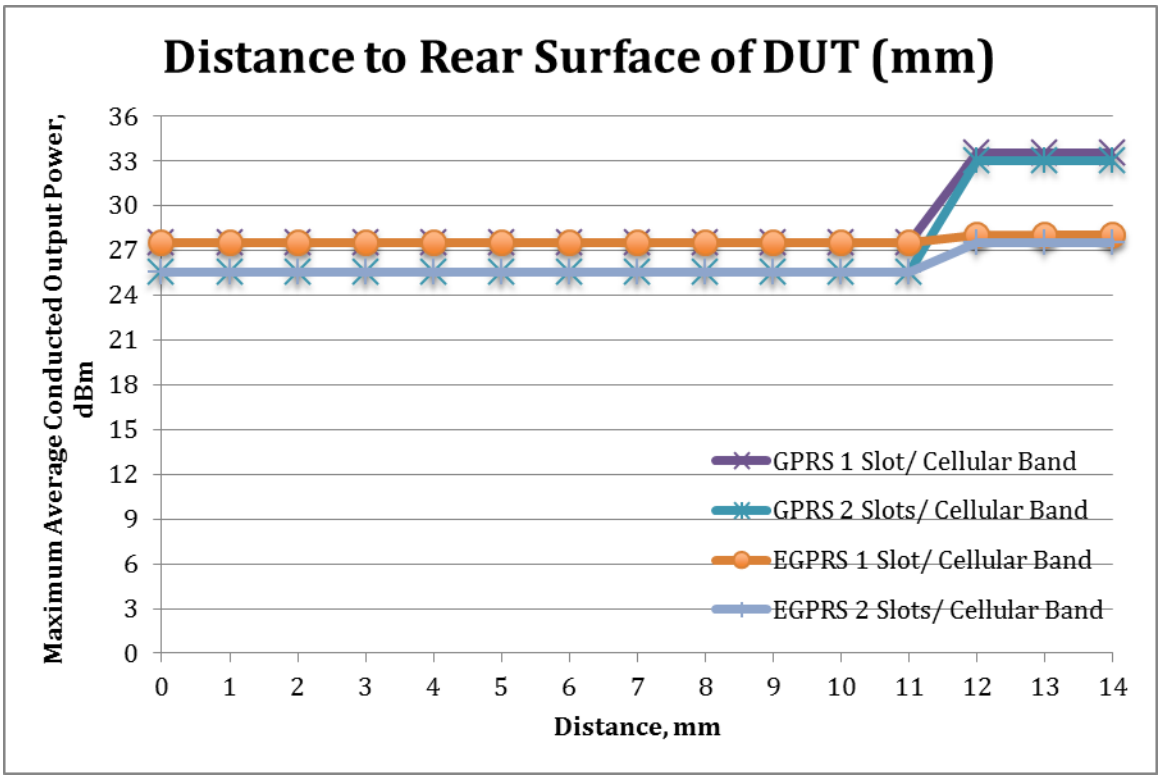
6.6. Power Reduction Values

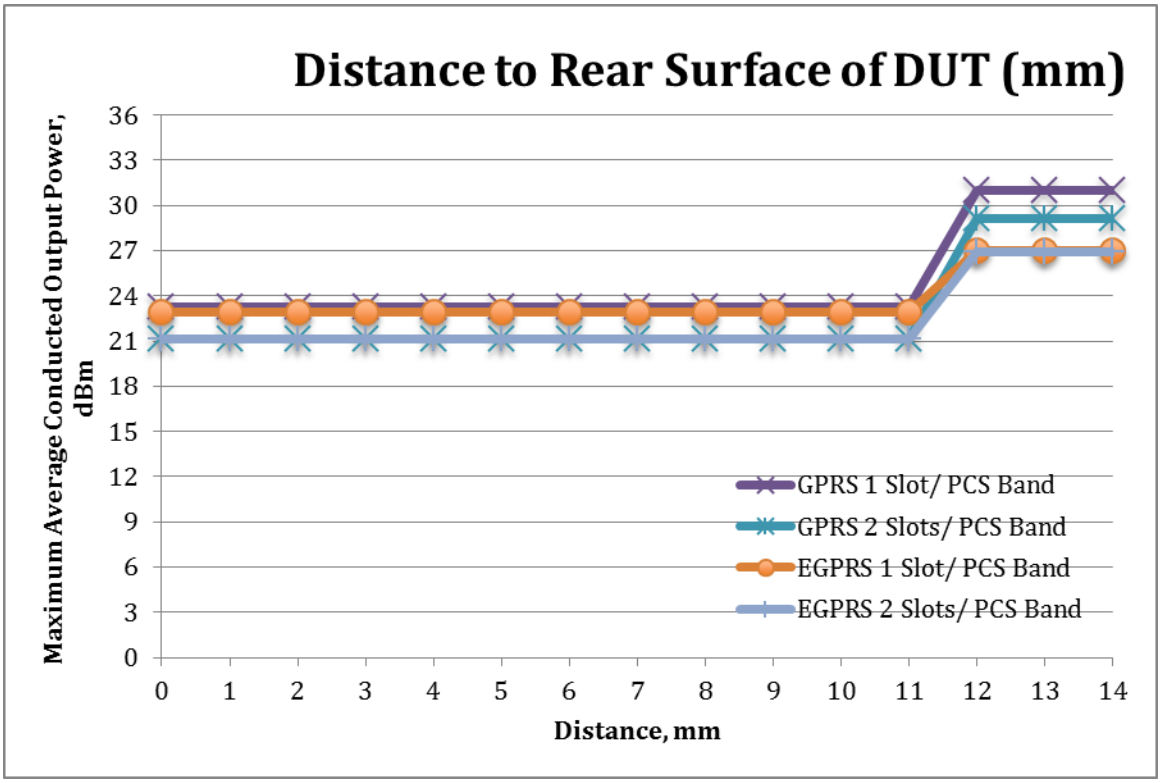
The measured power reduction in each air-interface is listed below. The power reduction values are same for Top-edge, Front and Rear.

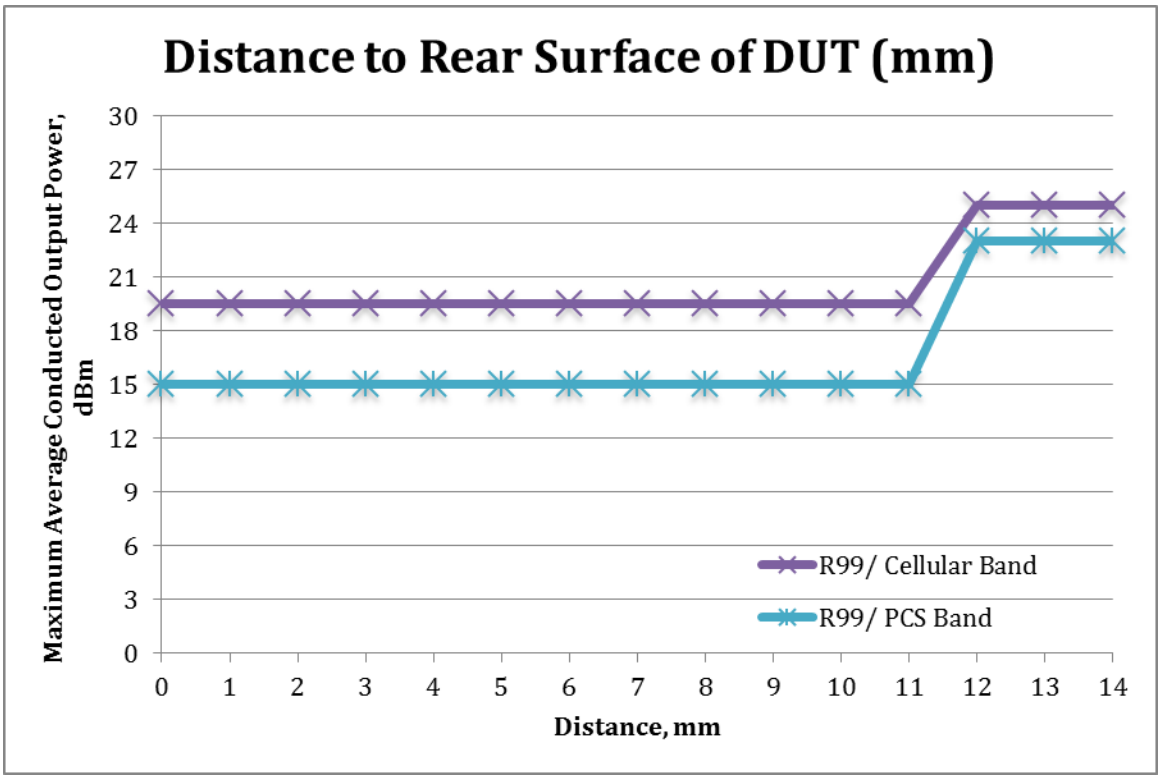
The following tables show the power vs distance plots for

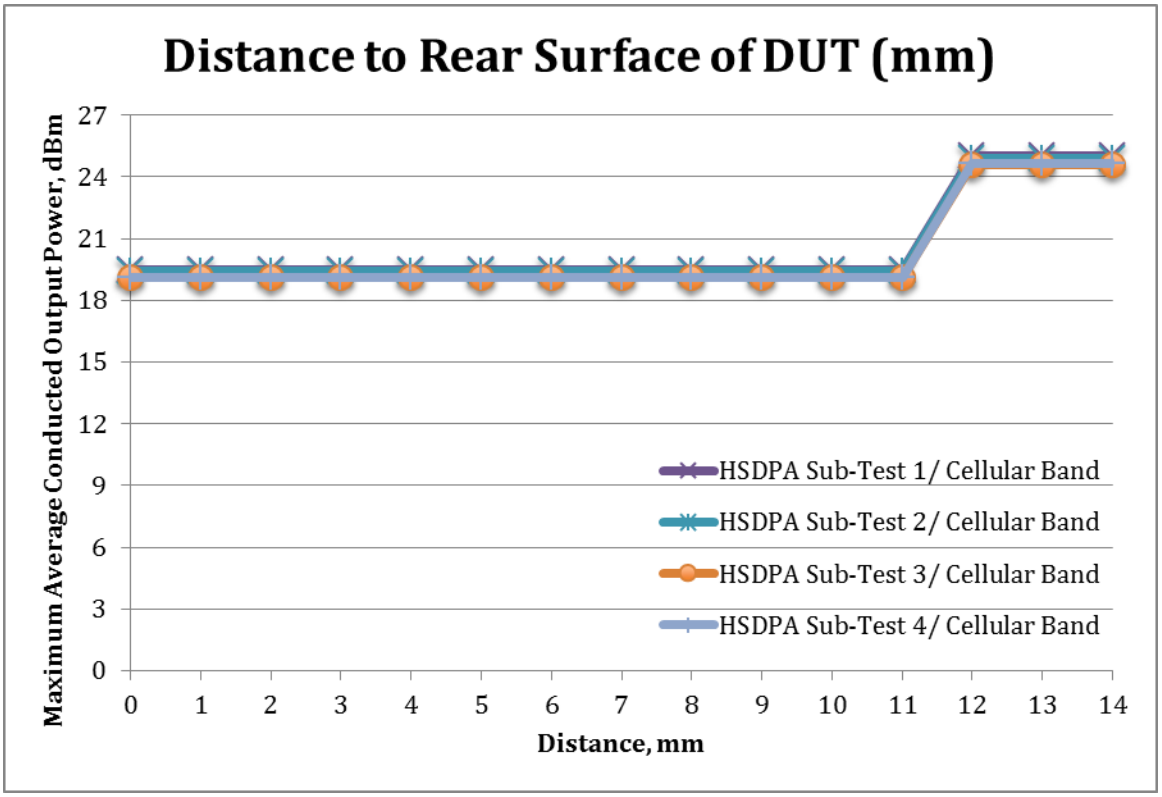
- Rear
- Top Edge

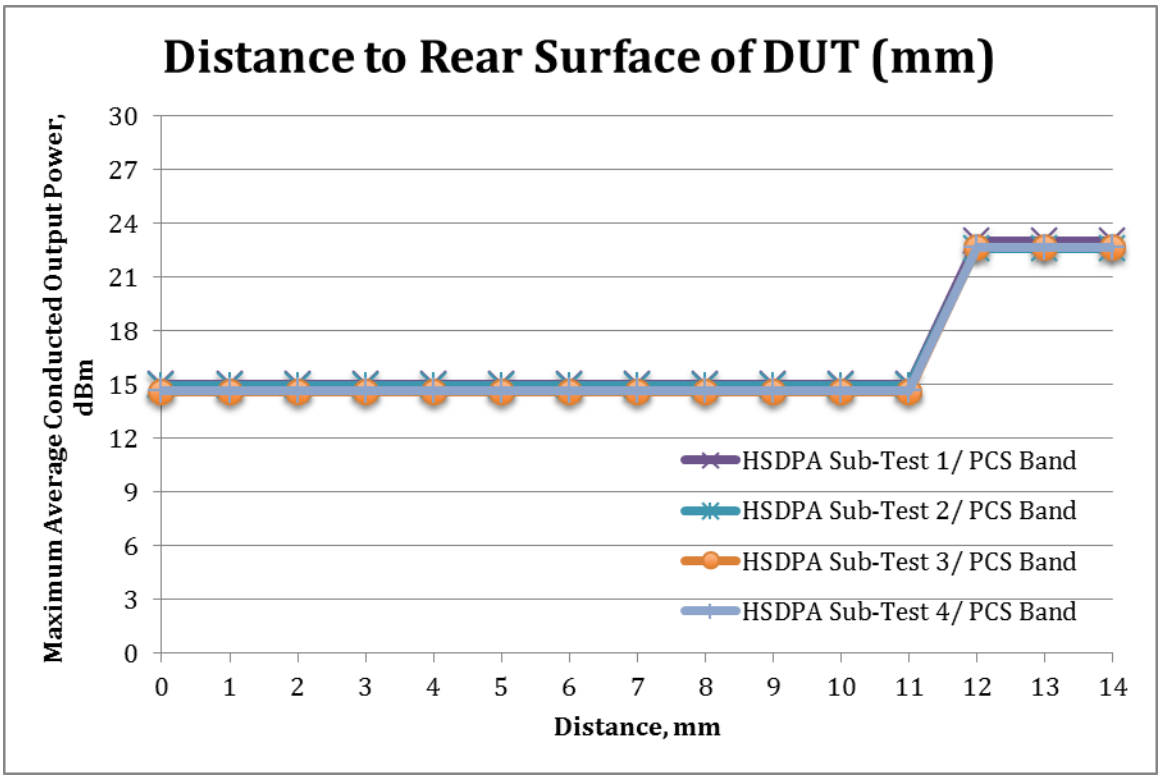
of the DUT with the proximity sensor enabled.

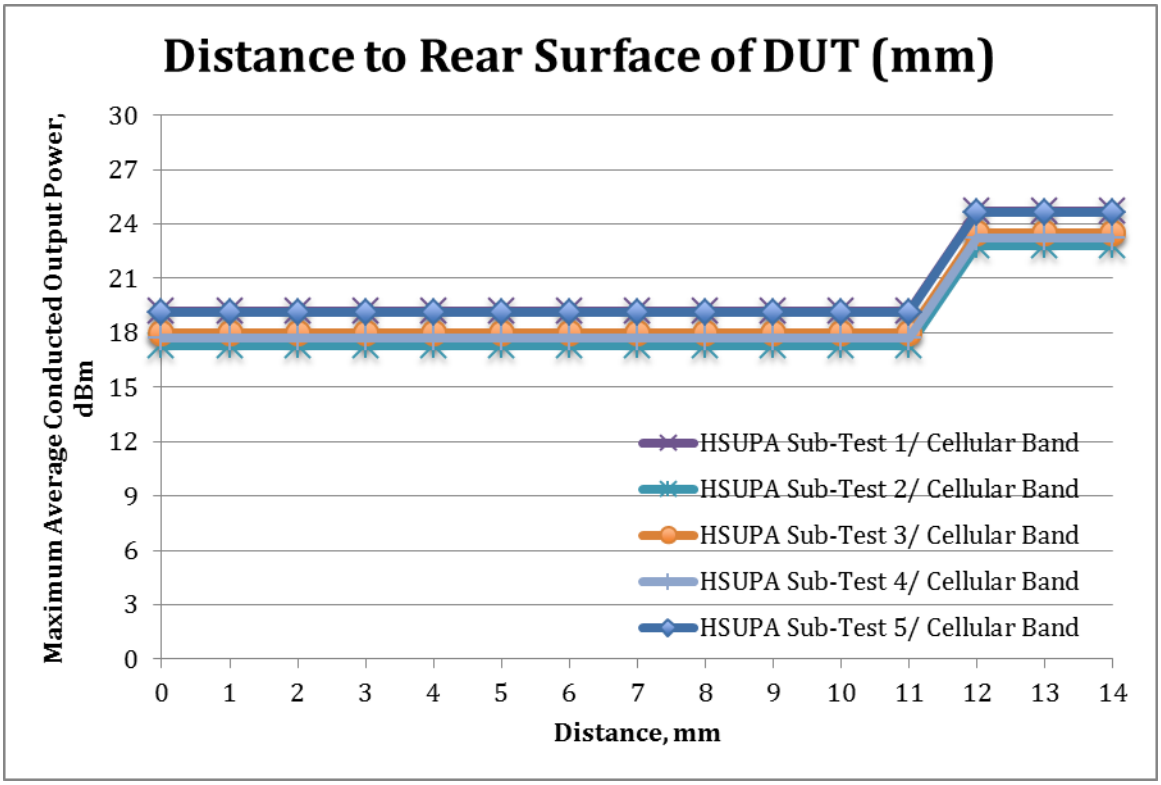


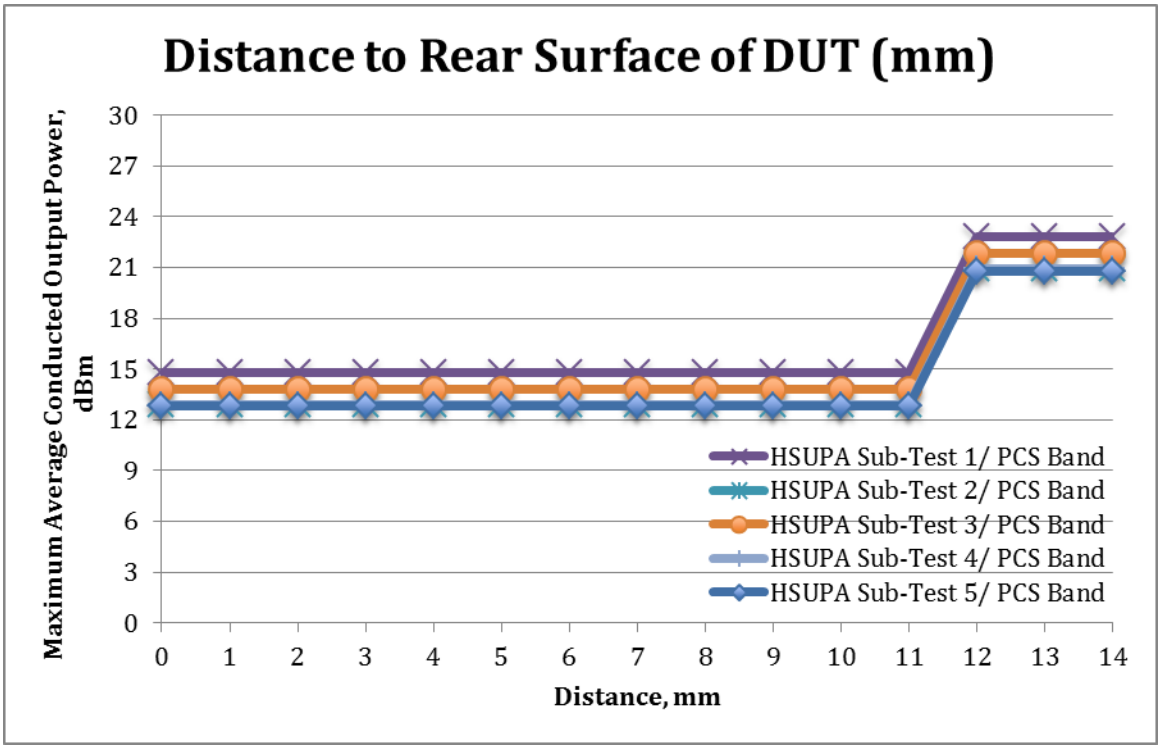


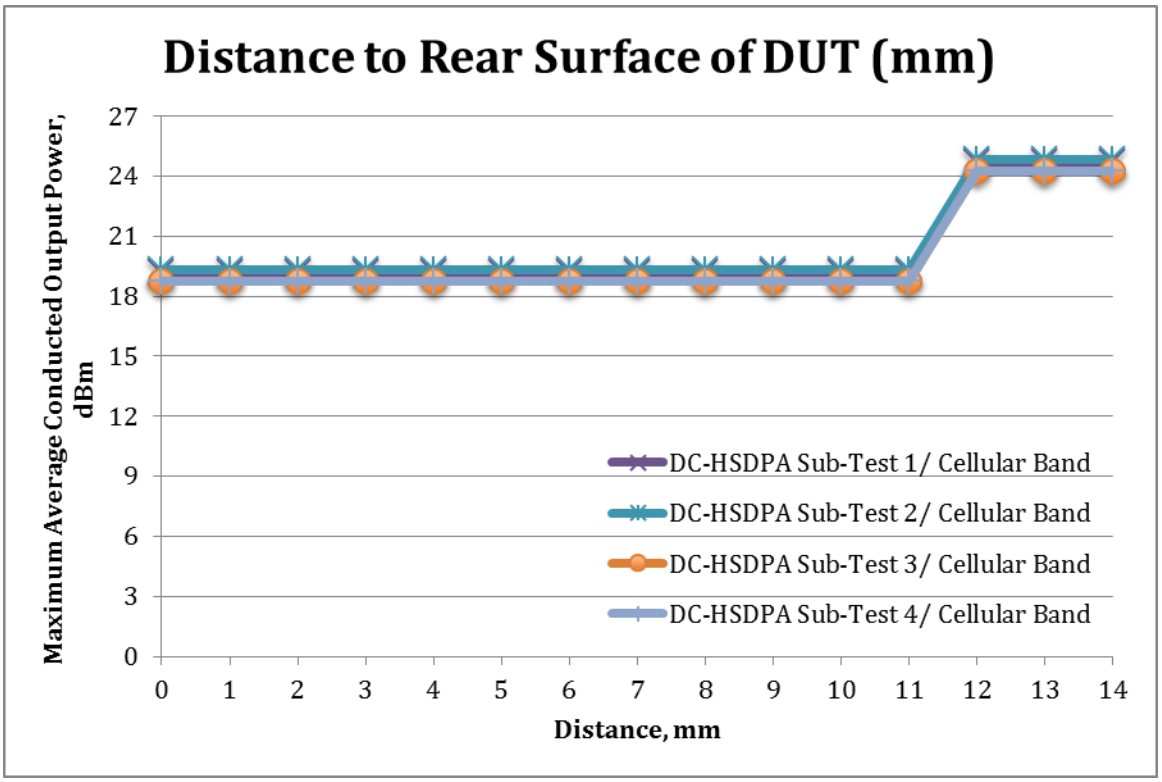


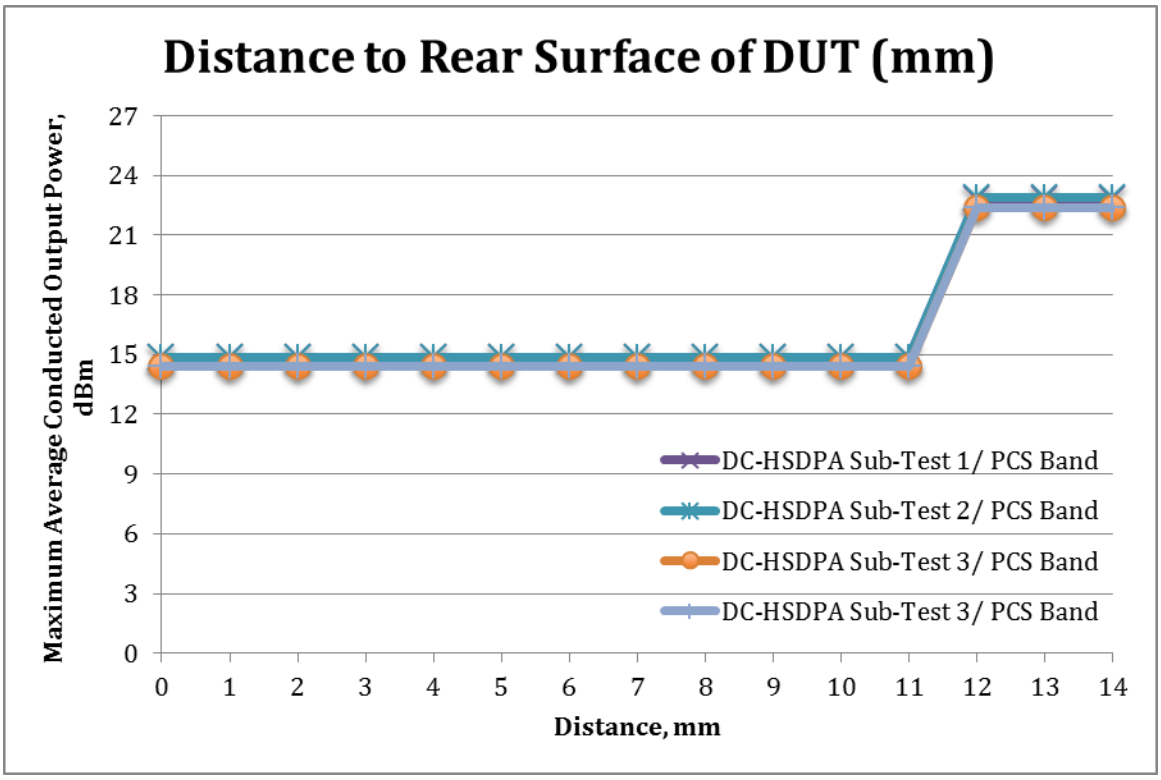


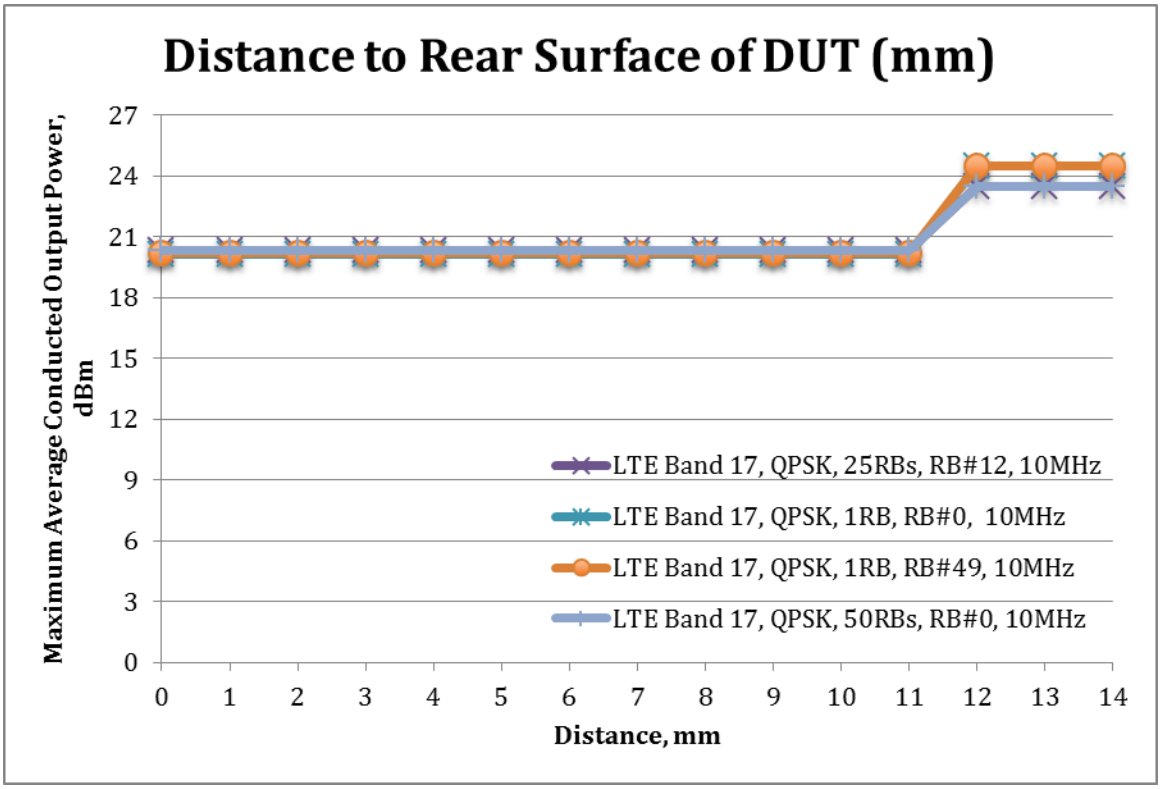


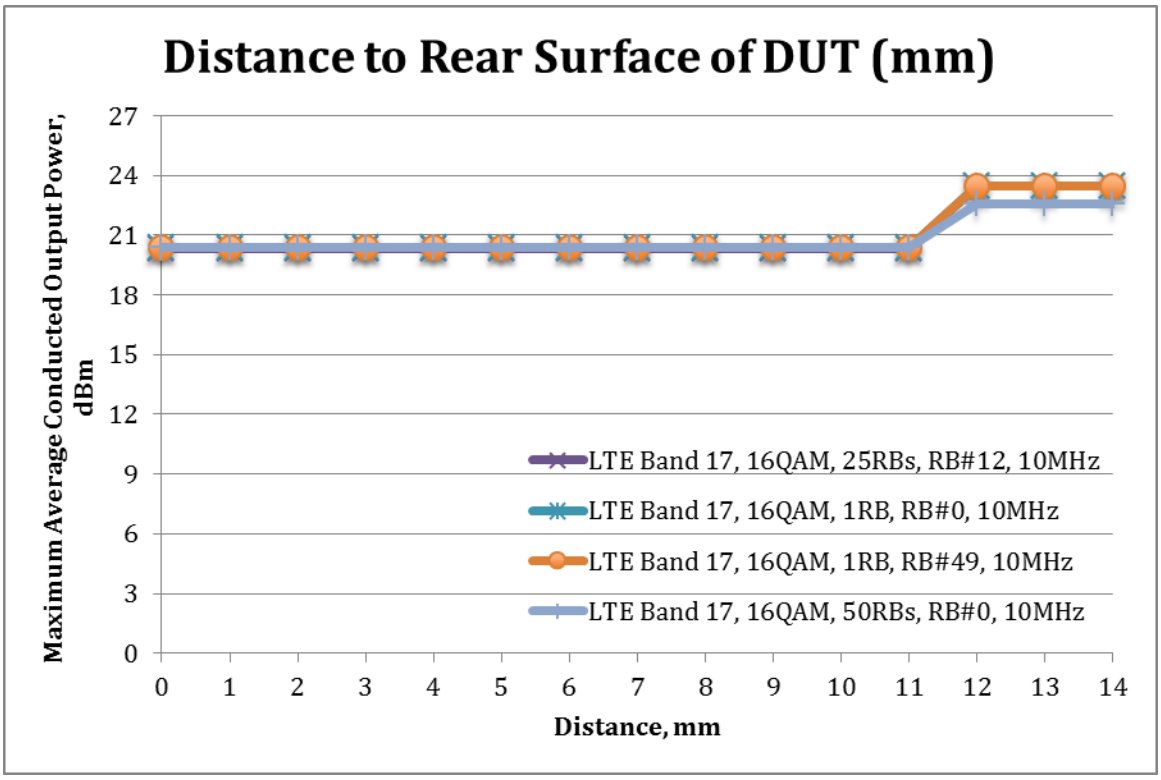


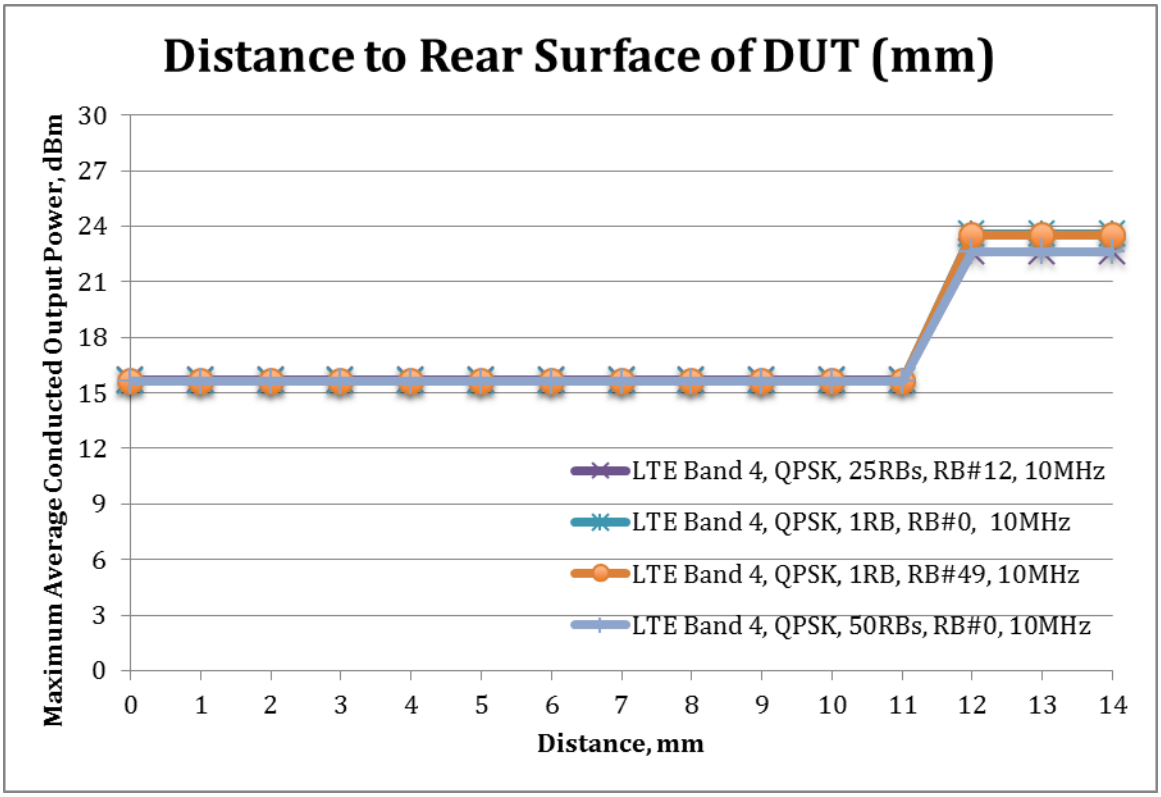


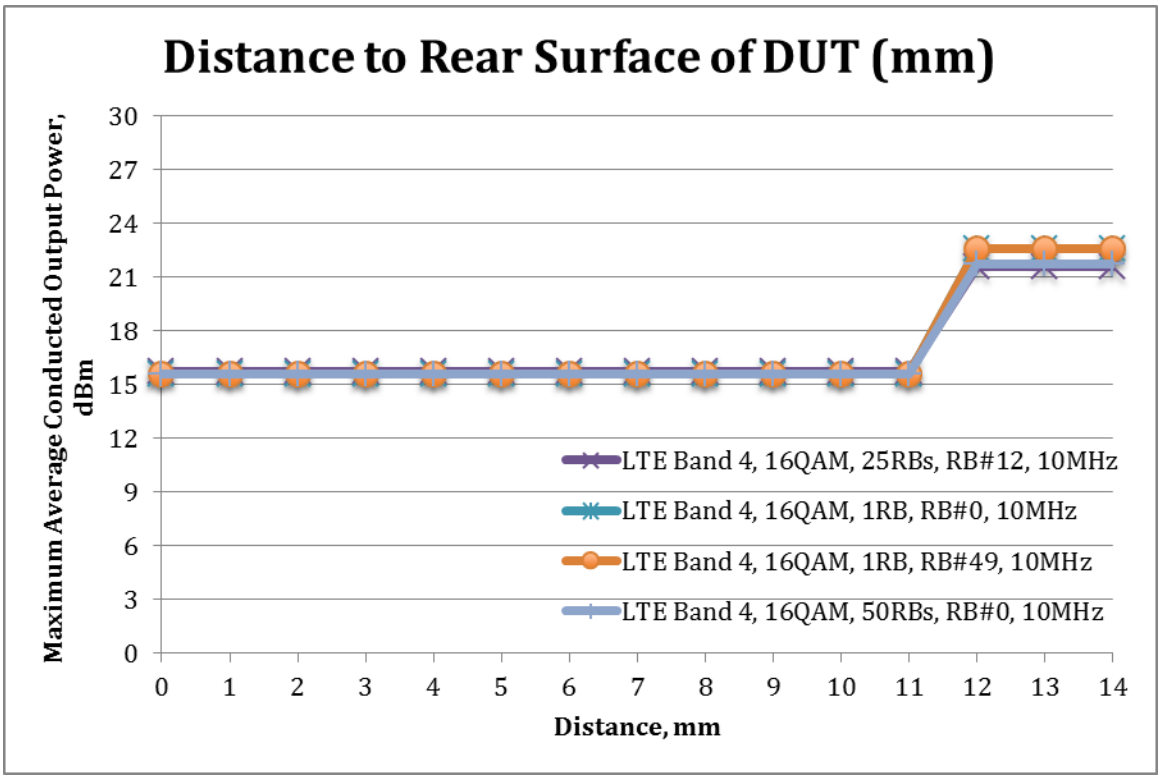


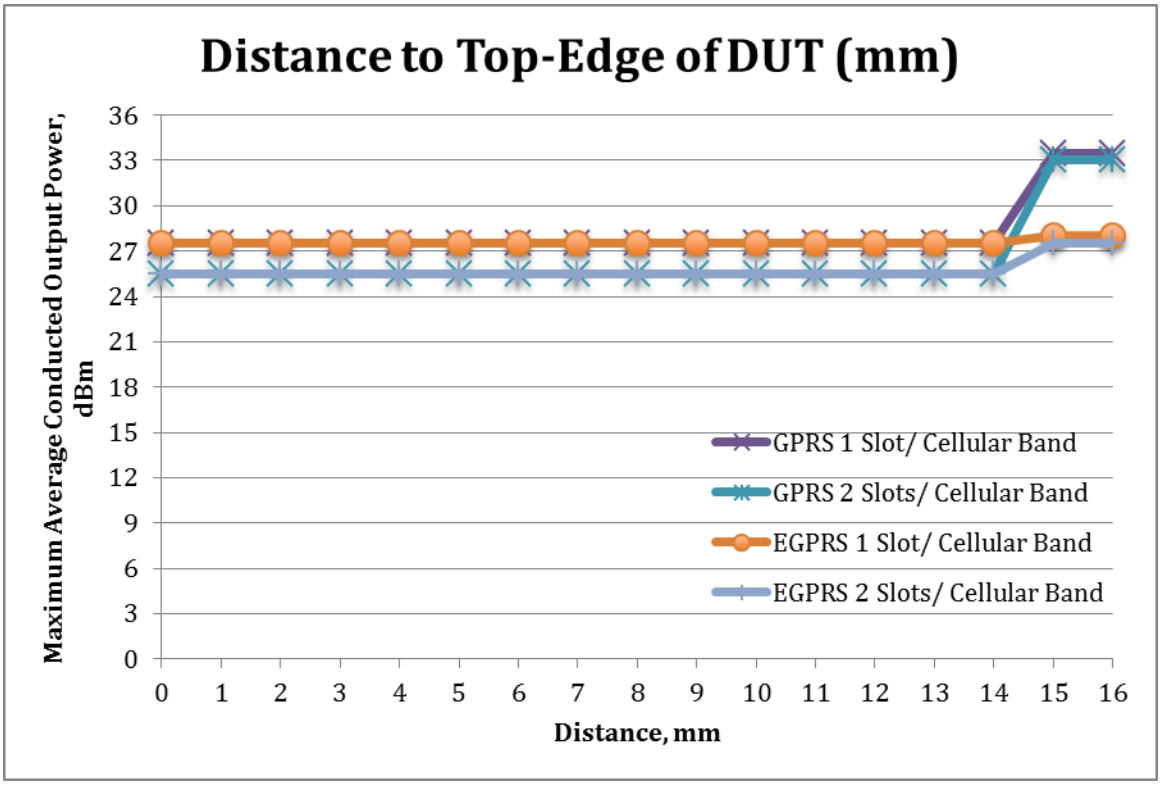


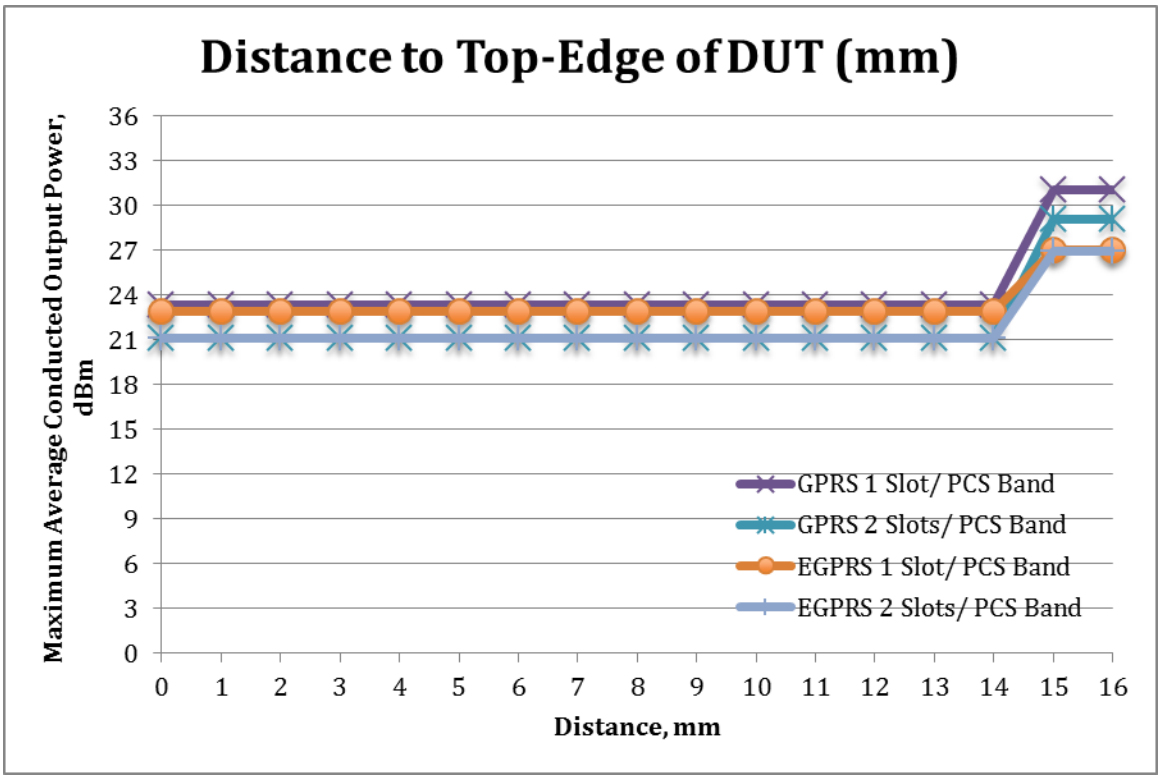


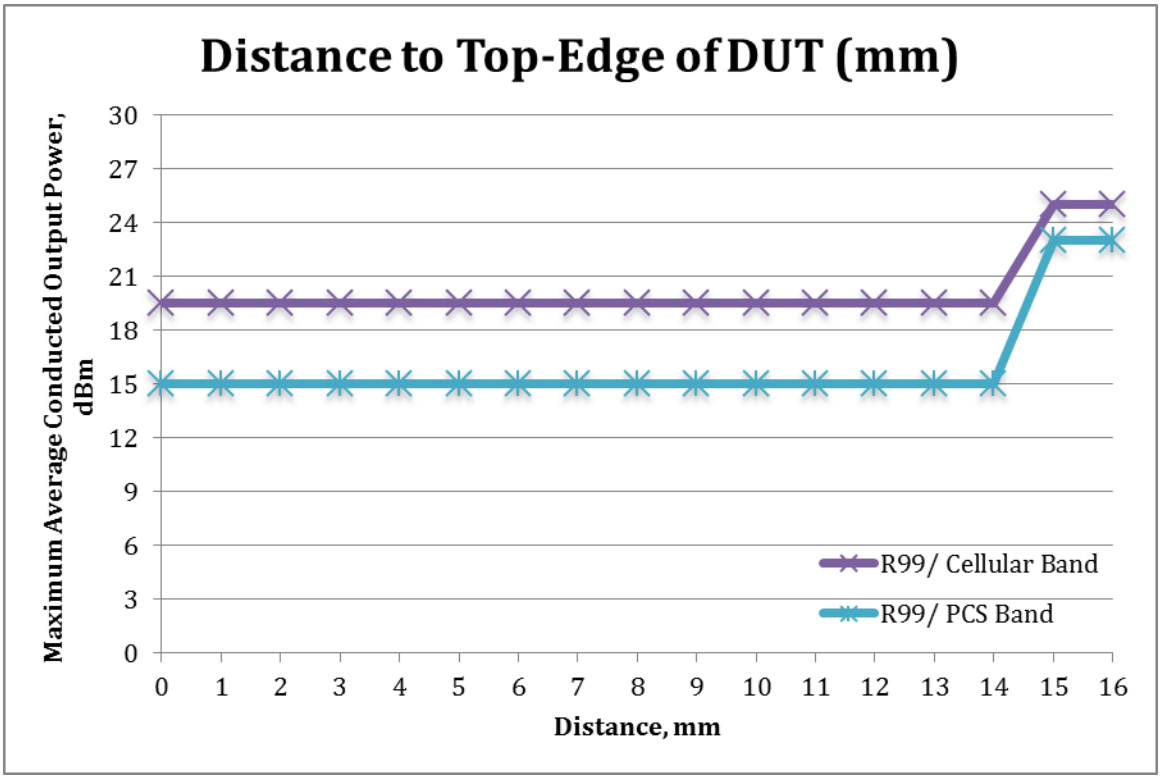


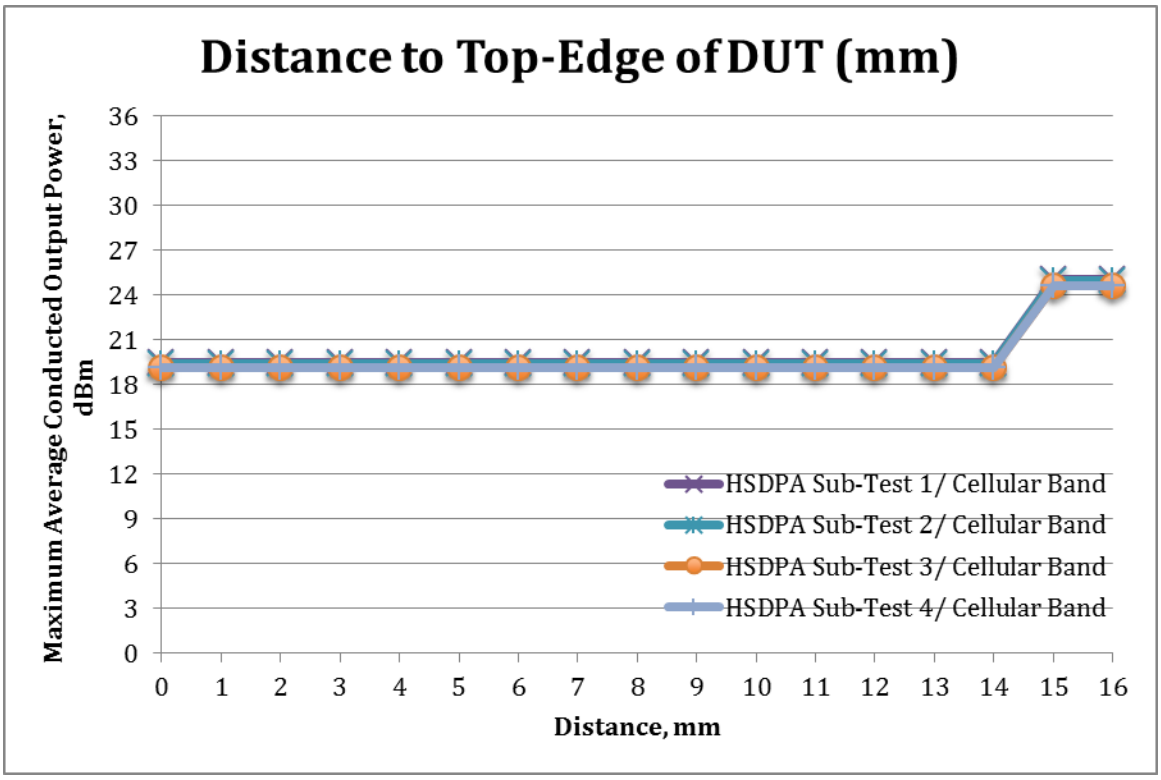


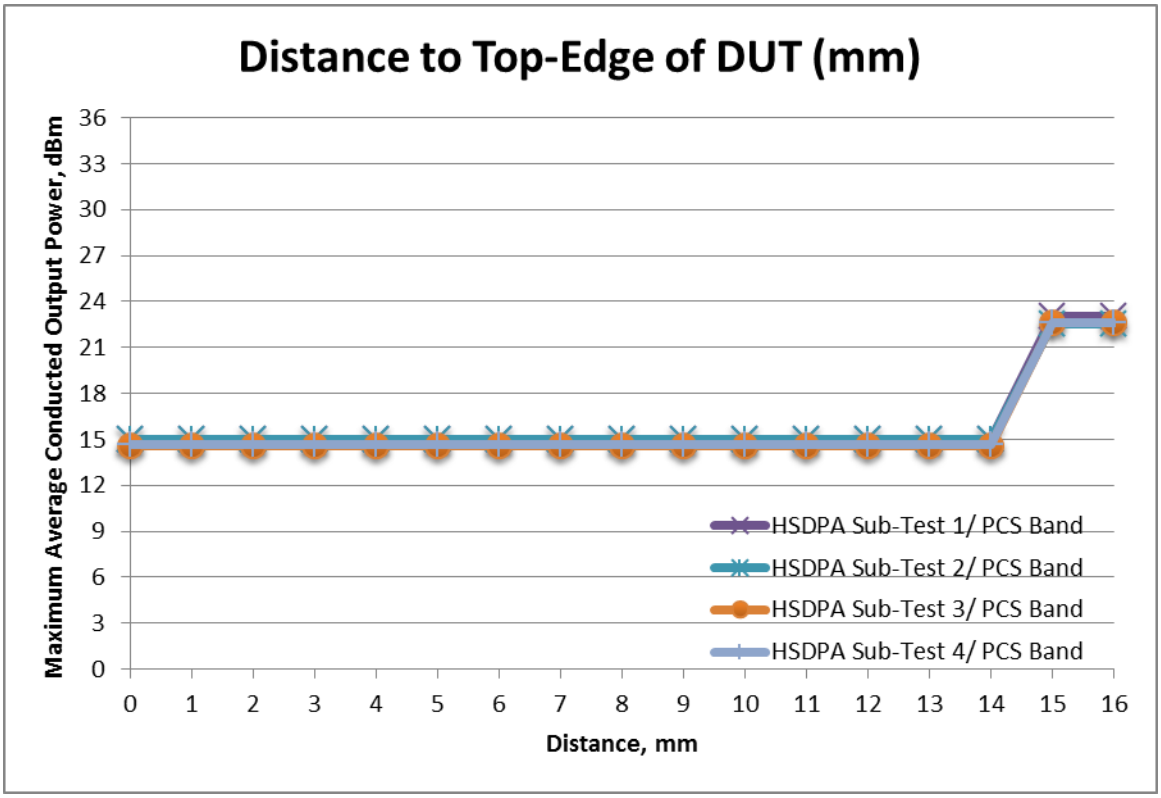


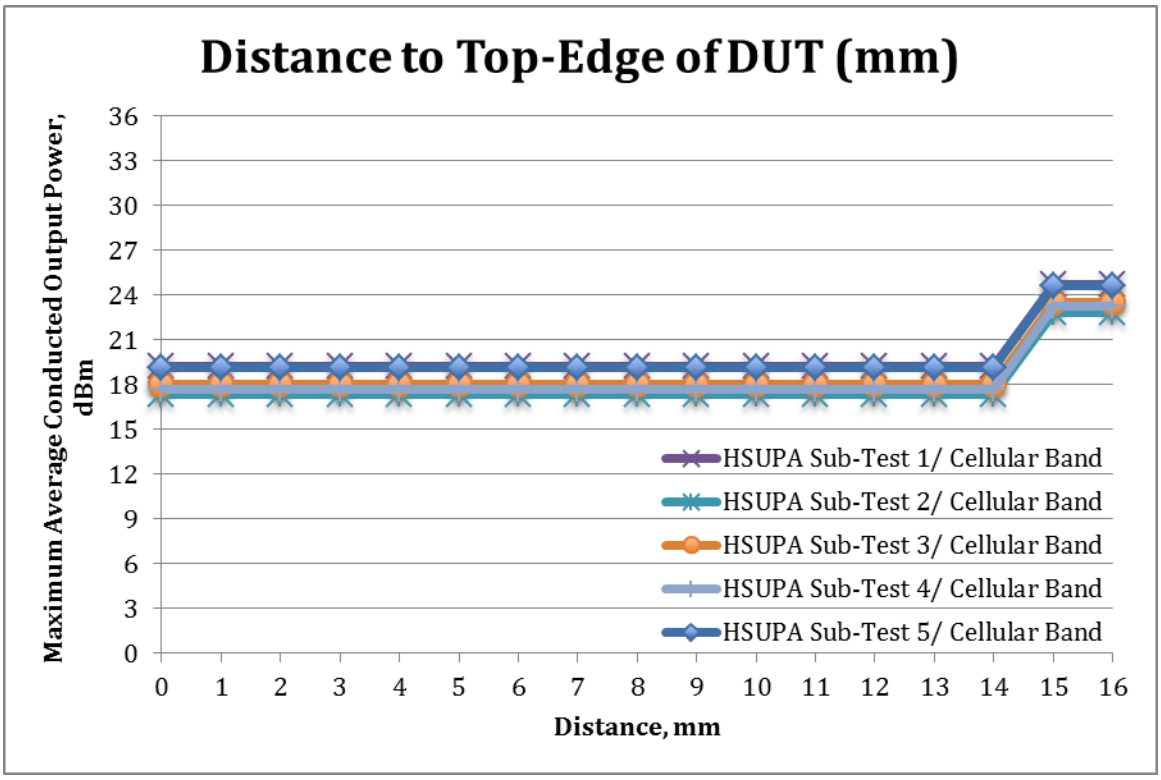


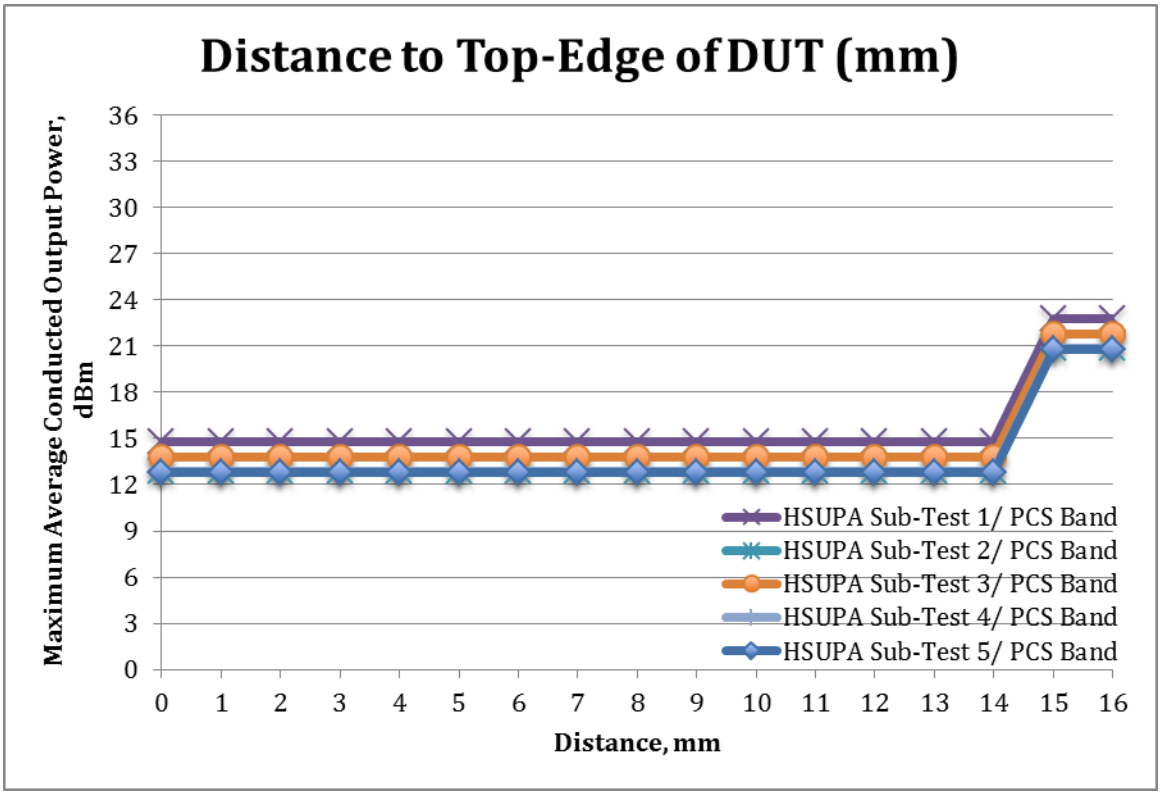


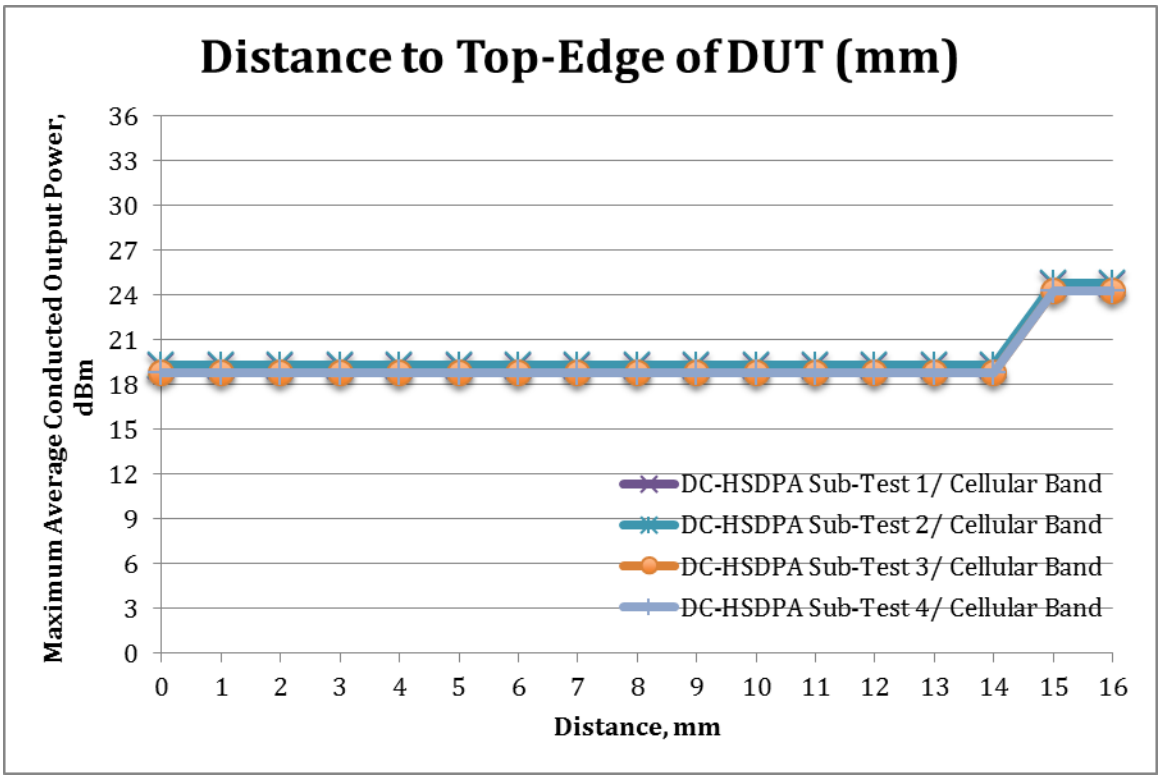


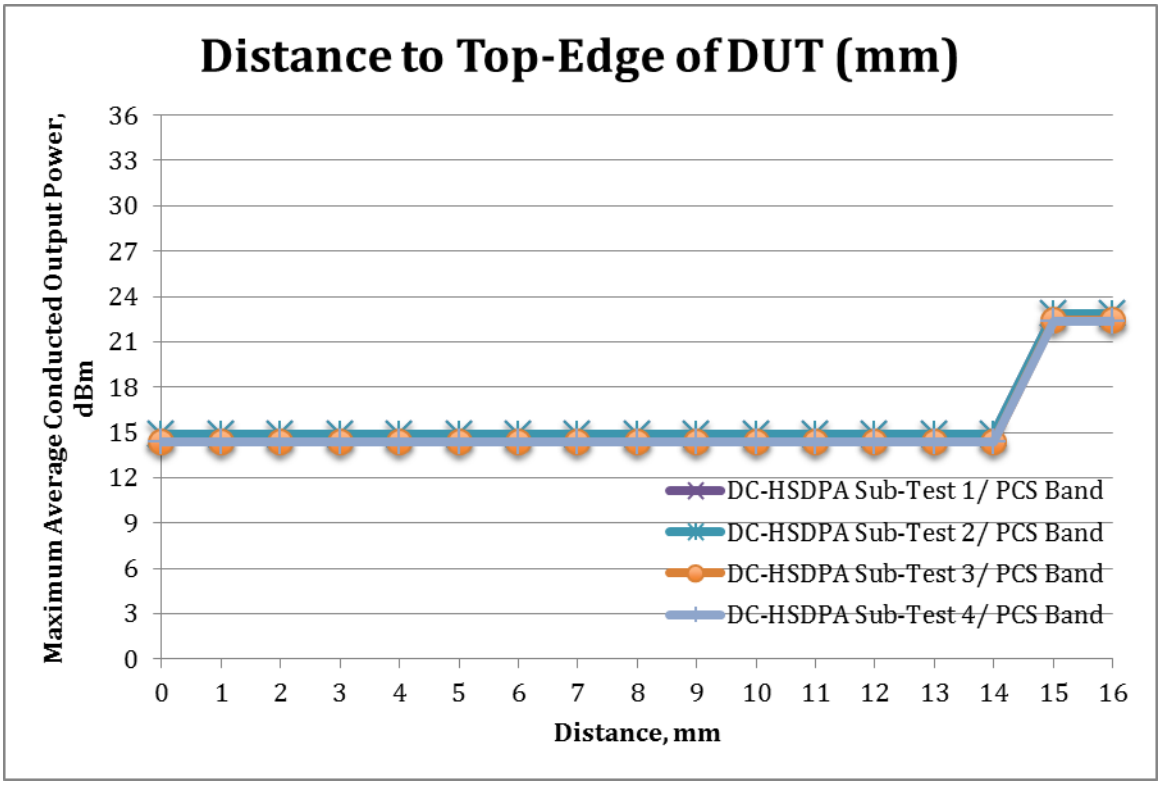


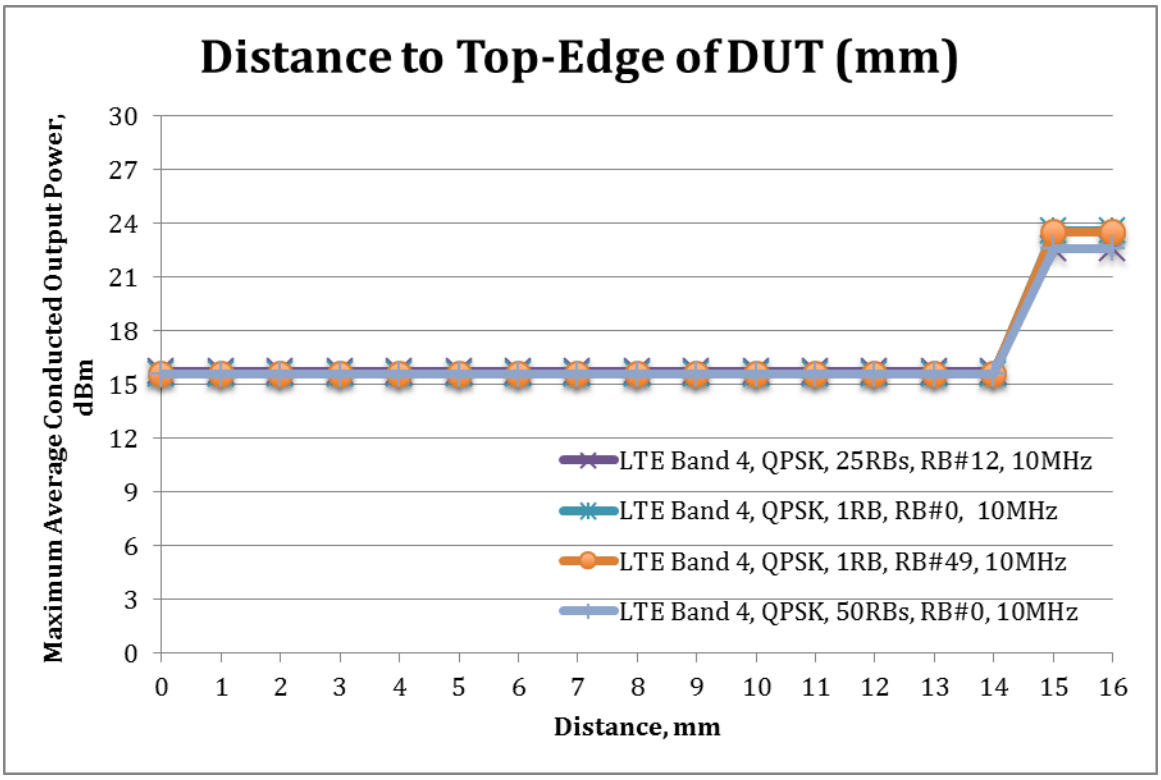


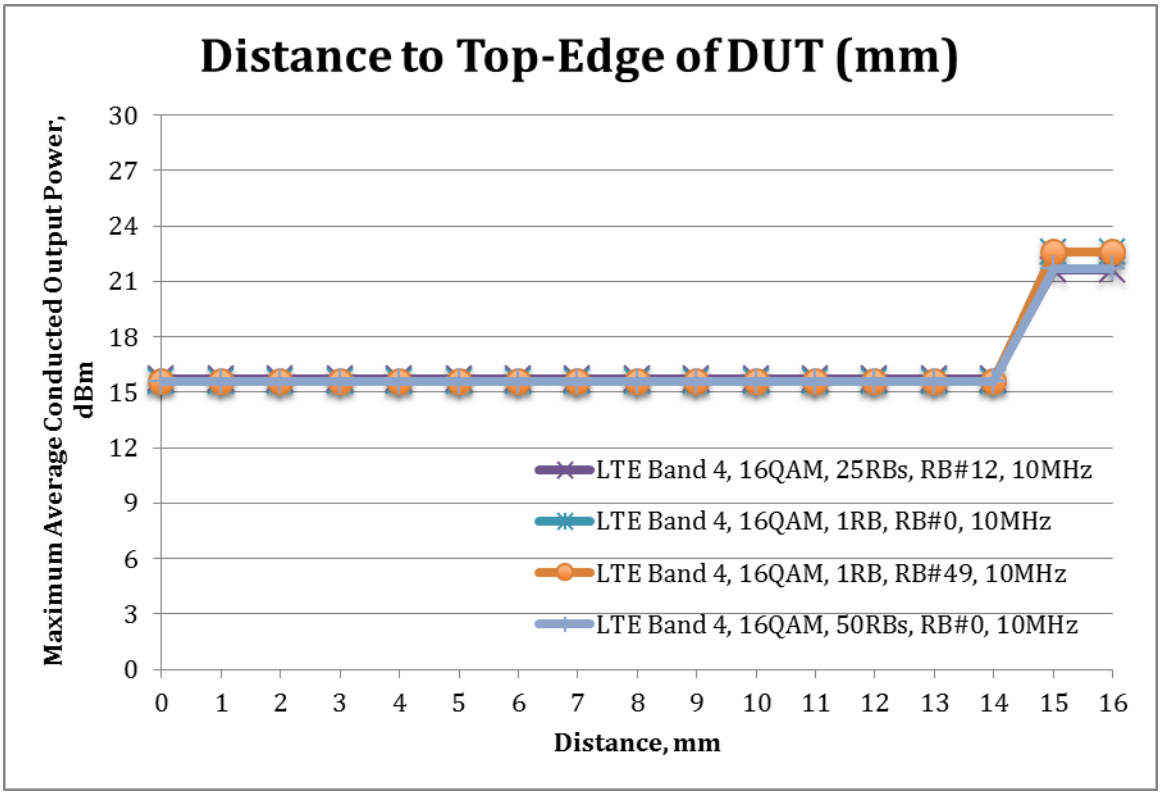


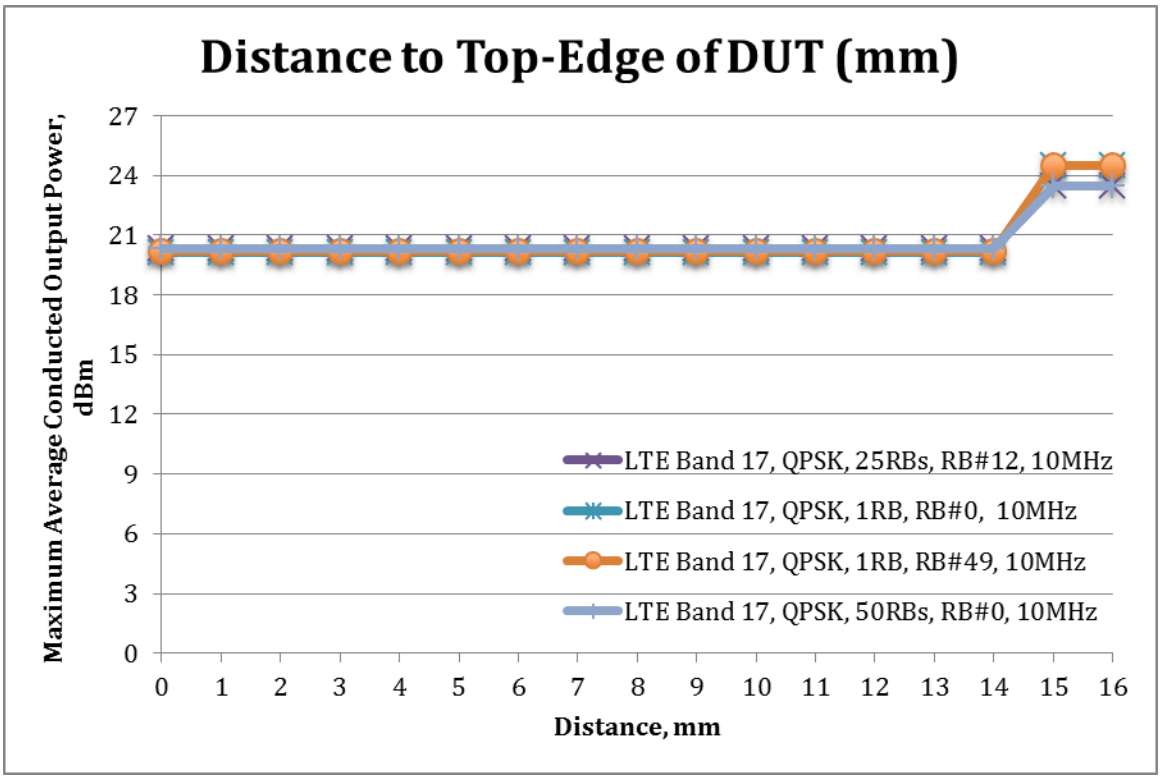


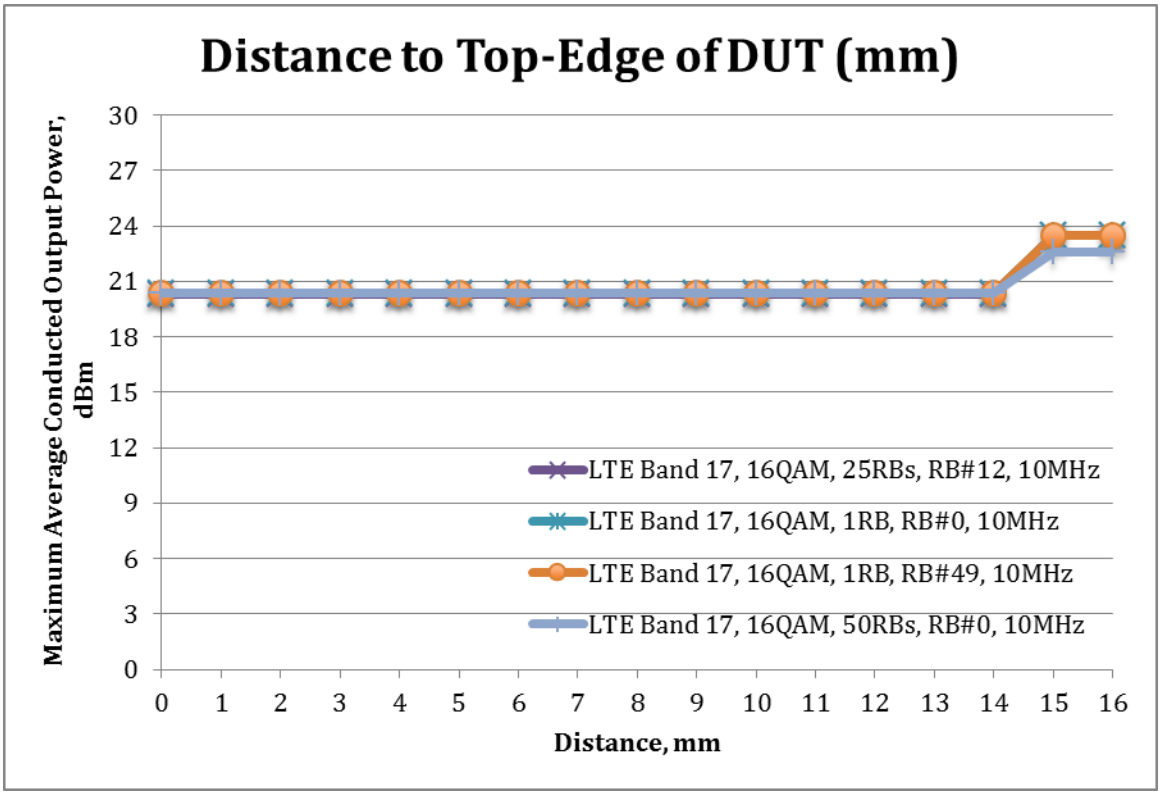












7. RF Output Power Measurement

7.1. GSM

GPRS (GMSK) - Coding Scheme: CS1

GPRS/EGPRS			GMSK				GMSK			
Band	Ch	Freq. (MHz)	w/o Pwr back-off		w/ Pwr back-off		w/o Pwr back-off		w/ Pwr back-off	
			1-Slot	Frame Avg	1-Slot	Frame Avg	2-Slot	Frame Avg	2-Slot	Frame Avg
GSM850	128	824.2	33.5	24.5	27.3	18.3	32.9	**26.9**	25.3	**19.3**
	190	836.6	33.3	24.3	27.5	18.5	33.0	**27.0**	25.5	**19.5**
	251	848.8	33.4	24.4	27.4	18.4	32.9	**26.9**	25.5	**19.5**
GSM1900	512	1850.2	30.9	21.9	23.3	14.3	29.0	**23.0**	21.1	**15.1**
	661	1880	31.0	22.0	23.3	14.3	29.1	**23.1**	21.0	**15.0**
	810	1909.8	31.0	22.0	23.1	14.1	29.0	**23.0**	21.0	**15.0**

Note: The modulation for CS1 to CS4 is GMSK, so the above table reflects the conducted power in the GMSK modulation

EGPRS (8PSK, Coding Scheme: MCS5)

GPRS/EGPRS			8PSK				8PSK			
Band	Ch	Freq. (MHz)	w/o Pwr back-off		w/ Pwr back-off		w/o Pwr back-off		w/ Pwr back-off	
			1-Slot	Frame Avg	1-Slot	Frame Avg	2-Slot	Frame Avg	2-Slot	Frame Avg
GSM850	128	824.2	28.0	19.0	27.5	18.5	29.0	23.0	25.4	19.4
	190	836.6	28.0	19.0	27.5	18.5	29.0	23.0	25.5	19.5
	251	848.8	28.0	19.0	27.5	18.5	29.0	23.0	25.5	19.5
GSM1900	512	1850.2	27.0	18.0	22.9	13.9	26.9	20.9	21.1	15.1
	661	1880	27.0	18.0	22.9	13.9	26.9	20.9	21.0	15.0
	810	1909.8	27.0	18.0	22.9	13.9	26.9	20.9	21.0	15.0

Note: The modulation for MCS5 to MCS9 is 8PSK, so the above table reflects the conducted power in the 8PSK modulation. The conducted power results for GPRS (GMSK), also apply to EGPRS (GMSK, MCS1 to MCS4) modes.

7.2. UMTS (WCDMA)

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 EUT supports power Class 3, which has a nominal maximum output power of 24 dBm (+1.7/-3.7).

	Mode	Rel99
	Subtest	-
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 V	Rel 99 (RMC, 12.2 kbps)	4357	826.4	25.0	19.4
		4408	836.6	25.0	19.5
		4458	846.6	24.9	19.4
UMTS (WCDMA) Band II	Rel 99 (RMC, 12.2 kbps)	9262	1852.4	23.0	14.9
		9400	1880.0	23.0	14.8
		9538	1907.6	23.0	15.0

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
WCDMA 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)	MPR	Tx Conducted Pwr (dBm)	
					W/o Pwr back-off	W/ Pwr back-off
UMTS (WCDMA) Band V	Subtest 1	4357	826.4	0	24.7	19.5
		4408	836.6	0	24.7	19.5
		4458	846.6	0	24.7	19.5
	Subtest 2	4357	826.4	1	24.6	19.4
		4408	836.6	1	24.8	19.4
		4458	846.6	1	24.6	19.4
	Subtest 3	4357	826.4	1.5	24.1	19.1
		4408	836.6	1.5	24.2	19.0
		4458	846.6	1.5	24.3	19.1
	Subtest 4	4357	826.4	1.5	24.1	19.1
		4408	836.6	1.5	24.2	19.1
		4458	846.6	1.5	24.3	19.1
UMTS (WCDMA) Band II	Subtest 1	9262	1852.4	0	22.8	14.9
		9400	1880.0	0	22.9	15.0
		9538	1907.6	0	22.8	15.0
	Subtest 2	9262	1852.4	1	22.7	14.9
		9400	1880.0	1	22.9	14.9
		9538	1907.6	1	22.8	15.0
	Subtest 3	9262	1852.4	1.5	22.4	14.6
		9400	1880.0	1.5	22.4	14.6
		9538	1907.6	1.5	22.4	14.6
	Subtest 4	9262	1852.4	1.5	22.4	14.5
		9400	1880.0	1.5	22.4	14.6
		9538	1907.6	1.5	22.4	14.6

Note(s):

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

HSPA (HSDPA & HSUPA)

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

	Mode	HSPA	HSPA	HSPA	HSPA	HSPA
	Subtest	1	2	3	4	5
WCDMA General Settings	Loopback Mode	Test Mode 1				
	Rel99 RMC	12.2kbps RMC				
	HSDPA FRC	H-Set1				
	HSUPA Test	HSUPA Loopback				
	Power Control Algorithm	Algorithm2				
	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)	MPR	Tx Conducted Pwr (dBm)	
					W/o Pwr back-off	W/ Pwr back-off
UMTS (WCDMA) Band V	Subtest 1	4357	826.4	0	24.7	19.2
		4408	836.6	0	24.6	19.1
		4458	846.6	0	24.4	18.9
	Subtest 2	4357	826.4	2	22.8	17.3
		4408	836.6	2	22.6	17.1
		4458	846.6	2	22.8	17.3
	Subtest 3	4357	826.4	1	23.5	18.0
		4408	836.6	1	23.5	18.0
		4458	846.6	1	23.4	17.9
	Subtest 4	4357	826.4	2	23.2	17.7
		4408	836.6	2	23.1	17.6
		4458	846.6	2	23.2	17.7
	Subtest 5	4357	826.4	0	24.5	19.0
		4408	836.6	0	24.5	19.0
		4458	846.6	0	24.6	19.1
UMTS (WCDMA) Band II	Subtest 1	9262	1852.4	0	22.8	14.8
		9400	1880.0	0	22.7	14.7
		9538	1907.6	0	22.7	14.7
	Subtest 2	9262	1852.4	2	20.8	12.8
		9400	1880.0	2	20.7	12.7
		9538	1907.6	2	20.9	12.9
	Subtest 3	9262	1852.4	1	21.8	13.8
		9400	1880.0	1	21.8	13.8
		9538	1907.6	1	21.8	13.8
	Subtest 4	9262	1852.4	2	20.9	12.9
		9400	1880.0	2	20.8	12.8
		9538	1907.6	2	20.8	12.8
	Subtest 5	9262	1852.4	0	22.8	12.8
		9400	1880.0	0	22.8	12.8
		9538	1907.6	0	22.8	12.8

Note(s):

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

DC-HSDPA (Rel 8, CAT 24)

The following tests were completed according to procedures in section 7.3.13 of 3GPP TS34.108 v9.5.0. A summary of these settings are illustrated below:

Downlink Physical Channels are set as per 3GPP TS34.121-1 v9.0.0 E.5.0

Table E.5.0: Levels for HSDPA connection setup

Parameter During Connection setup	Unit	Value
P-CPICH_Ec/Ior	dB	-10
P-CCPCH and SCH_Ec/Ior	dB	-12
PICH _Ec/Ior	dB	-15
HS-PDSCH	dB	off
HS-SCCH_1	dB	off
DPCH_Ec/Ior	dB	-5
OCNS_Ec/Ior	dB	-3.1

Call is set up as per 3GPP TS34.108 v9.5.0 sub clause 7.3.13

The configurations of the fixed reference channels for HSDPA RF tests are described in 3GPP TS 34.121, annex C for FDD and 3GPP TS 34.122.

Table C.8.1.12: Fixed Reference Channel H-Set 12

Parameter	Unit	Value
Nominal Avg. Inf. Bit Rate	kbps	60
Inter-TTI Distance	TTI's	1
Number of HARQ Processes	Processes	6
Information Bit Payload (N_{INF})	Bits	120
Number Code Blocks	Blocks	1
Binary Channel Bits Per TTI	Bits	960
Total Available SML's in UE	SML's	19200
Number of SML's per HARQ Proc.	SML's	3200
Coding Rate		0.15
Number of Physical Channel Codes	Codes	1
Modulation		QPSK
Note 1: The RMC is intended to be used for DC-HSDPA mode and both cells shall transmit with identical parameters as listed in the table.		
Note 2: Maximum number of transmission is limited to 1, i.e., retransmission is not allowed. The redundancy and constellation version 0 shall be used.		

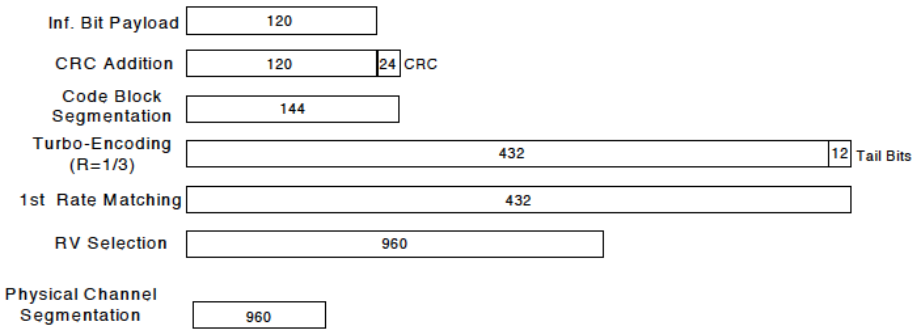


Figure C.8.19: Coding rate for Fixed reference Channel H-Set 12 (QPSK)

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

	Mode	Rel6 HSDPA	Rel6 HSDPA	Rel6 HSDPA	Rel6 HSDPA
	Subtest	1	2	3	4
WCDMA General Settings	Loopback Mode	Test Mode 1			
	Rel99 RMC	12.2kbps RMC			
	HSDPA FRC	H-Set1			
	Power Control Algorithm	Algorithm2			
	βc	2/15	12/15	15/15	15/15
	βd	15/15	15/15	8/15	4/15
	βd (SF)	64			
	βc/βd	2/15	12/15	15/8	15/4
	βhs	4/15	24/15	30/15	30/15
	MPR	0	0	0.5	0.5
HSDPA Specific Settings	DACK	8			
	DNAK	8			
	DCQI	8			
	Ack-Nack Repetition factor	3			
	CQI Feedback	4ms			
	CQI Repetition Factor	2			
	Ahs = βhs/ βc	30/15			

Up commands are set continuously to set the UE to Max power.

Results

Band	Mode	UL Ch No.	Freq. (MHz)	Tx Conducted Pwr (dBm)	
				W/o Pwr back-off	W/ Pwr back-off
UMTS (WCDMA) Band V	Subtest 1	4357	826.4	24.7	19.2
		4408	836.6	24.7	19.2
		4458	846.6	24.7	19.2
	Subtest 2	4357	826.4	24.6	19.1
		4408	836.6	24.8	19.3
		4458	846.6	24.6	19.1
	Subtest 3	4357	826.4	24.1	18.6
		4408	836.6	24.2	18.7
		4458	846.6	24.3	18.8
	Subtest 4	4357	826.4	24.1	18.6
		4408	836.6	24.2	18.7
		4458	846.6	24.3	18.8
UMTS (WCDMA) Band II	Subtest 1	9262	1852.4	22.8	14.8
		9400	1880.0	22.9	14.9
		9538	1907.6	22.8	14.8
	Subtest 2	9262	1852.4	22.7	14.7
		9400	1880.0	22.9	14.9
		9538	1907.6	22.8	14.8
	Subtest 3	9262	1852.4	22.4	14.4
		9400	1880.0	22.4	14.4
		9538	1907.6	22.4	14.4
	Subtest 4	9262	1852.4	22.4	14.4
		9400	1880.0	22.4	14.4
		9538	1907.6	22.4	14.4

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.

7.3. LTE

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 Signalling 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.					

Band	BW	Ch	Freq. (MHz)	Mode	UL RB Allocation	UL RB Start	Target MPR	Measure MPR	Tx Conducted Power (dBm)	
									W/o Pwr back-off	*W/ Pwr back-off
4	10	20000	1715.0	QPSK	25	12	1	1	22.5	15.5
					1	0	0	0	23.5	15.3
					1	49	0	0	23.5	15.3
					50	0	1	1	22.5	15.4
				16QAM	25	12	2	2	21.5	15.5
					1	0	1	1	22.5	15.3
					1	49	1	1	22.5	15.3
					50	0	2	2	21.6	15.4
		20175	1732.5	QPSK	25	12	1	1	22.6	15.7
					1	0	0	0	23.5	15.6
					1	49	0	0	23.5	15.6
					50	0	1	1	22.6	15.6
				16QAM	25	12	2	2	21.6	15.7
					1	0	1	1	22.6	15.6
					1	49	1	1	22.6	15.5
					50	0	2	2	21.7	15.6
		20350	1750.0	QPSK	25	12	1	1	22.6	15.5
					1	0	0	0	23.6	15.6
					1	49	0	0	23.5	15.6
					50	0	1	1	22.6	15.5
				16QAM	25	12	2	2	21.6	15.5
					1	0	1	1	22.6	15.6
					1	49	1	1	22.6	15.6
					50	0	2	2	21.6	15.6
	5	19975	1712.5	QPSK	12	6	1	1	22.5	15.4
					1	0	0	0	23.5	15.3
					1	24	0	0	23.5	15.3
					25	0	1	1	22.4	15.5
				16QAM	12	6	2	2	21.5	15.4
					1	0	1	1	22.5	15.5
					1	24	1	1	22.6	15.4
					25	0	2	2	21.4	15.3
		20175	1732.5	QPSK	12	6	1	1	22.4	15.6
					1	0	0	0	23.5	15.5
					1	24	0	0	23.6	15.5
					25	0	1	1	22.5	15.6
				16QAM	12	6	2	2	21.5	15.6
					1	0	1	1	22.6	15.5
					1	24	1	1	22.6	15.5
					25	0	2	2	21.5	15.6
		20375	1752.5	QPSK	12	6	1	1	22.5	15.5
					1	0	0	0	23.5	15.6
					1	24	0	0	23.5	15.5
					25	0	1	1	22.6	15.5
				16QAM	12	6	2	2	21.6	15.6
					1	0	1	1	22.5	15.5
					1	24	1	1	22.6	15.5
					25	0	2	2	21.5	15.5

Note(s):

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

Band	BW	Ch	Freq. (MHz)	Mode	UL RB Allocation	UL RB Start	Target MPR	Measure MPR	Tx Conducted Power (dBm)	
									W/o Pwr back-off	*W/ Pwr back-off
17	10	23780	709.0	QPSK	25	12	1	1	23.5	20.3
					1	0	0	0	24.5	20.1
					1	49	0	0	24.4	20.2
					50	0	1	1	23.5	20.2
				16QAM	25	12	2	2	22.5	20.3
					1	0	1	1	23.5	20.4
					1	49	1	1	23.5	20.3
					50	0	2	2	22.6	20.4
		23790	710.0	QPSK	25	12	1	1	23.5	20.3
					1	0	0	0	24.5	20.1
					1	49	0	0	24.5	20.1
					50	0	1	1	23.5	20.2
				16QAM	25	12	2	2	22.5	20.3
					1	0	1	1	23.5	20.4
					1	49	1	1	23.5	20.4
					50	0	2	2	22.5	20.3
		23800	711.0	QPSK	25	12	1	1	23.5	20.3
					1	0	0	0	24.5	20.1
					1	49	0	0	24.5	20.1
					50	0	1	1	23.5	20.3
				16QAM	25	12	2	2	22.5	20.3
					1	0	1	1	23.5	20.4
					1	49	1	1	23.4	20.3
					50	0	2	2	22.6	20.4
	5	23755	706.5	QPSK	12	6	1	1	23.5	20.1
					1	0	0	0	24.4	20.1
					1	24	0	0	24.5	20.1
					25	0	1	1	23.5	20.2
				16QAM	12	6	2	2	22.5	20.1
					1	0	1	1	23.5	20.3
					1	24	1	1	23.5	20.4
					25	0	2	2	22.5	20.2
		23790	710.0	QPSK	12	6	1	1	23.4	20.2
					1	0	0	0	24.5	20.1
					1	24	0	0	24.4	20.1
					25	0	1	1	23.5	20.2
				16QAM	12	6	2	2	22.4	20.2
					1	0	1	1	23.5	20.3
					1	24	1	1	23.5	20.3
					25	0	2	2	22.5	20.3
		23825	713.5	QPSK	12	6	1	1	23.4	20.2
					1	0	0	0	24.5	20.2
					1	24	0	0	24.5	20.2
					25	0	1	1	23.5	20.2
				16QAM	12	6	2	2	22.4	20.1
					1	0	1	1	23.5	20.4
					1	24	1	1	23.5	20.4
					25	0	2	2	22.5	20.3

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.

7.4. Wi-Fi

2.4 GHz

Mode	Channel #	Freq. (MHz)	Conducted Avg Power	
			(dBm)	(mW)
802.11b	1	2412	16.6	45.71
	6	2437	16.6	45.71
	11	2462	16.4	43.65
802.11g	1	2412	16.0	39.81
	6	2437	16.5	44.67
	11	2462	16.0	39.81
802.11n (HT20)	1	2412	15.5	35.48
	6	2437	16.5	44.67
	11	2462	15.0	31.62

5.2 GHz band (5150-5250 MHz)

Mode	Channel #	Freq. (MHz)	Conducted Avg Power	
			(dBm)	(mW)
802.11a	36	5180	13.5	22.39
	40	5200	13.5	22.39
	48	5240	13.5	22.39
802.11n (HT20)	36	5180	13.6	22.91
	40	5200	13.6	22.91
	48	5240	13.6	22.91

5.3 GHz band (5250-5350 MHz)

Mode	Channel #	Freq. (MHz)	Conducted Avg Power	
			(dBm)	(mW)
802.11a	52	5260	17.5	56.23
	60	5300	17.5	56.23
	64	5320	16.5	44.67
802.11n (HT20)	52	5260	17.4	54.95
	60	5300	17.4	54.95
	64	5320	16.4	43.65

5.5 GHz band (5500-5700 MHz)

Mode	Channel #	Freq. (MHz)	Conducted Avg Power	
			(dBm)	(mW)
802.11a	100	5500	16.5	44.67
	120	5600	16.5	44.67
	140	5700	16.5	44.67
802.11n (HT20)	100	5500	16.5	44.67
	120	5600	16.5	44.67
	140	5700	16.5	44.67

5.8 GHz band (5725-5850 MHz)

Mode	Channel #	Freq. (MHz)	Conducted Avg Power	
			(dBm)	(mW)
802.11a	149	5745	17.5	56.23
	157	5785	17.5	56.23
	165	5825	17.5	56.23
802.11n (HT20)	149	5745	17.5	56.23
	157	5785	17.5	56.23
	165	5825	17.5	56.23

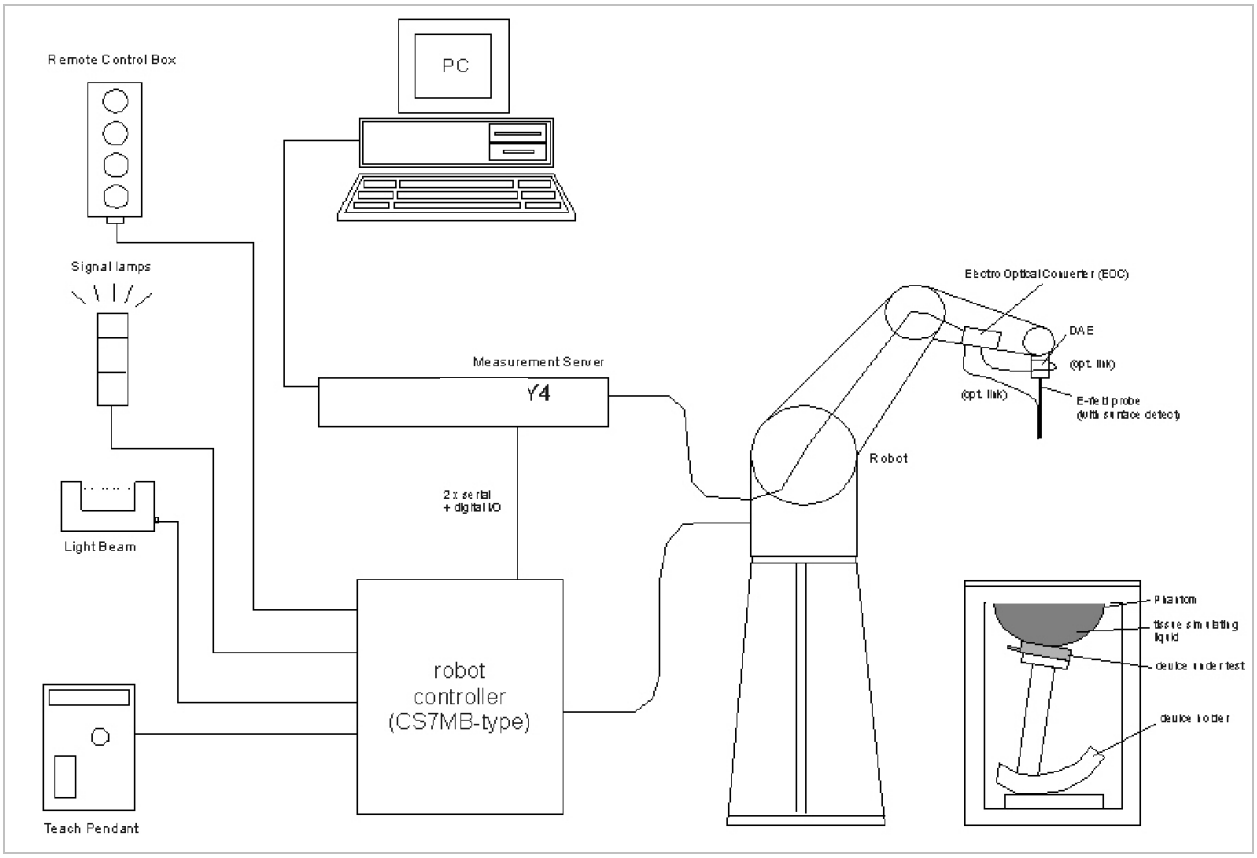
7.5. Bluetooth

Mode	Channel #	Freq. (MHz)	Conducted Avg Power	
			(dBm)	(mW)
V2.1 + EDR, GFSK	0	2402	11.9	15.49
	39	2441	11.7	14.79
	78	2480	10.8	12.02
V2.1 + EDR, π/4 DQPSK	0	2402	9.8	9.55
	39	2441	10.0	10.00
	78	2480	9.3	8.51
V2.1 + EDR, 8-DPSK	0	2402	9.9	9.77
	39	2441	10.0	10.00
	78	2480	9.3	8.51
V4.0 LE, GFSK	0	2402	8.8	7.59
	39	2441	8.9	7.76
	78	2480	8.7	7.41

Note(s):

Stand-alone SAR is not required as the output power is less than 25 mW [$60/f_{(GHz)}$].

8. System Specifications



The DASY system 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. The probe is equipped with an optical surface detector system.
- 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 2000 or 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.

9. Composition of Ingredients for Tissue Simulating Liquids

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

Simulating Liquids for 5 GHz, Manufactured by SPEAG

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

10. Liquid Parameters

The simulating liquids should be checked at the beginning of a series of SAR measurements to determine of the dielectric parameters are within the tolerances of the specified target values. For frequencies in 300 MHz to just under 2 GHz, the measured conductivity and relative permittivity should be within ± 5% of the target values. For frequencies in the range of 2–3 GHz and above the measured conductivity should be within ± 5% of the target values. The measured relative permittivity tolerance can be relaxed to no more than ± 10%.

Reference Values of Tissue Dielectric Parameters for Head & Body Phantom

The body tissue parameters that have not been specified in P1528 are derived from the tissue dielectric parameters computed from the 4-Cole-Cole equations and extrapolated according to the head parameters specified in IEEE Standard 1528.

Target Frequency (MHz)	Head		Body	
	ε_r	σ (S/m)	ε_r	σ (S/m)
150	52.3	0.76	61.9	0.8
300	45.3	0.87	58.2	0.92
450	43.5	0.87	56.7	0.94
835	41.5	0.9	55.2	0.97
900	41.5	0.97	55	1.05
915	41.5	0.98	55	1.06
1450	40.5	1.2	54	1.3
1610	40.3	1.29	53.8	1.4
1800 – 2000	40	1.4	53.3	1.52
2450	39.2	1.8	52.7	1.95
3000	38.5	2.4	52	2.73

(ε_r = relative permittivity, σ = conductivity and ρ = 1000 kg/m^3)

Reference Values of Tissue Dielectric Parameters for Body Phantom (for 3000 MHz – 5800 MHz)

In the current guidelines and draft standards for compliance testing of mobile phones (i.e., IEEE P1528, OET 65 Supplement C), the dielectric parameters suggested for head and body tissue simulating liquid are given only at 3.0 GHz and 5.8 GHz. As an intermediate solution, dielectric parameters for the frequencies between 5 to 5.8 GHz were obtained using linear interpolation (see table below).

SPEAG has developed suitable head and body tissue simulating liquids consisting of the following ingredients: de-ionized water, salt and a special composition including mineral oil and an emulgators. Dielectric parameters of these liquids were measured suing a HP 8570C Dielectric Probe Kit in conjunction with HP 8753ES Network Analyzer (30 kHz – 6G Hz).

Target Frequency (MHz)	Head		Body	
	ε_r	σ (S/m)	ε_r	σ (S/m)
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

(ε_r = relative permittivity, σ = conductivity and ρ = 1000 kg/m^3)

10.1. Liquid Check Results

Date	Freq. (MHz)	Liquid Parameters			Measured	Target	Delta (%)	Limit ±(%)
10/10/2011	Body 2450	e'	50.5230	Relative Permittivity (εr):	50.52	52.70	-4.13	5
		e"	14.5573	Conductivity (σ):	1.98	1.95	1.70	5
	Body 2410	e'	50.6534	Relative Permittivity (εr):	50.52	52.70	-4.13	5
		e"	14.4109	Conductivity (σ):	1.98	1.95	1.70	5
	Body 2435	e'	50.5759	Relative Permittivity (εr):	50.52	52.70	-4.13	5
		e"	14.5011	Conductivity (σ):	1.98	1.95	1.70	5
	Body 2465	e'	50.4696	Relative Permittivity (εr):	50.52	52.70	**-4.13**	5
		e"	14.6156	Conductivity (σ):	1.98	1.95	1.70	5
10/10/2011	Body 5180	e'	49.1209	Relative Permittivity (ϵ_r):	49.12	49.05	0.15	10
		e"	18.4112	Conductivity (σ):	5.30	5.27	0.60	5
	Body 5200	e'	49.1282	Relative Permittivity (ϵ_r):	49.13	49.02	0.22	10
		e"	18.4697	Conductivity (σ):	5.34	5.29	0.86	5
	Body 5500	e'	48.5634	Relative Permittivity (ϵ_r):	48.56	48.61	-0.10	10
		e"	18.7437	Conductivity (σ):	5.73	5.64	1.55	5
	Body 5800	e'	48.0852	Relative Permittivity (ϵ_r):	48.09	48.20	-0.24	10
		e"	19.0479	Conductivity (σ):	6.14	6.00	2.38	5
	Body 5825	e'	48.0422	Relative Permittivity (ϵ_r):	48.04	48.20	-0.33	10
		e"	19.0569	Conductivity (σ):	6.17	6.00	2.87	5
10/11/2011	Body 5180	e'	47.3328	Relative Permittivity (ϵ_r):	47.33	49.05	-3.49	10
		e"	18.4853	Conductivity (σ):	5.32	5.27	1.00	5
	Body 5200	e'	47.1193	Relative Permittivity (ϵ_r):	47.12	49.02	-3.88	10
		e"	18.4634	Conductivity (σ):	5.34	5.29	0.83	5
	Body 5500	e'	46.7376	Relative Permittivity (ϵ_r):	46.74	48.61	-3.86	10
		e"	18.8227	Conductivity (σ):	5.76	5.64	1.98	5
	Body 5800	e'	46.1847	Relative Permittivity (ϵ_r):	46.18	48.20	-4.18	10
		e"	19.1559	Conductivity (σ):	6.18	6.00	2.96	5
	Body 5825	e'	46.0593	Relative Permittivity (ϵ_r):	46.06	48.20	-4.44	10
		e"	19.1725	Conductivity (σ):	6.21	6.00	3.50	5
10/11/2011	Body 2450	e'	54.0530	Relative Permittivity (ϵ_r):	54.05	52.70	2.57	5
		e"	13.6199	Conductivity (σ):	1.86	1.95	-4.85	5
	Body 2410	e'	54.1646	Relative Permittivity (ϵ_r):	54.16	52.76	2.66	5
		e"	13.5487	Conductivity (σ):	1.82	1.91	-4.82	5
	Body 2435	e'	54.0939	Relative Permittivity (ϵ_r):	54.09	52.73	2.59	5
		e"	13.5605	Conductivity (σ):	1.84	1.93	**-4.92**	5
	Body 2465	e'	54.0080	Relative Permittivity (ϵ_r):	54.01	52.68	2.52	5
		e"	13.6836	Conductivity (σ):	1.88	1.97	-4.85	5
10/11/2011	Body 5200	e'	49.2153	Relative Permittivity (ϵ_r):	49.22	49.02	0.40	10
		e"	18.8478	Conductivity (σ):	5.45	5.29	2.93	5
	Body 5180	e'	49.2245	Relative Permittivity (ϵ_r):	49.22	49.05	0.36	10
		e"	18.8052	Conductivity (σ):	5.42	5.27	2.75	5
	Body 5250	e'	49.1116	Relative Permittivity (ϵ_r):	49.11	48.95	0.33	10
		e"	18.8602	Conductivity (σ):	5.51	5.35	2.85	5
	Body 5320	e'	49.0038	Relative Permittivity (ϵ_r):	49.00	48.86	0.30	10
		e"	18.9581	Conductivity (σ):	5.61	5.43	3.19	5

Liquid Check Results (continued)

Date	Freq. (MHz)	Liquid Parameters			Measured	Target	Delta (%)	Limit ±(%)
10/12/2011	Body 5180	e'	48.3255	Relative Permittivity (ϵ_r):	48.33	49.05	-1.47	10
		e"	18.3454	Conductivity (σ):	5.28	5.27	0.24	5
	Body 5200	e'	48.3026	Relative Permittivity (ϵ_r):	48.30	49.02	-1.46	10
		e"	18.3780	Conductivity (σ):	5.31	5.29	0.36	5
	Body 5500	e'	47.7738	Relative Permittivity (ϵ_r):	47.77	48.61	-1.73	10
		e"	18.6793	Conductivity (σ):	5.71	5.64	1.20	5
	Body 5800	e'	47.2691	Relative Permittivity (ϵ_r):	47.27	48.20	-1.93	10
		e"	18.9790	Conductivity (σ):	6.12	6.00	2.01	5
	Body 5825	e'	47.2315	Relative Permittivity (ϵ_r):	47.23	48.20	-2.01	10
		e"	19.0031	Conductivity (σ):	6.15	6.00	2.58	5
10/12/2011	Body 5180	e'	48.7356	Relative Permittivity (ϵ_r):	48.74	49.05	-0.63	10
		e"	18.2183	Conductivity (σ):	5.25	5.27	-0.46	5
	Body 5200	e'	48.7131	Relative Permittivity (ϵ_r):	48.71	49.02	-0.63	10
		e"	18.2494	Conductivity (σ):	5.28	5.29	-0.34	5
	Body 5500	e'	48.1450	Relative Permittivity (ϵ_r):	48.15	48.61	-0.96	10
		e"	18.4791	Conductivity (σ):	5.65	5.64	0.12	5
	Body 5800	e'	47.6225	Relative Permittivity (ϵ_r):	47.62	48.20	-1.20	10
		e"	18.7524	Conductivity (σ):	6.05	6.00	0.79	5
	Body 5825	e'	47.5898	Relative Permittivity (ϵ_r):	47.59	48.20	-1.27	10
		e"	18.7720	Conductivity (σ):	6.08	6.00	1.33	5
10/24/2011	Body 5180	e'	48.5943	Relative Permittivity (ϵ_r):	48.59	49.05	-0.92	10
		e"	18.8801	Conductivity (σ):	5.44	5.27	3.16	5
	Body 5200	e'	48.5741	Relative Permittivity (ϵ_r):	48.57	49.02	-0.91	10
		e"	18.9207	Conductivity (σ):	5.47	5.29	3.32	5
	Body 5500	e'	47.9902	Relative Permittivity (ϵ_r):	47.99	48.61	-1.28	10
		e"	19.2292	Conductivity (σ):	5.88	5.64	4.18	5
	Body 5700	e'	47.6270	Relative Permittivity (ϵ_r):	47.63	48.34	-1.48	10
		e"	19.4345	Conductivity (σ):	6.16	5.88	4.80	5
10/25/2011	Body 2450	e'	51.1919	Relative Permittivity (ϵ_r):	51.19	52.70	-2.86	5
		e"	14.2594	Conductivity (σ):	1.94	1.95	-0.38	5
	Body 2410	e'	51.3125	Relative Permittivity (εr):	50.52	52.70	-4.13	5
		e"	14.0991	Conductivity (σ):	1.98	1.95	1.70	5
	Body 2435	e'	51.2404	Relative Permittivity (εr):	50.52	52.70	-4.13	5
		e"	14.1995	Conductivity (σ):	1.98	1.95	1.70	5
	Body 2465	e'	51.1372	Relative Permittivity (εr):	50.52	52.70	-4.13	5
		e"	14.3225	Conductivity (σ):	1.98	1.95	1.70	5

Liquid Check Results (continued)

Date	Freq. (MHz)	Liquid Parameters			Measured	Target	Delta (%)	Limit ±(%)
12/5/2011	Body 1900	e'	50.7629	Relative Permittivity (ϵ_r):	50.76	53.30	-4.76	5
		e''	14.3814	Conductivity (σ):	1.52	1.52	-0.04	5
	Body 1850	e'	50.9544	Relative Permittivity (ϵ_r):	50.95	53.30	-4.40	5
		e''	14.1951	Conductivity (σ):	1.46	1.52	-3.93	5
	Body 1880	e'	50.8425	Relative Permittivity (ϵ_r):	50.84	53.30	-4.61	5
		e''	14.3102	Conductivity (σ):	1.50	1.52	-1.59	5
	Body 1910	e'	50.7268	Relative Permittivity (ϵ_r):	50.73	53.30	-4.83	5
		e''	14.4138	Conductivity (σ):	1.53	1.52	0.71	5
12/5/2011	Body 835	e'	56.3083	Relative Permittivity (εr):	56.31	55.20	2.01	5
		e''	21.0190	Conductivity (σ):	0.98	0.97	0.61	5
	Body 820	e'	56.4511	Relative Permittivity (εr):	56.45	55.28	2.12	5
		e''	21.0724	Conductivity (σ):	0.96	0.97	-0.79	5
	Body 830	e'	56.3553	Relative Permittivity (εr):	56.36	55.24	2.02	5
		e''	21.0349	Conductivity (σ):	0.97	0.97	0.16	5
	Body 850	e'	56.1593	Relative Permittivity (εr):	56.16	55.16	1.82	5
		e''	20.9659	Conductivity (σ):	0.99	0.99	0.38	5
12/6/2011	Body 1900	e'	50.7431	Relative Permittivity (ϵ_r):	50.74	53.30	-4.80	5
		e''	14.6944	Conductivity (σ):	1.55	1.52	2.13	5
	Body 1850	e'	50.9282	Relative Permittivity (ϵ_r):	50.93	53.30	-4.45	5
		e''	14.5129	Conductivity (σ):	1.49	1.52	-1.78	5
	Body 1880	e'	50.8109	Relative Permittivity (ϵ_r):	50.81	53.30	-4.67	5
		e''	14.6243	Conductivity (σ):	1.53	1.52	0.57	5
	Body 1910	e'	50.7073	Relative Permittivity (ϵ_r):	50.71	53.30	-4.86	5
		e''	14.7252	Conductivity (σ):	1.56	1.52	2.88	5
12/6/2011	Body 835	e'	54.0901	Relative Permittivity (ϵ_r):	54.09	55.20	-2.01	5
		e''	20.7686	Conductivity (σ):	0.96	0.97	-0.59	5
	Body 820	e'	54.2472	Relative Permittivity (ϵ_r):	54.25	55.28	-1.86	5
		e''	20.8261	Conductivity (σ):	0.95	0.97	-1.95	5
	Body 830	e'	54.1445	Relative Permittivity (ϵ_r):	54.14	55.24	-1.98	5
		e''	20.7861	Conductivity (σ):	0.96	0.97	-1.03	5
	Body 850	e'	53.9355	Relative Permittivity (ϵ_r):	53.94	55.16	-2.21	5
		e''	20.7110	Conductivity (σ):	0.98	0.99	-0.84	5
12/7/2011	Body 1900	e'	51.0377	Relative Permittivity (εr):	51.04	53.30	-4.24	5
		e''	14.5686	Conductivity (σ):	1.54	1.52	1.26	5
	Body 1850	e'	51.1822	Relative Permittivity (εr):	51.18	53.30	-3.97	5
		e''	14.3710	Conductivity (σ):	1.48	1.52	-2.74	5
	Body 1880	e'	51.0963	Relative Permittivity (εr):	51.10	53.30	-4.13	5
		e''	14.4956	Conductivity (σ):	1.52	1.52	-0.31	5
	Body 1910	e'	51.0043	Relative Permittivity (εr):	51.00	53.30	-4.31	5
		e''	14.5997	Conductivity (σ):	1.55	1.52	2.01	5
12/7/2011	Body 835	e'	53.3636	Relative Permittivity (ϵ_r):	53.36	55.20	-3.33	5
		e''	20.9600	Conductivity (σ):	0.97	0.97	0.32	5
	Body 820	e'	53.5334	Relative Permittivity (ϵ_r):	53.53	55.28	-3.15	5
		e''	21.0161	Conductivity (σ):	0.96	0.97	-1.06	5
	Body 830	e'	53.4202	Relative Permittivity (ϵ_r):	53.42	55.24	-3.29	5
		e''	20.9792	Conductivity (σ):	0.97	0.97	-0.11	5
	Body 850	e'	53.2035	Relative Permittivity (ϵ_r):	53.20	55.16	-3.54	5
		e''	20.9061	Conductivity (σ):	0.99	0.99	0.09	5

Liquid Check Results (continued)

Date	Freq. (MHz)	Liquid Parameters			Measured	Target	Delta (%)	Limit ±(%)
12/8/2011	Body 1750	e'	51.5035	Relative Permittivity (εr):	51.50	53.44	-3.63	5
		e"	15.1320	Conductivity (σ):	1.47	1.49	-0.92	5
	Body 1710	e'	51.6676	Relative Permittivity (εr):	51.67	53.54	-3.50	5
		e"	15.0401	Conductivity (σ):	1.43	1.46	-2.16	5
	Body 1715	e'	51.6463	Relative Permittivity (εr):	51.65	53.53	-3.52	5
		e"	15.0476	Conductivity (σ):	1.43	1.46	-2.03	5
	Body 1730	e'	51.5756	Relative Permittivity (εr):	51.58	53.49	-3.58	5
		e"	15.0781	Conductivity (σ):	1.45	1.47	-1.59	5
12/8/2011	Body 1900	e'	51.3059	Relative Permittivity (εr):	51.31	53.30	-3.74	5
		e"	14.5712	Conductivity (σ):	1.54	1.52	1.28	5
	Body 1850	e'	51.4827	Relative Permittivity (εr):	51.48	53.30	-3.41	5
		e"	14.3935	Conductivity (σ):	1.48	1.52	-2.59	5
	Body 1880	e'	51.3699	Relative Permittivity (εr):	51.37	53.30	-3.62	5
		e"	14.4979	Conductivity (σ):	1.52	1.52	-0.29	5
	Body 1910	e'	51.2710	Relative Permittivity (εr):	51.27	53.30	-3.81	5
		e"	14.6064	Conductivity (σ):	1.55	1.52	2.05	5
12/9/2011	Body 1750	e'	51.0539	Relative Permittivity (εr):	51.05	53.44	-4.47	5
		e"	15.4031	Conductivity (σ):	1.50	1.49	0.85	5
	Body 1710	e'	51.1955	Relative Permittivity (εr):	51.20	53.54	-4.39	5
		e"	15.3053	Conductivity (σ):	1.46	1.46	-0.43	5
	Body 1715	e'	51.1797	Relative Permittivity (εr):	51.18	53.53	-4.39	5
		e"	15.3195	Conductivity (σ):	1.46	1.46	-0.26	5
	Body 1730	e'	51.1300	Relative Permittivity (εr):	51.13	53.49	-4.42	5
		e"	15.3547	Conductivity (σ):	1.48	1.47	0.22	5
12/9/2011	Body 835	e'	53.2637	Relative Permittivity (ϵ_r):	53.26	55.20	-3.51	5
		e"	20.8023	Conductivity (σ):	0.97	0.97	-0.43	5
	Body 820	e'	53.4281	Relative Permittivity (ϵ_r):	53.43	55.28	-3.34	5
		e"	20.8646	Conductivity (σ):	0.95	0.97	-1.77	5
	Body 830	e'	53.3159	Relative Permittivity (ϵ_r):	53.32	55.24	-3.48	5
		e"	20.8198	Conductivity (σ):	0.96	0.97	-0.87	5
	Body 850	e'	53.1181	Relative Permittivity (ϵ_r):	53.12	55.16	-3.70	5
		e"	20.7538	Conductivity (σ):	0.98	0.99	-0.63	5
12/12/2011	Body 1750	e'	51.0462	Relative Permittivity (ϵ_r):	51.05	53.44	-4.48	5
		e"	15.2976	Conductivity (σ):	1.49	1.49	0.16	5
	Body 1710	e'	51.1922	Relative Permittivity (ϵ_r):	51.19	53.54	-4.39	5
		e"	15.1999	Conductivity (σ):	1.45	1.46	-1.12	5
	Body 1715	e'	51.1770	Relative Permittivity (ϵ_r):	51.18	53.53	-4.40	5
		e"	15.2139	Conductivity (σ):	1.45	1.46	-0.94	5
	Body 1730	e'	51.1252	Relative Permittivity (ϵ_r):	51.13	53.49	-4.43	5
		e"	15.2475	Conductivity (σ):	1.47	1.47	-0.48	5
12/12/2011	Body 750	e'	57.8300	Relative Permittivity (ϵ_r):	57.83	55.55	4.11	5
		e"	22.9504	Conductivity (σ):	0.96	0.96	-0.62	5
	Body 700	e'	58.3400	Relative Permittivity (ϵ_r):	58.34	55.74	4.67	5
		e"	23.4261	Conductivity (σ):	0.91	0.96	-4.95	5
	Body 710	e'	58.2435	Relative Permittivity (ϵ_r):	58.24	55.70	4.57	5
		e"	23.3210	Conductivity (σ):	0.92	0.96	-4.10	5

Liquid Check Results (continued)

Date	Freq. (MHz)	Liquid Parameters			Measured	Target	Delta (%)	Limit ±(%)
12/12/2011	Body 835	e'	54.0397	Relative Permittivity (ϵ_r):	54.04	55.20	-2.10	5
		e''	20.9028	Conductivity (σ):	0.97	0.97	0.05	5
	Body 820	e'	54.1865	Relative Permittivity (ϵ_r):	54.19	55.28	-1.97	5
		e''	20.9635	Conductivity (σ):	0.96	0.97	-1.31	5
	Body 830	e'	54.0890	Relative Permittivity (ϵ_r):	54.09	55.24	-2.08	5
		e''	20.9243	Conductivity (σ):	0.97	0.97	-0.37	5
	Body 850	e'	53.8918	Relative Permittivity (ϵ_r):	53.89	55.16	-2.29	5
		e''	20.8376	Conductivity (σ):	0.98	0.99	-0.23	5
12/13/2011	Body 1750	e'	51.1124	Relative Permittivity (εr):	51.11	53.44	-4.36	5
		e''	15.3964	Conductivity (σ):	1.50	1.49	0.81	5
	Body 1710	e'	51.2486	Relative Permittivity (εr):	51.25	53.54	-4.29	5
		e''	15.3046	Conductivity (σ):	1.46	1.46	-0.43	5
	Body 1715	e'	51.2343	Relative Permittivity (εr):	51.23	53.53	-4.29	5
		e''	15.3160	Conductivity (σ):	1.46	1.46	-0.28	5
	Body 1730	e'	51.1865	Relative Permittivity (εr):	51.19	53.49	-4.31	5
		e''	15.3483	Conductivity (σ):	1.48	1.47	0.17	5
12/13/2011	Body 750	e'	57.6634	Relative Permittivity (ϵ_r):	57.66	55.55	3.81	5
		e''	22.9509	Conductivity (σ):	0.96	0.96	-0.62	5
	Body 700	e'	58.2251	Relative Permittivity (ϵ_r):	58.23	55.74	4.46	5
		e''	23.4303	Conductivity (σ):	0.91	0.96	-4.93	5
	Body 710	e'	58.1053	Relative Permittivity (ϵ_r):	58.11	55.70	4.32	5
		e''	23.3240	Conductivity (σ):	0.92	0.96	-4.08	5
12/14/2011	Body 1750	e'	51.1158	Relative Permittivity (ϵ_r):	51.12	53.44	-4.35	5
		e''	15.3758	Conductivity (σ):	1.50	1.49	0.67	5
	Body 1710	e'	51.2655	Relative Permittivity (ϵ_r):	51.27	53.54	-4.25	5
		e''	15.3004	Conductivity (σ):	1.45	1.46	-0.46	5
	Body 1715	e'	51.2465	Relative Permittivity (ϵ_r):	51.25	53.53	-4.27	5
		e''	15.3121	Conductivity (σ):	1.46	1.46	-0.30	5
	Body 1730	e'	51.1900	Relative Permittivity (ϵ_r):	51.19	53.49	-4.30	5
		e''	15.3385	Conductivity (σ):	1.48	1.47	0.11	5
12/14/2011	Body 750	e'	57.8293	Relative Permittivity (ϵ_r):	57.83	55.55	4.11	5
		e''	23.1470	Conductivity (σ):	0.97	0.96	0.23	5
	Body 700	e'	58.3631	Relative Permittivity (ϵ_r):	58.36	55.74	4.71	5
		e''	23.6467	Conductivity (σ):	0.92	0.96	-4.05	5
	Body 710	e'	58.2502	Relative Permittivity (ϵ_r):	58.25	55.70	4.58	5
		e''	23.5348	Conductivity (σ):	0.93	0.96	-3.22	5
12/15/2011	Body 1750	e'	51.1715	Relative Permittivity (ϵ_r):	51.17	53.44	-4.25	5
		e''	15.3834	Conductivity (σ):	1.50	1.49	0.72	5
	Body 1710	e'	51.2988	Relative Permittivity (ϵ_r):	51.30	53.54	-4.19	5
		e''	15.2916	Conductivity (σ):	1.45	1.46	-0.52	5
	Body 1715	e'	51.2846	Relative Permittivity (ϵ_r):	51.28	53.53	-4.20	5
		e''	15.3024	Conductivity (σ):	1.46	1.46	-0.37	5
	Body 1730	e'	51.2388	Relative Permittivity (ϵ_r):	51.24	53.49	-4.21	5
		e''	15.3345	Conductivity (σ):	1.48	1.47	0.08	5
12/15/2011	Body 750	e'	57.7651	Relative Permittivity (ϵ_r):	57.77	55.55	3.99	5
		e''	23.0910	Conductivity (σ):	0.96	0.96	-0.01	5
	Body 700	e'	58.2853	Relative Permittivity (ϵ_r):	58.29	55.74	4.57	5
		e''	23.5785	Conductivity (σ):	0.92	0.96	-4.33	5
	Body 710	e'	58.1794	Relative Permittivity (ϵ_r):	58.18	55.70	4.45	5
		e''	23.4757	Conductivity (σ):	0.93	0.96	-3.46	5

Liquid Check Results (continued)

Date	Freq. (MHz)	Liquid Parameters			Measured	Target	Delta (%)	Limit ±(%)
12/16/2011	Body 750	e'	56.8722	Relative Permittivity (ϵ_r):	56.87	55.55	2.39	5
		e"	22.9796	Conductivity (σ):	0.96	0.96	-0.50	5
	Body 700	e'	57.4037	Relative Permittivity (ϵ_r):	57.40	55.74	2.99	5
		e"	23.4238	Conductivity (σ):	0.91	0.96	-4.95	5
	Body 710	e'	57.2910	Relative Permittivity (ϵ_r):	57.29	55.70	2.86	5
		e"	23.3267	Conductivity (σ):	0.92	0.96	-4.07	5
12/16/2011	Body 1750	e'	50.9290	Relative Permittivity (ϵ_r):	50.93	53.44	-4.70	5
		e"	15.2981	Conductivity (σ):	1.49	1.49	0.16	5
	Body 1710	e'	51.0929	Relative Permittivity (ϵ_r):	51.09	53.54	-4.58	5
		e"	15.1997	Conductivity (σ):	1.45	1.46	-1.12	5
	Body 1715	e'	51.0722	Relative Permittivity (ϵ_r):	51.07	53.53	-4.59	5
		e"	15.2123	Conductivity (σ):	1.45	1.46	-0.95	5
	Body 1730	e'	51.0082	Relative Permittivity (ϵ_r):	51.01	53.49	-4.64	5
		e"	15.2512	Conductivity (σ):	1.47	1.47	-0.46	5
12/16/2011	Body 1750	e'	50.9290	Relative Permittivity (ϵ_r):	50.93	53.44	-4.70	5
		e"	15.2981	Conductivity (σ):	1.49	1.49	0.16	5
	Body 1710	e'	51.0929	Relative Permittivity (ϵ_r):	51.09	53.54	-4.58	5
		e"	15.1997	Conductivity (σ):	1.45	1.46	-1.12	5
	Body 1715	e'	51.0722	Relative Permittivity (ϵ_r):	51.07	53.53	-4.59	5
		e"	15.2123	Conductivity (σ):	1.45	1.46	-0.95	5
	Body 1730	e'	51.0082	Relative Permittivity (ϵ_r):	51.01	53.49	-4.64	5
		e"	15.2512	Conductivity (σ):	1.47	1.47	-0.46	5
12/19/2011	Body 750	e'	57.1145	Relative Permittivity (ϵ_r):	57.11	55.55	2.82	5
		e"	23.0002	Conductivity (σ):	0.96	0.96	-0.41	5
	Body 700	e'	57.6226	Relative Permittivity (ϵ_r):	57.62	55.74	3.38	5
		e"	23.4687	Conductivity (σ):	0.91	0.96	-4.77	5
	Body 710	e'	57.5178	Relative Permittivity (ϵ_r):	57.52	55.70	3.26	5
		e"	23.3681	Conductivity (σ):	0.92	0.96	-3.90	5
12/19/2011	Body 1750	e'	50.8969	Relative Permittivity (ϵ_r):	50.90	53.44	-4.76	5
		e"	15.4656	Conductivity (σ):	1.50	1.49	1.26	5
	Body 1710	e'	51.0751	Relative Permittivity (ϵ_r):	51.08	53.54	-4.61	5
		e"	15.3524	Conductivity (σ):	1.46	1.46	-0.12	5
	Body 1715	e'	51.0506	Relative Permittivity (ϵ_r):	51.05	53.53	-4.63	5
		e"	15.3691	Conductivity (σ):	1.47	1.46	0.07	5
	Body 1730	e'	50.9801	Relative Permittivity (ϵ_r):	50.98	53.49	-4.70	5
		e"	15.4099	Conductivity (σ):	1.48	1.47	0.58	5
12/20/2011	Body 1750	e'	53.2329	Relative Permittivity (εr):	53.23	53.44	-0.39	5
		e"	14.7906	Conductivity (σ):	1.44	1.49	-3.16	5
	Body 1710	e'	53.3799	Relative Permittivity (εr):	53.38	53.54	-0.31	5
		e"	14.6945	Conductivity (σ):	1.40	1.46	-4.40	5
	Body 1715	e'	53.3626	Relative Permittivity (εr):	53.36	53.53	-0.31	5
		e"	14.7085	Conductivity (σ):	1.40	1.46	-4.23	5
	Body 1730	e'	53.3086	Relative Permittivity (εr):	53.31	53.49	-0.34	5
		e"	14.7455	Conductivity (σ):	1.42	1.47	-3.76	5
12/20/2011	Body 1750	e'	53.7111	Relative Permittivity (ϵ_r):	53.71	53.44	0.51	5
		e"	15.3409	Conductivity (σ):	1.49	1.49	0.44	5
	Body 1710	e'	53.8846	Relative Permittivity (ϵ_r):	53.88	53.54	0.64	5
		e"	15.2270	Conductivity (σ):	1.45	1.46	-0.94	5
	Body 1715	e'	53.8618	Relative Permittivity (ϵ_r):	53.86	53.53	0.62	5
		e"	15.2435	Conductivity (σ):	1.45	1.46	-0.75	5
	Body 1730	e'	53.7930	Relative Permittivity (ϵ_r):	53.79	53.49	0.56	5
		e"	15.2883	Conductivity (σ):	1.47	1.47	-0.22	5

Liquid Check Results (continued)

Date	Freq. (MHz)	Liquid Parameters			Measured	Target	Delta (%)	Limit ±(%)
12/21/2011	Body 750	e'	57.8469	Relative Permittivity (ϵ_r):	57.85	55.55	4.14	5
		e"	23.0932	Conductivity (σ):	0.96	0.96	0.00	5
	Body 700	e'	58.3873	Relative Permittivity (ϵ_r):	58.39	55.74	4.75	5
		e"	23.5593	Conductivity (σ):	0.92	0.96	-4.40	5
	Body 710	e'	58.2721	Relative Permittivity (ϵ_r):	58.27	55.70	4.62	5
		e"	23.4556	Conductivity (σ):	0.93	0.96	-3.54	5
12/21/2011	Body 835	e'	52.7725	Relative Permittivity (ϵ_r):	52.77	55.20	-4.40	5
		e"	20.7725	Conductivity (σ):	0.96	0.97	-0.57	5
	Body 820	e'	52.9056	Relative Permittivity (ϵ_r):	52.91	55.28	-4.29	5
		e"	20.8335	Conductivity (σ):	0.95	0.97	-1.92	5
	Body 830	e'	52.8040	Relative Permittivity (ϵ_r):	52.80	55.24	-4.41	5
		e"	20.7938	Conductivity (σ):	0.96	0.97	-0.99	5
	Body 850	e'	52.6018	Relative Permittivity (ϵ_r):	52.60	55.16	-4.63	5
		e"	20.7155	Conductivity (σ):	0.98	0.99	-0.82	5
1/10/2012	Body 750	e'	57.6705	Relative Permittivity (ϵ_r):	57.67	55.55	3.82	5
		e"	23.0846	Conductivity (σ):	0.96	0.96	-0.04	5
	Body 700	e'	58.2978	Relative Permittivity (ϵ_r):	58.30	55.74	4.59	5
		e"	23.4939	Conductivity (σ):	0.91	0.96	-4.67	5
	Body 710	e'	58.1358	Relative Permittivity (ϵ_r):	58.14	55.70	4.37	5
		e"	23.3978	Conductivity (σ):	0.92	0.96	-3.78	5
1/10/2012	Body 835	e'	54.1559	Relative Permittivity (ϵ_r):	54.16	55.20	-1.89	5
		e"	21.2648	Conductivity (σ):	0.99	0.97	1.78	5
	Body 820	e'	54.4209	Relative Permittivity (ϵ_r):	54.42	55.28	-1.55	5
		e"	21.3225	Conductivity (σ):	0.97	0.97	0.38	5
	Body 830	e'	54.2519	Relative Permittivity (ϵ_r):	54.25	55.24	-1.79	5
		e"	21.2874	Conductivity (σ):	0.98	0.97	1.36	5
	Body 850	e'	53.8876	Relative Permittivity (ϵ_r):	53.89	55.16	-2.30	5
		e"	21.2065	Conductivity (σ):	1.00	0.99	1.53	5
1/10/2012	Body 1750	e'	51.0058	Relative Permittivity (ϵ_r):	51.01	53.44	-4.56	5
		e"	14.7396	Conductivity (σ):	1.43	1.49	-3.49	5
	Body 1710	e'	50.9807	Relative Permittivity (ϵ_r):	50.98	53.54	-4.79	5
		e"	14.7154	Conductivity (σ):	1.40	1.46	-4.27	5
	Body 1715	e'	50.9896	Relative Permittivity (ϵ_r):	50.99	53.53	-4.75	5
		e"	14.7262	Conductivity (σ):	1.40	1.46	-4.12	5
	Body 1730	e'	51.0225	Relative Permittivity (ϵ_r):	51.02	53.49	-4.62	5
		e"	14.7378	Conductivity (σ):	1.42	1.47	-3.81	5

11. 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, 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

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.

12. System Verification

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%.

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 fine cube was chosen for 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.

Reference SAR Values for HEAD & BODY-tissue from calibration certificate of SPEAG.

System validation dipole	Serial No.	Cal. date	Cal. Freq. (GHz)	SAR Avg (mW/g)		
				Tissue:	Head	Body
D750V3	1019	12/16/10	0.75	1g SAR:	8.16	8.64
				10g SAR:	5.32	5.72
D750V3	1024	4/20/11	0.75	1g SAR:	8.52	8.80
				10g SAR:	5.56	5.84
D835V2	4d117	4/15/11	0.835	1g SAR:	9.64	10.1
				10g SAR:	6.28	6.60
D1750V2	1050	4/19/11	1.75	1g SAR:	36.8	36.4
				10g SAR:	19.6	19.4
D1900V2	5d140	4/18/11	1.9	1g SAR:	41.6	41.2
				10g SAR:	21.5	21.6
D2450V2	706	4/19/11	2.45	1g SAR:	51.6	52.4
				10g SAR:	24.4	24.5
D5GHzV2	1003	8/23/11	5200	1g SAR:	76.5	74.5
				10g SAR:	21.8	20.8
			5500	1g SAR:	80.9	80.0
				10g SAR:	23.1	22.3
			5800	1g SAR:	76.3	76.3
				10g SAR:	21.7	21.2

12.1. System Check Results

Date Tested	System validation dipole		Measured (Normalized to 1 W)		Target	Delta (%)	Tolerance (%)
10/10/11	Body	2450	1g SAR:	52.4	52.4	0.00	±10
			10g SAR:	24.4	24.5	-0.41	
10/10/11	Body	5200	1g SAR:	74.1	74.5	-0.54	±10
			10g SAR:	21.3	20.8	2.40	
10/11/11	Body	2450	1g SAR:	52.5	52.4	0.19	±10
			10g SAR:	24.8	24.5	1.22	
10/11/11	Body	5800	1g SAR:	70.6	76.3	-7.47	±10
			10g SAR:	19.9	21.2	-6.13	
10/11/11	Body	5200	1g SAR:	76.1	74.5	2.15	±10
			10g SAR:	22.0	20.8	5.77	
10/12/11	Body	5500	1g SAR:	85.8	80	7.25	±10
			10g SAR:	24.2	22.3	8.52	
10/12/11	Body	5800	1g SAR:	73.1	76.3	-4.19	±10
			10g SAR:	20.7	21.2	-2.36	
10/12/11	Body	5200	1g SAR:	75.4	74.5	1.21	±10
			10g SAR:	21.4	20.8	2.88	
10/12/11	Body	5500	1g SAR:	83.8	80	4.75	±10
			10g SAR:	24.1	22.3	8.07	
10/24/11	Body	5200	1g SAR:	73.4	74.5	-1.48	±10
			10g SAR:	20.7	20.8	-0.48	
10/24/11	Body	5500	1g SAR:	78.2	80	-2.25	±10
			10g SAR:	22.0	22.3	-1.35	
10/25/11	Body	2450	1g SAR:	49.9	52.4	-4.77	±10
			10g SAR:	23.4	24.5	-4.49	
12/05/11	Body	835	SAR_{1g}:	10.0	10.1	-0.99	±10
			SAR_{10g}:	6.6	6.6	-0.45	
12/05/11	Body	1900	SAR_{1g}:	43.6	41.2	5.83	±10
			SAR_{10g}:	22.7	21.6	5.09	
12/06/11	Body	835	SAR_{1g}:	9.8	10.1	-2.97	±10
			SAR_{10g}:	6.4	6.6	-2.58	
12/06/11	Body	1900	SAR_{1g}:	41.0	41.2	-0.49	±10
			SAR_{10g}:	21.1	21.6	-2.31	
12/07/11	Body	1900	SAR_{1g}:	43.0	41.2	4.37	±10
			SAR_{10g}:	22.0	21.6	1.85	
12/07/11	Body	835	SAR_{1g}:	9.86	10.1	-2.38	±10
			SAR_{10g}:	6.48	6.6	-1.82	
12/08/11	Body	1900	SAR_{1g}:	43.4	41.2	5.34	±10
			SAR_{10g}:	22.4	21.6	3.70	
12/08/11	Body	1750	SAR_{1g}:	38.8	36.4	6.59	±10
			SAR_{10g}:	20.7	19.4	6.70	
12/09/11	Body	1750	SAR_{1g}:	38.0	36.4	4.40	±10
			SAR_{10g}:	20.1	19.4	3.61	
12/09/11	Body	835	SAR_{1g}:	9.95	10.1	-1.49	±10
			SAR_{10g}:	6.51	6.6	-1.36	
12/12/11	Body	1750	SAR_{1g}:	39.0	36.4	7.14	±10
			SAR_{10g}:	20.5	19.4	5.67	
12/12/11	Body	750	SAR_{1g}:	8.44	8.64	-2.31	±10
			SAR_{10g}:	5.6	5.72	-2.10	

System Check Results (continued)

Date Tested	System validation dipole		Measured (Normalized to 1 W)		Target	Delta (%)	Tolerance (%)
12/12/11	Body	835	SAR_{1g}:	10.0	10.1	-0.99	±10
			SAR_{10g}:	6.58	6.6	-0.30	
12/13/11	Body	1750	SAR_{1g}:	37.2	36.4	2.20	±10
			SAR_{10g}:	19.6	19.4	1.03	
12/13/11	Body	750	SAR_{1g}:	8.99	8.64	4.05	±10
			SAR_{10g}:	5.97	5.72	4.37	
12/14/11	Body	1750	SAR_{1g}:	38.0	36.4	4.40	±10
			SAR_{10g}:	20.1	19.4	3.61	
12/14/11	Body	750	SAR_{1g}:	8.9	8.64	3.01	±10
			SAR_{10g}:	5.9	5.72	3.15	
12/15/11	Body	1750	SAR_{1g}:	36.6	36.4	0.55	±10
			SAR_{10g}:	19.3	19.4	-0.52	
12/15/11	Body	750	SAR_{1g}:	8.77	8.64	1.50	±10
			SAR_{10g}:	5.84	5.72	2.10	
12/16/11	Body	1750	SAR_{1g}:	37.7	36.4	3.57	±10
			SAR_{10g}:	19.9	19.4	2.58	
12/16/11	Body	750	SAR_{1g}:	8.6	8.64	-0.46	±10
			SAR_{10g}:	5.7	5.72	-0.35	
12/19/11	Body	750	SAR_{1g}:	8.69	8.64	0.58	±10
			SAR_{10g}:	5.76	5.72	0.70	
12/19/11	Body	1750	SAR_{1g}:	39.1	36.4	7.42	±10
			SAR_{10g}:	20.6	19.4	6.19	
12/20/11	Body	1750	SAR_{1g}:	36.8	36.4	1.10	±10
			SAR_{10g}:	19.3	19.4	-0.52	
12/21/11	Body	750	SAR_{1g}:	8.93	8.64	3.36	±10
			SAR_{10g}:	5.94	5.72	3.85	
12/21/11	Body	835	SAR_{1g}:	10.2	10.1	0.99	±10
			SAR_{10g}:	6.69	6.6	1.36	
01/10/12	Body	750	SAR_{1g}:	9.0	8.64	4.40	±10
			SAR_{10g}:	6.0	5.72	4.55	
01/10/12	Body	835	SAR_{1g}:	10.0	10.1	-0.99	±10
			SAR_{10g}:	6.6	6.6	-0.30	
01/10/12	Body	1750	SAR_{1g}:	37.9	36.4	4.12	±10
			SAR_{10g}:	20.2	19.4	4.12	

13. SAR Test Results

13.1. GSM850

Test position	dist. (mm)	Pwr back-off	Mode	Ch No.	Freq. (MHz)	Avg Pwr (dBm)	SAR (mW/g) 1-g	Note
Rear	11	No	GPRS 2 Slot	128	824.2	26.9	0.980	
				190	836.6	27.0	0.930	
				251	848.8	26.9	**1.000**	
			GPRS 1 Slot	128	824.2	24.5		1
				190	836.6	24.3	0.438	
				251	848.8	24.4		1
			EGPRS 2 Slot	128	824.2	23.0		1
				190	836.6	23.0	0.335	
				251	848.8	23.0		1
			EGPRS 1 Slot	128	824.2	19.0		1
				190	836.6	19.0	0.176	
				251	848.8	19.0		1

Test position	dist. (mm)	Pwr back-off	Mode	Ch No.	Freq. (MHz)	Avg Pwr (dBm)	SAR (mW/g) 1-g	Note
Top	0	Yes	GPRS 2 Slot	128	824.2	19.3		1
				190	836.6	19.5	0.397	
				251	848.8	19.5		1
Right	0	No	GPRS 2 Slot	128	824.2	26.9		1
				190	836.6	27.0	0.347	
				251	848.8	26.9		1
Rear	0	Yes	GPRS 2 Slot	128	824.2	19.3	0.717	
				190	836.6	19.5	0.757	
				251	848.8	19.5	0.858	
Top	14	No	GPRS 2 Slot	128	824.2	26.9		1
				190	836.6	27.0	0.428	
				251	848.8	26.9		1
Top edge/ Right corner at 15°	0	No	GPRS 2 Slot	128	824.2	26.9	0.789	
				190	836.6	27.0	0.757	
				251	848.8	26.9	0.777	

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. GSM1900

Test position	dist. (mm)	Pwr back-off	Mode	Ch No.	Freq. (MHz)	Avg Pwr (dBm)	SAR (mW/g) 1-g	Note
Rear	0	Yes	GPRS 2 Slot	512	1850.2	15.1	1.110	
				661	1880.0	15.0	**1.180**	
				810	1909.8	15.0	1.160	
	0	Yes	GPRS 1 Slot	512	1850.2	14.3	0.856	
				661	1880.0	14.3	0.937	
				810	1909.8	14.1	0.845	
	0	Yes	EGPRS 2 Slot	512	1850.2	15.1	0.975	
				661	1880.0	15.1	1.050	
				810	1909.8	15.0	1.000	
	0	Yes	EGPRS 1 Slot	512	1850.2	13.9	0.756	
				661	1880.0	13.9	0.777	
				810	1909.8	13.9	0.741	

Test position	dist. (mm)	Pwr back-off	Mode	Ch No.	Freq. (MHz)	Avg Pwr (dBm)	SAR (mW/g) 1-g	Note
Top	0	Yes	GPRS 2 Slot	512	1850.2	15.1		1
				661	1880.0	15.0	0.647	
				810	1909.8	15.0		1
Right	0	No	GPRS 2 Slot	512	1850.2	23.0		1
				661	1880.0	23.1	0.532	
				810	1909.8	23.0		1
Rear	11	No	GPRS 2 Slot	512	1850.2	23.0	0.953	
				661	1880.0	23.1	0.963	
				810	1909.8	23.0	0.885	
Top	14	No	GPRS 2 Slot	512	1850.2	23.0	1.010	
				661	1880.0	23.1	0.982	
				810	1909.8	23.0	0.957	
Top edge/ Right corner at 15°	0	No	GPRS 2 Slot	512	1850.2	23.0	1.000	
				661	1880.0	23.1	1.150	
				810	1909.8	23.0	1.160	

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. UMTS (WCDMA) 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

Test position	dist. (mm)	Pwr back-off	Mode	Ch No.	Freq. (MHz)	Avg Pwr (dBm)	SAR (mW/g) 1-g	Note
Rear	0	Yes	Rel 99	4357	826.4	19.4	0.973	
				4408	836.6	19.5	0.982	
				4458	846.6	19.4	**0.986**	
Top	0	Yes	Rel 99	4357	826.4	19.4		1
				4408	836.6	19.5	0.604	
				4458	846.6	19.4		1
Right	0	No	Rel 99	4357	826.4	25.0		1
				4408	836.6	25.0	0.311	
				4458	846.6	24.9		1
Rear	11	No	Rel 99	4357	826.4	25.0	0.836	
				4408	836.6	25.0	0.845	
				4458	846.6	24.9	0.836	
Top	14	No	Rel 99	4357	826.4	25.0		1
				4408	836.6	25.0	0.390	
				4458	846.6	24.9		1
Top edge/ Right corner at 15°	0	No	Rel 99	4357	826.4	25.0		1
				4408	836.6	25.0	0.671	
				4458	846.6	24.9		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.

13.4. UMTS (WCDMA) 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

Test position	dist. (mm)	Pwr back-off	Mode	Ch No.	Freq. (MHz)	Avg Pwr (dBm)	SAR (mW/g) 1-g	Note
Rear	0	Yes	Rel 99	9262	1852.4	14.9	0.939	
				9400	1880.0	14.8	0.952	
				9538	1907.6	15.0	0.963	
Top	0	Yes	Rel 99	9262	1852.4	14.9		1
				9400	1880.0	14.8	0.522	
				9538	1907.6	15.0		1
Right	0	No	Rel 99	9262	1852.4	23.0		1
				9400	1880.0	23.0	0.560	
				9538	1907.6	23.0		1
Rear	11	No	Rel 99	9262	1852.4	23.0	1.090	
				9400	1880.0	23.0	1.130	
				9538	1907.6	23.0	**1.150**	
Top	14	No	Rel 99	9262	1852.4	23.0	0.969	
				9400	1880.0	23.0	1.010	
				9538	1907.6	23.0	1.000	
Top edge/ Right corner at 15°	0	No	Rel 99	9262	1852.4	23.0	0.950	
				9400	1880.0	23.0	1.050	
				9538	1907.6	23.0	0.958	

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.

13.5. LTE Band 4

Test mode reduction considerations

SAR evaluation for 5MHz channel bandwidth is not performed, because the maximum average conducted output power of a 5 MHz channel bandwidth is within 0.5 dB of the average conducted output power measured for the 10 MHz channel bandwidth.

10MHz Channel Bandwidth

Test position	dist. (mm)	Pwr back-off	Mode	Ch #	Freq. (MHz)	RB SIze	RB Offset	MPR	Avg Pwr (dBm)	SAR (mW/g) 1-g	Note
Rear	0	Yes	QPSK	20000	1715.0	25	12	1	15.5	0.876	
						1	0	0	15.3	0.799	
						1	49	0	15.3	0.889	
						50	0	1	15.40		1
			16QAM			25	12	2	15.50	0.890	
						1	0	1	15.30	0.784	
						1	49	1	15.30	0.877	
						50	0	2	15.40		1
			QPSK	20175	1732.5	25	12	1	15.70	**1.180**	
						1	0	0	15.60	1.070	
						1	49	0	15.60	0.975	
						50	0	1	15.60		1
			16QAM			25	12	2	15.70	1.160	
						1	0	1	15.60	1.040	
						1	49	1	15.50	0.943	
						50	0	2	15.60		1
			QPSK	20350	1750.0	25	12	1	15.5	0.968	
						1	0	0	15.6	0.931	
						1	49	0	15.6	0.998	
						50	0	1	15.50		1
			16QAM			25	12	2	15.50	1.010	
						1	0	1	15.60	0.909	
						1	49	1	15.60	1.020	
						50	0	2	15.60		1
Top	0	Yes	QPSK	20000	1715.0	25	12	1	15.50	0.707	
						1	0	0	15.30	0.661	
						1	49	0	15.30	0.701	
						50	0	1	15.40		1
			16QAM			25	12	2	15.50	0.724	
						1	0	1	15.30	0.650	
						1	49	1	15.30	0.689	
						50	0	2	15.40		1
			QPSK	20175	1732.5	25	12	1	15.70	1.060	
						1	0	0	15.60	0.914	
						1	49	0	15.60	0.854	
						50	0	1	15.60		1
			16QAM			25	12	2	15.70	1.010	
						1	0	1	15.60	0.887	
						1	49	1	15.50	0.829	
						50	0	2	15.60		1
			QPSK	20350	1750.0	25	12	1	15.50	0.794	
						1	0	0	15.60	0.757	
						1	49	0	15.60	0.746	
						50	0	1	15.50		1
			16QAM			25	12	2	15.50	0.787	
						1	0	1	15.60	0.738	
						1	49	1	15.60	0.741	
						50	0	2	15.60		1

Note(s):

1. 100% RB Allocation in QPSK and 16QAM is not needed due to the SAR result is < 1.45 mW/g from 50% RB Allocation. The data has not been considered for FCC Equipment Certification.

10MHz Channel Bandwidth (continued)

Test position	dist. (mm)	Pwr back-off	Mode	Ch #	Freq. (MHz)	RB SIze	RB Offset	MPR	Avg Pwr (dBm)	SAR (mW/g) 1-g	Note
Right	0	No	QPSK	20000	1715.0	25	12	1	22.46		2
						1	0	0	23.52		2
						1	49	0	23.45		2
						50	0	1	22.48		2
			16QAM			25	12	2	21.50		2
						1	0	1	22.53		2
						1	49	1	22.50		2
						50	0	2	21.60		1
			QPSK	20175	1732.5	25	12	1	22.55	0.370	
						1	0	0	23.50	0.492	
						1	49	0	23.50	0.494	
						50	0	1	22.60		1
			16QAM			25	12	2	21.58	0.307	
						1	0	1	22.56	0.383	
						1	49	1	22.60	0.377	
						50	0	2	21.70		1
			QPSK	20350	1750.0	25	12	1	22.58		2
						1	0	0	23.60		2
						1	49	0	23.53		2
						50	0	1	22.58		1
			16QAM			25	12	2	21.60		2
						1	0	1	22.60		2
						1	49	1	22.60		2
						50	0	2	21.60		1
Rear	11	No	QPSK	20000	1715.0	25	12	1	22.46	0.712	
						1	0	0	23.52	0.911	
						1	49	0	23.45	0.898	
						50	0	1	22.48		1
			16QAM			25	12	2	21.50	0.574	
						1	0	1	22.53	0.696	
						1	49	1	22.50	0.695	
						50	0	2	21.60		1
			QPSK	20175	1732.5	25	12	1	22.55	0.720	
						1	0	0	23.50	0.928	
						1	49	0	23.50	0.930	
						50	0	1	22.60		1
			16QAM			25	12	2	21.58	0.580	
						1	0	1	22.56	0.720	
						1	49	1	22.60	0.715	
						50	0	2	21.70		1
			QPSK	20350	1750.0	25	12	1	22.58	0.762	
						1	0	0	23.60	0.973	
						1	49	0	23.53	0.965	
						50	0	1	22.58		1
			16QAM			25	12	2	21.60	0.613	
						1	0	1	22.60	0.852	
						1	49	1	22.60	0.747	
						50	0	2	21.60		1

Note(s):

1. 100% RB Allocation in QPSK and 16QAM is not needed due to the SAR result is < 1.45 mW/g from 50% RB Allocation. The data has not been considered for FCC Equipment Certification.
2. Mid. Channel SAR value not over 0.8, therefore low and high channel SAR is not necessary.

10MHz Channel Bandwidth (continued)

Test position	dist. (mm)	Pwr back-off	Mode	Ch #	Freq. (MHz)	RB SIze	RB Offset	MPR	Avg Pwr (dBm)	SAR (mW/g) 1-g	Note
Top	14	No	QPSK	20000	1715.0	25	12	1	22.46	0.654	
						1	0	0	23.52	0.858	
						1	49	0	23.45	0.853	
						50	0	1	22.48		1
			16QAM			25	12	2	21.50	0.542	
						1	0	1	22.53	0.660	
						1	49	1	22.50	0.655	
						50	0	2	21.60		1
			QPSK	20175	1732.5	25	12	1	22.55	0.679	
						1	0	0	23.50	0.878	
						1	49	0	23.50	0.874	
						50	0	1	22.60		1
			16QAM			25	12	2	21.58	0.551	
						1	0	1	22.56	0.688	
						1	49	1	22.60	0.676	
						50	0	2	21.70		1
			QPSK	20350	1750.0	25	12	1	22.58	0.754	
						1	0	0	23.60	0.959	
						1	49	0	23.53	0.954	
						50	0	1	22.58		1
			16QAM			25	12	2	21.60	0.610	
						1	0	1	22.60	0.742	
						1	49	1	22.60	0.739	
						50	0	2	21.60		1
Top edge/ Right corner at 15°	0	No	QPSK	20000	1715.0	25	12	1	22.46	0.597	
						1	0	0	23.52	0.763	
						1	49	0	23.45	0.747	
						50	0	1	22.48		1
			16QAM			25	12	2	21.50	0.536	
						1	0	1	22.53	0.651	
						1	49	1	22.50	0.638	
						50	0	2	21.60		1
			QPSK	20175	1732.5	25	12	1	22.55	0.658	
						1	0	0	23.50	0.852	
						1	49	0	23.50	0.836	
						50	0	1	22.60		1
			16QAM			25	12	2	21.58	0.534	
						1	0	1	22.56	0.665	
						1	49	1	22.60	0.650	
						50	0	2	21.70		1
			QPSK	20350	1750.0	25	12	1	22.58	0.723	
						1	0	0	23.60	0.906	
						1	49	0	23.53	1.050	
						50	0	1	22.58		1
			16QAM			25	12	2	21.60	0.583	
						1	0	1	22.60	0.703	
						1	49	1	22.60	0.692	
						50	0	2	21.60		1

Note(s):

1. 100% RB Allocation in QPSK and 16QAM is not needed due to the SAR result is < 1.45 mW/g from 50% RB Allocation. The data has not been considered for FCC Equipment Certification.

10MHz Channel Bandwidth (continued)

Test position	dist. (mm)	Pwr back-off	Mode	Ch #	Freq. (MHz)	RB SIze	RB Offset	MPR	Avg Pwr (dBm)	SAR (mW/g) 1-g	Note
Top edge/ Rear corner at 41°	0	Yes	QPSK	20175	1732.5	25	12	1	15.5	1.180	
						1	0	0	15.3	1.120	
						1	49	0	15.3	0.998	
						50	0	1	15.40		1
			16QAM			25	12	2	15.50	1.170	
						1	0	1	15.30	1.100	
						1	49	1	15.30	0.987	
						50	0	2	15.40		1

Note(s):

1. 100% RB Allocation in QPSK and 16QAM is not needed due to the SAR result is < 1.45 mW/g from 50% RB Allocation. The data has not been considered for FCC Equipment Certification.

13.6. LTE Band 17

Test mode reduction considerations

SAR evaluation for 5MHz channel bandwidth is not performed, because the maximum average conducted output power of a 5 MHz channel bandwidth is within 0.5 dB of the average conducted output power measured for the 10 MHz channel bandwidth.

10MHz Channel Bandwidth

Test position	dist. (mm)	Pwr back-off	Mode	Ch #	Freq. (MHz)	RB SIze	RB Offset	MPR	Avg Pwr (dBm)	SAR (mW/g) 1-g	Note
Rear	0	Yes	QPSK	23780	709.0	25	12	1	20.3	1.160	
						1	0	0	20.1	1.050	
						1	49	0	20.2	1.120	
						50	0	1	20.2		1
			16QAM			25	12	2	20.3	1.130	
						1	0	1	20.4	1.030	
						1	49	1	20.3	1.120	
						50	0	2	20.4		1
			QPSK	23790	710.0	25	12	1	20.3	1.140	
						1	0	0	20.1	1.040	
						1	49	0	20.1	1.120	
						50	0	1	20.2		1
			16QAM			25	12	2	20.3	1.120	
						1	0	1	20.4	1.030	
						1	49	1	20.4	1.090	
						50	0	2	20.3		1
			QPSK	23800	711.0	25	12	1	20.3	**1.170**	
						1	0	0	20.1	1.060	
						1	49	0	20.1	1.140	
						50	0	1	20.3		1
			16QAM			25	12	2	20.3	1.150	
						1	0	1	20.4	1.050	
						1	49	1	20.3	1.120	
						50	0	2	20.4		1
Top	0	Yes	QPSK	23780	709.0	25	12	1	20.3	0.788	
						1	0	0	20.1	0.736	
						1	49	0	20.2	0.779	
						50	0	1	20.2		1
			16QAM			25	12	2	20.3	0.777	
						1	0	1	20.4	0.728	
						1	49	1	20.3	0.764	
						50	0	2	20.4		1
			QPSK	23790	710.0	25	12	1	20.3	0.797	
						1	0	0	20.1	0.738	
						1	49	0	20.1	0.782	
						50	0	1	20.2		1
			16QAM			25	12	2	20.3	0.789	
						1	0	1	20.4	0.735	
						1	49	1	20.4	0.755	
						50	0	2	20.3		1
			QPSK	23800	711.0	25	12	1	20.3	0.805	
						1	0	0	20.1	0.752	
						1	49	0	20.1	0.789	
						50	0	1	20.3		1
			16QAM			25	12	2	20.3	0.798	
						1	0	1	20.4	0.746	
						1	49	1	20.3	0.767	
						50	0	2	20.4		1

Note(s):

1. 100% RB Allocation in QPSK and 16QAM is not needed due to the SAR result is < 1.45 mW/g from 50% RB Allocation. The data has not been considered for FCC Equipment Certification.

10MHz Channel Bandwidth (continued)

Test position	dist. (mm)	Pwr back-off	Mode	Ch #	Freq. (MHz)	RB SIze	RB Offset	MPR	Avg Pwr (dBm)	SAR (mW/g) 1-g	Note
Right	0	No	QPSK	23780	709.0	25	12	1	23.5		2
						1	0	0	24.5		2
						1	49	0	24.4		2
						50	0	1	23.5		2
			16QAM			25	12	2	22.5		2
						1	0	1	23.5		2
						1	49	1	23.5		2
						50	0	2	22.6		2
			QPSK	23790	710.0	25	12	1	23.5	0.145	
						1	0	0	24.5	0.163	
						1	49	0	24.5	0.201	
						50	0	1	23.5		1
			16QAM			25	12	2	22.5	0.113	
						1	0	1	23.5	0.126	
						1	49	1	23.5	0.155	
						50	0	2	22.5		1
			QPSK	23800	711.0	25	12	1	23.5		2
						1	0	0	24.5		2
						1	49	0	24.5		2
						50	0	1	23.5		2
			16QAM			25	12	2	22.5		2
						1	0	1	23.5		2
						1	49	1	23.4		2
						50	0	2	22.6		2
Rear	11	No	QPSK	23780	709.0	25	12	1	23.5		2
						1	0	0	24.5		2
						1	49	0	24.4		2
						50	0	1	23.5		2
			16QAM			25	12	2	22.5		2
						1	0	1	23.5		2
						1	49	1	23.5		2
						50	0	2	22.6		2
			QPSK	23790	710.0	25	12	1	23.5	0.288	
						1	0	0	24.5	0.344	
						1	49	0	24.5	0.382	
						50	0	1	23.5		1
			16QAM			25	12	2	22.5	0.229	
						1	0	1	23.5	0.266	
						1	49	1	23.5	0.311	
						50	0	2	22.5		1
			QPSK	23800	711.0	25	12	1	23.5		2
						1	0	0	24.5		2
						1	49	0	24.5		2
						50	0	1	23.5		2
			16QAM			25	12	2	22.5		2
						1	0	1	23.5		2
						1	49	1	23.4		2
						50	0	2	22.6		2

Note(s):

1. 100% RB Allocation in QPSK and 16QAM is not needed due to the SAR result is < 1.45 mW/g from 50% RB Allocation. The data has not been considered for FCC Equipment Certification.
2. Mid. Channel SAR value not over 0.8, therefore low and high channel SAR is not necessary.

10MHz Channel Bandwidth (continued)

Test position	dist. (mm)	Pwr back-off	Mode	Ch #	Freq. (MHz)	RB SIze	RB Offset	MPR	Avg Pwr (dBm)	SAR (mW/g) 1-g	Note
Top	14	No	QPSK	23780	709.0	25	12	1	23.5		2
						1	0	0	24.5		2
						1	49	0	24.4		2
						50	0	1	23.5		2
			16QAM			25	12	2	22.5		2
						1	0	1	23.5		2
						1	49	1	23.5		2
						50	0	2	22.6		2
			QPSK	23790	710.0	25	12	1	23.5	0.162	
						1	0	0	24.5	0.199	
						1	49	0	24.5	0.207	
						50	0	1	23.5		1
			16QAM			25	12	2	22.5	0.127	
						1	0	1	23.5	0.153	
						1	49	1	23.5	0.160	
						50	0	2	22.5		1
			QPSK	23800	711.0	25	12	1	23.5		2
						1	0	0	24.5		2
						1	49	0	24.5		2
						50	0	1	23.5		2
			16QAM			25	12	2	22.5		2
						1	0	1	23.5		2
						1	49	1	23.4		2
						50	0	2	22.6		2
Top edge/ Right corner at 15°	0	No	QPSK	23780	709.0	25	12	1	23.5		2
						1	0	0	24.5		2
						1	49	0	24.4		2
						50	0	1	23.5		2
			16QAM			25	12	2	22.5		2
						1	0	1	23.5		2
						1	49	1	23.5		2
						50	0	2	22.6		2
			QPSK	23790	710.0	25	12	1	23.5	0.289	
						1	0	0	24.5	0.350	
						1	49	0	24.5	0.381	
						50	0	1	23.5		1
			16QAM			25	12	2	22.5	0.228	
						1	0	1	23.5	0.268	
						1	49	1	23.5	0.293	
						50	0	2	22.5		1
			QPSK	23800	711.0	25	12	1	23.5		2
						1	0	0	24.5		2
						1	49	0	24.5		2
						50	0	1	23.5		2
			16QAM			25	12	2	22.5		2
						1	0	1	23.5		2
						1	49	1	23.4		2
						50	0	2	22.6		2

Note(s):

1. 100% RB Allocation in QPSK and 16QAM is not needed due to the SAR result is < 1.45 mW/g from 50% RB Allocation. The data has not been considered for FCC Equipment Certification.
2. Mid. Channel SAR value not over 0.8, therefore low and high channel SAR is not necessary.

10MHz Channel Bandwidth (continued)

Test position	dist. (mm)	Pwr back-off	Mode	Ch #	Freq. (MHz)	RB SIze	RB Offset	MPR	Avg Pwr (dBm)	SAR (mW/g) 1-g	Note
Top edge/ Rear corner at 41°	0	Yes	QPSK	23800	711	25	12	1	20.3	1.160	
						1	0	0	20.1	1.110	
						1	49	0	20.2	1.110	
						50	0	1	20.2		1
			16QAM			25	12	2	20.3	1.140	
						1	0	1	20.4	1.090	
						1	49	1	20.3	1.090	
						50	0	2	20.4		1

Note(s):

1. 100% RB Allocation in QPSK and 16QAM is not needed due to the SAR result is < 1.45 mW/g from 50% RB Allocation. The data has not been considered for FCC Equipment Certification.

13.7. WiFi (802.11abgn)

802.11bgn (2.4GHz)

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

Test position	dist. (mm)	Pwr back-off	Mode	Ch No.	Freq. (MHz)	Avg Pwr (dBm)	SAR (mW/g) 1-g	Note
Rear	0	N/A	802.11 b 1Mbps	1	2412.0	16.6		1
				6	2437.0	16.6	0.093	
				11	2462.0	16.4		1
bottom	0	N/A	802.11 b 1Mbps	1	2412.0	16.6	1.040	
				6	2437.0	16.6	1.100	
				11	2462.0	16.4	**1.190**	
Right	0	N/A	802.11 b 1Mbps	1	2412.0	16.6		1
				6	2437.0	16.6	0.053	
				11	2462.0	16.4		1

Note(s):

1. Testing was performed on the channel with the highest output power only as the SAR was ≤ 0.8 W/kg with the operating frequency band having a range of < 100 MHz. Per KDB 447498 1) e) i).

802.11an (5GHz)

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

Test position	dist. (mm)	Pwr back-off	Mode	Ch No.	Freq. (MHz)	Avg Pwr (dBm)	SAR (mW/g) 1-g	Note
Rear	0	N/A	802.11 a 5.2GHz 6Mbps	36	5180.0	14.5		1
				40	5200.0	14.5	0.038	
				48	5240.0	14.5		1
bottom	0	N/A		36	5180.0	14.5		1
				40	5200.0	14.5	**0.522**	
				48	5240.0	14.5		1
Right	0	N/A		36	5180.0	14.5		1
				40	5200.0	14.5	0.047	
				48	5240.0	14.5		1
Rear	0	N/A	802.11 a 5.3GHz 6Mbps	52	5260.0	17.5		1
				60	5300.0	17.5	0.113	
				64	5320.0	17.5		1
bottom	0	N/A		52	5260.0	17.5	0.966	
				60	5300.0	17.5	**1.000**	
				64	5320.0	17.5	1.020	
Right	0	N/A		52	5260.0	17.5		1
				60	5300.0	17.5	0.058	
				64	5320.0	17.5		1
Rear	0	N/A	*802.11 a 5.5GHz 6Mbps	100	5500.0	16.5		2
				120	5600.0	16.5	0.063	
				140	5700.0	16.5		2
bottom	0	N/A		100	5500.0	16.5	0.875	
				120	5600.0	16.5	**0.946**	
				140	5700.0	16.5	0.958	
Right	0	N/A		100	5500.0	16.5		2
				120	5600.0	16.5	0.014	
				140	5700.0	16.5		2
Rear	0	N/A	802.11 a 5.8GHz 6Mbps	149	5745.0	17.5		1
				157	5785.0	17.5	0.057	
				165	5825.0	17.5		1
bottom	0	N/A		149	5745.0	17.5	**1.110**	
				157	5785.0	17.5	1.070	
				165	5825.0	17.5	1.040	
Right	0	N/A		149	5745.0	17.5		1
				157	5785.0	17.5	0.028	
				165	5825.0	17.5		1

Note(s):

1. Testing was performed on the channel with the highest output power only as the SAR was ≤ 0.8 W/kg with the operating frequency band having a range of < 100 MHz. Per KDB 447498 1) e) i).
2. Testing was performed on the channel with the highest output power only as the SAR was ≤ 0.4 W/kg with the operating frequency band having a range of ≤ 200 MHz. Per KDB 447498 1) e) ii).
3. ***The FCC has reviewed and accepted the measurements on the non-default channels.**

14. Summary of Highest 1g SAR

FCC rule part	Technology/Band	Test configuration	Mode	Separation distance (mm)	Highest 1g SAR (W/kg)
22	GSM850	Rear	GPRS 2 slot	11	1.00
	UMTS Band V	Rear	R99	0	0.99
24	GSM1900	Rear	GPRS 2 slot	0	1.18
	UMTS Band II	Rear	R99	0	1.15
27	LTE band 4	Rear	QPSK (RB 25/12)	0	1.18
	LTE band 17	Rear	QPSK (RB 25/12)	0	1.17
15.247	WiFi 2.4 GHz	Bottom	802.11b	0	1.19
15.407	WiFi 5.2 GHz	Bottom	802.11a	0	0.52
	WiFi 5.3 GHz	Bottom	802.11a	0	1.00
	WiFi 5.5 GHz	Bottom	802.11a	0	0.95
15.247	WiFi 5.8 GHz	Bottom	802.11a	0	1.11

15. Worst-case SAR Plots

Date: 12/5/2011

Test Laboratory: UL CCS SAR Lab A

GSM850

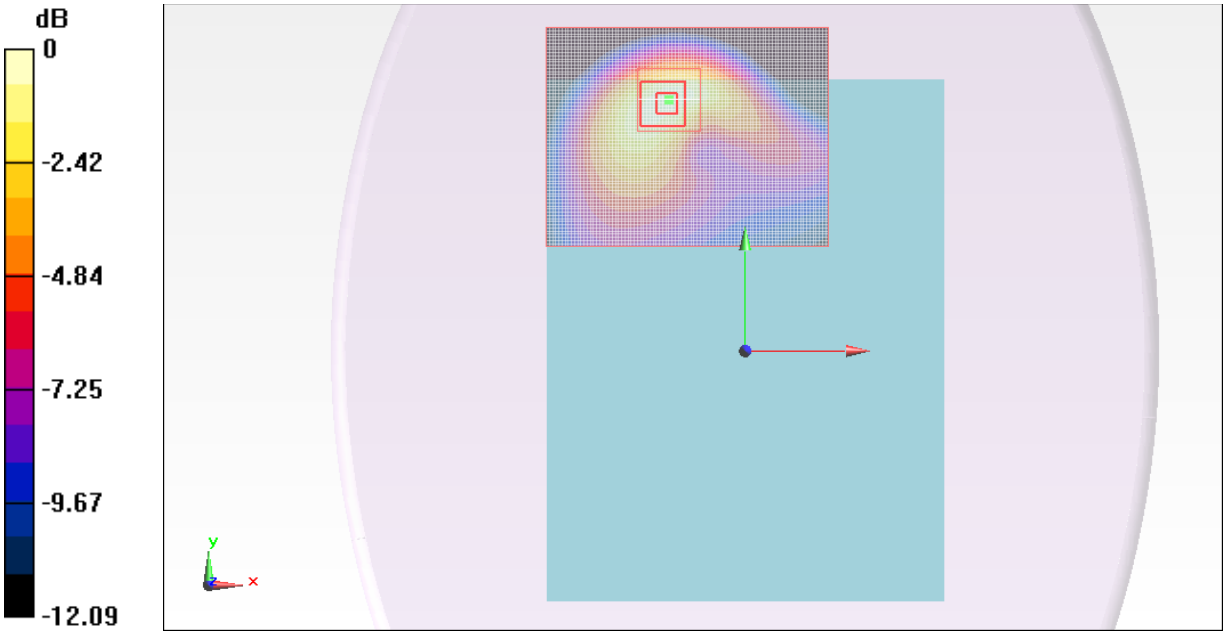
Communication System: GPRS-FDD (2 slot); Frequency: 848.8 MHz; Duty Cycle: 1:4.00037
Medium parameters used (interpolated): f = 848.8 MHz; σ = 0.99 mho/m; ε_r = 56.171; ρ = 1000 kg/m^3
Phantom section: Flat Section

Room Ambient Temperature: 24.0 deg. C; Liquid Temperature: 23.0 deg. C

DASY5 Configuration:
- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Probe: EX3DV4 - SN3749; ConvF(8.79, 8.79, 8.79); Calibrated: 12/13/2010
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn500; Calibrated: 7/14/2011
- Phantom: ELI v4.0(A); Type: QDOVA001BB; Serial: 1119
- Measurement SW: DASY52, Version 52.6 (2);SEMCAD X Version 14.4.5 (3634)

Rear with 11mm/GPRS 2 slot_H ch/Area Scan (91x71x1): Measurement grid: dx=15mm, dy=15mm
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 1.218 mW/g

Rear with 11mm/GPRS 2 slot_H ch/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=3mm
Reference Value = 33.778 V/m; Power Drift = 0.0049 dB
Peak SAR (extrapolated) = 1.587 W/kg
SAR(1 g) = 1 mW/g; SAR(10 g) = 0.620 mW/g
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.244 mW/g



0 dB = 1.240mW/g

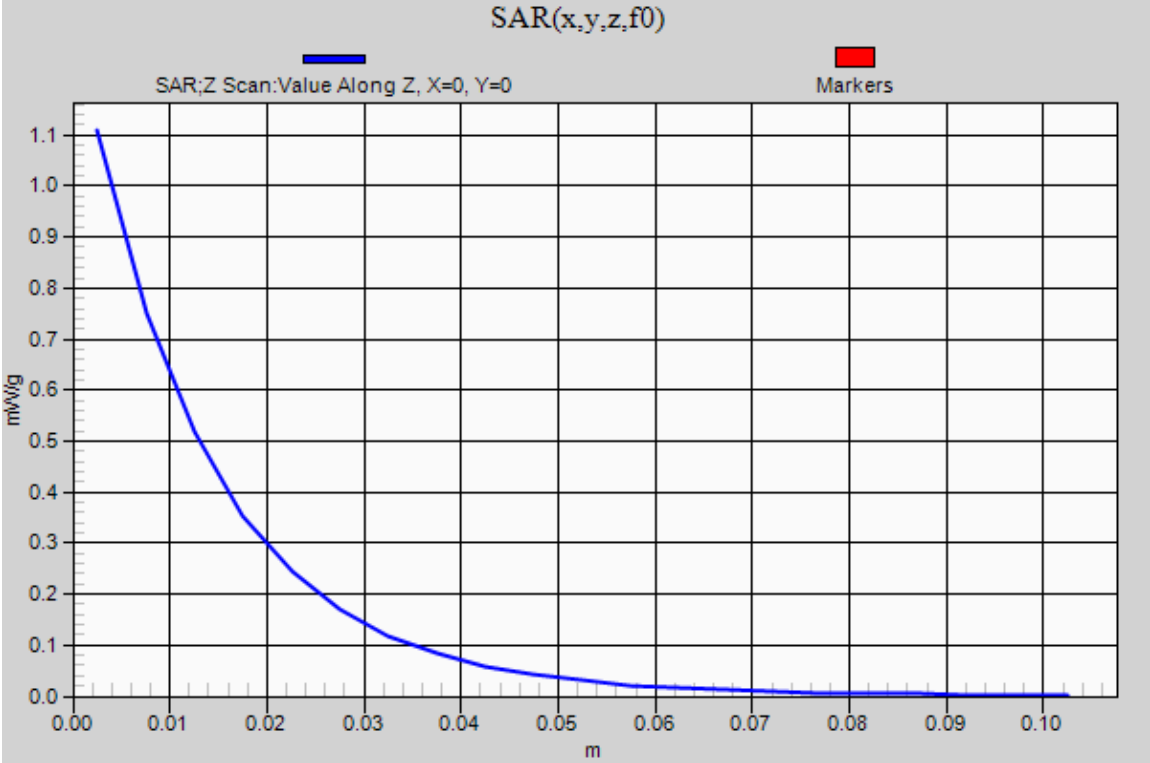
Date: 12/5/2011

Test Laboratory: UL CCS SAR Lab A

GSM850

Communication System: GPRS-FDD (2 slot); Frequency: 848.8 MHz; Duty Cycle: 1:4.00037

Rear with 11mm/GPRS 2 slot_H ch/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.109 mW/g



Date/Time: 12/7/2011 11:31:45 AM

Test Laboratory: UL CCS SAR Lab D

GSM1900

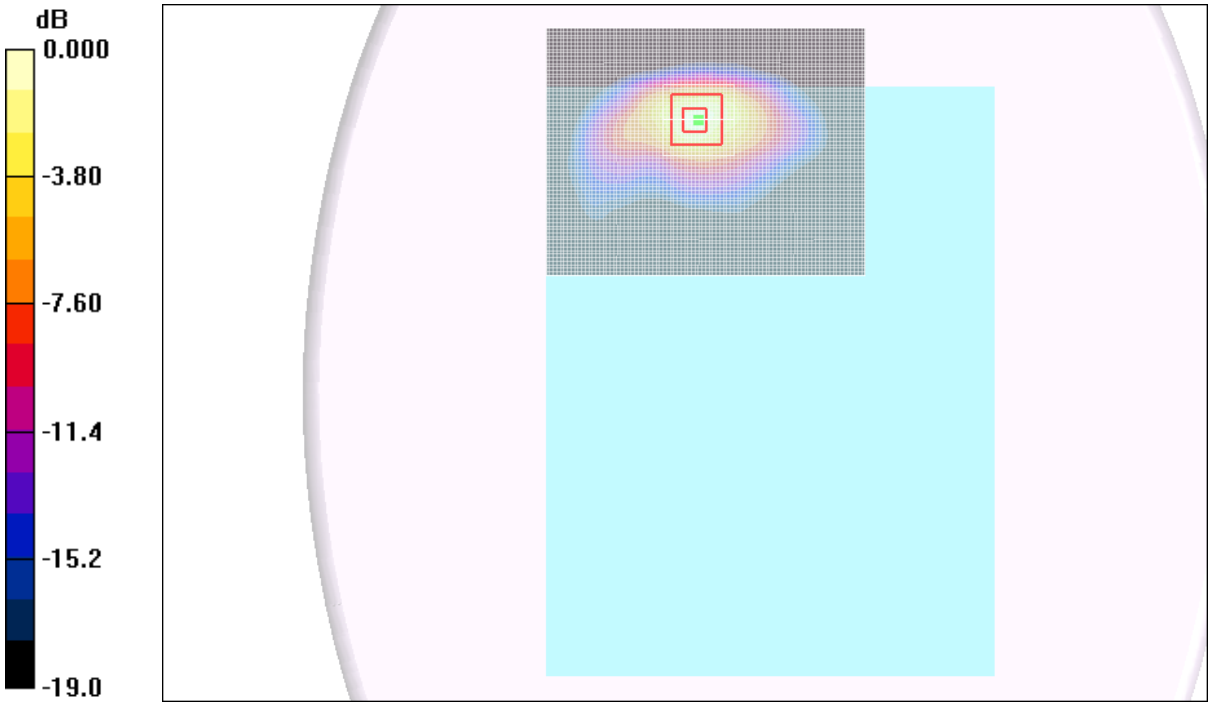
Communication System: PCS1900; Frequency: 1880 MHz; Duty Cycle: 1:4
Medium parameters used: f = 1880 MHz; σ = 1.52 mho/m; ε_r = 51.1; ρ = 1000 kg/m^3
Phantom section: Flat Section

Room Ambient Temperature: 24.0 deg. C; Liquid Temperature: 23.0 deg. C

DASY4 Configuration:
- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Probe: EX3DV4 - SN3686; ConvF(6.99, 6.99, 6.99); Calibrated: 1/24/2011
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1259; Calibrated: 5/3/2011
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BB; Serial: SN:1017
- Measurement SW: DASY4, V4.7 Build 80; Post processing SW: SEMCAD, V1.8 Build 186

Rear_M ch_GPRS 2 Slot/Area Scan (91x71x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.45 mW/g

Rear_M ch_GPRS 2 Slot/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=3mm
Reference Value = 27.3 V/m; Power Drift = 0.113 dB
Peak SAR (extrapolated) = 2.37 W/kg
SAR(1 g) = 1.18 mW/g; SAR(10 g) = 0.572 mW/g
Maximum value of SAR (measured) = 1.66 mW/g



0 dB = 1.66mW/g

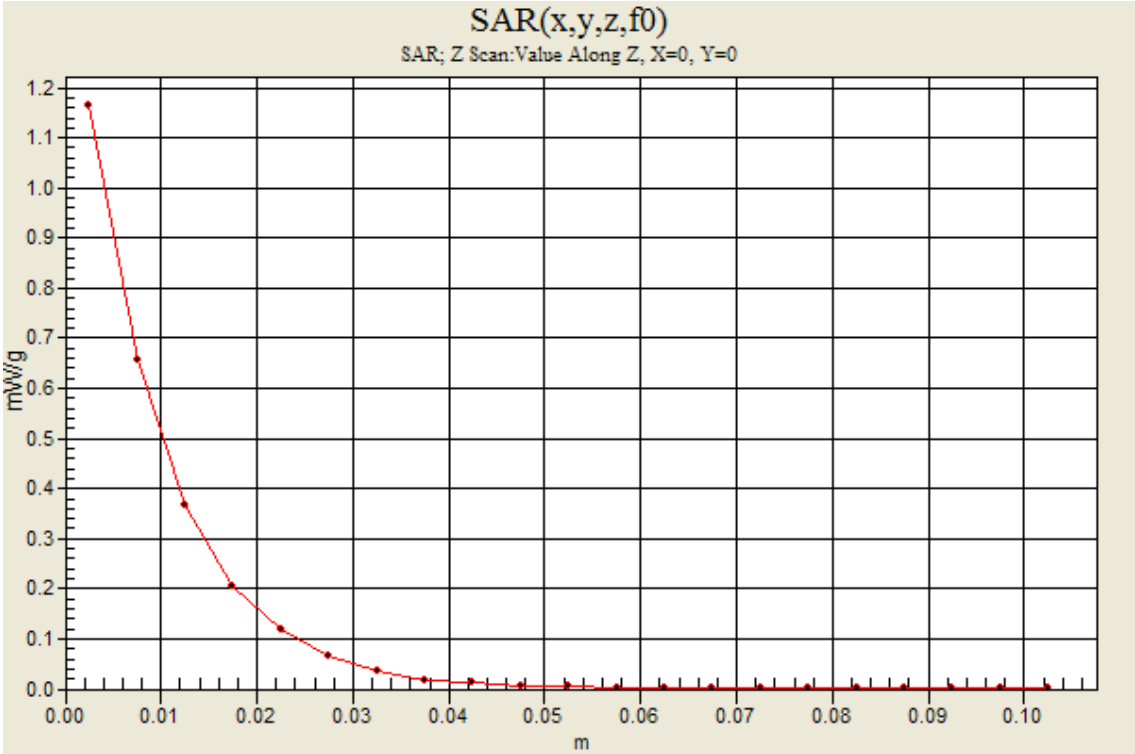
Date/Time: 12/7/2011 11:52:18 AM

Test Laboratory: UL CCS SAR Lab D

GSM1900

Communication System: PCS1900; Frequency: 1880 MHz; Duty Cycle: 1:4

Rear_M ch_GPRS 2 Slot/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Maximum value of SAR (measured) = 1.16 mW/g



Date: 12/5/2011

Test Laboratory: UL CCS SAR Lab A

UMTS band V

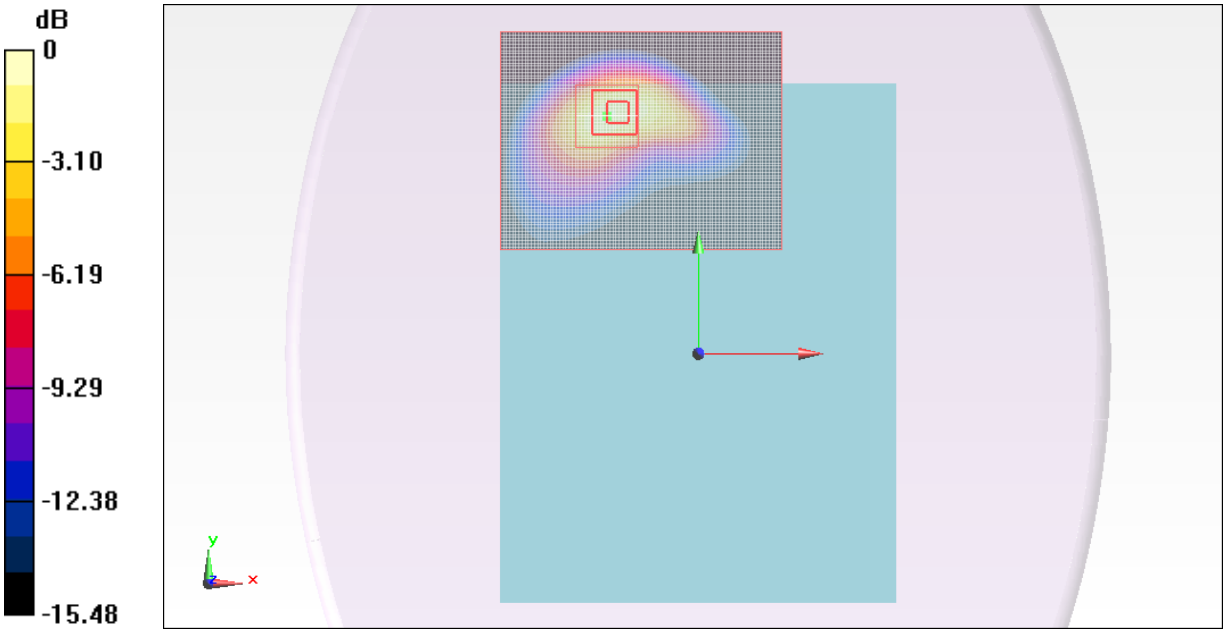
Communication System: WCDMA (UMTS); Frequency: 846.6 MHz; Duty Cycle: 1:1
Medium parameters used (interpolated): f = 846.6 MHz; σ = 0.988 mho/m; ε_r = 56.193; ρ = 1000 kg/m^3
Phantom section: Flat Section

Room Ambient Temperature: 24.0 deg. C; Liquid Temperature: 23.0 deg. C

DASY5 Configuration:
- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Probe: EX3DV4 - SN3749; ConvF(8.79, 8.79, 8.79); Calibrated: 12/13/2010
- Sensor-Surface: 2.5mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn500; Calibrated: 7/14/2011
- Phantom: ELI v4.0(A); Type: QDOVA001BB; Serial: 1119
- Measurement SW: DASY52, Version 52.6 (2);SEMCAD X Version 14.4.5 (3634)

Rear/H ch/Area Scan (91x71x1): Measurement grid: dx=15mm, dy=15mm
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 1.121 mW/g

Rear/H ch/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=3mm
Reference Value = 32.724 V/m; Power Drift = -0.0022 dB
Peak SAR (extrapolated) = 2.117 W/kg
SAR(1 g) = 0.986 mW/g; SAR(10 g) = 0.507 mW/g
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.389 mW/g



0 dB = 1.390mW/g

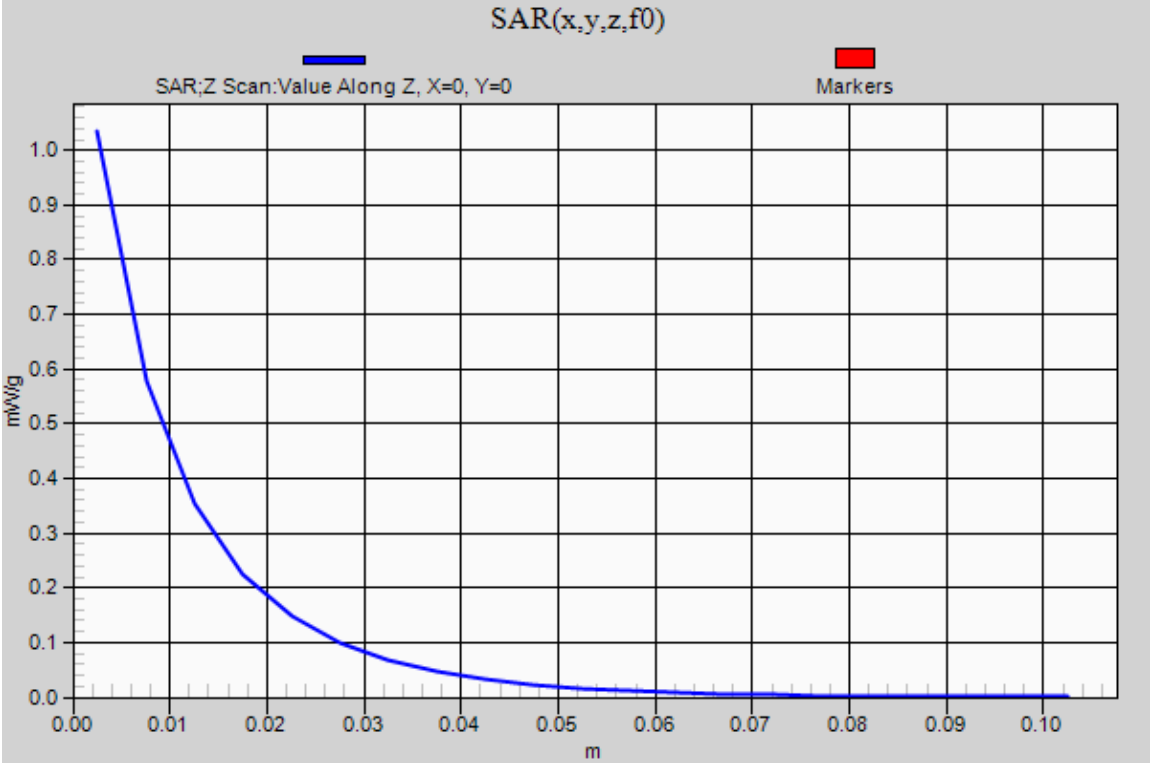
Date: 12/5/2011

Test Laboratory: UL CCS SAR Lab A

UMTS band V

Communication System: WCDMA (UMTS); Frequency: 846.6 MHz; Duty Cycle: 1:1

Rear/H ch/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.035 mW/g



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Test Laboratory: UL CCS SAR Lab D

UMTS band II

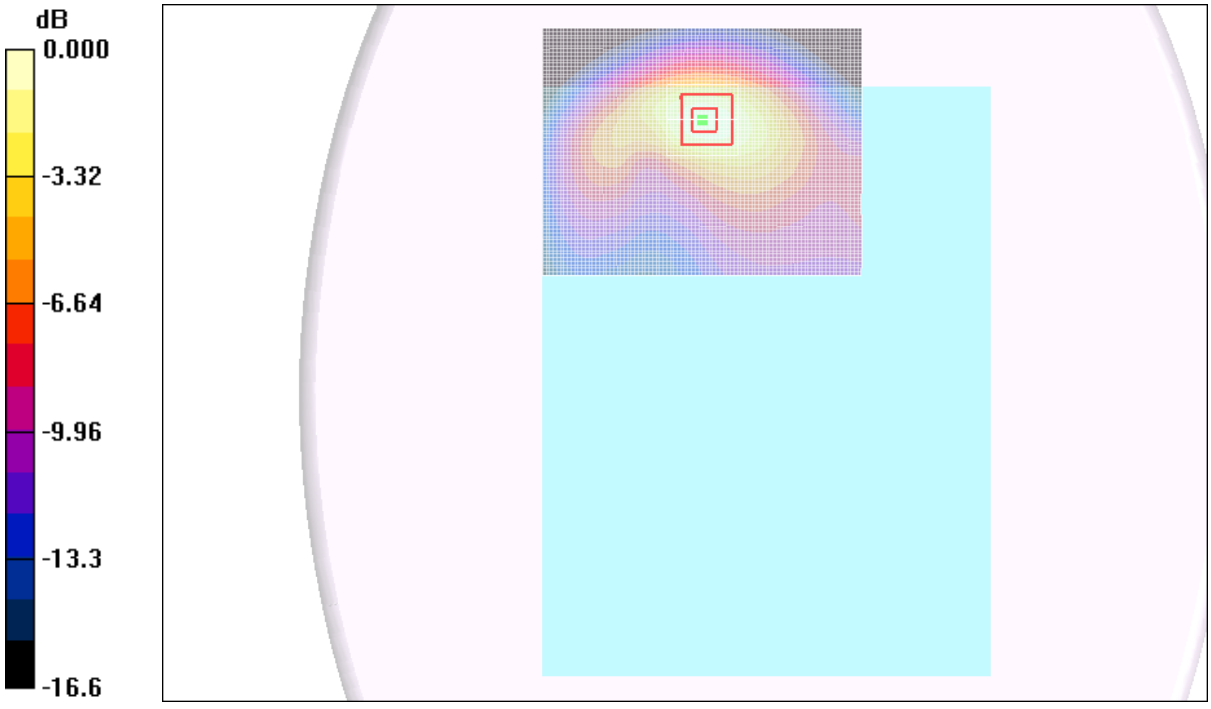
Communication System: UMTS Band II; Frequency: 1907.6 MHz; Duty Cycle: 1:1
Medium parameters used (interpolated): f = 1907.6 MHz; σ = 1.56 mho/m; ε_r = 50.7; ρ = 1000 kg/m^3
Phantom section: Flat Section

Room Ambient Temperature: 24.0 deg. C; Liquid Temperature: 23.0 deg. C

DASY4 Configuration:
- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Probe: EX3DV4 - SN3686; ConvF(6.99, 6.99, 6.99); Calibrated: 1/24/2011
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1259; Calibrated: 5/3/2011
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BB; Serial: SN:1017
- Measurement SW: DASY4, V4.7 Build 80; Post processing SW: SEMCAD, V1.8 Build 186

Rear_H ch_W/11mm Seperation/Area Scan (91x71x1): Measurement grid: dx=15mm, dy=15mm
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 1.48 mW/g

Rear_H ch_W/11mm Seperation/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=3mm
Reference Value = 28.4 V/m; Power Drift = 0.024 dB
Peak SAR (extrapolated) = 1.95 W/kg
SAR(1 g) = 1.15 mW/g; SAR(10 g) = 0.647 mW/g
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.50 mW/g



0 dB = 1.50mW/g

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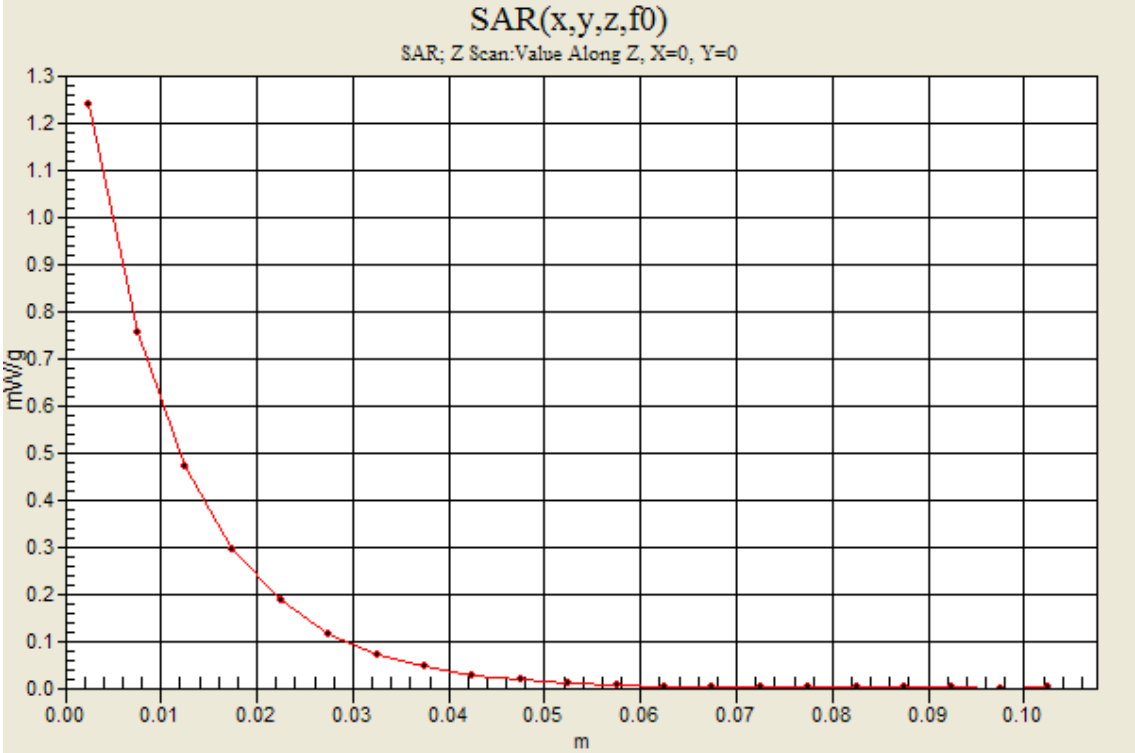
Test Laboratory: UL CCS SAR Lab D

UMTS band II

Communication System: UMTS Band II; Frequency: 1907.6 MHz; Duty Cycle: 1:1

Rear_H ch_W/11mm Seperation/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.24 mW/g



Date/Time: 12/20/2011 12:02:13 PM

Test Laboratory: UL CCS SAR Lab D

LTE Band 4

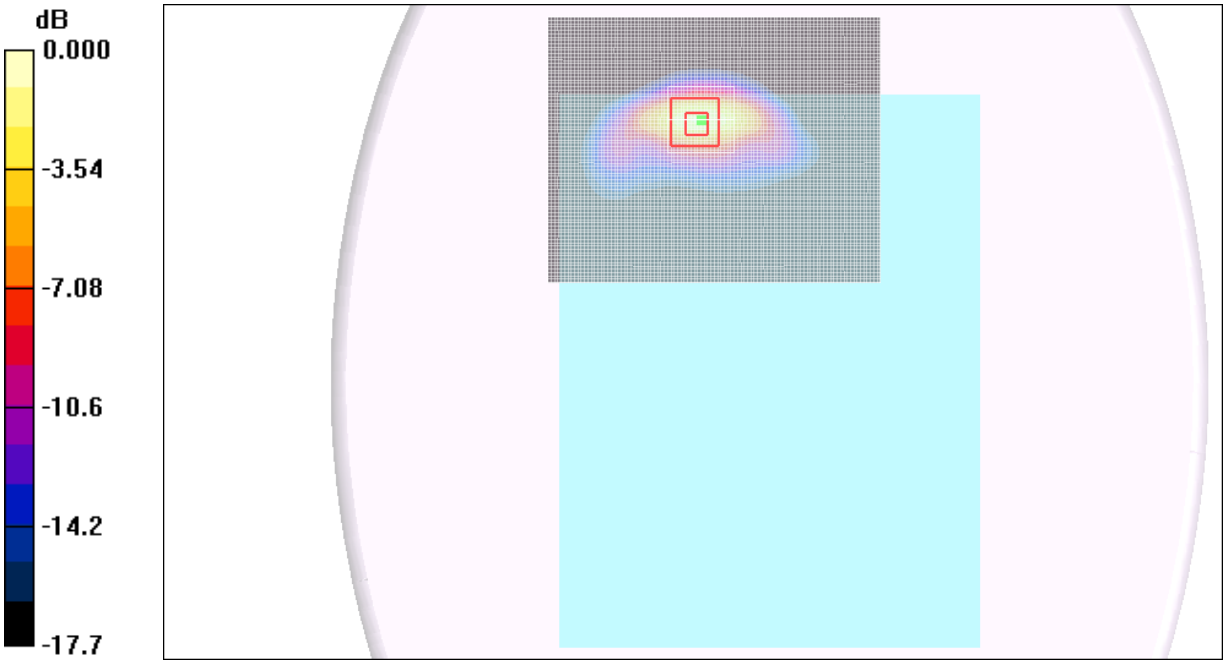
Communication System: LTE Band 4; Frequency: 1732.5 MHz; Duty Cycle: 1:1
Medium parameters used (interpolated): f = 1732.5 MHz; σ = 1.42 mho/m; ε_r = 53.3; ρ = 1000 kg/m^3
Phantom section: Flat Section

Room Ambient Temperature: 24.0 deg. C; Liquid Temperature: 23.0 deg. C

DASY4 Configuration:
- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Probe: EX3DV4 - SN3772; ConvF(7.15, 7.15, 7.15); Calibrated: 5/3/2011
- Sensor-Surface: 2.5mm (Mechanical Surface Detection (Locations From Previous Scan Used))Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1259; Calibrated: 5/3/2011
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BB; Serial: SN:1017
- Measurement SW: DASY4, V4.7 Build 80; Post processing SW: SEMCAD, V1.8 Build 186

Rear_M ch_QPSK_RB 25/12/Area Scan 2 2 (101x81x1): Measurement grid: dx=15mm, dy=15mm
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 1.23 mW/g

Rear_M ch_QPSK_RB 25/12/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=3mm
Reference Value = 29.6 V/m; Power Drift = 0.114 dB
Peak SAR (extrapolated) = 2.47 W/kg
SAR(1 g) = 1.18 mW/g; SAR(10 g) = 0.549 mW/g
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.56 mW/g



0 dB = 1.56mW/g

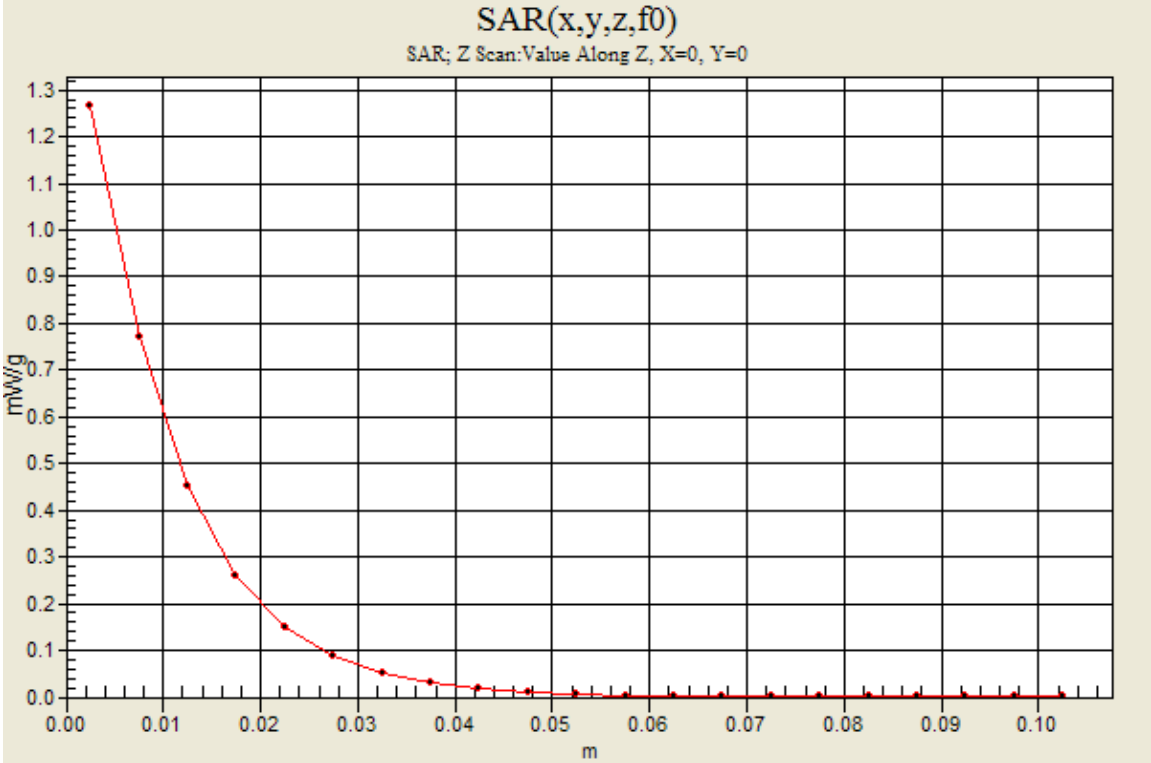
Date/Time: 12/20/2011 12:20:41 PM

Test Laboratory: UL CCS SAR Lab D

LTE Band 4

Communication System: LTE Band 4; Frequency: 1732.5 MHz; Duty Cycle: 1:1

Rear_M ch_QPSK_RB 25/12/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.27 mW/g



Date: 12/16/2011

Test Laboratory: UL CCS SAR Lab A

LTE Band 17

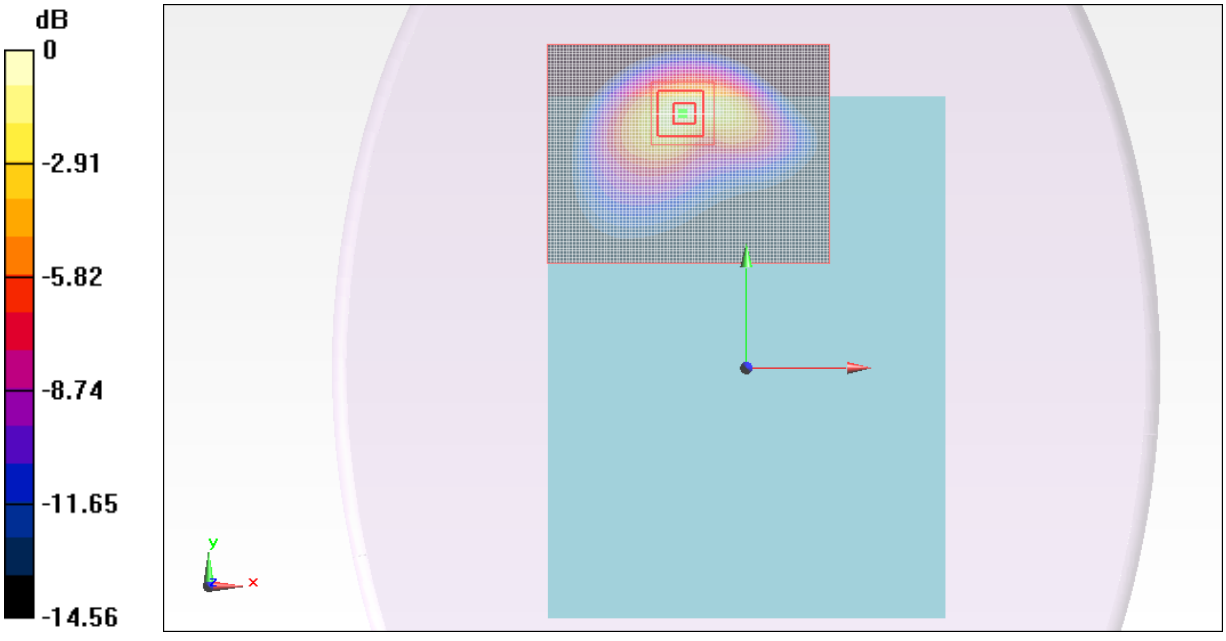
Communication System: LTE; Frequency: 711 MHz; Duty Cycle: 1:1
Medium parameters used (interpolated): f = 711 MHz; σ = 0.922 mho/m; ε_r = 57.281; ρ = 1000 kg/m^3
Phantom section: Flat Section

Room Ambient Temperature: 24.0 deg. C; Liquid Temperature: 23.0 deg. C

DASY5 Configuration:
- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Probe: EX3DV4 - SN3686; ConvF(8.87, 8.87, 8.87); Calibrated: 1/24/2011
- Sensor-Surface: 2.5mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn500; Calibrated: 7/14/2011
- Phantom: ELI v4.0(B); Type: QDOVA001BB; Serial: 1099
- Measurement SW: DASY52, Version 52.6 (2);SEMCAD X Version 14.4.5 (3634)

Rear/10MHz_H ch_QPSK_RB25_RB12/Area Scan (91x71x1): Measurement grid: dx=15mm, dy=15mm
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 1.390 mW/g

Rear/10MHz_H ch_QPSK_RB25_RB12/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=3mm
Reference Value = 39.340 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 2.626 W/kg
SAR(1 g) = 1.17 mW/g; SAR(10 g) = 0.600 mW/g
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.670 mW/g



0 dB = 1.670mW/g

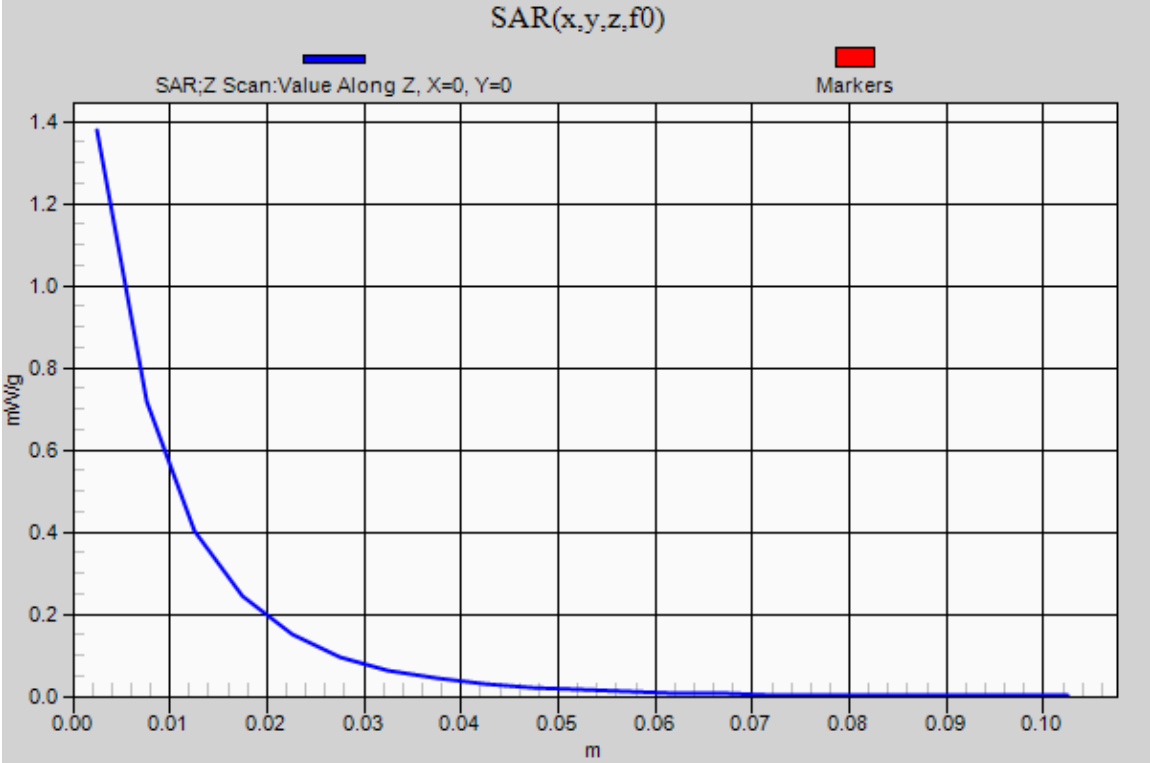
Date: 12/16/2011

Test Laboratory: UL CCS SAR Lab A

LTE Band 17

Communication System: LTE; Frequency: 711 MHz; Duty Cycle: 1:1

Rear/10MHz_H ch_QPSK_RB25_RB12/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.379 mW/g



Date/Time: 10/11/2011 4:18:21 PM

Test Laboratory: UL CCS SAR Lab D

WiFi 2.4GHz_Body

Communication System: 802.11b/g 2.4GHz; Frequency: 2462 MHz; Duty Cycle: 1:1
Medium parameters used (interpolated): f = 2462 MHz; σ = 2 mho/m; ε_r = 50.5; ρ = 1000 kg/m^3
Phantom section: Flat Section

Room Ambient Temperature: 24.0 deg. C; Liquid Temperature: 23.0 deg. C

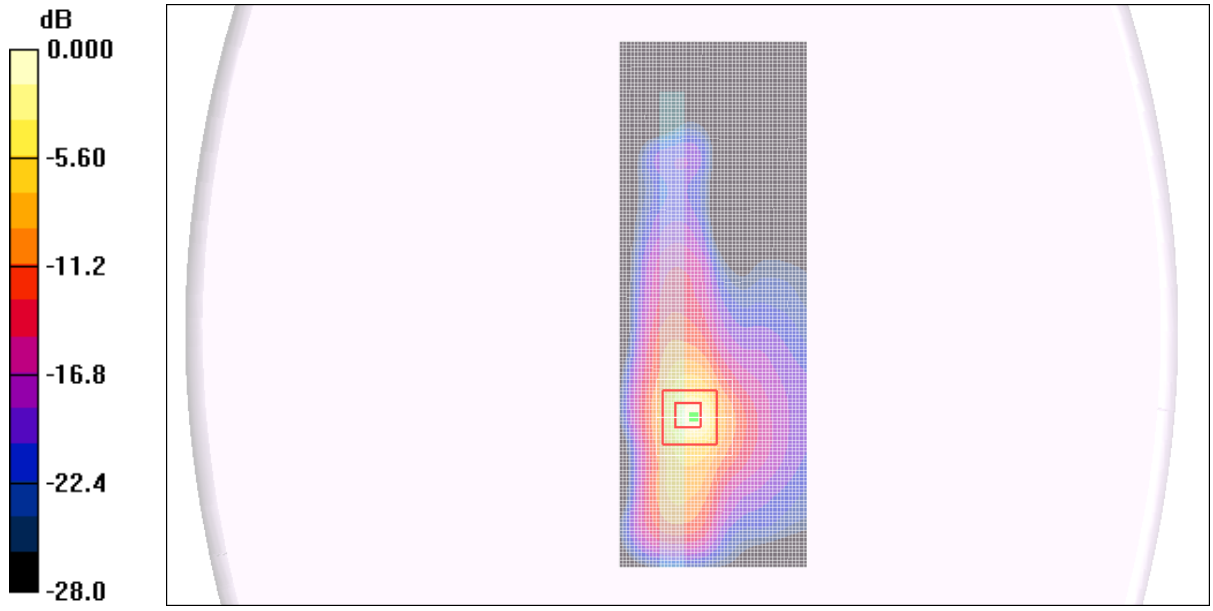
DASY4 Configuration:
- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Probe: EX3DV4 - SN3749; ConvF(6.9, 6.9, 6.9); Calibrated: 12/13/2010
- Sensor-Surface: 2.5mm (Mechanical Surface Detection (Locations From Previous Scan Used))Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1259; Calibrated: 5/3/2011
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BB; Serial: 1017
- Measurement SW: DASY4, V4.7 Build 80; Post processing SW: SEMCAD, V1.8 Build 186

Bottom_ch 11 2/Area Scan (51x141x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 1.81 mW/g

Bottom_ch 11 2/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=3mm

Reference Value = 29.5 V/m; Power Drift = 0.18 dB
Peak SAR (extrapolated) = 3.48 W/kg
SAR(1 g) = 1.19 mW/g; SAR(10 g) = 0.413 mW/g
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.93 mW/g



0 dB = 1.93mW/g

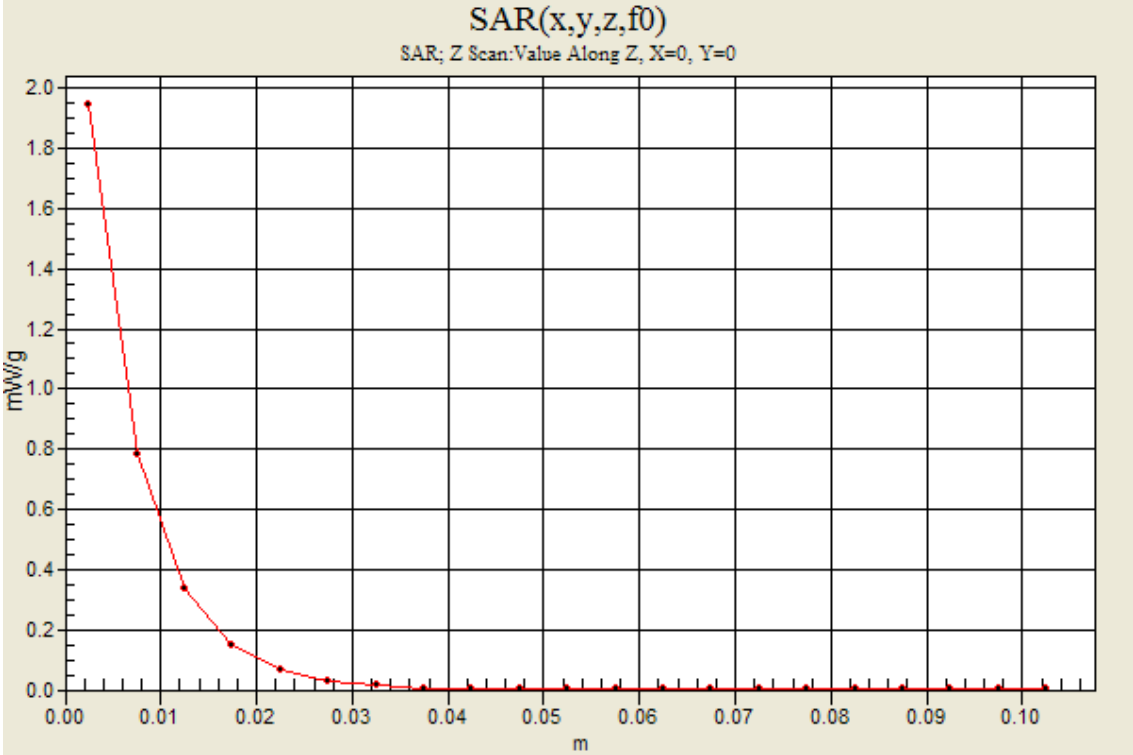
Date/Time: 10/11/2011 4:53:10 PM

Test Laboratory: UL CCS SAR Lab D

WiFi 2.4GHz_Body

Communication System: 802.11b/g 2.4GHz; Frequency: 2462 MHz; Duty Cycle: 1:1

Bottom_ch 11 2/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.94 mW/g



Date/Time: 10/24/2011 9:08:20 PM

Test Laboratory: UL CCS SAR Lab D

WiFi 5GHz_Body

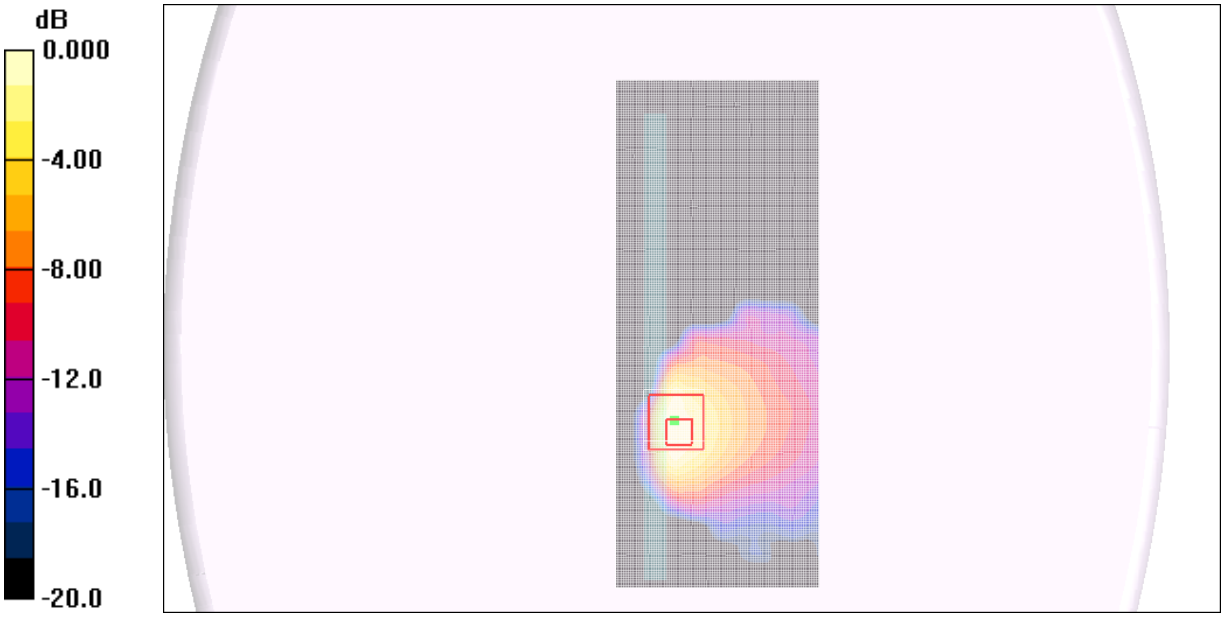
Communication System: 802.11abgn; Frequency: 5200 MHz; Duty Cycle: 1:1
Medium parameters used: f = 5200 MHz; σ = 5.47 mho/m; ε_r = 48.6; ρ = 1000 kg/m^3
Phantom section: Flat Section

Room Ambient Temperature: 24.0 deg. C; Liquid Temperature: 23.0 deg. C

DASY4 Configuration:
- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Probe: EX3DV4 - SN3749; ConvF(4.07, 4.07, 4.07); Calibrated: 12/13/2010
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1259; Calibrated: 5/3/2011
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BB; Serial: SN:1017
- Measurement SW: DASY4, V4.7 Build 80; Post processing SW: SEMCAD, V1.8 Build 186

Bottom_Ch40/Area Scan (81x201x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 1.03 mW/g

Bottom_Ch40/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 11.8 V/m; Power Drift = -0.104 dB
Peak SAR (extrapolated) = 1.65 W/kg
SAR(1 g) = 0.522 mW/g; SAR(10 g) = 0.173 mW/g
Maximum value of SAR (measured) = 0.865 mW/g



0 dB = 0.865mW/g

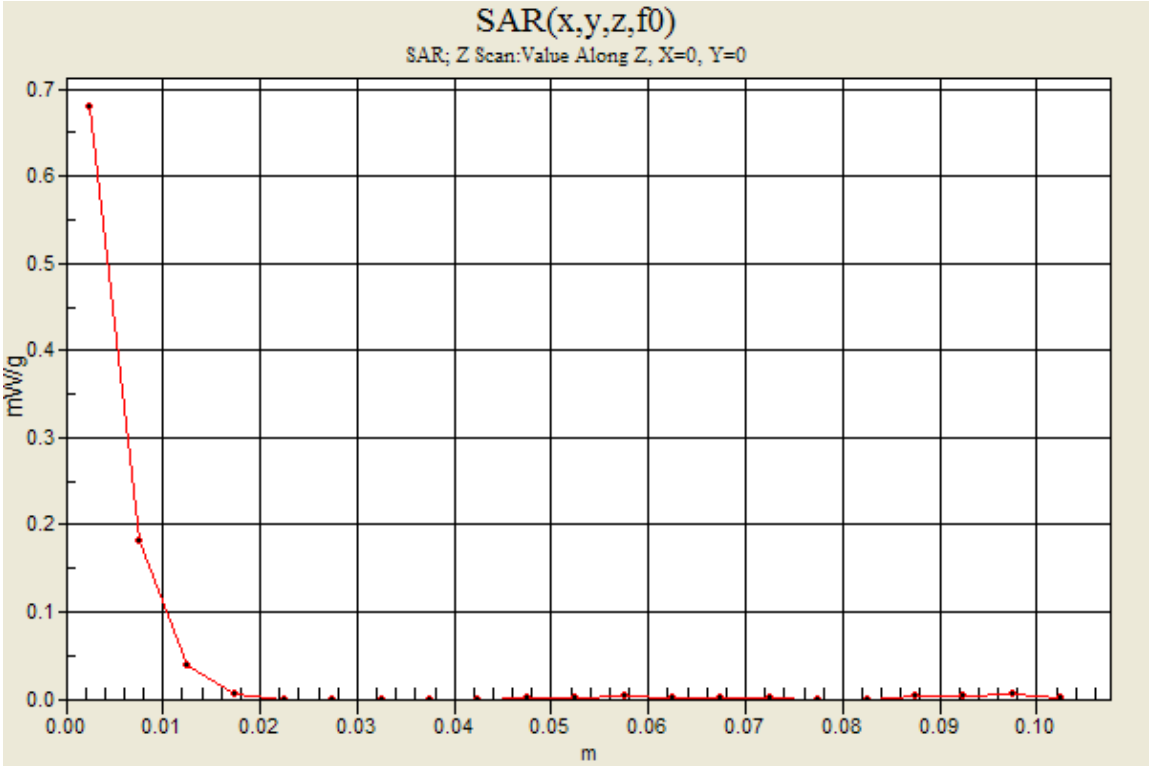
Date/Time: 10/24/2011 9:39:18 PM

Test Laboratory: UL CCS SAR Lab D

WiFi 5GHz_Body

Communication System: 802.11abgn; Frequency: 5200 MHz; Duty Cycle: 1:1

Bottom_Ch40/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Maximum value of SAR (measured) = 0.679 mW/g



Date: 10/13/2011

Test Laboratory: UL CCS SAR Lab A

WiFi 5GHz_Body

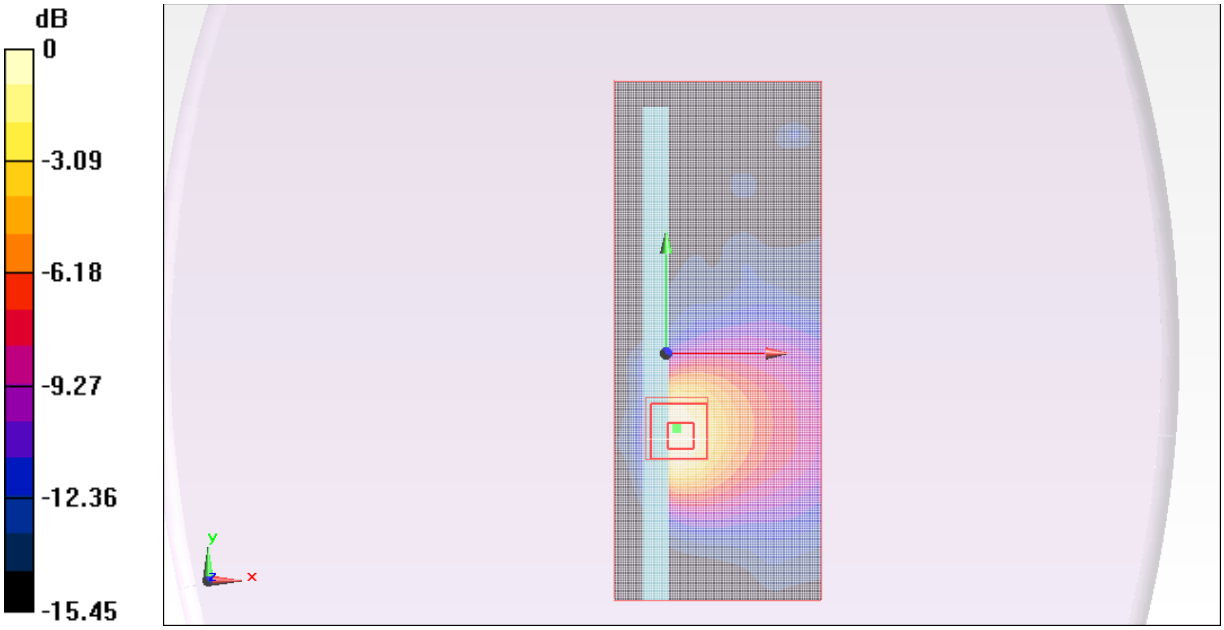
Communication System: WLAN 5GHz; Frequency: 5320 MHz; Duty Cycle: 1:1
Medium parameters used: f = 5320 MHz; σ = 5.425 mho/m; ε_r = 48.496; ρ = 1000 kg/m^3
Phantom section: Flat Section

Room Ambient Temperature: 25.0 deg. C; Liquid Temperature: 24.0 deg. C

DASY5 Configuration:
- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Probe: EX3DV4 - SN3686; ConvF(3.7, 3.7, 3.7); Calibrated: 1/24/2011
- Sensor-Surface: 2.5mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn500; Calibrated: 7/14/2011
- Phantom: ELI v4.0(A); Type: QDOVA001BB; Serial: 1119
- Measurement SW: DASY52, Version 52.6 (2);SEMCAD X Version 14.4.5 (3634)

Bottom/802.11a_ch 64/Area Scan (81x201x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 1.989 mW/g

Bottom/802.11a_ch 64/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 16.981 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 3.180 W/kg
SAR(1 g) = 1.02 mW/g; SAR(10 g) = 0.394 mW/g
Maximum value of SAR (measured) = 1.651 mW/g



0 dB = 1.650mW/g

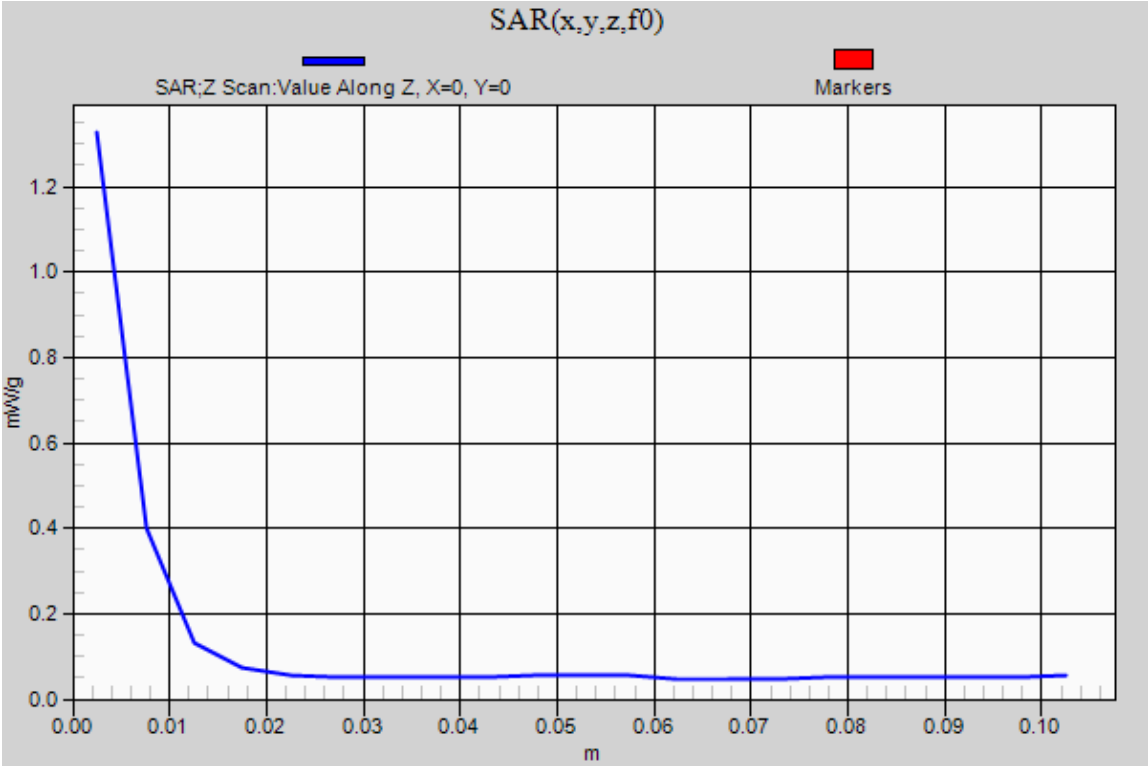
Date: 10/13/2011

Test Laboratory: UL CCS SAR Lab A

WiFi 5GHz_Body

Communication System: WLAN 5GHz; Frequency: 5320 MHz; Duty Cycle: 1:1

Bottom/802.11a_ch 64/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Maximum value of SAR (measured) = 1.327 mW/g



Date/Time: 10/25/2011 12:37:46 AM

Test Laboratory: UL CCS SAR Lab D

WiFi 5GHz_Body

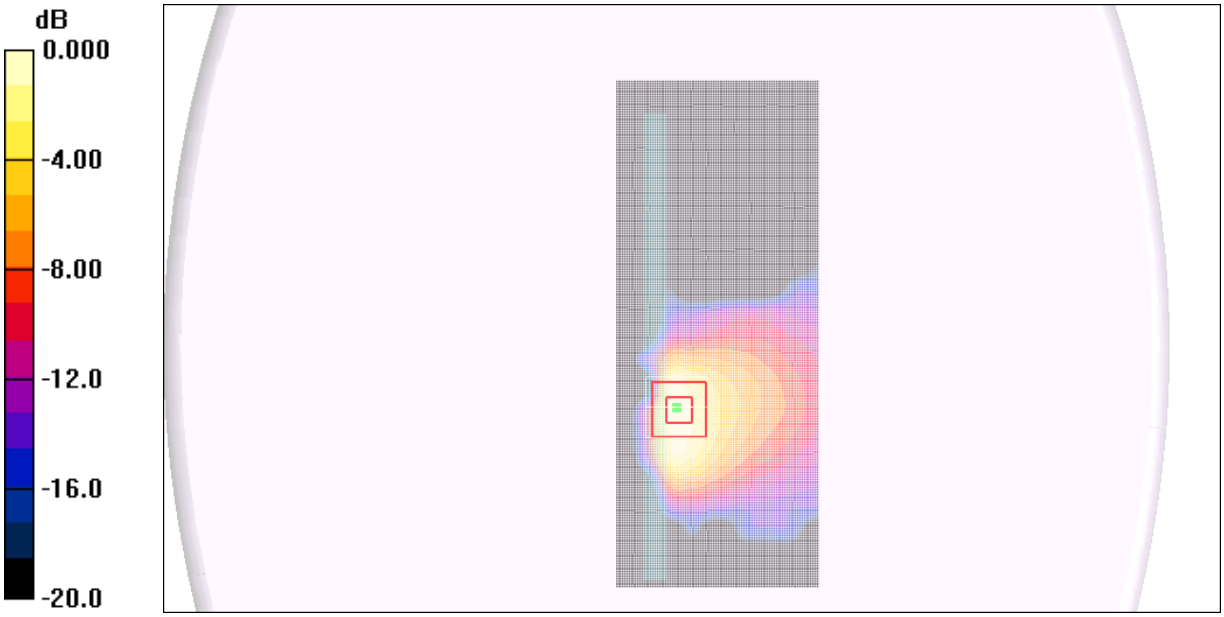
Communication System: 802.11abgn; Frequency: 5700 MHz; Duty Cycle: 1:1
Medium parameters used: f = 5700 MHz; σ = 6.16 mho/m; ε_r = 47.6; ρ = 1000 kg/m^3
Phantom section: Flat Section

Room Ambient Temperature: 24.0 deg. C; Liquid Temperature: 23.0 deg. C

DASY4 Configuration:
- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Probe: EX3DV4 - SN3749; ConvF(3.65, 3.65, 3.65); Calibrated: 12/13/2010
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1259; Calibrated: 5/3/2011
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BB; Serial: SN:1017
- Measurement SW: DASY4, V4.7 Build 80; Post processing SW: SEMCAD, V1.8 Build 186

Bottom_Ch140/Area Scan (81x201x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 2.02 mW/g

Bottom_Ch140/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 15.9 V/m; Power Drift = -0.116 dB
Peak SAR (extrapolated) = 3.25 W/kg
SAR(1 g) = 0.958 mW/g; SAR(10 g) = 0.333 mW/g
Maximum value of SAR (measured) = 1.68 mW/g



0 dB = 1.68mW/g

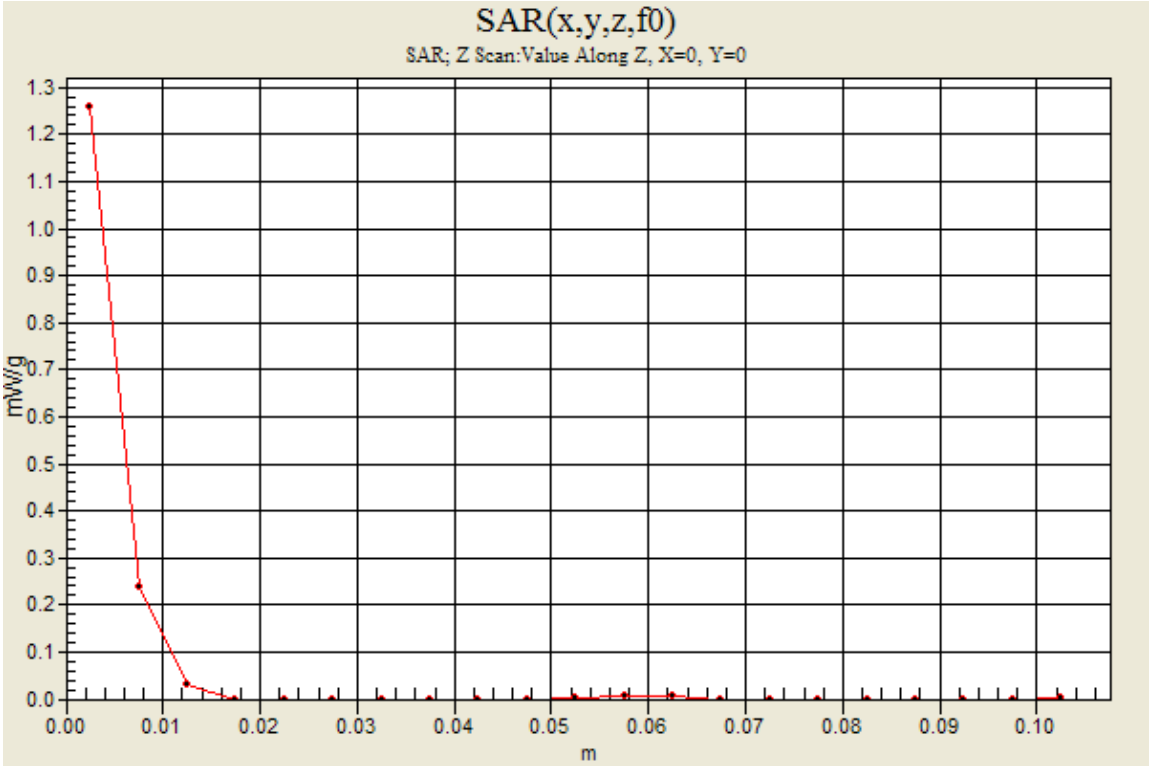
Date/Time: 10/25/2011 1:10:58 AM

Test Laboratory: UL CCS SAR Lab D

WiFi 5GHz_Body

Communication System: 802.11abgn; Frequency: 5700 MHz; Duty Cycle: 1:1

Bottom_Ch140/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Maximum value of SAR (measured) = 1.26 mW/g



Date/Time: 10/13/2011 2:12:01 AM

Test Laboratory: UL CCS SAR Lab D

WiFi 5GHz_Body

DUT: Apple; Type: 17 inch; Serial: N/A

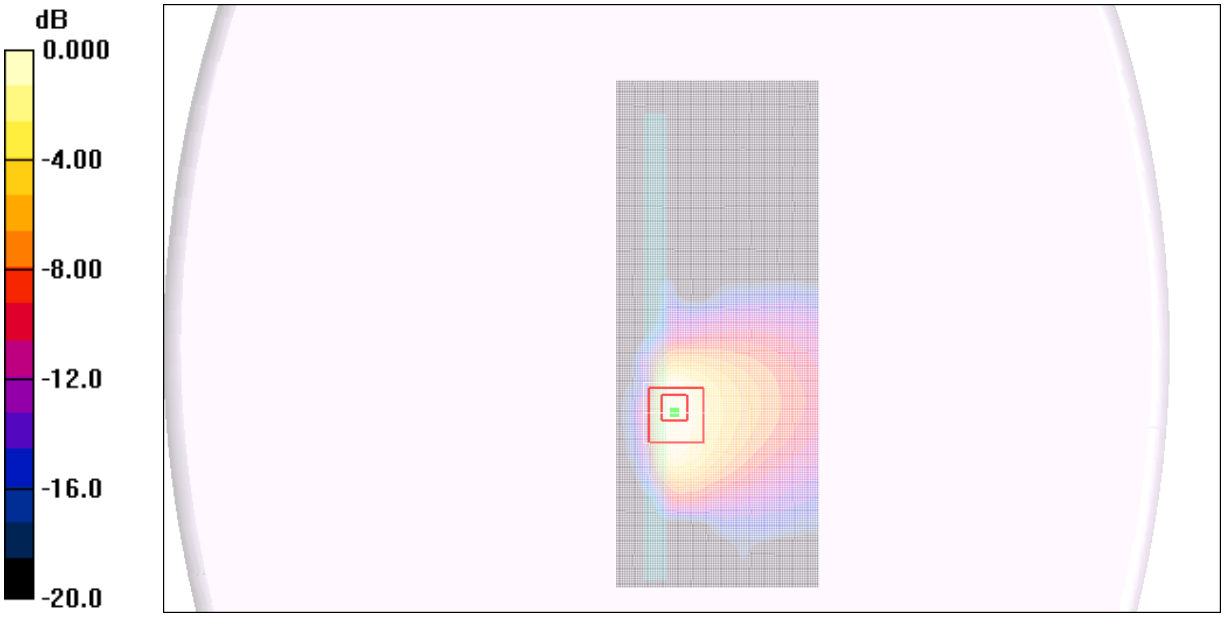
Communication System: 802.11abgn; Frequency: 5745 MHz; Duty Cycle: 1:1
Medium parameters used: f = 5745 MHz; σ = 6.05 mho/m; ε_r = 47.4; ρ = 1000 kg/m^3
Phantom section: Flat Section

Room Ambient Temperature: 25.0 deg. C; Liquid Temperature: 24.0 deg. C

DASY4 Configuration:
- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Probe: EX3DV4 - SN3749; ConvF(3.65, 3.65, 3.65); Calibrated: 12/13/2010
- Sensor-Surface: 2.5mm (Mechanical Surface Detection (Locations From Previous Scan Used))Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1259; Calibrated: 5/3/2011
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BB; Serial: SN:1017
- Measurement SW: DASY4, V4.7 Build 80; Post processing SW: SEMCAD, V1.8 Build 186

Bottom_Ch149/Area Scan (81x201x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 2.30 mW/g

Bottom_Ch149/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 19.1 V/m; Power Drift = -0.166 dB
Peak SAR (extrapolated) = 3.66 W/kg
SAR(1 g) = 1.11 mW/g; SAR(10 g) = 0.397 mW/g
Maximum value of SAR (measured) = 1.88 mW/g



0 dB = 1.88mW/g

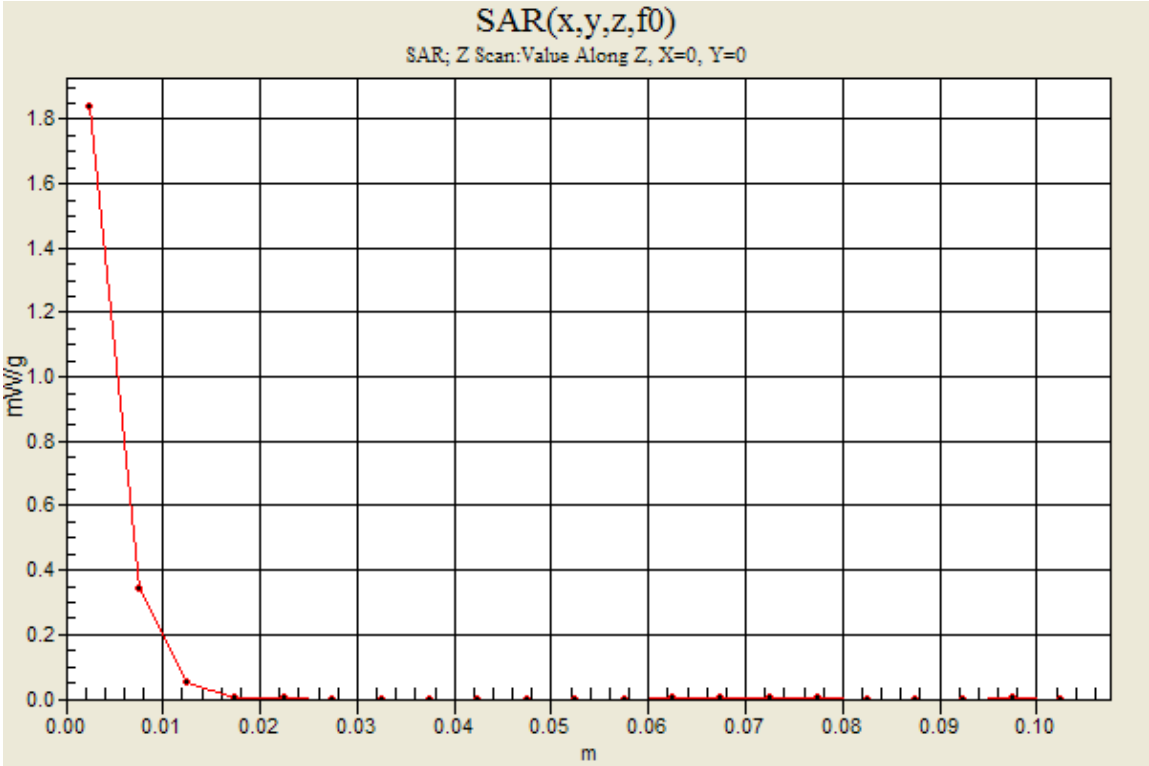
Date/Time: 10/13/2011 2:34:07 AM

Test Laboratory: UL CCS SAR Lab D

WiFi 5GHz_Body

Communication System: 802.11abgn; Frequency: 5745 MHz; Duty Cycle: 1:1

Bottom_Ch149/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Maximum value of SAR (measured) = 1.84 mW/g



16. Simultaneous Transmission SAR Analysis

The Bluetooth's output power is < 25 mW [$60/f_{(GHz)}$], which stand-alone SAR evaluation is not required. Therefore, simultaneous transmission SAR evaluation is not required.

SVDO and SVLTE are NOT supported features on this device

16.1. Body exposure condition (3G + WiFi 2.4 GHz)

Test Position	Data				Data	Sum of 1g SAR (mW/g)
	(1) GSM 850	(2) GSM 1900	(3) UMTS Band V	(4) UMTS Band II	(5) WiFi 2.4G	
Rear	1.000				0.093	1.093
		1.18			0.093	1.273
			0.986		0.093	1.079
				1.150	0.093	1.243
Right	0.347				0.053	0.400
		0.532			0.053	0.585
			0.311		0.053	0.364
				0.560	0.053	0.613
Top	0.397				0	0.397
		0.647			0	0.647
			0.604		0	0.604
				0.522	0	0.522
Bottom	0				1.190	1.190
		0			1.190	1.190
			0		1.190	1.190
				0	1.190	1.190

Conclusions:
Simultaneous transmission SAR is not required because the sum of the 1-g SAR is < 1.6 W/kg

16.2. Body exposure condition (3G + WiFi 5 GHz Bands)

Test Position	Data				Data				Sum of 1g SAR (mW/g)
	(1) GSM 850	(2) GSM 1900	(3) UMTS Band V	(4) UMTS Band II	(5) WiFi 5.2G	(6) WiFi 5.3G	(7) WiFi 5.5G	(8) WiFi 5.8G	
Rear	1.000				0.038				1.038
		1.18			0.038				1.218
			0.986		0.038				1.024
				1.150	0.038				1.188
	1.000					0.113			1.113
		1.18				0.113			1.293
			0.986			0.113			1.099
				1.150		0.113			1.263
	1.000						0.063		1.063
		1.18					0.063		1.243
			0.986				0.063		1.049
				1.150			0.063		1.213
	1.000							0.057	1.057
		1.18						0.057	1.237
			0.986					0.057	1.043
				1.150				0.057	1.207
Right	0.347				0.047				0.394
		0.532			0.047				0.579
			0.311		0.047				0.358
				0.560	0.047				0.607
	0.347					0.058			0.405
		0.532				0.058			0.590
			0.311			0.058			0.369
				0.560		0.058			0.618
	0.347						0.014		0.361
		0.532					0.014		0.546
			0.311				0.014		0.325
				0.560			0.014		0.574
	0.347							0.028	0.375
		0.532						0.028	0.560
			0.311					0.028	0.339
				0.560				0.028	0.588
Top	0.397				0				0.397
		0.647			0				0.647
			0.604		0				0.604
				0.522	0				0.522
	0.397					0			0.397
		0.647				0			0.647
			0.604			0			0.604
				0.522		0			0.522
	0.397						0		0.397
		0.647					0		0.647
			0.604				0		0.604
				0.522			0		0.522
	0.397							0	0.397
		0.647						0	0.647
			0.604					0	0.604
				0.522				0	0.522

Test Position	Data				Data				Sum of 1g SAR (mW/g)
	(1) GSM 850	(2) GSM 1900	(3) UMTS Band V	(4) UMTS Band II	(5) WiFi 5.2G	(6) WiFi 5.3G	(7) WiFi 5.5G	(8) WiFi 5.8G	
Bottom	0				0.522				0.522
		0			0.522				0.522
			0		0.522				0.522
				0	0.522				0.522
	0					1.000			1.000
		0				1.000			1.000
			0			1.000			1.000
				0		1.000			1.000
	0						0.946		0.946
		0					0.946		0.946
			0				0.946		0.946
				0			0.946		0.946
	0							1.110	1.110
		0						1.110	1.110
			0					1.110	1.110
				0				1.110	1.110

Conclusions:

Simultaneous transmission SAR is not required because the sum of the 1-g SAR is < 1.6 W/kg

16.3. Body exposure condition (LTE Bands + WiFi 2.4 GHz)

Test Position	Data		Data	Sum of 1g SAR (mW/g)
	(1) LTE Band 4	(2) LTE Band 17	(3) WiFi 2.4G	
Rear	1.180		0.093	1.273
Right	0.494		0.053	0.547
Top	1.060		0	1.060
Bottom	0		1.190	1.190
Rear		1.170	0.093	1.263
Right		0.805	0.053	0.858
Top		0.201	0.0	0.201
Bottom		0	1.190	1.190

Conclusions:
Simultaneous transmission SAR is not required because the sum of the 1-g SAR is < 1.6 W/kg

16.4. Body exposure condition (LTE Bands + WiFi 5 GHz Bands)

Test Position	Data		Data				Sum of 1g SAR (mW/g)
	(1) LTE Band 4	(2) LTE Band 17	(3) WiFi 5.2G	(4) WiFi 5.3G	(5) WiFi 5.5G	(6) WiFi 5.8G	
Rear	1.18		0.038				1.218
	1.18			0.113			1.293
	1.18				0.063		1.243
	1.18					0.057	1.237
Right	0.494		0.047				0.541
	0.494			0.058			0.552
	0.494				0.014		0.508
	0.494					0.028	0.522
Top	1.060		0				1.060
	1.060			0			1.060
	1.060				0		1.060
	1.060					0	1.060
Bottom	0		0.522				0.522
	0			1.000			1.000
	0				0.946		0.946
	0					1.110	1.110
Rear		1.17	0.038				1.208
		1.17		0.113			1.283
		1.17			0.063		1.233
		1.17				0.057	1.227
Right		0.805	0.047				0.852
		0.805		0.058			0.863
		0.805			0.014		0.819
		0.805				0.028	0.833
Top		0.201	0				0.201
		0.201		0			0.201
		0.201			0		0.201
		0.201				0	0.201
Bottom		0	0.522				0.522
		0		1.000			1.000
		0			0.946		0.946
		0				1.110	1.110

Conclusions:
Simultaneous transmission SAR is not required because the sum of the 1-g SAR is < 1.6 W/kg

17. Appendixes

Refer to separated files for the following appendixes.

17.1. System check plots

17.2. SAR test plots for GSM850

17.3. SAR test plots for GSM1900

17.4. SAR test plots for UMTS Band V

17.5. SAR test plots for UMTS Band II

17.6. SAR test plots for LTE Band 4

17.7. SAR test plots for LTE Band 17

17.8. SAR test plots for WiFi 2.4 GHz

17.9. SAR test plots for WiFi 5 GHz Bands

17.10. Calibration certificate for E-Field Probe EX3DV4 SN 3686

17.11. Calibration certificate for E-Field Probe EX3DV4 SN 3749

17.12. Calibration certificate for E-Field Probe EX3DV4 SN 3772

17.13. Calibration certificate for D750V3 SN 1019

17.14. Calibration certificate for D750V3 SN 1024

17.15. Calibration Certificate for D835V2 SN 4d117

17.16. Calibration Certificate for D1750V2 SN 1050

17.17. Calibration certificate for D1900V2 SN 5d140

17.18. Calibration certificate for D2450V2 SN: 706 with extended cal. Data

17.19. Calibration certificate for D5GHzV2 SN 1003

18. Summary of Test Configurations

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

18.1. Exposure conditions for WWAN and LTE

Configuration	Antenna-to-edge/surface	SAR Required	note
Rear	2.14 mm	Yes	SAR evaluated with the base/bottom of the tablet in direct contact with a flat phantom as per KDB 447498 4) b) i)
Top edge	3.7 mm	Yes	This is the most conservative antenna-to-user distance at edge mode as per KDB 447498 4) b) ii) (2)
Top edge/Right corner at 15°	>3.7 mm	Yes	This is the most conservative antenna-to-user angle at Top-Edge/Right Corner at which proximity sensor is triggered.
Top edge/Rear corner at 41°	1.98 mm	Yes	Since, the Top-Edge of the tablet is rounded, this is the most conservative antenna-to-user distance/angle at edge mode as per KDB 447498 4)B)ii) (2).
Bottom	225.5 mm	No	> 20 cm
Left edge	99.8mm	No	This is not the most conservative antenna-to-user distance at edge mode as per KDB 447498 4) b) ii) (2)
Right edge	35.1 mm	Yes	This is the most conservative antenna-to-user distance at edge mode compared with Left edge

18.2. Exposure conditions for WiFi

Configuration	Antenna-to-edge/surface	SAR Required	note
Rear	8.48 mm	Yes	SAR evaluated with the base/bottom of the tablet in direct contact with a flat phantom as per KDB 447498 4) b) i)
Top edge	227.4 mm	No	> 20 cm
Bottom	4 mm	Yes	This is the most conservative antenna-to-user distance at edge mode as per KDB 447498 4) b) ii) (2)
Left edge	111.7 mm	No	This is not the most conservative antenna-to-user distance at edge mode as per KDB 447498 4) b) ii) (2)
Right edge	44.6 mm	Yes	This is the most conservative antenna-to-user distance at edge mode compared with Left edge