



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

SAR EVALUATION REPORT

For

Cellular/PCS GSM/GPRS/EDGE, PCS WCDMA Tablet with 802.11abgn, BT3.0

**MODEL: GT-P6200
FCC ID: A3LGTP6200**

**REPORT NUMBER: 11I14015-6D2
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Prepared for

**Samsung Electronics Co., Ltd.
18600 Broadwick St.
Rancho Dominguez, CA 90220**

Prepared by

**COMPLIANCE CERTIFICATION SERVICES (UL CCS)
47173 BENICIA STREET
FREMONT, CA 94538, U.S.A.
TEL: (510) 771-1000
FAX: (510) 661-0888**



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Revision History

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--	October 17, 2011	Initial Issue	--
A	October 26, 2011	Updated report based on reviewer's comments. 1. Sec. 16: Added statement that simultaneous Tx for BT is not required.	Sunny Shih
B	November 10, 2011	Updated report based on reviewer's comments. 1. Added Sec. 5.6 Summary table of power reduction dB levels per mode & band. 2. Additional SAR with the EUT corner in contact with the phantom at a 45 degree angle (Top/Sec. Landscape). 3. Updated Sec. 12 Summary of test configurations, to include secondary landscape with 45° angle.	Sunny Shih
C	November 15, 2011	Updated report based on reviewer's comments. 1. Sec. 5: Added device dimensions 2. Sec. 5.2 (p10): Corrected from "10 m" to "10 mm" 3. Sec. 5.4 & 5.5: Updated sensor descriptions. 4. Sec. 5.6 (p12): - Corrected from "Grip sensor" to "IR sensor" - Corrected unit from "mm" to "cm" 5. Redefined test configurations 6. Added Targeted Power Reduction Levels table in sec. 12.1	Sunny Shih
D	November 16, 2011	1. Remove sensor location info, file as separate exhibit	Sunny Shih
D1	November 16, 2011	Revised Section 12	Sunny Shih
D2	November 16, 2011	Revised report based on the reviewer's comments	Sunny Shih

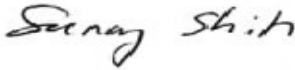
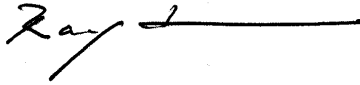
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1. Attestation of Test Results

Applicant:	Samsung Electronics Co., Ltd.		
EUT description:	Cellular/PCS GSM/GPRS/EDGE, PCS WCDMA Tablet with 802.11abgn, BT3.0		
Model number:	GT-P6200		
Device category:	Portable		
Exposure category:	General Population/Uncontrolled Exposure		
Date tested:	9/30 - 10/13, & 11/4, 2011		
FCC Rule Parts	Freq. Range [MHz]	Highest 1-g SAR (W/kg)	Limit (W/kg)
22H	824-849	0.32 W/kg (Head Right Touch) 1.14 W/kg (Body_Rear w/ 0 mm distance & Power back-off)	1.6
24E	1850-1910	1.09 W/kg (Head Right Touch) 1.16 W/kg (Body_Top-edge w/ 5 mm distance)	
15.407	5150-5250	0.02 W/kg (Head Right Touch) 0.71 W/kg (Body_Rear w/ 0 mm distance)	
	5250-5350	0.02 W/kg (Head Right Touch) 0.70 W/kg (Body_Rear w/ 0 mm distance)	
	5500-5700	0.03 W/kg (Head Right Touch) 0.52 W/kg (Body_Rear w/ 0 mm distance)	
15.247	2412-2462	0.02 W/kg (Head Right Touch) 0.54 W/kg (Body_Rear w/ 0 mm distance)	
	5725-5850	0.03 W/kg (Head Right Touch) 0.54 W/kg (Body_Rear w/ 0 mm distance)	
Simultaneous SAR	-	Highest SUM SAR < 1.6 W/Kg: 1.5 W/Kg Highest SPLSR: 0.16	
Applicable Standards			Test Results
FCC OET Bulletin 65 Supplement C 01-01, IEEE STD 1528:2003			Pass
Compliance Certification Services, Inc. (UL CCS) tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by UL CCS based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report. Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by UL CCS and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL CCS will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, any agency of the Federal Government, or any agency of any government (NIST Handbook 150, Annex A). This report is written to support regulatory compliance of the applicable standards stated above. Approved & Released For UL CCS By:  Tested By: 			
Sunny Shih Engineering Team Leader Compliance Certification Services (UL CCS)		Ray Su EMC Associate 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 STD 1528:2003, and the following KDB Test Procedures.

- o 447498 D01 Mobile Portable RF Exposure v04
- o 648474 D01 SAR Handsets Multi Xmitter and Ant, v01r05
- o 941225 D06 Hot Spot SAR v01
- o 941225 D01 SAR test for 3G devices v02
- o 941225 D02 Guidance for 3GPP R6 and R7 HSPA v02v01
- o 941225 D03 SAR Test Reduction GSM GPRS EDGE v01
- o 248227 D01 SAR meas for 802 11abg v01r02
- o 865664 SAR 3 to 6 GHz Rev SAR measurement procedures for transmitters operating in the 3 to 6 GHz range

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	3686	1	24	2012
Thermometer	ERTCO	639-1S	1718	7	19	2012
Data Acquisition Electronics	SPEAG	DAE4	1239	11	17	2011
Data Acquisition Electronics	SPEAG	DAE4	1257	5	3	2012
System Validation Dipole	SPEAG	D835V2	4d117	4	15	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	Giga-tronics	8651A	8651404	5	13	2012
Power Sensor	Giga-tronics	80701A	1834588	5	13	2012
Power Meter	HP	437B	3125U16345	5	13	2012
Power Sensor	HP	8481A	2702A60780	5	13	2012
Amplifier	MITEQ	4D00400600-50-30P	1620606	N/A		
Directional coupler	Werlatone	C8060-102	2141	N/A		

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 "K_Calibration Certificate - Validation Dipole D2450V2 - SN 706" with extended cal. data)
4. Impedance is within 5Ω of calibrated measurement (See Appendix "K_Calibration Certificate - Validation Dipole D2450V2 - SN 706" with extended cal. data)

4.2. Measurement Uncertainty

Specific Absorption Rate (SAR) uncertainty calculation					
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 (Body 1900)	3.40	Normal	1	0.64	2.18
Liquid Permittivity - deviation from target	5.00	Rectangular	1.732	0.6	1.73
Liquid Permittivity - measurement uncertainty (Body 1900)	-4.83	Normal	1	0.6	-2.90
Combined Standard Uncertainty Uc(y) =					10.11
Expanded Uncertainty U, Coverage Factor = 2, > 95 % Confidence =				20.22	%
Expanded Uncertainty U, Coverage Factor = 2, > 95 % Confidence =				1.60	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 (Head 5800)	3.72	Normal	1	0.64	2.38
Liquid Permittivity - deviation from target	10.00	Rectangular	1.732	0.6	3.46
Liquid Permittivity - measurement uncertainty (Body 5200)	7.46	Normal	1	0.6	4.48
Combined Standard Uncertainty Uc(y), %:					11.62
Expanded Uncertainty U, Coverage Factor = 1.96, > 95 % Confidence =				22.77	%
Expanded Uncertainty U, Coverage Factor = 1.96, > 95 % Confidence =				1.78	dB

5. Equipment Under Test

Cellular/PCS GPRS/EDGE, PCS WCDMA Tablet with 802.11abgn, BT3.0 Model: GT-6200	
Mode of operation:	Held to head Body and Wireless Router (Hotspot)
Antenna-to-antenna and antenna-to-edges' separation distances:	Please refer to Section 19 Antenna Locations & Separation Distances
Device dimensions (cm):	19.4 x 12.2 x 10 (length x width x height)

5.1. Band and Air interlaces

Air Interfaces:	GSM, GPRS, EGPRS. WCDMA (Rel 99), HSDPA, HSPA, HSPA+ (DL: 64QAM, UL: QPSK) WiFi: 802.11abgn: 2.4GHz, 5GHz Bluetooth: 2.4 GHz
Uplink Modulations:	GSM Modes: GMSK, 8PSK UMTS Modes: BPSK, QPSK WiFi: 802.11abgn: 2.4GHz, 5GHz Bluetooth: Ver 3.0
GPRS Multi-Slot Class:	33
GPRS Class:	B
DTM Class:	Not support

5.2. Personal Hotspot Mode

The device is capable of personal hotspot mode. The hotspot mode can be enabled by the users. As the tablet has a diagonal size of greater than 20cm, and in accordance with FCC training provided in October 2011 (TCBC Workshop) hot spot SAR is not required for this device.

5.3. Simultaneous Transmission Conditions

No	Simultaneous Transmission	Head	Body	Hot-spot
1	GSM voice + WiFi 2.4 GHz	☒	☒	☐
2	WCDMA Voice + WiFi 2.4 GHz	☒	☒	☐
3	GSM voice + BT	☒	☒	☐
4	WCDMA Voice + BT	☒	☒	☐
5	GSM voice + WiFi 5 GHz	☒	☒	☐
6	WCDMA Voice + WiFi 5 GHz + BT	☒	☒	☐
7	WCDMA Voice + WiFi 5 GHz	☒	☒	☐
8	WCDMA Voice + WiFi 5 GHz + BT	☒	☒	☐
9	GPRS/EGPRS + WiFi 2.4 GHz	☐	☒	☒
10	WCDMA/HSPA + WiFi 2.4 GHz	☐	☒	☒
11	GPRS/EGPRS + WiFi 5 GHz	☐	☒	☐
12	WCDMA/HSPA + WiFi 5 GHz	☐	☒	☐

Notes:

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

5.4. Power Sensor

The following sensors (functioning as proximity sensor) are used for power reduction.

- 1 Grip sensor - Covers the rear and top-edge of the EUT.
- 1 IR sensor - Located at the front of the EUT.

(Refer to Sec. 19 Sensor Locations)

5.5. Power Reduction Implementation

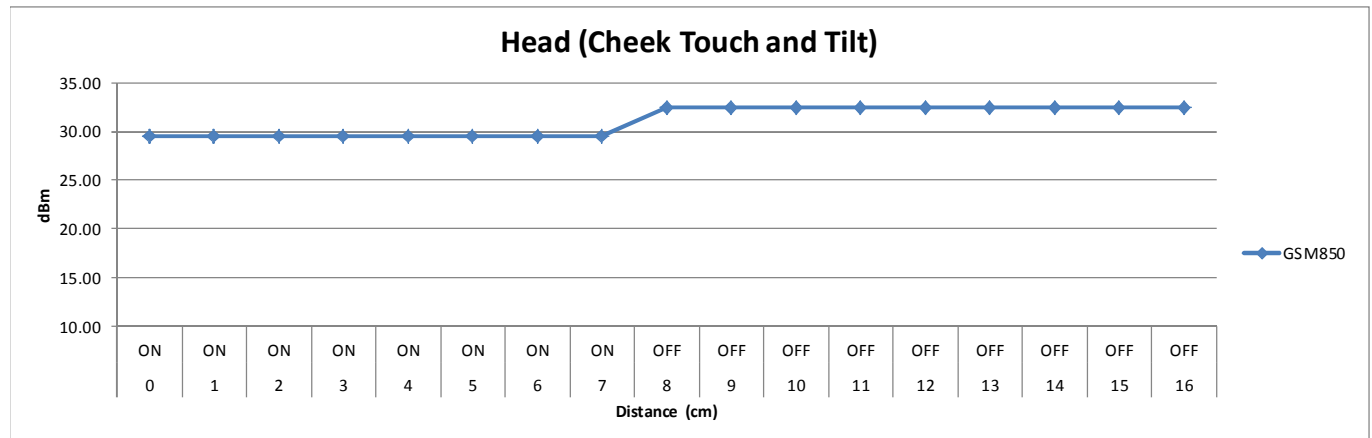
Trigger distances are:

- Grip sensor: 8 mm from rear and 5 mm from top-edge of the EUT
- IR sensor: 70 mm from front of the EUT

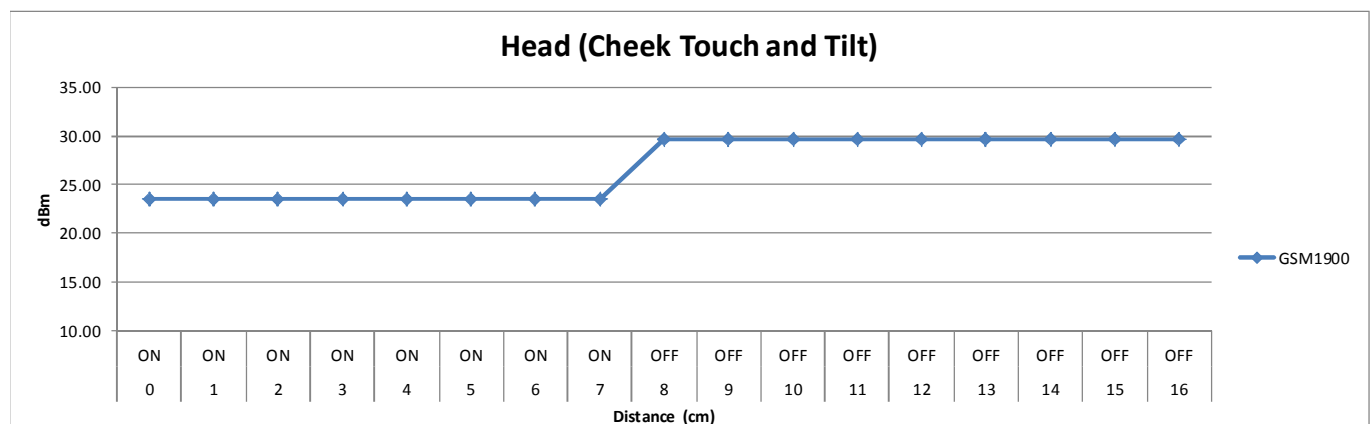
Both Grip and IR sensors have the same levels of power reduction.

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

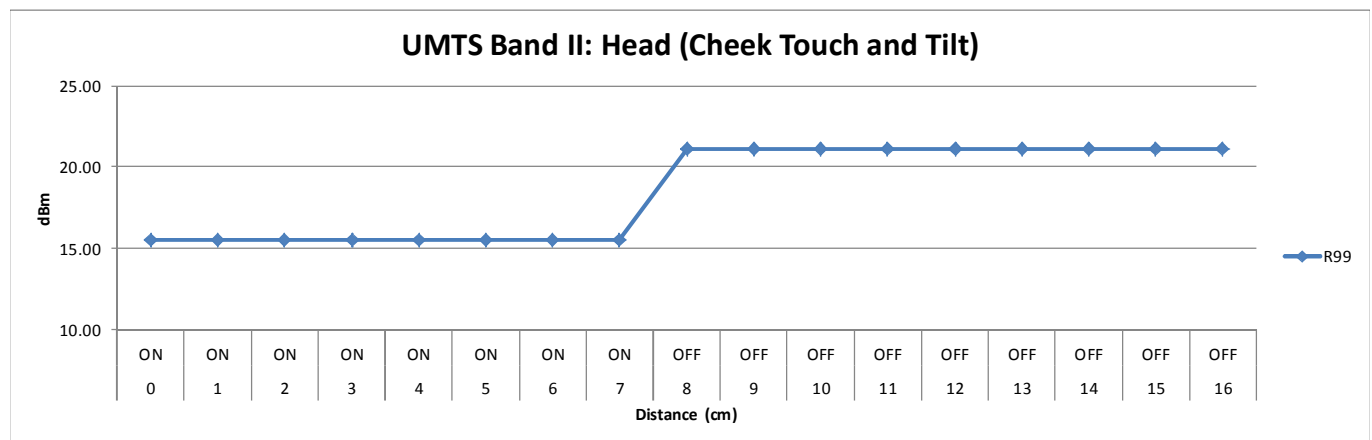
Head (Cheek Touch and Tilt)																		
Distance (cm):	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
IR Sensor with reduced power activation:	ON	ON	ON	ON	ON	ON	ON	ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	
GSM850	29.50	29.50	29.50	29.50	29.50	29.50	29.50	29.50	32.40	32.40	32.40	32.40	32.40	32.40	32.40	32.40	32.40	



Head (Cheek Touch and Tilt)																		
Distance (cm):	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
IR Sensor with reduced power activation:	ON	ON	ON	ON	ON	ON	ON	ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	
GSM1900	23.50	23.50	23.50	23.50	23.50	23.50	23.50	23.50	29.70	29.70	29.70	29.70	29.70	29.70	29.70	29.70	29.70	

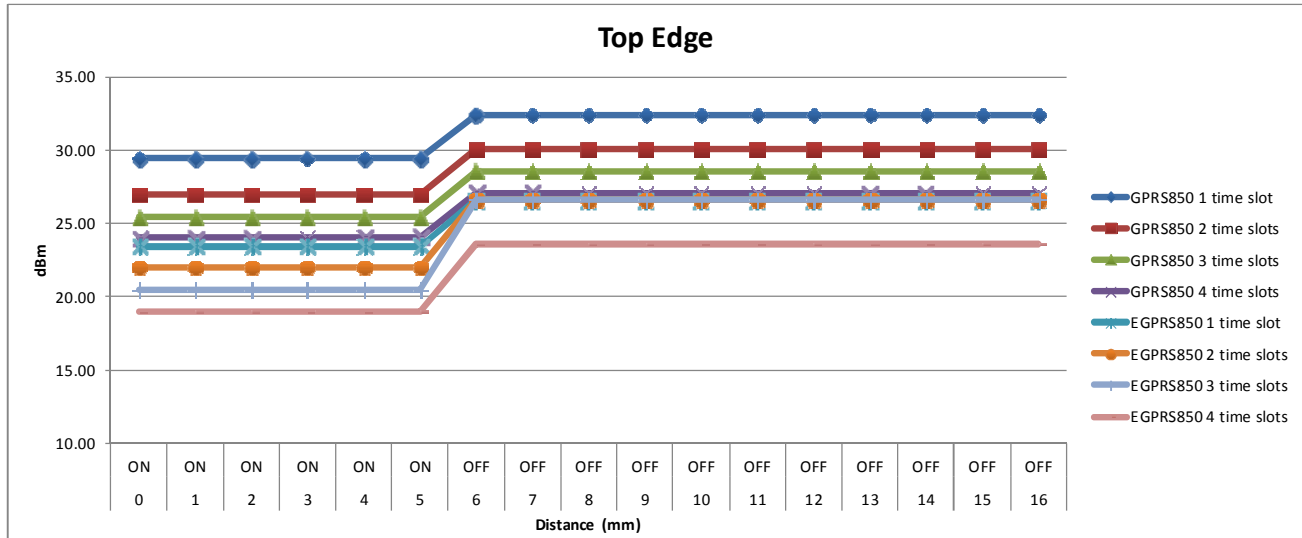


UMTS Band II: Head (Cheek Touch and Tilt)																		
Distance (cm):	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
IR Sensor with reduced power activation:	ON	ON	ON	ON	ON	ON	ON	ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	
R99	15.50	15.50	15.50	15.50	15.50	15.50	15.50	15.50	21.10	21.10	21.10	21.10	21.10	21.10	21.10	21.10	21.10	

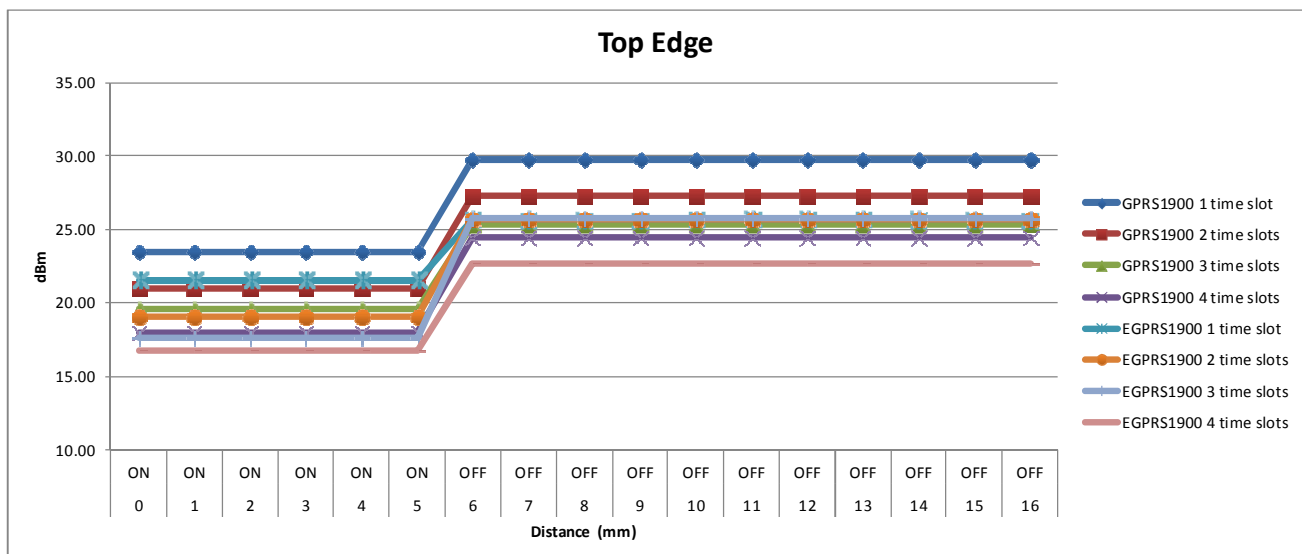


Summary Table of Power Reduction dB Levels per Mode & Band (continued)

Top Edge																		
Distance (mm):	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
Grip Sensor with reduced power activation:	ON	ON	ON	ON	ON	ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	
GPRS850 1 time slot	29.50	29.50	29.50	29.50	29.50	29.50	32.40	32.40	32.40	32.40	32.40	32.40	32.40	32.40	32.40	32.40	32.40	
GPRS850 2 time slots	27.00	27.00	27.00	27.00	27.00	27.00	30.10	30.10	30.10	30.10	30.10	30.10	30.10	30.10	30.10	30.10	30.10	
GPRS850 3 time slots	25.50	25.50	25.50	25.50	25.50	25.50	28.60	28.60	28.60	28.60	28.60	28.60	28.60	28.60	28.60	28.60	28.60	
GPRS850 4 time slots	24.00	24.00	24.00	24.00	24.00	24.00	27.10	27.10	27.10	27.10	27.10	27.10	27.10	27.10	27.10	27.10	27.10	
EGPRS850 1 time slot	23.40	23.40	23.40	23.40	23.40	23.40	26.60	26.60	26.60	26.60	26.60	26.60	26.60	26.60	26.60	26.60	26.60	
EGPRS850 2 time slots	22.00	22.00	22.00	22.00	22.00	22.00	26.60	26.60	26.60	26.60	26.60	26.60	26.60	26.60	26.60	26.60	26.60	
EGPRS850 3 time slots	20.50	20.50	20.50	20.50	20.50	20.50	26.60	26.60	26.60	26.60	26.60	26.60	26.60	26.60	26.60	26.60	26.60	
EGPRS850 4 time slots	19.00	19.00	19.00	19.00	19.00	19.00	23.60	23.60	23.60	23.60	23.60	23.60	23.60	23.60	23.60	23.60	23.60	

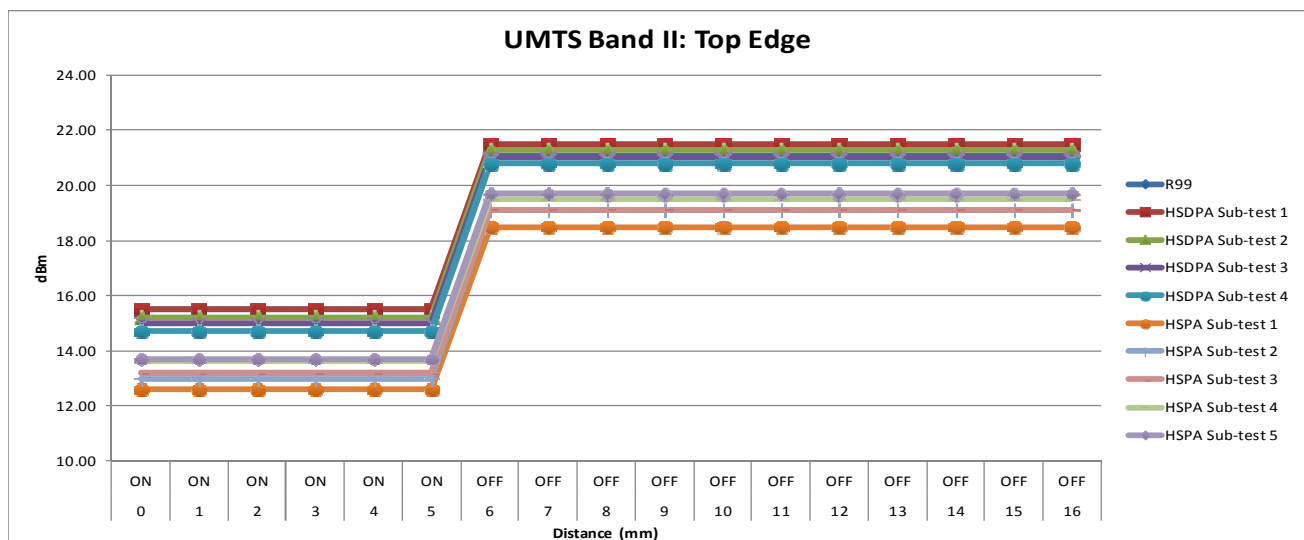


		Top Edge																
Distance (mm):		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Grip Sensor with reduced power activation:		ON	ON	ON	ON	ON	ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
GPRS1900 1 time slot		23.50	23.50	23.50	23.50	23.50	23.50	29.70	29.70	29.70	29.70	29.70	29.70	29.70	29.70	29.70	29.70	29.70
GPRS1900 2 time slots		21.00	21.00	21.00	21.00	21.00	21.00	27.30	27.30	27.30	27.30	27.30	27.30	27.30	27.30	27.30	27.30	27.30
GPRS1900 3 time slots		19.60	19.60	19.60	19.60	19.60	19.60	25.30	25.30	25.30	25.30	25.30	25.30	25.30	25.30	25.30	25.30	25.30
GPRS1900 4 time slots		18.00	18.00	18.00	18.00	18.00	18.00	24.40	24.40	24.40	24.40	24.40	24.40	24.40	24.40	24.40	24.40	24.40
EGPRS1900 1 time slot		21.50	21.50	21.50	21.50	21.50	21.50	25.70	25.70	25.70	25.70	25.70	25.70	25.70	25.70	25.70	25.70	25.70
EGPRS1900 2 time slots		19.00	19.00	19.00	19.00	19.00	19.00	25.70	25.70	25.70	25.70	25.70	25.70	25.70	25.70	25.70	25.70	25.70
EGPRS1900 3 time slots		17.60	17.60	17.60	17.60	17.60	17.60	25.80	25.80	25.80	25.80	25.80	25.80	25.80	25.80	25.80	25.80	25.80
EGPRS1900 4 time slots		16.70	16.70	16.70	16.70	16.70	16.70	22.70	22.70	22.70	22.70	22.70	22.70	22.70	22.70	22.70	22.70	22.70

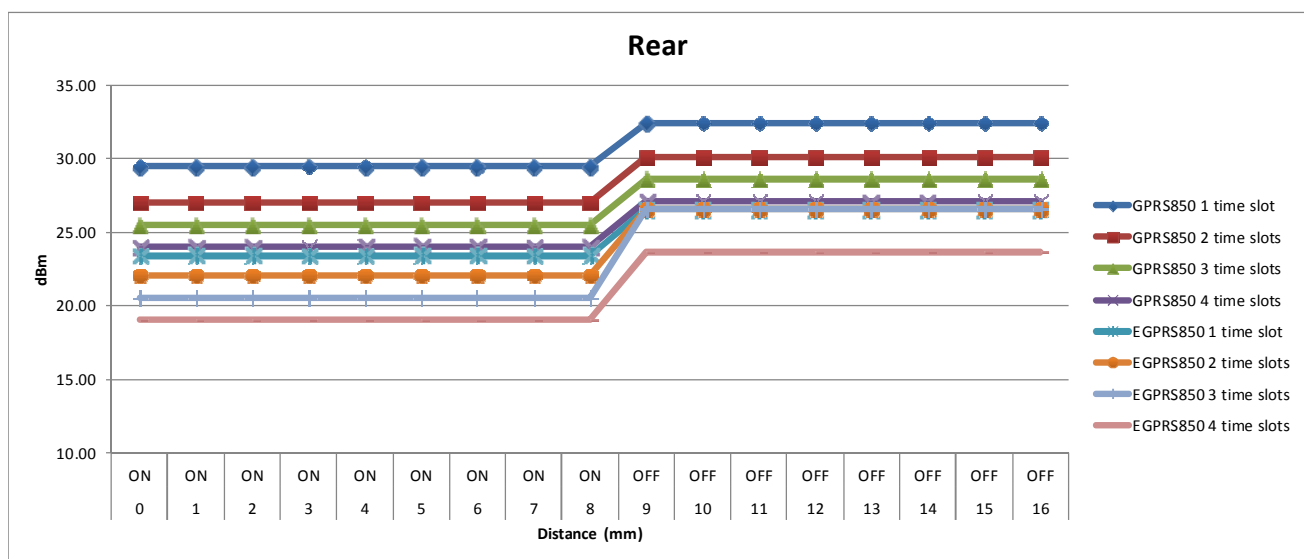


Summary Table of Power Reduction dB Levels per Mode & Band (continued)

UMTS Band II: Top Edge																	
Distance (mm):	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
GripSensor with reduced power activation:	ON	ON	ON	ON	ON	ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
R99	15.50	15.50	15.50	15.50	15.50	15.50	21.10	21.10	21.10	21.10	21.10	21.10	21.10	21.10	21.10	21.10	21.10
HSDPA Sub-test 1	15.50	15.50	15.50	15.50	15.50	15.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50
HSDPA Sub-test 2	15.20	15.20	15.20	15.20	15.20	15.20	21.30	21.30	21.30	21.30	21.30	21.30	21.30	21.30	21.30	21.30	21.30
HSDPA Sub-test 3	15.00	15.00	15.00	15.00	15.00	15.00	21.00	21.00	21.00	21.00	21.00	21.00	21.00	21.00	21.00	21.00	21.00
HSDPA Sub-test 4	14.70	14.70	14.70	14.70	14.70	14.70	20.80	20.80	20.80	20.80	20.80	20.80	20.80	20.80	20.80	20.80	20.80
HSPA Sub-test 1	12.60	12.60	12.60	12.60	12.60	12.60	18.50	18.50	18.50	18.50	18.50	18.50	18.50	18.50	18.50	18.50	18.50
HSPA Sub-test 2	13.00	13.00	13.00	13.00	13.00	13.00	19.10	19.10	19.10	19.10	19.10	19.10	19.10	19.10	19.10	19.10	19.10
HSPA Sub-test 3	13.20	13.20	13.20	13.20	13.20	13.20	19.10	19.10	19.10	19.10	19.10	19.10	19.10	19.10	19.10	19.10	19.10
HSPA Sub-test 4	13.60	13.60	13.60	13.60	13.60	13.60	19.50	19.50	19.50	19.50	19.50	19.50	19.50	19.50	19.50	19.50	19.50
HSPA Sub-test 5	13.70	13.70	13.70	13.70	13.70	13.70	19.70	19.70	19.70	19.70	19.70	19.70	19.70	19.70	19.70	19.70	19.70

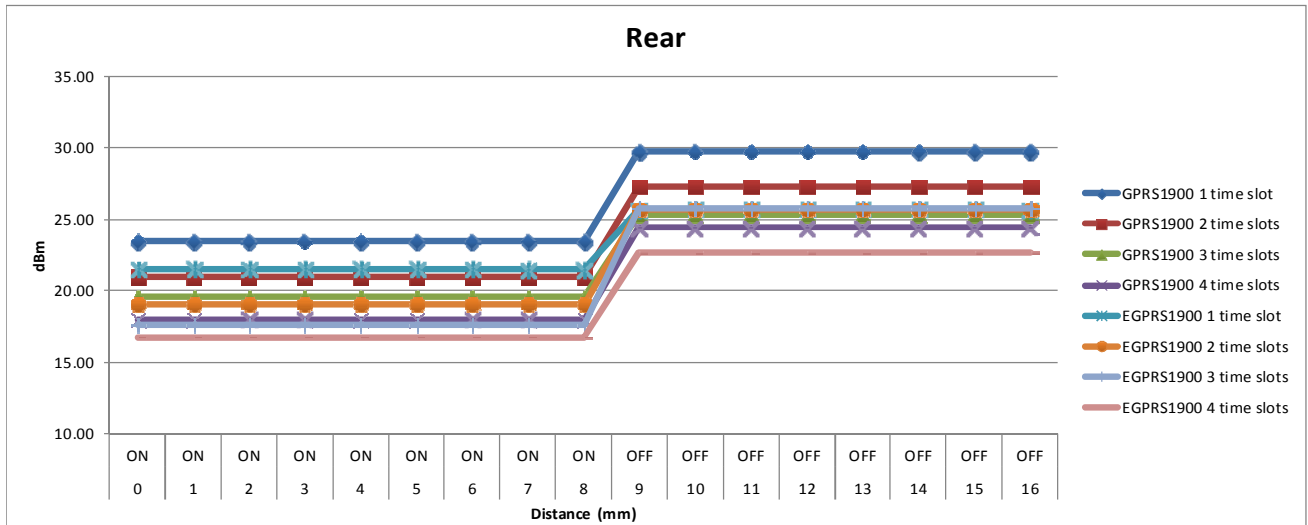


Rear																	
Distance (mm):	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Grip Sensor with reduced power activation:	ON	ON	ON	ON	ON	ON	ON	ON	ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
GPRS850 1 time slot	29.50	29.50	29.50	29.50	29.50	29.50	29.50	29.50	29.50	32.40	32.40	32.40	32.40	32.40	32.40	32.40	32.40
GPRS850 2 time slots	27.00	27.00	27.00	27.00	27.00	27.00	27.00	27.00	27.00	30.10	30.10	30.10	30.10	30.10	30.10	30.10	30.10
GPRS850 3 time slots	25.50	25.50	25.50	25.50	25.50	25.50	25.50	25.50	25.50	28.60	28.60	28.60	28.60	28.60	28.60	28.60	28.60
GPRS850 4 time slots	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	27.10	27.10	27.10	27.10	27.10	27.10	27.10	27.10
EGPRS850 1 time slot	23.40	23.40	23.40	23.40	23.40	23.40	23.40	23.40	23.40	26.60	26.60	26.60	26.60	26.60	26.60	26.60	26.60
EGPRS850 2 time slots	22.00	22.00	22.00	22.00	22.00	22.00	22.00	22.00	22.00	26.60	26.60	26.60	26.60	26.60	26.60	26.60	26.60
EGPRS850 3 time slots	20.50	20.50	20.50	20.50	20.50	20.50	20.50	20.50	20.50	26.60	26.60	26.60	26.60	26.60	26.60	26.60	26.60
EGPRS850 4 time slots	19.00	19.00	19.00	19.00	19.00	19.00	19.00	19.00	19.00	23.60	23.60	23.60	23.60	23.60	23.60	23.60	23.60

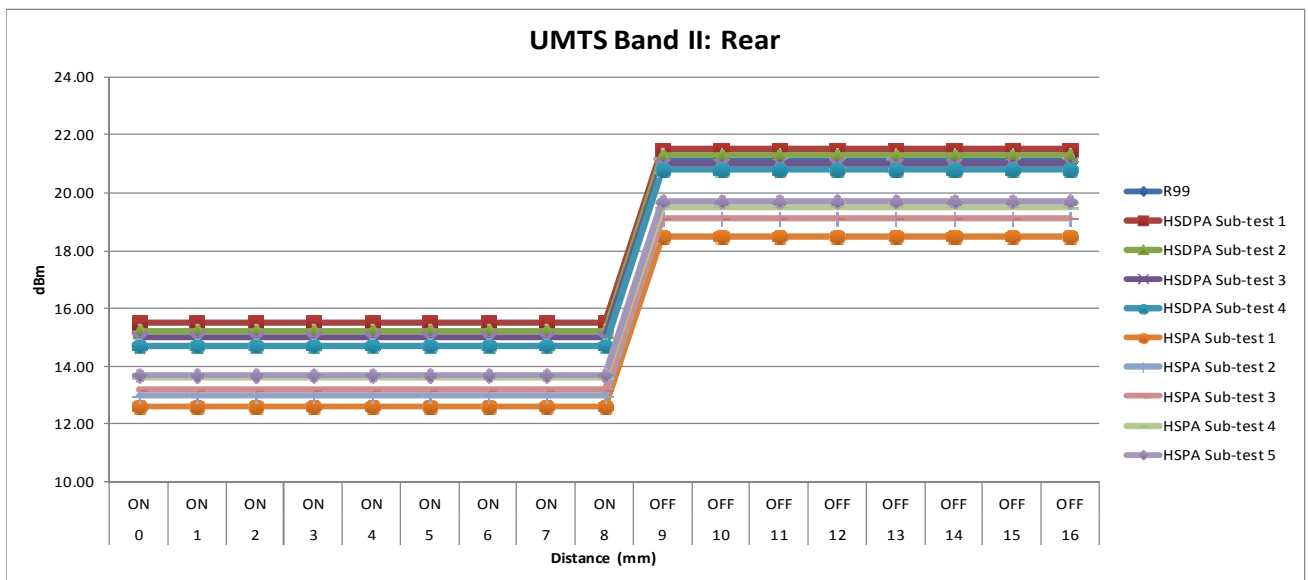


Summary Table of Power Reduction dB Levels per Mode & Band (continued)

		Rear																
Distance (mm):		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Grip Sensor with reduced power activation:		ON	ON	ON	ON	ON	ON	ON	ON	ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
GPRS1900 1 time slot		23.50	23.50	23.50	23.50	23.50	23.50	23.50	23.50	23.50	29.70	29.70	29.70	29.70	29.70	29.70	29.70	29.70
GPRS1900 2 time slots		21.00	21.00	21.00	21.00	21.00	21.00	21.00	21.00	21.00	27.30	27.30	27.30	27.30	27.30	27.30	27.30	27.30
GPRS1900 3 time slots		19.60	19.60	19.60	19.60	19.60	19.60	19.60	19.60	19.60	25.30	25.30	25.30	25.30	25.30	25.30	25.30	25.30
GPRS1900 4 time slots		18.00	18.00	18.00	18.00	18.00	18.00	18.00	18.00	18.00	24.40	24.40	24.40	24.40	24.40	24.40	24.40	24.40
EGPRS1900 1 time slot		21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50	25.70	25.70	25.70	25.70	25.70	25.70	25.70	25.70
EGPRS1900 2 time slots		19.00	19.00	19.00	19.00	19.00	19.00	19.00	19.00	19.00	25.70	25.70	25.70	25.70	25.70	25.70	25.70	25.70
EGPRS1900 3 time slots		17.60	17.60	17.60	17.60	17.60	17.60	17.60	17.60	17.60	25.80	25.80	25.80	25.80	25.80	25.80	25.80	25.80
EGPRS1900 4 time slots		16.70	16.70	16.70	16.70	16.70	16.70	16.70	16.70	16.70	22.70	22.70	22.70	22.70	22.70	22.70	22.70	22.70

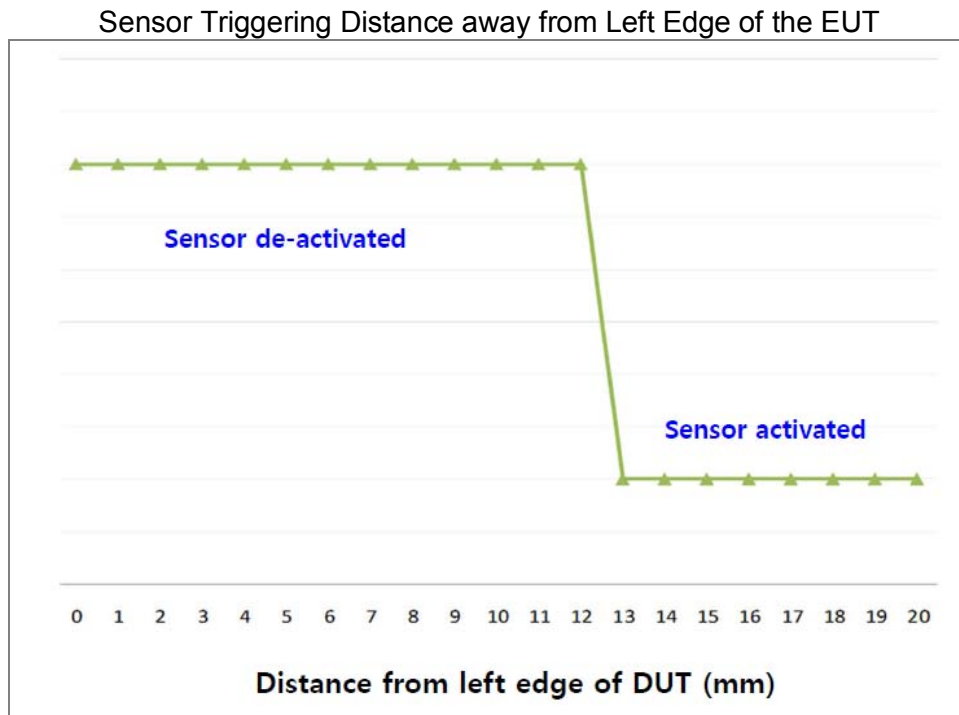


UMTS Band II: Rear																		
Distance (mm):	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
Grip Sensor with reduced power activation:	ON	ON	ON	ON	ON	ON	ON	ON	ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	
R99	15.50	15.50	15.50	15.50	15.50	15.50	15.50	15.50	15.50	21.10	21.10	21.10	21.10	21.10	21.10	21.10	21.10	
HSDPA Sub-test 1	15.50	15.50	15.50	15.50	15.50	15.50	15.50	15.50	15.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50	
HSDPA Sub-test 2	15.20	15.20	15.20	15.20	15.20	15.20	15.20	15.20	15.20	21.30	21.30	21.30	21.30	21.30	21.30	21.30	21.30	
HSDPA Sub-test 3	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	21.00	21.00	21.00	21.00	21.00	21.00	21.00	21.00	
HSDPA Sub-test 4	14.70	14.70	14.70	14.70	14.70	14.70	14.70	14.70	14.70	20.80	20.80	20.80	20.80	20.80	20.80	20.80	20.80	
HSPA Sub-test 1	12.60	12.60	12.60	12.60	12.60	12.60	12.60	12.60	12.60	18.50	18.50	18.50	18.50	18.50	18.50	18.50	18.50	
HSPA Sub-test 2	13.00	13.00	13.00	13.00	13.00	13.00	13.00	13.00	13.00	19.10	19.10	19.10	19.10	19.10	19.10	19.10	19.10	
HSPA Sub-test 3	13.20	13.20	13.20	13.20	13.20	13.20	13.20	13.20	13.20	19.10	19.10	19.10	19.10	19.10	19.10	19.10	19.10	
HSPA Sub-test 4	13.60	13.60	13.60	13.60	13.60	13.60	13.60	13.60	13.60	19.50	19.50	19.50	19.50	19.50	19.50	19.50	19.50	
HSPA Sub-test 5	13.70	13.70	13.70	13.70	13.70	13.70	13.70	13.70	13.70	19.70	19.70	19.70	19.70	19.70	19.70	19.70	19.70	

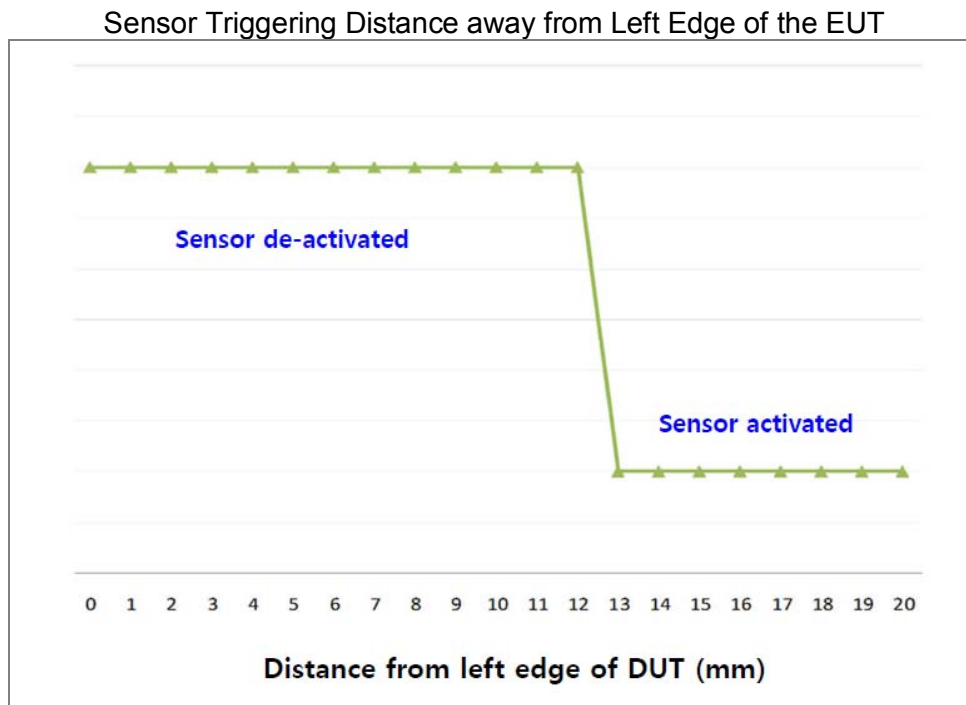


6. Sensor Coverage Area

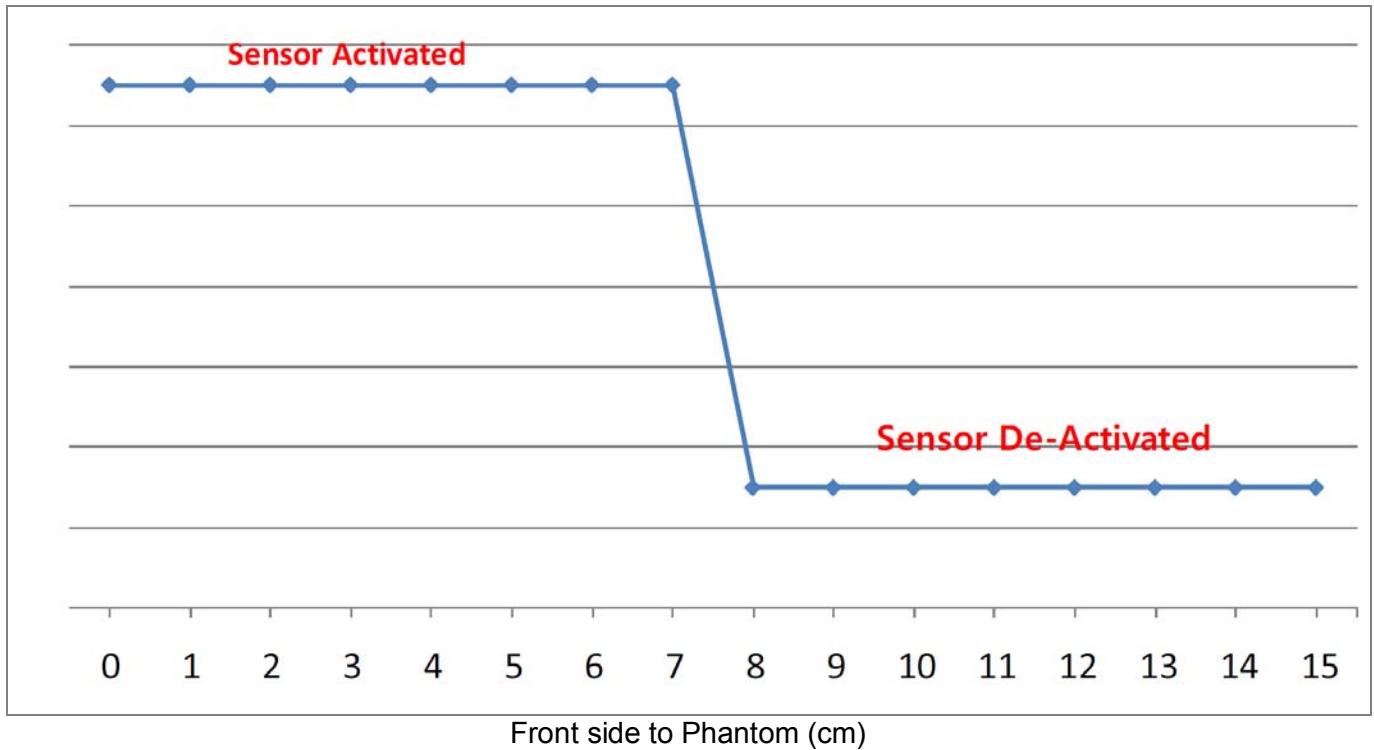
6.1. Rear Sensor



6.2. Top Edge Sensor

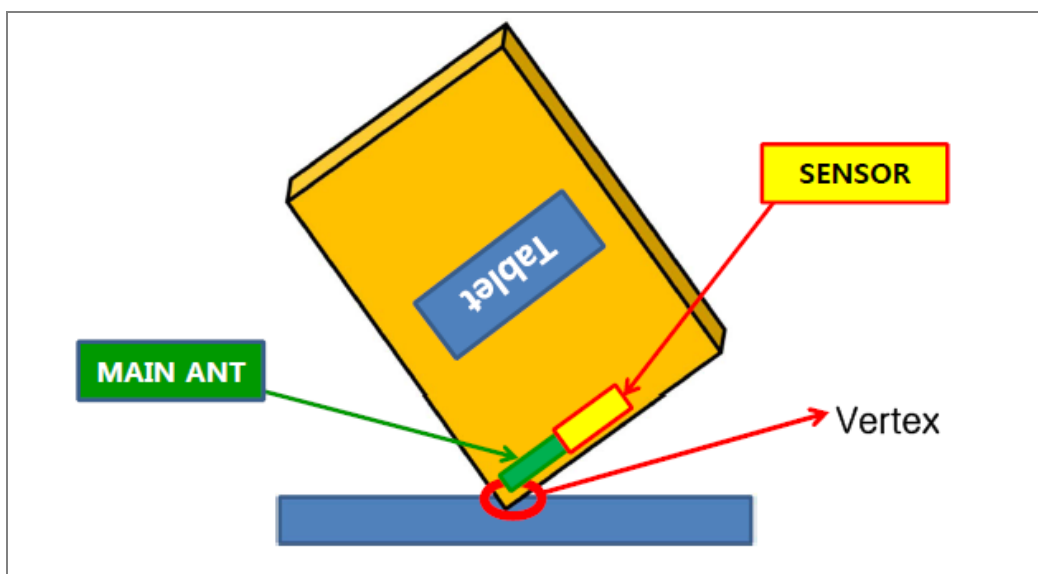
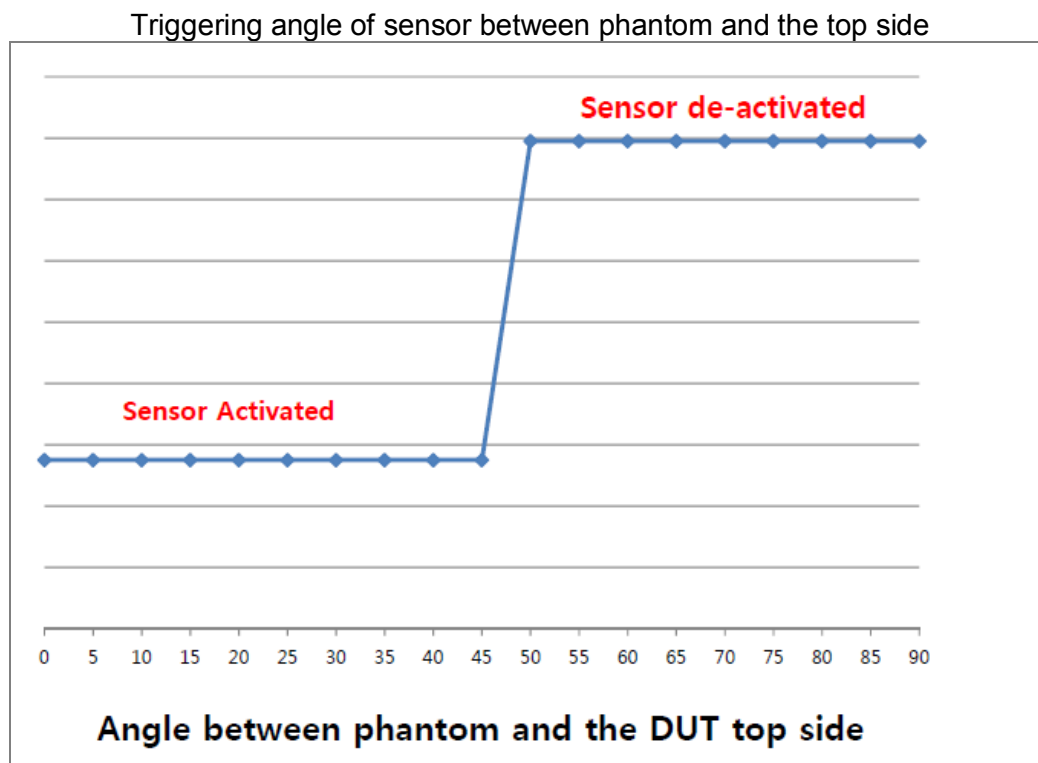


6.3. IR Sensor

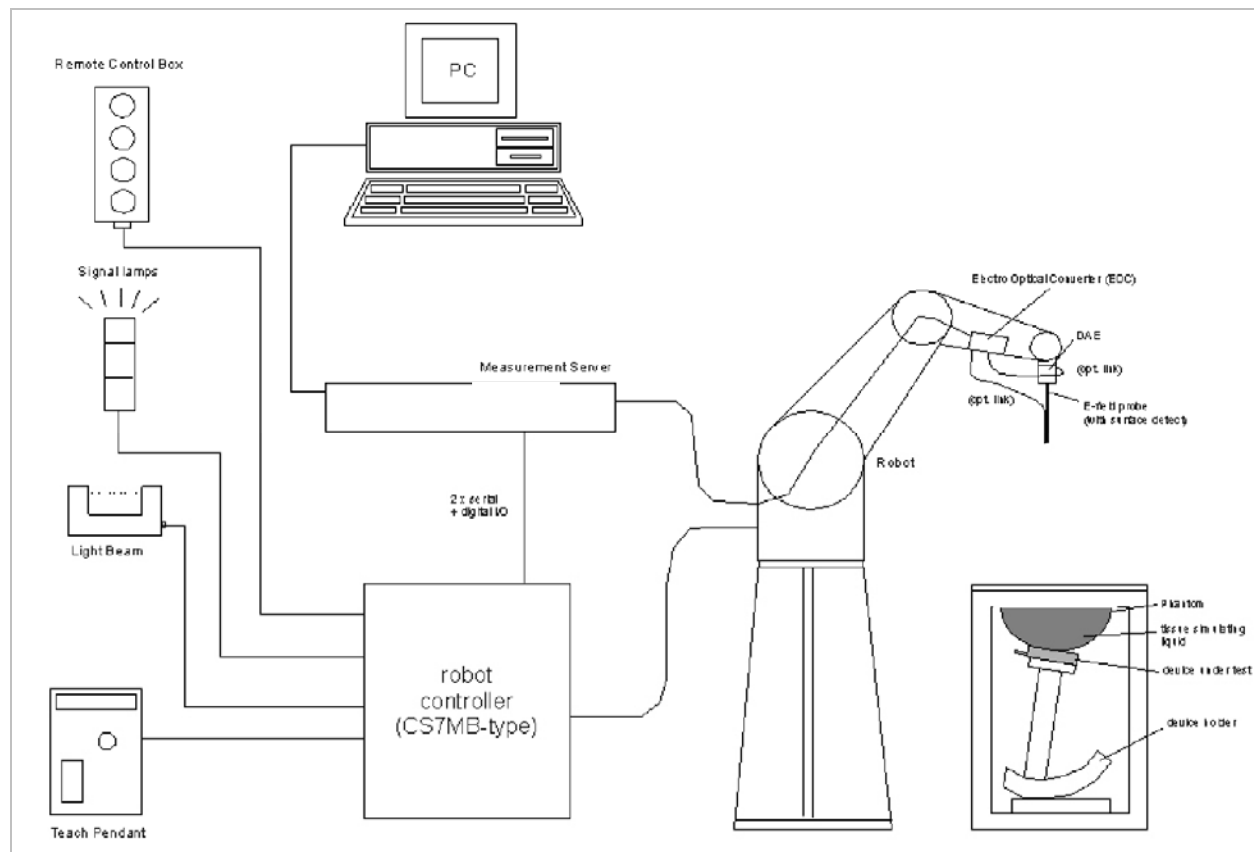


6.4. Vertex Coverage / Top Left Corner

At the top left corner, top edge and rear sensor are not activated. Taken into the account if the device could be easily be used in such a way that the antenna could be in close proximity to the user without the proximity sensor triggering power reduction; for example, held by the left corner or with the left corner resting on the left knee or leg of the user. Based upon the trigger angle for power reduction as illustrated below, additional Vertex at 45 degree SAR evaluation with full power (no power reduction was performed)



7. 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.

8. 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

9. Liquid Parameters

The simulating liquids should be checked at the beginning of a series of SAR measurements to determine if 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 $\pm 5\%$ of the target values. For frequencies in the range of 2–3 GHz and above the measured conductivity should be within $\pm 5\%$ of the target values. The measured relative permittivity tolerance can be relaxed to no more than $\pm 10\%$.

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 $\rho = 1000 \text{ kg/m}^3$)

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 emulators. Dielectric parameters of these liquids were measured using 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 $\rho = 1000 \text{ kg/m}^3$)

9.1. Liquid Check Results

Date	Freq. (MHz)	Liquid Parameters		Measured	Target	Delta (%)	Limit ±(%)	
9/30/2011	Head 2450	e'	38.0744	Relative Permittivity (ϵ_r):	38.07	39.20	-2.87	5
		e"	13.5609	Conductivity (σ):	1.85	1.80	2.63	5
9/30/2011	Body 2450	e'	51.2573	Relative Permittivity (ϵ_r):	51.26	52.70	-2.74	5
		e"	13.9084	Conductivity (σ):	1.89	1.95	-2.84	5
10/4/2011	Head 1900	e'	40.7271	Relative Permittivity (ϵ_r):	40.73	40.00	1.82	5
		e"	13.5676	Conductivity (σ):	1.43	1.40	2.38	5
10/4/2011	Body 1900	e'	52.0817	Relative Permittivity (ϵ_r):	52.08	53.30	-2.29	5
		e"	14.6260	Conductivity (σ):	1.55	1.52	1.66	5
10/5/2011	Body 1900	e'	50.7235	Relative Permittivity (ϵ_r):	50.72	53.30	-4.83	5
		e"	14.8618	Conductivity (σ):	1.57	1.52	3.30	5
10/6/2011	Head 835	e'	42.8600	Relative Permittivity (ϵ_r):	42.86	41.50	3.28	5
		e"	19.2500	Conductivity (σ):	0.89	0.90	-0.69	5
10/6/2011	Body 835	e'	54.6600	Relative Permittivity (ϵ_r):	54.66	55.20	-0.98	5
		e"	21.2100	Conductivity (σ):	0.98	0.97	1.52	5
10/6/2011	Body 1900	e'	51.7855	Relative Permittivity (ϵ_r):	51.79	53.30	-2.84	5
		e"	14.5992	Conductivity (σ):	1.54	1.52	1.47	5
10/7/2011	Head 5200	e'	36.7131	Relative Permittivity (ϵ_r):	36.71	35.99	2.01	10
		e"	16.5390	Conductivity (σ):	4.78	4.65	2.82	5
10/7/2011	Head 5500	e'	36.2038	Relative Permittivity (ϵ_r):	36.20	35.65	1.56	10
		e"	16.7361	Conductivity (σ):	5.12	4.96	3.23	5
10/7/2011	Head 5800	e'	35.7006	Relative Permittivity (ϵ_r):	35.70	35.30	1.13	10
		e"	16.9484	Conductivity (σ):	5.47	5.27	3.72	5
10/9/2011	Body 5200	e'	52.6773	Relative Permittivity (ϵ_r):	52.68	49.02	7.46	10
		e"	18.5108	Conductivity (σ):	5.35	5.29	1.08	5
10/9/2011	Body 5500	e'	52.0627	Relative Permittivity (ϵ_r):	52.06	48.61	7.10	10
		e"	18.8859	Conductivity (σ):	5.78	5.64	2.32	5
10/10/2011	Body 1900	e'	51.0317	Relative Permittivity (ϵ_r):	51.03	53.30	-4.26	5
		e"	14.2150	Conductivity (σ):	1.50	1.52	-1.20	5
10/11/2011	Body 1900	e'	52.5606	Relative Permittivity (ϵ_r):	52.56	53.30	-1.39	5
		e"	14.0387	Conductivity (σ):	1.48	1.52	-2.43	5
10/11/2011	Body 835	e'	54.7800	Relative Permittivity (ϵ_r):	54.78	55.20	-0.76	5
		e"	21.4200	Conductivity (σ):	0.99	0.97	2.53	5
10/12/2011	Body 2450	e'	51.6994	Relative Permittivity (ϵ_r):	51.70	52.70	-1.90	5
		e"	14.2420	Conductivity (σ):	1.94	1.95	-0.50	5
10/12/2011	Body 5200	e'	51.9634	Relative Permittivity (ϵ_r):	51.96	49.02	6.01	10
		e"	18.2589	Conductivity (σ):	5.28	5.29	-0.29	5
10/12/2011	Body 5500	e'	51.3938	Relative Permittivity (ϵ_r):	51.39	48.61	5.72	10
		e"	18.6315	Conductivity (σ):	5.70	5.64	0.95	5
10/12/2011	Body 5800	e'	50.8975	Relative Permittivity (ϵ_r):	50.90	48.20	5.60	10
		e"	19.0560	Conductivity (σ):	6.15	6.00	2.43	5
11/4/2011	Body 835	e'	54.9449	Relative Permittivity (ϵ_r):	54.94	55.20	-0.46	5
		e"	21.2187	Conductivity (σ):	0.99	0.97	1.56	5
11/4/2011	Body 1850	e'	54.8294	Relative Permittivity (ϵ_r):	54.83	53.30	2.87	5
		e"	14.5817	Conductivity (σ):	1.50	1.52	-1.32	5
11/4/2011	Body 1880	e'	54.7415	Relative Permittivity (ϵ_r):	54.74	53.30	2.70	5
		e"	14.6977	Conductivity (σ):	1.54	1.52	1.08	5
11/4/2011	Body 1900	e'	54.6890	Relative Permittivity (ϵ_r):	54.69	53.30	2.61	5
		e"	14.7671	Conductivity (σ):	1.56	1.52	2.64	5
11/4/2011	Body 1910	e'	54.6587	Relative Permittivity (ϵ_r):	54.66	53.30	2.55	5
		e"	14.7983	Conductivity (σ):	1.57	1.52	3.40	5

10. 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 $\pm 10\%$.

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 EX3DV4 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.

Cal. certificate #	Cal. date	System validation dipole	Freq. (MHz)	SAR Avg (mW/g)		
				Tissue:	Head	Body
D835V2-4d117	4/15/11	D835V2	835	1g SAR:	9.64	10.10
				10g SAR:	6.28	6.60
D1900V2-5d140	4/18/11	D1900V2	1900	1g SAR:	41.60	41.20
				10g SAR:	21.50	21.60
D2450V2-706	4/19/10	D2450V2	2450	1g SAR:	51.60	52.40
				10g SAR:	24.40	24.50
D5GHz-1003	8/23/11	D5GHzV2	5200	1g SAR:	76.50	74.50
				10g SAR:	21.80	20.80
		D5GHzV2	5500	1g SAR:	80.90	80.00
				10g SAR:	23.10	22.30
		D5GHzV2	5800	1g SAR:	76.30	76.30
				10g SAR:	21.70	21.20

10.1. System Check Results

Date Tested	System validation dipole	Freq. (MHz)	Measured (Normalized to 1 W)		Target	Delta (%)	Tolerance (%)
09/30/11	D2450V2 Head	2450	1g SAR:	52.80	51.60	2.33	±10
			10g SAR:	24.10	24.40	-1.23	
09/30/11	D2450V2 Body	2450	1g SAR:	51.00	52.40	-2.67	±10
			10g SAR:	23.90	24.50	-2.45	
10/04/11	D1900V2 Head	1900	1g SAR:	38.60	41.60	-7.21	±10
			10g SAR:	20.00	21.50	-6.98	
10/04/11	D1900V2 Body	1900	1g SAR:	37.80	41.20	-8.25	±10
			10g SAR:	19.70	21.60	-8.80	
10/05/11	D1900V2 Body	1900	1g SAR:	39.20	41.20	-4.85	±10
			10g SAR:	20.30	21.60	-6.02	
10/06/11	D835V2 Head	835	1g SAR:	9.49	9.64	-1.56	±10
			10g SAR:	6.20	6.28	-1.27	
10/06/11	D835V2 Body	835	1g SAR:	9.78	10.10	-3.17	±10
			10g SAR:	6.42	6.60	-2.73	
10/06/11	D1900V2 Body	1900	1g SAR:	39.40	41.20	-4.37	±10
			10g SAR:	20.50	21.60	-5.09	
10/07/11	D5GHzV2 Head	5200	1g SAR:	74.20	76.50	-3.01	±10
			10g SAR:	21.40	21.80	-1.83	
10/07/11	D5GHzV2 Head	5500	1g SAR:	78.50	80.90	-2.97	±10
			10g SAR:	22.20	23.10	-3.90	
10/07/11	D5GHzV2 Head	5800	1g SAR:	75.40	76.30	-1.18	±10
			10g SAR:	21.50	21.70	-0.92	
10/09/11	D5GHzV2 Body	5200	1g SAR:	71.60	74.50	-3.89	±10
			10g SAR:	20.50	20.80	-1.44	
10/09/11	D5GHzV2 Body	5500	1g SAR:	79.60	80.00	-0.50	±10
			10g SAR:	22.50	22.30	0.90	
10/10/11	D1900V2 Body	1900	1g SAR:	38.30	41.20	-7.04	±10
			10g SAR:	20.10	21.60	-6.94	
10/11/11	D1900V2 Body	1900	1g SAR:	41.20	41.20	0.00	±10
			10g SAR:	21.80	21.60	0.93	
10/11/11	D835V2 Body	835	1g SAR:	9.78	10.10	-3.17	±10
			10g SAR:	6.42	6.60	-2.73	
10/12/11	D2450V2 Body	2450	1g SAR:	54.70	52.40	4.39	±10
			10g SAR:	25.60	24.50	4.49	
10/12/11	D5GHzV2 Body	5200	1g SAR:	74.30	74.50	-0.27	±10
			10g SAR:	21.20	20.80	1.92	
10/12/11	D5GHzV2 Body	5500	1g SAR:	77.20	80.00	-3.50	±10
			10g SAR:	21.80	22.30	-2.24	
10/12/11	D5GHzV2 Body	5800	1g SAR:	72.50	76.3	-4.98	±10
			10g SAR:	20.60	21.2	-2.83	
11/04/11	D835V2 Body	835	1g SAR:	10.10	10.1	0.00	±10
			10g SAR:	6.62	6.6	0.30	
11/04/11	D1900V2 Body	1900	1g SAR:	42.7	41.2	3.64	±10
			10g SAR:	22.1	21.6	2.31	

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 $\geq 7 \times 7 \times 9$ (above 4.5 GHz) or $5 \times 5 \times 7$ (below 3 GHz) points within a cube whose base faces are centered on the maxima found in a preceding area scan job within the same procedure. When the measurement is done, the Zoom Scan evaluates the averaged SAR for 1 g and 10 g and displays these values next to the job's label.

Step 4: Power drift measurement

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

Step 5: Z-Scan

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. RF Output Power Measurement

12.1. Targeted Power Reduction Levels

Head (Implemented with IR Sensor)

GSM/GPRS		
Normal		Back-Off Level
GSM850	128	3
	190	
	251	
GSM1900	512	6
	661	
	810	
WCDMA		
Normal		Back-Off Level
WCDMA1900	9662	6
	9799	
	9638	

Body (Implemented with Grip Sensor)

GSM/GPRS		
Normal		Back-Off Level
GSM850	128	3
	190	
	251	
GSM1900	512	6
	661	
	810	
WCDMA		
Normal		Back-Off Level
WCDMA1900	9662	6
	9799	
	9638	

12.2. GSM850/1900

GSM (GMSK) Voice

Band	Ch No.	Freq. (MHz)	Avg burst Pwr (dBm)
GSM850	128	824.2	32.5
	190	836.6	32.4
	251	848.8	32.4
GSM1900	512	1850.2	29.7
	661	1880.0	29.7
	810	1909.8	29.7

GSM (GMSK) Voice Mode with Power Back Off (IR Sensor)

Band	Ch No.	Freq. (MHz)	Avg burst Pwr (dBm)
GSM850	128	824.2	29.6
	190	836.6	29.6
	251	848.8	29.5
GSM1900	512	1850.2	23.5
	661	1880.0	23.5
	810	1909.8	23.5

GPRS (GMSK) - Coding Scheme: CS1

Band	Ch No.	f (MHz)	Avg burst Pwr (dBm)							
			1 slot	Frame Avg Pwr	2 slots	Frame Avg Pwr	3 slots	Frame Avg Pwr	4 slots	Frame Avg Pwr
GSM850	128	824.2	32.5	23.5	30.1	24.1	28.7	24.4	27.2	24.2
	190	836.6	32.4	23.4	30.1	24.1	28.6	24.3	27.1	24.1
	251	848.8	32.4	23.4	30.1	24.1	28.6	24.3	27.1	24.1
GSM1900	512	1850.2	29.7	20.7	27.3	21.3	25.3	21.0	24.4	21.4
	661	1880	29.7	20.7	27.3	21.3	25.4	21.1	24.4	21.4
	810	1909.8	29.7	20.7	27.3	21.3	25.3	21.0	24.4	21.4

GPRS (GMSK) - Coding Scheme: CS1 With Power Back Off (Grip Sensor)

Band	Ch No.	f (MHz)	Avg burst Pwr (dBm)							
			1 slot	Frame Avg Pwr	2 slots	Frame Avg Pwr	3 slots	Frame Avg Pwr	4 slots	Frame Avg Pwr
GSM850	128	824.2	29.6	20.6	27.1	21.1	25.6	21.3	24.1	21.1
	190	836.6	29.6	20.6	27.1	21.1	25.6	21.3	24.1	21.1
	251	848.8	29.5	20.5	27.0	21.0	25.5	21.2	24.0	21.0
GSM1900	512	1850.2	23.5	14.5	21.0	15.0	19.6	15.3	18.0	15.0
	661	1880	23.5	14.5	21.0	15.0	19.6	15.3	18.0	15.0
	810	1909.8	23.5	14.5	21.1	15.1	19.6	15.3	18.0	15.0

Notes:

According to KDB 941225 D03 SAR Test Reduction GSM/GPRS/EDGE vo1, noted in the following sections indicated below may be considered to determine SAR test reduction requirements for devices operating in GSM/GPRS/EDGE modes to demonstrate RF exposure compliance.

- Since the source-based time-averaged output power for EGPRS mode is lower than that in the GPRS mode, therefore Body SAR test reduction is applicable for this device.
- Based on output power above and time slots, the following worst-case configurations were chosen for Body SAR testing.
 - GPRS850 3 time slots
 - GPRS1900 4 time slots
 - GPRS850 3 time slots (Power back off)
 - GPRS1900 3 time slots (Power back off)

EGPRS (8PSK, Coding Scheme: MCS5): Class 33

Band	Ch No.	f (MHz)	Avg burst Pwr (dBm)							
			1 slot	Frame Avg Pwr	2 slots	Frame Avg Pwr	3 slots	Frame Avg Pwr	4 slots	Frame Avg Pwr
GSM850	128	824.2	26.7	17.7	26.7	20.7	26.7	22.4	23.7	20.7
	190	836.6	26.6	17.6	26.6	20.6	26.6	22.3	23.7	20.7
	251	848.8	26.6	17.6	26.6	20.6	26.6	22.3	23.6	20.6
GSM1900	512	1850.2	25.8	16.8	25.8	19.8	25.8	21.5	22.8	19.8
	661	1880	25.8	16.8	25.8	19.8	25.8	21.5	22.7	19.7
	810	1909.8	25.7	16.7	25.7	19.7	25.8	21.5	22.7	19.7

EGPRS (8PSK, Coding Scheme: MCS5) with Power Back Off triggered by sensor: Class 33

Band	Ch No.	f (MHz)	Avg burst Pwr (dBm)							
			1 slot	Frame Avg Pwr	2 slots	Frame Avg Pwr	3 slots	Frame Avg Pwr	4 slots	Frame Avg Pwr
GSM850	128	824.2	23.6	14.6	22.1	16.1	20.6	16.3	19.1	16.1
	190	836.6	23.6	14.6	22.1	16.1	20.6	16.3	19.1	16.1
	251	848.8	23.4	14.4	22.0	16.0	20.5	16.2	19.0	16.0
GSM1900	512	1850.2	21.5	12.5	19.0	13.0	17.7	13.4	16.7	13.7
	661	1880	21.6	12.6	19.0	13.0	17.6	13.3	16.7	13.7
	810	1909.8	21.6	12.6	19.1	13.1	17.6	13.3	16.7	13.7

Note(s):

1. Since the source-based time-averaged output power for EGPRS mode is lower than that in the GPRS mode, therefore body SAR test reduction is applicable for this device.

12.3. UMTS (WCDMA) Band II

The data for power back-off is the output power with either grip or IR sensors triggered.

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).

WCDMA General Settings	Mode	Rel99
	Subtest	-
	Loopback Mode	Test Mode 1
	Rel99 RMC	12.2kbps RMC
	Power Control Algorithm	Algorithm2
	β_c/β_d	8/15

Release 99 (RMC, 12.2 kbps)

Band	Mode	UL Ch No.	Freq. (MHz)	Tx Conducted Pwr (dBm)	
				Avg Tx Pwr	with power back-off
UMTS (WCDMA) Band II	Rel 99 (RMC, 12.2 kbps)	9262	1852.4	21.1	15.6
		9400	1880.0	21.1	15.5
		9538	1907.6	21.1	15.6

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			
	β_c	2/15	12/15	15/15	15/15
	β_d	15/15	15/15	8/15	4/15
	Bd (SF)	64			
	β_c/β_d	2/15	12/15	15/8	15/4
	β_{hs}	4/15	24/15	30/15	30/15
	CM (dB)	0	1	1.5	1.5
HSDPA Specific Settings	D _{ACK}	8			
	D _{NAK}	8			
	DCQI	8			
	Ack-Nack repetition factor	3			
	CQI Feedback (Table 5.2B.4)	4ms			
	CQI Repetition Factor (Table 5.2B.4)	2			
	A _{hs} = β_{hs}/β_c	30/15			

HSDPA (Rel 6)

Band	Mode	UL Ch No.	Freq. (MHz)	MPR	Tx Conducted Pwr (dBm)	
					Avg Tx Pwr	with power back-off
UMTS (WCDMA) Band II	Subtest 1	9262	1852.4	0	21.6	15.6
		9400	1880.0	0	21.6	15.6
		9538	1907.6	0	21.5	15.5
	Subtest 2	9262	1852.4	1	21.4	15.3
		9400	1880.0	1	21.3	15.2
		9538	1907.6	1	21.3	15.2
	Subtest 3	9262	1852.4	1.5	21.1	15.0
		9400	1880.0	1.5	21.0	15.0
		9538	1907.6	1.5	21.0	15.0
	Subtest 4	9262	1852.4	1.5	20.9	14.8
		9400	1880.0	1.5	20.8	14.7
		9538	1907.6	1.5	20.8	14.7

Note:

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	Test Mode 1				
	12.2kbps RMC				
	H-Set1				
	HSUPA Loopback				
	Algorithm2				
	β_c	11/15	6/15	15/15	2/15
	β_d	15/15	15/15	9/15	15/15
	β_{ec}	209/225	12/15	30/15	2/15
	β_c/β_d	11/15	6/15	15/9	2/15
	β_{hs}	22/15	12/15	30/15	4/15
	β_{ed}	1309/225	94/75	47/15	56/75
	CM (dB)	1.0	3.0	2.0	3.0
HSDPA Specific Settings	DACK	8			
	DNAK	8			
	DCQI	8			
	Ack-Nack repetition factor	3			
	CQI Feedback (Table 5.2B.4)	4ms			
	CQI Repetition Factor (Table 5.2B.4)	2			
	Ahs = β_{hs}/β_c	30/15			
HSUPA Specific Settings	D E-DPCCH	6	8	8	5
	DHARQ	0	0	0	0
	AG Index	20	12	15	17
	ETFCI (from 34.121 Table C.11.1.3)	75	67	92	71
	Associated Max UL Data Rate kbps	242.1	174.9	482.8	205.8
	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

HSPA (HSDPA/HSUPA)

Band	Mode	UL Ch No.	Freq. (MHz)	MPR	Tx Conducted Pwr (dBm)	
					Avg Tx Pwr	with power back-off
UMTS (WCDMA) Band II	Subtest 1	9262	1852.4	0	19.0	13.1
		9400	1880.0	0	18.5	12.6
		9538	1907.6	0	18.9	13.0
	Subtest 2	9262	1852.4	2	19.1	13.2
		9400	1880.0	2	19.3	13.4
		9538	1907.6	2	19.1	13.0
	Subtest 3	9262	1852.4	1	19.2	13.3
		9400	1880.0	1	19.1	13.2
		9538	1907.6	1	19.6	13.6
	Subtest 4	9262	1852.4	2	19.6	13.6
		9400	1880.0	2	19.6	13.6
		9538	1907.6	2	19.5	13.6
	Subtest 5	9262	1852.4	0	19.7	13.8
		9400	1880.0	0	19.7	13.7
		9538	1907.6	0	19.7	13.7

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.

12.4. Wi-Fi

2.4 GHz

Mode	Channel #	Freq. (MHz)	Conducted Avg Power	
			(dBm)	(mW)
802.11b	1	2412	12.31	17.02
	6	2437	12.23	16.71
	11	2462	12.63	18.32
802.11g	1	2412	11.46	14.00
	6	2437	11.32	13.55
	11	2462	11.64	14.59
802.11n (HT20)	1	2412	11.96	15.70
	6	2437	11.25	13.34
	11	2462	12.04	16.00

5.2 GHz band (5150-5250 MHz)

Mode	Channel #	Freq. (MHz)	Conducted Avg Power	
			(dBm)	(mW)
802.11a	36	5180	8.05	6.38
	40	5200	7.56	5.70
	48	5240	7.29	5.36
802.11n (HT20)	36	5180	7.89	6.15
	40	5200	7.75	5.96
	48	5240	7.52	5.65
802.11n (HT40)	38	5190	8.73	7.46
	46	5230	8.88	7.73

5.3 GHz band (5250-5350 MHz)

Mode	Channel #	Freq. (MHz)	Conducted Avg Power	
			(dBm)	(mW)
802.11a	52	5260	7.88	6.14
	60	5300	8.23	6.65
	64	5320	8.09	6.44
802.11n (HT20)	52	5260	8.02	6.34
	60	5300	8.12	6.49
	64	5320	8.06	6.40
802.11n (HT40)	54	5270	9.38	8.67
	62	5310	8.34	6.82

5.5 GHz band (5500-5700 MHz)

Mode	Channel #	Freq. (MHz)	Conducted Avg Power	
			(dBm)	(mW)
802.11a	100	5500	9.15	8.22
	120	5600	9.12	8.17
	140	5700	9.36	8.63
802.11n (HT20)	100	5500	9.09	8.11
	120	5600	9.04	8.02
	140	5700	9.05	8.04
802.11n (HT40)	102	5510	8.91	7.78
	134	5670	9.69	9.31

5.8 GHz band (5725-5850 MHz)

Mode	Channel #	Freq. (MHz)	Conducted Avg Power	
			(dBm)	(mW)
802.11a	149	5745	9.90	9.77
	157	5785	10.16	10.38
	165	5825	9.46	8.83
802.11n (HT20)	149	5745	9.75	9.44
	157	5785	9.84	9.64
	165	5825	9.38	8.67
802.11n (HT40)	151	5755	10.23	10.54
	159	5795	10.28	10.67

12.5. Bluetooth

Mode	Channel #	Freq. (MHz)	Conducted Avg Power	
			(dBm)	(mW)
GFSK	0	2402	8.29	6.75
	39	2441	8.25	6.68
	78	2480	8.82	7.62
8PSK	0	2402	5.46	3.52
	39	2441	5.94	3.93
	78	2480	6.67	4.65

Note(s):

1. Stand-alone SAR is not required as the output power is $\leq 60/f(\text{GHz})$ mW.

13. Summary of Test Configurations

13.1. Exposure conditions for WWAN

Configuration	Antenna-to-edge/surface	SAR Required	note
Rear	1.91 mm	Yes	
Top edge	4.9 mm	Yes	
Top edge at 45° (Vertex)	➤ 4.9 mm	Yes	With full power
Bottom edge	> 180 mm	No	This is not the most conservative antenna-to-user distance at edge mode. According to KDB 447498 4) b) ii) (2), SAR is required only for the edge with the most conservative exposure conditions.
Left edge	7.1 mm	Yes	
Right edge	>70 mm	No	This is not the most conservative antenna-to-user distance at edge mode. According to KDB 447498 4) b) ii) (2), SAR is required only for the edge with the most conservative exposure conditions.

13.2. Exposure conditions for WLAN

Configuration	Antenna-to-edge/surface	SAR Required	note
Rear	< 0.85 mm	Yes	
Top edge	>121 mm	No	This is not the most conservative antenna-to-user distance at edge mode. According to KDB 447498 4) b) ii) (2), SAR is required only for the edge with the most conservative exposure conditions.
Bottom edge	> 54 mm	No	ditto
Left edge	< 6 mm	Yes	
Right edge	> 107 mm	No	This is not the most conservative antenna-to-user distance at edge mode. According to KDB 447498 4) b) ii) (2), SAR is required only for the edge with the most conservative exposure conditions.

14. Standalone SAR Test Results

14.1. GSM850

Head SAR with IR sensor activated (with power back-off)

Test position	Mode	Ch No.	Freq. (MHz)	Avg Pwr (dBm)	SAR (mW/g)		Note
					1-g	10-g	
Left Touch	Voice	128	824.2	29.6			1
		190	836.6	29.6	0.112	0.076	
		251	848.8	29.5			1
Left Tilt	Voice	128	824.2	29.6			1
		190	836.6	29.6	0.111	0.075	
		251	848.8	29.5			1
Right Touch	Voice	128	824.2	29.6			1
		190	836.6	29.6	0.323	0.185	
		251	848.8	29.5			1
Right Tilt	Voice	128	824.2	29.6			1
		190	836.6	29.6	0.272	0.155	
		251	848.8	29.5			1

Body SAR with Full Power

Test position	Distance (mm)	Mode	Ch No.	Freq. (MHz)	Avg Pwr (dBm)	SAR (mW/g)		Note
						1-g	10-g	
Rear	8	GPRS 3 Slot	128	824.2	28.7			1
			190	836.6	28.6	0.435	0.287	
			251	848.8	28.6			1
Top-edge	5	GPRS 3 Slot	128	824.2	28.7			1
			190	836.6	28.6	0.503	0.329	
			251	848.8	28.6			1
Top-edge @45° (Vertex)	0	GPRS 3 Slot	128	824.2	28.7			
			190	836.6	28.6	0.224	0.109	
			251	848.8	28.6			
Left-edge	0	GPRS 3 Slot	128	824.2	28.7			1
			190	836.6	28.6	0.277	0.167	
			251	848.8	28.6			1

Body SAR with Power Back Off

Test position	Distance (mm)	Mode	Ch No.	Freq. (MHz)	Avg Pwr (dBm)	SAR (mW/g)		Note
						1-g	10-g	
Rear	0	GPRS 3 Slot	128	824.2	25.6	0.862	0.486	
			190	836.6	25.6	1.010	0.568	
			251	848.8	25.5	1.140	0.640	
			251	848.8	25.5	1.120	0.627	2
Top-edge	0	GPRS 3 Slot	128	824.2	25.6			1
			190	836.6	25.6	0.637	0.394	
			251	848.8	25.5			1

Note(s):

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

14.2. GSM1900

Head SAR with IR sensor activated (with power back-off)

Test position	Mode	Ch No.	Freq. (MHz)	Avg Pwr (dBm)	SAR (mW/g)		Note
					1-g	10-g	
Left Touch	Voice	512	1850.2	23.5			1
		661	1880.0	23.5	0.114	0.061	
		810	1909.8	23.5			1
Left Tilt	Voice	512	1850.2	23.5			1
		661	1880.0	23.5	0.108	0.058	
		810	1909.8	23.5			1
Right Touch	Voice	512	1850.2	23.5			1
		661	1880.0	23.5	0.413	0.185	
		810	1909.8	23.5			1
Right Tilt	Voice	512	1850.2	23.5			1
		661	1880.0	23.5	0.371	0.167	
		810	1909.8	23.5			1

Body SAR with Full Power

Test position	Distance (mm)	Mode	Ch No.	Freq. (MHz)	Avg Pwr (dBm)	SAR (mW/g)		Note
						1-g	10-g	
Rear	8	GPRS 4 Slot	512	1850.2	24.4			1
			661	1880.0	24.4	0.712	0.384	
			810	1909.8	24.4			1
Top-edge	5	GPRS 4 Slot	512	1850.2	24.4	0.944	0.461	
			661	1880.0	24.4	0.987	0.479	
			810	1909.8	24.4	0.973	0.473	
Top-edge @45° (Vertex)	0	GPRS 4 Slot	512	1850.2	24.4			
			661	1880.0	24.4	0.648	0.329	
			810	1909.8	24.4			
Left-edge	0	GPRS 4 Slot	512	1850.2	24.4			1
			661	1880.0	24.4	0.372	0.183	
			810	1909.8	24.4			1

Body SAR with Power Back Off

Test position	Distance (mm)	Mode	Ch No.	Freq. (MHz)	Avg Pwr (dBm)	SAR (mW/g)		Note
						1-g	10-g	
Rear	0	GPRS 3 Slot	512	1850.2	19.6	0.889	0.416	
			661	1880.0	19.6	0.922	0.428	
			810	1909.8	19.6	0.960	0.437	
			810	1909.8	19.6	0.954	0.439	2
Top-edge	0	GPRS 3 Slot	512	1850.2	19.6			1
			661	1880.0	19.6	0.640	0.272	
			810	1909.8	19.6			1

Note(s):

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

14.3. UMTS (WCDMA) Band II

Head SAR with IR sensor activated (with power back-back)

Test Position	Mode	UL Ch #.	Freq. (MHz)	Avg Pwr (dBm)	SAR (mW/g)		Note
					1-g	10-g	
Left Touch	R99 (RMC, 12.2 kbps)	9262	1852.4	15.6			1
		9400	1880.0	15.5	0.349	0.184	
		9538	1907.6	15.6			1
Left Tilt	R99 (RMC, 12.2 kbps)	9262	1852.4	15.6			1
		9400	1880.0	15.5	0.321	0.170	
		9538	1907.6	15.6			1
Right Touch	R99 (RMC, 12.2 kbps)	9262	1852.4	15.6	1.090	0.486	
		9400	1880.0	15.5	1.030	0.455	
		9538	1907.6	15.6	1.070	0.470	
Right Tilt	R99 (RMC, 12.2 kbps)	9262	1852.4	15.6	0.938	0.419	
		9400	1880.0	15.5	0.880	0.391	
		9538	1907.6	15.6	0.940	0.415	

Body SAR with Full Power

Test position	Distance (mm)	Mode	Ch No.	Freq. (MHz)	Avg Pwr (dBm)	SAR (mW/g)		Note
						1-g	10-g	
Rear	8	R99 (RMC, 12.2 kbps)	9262	1852.4	21.1	1.010	0.542	
			9400	1880.0	21.1	0.904	0.482	
			9538	1907.6	21.1	0.905	0.481	
Top-edge	5	R99 (RMC, 12.2 kbps)	9262	1852.4	21.1	1.160	0.569	
			9400	1880.0	21.1	1.100	0.540	
			9538	1907.6	21.1	1.160	0.569	
Top-edge @45° (Vertex)	0	R99 (RMC, 12.2 kbps)	9262	1852.4	21.1	0.994	0.503	
			9400	1880.0	21.1	0.922	0.464	
			9538	1907.6	21.1	0.904	0.454	
Left-edge	0	R99 (RMC, 12.2 kbps)	9262	1852.4	21.1			1
			9400	1880.0	21.1	0.522	0.258	
			9538	1907.6	21.1			1

Body SAR with Power Back Off

Test position	Distance (mm)	Mode	Ch No.	Freq. (MHz)	Avg Pwr (dBm)	SAR (mW/g)		Note
						1-g	10-g	
Rear	0	R99 (RMC, 12.2 kbps)	9262	1852.4	15.6	1.130	0.540	
			9262	1852.4	15.6	1.110	0.530	2
			9400	1880.0	15.5	1.060	0.497	
			9538	1907.6	15.6	1.110	0.514	
Top-edge	0	R99 (RMC, 12.2 kbps)	9262	1852.4	15.6			1
			9400	1880.0	15.5	0.765	0.326	
			9538	1907.6	15.6			1

Note(s):

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

14.4. WiFi

Justification for using body phantom for measuring head SAR for WiFi Antenna

Due to the size of the EUT and the position of the WiFi antenna, it was impossible to get meaningful data for head SAR.

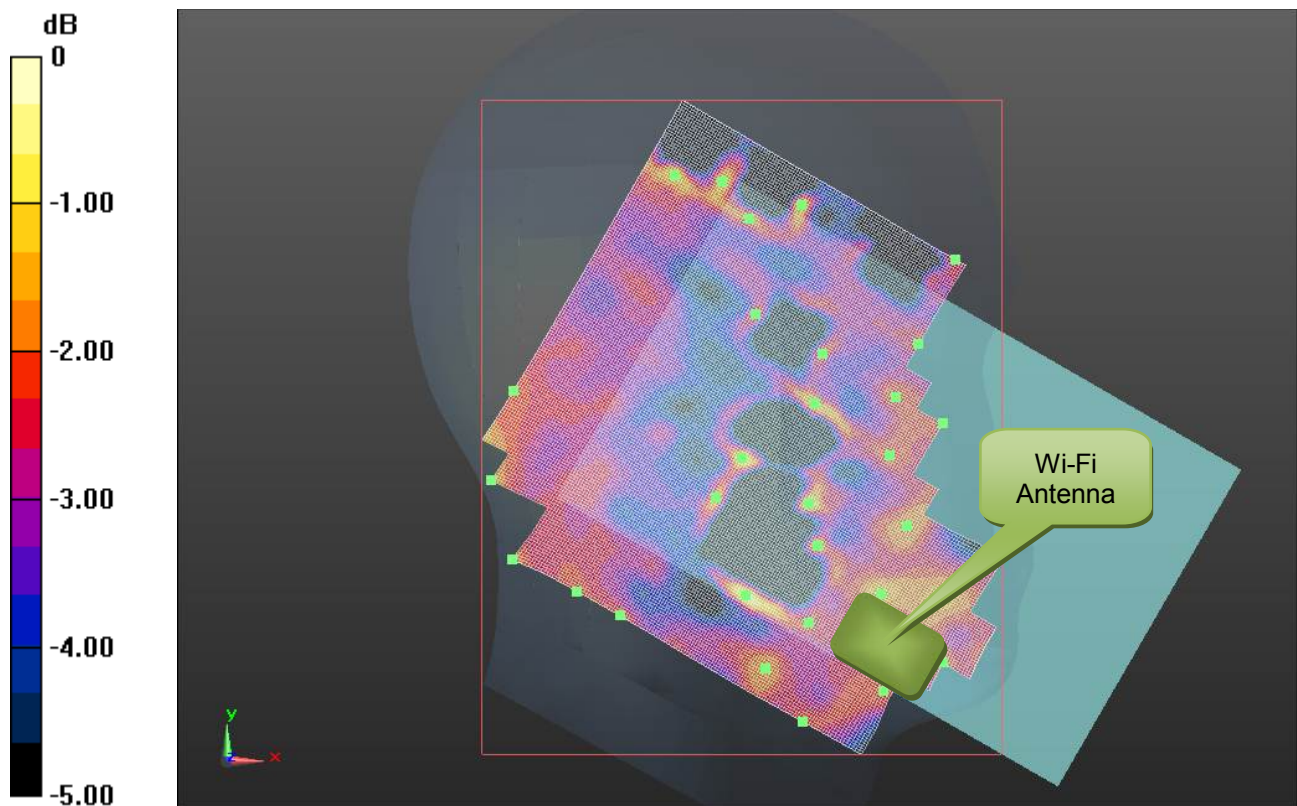
The following procedure was applied (KDB 648474 section on SAR Tests in Mouth and Jaw Regions of the SAM Phantom):

- EUT was positioned with its bottom edge positioned from the flat phantom with the same distance provided by the cheek touching position using SAM.
- The ear reference point (ERP, as defined for SAM) of the device should be positioned $\frac{1}{2}$ cm from the flat phantom shell.
- The lower half of the EUT is secured in the test device holder at a fixed distance below the flat phantom determined by the minimum separation along the lower edge of the EUT in the cheek touching position using SAM.

The EUT protruded too far from the SAM to allow measurement from its bottom edge. The separation distance from the antenna to the phantom was used as a reference. This resulted in the antenna being closer to the phantom when the EUT was mounted on the left. Therefore the left head distance was used as the most conservative.

See section 17 Setup Photos for details on device positioning and photographs showing how separation distances are determined.

The following head SAR plot is provided to show the difficulties associated with using the Flat Phantom for measuring head SAR with this EUT.



0 dB = 0.060mW/g

Head SAR

Mode	Ch No.	Freq. (MHz)	Avg Pwr (dBm)	SAR (mW/g)		Note
				1-g	10-g	
802.11b	1	2412	12.31			1
	6	2437	12.23			
	11	2462	12.63	0.020	0.011	1
802.11a	36	5180	8.05	0.010	0.003	
	40	5200	7.56			1
	48	5240	7.29			1
802.11n HT40	38	5190	8.73			1
	46	5230	8.88	0.019	0.00736	
802.11a	52	5260	7.88			1
	60	5300	8.23			1
	64	5320	8.09	0.00781	0.000948	
802.11n HT40	54	5270	9.38	0.023	0.00666	
	62	5310	8.34			1
802.11a	100	5500	9.15			2
	120	5600	9.12			2
	140	5700	9.36	0.025	0.00773	
802.11n HT40	102	5510	8.91			2
	134	5670	9.69	0.032	0.012	
802.11a	149	5745	9.90			1
	157	5785	10.16			1
	165	5825	9.46	0.031	0.010	
802.11n HT40	151	5755	10.23			1
	159	5795	10.28	0.033	0.013	

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).

2.4GHz Body SAR with 0 mm separation distance

Test position	Mode	Ch No.	Freq. (MHz)	Avg Pwr (dBm)	SAR (mW/g)		Note
					1-g	10-g	
Rear	802.11b	1	2412	12.31			1
		6	2437	12.23			1
		11	2462	12.63	0.539	0.208	
		11	2462	12.63	0.539	0.208	2
Left-edge	802.11b	1	2412	12.31			1
		6	2437	12.23			1
		11	2462	12.63	0.056	0.027	

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. With headset attached.

5GHz Body SAR with 0 mm separation distance

Test position	Mode	Ch No.	Freq. (MHz)	Avg Pwr (dBm)	SAR (mW/g)		Note
					1-g	10-g	
Rear	802.11a	36	5180	8.05	0.522	0.113	
		40	5200	7.56			1
		48	5240	7.29			1
	802.11n (HT40)	38	5190	8.73			1
		46	5230	8.88	0.707	0.154	
Left-edge	802.11a	36	5180	8.05	0.117	0.028	
		40	5200	7.56			1
		48	5240	7.29			1
	802.11n (HT40)	38	5190	8.73			1
		46	5230	8.88	0.184	0.047	
Rear	802.11a	52	5260	7.88			1
		60	5300	8.23	0.455	0.140	
		64	5320	8.09			1
	802.11n (HT40)	54	5270	9.38	0.703	0.156	
		62	5310	8.34			1
Left-edge	802.11a	52	5260	7.88			1
		60	5300	8.23	0.138	0.032	
		64	5320	8.09			1
	802.11n (HT40)	54	5270	9.38	0.203	0.049	
		62	5310	8.34			1
Rear	802.11a	100	5500	9.15	0.382	0.086	
		120	5600	9.12			2
		140	5700	9.36	0.424	0.101	
	802.11n (HT40)	102	5510	8.91			3
		134	5670	9.69	0.516	0.119	
Left-edge	802.11a	100	5500	9.15			2
		120	5600	9.12			2
		140	5700	9.36	0.00548	0.00171	
	802.11n (HT40)	102	5510	8.91			2
		134	5670	9.69	0.209	0.046	
Rear	802.11a	149	5745	9.90			1
		157	5785	10.16	0.478	0.113	
		165	5825	9.46			1
	802.11n (HT40)	151	5755	10.23			1
		159	5795	10.28	0.535	0.126	
Left-edge	802.11a	149	5745	9.90			1
		157	5785	10.16	0.205	0.050	
		165	5825	9.46			1
	802.11n (HT40)	151	5755	10.23			1
		159	5795	10.28	0.214	0.051	

Note(s):

- 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).
- 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).
- Additional SAR was skipped since HT40 was highest power mode and had two measurements at either ends of the band with SAR < 0.8 W/kg

15. Summary of Test Results for Highest 1g SAR

FCC rule part	Technology/Band	Test configuration	Mode	Separation distance (mm)	Highest 1g SAR (W/kg)
22	GSM850	Head: Right Touch	GSM voice	--	0.323
		Body: Rear/Base	GPRS 3 Slot, CS1 (w/ power back off)	0	1.14
24	GSM1900	Head: Right touch	GSM voice	--	0.413
		Body: Top-edge	GPRS 4 Slot, CS1	5	0.987
	UMTS (WCDMA) Band II	Head: Right touch	R99 (RMC, 12.2 kbps)	--	1.09
		Body: Top-edge	R99 (RMC, 12.2 kbps)	5	1.16
15.247	WiFi 2.4 GHz	Head	802.11b	--	0.02
		Body: Rear	802.11b	0	0.539
15.407	WiFi 5.2 GHz	Head	802.11n HT40	--	0.019
		Body: Rear	802.11n HT40	0	0.707
	WiFi 5.3 GHz	Head	802.11n HT40	--	0.023
		Body: Rear	802.11n HT40	0	0.703
	WiFi 5.5 GHz	Head	802.11n HT40	--	0.032
		Body: Rear	802.11n HT40	0	0.516
15.247	WiFi 5.8 GHz	Head	802.11n HT40	--	0.033
		Body: Rear	802.11n HT40	0	0.535

16. Worst-case SAR Plots

Date: 10/6/20

Test Laboratory: UL CCS SAR Lab C

GSM850 Head

Communication System: Generic GSM; Frequency: 836.6 MHz; Duty Cycle: 1:8.30042
Medium parameters used (interpolated): $f = 836.6$ MHz; $\sigma = 0.896$ mho/m; $\epsilon_r = 42.838$; $\rho = 1000$ kg/m³
Phantom section: Right 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 - SN3772; ConvF(8.52, 8.52, 8.52); Calibrated: 5/3/2011
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1257; Calibrated: 5/3/2011
- Phantom: SAM with CRP v5.0; Type: QD000P40CD; Serial: TP1632
- Measurement SW: DASY52, Version 52.6 (2); SEMCAD X Version 14.4.5 (3634)

RHS/Touch_M ch/Area Scan (91x121x1): Measurement grid: dx=15mm, dy=15mm

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

Maximum value of SAR (interpolated) = 0.521 mW/g

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

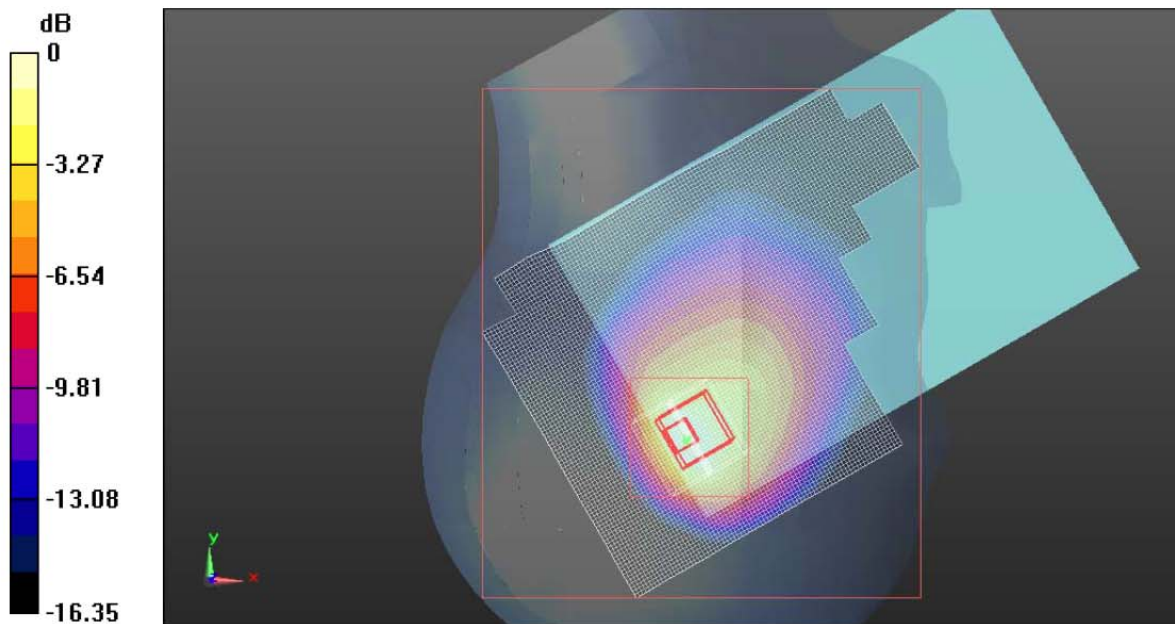
Reference Value = 22.622 V/m; Power Drift = 0.07 dB

Peak SAR (extrapolated) = 0.657 W/kg

SAR(1 g) = 0.323 mW/g; SAR(10 g) = 0.185 mW/g

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

Maximum value of SAR (measured) = 0.405 mW/g



0 dB = 0.410mW/g

Z Plot

Date: 10/6/2011

Test Laboratory: UL CCS SAR Lab C

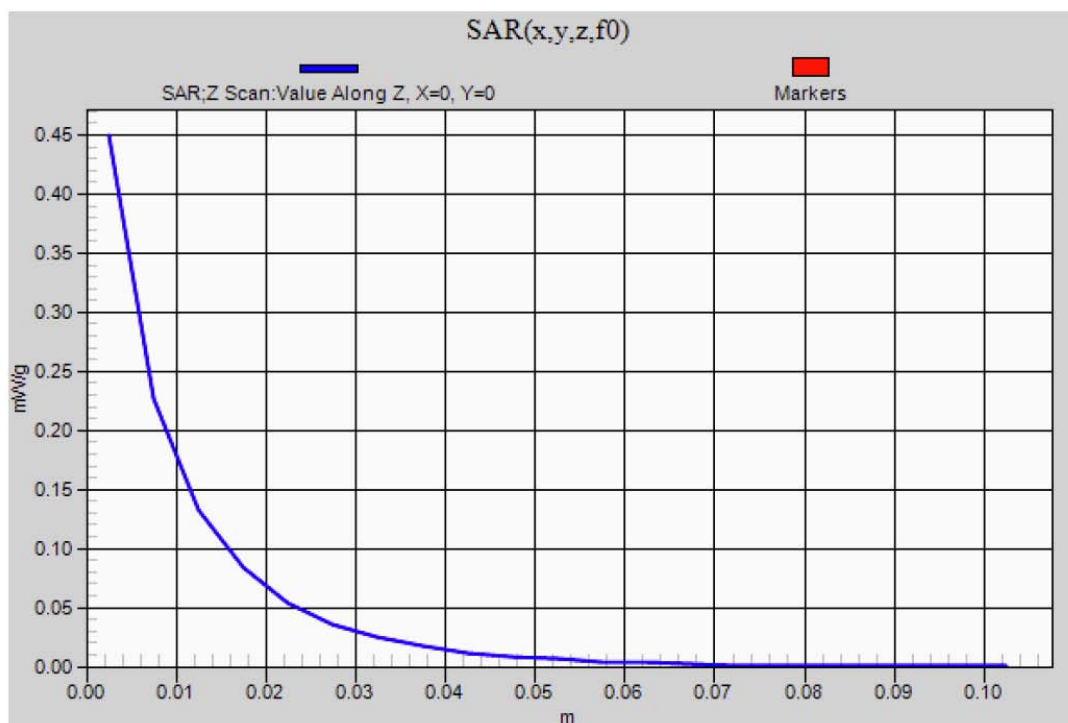
GSM850 Head

Communication System: Generic GSM; Frequency: 836.6 MHz; Duty Cycle: 1:8.30042

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

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

Maximum value of SAR (measured) = 0.450 mW/g



Date: 10/6/2011

Test Laboratory: UL CCS SAR Lab C

GSM850 Body

Communication System: GPRS-FDD (TDMA, GMSK, 3 slot); Frequency: 848.8 MHz; Duty Cycle: 1:2.60016
Medium parameters used (interpolated): $f = 848.8$ MHz; $\sigma = 0.999$ mho/m; $\epsilon_r = 54.522$; $\rho = 1000$ kg/m³
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 - SN3772; ConvF(8.57, 8.57, 8.57); 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 Sn1257; Calibrated: 5/3/2011
- Phantom: ELI v4.0 (A); Type: QDOVA001BB; Serial: 1117
- Measurement SW: DASY52, Version 52.6 (2); SEMCAD X Version 14.4.5 (3634)

Rear with power back off/H ch/Area Scan (101x61x1): Measurement grid: dx=15mm, dy=15mm

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

Maximum value of SAR (interpolated) = 1.732 mW/g

Rear with power back off/H ch/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

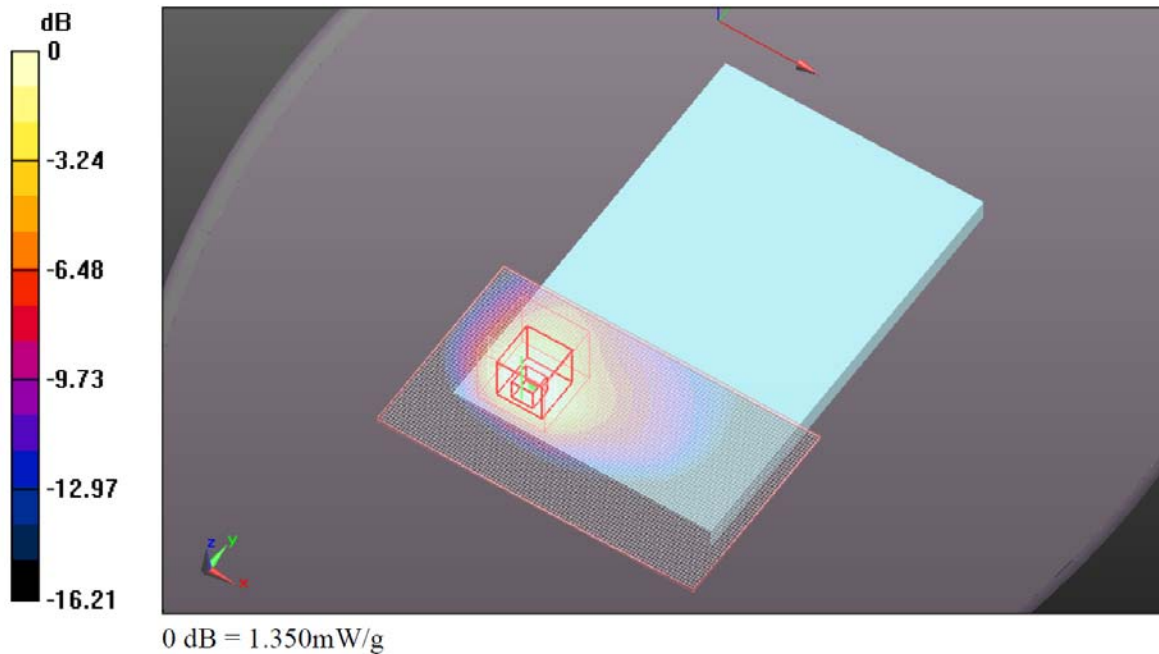
Reference Value = 39.791 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 2.096 W/kg

SAR(1 g) = 1.14 mW/g; SAR(10 g) = 0.640 mW/g

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

Maximum value of SAR (measured) = 1.349 mW/g



Date: 10/6/2011

Test Laboratory: UL CCS SAR Lab C

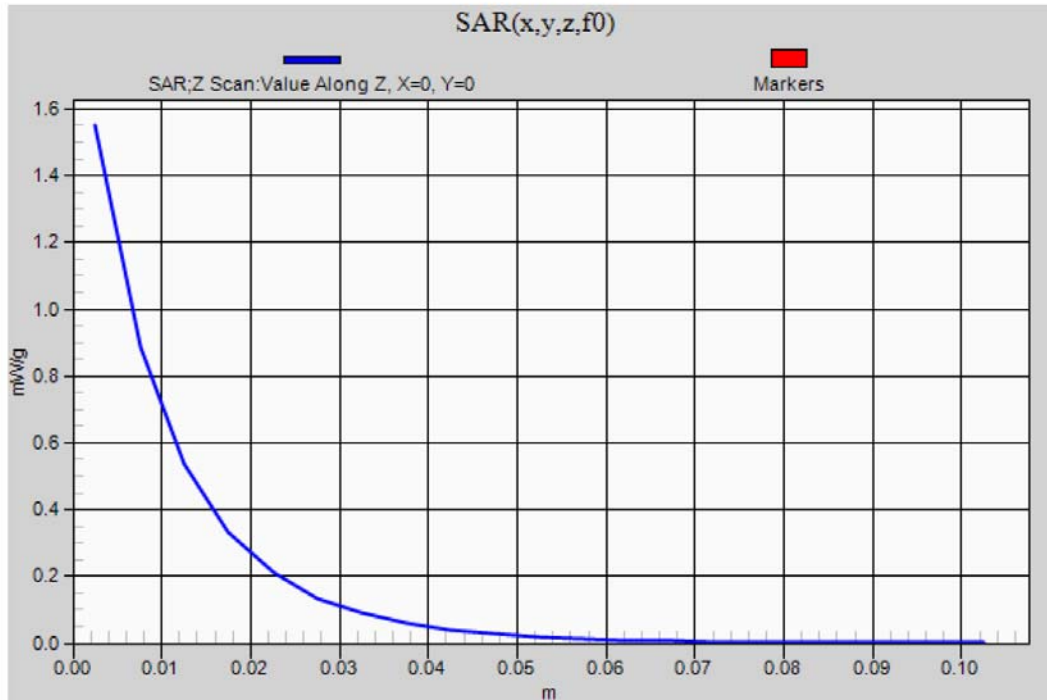
GSM850 Body

Communication System: GPRS-FDD (TDMA, GMSK, 3 slot); Frequency: 848.8 MHz; Duty Cycle: 1:2.60016

Rear with power back off/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) = 1.551 mW/g



Date: 10/4/2011

Test Laboratory: UL CCS SAR Lab C

PCS1900 Head

Communication System: Generic GSM; Frequency: 1880 MHz; Duty Cycle: 1:8.30042
Medium parameters used: $f = 1880$ MHz; $\sigma = 1.412$ mho/m; $\epsilon_r = 40.811$; $\rho = 1000$ kg/m³
Phantom section: Right Section

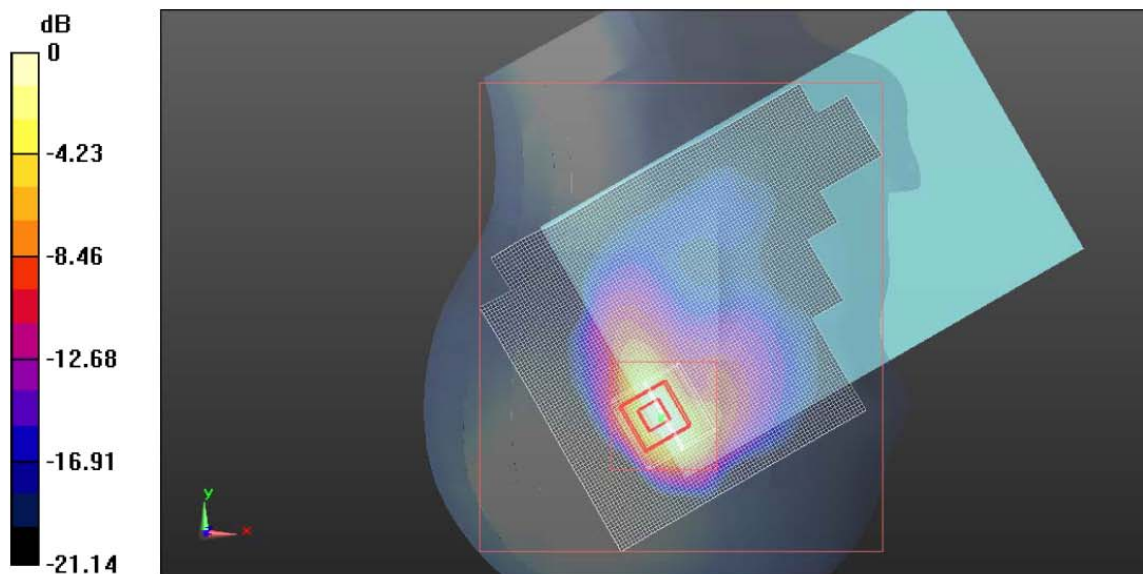
Room Ambient Temperature: 24.0 deg. C; Liquid Temperature: 23.0 deg. C

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 - SN3772; ConvF(7.17, 7.17, 7.17); Calibrated: 5/3/2011
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1257; Calibrated: 5/3/2011
- Phantom: SAM with CRP v5.0; Type: QD000P40CD; Serial: TP1632
- Measurement SW: DASY52, Version 52.6 (2); SEMCAD X Version 14.4.5 (3634)

RHS/Touch_M ch/Area Scan (91x121x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.607 mW/g

RHS/Touch_M ch/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 19.622 V/m; Power Drift = 0.17 dB
Peak SAR (extrapolated) = 0.828 W/kg
SAR(1 g) = 0.413 mW/g; SAR(10 g) = 0.185 mW/g
Maximum value of SAR (measured) = 0.582 mW/g



0 dB = 0.580mW/g

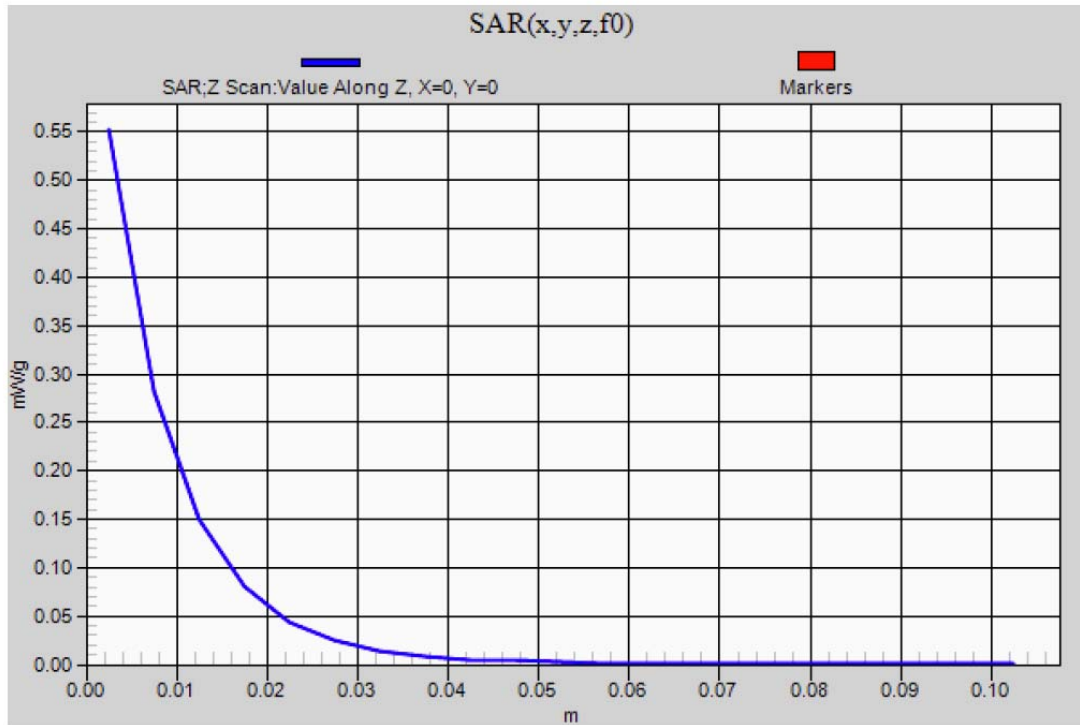
Date: 10/4/2011

Test Laboratory: UL CCS SAR Lab C

PCS1900 Head

Communication System: Generic GSM; Frequency: 1880 MHz; Duty Cycle: 1:8.30042

RHS/Touch_M ch/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Maximum value of SAR (measured) = 0.552 mW/g



Date: 10/5/2011

Test Laboratory: UL CCS SAR Lab C

PCS1900 Body

Communication System: GPRS-FDD (TDMA, GMSK, 4 slot); Frequency: 1880 MHz; Duty Cycle: 1:1.99986
Medium parameters used: $f = 1880 \text{ MHz}$; $\sigma = 1.547 \text{ mho/m}$; $\epsilon_r = 50.801$; $\rho = 1000 \text{ kg/m}^3$
Phantom section: Flat Section

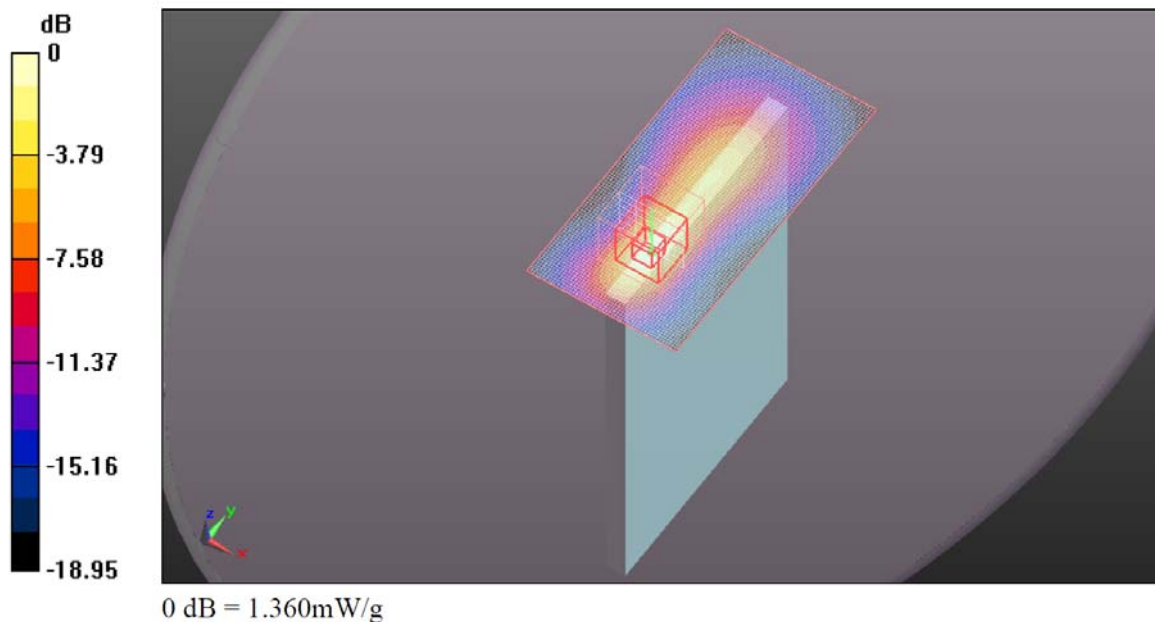
Room Ambient Temperature: 24.0 deg. C; Liquid Temperature: 23.0 deg. C

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 - SN3772; ConvF(6.76, 6.76, 6.76); Calibrated: 5/3/2011
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1257; Calibrated: 5/3/2011
- Phantom: ELI v4.0 (B); Type: QDOVA001BB; Serial: 1121
- Measurement SW: DASY52, Version 52.6 (2);SEMCAD X Version 14.4.5 (3634)

Top-edge/M ch/Area Scan (51x101x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$
Maximum value of SAR (interpolated) = 1.433 mW/g

Top-edge/M ch/Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$
Reference Value = 22.657 V/m; Power Drift = -0.19 dB
Peak SAR (extrapolated) = 1.798 W/kg
SAR(1 g) = 0.987 mW/g; SAR(10 g) = 0.479 mW/g
Maximum value of SAR (measured) = 1.362 mW/g



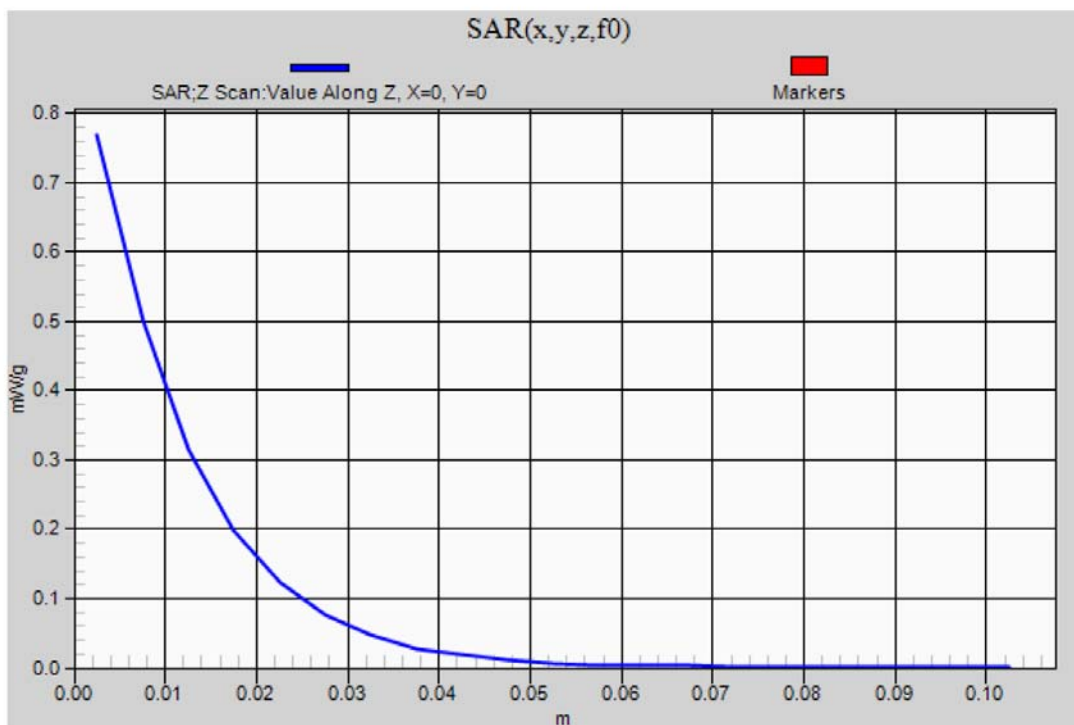
Date: 10/5/2011

Test Laboratory: UL CCS SAR Lab C

PCS1900 Body

Communication System: GPRS-FDD (TDMA, GMSK, 4 slot); Frequency: 1880 MHz; Duty Cycle: 1:1.99986

Top-edge/M ch/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Maximum value of SAR (measured) = 0.769 mW/g



Date: 10/4/2011

Test Laboratory: UL CCS SAR Lab C

UMTS band II Head

Communication System: UMTS-FDD (WCDMA); Frequency: 1852.4 MHz; Duty Cycle: 1:1
Medium parameters used (interpolated): $f = 1852.4$ MHz; $\sigma = 1.382$ mho/m; $\epsilon_r = 40.929$; $\rho = 1000$ kg/m³
Phantom section: Right 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 - SN3772; ConvF(7.17, 7.17, 7.17); Calibrated: 5/3/2011
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1257; Calibrated: 5/3/2011
- Phantom: SAM with CRP v5.0; Type: QD000P40CD; Serial: TP1632
- Measurement SW: DASY52, Version 52.6 (2); SEMCAD X Version 14.4.5 (3634)

RHS/Touch_L ch/Area Scan (91x121x1): Measurement grid: dx=15mm, dy=15mm

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

Maximum value of SAR (interpolated) = 1.472 mW/g

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

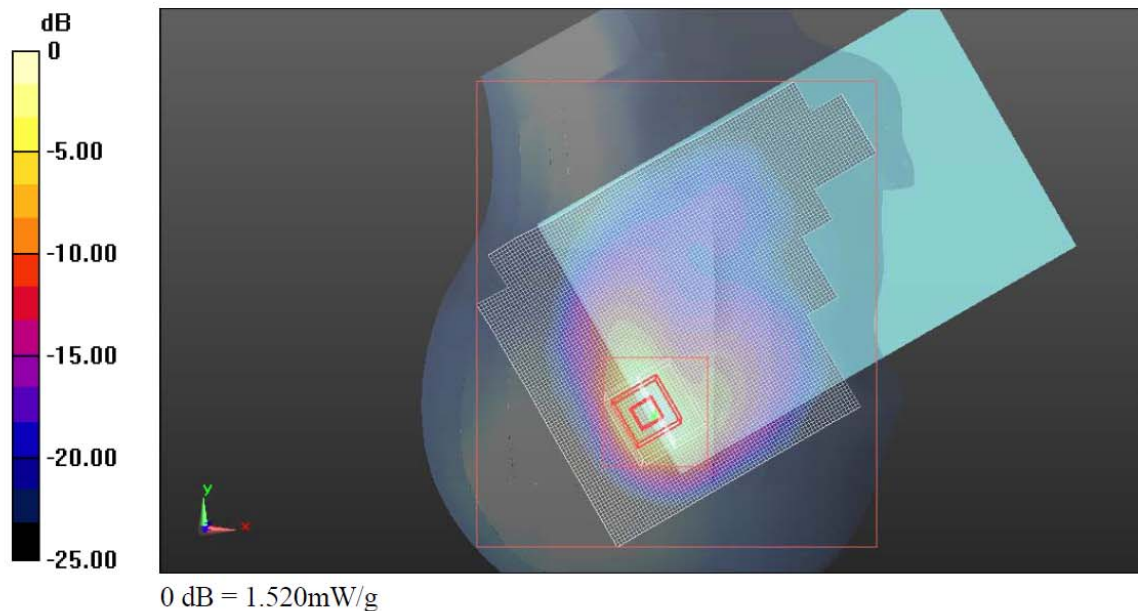
Reference Value = 29.927 V/m; Power Drift = 0.16 dB

Peak SAR (extrapolated) = 2.225 W/kg

SAR(1 g) = 1.09 mW/g; SAR(10 g) = 0.486 mW/g

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

Maximum value of SAR (measured) = 1.525 mW/g



Date: 10/4/2011

Test Laboratory: UL CCS SAR Lab C

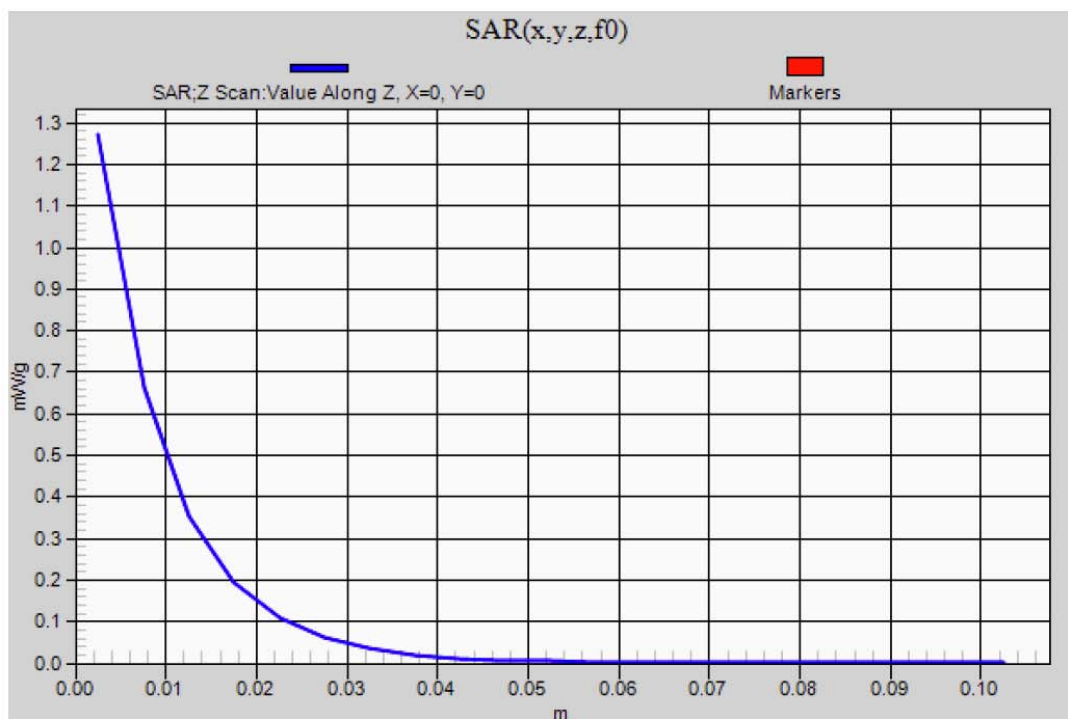
UMTS band II Head

Communication System: UMTS-FDD (WCDMA); Frequency: 1852.4 MHz; Duty Cycle: 1:1

RHS/Touch_L 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) = 1.271 mW/g



Date: 10/4/2011

Test Laboratory: UL CCS SAR Lab C

UMTS band II Body

Communication System: UMTS-FDD (WCDMA); Frequency: 1907.6 MHz; Duty Cycle: 1:1
Medium parameters used (interpolated): $f = 1907.6$ MHz; $\sigma = 1.556$ mho/m; $\epsilon_r = 52.058$; $\rho = 1000$ kg/m³
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 - SN3772; ConvF(6.76, 6.76, 6.76); 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 Sn1257; Calibrated: 5/3/2011
- Phantom: ELI v4.0 (B); Type: QDOVA001BB; Serial: 1121
- Measurement SW: DASY52, Version 52.6 (2); SEMCAD X Version 14.4.5 (3634)

Top-edge/H ch/Area Scan (51x101x1): Measurement grid: dx=15mm, dy=15mm

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

Maximum value of SAR (interpolated) = 1.627 mW/g

Top-edge/H ch/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

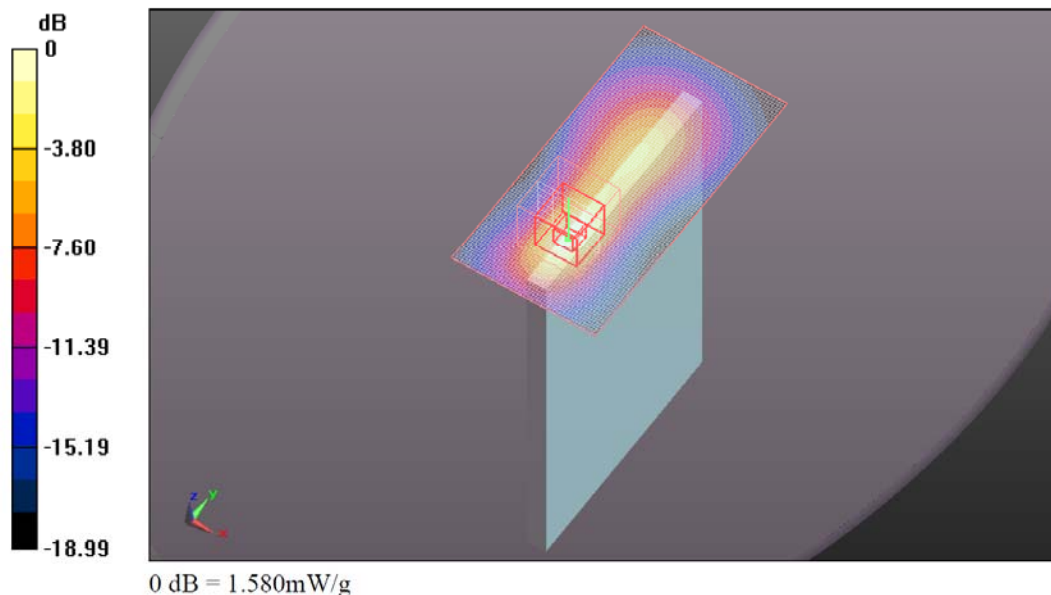
Reference Value = 25.956 V/m; Power Drift = -0.19 dB

Peak SAR (extrapolated) = 2.080 W/kg

SAR(1 g) = 1.16 mW/g; SAR(10 g) = 0.569 mW/g

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

Maximum value of SAR (measured) = 1.583 mW/g



Date: 10/4/2011

Test Laboratory: UL CCS SAR Lab C

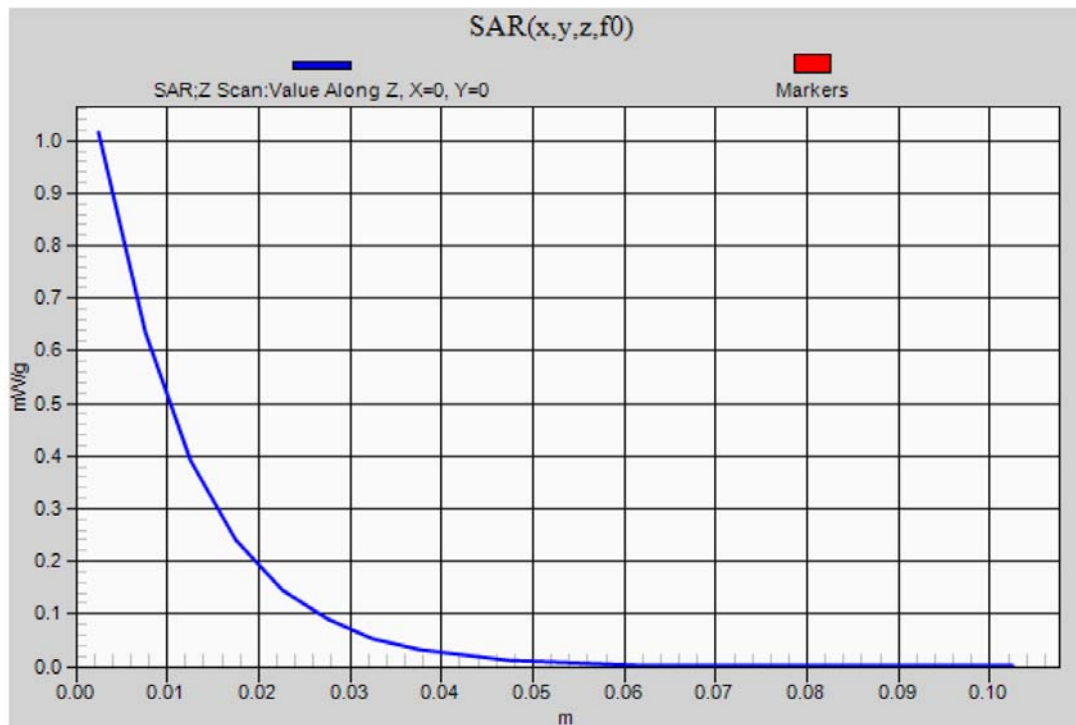
UMTS band II Body

Communication System: UMTS-FDD (WCDMA); Frequency: 1907.6 MHz; Duty Cycle: 1:1

Top-edge/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) = 1.015 mW/g



Date: 9/30/2011

Test Laboratory: UL CCS SAR Lab C

2.4GHz Head

Communication System: IEEE 802.11b/g/n 2.4 GHz Band; Frequency: 2462 MHz; Duty Cycle: 1:1
Medium parameters used (interpolated): $f = 2462$ MHz; $\sigma = 1.863$ mho/m; $\epsilon_r = 38.032$; $\rho = 1000$ kg/m³
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(6.82, 6.82, 6.82); Calibrated: 1/24/2011
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1239; Calibrated: 11/17/2010
- Phantom: SAM with CRP v5.0 (B); Type: QD000P40CD; Serial: 1628
- Measurement SW: DASY52, Version 52.6 (2); SEMCAD X Version 14.4.5 (3634)

Flat Phantom/802.11b_ch 11/Area Scan (101x141x1): Measurement grid: dx=15mm, dy=15mm

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

Maximum value of SAR (interpolated) = 0.019 mW/g

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

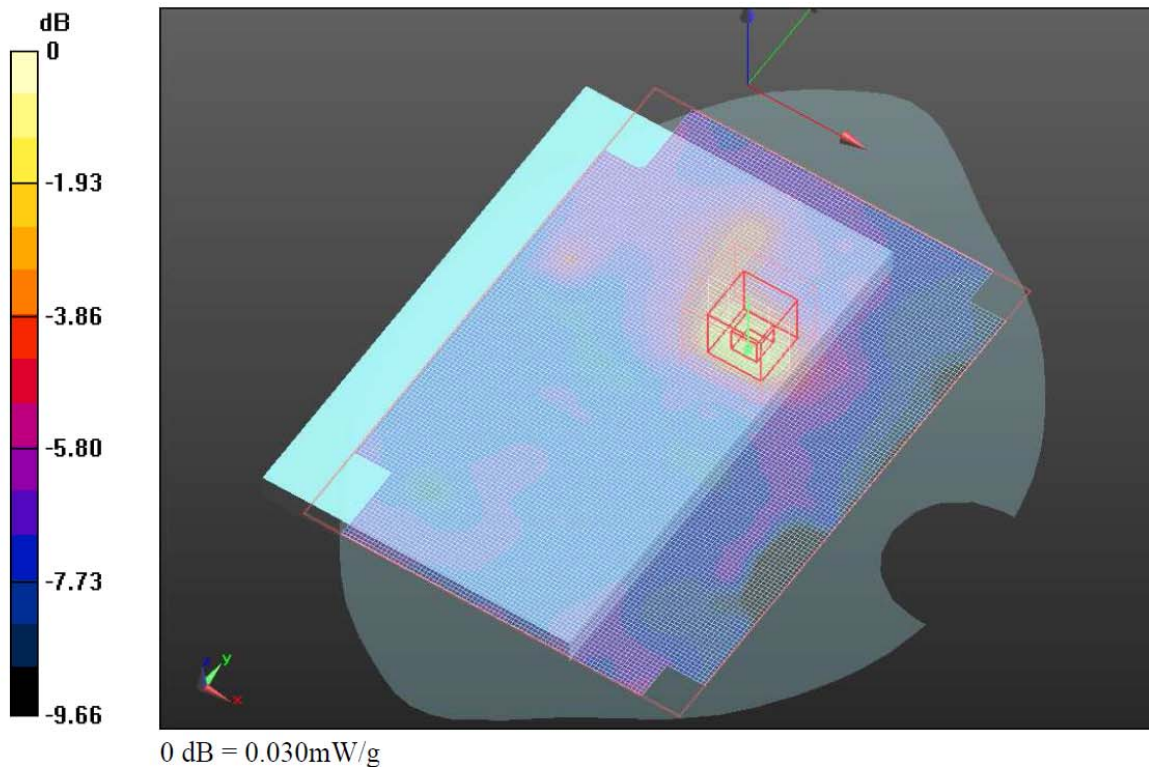
Reference Value = 3.134 V/m; Power Drift = 0.13 dB

Peak SAR (extrapolated) = 0.037 W/kg

SAR(1 g) = 0.020 mW/g; SAR(10 g) = 0.011 mW/g

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

Maximum value of SAR (measured) = 0.027 mW/g



Date: 9/30/2011

Test Laboratory: UL CCS SAR Lab C

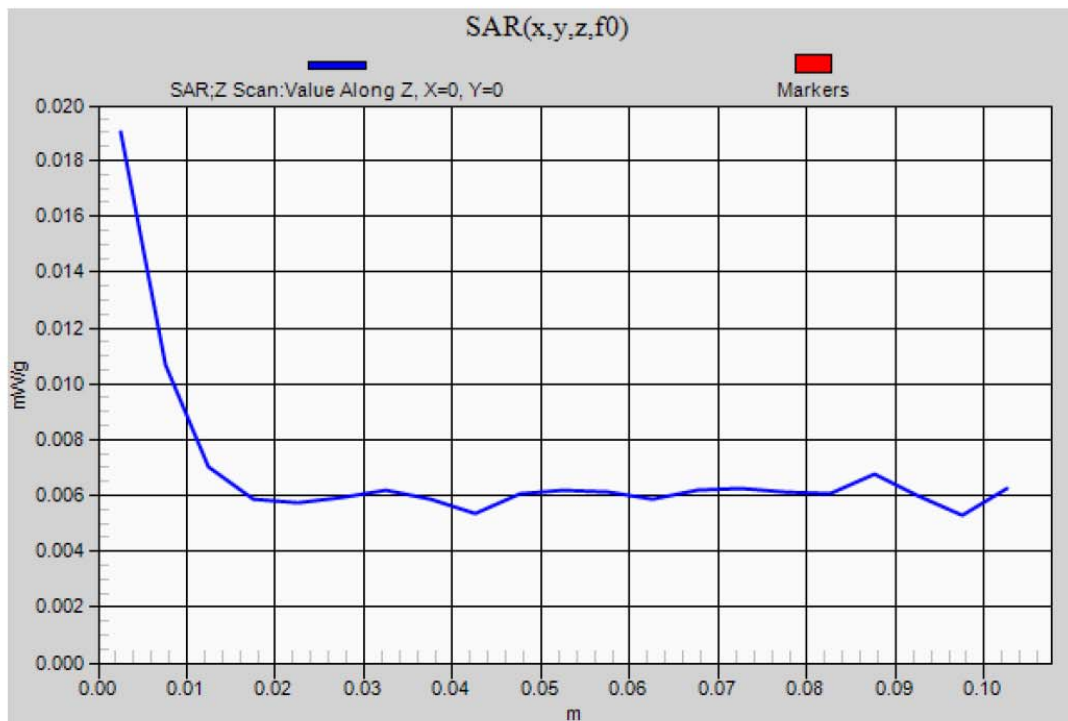
2.4GHz Head

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

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

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

Maximum value of SAR (measured) = 0.019 mW/g



Date: 10/13/2011

Test Laboratory: UL CCS SAR Lab C

WiFi 2.4GHz Body

Communication System: IEEE 802.11b WiFi 2.4GHz; Frequency: 2462 MHz; Duty Cycle: 1:1
Medium parameters used (interpolated): $f = 2462$ MHz; $\sigma = 1.957$ mho/m; $\epsilon_r = 51.65$; $\rho = 1000$ kg/m³
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 - SN3772; ConvF(6.41, 6.41, 6.41); 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 Sn1257; Calibrated: 5/3/2011
- Phantom: ELI v4.0 (A); Type: QDOVA001BB; Serial: 1117
- Measurement SW: DASY52, Version 52.6 (2); SEMCAD X Version 14.4.5 (3634)

Rear/802.11b_Ch 11 w/Headset/Area Scan (111x151x1): Measurement grid: dx=15mm, dy=15mm

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

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

Rear/802.11b_Ch 11 w/Headset/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

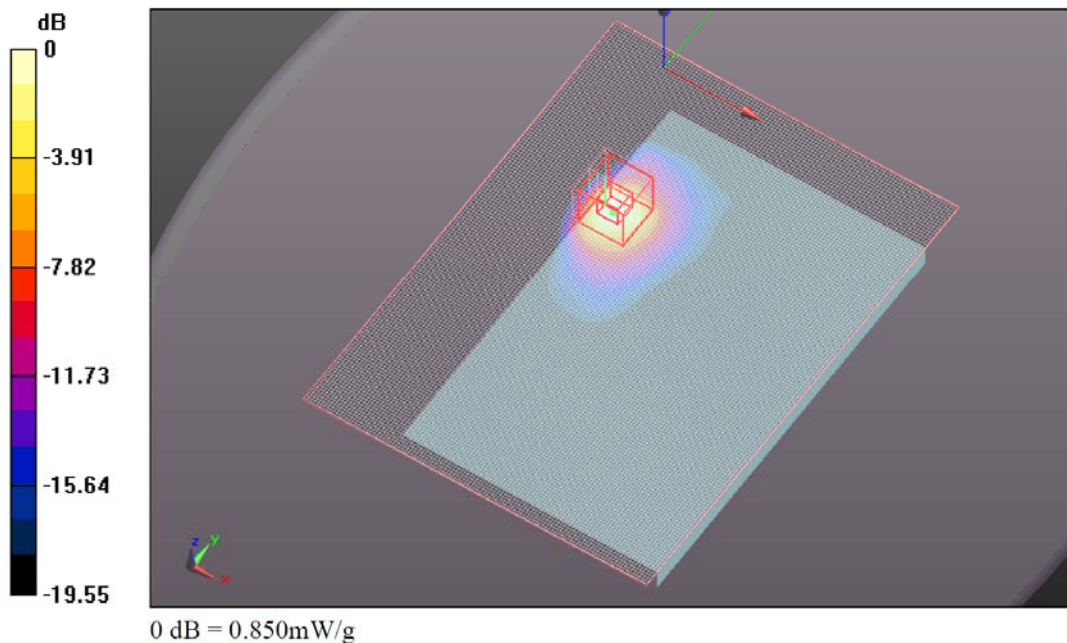
Reference Value = 17.371 V/m; Power Drift = -0.18 dB

Peak SAR (extrapolated) = 1.711 W/kg

SAR(1 g) = 0.539 mW/g; SAR(10 g) = 0.208 mW/g

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

Maximum value of SAR (measured) = 0.848 mW/g



Date: 10/13/2011

Test Laboratory: UL CCS SAR Lab C

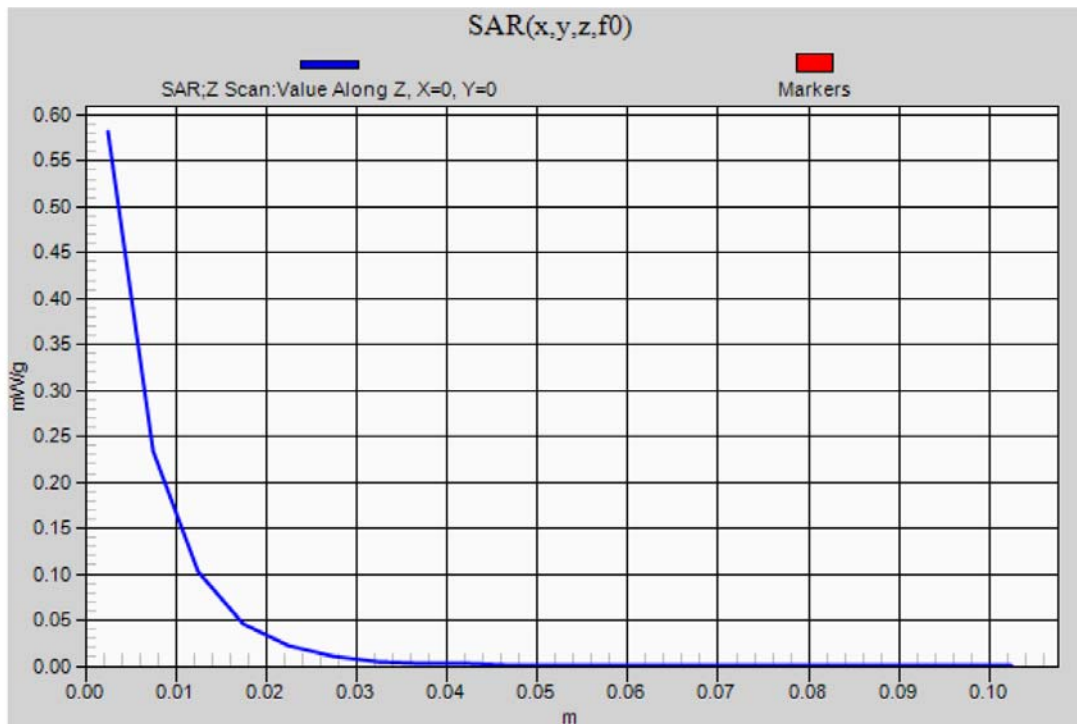
WiFi 2.4GHz Body

Communication System: IEEE 802.11b WiFi 2.4GHz; Frequency: 2462 MHz; Duty Cycle: 1:1

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

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

Maximum value of SAR (measured) = 0.581 mW/g



Date: 10/7/2011

Test Laboratory: UL CCS SAR Lab C

WiFi 5GHz Head

Communication System: IEEE 802.11a/n 5 GHz Band; Frequency: 5230 MHz; Duty Cycle: 1:1
Medium parameters used: $f = 5230$ MHz; $\sigma = 4.809$ mho/m; $\epsilon_r = 36.689$; $\rho = 1000$ kg/m³
Phantom section: Flat Section

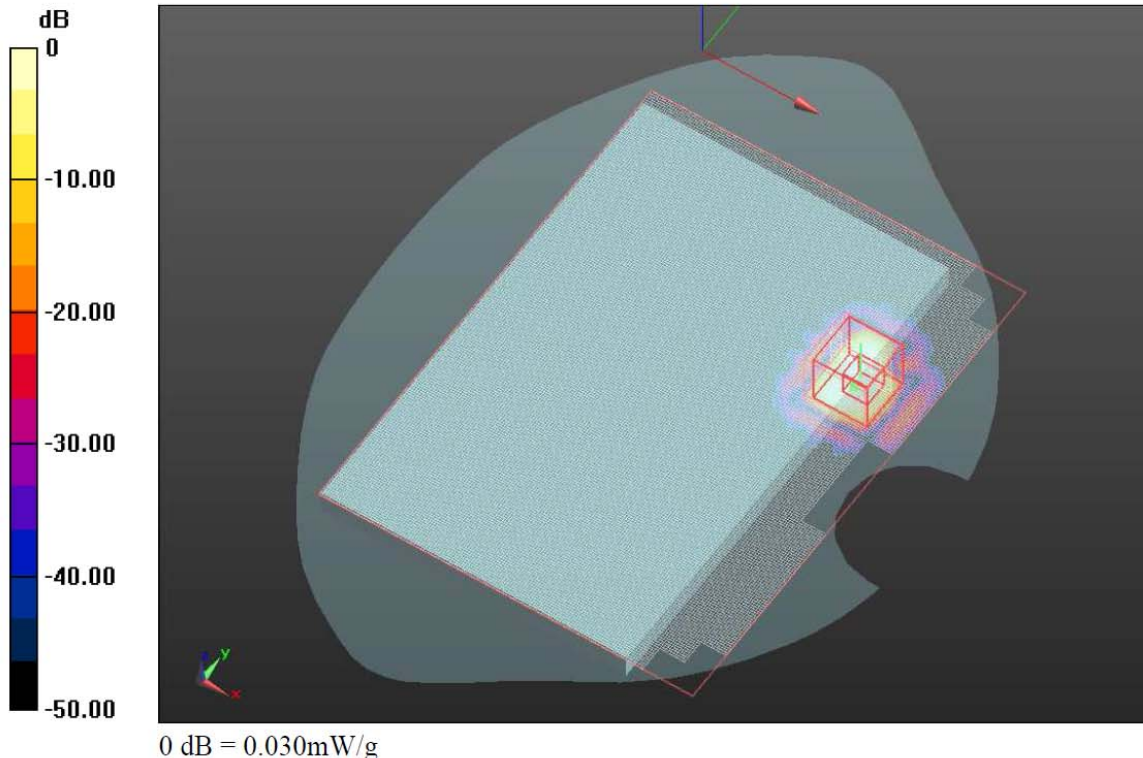
Room Ambient Temperature: 25.0 deg. C; Liquid Temperature: 24.0 deg. C

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 - SN3772; ConvF(4.49, 4.49, 4.49); 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 Sn1257; Calibrated: 5/3/2011
- Phantom: SAM with CRP v5.0; Type: QD000P40CD; Serial: TP1632
- Measurement SW: DASY52, Version 52.6 (2);SEMCAD X Version 14.4.5 (3634)

Flat Phantom/802.11n_ch 46/Area Scan (151x201x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.036 mW/g

Flat Phantom/802.11n_ch 46/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 2.518 V/m; Power Drift = 0.15 dB
Peak SAR (extrapolated) = 0.140 W/kg
SAR(1 g) = 0.019 mW/g; SAR(10 g) = 0.00736 mW/g
Maximum value of SAR (measured) = 0.031 mW/g



Date: 10/9/2011

Test Laboratory: UL CCS SAR Lab C

WiFi 5GHz Body

Communication System: IEEE 802.11a/n 5 GHz Band; Frequency: 5230 MHz; Duty Cycle: 1:1
Medium parameters used: $f = 5230$ MHz; $\sigma = 5.386$ mho/m; $\epsilon_r = 52.647$; $\rho = 1000$ kg/m³
Phantom section: Flat Section

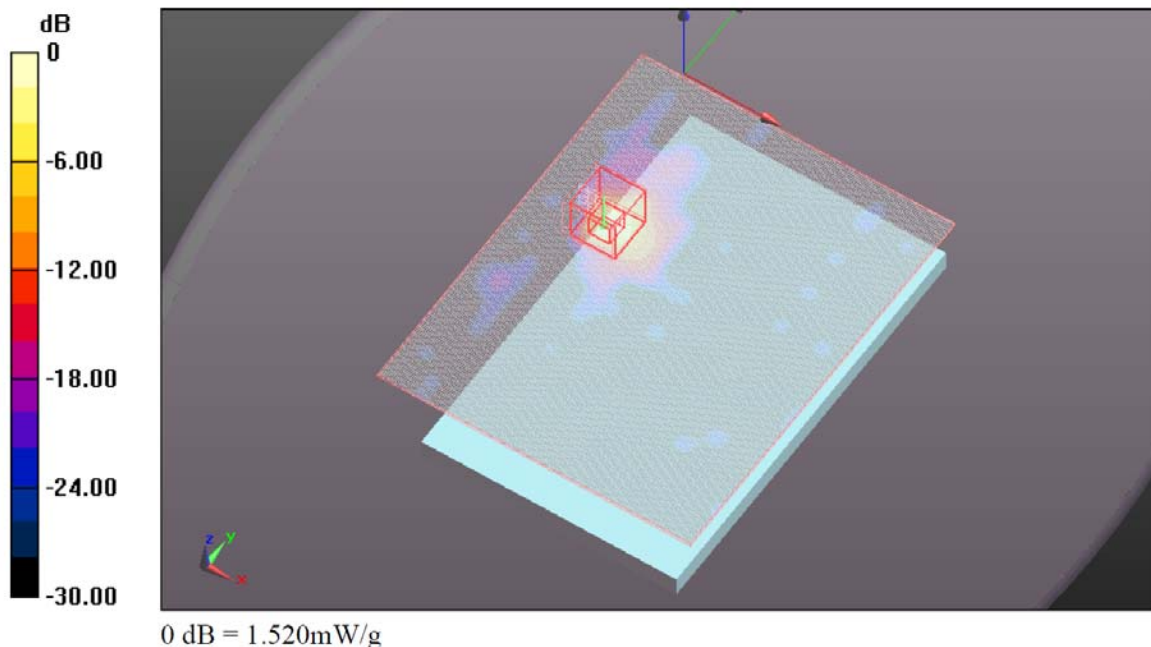
Room Ambient Temperature: 25.0 deg. C; Liquid Temperature: 24.0 deg. C

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 - SN3772; ConvF(4.05, 4.05, 4.05); 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 Sn1257; Calibrated: 5/3/2011
- Phantom: ELI v4.0 (B); Type: QDOVA001BB; Serial: 1121
- Measurement SW: DASY52, Version 52.6 (2); SEMCAD X Version 14.4.5 (3634)

Rear/802.11n HT40_Ch 46/Area Scan (151x191x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 1.193 mW/g

Rear/802.11n HT40_Ch 46/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 12.634 V/m; Power Drift = 0.14 dB
Peak SAR (extrapolated) = 3.135 W/kg
SAR(1 g) = 0.707 mW/g; SAR(10 g) = 0.154 mW/g
Maximum value of SAR (measured) = 1.524 mW/g



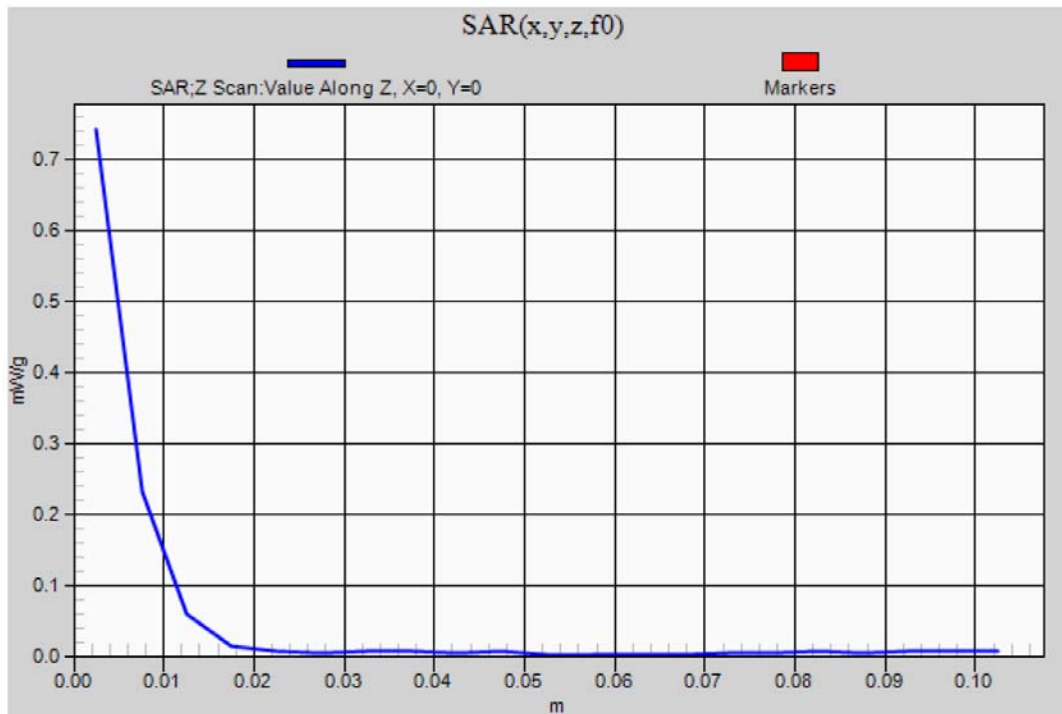
Date: 10/9/2011

Test Laboratory: UL CCS SAR Lab C

WiFi 5GHz Body

Communication System: IEEE 802.11a/n 5 GHz Band; Frequency: 5230 MHz; Duty Cycle: 1:1

Rear/802.11n HT40_Ch 46/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Maximum value of SAR (measured) = 0.742 mW/g



Date: 10/7/2011

Test Laboratory: UL CCS SAR Lab C

WiFi 5GHz Head

Communication System: IEEE 802.11a/n 5 GHz Band; Frequency: 5270 MHz; Duty Cycle: 1:1
Medium parameters used: $f = 5270$ MHz; $\sigma = 4.854$ mho/m; $\epsilon_r = 36.587$; $\rho = 1000$ kg/m³
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 - SN3772; ConvF(4.2, 4.2, 4.2); 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 Sn1257; Calibrated: 5/3/2011
- Phantom: SAM with CRP v5.0; Type: QD000P40CD; Serial: TP1632
- Measurement SW: DASY52, Version 52.6 (2); SEMCAD X Version 14.4.5 (3634)

Flat Phantom/802.11n_ch 54/Area Scan (151x201x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.080 mW/g

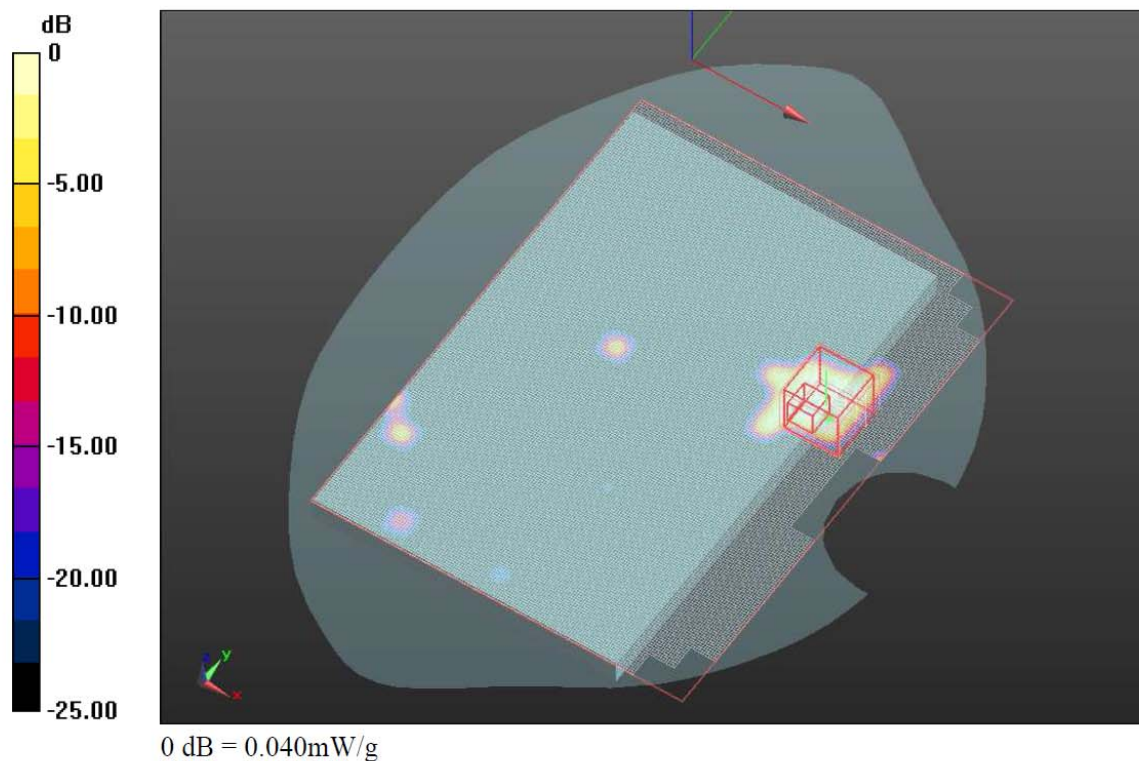
Flat Phantom/802.11n_ch 54/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 2.678 V/m; Power Drift = 0.10 dB

Peak SAR (extrapolated) = 0.217 W/kg

SAR(1 g) = 0.023 mW/g; SAR(10 g) = 0.00666 mW/g

Maximum value of SAR (measured) = 0.037 mW/g



Date: 10/9/2011

Test Laboratory: UL CCS SAR Lab C

WiFi 5GHz Body

Communication System: IEEE 802.11a/n 5 GHz Band; Frequency: 5270 MHz; Duty Cycle: 1:1
Medium parameters used: $f = 5270$ MHz; $\sigma = 5.441$ mho/m; $\epsilon_r = 52.506$; $\rho = 1000$ kg/m³
Phantom section: Flat Section

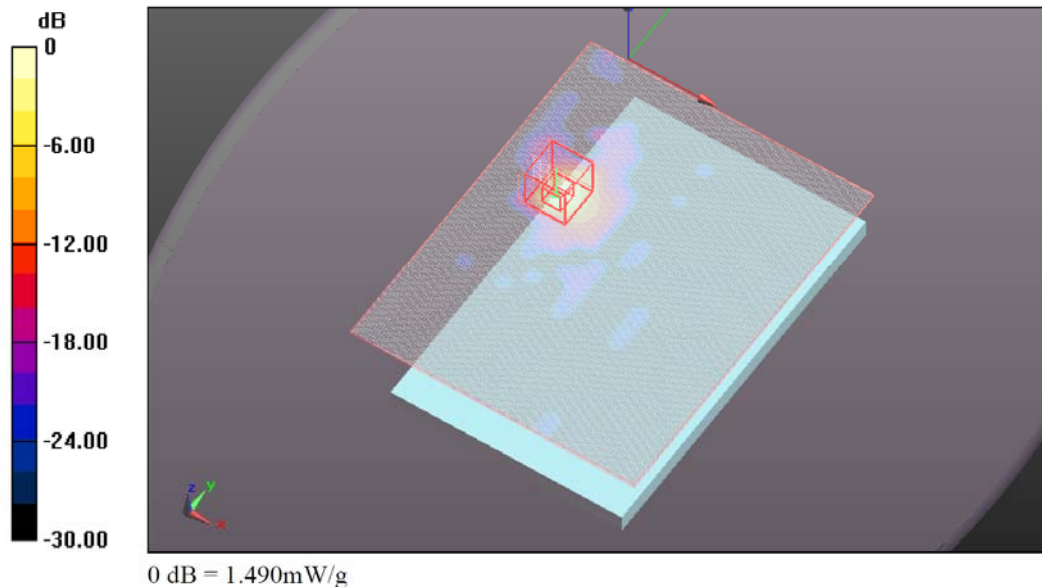
Room Ambient Temperature: 25.0 deg. C; Liquid Temperature: 24.0 deg. C

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 - SN3772; ConvF(3.85, 3.85, 3.85); 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 Sn1257; Calibrated: 5/3/2011
- Phantom: ELI v4.0 (B); Type: QDOVA001BB; Serial: 1121
- Measurement SW: DASY52, Version 52.6 (2); SEMCAD X Version 14.4.5 (3634)

Rear/802.11n HT40_Ch 54/Area Scan (151x191x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 1.117 mW/g

Rear/802.11n HT40_Ch 54/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 13.257 V/m; Power Drift = -0.08 dB
Peak SAR (extrapolated) = 3.105 W/kg
SAR(1 g) = 0.703 mW/g; SAR(10 g) = 0.156 mW/g
Maximum value of SAR (measured) = 1.485 mW/g



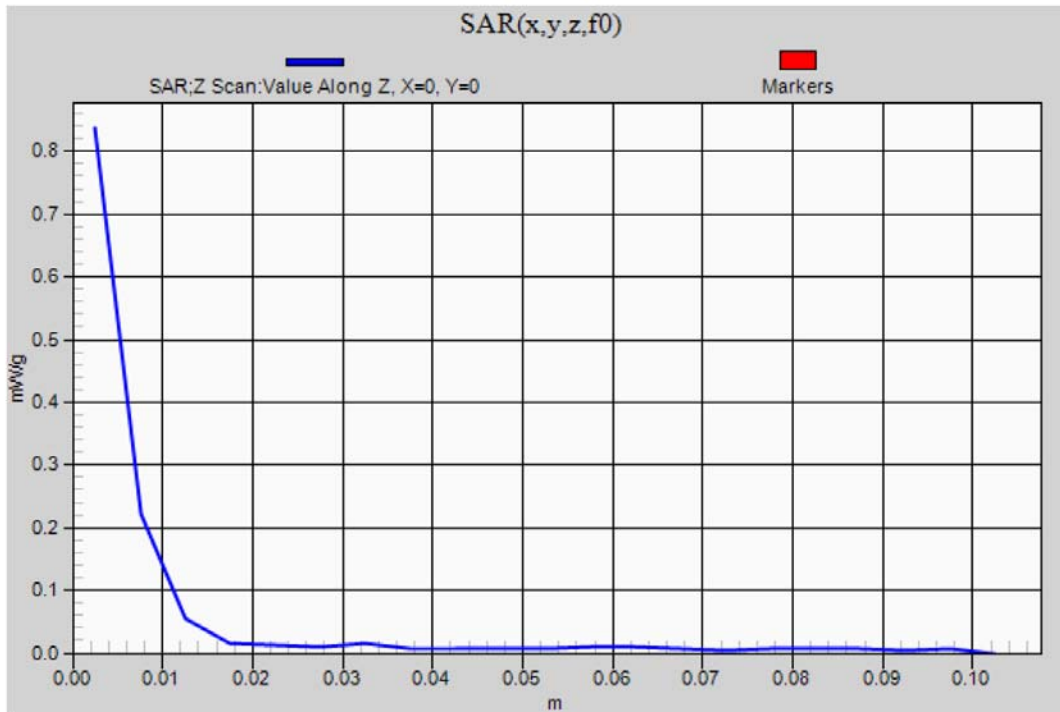
Date: 10/9/2011

Test Laboratory: UL CCS SAR Lab C

WiFi 5GHz Body

Communication System: IEEE 802.11a/n 5 GHz Band; Frequency: 5270 MHz; Duty Cycle: 1:1

Rear/802.11n HT40_Ch 54/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Maximum value of SAR (measured) = 0.837 mW/g



Date: 10/8/2011

Test Laboratory: UL CCS SAR Lab C

WiFi 5GHz Head

Communication System: IEEE 802.11a/n 5 GHz Band; Frequency: 5670 MHz; Duty Cycle: 1:1
Medium parameters used: $f = 5670$ MHz; $\sigma = 5.313$ mho/m; $\epsilon_r = 35.932$; $\rho = 1000$ kg/m³
Phantom section: Flat Section

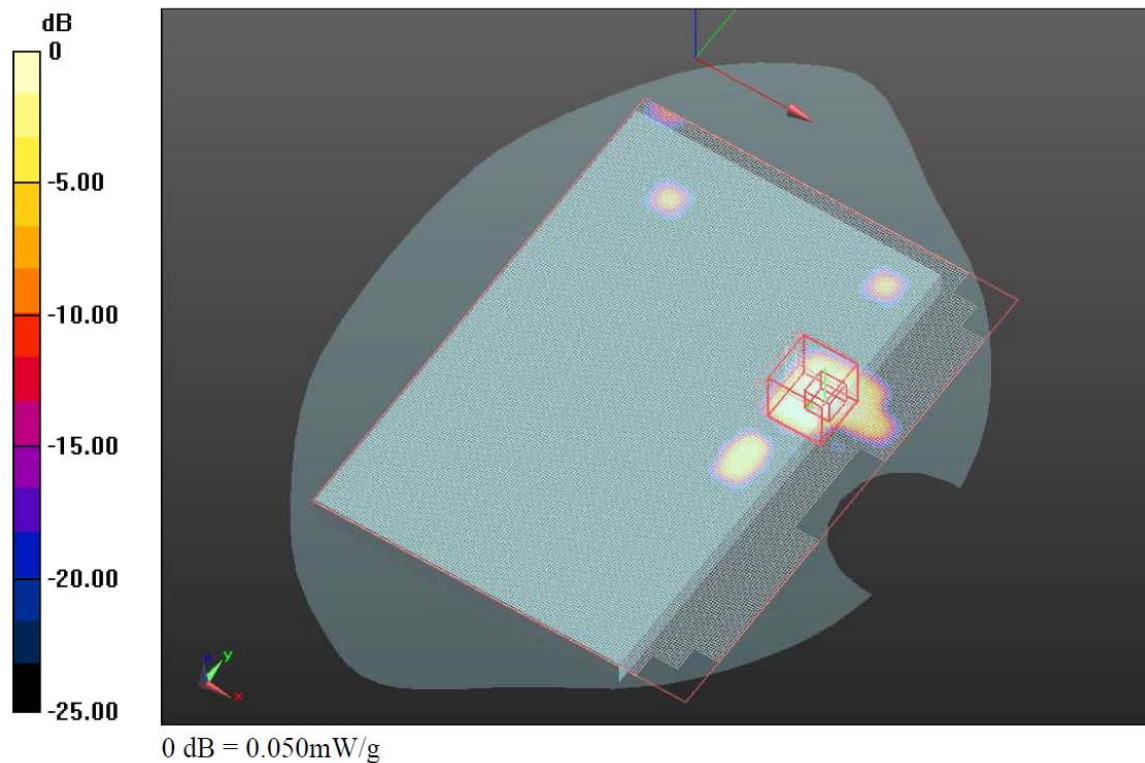
Room Ambient Temperature: 25.0 deg. C; Liquid Temperature: 24.0 deg. C

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 - SN3772; ConvF(3.88, 3.88, 3.88); 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 Sn1257; Calibrated: 5/3/2011
- Phantom: SAM with CRP v5.0; Type: QD000P40CD; Serial: TP1632
- Measurement SW: DASY52, Version 52.6 (2); SEMCAD X Version 14.4.5 (3634)

Flat Phantom/802.11n_ch 134/Area Scan (151x201x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.056 mW/g

Flat Phantom/802.11n_ch 134/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 3.091 V/m; Power Drift = -0.17 dB
Peak SAR (extrapolated) = 0.300 W/kg
SAR(1 g) = 0.032 mW/g; SAR(10 g) = 0.012 mW/g
Maximum value of SAR (measured) = 0.046 mW/g



Date: 10/9/2011

Test Laboratory: UL CCS SAR Lab C

WiFi 5GHz Body

Communication System: IEEE 802.11a/n 5 GHz Band; Frequency: 5670 MHz; Duty Cycle: 1:1
Medium parameters used: $f = 5670$ MHz; $\sigma = 6.033$ mho/m; $\epsilon_r = 51.784$; $\rho = 1000$ kg/m³
Phantom section: Flat Section

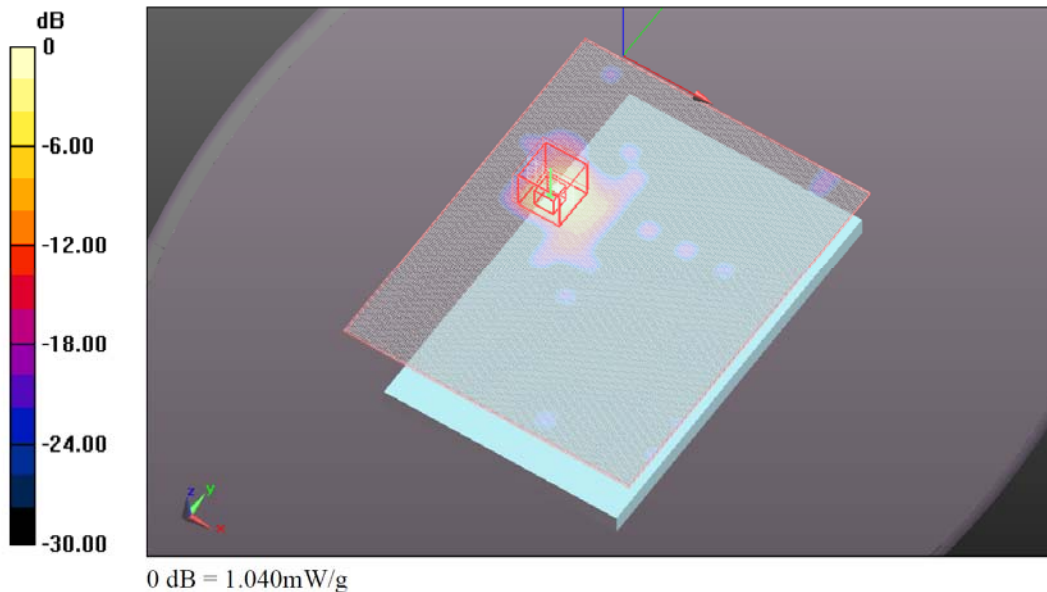
Room Ambient Temperature: 25.0 deg. C; Liquid Temperature: 24.0 deg. C

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 - SN3772; ConvF(3.1, 3.1, 3.1); 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 Sn1257; Calibrated: 5/3/2011
- Phantom: ELI v4.0 (B); Type: QDOVA001BB; Serial: 1121
- Measurement SW: DASY52, Version 52.6 (2); SEMCAD X Version 14.4.5 (3634)

Rear/802.11n HT40_Ch 134/Area Scan (151x191x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.808 mW/g

Rear/802.11n HT40_Ch 134/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 10.737 V/m; Power Drift = 0.13 dB
Peak SAR (extrapolated) = 2.080 W/kg
SAR(1 g) = 0.516 mW/g; SAR(10 g) = 0.119 mW/g
Maximum value of SAR (measured) = 1.039 mW/g



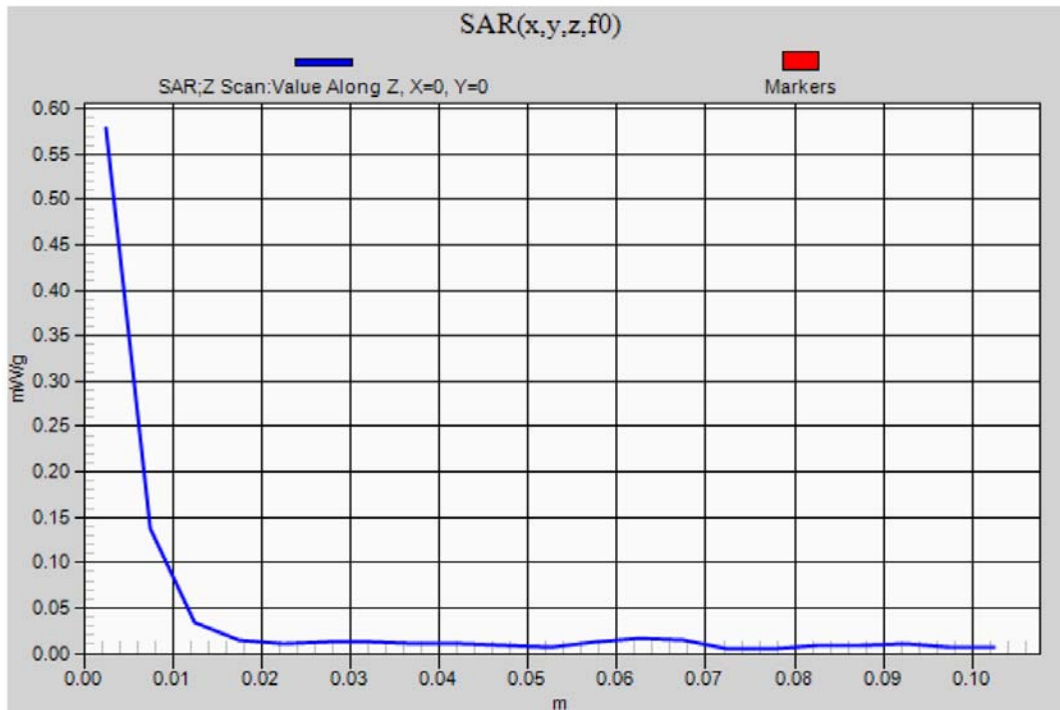
Date: 10/9/2011

Test Laboratory: UL CCS SAR Lab C

WiFi 5GHz Body

Communication System: IEEE 802.11a/n 5 GHz Band; Frequency: 5670 MHz; Duty Cycle: 1:1

Rear/802.11n HT40_Ch 134/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Maximum value of SAR (measured) = 0.578 mW/g



Date: 10/8/2011

Test Laboratory: UL CCS SAR Lab C

WiFi 5GHz Head

Communication System: IEEE 802.11a/n 5 GHz Band; Frequency: 5795 MHz; Duty Cycle: 1:1
Medium parameters used: $f = 5795 \text{ MHz}$; $\sigma = 5.462 \text{ mho/m}$; $\epsilon_r = 35.706$; $\rho = 1000 \text{ kg/m}^3$
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 - SN3772; ConvF(4.1, 4.1, 4.1); 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 Sn1257; Calibrated: 5/3/2011
- Phantom: SAM with CRP v5.0; Type: QD000P40CD; Serial: TP1632
- Measurement SW: DASY52, Version 52.6 (2); SEMCAD X Version 14.4.5 (3634)

Flat Phantom/802.11n_ch 159/Area Scan (151x201x1): Measurement grid: $dx=10\text{mm}$, $dy=10\text{mm}$
Maximum value of SAR (interpolated) = 0.085 mW/g

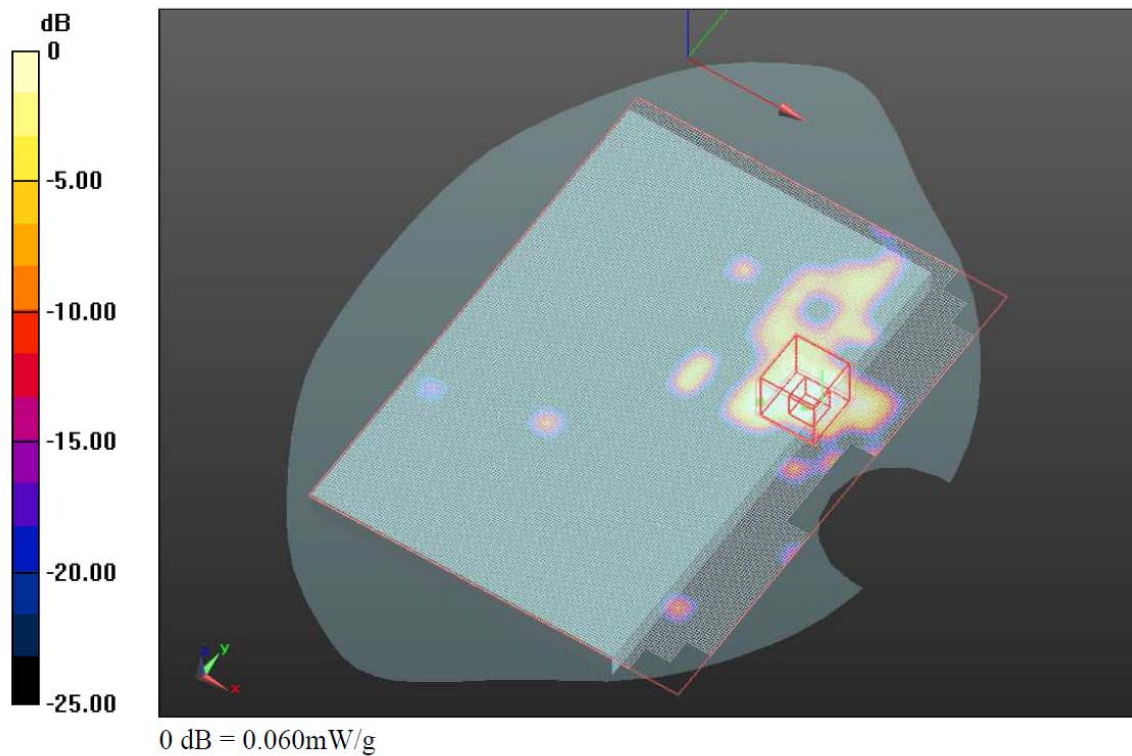
Flat Phantom/802.11n_ch 159/Zoom Scan (7x7x9)/Cube 0: Measurement grid: $dx=4\text{mm}$, $dy=4\text{mm}$, $dz=2.5\text{mm}$

Reference Value = 3.208 V/m; Power Drift = 0.16 dB

Peak SAR (extrapolated) = 0.237 W/kg

SAR(1 g) = 0.033 mW/g; SAR(10 g) = 0.013 mW/g

Maximum value of SAR (measured) = 0.058 mW/g



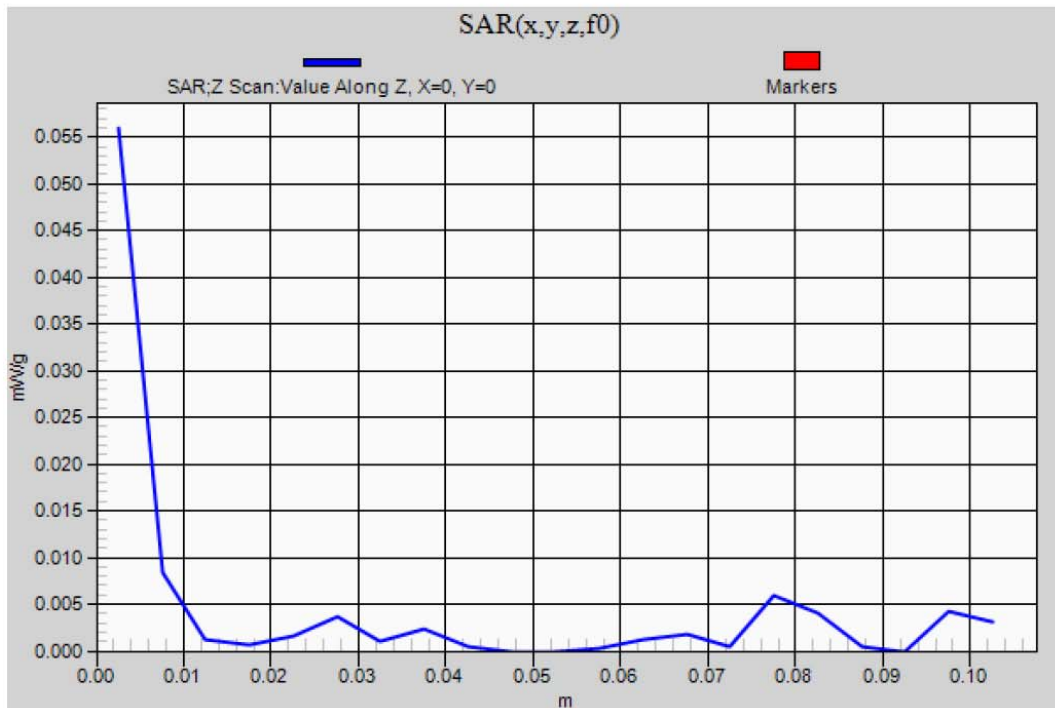
Date: 10/8/2011

Test Laboratory: UL CCS SAR Lab C

WiFi 5GHz Head

Communication System: IEEE 802.11a/n 5 GHz Band; Frequency: 5795 MHz; Duty Cycle: 1:1

Flat Phantom/802.11n_ch 159/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Maximum value of SAR (measured) = 0.056 mW/g



Date: 10/13/2011

Test Laboratory: UL CCS SAR Lab C

WiFi 5GHz Body

Communication System: IEEE 802.11a/n 5 GHz Band; Frequency: 5795 MHz; Duty Cycle: 1:1
Medium parameters used: $f = 5795$ MHz; $\sigma = 6.141$ mho/m; $\epsilon_r = 50.905$; $\rho = 1000$ kg/m³
Phantom section: Flat Section

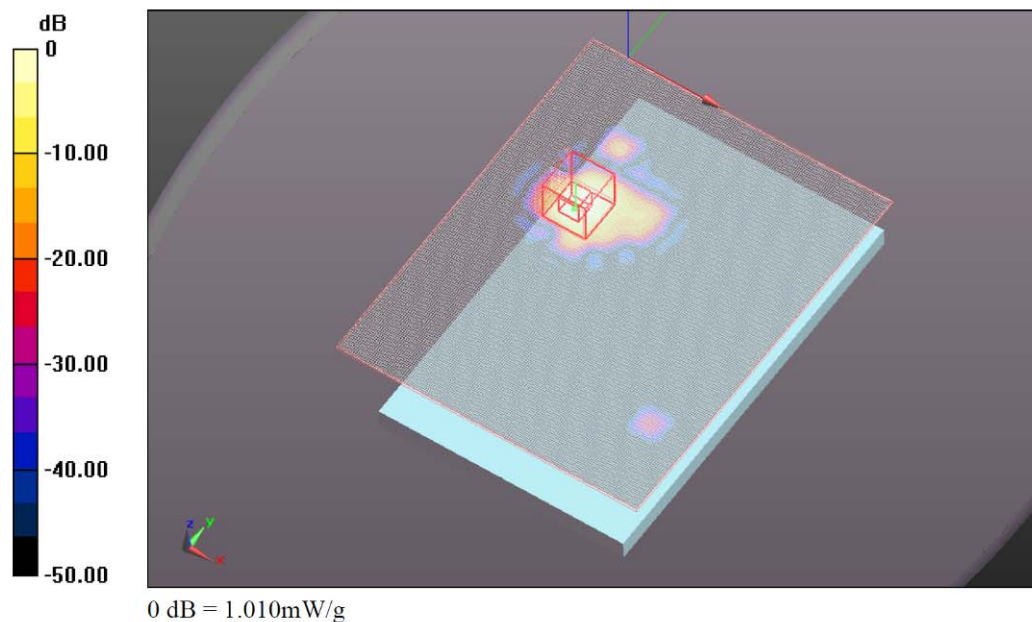
Room Ambient Temperature: 25.0 deg. C; Liquid Temperature: 24.0 deg. C

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 - SN3772; ConvF(3.44, 3.44, 3.44); Calibrated: 5/3/2011
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1257; Calibrated: 5/3/2011
- Phantom: ELI v4.0 (B); Type: QDOVA001BB; Serial: 1121
- Measurement SW: DASY52, Version 52.6 (2);SEMCAD X Version 14.4.5 (3634)

Rear/802.11n HT40_Ch 159/Area Scan (151x191x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 1.468 mW/g

Rear/802.11n HT40_Ch 159/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 12.735 V/m; Power Drift = 0.10 dB
Peak SAR (extrapolated) = 2.366 W/kg
SAR(1 g) = 0.535 mW/g; SAR(10 g) = 0.126 mW/g
Maximum value of SAR (measured) = 1.012 mW/g



Date: 10/13/2011

Test Laboratory: UL CCS SAR Lab C

WiFi 5GHz Body

Communication System: IEEE 802.11a/n 5 GHz Band; Frequency: 5795 MHz; Duty Cycle: 1:1

Rear/802.11n HT40_Ch 159/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Maximum value of SAR (measured) = 0.840 mW/g

