FCC OET BULLETIN 65 SUPPLEMENT C 01-01
IEEE STD 1528:2003
IC RSS-102 ISSUE 4

SAR EVALUATION REPORT

For

The Apple iPad, Model A1396 is a tablet device with iPod functions (music, application support, and video), 802.11a/b/g/n radio, Bluetooth radio functions, and cellular using the GSM 2G/3G data radio functions

MODEL: A1396
FCC ID: BCGA1396
IC: 579C-A1396

REPORT NUMBER: 10U13582-1B

ISSUE DATE: March 1, 2011

Prepared for

APPLE INC.
1 INFINITE LOOP, MS 26A
CUPERTINO, CA 95014-2084

Prepared by

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Revision History

Rev.	Issue Date	Revisions	Revised By
--	February 20, 2011	Initial Issue	--
A	February 27, 2011	Includes Proximity Sensor reliability tests at the most conservative triggered distance	Sunny Shih
B	March 1, 2011	Updated report per reviewer's comments, including 1. Page 46: • Removed sections 11.1 and 11.2 • Changed text to "FCC pre-TCB testing guidance KDB 335737" 2. Pages 46 ~ 48: Removed ambiguous plots and added section 11.6 - Summary Table of Power Reduction dB Levels per Mode and Band. 3. Pages 57 and 87: Corrected typos, changed from "WWNA' to "WWAN" and from "SA" to "SAR".	Sunny Shih

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1. ATTESTATION OF TEST RESULTS

Tested for:	APPLE INC. 1 INFINITE LOOP, MS 26A CUPERTINO, CA 95014-2084		
EUT description:	The Apple iPad, Model A1396 is a tablet device with iPod functions (music, application support, and video), 802.11a/b/g/n radio, Bluetooth radio functions, and cellular using the GSM 2G/3G data radio functions		
Model number:	A1396, S/N: DLXDW007DK4P (WIFI), DLXDT003DK3G (WWAN)		
Device category:	Portable		
Exposure category:	General Population/Uncontrolled Exposure		
Date tested:	January 10 - 17, 2011 (WIFI); January 20 - 23, 2011 (WWAN); February 25 – 26, 2011 (WWAN Without Proximity sensor activated)		
FCC / IC Rule Parts	Freq. Range [MHz]	Highest 1-g SAR (mW/g)	Limit (mW/g)
22H / RSS-132	824 - 849	1.180 (Secondary Portrait/Top Edge)	1.6
	Special Development Software to disable power back-off	0.463 (Back Surface w/10 mm air-gap distance)	
24E / RSS-133	1850 - 1910	1.190 (Secondary Portrait/Top Edge)	
	Special Development Software to disable power back-off	1.44 (Secondary Portrait / Top Edge with 9.5 mm air-gap distance)	
15.247 / RSS-102	2412 – 2462	1.070 (Primary Portrait)	
15.407 / RSS-102	5150 – 5250	0.788 (Primary Portrait)	
	5250 – 5350	0.822 (Primary Portrait)	
	5500 – 5700	0.679 (Primary Portrait)	
15.247 / RSS-102	5725 – 5850	0.621 (Primary Portrait)	
Applicable Standards			Test Results
FCC OET Bulletin 65 Supplement C 01-01, IEEE STD 1528:2003 IC RSS 102 Issue 4			Pass

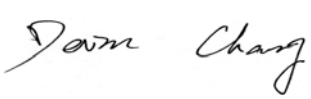
Compliance Certification Services, Inc. (UL CCS) tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by UL CCS based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by UL CCS and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL CCS will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, any agency of the Federal Government, or any agency of any government (NIST Handbook 150, Annex A). This report is written to support regulatory compliance of the applicable standards stated above.

Approved & Released For UL CCS By:

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

Tested By:



Devin Chang
EMC 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, IC RSS 102 Issue 4 and the following specific FCC Test Procedures.

- KDB 248227 D01 SAR Measurement Procedure for 802 11abg v01r02
- KDB 941225 D01 SAR test for 3G devices v02
- KDB 941225 D03 SAR Test Reduction GSM/GPRS/EDGE vo1
- KDB 447498 D01 Mobile Portable RF Exposure v04
- KDB 616217 D03 SAR Supp Note and Netbook Laptop v01
- Power Reduction by Sensing (Oct. 2010 TCBC workshop SAR Updates)

3. FACILITIES AND ACCREDITATION

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

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

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment 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
Robot - Six Axes	Stäubli	RX90BL	N/A	N/A		
Robot Remote Control	Stäubli	CS7MB	3403-91535	N/A		
DASY4 Measurement Server	SPEAG	SEUMS001BA	1041	N/A		
Data Acquistion Electronics	SPEAG	DAE4	1239	11	11	2011
Data Acquistion Electronics	SPEAG	DAE3	427	7	21	2011
Probe Alignment Unit	SPEAG	LB (V2)	261	N/A		
SAM Phantom (SAM1)	SPEAG	QD000P40CA	1185	N/A		
SAM Phantom (SAM2)	SPEAG	QD000P40CA	1050	N/A		
Oval Flat Phantom (ELI 4.0)	SPEAG	QD OVA001 B	1003	N/A		
Dielectronic Probe kit	HP	85070C	N/A	N/A		
ESA Series Network Analyzer	Agilent	E5071B	MY42100131	8	2	2011
Synthesized Signal Generator	HP	83732B	US34490599	7	14	2012
Wireless comunication test set	Agilent	E5515C (8960)	GB46160222	6	17	2012
E-Field Probe	SPEAG	EX3DV3	3686	1	24	2012
E-Field Probe	SPEAG	EX3DV4	3749	11	13	2011
Thermometer	ERTCO	639-1S	1718	7	19	2011
System Validation Dipole	SPEAG	* D835V2	4d002	4	22	2011
System Validation Dipole	SPEAG	* D900V2	108	11	23	2011
System Validation Dipole	SPEAG	D1800V2	294	11	24	2011
System Validation Dipole	SPEAG	D1900V2	5d043	11	24	2012
System Validation Dipole	SPEAG	D2450V2	706	4	19	2012
System Validation Dipole	SPEAG	*D5GHzV2	1075	9	3	2011
Power Meter	Giga-tronics	8651A	8651404	3	13	2012
Power Sensor	Giga-tronics	80701A	1834588	3	13	2012
Amplifier	Mini-Circuits	ZHL-42W	D072701-5	N/A		
Simulating Liquid	CCS	M1800	N/A	Within 24 hrs of first test		
Simulating Liquid	SPEAG	M900	N/A	Within 24 hrs of first test		
Simulating Liquid	SPEAG	H2450	N/A	Within 24 hrs of first test		
Simulating Liquid	SPAEG	M5800 (5-6GHz)	N/A	Within 24 hrs of first test		
Simulating Liquid	SPAEG	H5800	N/A	Within 24 hrs of first test		

***Note:** 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 (Appendix 3 , 4 & 6)
4. Impedance is within 5Ω of calibrated measurement (Appendix 3, 4 & 6)

4.2. MEASUREMENT UNCERTAINTY

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

Component	error, %	Probe Distribution	Divisor	Sensitivity	U (Xi), %
Measurement System					
Probe Calibration (k=1)	5.50	Normal	1	1	5.50
Axial Isotropy	1.15	Rectangular	1.732	0.7071	0.47
Hemispherical Isotropy	2.30	Rectangular	1.732	0.7071	0.94
Boundary Effect	0.90	Rectangular	1.732	1	0.52
Probe Linearity	3.45	Rectangular	1.732	1	1.99
System Detection Limits	1.00	Rectangular	1.732	1	0.58
Readout Electronics	0.30	Normal	1	1	0.30
Response Time	0.80	Rectangular	1.732	1	0.46
Integration Time	2.60	Rectangular	1.732	1	1.50
RF Ambient Conditions - Noise	3.00	Rectangular	1.732	1	1.73
RF Ambient Conditions - Reflections	3.00	Rectangular	1.732	1	1.73
Probe Positioner Mechanical Tolerance	0.40	Rectangular	1.732	1	0.23
Probe Positioning with respect to Phantom	2.90	Rectangular	1.732	1	1.67
Extrapolation, Interpolation and Integration	1.00	Rectangular	1.732	1	0.58
Test Sample Related					
Test Sample Positioning	2.90	Normal	1	1	2.90
Device Holder Uncertainty	3.60	Normal	1	1	3.60
Output Power Variation - SAR Drift	5.00	Rectangular	1.732	1	2.89
Phantom and Tissue Parameters					
Phantom Uncertainty (shape and thickness)	4.00	Rectangular	1.732	1	2.31
Liquid Conductivity - deviation from target	5.00	Rectangular	1.732	0.64	1.85
Liquid Conductivity - measurement (Body 2450 MHz)	2.04	Normal	1	0.64	1.31
Liquid Permittivity - deviation from target	5.00	Rectangular	1.732	0.6	1.73
Liquid Permittivity - measurement uncertainty (Body 1900 MHz)	-2.96	Normal	1	0.6	-1.78
				Combined Standard Uncertainty Uc(y) =	9.69
				Expanded Uncertainty U, Coverage Factor = 2, > 95 % Confidence = 19.39	%
				Expanded Uncertainty U, Coverage Factor = 2, > 95 % Confidence = 1.54	dB

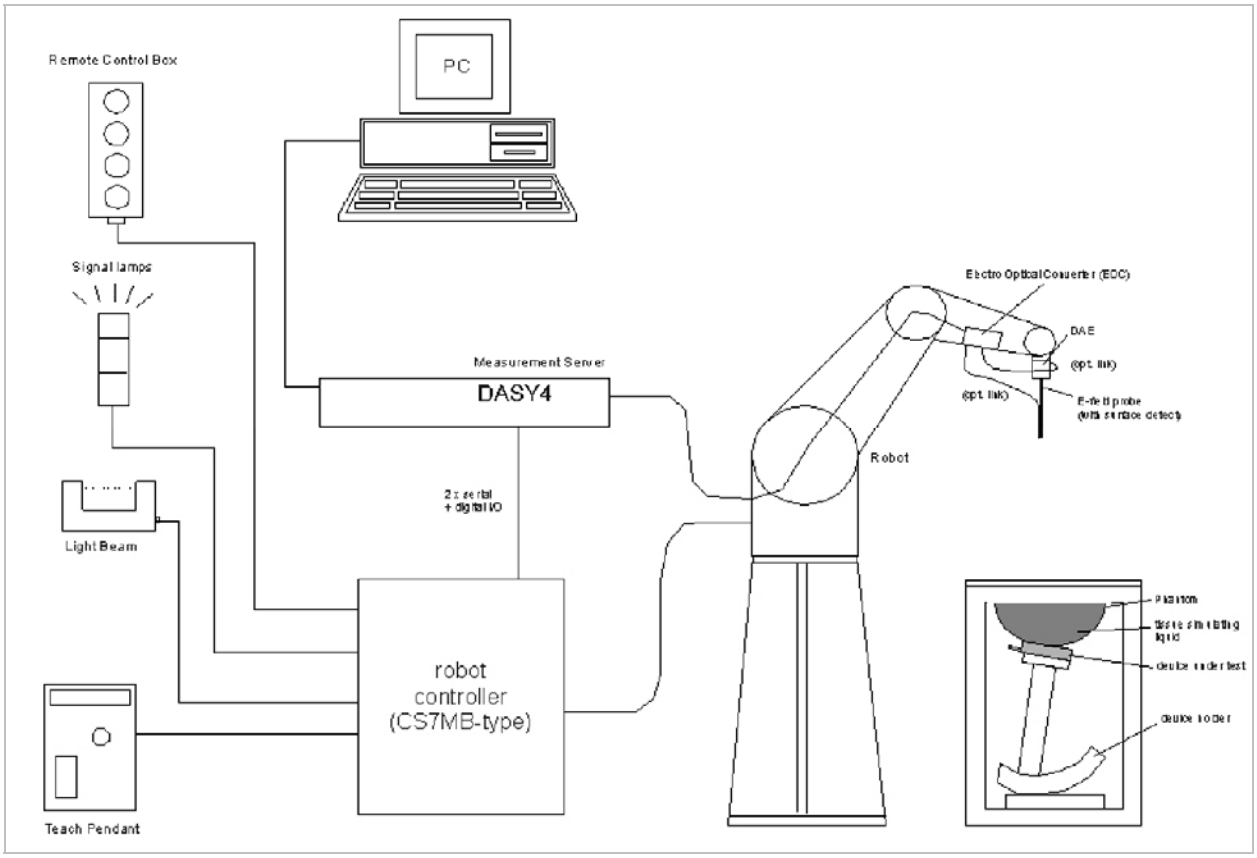
3 to 6 GHz averaged over 1 gram

Component	error, %	Distribution	Divisor	Sensitivity	U (Xi), %
Measurement System					
Probe Calibration (k=1) @ 5GHz	6.55	Normal	1	1	6.55
Axial Isotropy	1.15	Rectangular	1.732	0.7071	0.47
Hemispherical Isotropy	2.30	Rectangular	1.732	0.7071	0.94
Boundary Effect	0.90	Rectangular	1.732	1	0.52
Probe Linearity	3.45	Rectangular	1.732	1	1.99
System Detection Limits	1.00	Rectangular	1.732	1	0.58
Readout Electronics	1.00	Normal	1	1	1.00
Response Time	0.80	Rectangular	1.732	1	0.46
Integration Time	2.60	Rectangular	1.732	1	1.50
RF Ambient Conditions - Noise	3.00	Rectangular	1.732	1	1.73
RF Ambient Conditions - Reflections	3.00	Rectangular	1.732	1	1.73
Probe Positioner Mechanical Tolerance	0.40	Rectangular	1.732	1	0.23
Probe Positioning with respect to Phantom	2.90	Rectangular	1.732	1	1.67
Extrapolation, Interpolation and Integration	3.90	Rectangular	1.732	1	2.25
Test Sample Related					
Test Sample Positioning	1.10	Normal	1	1	1.10
Device Holder Uncertainty	3.60	Normal	1	1	3.60
Output Power Variation - SAR Drift	5.00	Rectangular	1.732	1	2.89
Phantom and Tissue Parameters					
Phantom Uncertainty (shape and thickness)	4.00	Rectangular	1.732	1	2.31
Liquid Conductivity - deviation from target	5.00	Rectangular	1.732	0.64	1.85
Liquid Conductivity - measurement	-4.60	Normal	1	0.64	-2.94
Liquid Permittivity - deviation from target	10.00	Rectangular	1.732	0.6	3.46
Liquid Permittivity - measurement uncertainty	-3.61	Normal	1	0.6	-2.17
				Combined Standard Uncertainty Uc(y), %:	11.07
				Expanded Uncertainty U, Coverage Factor = 1.96, > 95 % Confidence = 21.70	%
				Expanded Uncertainty U, Coverage Factor = 1.96, > 95 % Confidence = 1.71	dB

5. EQUIPMENT UNDER TEST

The Apple iPad, Model A1396 is a tablet device with iPod functions (music, application support, and video), 802.11a/b/g/n radio, Bluetooth radio functions, and cellular using the GSM 2G/3G data radio functions	
Normal operation:	Tablet bottom face, and Tablet edges - Multiple display orientations supporting both portrait and landscape configurations
Antenna tested:	Antenna — Apple part number WiFi/BT — 631-1482 (shared with BT) WWAN — 631-1725
Antenna-to-antenna/user separation distances:	Refer to Sec. 14 for details of antenna locations and separation distances.
Simultaneous transmission:	• WWAN (GSM/UMTS) can transmit simultaneously with WiFi/BT • WWAN (GSM/UMTS) can transmit simultaneously with Bluetooth • WiFi 2.4 GHz cannot transmit simultaneously with Bluetooth • WiFi 5 GHz bands can transmit simultaneously with Bluetooth
Assessment for SAR evaluation for Simultaneous transmission:	Refer to Sec. 14 for details of KDB 447498 Simultaneous Transmission SAR Evaluations.
Proximity Sensor for Power Reduction	• Trigger Distance: 0-10 mm from back surface, 0- 9.5 mm from top edge of device / Secondary Portrait.

6. SYSTEM SPECIFICATIONS



The DASY4 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.
- DASY4 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.

7. 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

8. LIQUID PARAMETERS

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

Reference Values of Tissue Dielectric Parameters for Head & Body Phantom
The body tissue parameters that have not been specified in P1528 are derived from the tissue dielectric parameters computed from the 4-Cole-Cole equations and extrapolated according to the head parameters specified in IEEE Standard 1528.

Target Frequency (MHz)	Head		Body	
	ε_r	σ (S/m)	ε_r	σ (S/m)
150	52.3	0.76	61.9	0.8
300	45.3	0.87	58.2	0.92
450	43.5	0.87	56.7	0.94
835	41.5	0.9	55.2	0.97
900	41.5	0.97	55	1.05
915	41.5	0.98	55	1.06
1450	40.5	1.2	54	1.3
1610	40.3	1.29	53.8	1.4
1800 – 2000	40	1.4	53.3	1.52
2450	39.2	1.8	52.7	1.95
3000	38.5	2.4	52	2.73
5800	35.3	5.27	48.2	6

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

Reference Values of Tissue Dielectric Parameters for Body Phantom (for 3000 MHz – 5800 MHz)
In the current guidelines and draft standards for compliance testing of mobile phones (i.e., IEEE P1528, OET 65 Supplement C), the dielectric parameters suggested for head and body tissue simulating liquid are given only at 3.0 GHz and 5.8 GHz. As an intermediate solution, dielectric parameters for the frequencies between 5 to 5.8 GHz were obtained using linear interpolation (see table below).

SPEAG has developed suitable head and body tissue simulating liquids consisting of the following ingredients: de-ionized water, salt and a special composition including mineral oil and an emulgators. Dielectric parameters of these liquids were measured suing a HP 8570C Dielectric Probe Kit in conjunction with HP 8753ES Network Analyzer (30 kHz – 6G Hz). The differences with respect to the interpolated values were well within the desired ±5% for the whole 5 to 5.8 GHz range.

f (MHz)	Body Tissue		Reference
	rel. permittivity	conductivity	
3000	52.0	2.73	Standard
5100	49.1	5.18	Interpolated
5200	49.0	5.30	Interpolated
5300	48.9	5.42	Interpolated
5400	48.7	5.53	Interpolated
5500	48.6	5.65	Interpolated
5600	48.5	5.77	Interpolated
5700	48.3	5.88	Interpolated
5800	48.2	6.00	Standard

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

8.1. LIQUID CHECK RESULTS

Simulating Liquid Dielectric Parameters for Body 835 MHz Measured by: Devin Chang

f (MHz)	Liquid Parameters			Measured	Target	Delta (%)	Limit (%)
835	e'	54.73	Relative Permittivity (ε_r):	54.732	55.2	-0.85	± 5
	e"	21.18	Conductivity (σ):	0.984	0.97	1.44	± 5

Liquid Check
Ambient temperature: 24 deg. C; Liquid temperature: 23 deg. C; Relative humidity = 40%
January 23, 2011 10:31 AM

Frequency	e'	e"
800000000.	54.9348	21.3031
805000000.	54.9168	21.2896
810000000.	54.8989	21.2789
815000000.	54.8785	21.2679
820000000.	54.8457	21.2563
825000000.	54.8193	21.2371
830000000.	54.7799	21.2066
835000000.	**54.7317**	**21.1830**
840000000.	54.6760	21.1474
845000000.	54.6182	21.1082
850000000.	54.5526	21.0703
855000000.	54.4881	21.0289
860000000.	54.4193	20.9934
865000000.	54.3488	20.9570
870000000.	54.2827	20.9268
875000000.	54.2136	20.8954
880000000.	54.1555	20.8678
885000000.	54.0991	20.8508
890000000.	54.0430	20.8330
895000000.	53.9912	20.8169
900000000.	53.9546	20.8059
905000000.	53.9240	20.8062
910000000.	53.8968	20.8014
915000000.	53.8790	20.7981
920000000.	53.8531	20.7946
925000000.	53.8333	20.7949
930000000.	53.8106	20.7873
935000000.	53.7893	20.7811
940000000.	53.7682	20.7701
945000000.	53.7309	20.7548
950000000.	53.6900	20.7377

The conductivity (σ) can be given as:

$$\sigma = \omega \varepsilon_0 e'' = 2 \pi f \varepsilon_0 e''$$

where f = target f * 10^6

$\varepsilon_0 = 8.854 * 10^{-12}$

Simulating Liquid Dielectric Parameters for Body 1900 MHz Measured by: Devin Chang

f (MHz)	Muscle Liquid Parameters			Measured	Target	Delta (%)	Limit (%)
1900	e'	51.722	Relative Permittivity (ε_r):	51.7221	53.3	-2.96	± 5
	e"	14.289	Conductivity (σ):	1.51031	1.52	-0.64	± 5

Liquid Check
Ambient temperature: 24 deg. C; Liquid temperature: 23 deg. C; Relative humidity = 42%
January 21, 2011 11:53 AM

Frequency	e'	e"
1710000000.	52.3410	13.6646
1720000000.	52.3249	13.6896
1730000000.	52.3086	13.7171
1740000000.	52.2849	13.7529
1750000000.	52.2563	13.7898
1760000000.	52.2249	13.8273
1770000000.	52.1850	13.8738
1780000000.	52.1441	13.9224
1790000000.	52.0978	13.9664
1800000000.	52.0588	14.0132
1810000000.	52.0195	14.0511
1820000000.	51.9810	14.0829
1830000000.	51.9492	14.1141
1840000000.	51.9141	14.1325
1850000000.	51.8836	14.1528
1860000000.	51.8515	14.1743
1870000000.	51.8202	14.1923
1880000000.	51.7845	14.2198
1890000000.	51.7505	14.2524
1900000000.	**51.7221**	**14.2887**
1910000000.	51.6929	14.3303

The conductivity (σ) can be given as:

$$\sigma = \omega \varepsilon_0 e'' = 2 \pi f \varepsilon_0 e''$$

where f = target f * 10^6

$\varepsilon_0 = 8.854 * 10^{-12}$

Simulating Liquid Dielectric Parameter Check Result @ Body 2450 MHz Measured by: Devin Chang

f (MHz)	Liquid Parameters			Measured	Target	Delta (%)	Limit (%)
2450	e'	52.12	Relative Permittivity (ϵ_r):	52.123	52.7	-1.09	± 5
	e"	14.60	Conductivity (σ):	1.990	1.95	2.04	± 5

Liquid Check
Ambient temperature: 24 deg. C; Liquid temperature: 23 deg. C; Relative humidity = 41%
January 17, 2011 10:19 AM

Frequency	e'	e"
2400000000.	52.2326	14.4366
2405000000.	52.2147	14.4597
2410000000.	52.1991	14.4816
2415000000.	52.1855	14.5056
2420000000.	52.1667	14.5284
2425000000.	52.1536	14.5495
2430000000.	52.1393	14.5734
2435000000.	52.1232	14.5986
2440000000.	52.1087	14.6220
2445000000.	52.0897	14.6442
2450000000.	**52.0746**	**14.6668**
2455000000.	52.0580	14.6922
2460000000.	52.0413	14.7137
2465000000.	52.0240	14.7365
2470000000.	52.0066	14.7559
2475000000.	51.9900	14.7801
2480000000.	51.9720	14.7994
2485000000.	51.9556	14.8200
2490000000.	51.9384	14.8406
2495000000.	51.9233	14.8596
2500000000.	51.9049	14.8796

The conductivity (σ) can be given as:

$$\sigma = \omega \varepsilon_0 e'' = 2 \pi f \varepsilon_0 e''$$

where f = target f * 10^6

$\varepsilon_0 = 8.854 * 10^{-12}$

Simulating Liquid Dielectric Parameter Check Result @ Body 5 GHz Measured by: David Lee

f (MHz)	Muscle Liquid Parameters			Measured	Target	Delta (%)	Limit (%)
5200	e'	48.7136	Relative Permittivity (ϵ_r):	48.7136	49.0	-0.58	± 10
	e"	17.7246	Conductivity (σ):	5.12742	5.30	-3.26	± 5
5500	e'	48.3858	Relative Permittivity (ϵ_r):	48.3858	48.6	-0.44	± 10
	e"	18.6984	Conductivity (σ):	5.72119	5.65	1.26	± 5
5800	e'	47.1616	Relative Permittivity (ϵ_r):	47.1616	48.2	-2.15	± 10
	e"	18.5549	Conductivity (σ):	5.98695	6.00	-0.22	± 5

Liquid Check
Ambient temperature: 25 deg. C; Liquid temperature: 24 deg. C; Relative humidity = 40%
January 10, 2011 10:02 AM

Frequency	e'	e"
4600000000.	49.9964	16.7112
4650000000.	50.1388	17.2854
4700000000.	49.9642	16.8133
4750000000.	49.7733	17.4304
4800000000.	49.9223	17.1918
4850000000.	49.4924	17.3158
4900000000.	49.6582	17.6773
4950000000.	49.4340	17.2445
5000000000.	49.2491	17.9967
5050000000.	49.4366	17.4994
5100000000.	48.8332	17.9671
5150000000.	49.2039	17.9794
5200000000.	**48.7136**	**17.7246**
5250000000.	48.7909	18.4706
5300000000.	48.8218	17.6755
5350000000.	48.2787	18.6161
5400000000.	48.8176	18.0649
5450000000.	47.9861	18.3675
5500000000.	**48.3858**	**18.6984**
5550000000.	48.0946	18.0570
5600000000.	47.7267	19.1225
5650000000.	48.2976	18.1278
5700000000.	47.1626	19.0392
5750000000.	48.1469	18.7509
5800000000.	**47.1616**	**18.5549**
5850000000.	47.3194	19.4642
5900000000.	47.6455	18.3207
5950000000.	46.4286	19.6760
6000000000.	47.8654	18.7048

The conductivity (σ) can be given as:

$$\sigma = \omega \varepsilon_0 e'' = 2 \pi f \varepsilon_0 e''$$

where f = target f * 10^6

$\varepsilon_0 = 8.854 * 10^{-12}$

Simulating Liquid Dielectric Parameter Check Result @ Body 5 GHz Measured by: David Lee

f (MHz)	Muscle Liquid Parameters			Measured	Target	Delta (%)	Limit (%)
5200	e'	47.721	Relative Permittivity (ϵ_r):	47.7210	49.0	-2.61	± 10
	e"	18.2905	Conductivity (σ):	5.29112	5.30	-0.17	± 5
5500	e'	47.1076	Relative Permittivity (ϵ_r):	47.1076	48.6	-3.07	± 10
	e"	17.6165	Conductivity (σ):	5.39016	5.65	-4.60	± 5
5800	e'	46.4622	Relative Permittivity (ϵ_r):	46.4622	48.2	-3.61	± 10
	e"	19.1959	Conductivity (σ):	6.19378	6.00	3.23	± 5

Liquid Check
Ambient temperature: 25 deg. C; Liquid temperature: 24 deg. C; Relative humidity = 40%
January 11, 2011 07:11 AM

Frequency	e'	e"
4600000000.	48.9605	17.1721
4650000000.	49.0228	16.6388
4700000000.	48.5934	17.1306
4750000000.	48.9218	17.1374
4800000000.	48.3948	16.9383
4850000000.	48.5934	17.6079
4900000000.	48.3747	16.9491
4950000000.	48.1533	17.7381
5000000000.	48.3697	17.3338
5050000000.	47.8348	17.5142
5100000000.	48.1501	17.9113
5150000000.	47.7424	17.2874
5200000000.	**47.7210**	**18.2905**
5250000000.	47.7744	17.4219
5300000000.	47.2645	18.1916
5350000000.	47.7141	17.9886
5400000000.	47.0624	17.8217
5450000000.	47.3729	18.5721
5500000000.	**47.1076**	**17.6165**
5550000000.	46.8420	18.7476
5600000000.	47.1761	17.9970
5650000000.	46.4814	18.3995
5700000000.	46.9786	18.7034
5750000000.	46.4722	17.9818
5800000000.	**46.4622**	**19.1959**
5850000000.	46.6404	17.9547
5900000000.	45.9285	19.0913
5950000000.	46.6394	18.5729
6000000000.	45.7546	18.5346

The conductivity (σ) can be given as:

$$\sigma = \omega \varepsilon_0 e'' = 2 \pi f \varepsilon_0 e''$$

where f = target f * 10^6

$\varepsilon_0 = 8.854 * 10^{-12}$

Simulating Liquid Dielectric Parameter Check Result @ Body 5 GHz Measured by: David Lee

f (MHz)	Muscle Liquid Parameters			Measured	Target	Delta (%)	Limit (%)
5200	e'	49.8309	Relative Permittivity (ϵ_r):	49.8309	49.0	1.70	± 10
	e"	17.6668	Conductivity (σ):	5.11070	5.30	-3.57	± 5
5500	e'	49.3059	Relative Permittivity (ϵ_r):	49.3059	48.6	1.45	± 10
	e"	18.5943	Conductivity (σ):	5.68934	5.65	0.70	± 5
5800	e'	48.4447	Relative Permittivity (ϵ_r):	48.4447	48.2	0.51	± 10
	e"	18.5910	Conductivity (σ):	5.99860	6.00	-0.02	± 5

Liquid Check
Ambient temperature: 25 deg. C; Liquid temperature: 24 deg. C; Relative humidity = 40%
January 14, 2011 08:19 AM

Frequency	e'	e"
4600000000.	51.0668	16.6305
4650000000.	50.9337	16.8486
4700000000.	50.9261	16.8108
4750000000.	50.6895	17.0003
4800000000.	50.7597	17.1063
4850000000.	50.5242	17.0815
4900000000.	50.5395	17.4281
4950000000.	50.3430	17.1591
5000000000.	50.2519	17.6434
5050000000.	50.2001	17.3320
5100000000.	50.0312	17.6791
5150000000.	50.0846	17.7401
5200000000.	**49.8309**	**17.6668**
5250000000.	49.7359	18.1132
5300000000.	49.6753	17.7682
5350000000.	49.4087	18.2335
5400000000.	49.5257	18.0992
5450000000.	49.1997	18.1579
5500000000.	**49.3059**	**18.5943**
5550000000.	49.1474	18.0706
5600000000.	48.9053	18.8925
5650000000.	49.1268	18.3265
5700000000.	48.5435	18.8295
5750000000.	48.8989	18.8875
5800000000.	**48.4447**	**18.5910**
5850000000.	48.4257	19.4993
5900000000.	48.5819	18.5486
5950000000.	47.8553	19.6052
6000000000.	48.5302	19.0647

The conductivity (σ) can be given as:

$$\sigma = \omega \varepsilon_0 e'' = 2 \pi f \varepsilon_0 e''$$

where f = target f * 10^6

$\varepsilon_0 = 8.854 * 10^{-12}$

Date	Freq. (MHz)	Liquid Parameters			Measured	Target	Delta (%)	Limit ? %)
2/25/2011	Body 835	e'	54.3291	Relative Permittivity (ε_r):	54.33	55.20	-1.58	5
		e"	21.2383	Conductivity (σ):	0.99	0.97	1.66	5

Liquid Check

Ambient temperature: 24 deg. C; Liquid temperature: 23 deg. C; Relative humidity = 40%

February 25, 2011 05:37 PM

Frequency	e'	e''
800000000.	54.6740	21.3992
805000000.	54.6229	21.3831
810000000.	54.5765	21.3512
815000000.	54.5243	21.3337
820000000.	54.4738	21.3109
825000000.	54.4261	21.2845
830000000.	54.3775	21.2573
835000000.	**54.3291**	**21.2383**
840000000.	54.2867	21.2100
845000000.	54.2378	21.1910
850000000.	54.1978	21.1730
855000000.	54.1548	21.1532
860000000.	54.1094	21.1407
865000000.	54.0573	21.1236
870000000.	54.0084	21.1143
875000000.	53.9593	21.0931
880000000.	53.9118	21.0789
885000000.	53.8564	21.0610
890000000.	53.8071	21.0528
895000000.	53.7547	21.0314
900000000.	53.7056	21.0170
905000000.	53.6593	20.9994
910000000.	53.6072	20.9761
915000000.	53.5606	20.9636
920000000.	53.5089	20.9482
925000000.	53.4691	20.9313
930000000.	53.4230	20.9158
935000000.	53.3785	20.8970
940000000.	53.3313	20.8796
945000000.	53.2849	20.8633
950000000.	53.2376	20.8459

The conductivity (σ) can be given as:

$$\sigma = \omega \varepsilon_0 e'' = 2 \pi f \varepsilon_0 e''$$

where f = target f * 10^6

$\varepsilon_0 = 8.854 * 10^{-12}$

Date	Freq. (MHz)	Liquid Parameters			Measured	Target	Delta (%)	Limit ? %)
2/11/2011	Body 1900	e'	52.9619	Relative Permittivity (ϵ_r):	52.96	53.30	-0.63	5
		e"	14.0530	Conductivity (σ):	1.48	1.52	-2.33	5

Liquid Check
Ambient temperature: 24 deg. C; Liquid temperature: 23 deg. C; Relative humidity = 42%
February 25, 2011 07:03 PM

Frequency	e'	e"
1710000000.	53.5953	13.4024
1720000000.	53.5673	13.4333
1730000000.	53.5418	13.4644
1740000000.	53.5091	13.4961
1750000000.	53.4811	13.5285
1760000000.	53.4480	13.5618
1770000000.	53.4153	13.5965
1780000000.	53.3853	13.6331
1790000000.	53.3479	13.6719
1800000000.	53.3152	13.7081
1810000000.	53.2838	13.7440
1820000000.	53.2491	13.7803
1830000000.	53.2169	13.8138
1840000000.	53.1842	13.8505
1850000000.	53.1492	13.8837
1860000000.	53.1149	13.9187
1870000000.	53.0755	13.9505
1880000000.	53.0350	13.9832
1890000000.	52.9983	14.0180
1900000000.	**52.9619**	**14.0530**
1910000000.	52.9250	14.0833

The conductivity (σ) can be given as:

$$\sigma = \omega \varepsilon_0 e'' = 2 \pi f \varepsilon_0 e''$$

where f = target f * 10^6

$\varepsilon_0 = 8.854 * 10^{-12}$

9. SYSTEM VERIFICATION

The system performance check is performed prior to any usage of the system in order to verify SAR system measurement accuracy. The system performance check verifies that the system operates within its specifications of ±10%.

System Performance Check Measurement Conditions

- The measurements were performed in the flat section of the SAM twin phantom filled with Head or Body simulating liquid of the following parameters.
- The DASY4 system with an Isotropic E-Field Probe EX3DV3 SN3531 was used for the measurements.
- The dipole was mounted on the small tripod so that the dipole feed point was positioned below the center marking of the flat phantom section and the dipole was oriented parallel to the body axis (the long side of the phantom). The standard measuring distance was 10 mm (above 1 GHz) and 15 mm (below 1 GHz) from dipole center to the simulating liquid surface.
- The coarse grid with a grid spacing of 15 mm was aligned with the dipole.
  For 5 GHz band - The coarse grid with a grid spacing of 10 mm was aligned with the dipole.
- Special 7x7x7 fine cube was chosen for cube
- Distance between probe sensors and phantom surface was set to 3 mm.
  For 5 GHz band - Distance between probe sensors and phantom surface was set to 2.5 mm
- The dipole input power (forward power) was 100 mW
- The results are normalized to 1 W input power.

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

System validation dipole	Cal. certificate #	Cal. date	Cal. Freq. (GHz)	SAR Avg (mW/g)		
				Tissue:	Head	Body
D835V2	D835V2-4d002_Apr09	*4/23/2009	0.835	SAR_{1g}:	9.64	9.96
				SAR_{10g}:	6.28	6.56
D1900V2	D1900V2-5d043_Nov09	*11/24/2009	1.9	SAR_{1g}:	39.8	40.4
				SAR_{10g}:	20.7	21.4
D2450V2	D2450V2-706_Apr10	04/19/10	2.4	SAR_{1g}:	51.6	52.4
				SAR_{10g}:	24.4	24.5
D5GHzV2	D5GHzV2-1075_Sep09	*9/3/2009	5.2	SAR_{1g}:		79.0
				SAR_{10g}:		22.0
			5.5	SAR_{1g}:		85.4
				SAR_{10g}:		23.5
			5.8	SAR_{1g}:		73.2
				SAR_{10g}:		20.1

***Note:** 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 (Appendix 3, 4 & 6)
4. Impedance is within 5Ω of calibrated measurement (Appendix 3, 4 & 6)

9.1. SYSTEM CHECK RESULTS

System validation dipole	Date Tested	Measured (Normalized to 1 W)		Target	Delta (%)	Tolerance (%)
		Tissue:	Body			
D835V2	01/23/11	SAR_{1g}:	9.65	9.96	-3.11	±10
		SAR_{10g}:	6.32	6.56	-3.66	
D835V2	01/25/11	SAR_{1g}:	9.92	9.96	-0.40	±10
		SAR_{10g}:	6.51	6.56	-0.76	
System validation dipole	Date Tested	Measured (Normalized to 1 W)		Target	Delta (%)	Tolerance (%)
		Tissue:	Body			
D1900V2 SN 5d043	01/21/11	SAR_{1g}:	39.5	40.4	-2.23	±10
		SAR_{10g}:	20.5	21.4	-4.21	
D1900V2 SN 5d043	02/25/11	SAR_{1g}:	38.0	40.4	-5.94	±10
		SAR_{10g}:	20.0	21.4	-6.54	
System validation dipole	Date Tested	Measured (Normalized to 1 W)		Target	Delta (%)	Tolerance (%)
		Tissue:	Body			
D2450V2	01/17/11	SAR_{1g}:	52.7	52.4	0.57	±10
		SAR_{10g}:	24.1	24.5	-1.63	
System validation dipole	Date Tested	Measured (Normalized to 1 W)		Target	Delta (%)	Tolerance (%)
		Tissue:	Body			
D5GHzV2 (5.2GHz)	01/10/10	SAR_{1g}:	74.2	79.0	-6.08	±10
		SAR_{10g}:	21.4	22.0	-2.73	
D5GHzV2 (5.5GHz)	01/10/10	SAR_{1g}:	83.0	85.4	-2.81	±10
		SAR_{10g}:	23.6	23.5	0.43	
D5GHzV2 (5.8GHz)	01/10/10	SAR_{1g}:	73.7	73.2	0.68	±10
		SAR_{10g}:	21.0	20.1	4.48	
D5GHzV2 (5.2GHz)	01/11/11	SAR_{1g}:	75.0	79.0	-5.06	±10
		SAR_{10g}:	21.7	22.0	-1.36	
D5GHzV2 (5.5GHz)	01/11/11	SAR_{1g}:	80.9	85.4	-5.27	±10
		SAR_{10g}:	23.0	23.5	-2.13	
D5GHzV2 (5.8GHz)	01/11/11	SAR_{1g}:	73.1	73.2	-0.14	±10
		SAR_{10g}:	20.8	20.1	3.48	
D5GHzV2 (5.2GHz)	01/14/11	SAR_{1g}:	75.6	79.0	-4.30	±10
		SAR_{10g}:	22.1	22.0	0.45	
D5GHzV2 (5.5GHz)	01/14/11	SAR_{1g}:	83.2	85.4	-2.58	±10
		SAR_{10g}:	23.8	23.5	1.28	
D5GHzV2 (5.8GHz)	01/14/11	SAR_{1g}:	73.3	73.2	0.14	±10
		SAR_{10g}:	21.0	20.1	4.48	

SYSTEM CHECK PLOT for D835V2

Date/Time: 1/23/2011 11:32:44 AM

Test Laboratory: Compliance Certification Services (UL CCS)

System Performance Check - D835V2

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:xxx

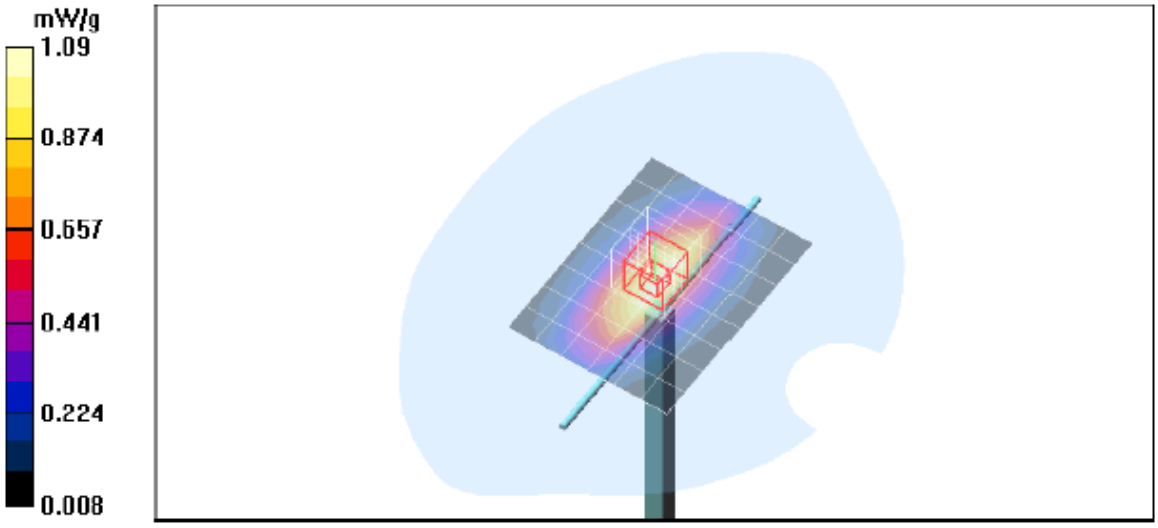
Communication System: CW 835; Frequency: 835 MHz;Duty Cycle: 1:1
Medium parameters used: f = 835 MHz; σ = 0.984 mho/m; ε_r = 54.7; ρ = 1000 kg/m^3
Phantom section: Flat Section

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

DASY4 Configuration:
- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Probe: EX3DV4 - SN3749; ConvF(8.79, 8.79, 8.79); Calibrated: 12/13/2010
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn427; Calibrated: 7/21/2010
- Phantom: SAM 2 (Twin); Type: SAM 2; Serial: 1050
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

d=15mm, Pin=100 mW/Area Scan (7x9x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 1.09 mW/g

d=15mm, Pin=100 mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 33.4 V/m; Power Drift = 0.123 dB
Peak SAR (extrapolated) = 1.46 W/kg
SAR(1 g) = 0.965 mW/g; SAR(10 g) = 0.632 mW/g
Maximum value of SAR (measured) = 1.13 mW/g



Z-Axis PLOT for D835V2

Date/Time: 1/23/2011 11:49:09 AM

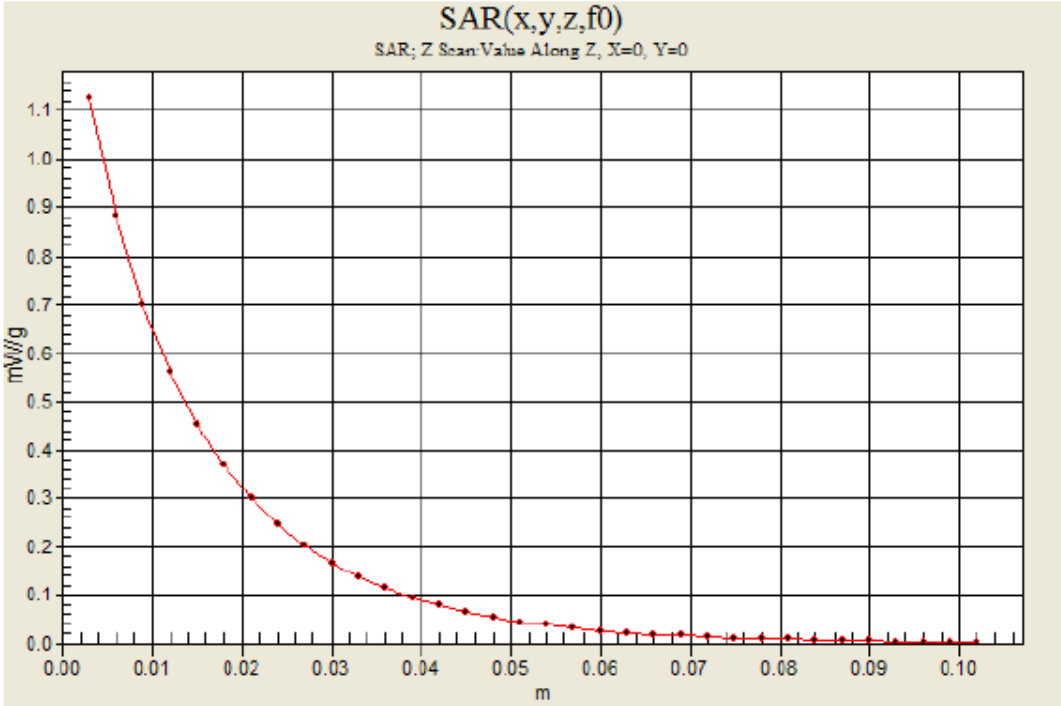
Test Laboratory: Compliance Certification Services (UL CCS)

System Performance Check - D835V2

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:xxx

Communication System: CW 835; Frequency: 835 MHz;Duty Cycle: 1:1

d=15mm, Pin=100 mW/Z Scan (1x1x34): Measurement grid: dx=20mm, dy=20mm, dz=3mm
Maximum value of SAR (measured) = 1.13 mW/g



SYSTEM CHECK PLOT for D1900V2

Date/Time: 1/21/2011 1:11:47 PM

Test Laboratory: Compliance Certification Services (UL CCS)

System Performance Check - D1900V2

DUT: Dipole; Type: D1900V2; Serial: 5d043

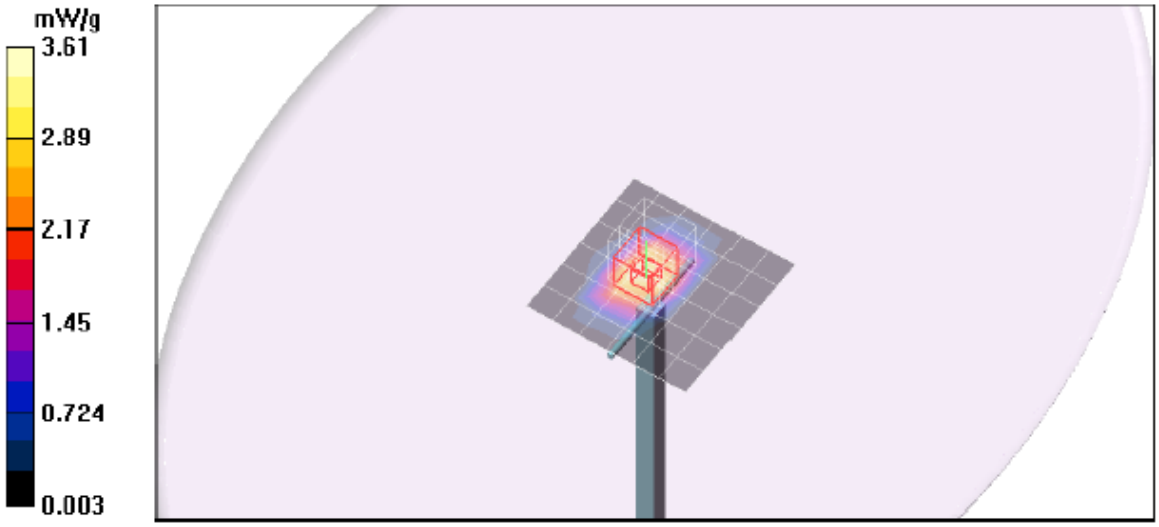
Communication System: System Check Signal - CW; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1900 MHz; σ = 1.51 mho/m; ε_r = 51.9; ρ = 1000 kg/m^3
Phantom section: Flat Section

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

DASY4 Configuration:
- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Probe: EX3DV4 - SN3749; ConvF(7.33, 7.33, 7.33); Calibrated: 12/13/2010
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn427; Calibrated: 7/21/2010
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: SN:1003
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

d=10mm, Pin=100mW/Area Scan (7x7x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 3.61 mW/g

d=10mm, Pin=100mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 54.8 V/m; Power Drift = 0.103 dB
Peak SAR (extrapolated) = 7.32 W/kg
SAR(1 g) = 3.95 mW/g; SAR(10 g) = 2.05 mW/g
Maximum value of SAR (measured) = 4.99 mW/g



Z-Axis PLOT for D1900V2

Date/Time: 1/21/2011 1:28:43 PM

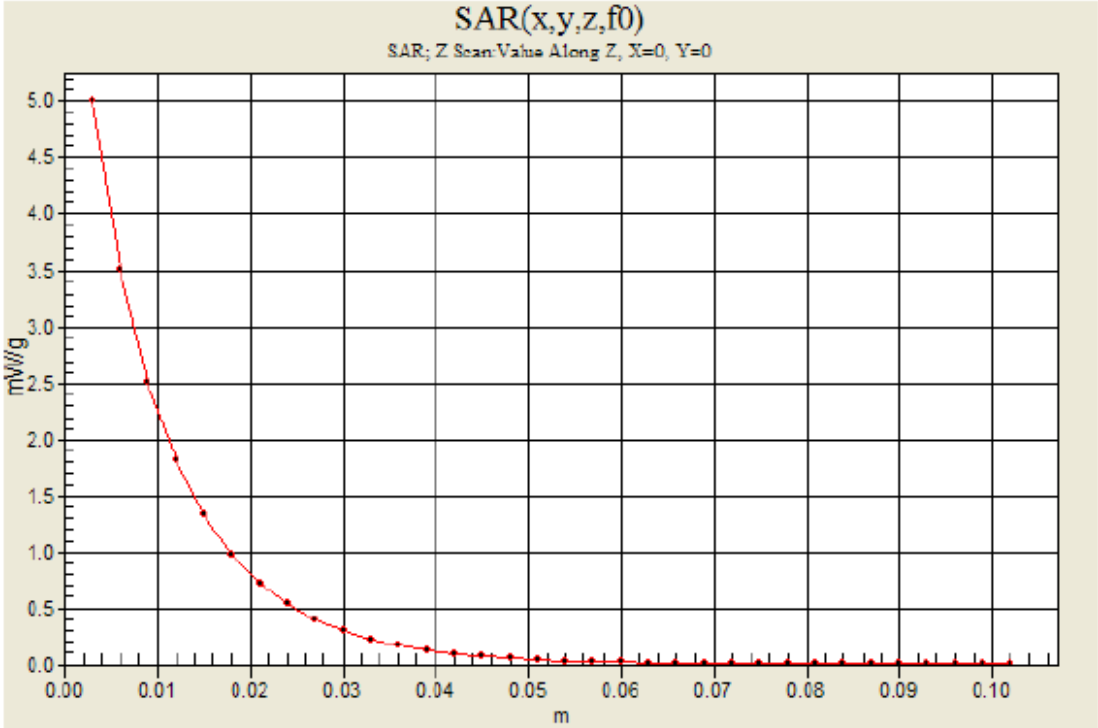
Test Laboratory: Compliance Certification Services (UL CCS)

System Performance Check - D1900V2

DUT: Dipole; Type: D1900V2; Serial: 5d043

Communication System: System Check Signal - CW; Frequency: 1900 MHz;Duty Cycle: 1:1

d=10mm, Pin=100mW/Z Scan (1x1x34): Measurement grid: dx=20mm, dy=20mm, dz=3mm
Maximum value of SAR (measured) = 5.01 mW/g



SYSTEM CHECK PLOT for D2450V2

Date/Time: 1/17/2011 11:20:01 AM

Test Laboratory: Compliance Certification Services (UL CCS)

System Performance Check - D2450V2

DUT: Dipole ; Type: D2450V2; Serial: 706

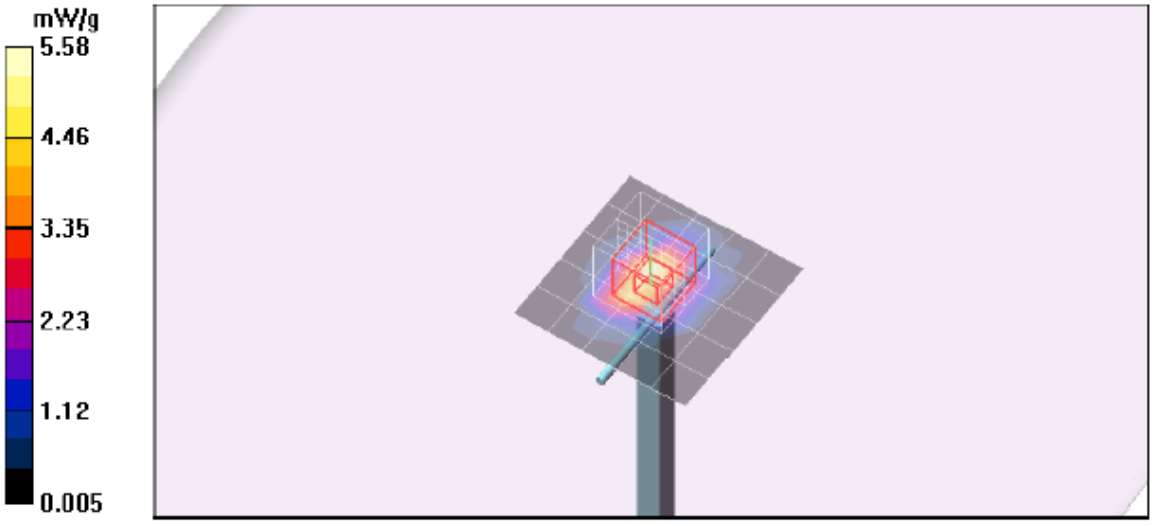
Communication System: System Check Signal - CW; Frequency: 2450 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2450 MHz; σ = 2 mho/m; ε_r = 52.1; ρ = 1000 kg/m^3
Phantom section: Flat Section

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

DASY4 Configuration:
- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Probe: EX3DV4 - SN3749; ConvF(6.9, 6.9, 6.9); Calibrated: 12/13/2010
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn427; Calibrated: 7/21/2010
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: SN:1003
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

d=10mm, Pin=100mW/Area Scan (6x6x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 5.58 mW/g

d=10mm, Pin=100mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 59.3 V/m; Power Drift = -0.032 dB
Peak SAR (extrapolated) = 11.2 W/kg
SAR(1 g) = 5.27 mW/g; SAR(10 g) = 2.41 mW/g
Maximum value of SAR (measured) = 6.96 mW/g



Z-Axis PLOT for D2450V2

Date/Time: 1/17/2011 11:34:38 AM

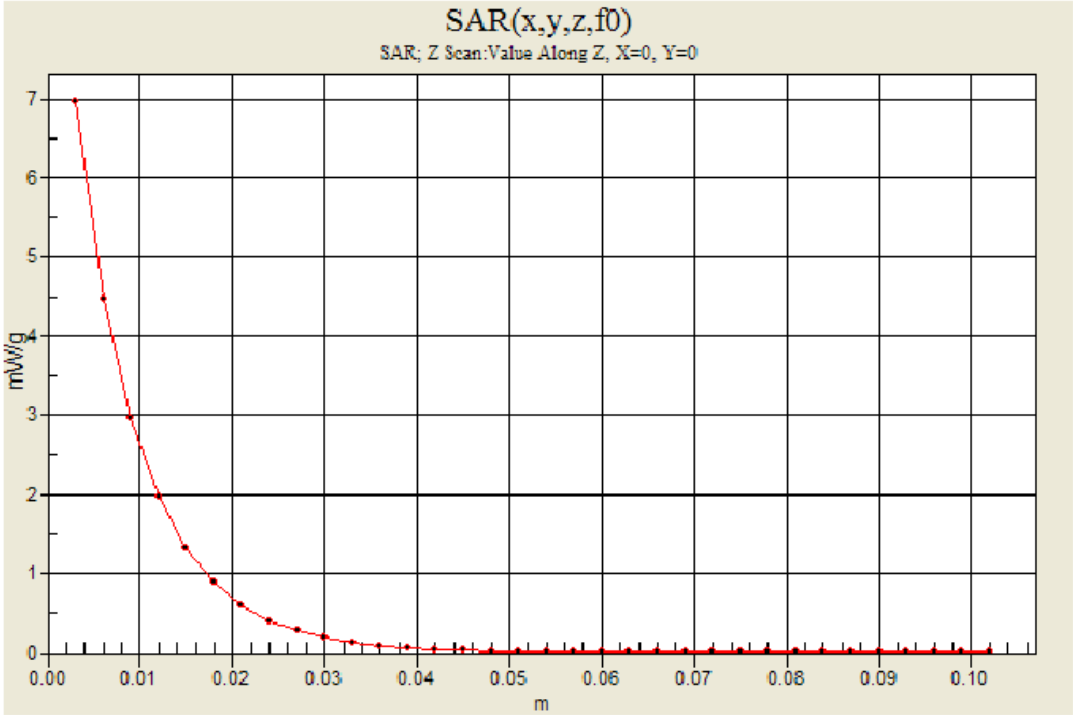
Test Laboratory: Compliance Certification Services (UL CCS)

System Performance Check - D2450V2

DUT: Dipole ; Type: D2450V2; Serial: 706

Communication System: System Check Signal - CW; Frequency: 2450 MHz;Duty Cycle: 1:1

d=10mm, Pin=100mW/Z Scan (1x1x34): Measurement grid: dx=20mm, dy=20mm, dz=3mm
Maximum value of SAR (measured) = 6.97 mW/g



SYSTEM CHECK PLOT for 5.2 GHz

Date/Time: 1/10/2011 12:10:22 PM

Test Laboratory: Compliance Certification Services (UL CCS)

System Performance Check - D5GHzV2

DUT: Dipole 5200-5800MHz; Type: D5GHzV2; Serial: 1075

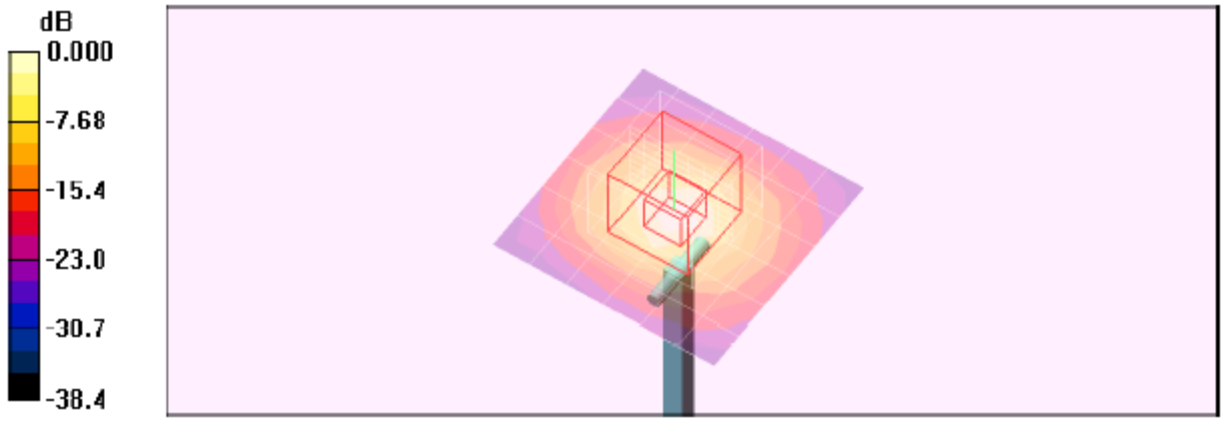
Communication System: System Check Signal - CW; Frequency: 5200 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5200 MHz; σ = 5.39 mho/m; ε_r = 48.4; ρ = 1000 kg/m^3
Phantom section: Flat Section

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

DASY4 Configuration:
- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Probe: EX3DV4 - SN3749; ConvF(4.07, 4.07, 4.07); Calibrated: 12/13/2010
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn427; Calibrated: 7/21/2010
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: SN:XXXX
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

5.2GHz, d=10mm, Pin=100mW/Area Scan (7x7x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 13.6 mW/g

5.2GHz, d=10mm, Pin=100mW/Zoom Scan (8x8x10)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 54.8 V/m; Power Drift = -0.046 dB
Peak SAR (extrapolated) = 25.0 W/kg
SAR(1 g) = 7.42 mW/g; SAR(10 g) = 2.14 mW/g
Maximum value of SAR (measured) = 13.3 mW/g



0 dB = 13.3mW/g

SYSTEM CHECK PLOT for 5.5 GHz

Date/Time: 1/10/2011 11:06:47 AM

Test Laboratory: Compliance Certification Services (UL CCS)

System Performance Check - D5GHzV2

DUT: Dipole 5200-5800MHz; Type: D5GHzV2; Serial: 1075

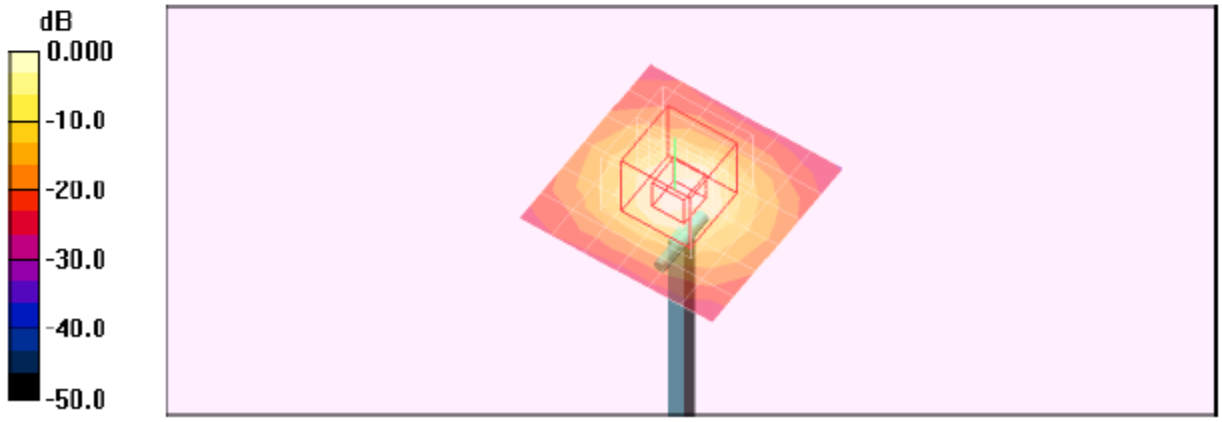
Communication System: System Check Signal - CW; Frequency: 5500 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5500 MHz; σ = 5.83 mho/m; ε_r = 47.8; ρ = 1000 kg/m^3
Phantom section: Flat Section

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

DASY4 Configuration:
- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Probe: EX3DV4 - SN3749; ConvF(3.53, 3.53, 3.53); Calibrated: 12/13/2010
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn427; Calibrated: 7/21/2010
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: SN:XXXX
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

5.5GHz, d=10mm, Pin=100mW/Area Scan (7x7x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 15.2 mW/g

5.5GHz, d=10mm, Pin=100mW/Zoom Scan (8x8x10)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 55.4 V/m; Power Drift = -0.047 dB
Peak SAR (extrapolated) = 29.1 W/kg
SAR(1 g) = 8.3 mW/g; SAR(10 g) = 2.36 mW/g
Maximum value of SAR (measured) = 14.8 mW/g



0 dB = 14.8mW/g

SYSTEM CHECK PLOT for 5.8 GHz

Date/Time: 1/10/2011 10:36:47 AM

Test Laboratory: Compliance Certification Services (UL CCS)

System Performance Check - D5GHzV2

DUT: Dipole 5200-5800MHz; Type: D5GHzV2; Serial: 1075

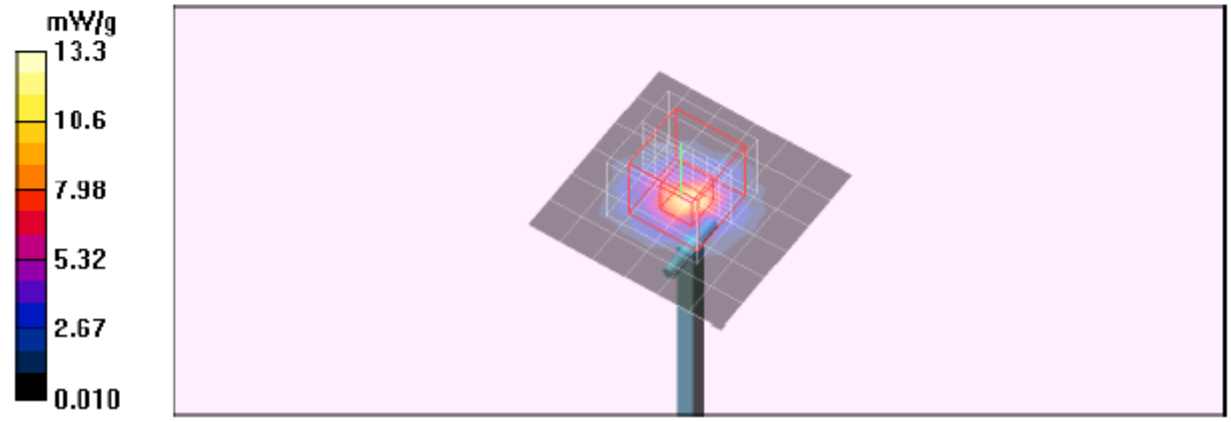
Communication System: System Check Signal - CW; Frequency: 5800 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5800 MHz; σ = 6.27 mho/m; ε_r = 47.2; ρ = 1000 kg/m^3
Phantom section: Flat Section

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

DASY4 Configuration:
- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Probe: EX3DV4 - SN3749; ConvF(3.65, 3.65, 3.65); Calibrated: 12/13/2010
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn427; Calibrated: 7/21/2010
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: SN:XXXX
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

5.8GHz, d=10mm, Pin=100mW/Area Scan (7x7x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 13.3 mW/g

5.8GHz, d=10mm, Pin=100mW/Zoom Scan (8x8x10)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 50.8 V/m; Power Drift = -0.077 dB
Peak SAR (extrapolated) = 26.8 W/kg
SAR(1 g) = 7.37 mW/g; SAR(10 g) = 2.1 mW/g
Maximum value of SAR (measured) = 13.2 mW/g



Z-Axis PLOT for 5.8 GHz

Date/Time: 1/10/2011 11:01:25 AM

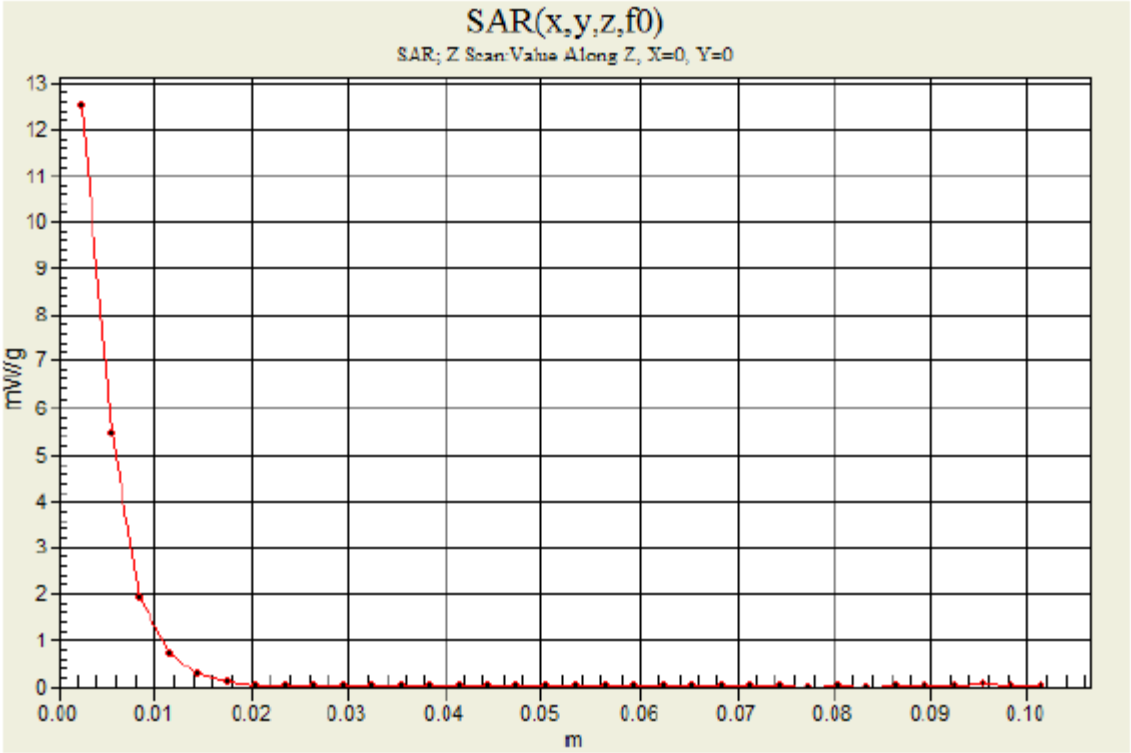
Test Laboratory: Compliance Certification Services (UL CCS)

System Performance Check - D5GHzV2

DUT: Dipole 5200-5800MHz; Type: D5GHzV2; Serial: 1075

Communication System: System Check Signal - CW; Frequency: 5800 MHz;Duty Cycle: 1:1

5.8GHz, d=10mm, Pin=100mW/Z Scan (1x1x34): Measurement grid: dx=20mm, dy=20mm, dz=3mm
Maximum value of SAR (measured) = 12.5 mW/g



SYSTEM CHECK PLOT for 5.2 GHz

Date/Time: 1/11/2011 7:55:42 AM

Test Laboratory: Compliance Certification Services (UL CCS)

System Performance Check - D5GHzV2_5 GHz

DUT: D5GHzV2; Type: D5GHzV2; Serial: 1075

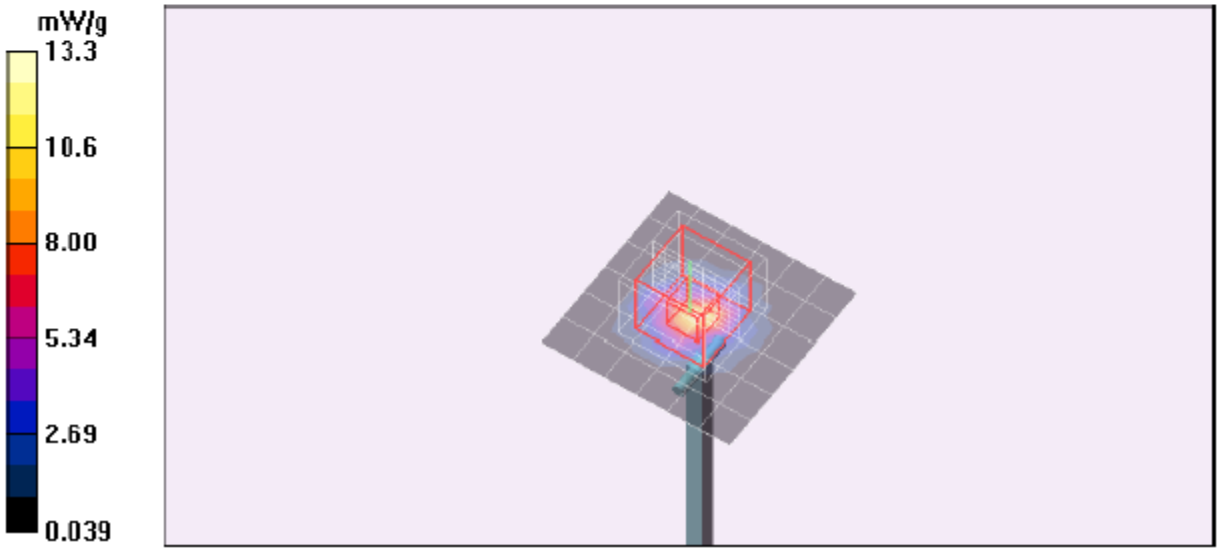
Communication System: CW 5GHz; Frequency: 5200 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5200 MHz; σ = 5.29 mho/m; ε_r = 47.7; ρ = 1000 kg/m^3
Phantom section: Flat Section

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

DASY4 Configuration:
- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Probe: EX3DV4 - SN3749; ConvF(4.07, 4.07, 4.07); Calibrated: 12/13/2010
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn427; Calibrated: 7/21/2010
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: SN:XXXX
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

d=10mm, Pin=100mW, 5.2GHz/Area Scan (7x7x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 13.3 mW/g

d=10mm, Pin=100mW, 5.2GHz/Zoom Scan (8x8x10)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 55.1 V/m; Power Drift = 0.196 dB
Peak SAR (extrapolated) = 25.4 W/kg
SAR(1 g) = 7.5 mW/g; SAR(10 g) = 2.17 mW/g



SYSTEM CHECK PLOT for 5.5 GHz

Date/Time: 1/11/2011 9:01:30 AM

Test Laboratory: Compliance Certification Services (UL CCS)

System Performance Check - D5GHzV2_5 GHz

DUT: D5GHzV2; Type: D5GHzV2; Serial: 1075

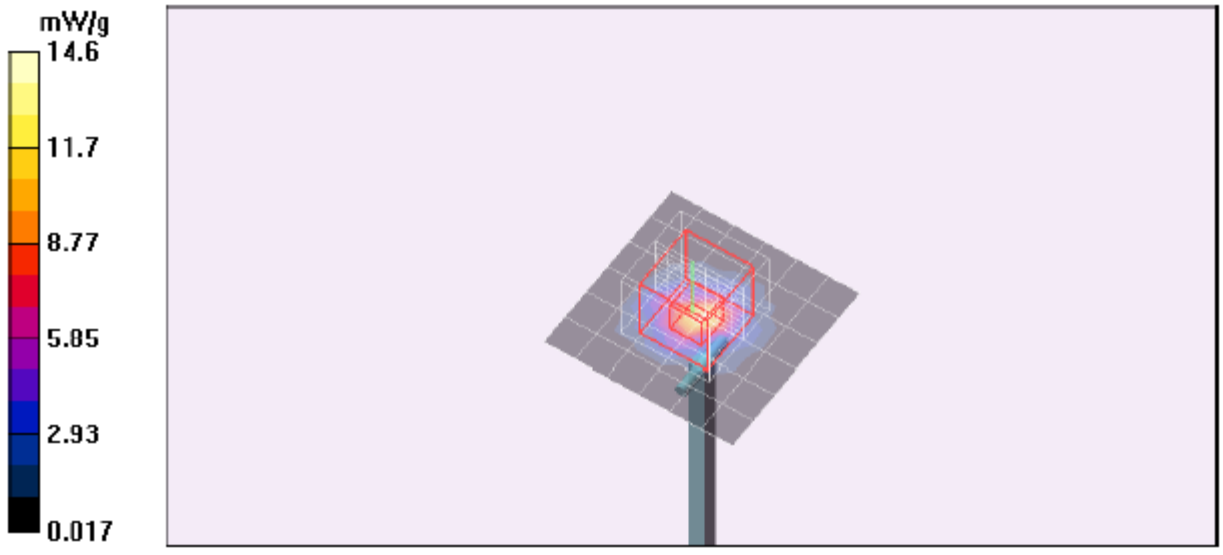
Communication System: CW 5GHz; Frequency: 5500 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5500 MHz; σ = 5.39 mho/m; ε_r = 47.1; ρ = 1000 kg/m^3
Phantom section: Flat Section

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

DASY4 Configuration:
- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Probe: EX3DV4 - SN3749; ConvF(3.53, 3.53, 3.53); Calibrated: 12/13/2010
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn427; Calibrated: 7/21/2010
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: SN:XXXX
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

d=10mm, Pin=100mW, 5.5GHz/Area Scan (7x7x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 14.6 mW/g

d=10mm, Pin=100mW, 5.5GHz/Zoom Scan (8x8x10)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 56.8 V/m; Power Drift = 0.087 dB
Peak SAR (extrapolated) = 28.2 W/kg
SAR(1 g) = 8.09 mW/g; SAR(10 g) = 2.3 mW/g
Maximum value of SAR (measured) = 14.3 mW/g



SYSTEM CHECK PLOT for 5.8 GHz

Date/Time: 1/11/2011 10:03:36 AM

Test Laboratory: Compliance Certification Services (UL CCS)

System Performance Check - D5GHzV2_5 GHz

DUT: D5GHzV2; Type: D5GHzV2; Serial: 1075

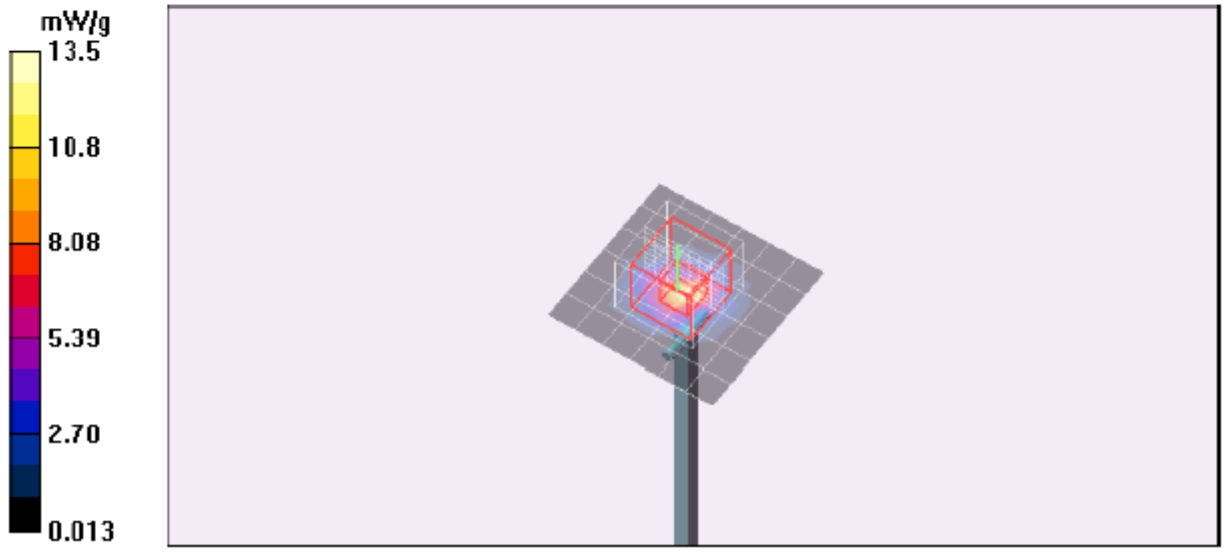
Communication System: CW 5GHz; Frequency: 5800 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5800 MHz; σ = 6.19 mho/m; ε_r = 46.5; ρ = 1000 kg/m^3
Phantom section: Flat Section

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

DASY4 Configuration:
- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Probe: EX3DV4 - SN3749; ConvF(3.65, 3.65, 3.65); Calibrated: 12/13/2010
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn427; Calibrated: 7/21/2010
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: SN:XXXX
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

d=10mm, Pin=100mW, 5.8GHz/Area Scan (7x7x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 13.5 mW/g

d=10mm, Pin=100mW, 5.8GHz/Zoom Scan (8x8x10)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 51.0 V/m; Power Drift = 0.119 dB
Peak SAR (extrapolated) = 27.6 W/kg
SAR(1 g) = 7.31 mW/g; SAR(10 g) = 2.08 mW/g
Maximum value of SAR (measured) = 13.3 mW/g



Z-Axis PLOT for 5.8 GHz

Date/Time: 1/11/2011 10:28:03 AM

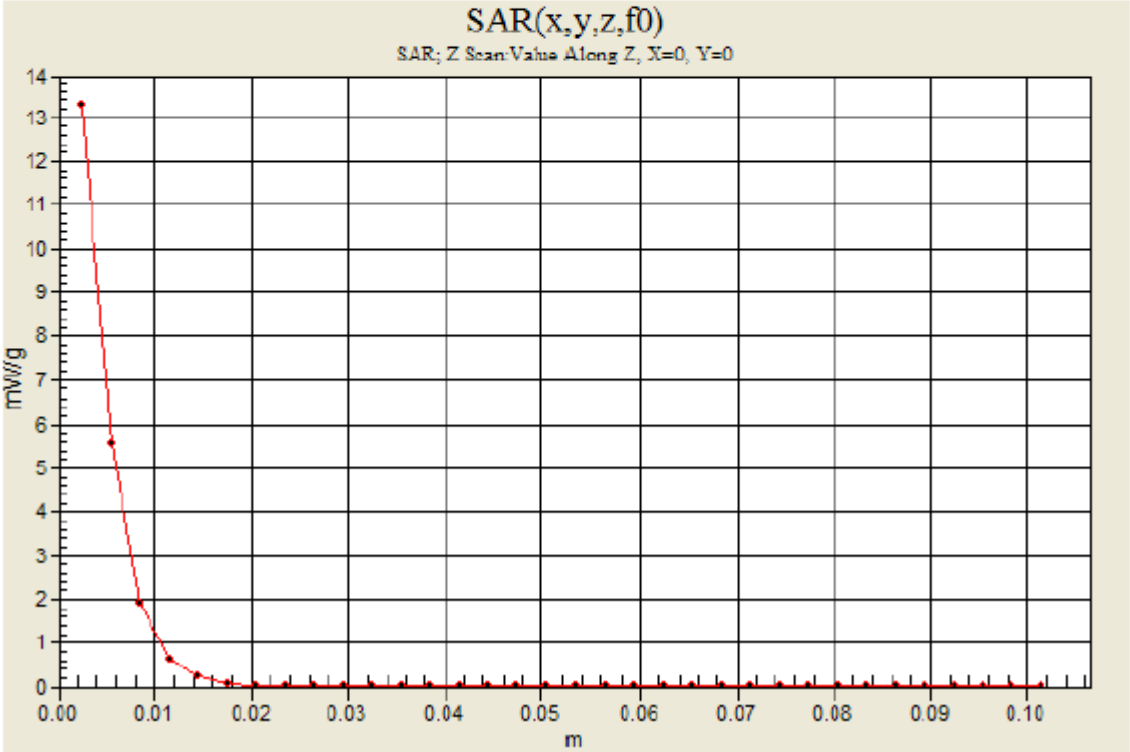
Test Laboratory: Compliance Certification Services (UL CCS)

System Performance Check - D5GHzV2_5 GHz

DUT: D5GHzV2; Type: D5GHzV2; Serial: 1075

Communication System: CW 5GHz; Frequency: 5800 MHz;Duty Cycle: 1:1

d=10mm, Pin=100mW, 5.8GHz/Z Scan (1x1x34): Measurement grid: dx=20mm, dy=20mm, dz=3mm
Maximum value of SAR (measured) = 13.3 mW/g



SYSTEM CHECK PLOT for 5.2 GHz

Date/Time: 1/14/2011 9:09:44 AM

Test Laboratory: Compliance Certification Services (UL CCS)

System Performance Check - D5GHzV2

DUT: Dipole 5200-5800MHz; Type: D5GHzV2; Serial: 1075

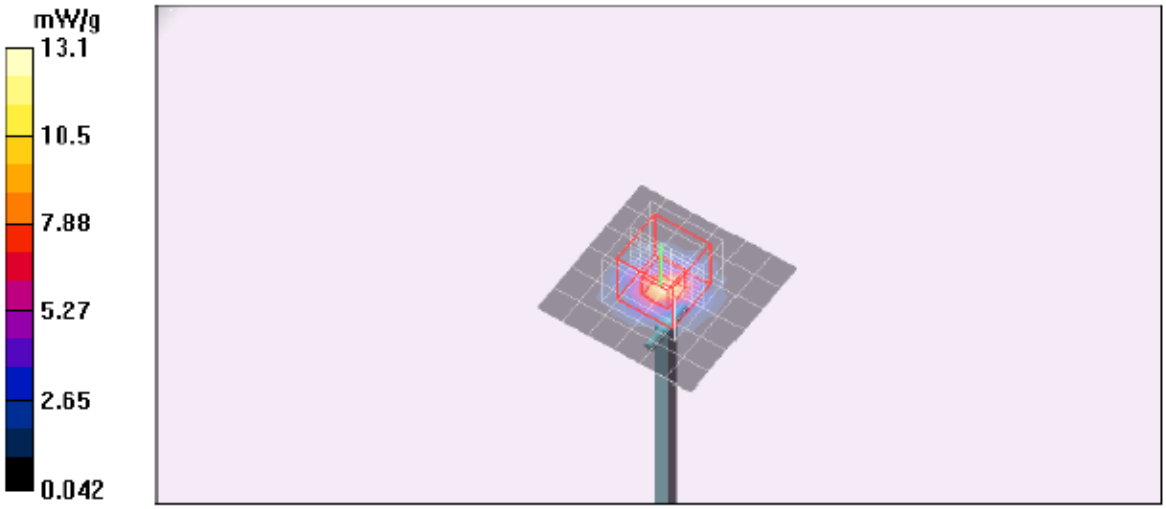
Communication System: System Check Signal - CW; Frequency: 5200 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5200 MHz; σ = 5.11 mho/m; ε_r = 49.8; ρ = 1000 kg/m^3
Phantom section: Flat Section

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

DASY4 Configuration:
- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Probe: EX3DV4 - SN3749; ConvF(4.07, 4.07, 4.07); Calibrated: 12/13/2010
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn427; Calibrated: 7/21/2010
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: SN:XXXX
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

5.2GHz, d=10mm, Pin=100mW/Area Scan (7x7x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 13.1 mW/g

5.2GHz, d=10mm, Pin=100mW/Zoom Scan (8x8x10)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 56.0 V/m; Power Drift = 0.065 dB
Peak SAR (extrapolated) = 23.8 W/kg
SAR(1 g) = 7.56 mW/g; SAR(10 g) = 2.21 mW/g
Maximum value of SAR (measured) = 13.2 mW/g



SYSTEM CHECK PLOT for 5.5 GHz

Date/Time: 1/14/2011 9:38:08 AM

Test Laboratory: Compliance Certification Services (UL CCS)

System Performance Check - D5GHzV2

DUT: Dipole 5200-5800MHz; Type: D5GHzV2; Serial: 1075

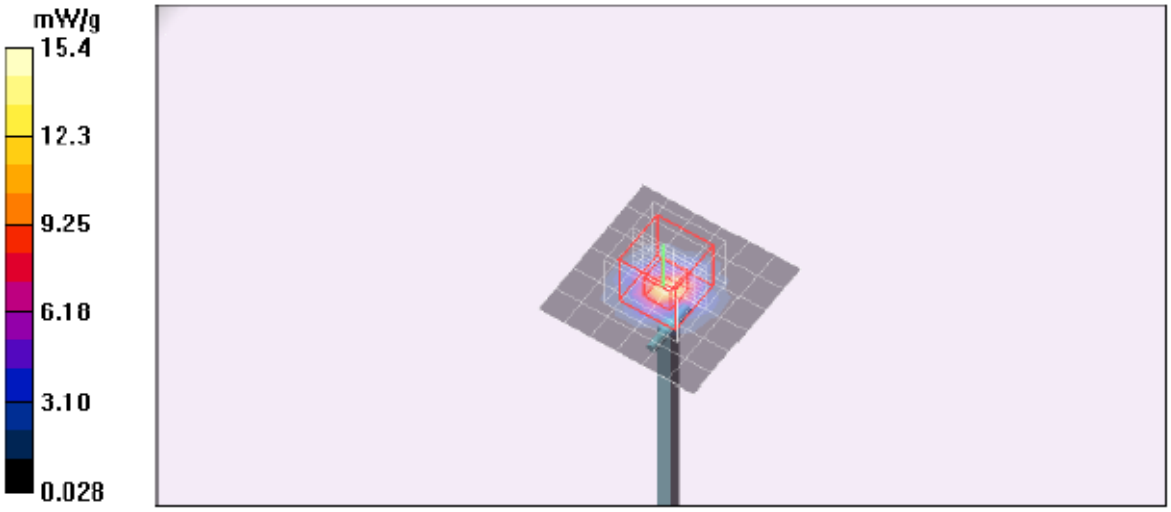
Communication System: System Check Signal - CW; Frequency: 5500 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5500 MHz; σ = 5.69 mho/m; ε_r = 49.3; ρ = 1000 kg/m^3
Phantom section: Flat Section

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

DASY4 Configuration:
- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Probe: EX3DV4 - SN3749; ConvF(3.53, 3.53, 3.53); Calibrated: 12/13/2010
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn427; Calibrated: 7/21/2010
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: SN:XXXX
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

5.5GHz, d=10mm, Pin=100mW/Area Scan (7x7x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 15.4 mW/g

5.5GHz, d=10mm, Pin=100mW/Zoom Scan (8x8x10)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 56.8 V/m; Power Drift = 0.005 dB
Peak SAR (extrapolated) = 27.3 W/kg
SAR(1 g) = 8.32 mW/g; SAR(10 g) = 2.38 mW/g
Maximum value of SAR (measured) = 15.1 mW/g



SYSTEM CHECK PLOT for 5.8 GHz

Date/Time: 1/14/2011 10:04:26 AM

Test Laboratory: Compliance Certification Services (UL CCS)

System Performance Check - D5GHzV2

DUT: Dipole 5200-5800MHz; Type: D5GHzV2; Serial: 1075

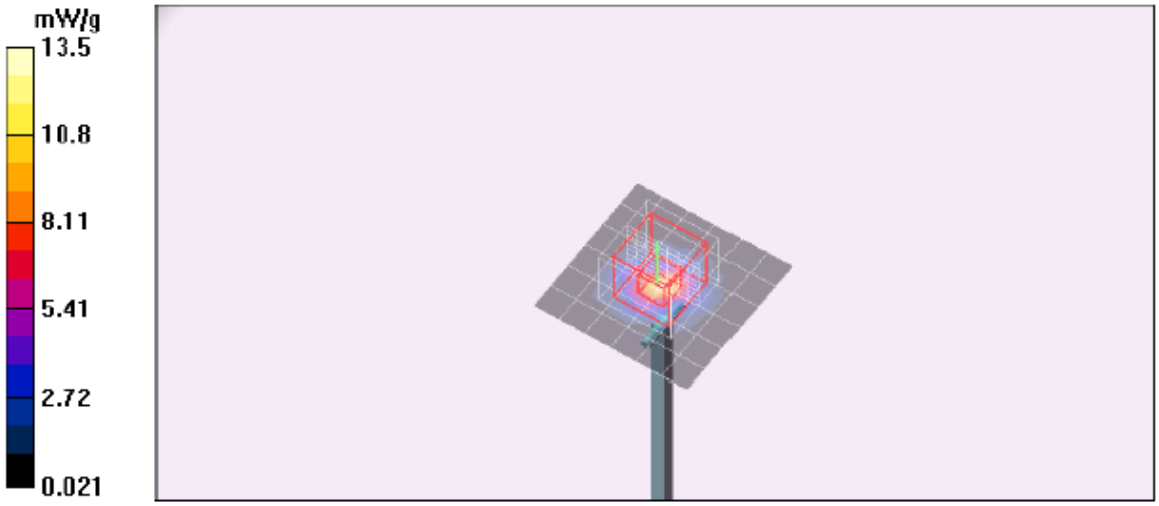
Communication System: System Check Signal - CW; Frequency: 5800 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5800 MHz; σ = 6 mho/m; ε_r = 48.4; ρ = 1000 kg/m^3
Phantom section: Flat Section

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

DASY4 Configuration:
- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Probe: EX3DV4 - SN3749; ConvF(3.65, 3.65, 3.65); Calibrated: 12/13/2010
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn427; Calibrated: 7/21/2010
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: SN:XXXX
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

5.8GHz, d=10mm, Pin=100mW/Area Scan (7x7x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 13.5 mW/g

5.8GHz, d=10mm, Pin=100mW/Zoom Scan (8x8x10)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 52.0 V/m; Power Drift = -0.049 dB
Peak SAR (extrapolated) = 26.5 W/kg
SAR(1 g) = 7.33 mW/g; SAR(10 g) = 2.1 mW/g
Maximum value of SAR (measured) = 13.4 mW/g



Z-Axis PLOT for 5.8 GHz

Date/Time: 1/14/2011 10:28:56 AM

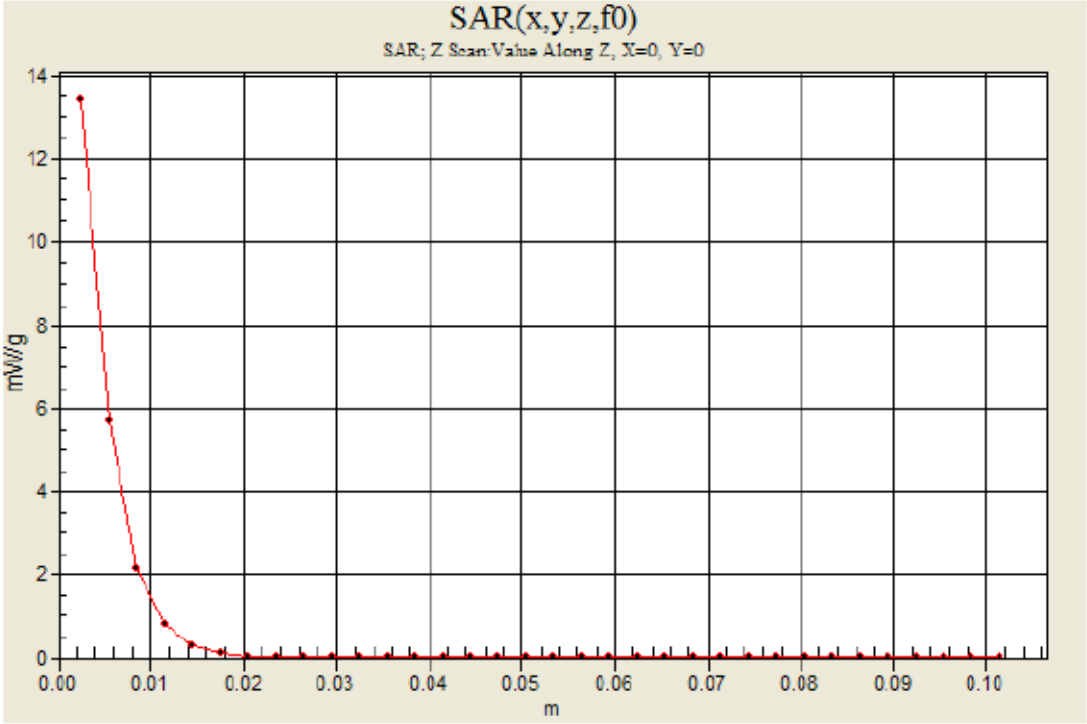
Test Laboratory: Compliance Certification Services (UL CCS)

System Performance Check - D5GHzV2

DUT: Dipole 5200-5800MHz; Type: D5GHzV2; Serial: 1075

Communication System: System Check Signal - CW; Frequency: 5800 MHz;Duty Cycle: 1:1

5.8GHz, d=10mm, Pin=100mW/Z Scan (1x1x34): Measurement grid: dx=20mm, dy=20mm, dz=3mm
Maximum value of SAR (measured) = 13.4 mW/g



SYSTEM CHECK PLOT for D835V2

Date/Time: 2/25/2011 5:52:40 PM

Test Laboratory: UL CCS

System Check D835V2 SN 4d002

DUT: Dipole D835V2; Type: D835V2; Serial: 4d002

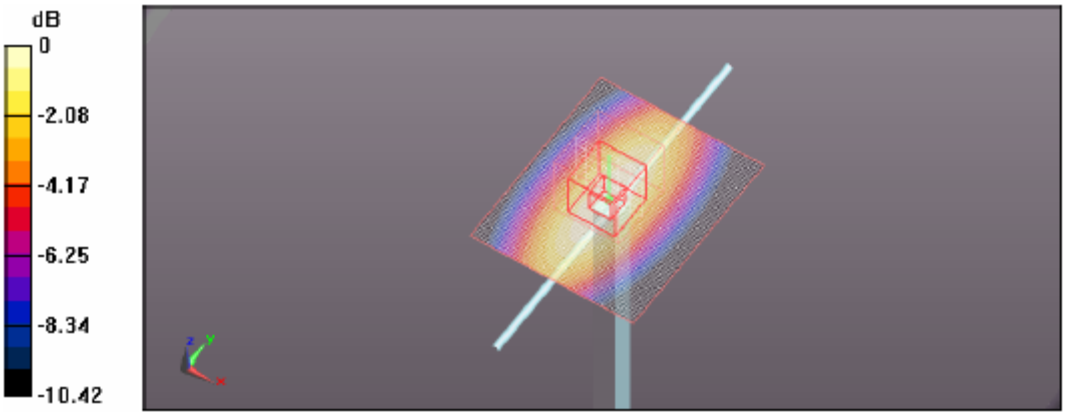
Communication System: CW; Frequency: 835 MHz;Duty Cycle: 1:1
Medium parameters used: f = 835 MHz; σ = 0.987 mho/m; ε_r = 54.329; ρ = 1000 kg/m^3
Phantom section: Flat Section

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

DASY5 Configuration:
- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Probe: EX3DV4 - SN3686; ConvF(8.78, 8.78, 8.78); Calibrated: 1/24/2011
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1239; Calibrated: 11/17/2010
- Phantom: ELI 4.0; Type: QDOVA001BB; Serial: 1099
- Measurement SW: DASY52, Version 52.6 (1);SEMCAD X Version 14.4.2 (2595)

D835V2/Pin=100 mW/Area Scan (51x61x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.214 mW/g

D835V2/Pin=100 mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 35.560 V/m; Power Drift = -0.11 dB
Peak SAR (extrapolated) = 1.489 W/kg
SAR(1 g) = 0.992 mW/g; SAR(10 g) = 0.651 mW/g
Maximum value of SAR (measured) = 1.210 mW/g



0 dB = 1.210mW/g

Z-Axis PLOT for D835V2

Date/Time: 2/25/2011 6:07:47 PM

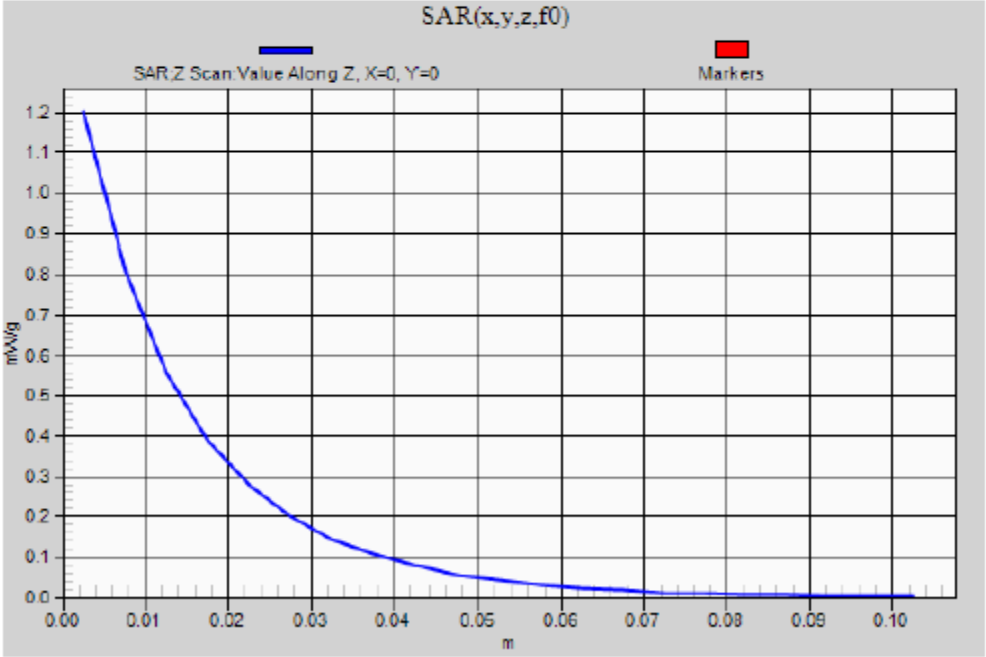
Test Laboratory: UL CCS

System Check D835V2 SN 4d002

DUT: Dipole D835V2; Type: D835V2; Serial: 4d002

Communication System: CW; Frequency: 835 MHz;Duty Cycle: 1:1

D835V2/Pin=100 mW/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Maximum value of SAR (measured) = 1.202 mW/g



SYSTEM CHECK PLOT for D1900V2

Date/Time: 2/25/2011 7:52:39 PM

Test Laboratory: Compliance Certification Services (UL CCS)

System Performance Check - D1900V2

DUT: Dipole; Type: D1900V2; Serial: 5d043

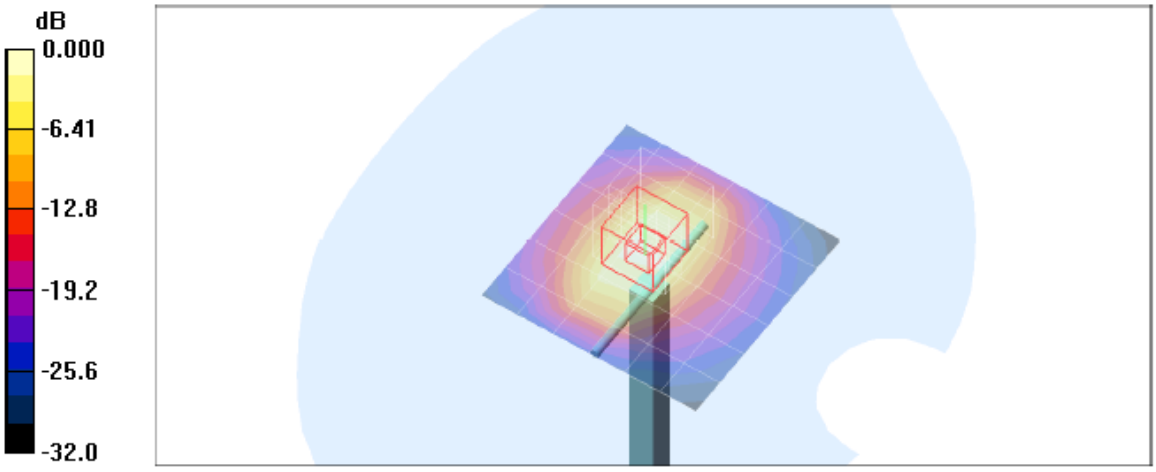
Communication System: System Check Signal - CW; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1900 MHz; σ = 1.49 mho/m; ε_r = 53; ρ = 1000 kg/m^3
Phantom section: Flat Section

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

DASY4 Configuration:
- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Probe: EX3DV4 - SN3749; ConvF(7.33, 7.33, 7.33); Calibrated: 12/13/2010
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn427; Calibrated: 7/21/2010
- Phantom: SAM 2 (Twin); Type: SAM 2; Serial: 1050
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

d=10mm, Pin=100mW/Area Scan (7x7x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 3.33 mW/g

d=10mm, Pin=100mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 54.7 V/m; Power Drift = 0.163 dB
Peak SAR (extrapolated) = 6.91 W/kg
SAR(1 g) = 3.8 mW/g; SAR(10 g) = 2 mW/g
Maximum value of SAR (measured) = 4.78 mW/g



0 dB = 4.78mW/g

Z-Axis PLOT for D1900V2

Date/Time: 2/25/2011 8:08:03 PM

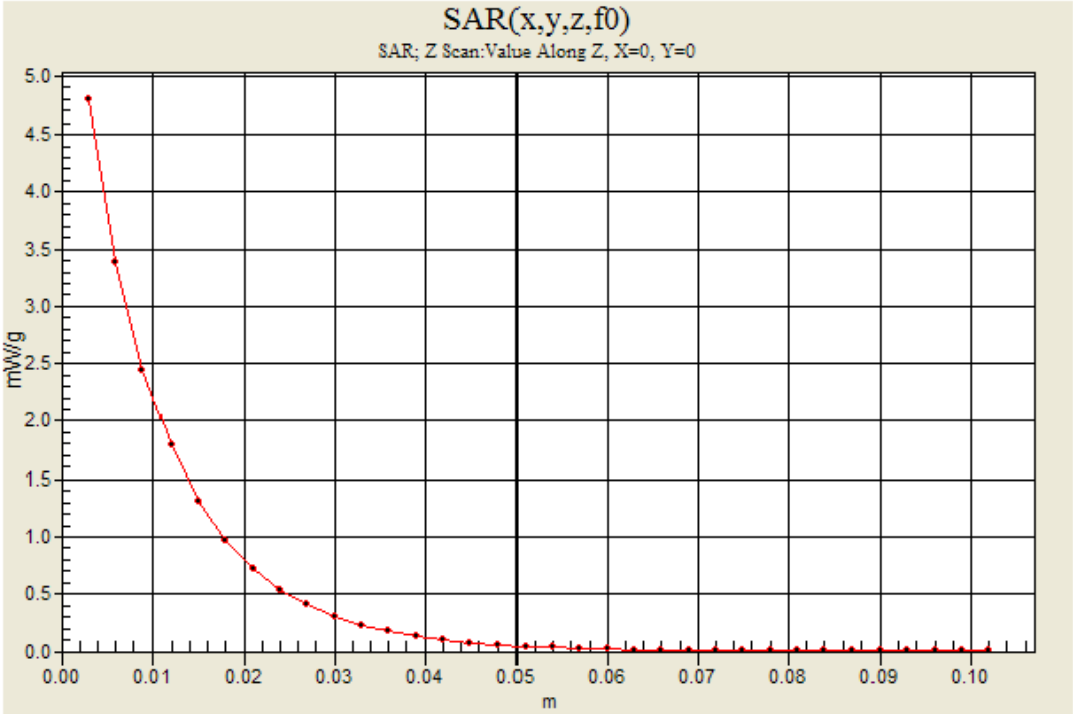
Test Laboratory: Compliance Certification Services (UL CCS)

System Performance Check - D1900V2

DUT: Dipole; Type: D1900V2; Serial: 5d043

Communication System: System Check Signal - CW; Frequency: 1900 MHz;Duty Cycle: 1:1

d=10mm, Pin=100mW/Z Scan (1x1x34): Measurement grid: dx=20mm, dy=20mm, dz=3mm
Maximum value of SAR (measured) = 4.80 mW/g



10. SAR MEASUREMENT PROCEDURES

Step 1: Power Reference Measurement

The Power Reference Measurement and Power Drift Measurements are for monitoring the power drift of the device under test in the batch process. The Minimum distance of probe sensors to surface determines the closest measurement point to phantom surface. The minimum distance of probe sensors to surface is 2.1 mm. This distance cannot be smaller than the Distance of sensor calibration points to probe tip as defined in the probe properties (for example, 1.2 mm for an EX3DV3 probe type).

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 DASY4 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, EN 50361 and IEC 62209 standards, whereby 3 dB is a requirement when compliance is assessed in accordance with the ARIB standard (Japan). If only one Zoom Scan follows the Area Scan, then only the absolute maximum will be taken as reference. For cases where multiple maximums are detected, the number of Zoom Scans has to be increased accordingly.

Step 3: Zoom Scan

Zoom Scans are used to assess the peak spatial SAR values within a cubic averaging volume containing 1 g and 10 g of simulated tissue. The Zoom Scan measures ≥ 7 x 7 x 9 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.

11. POWER REDUCTION BY SENSING

SAR Testing Considerations & FCC pre-TCB testing guidance KDB 335737

11.1. iPad WIFI Exclusions for SAR Testing

The iPad does not have proximity sensors or back-off capabilities on WiFi.

11.2. Additional SAR Testing for the Back Surface and Top Edge

Based on discussions with the FCC it was determined that additional SAR testing is required. The additional testing required testing at a conservative distance from the iPad with the power back-off disabled via special development software. Details about the proximity sensor operation, and special development software are included in a separate document titled “Operational Description”.

Proximity Sensor Status Table – Back Surface In Conservative Proximity Sensor Operation

Distance to Back Surface of iPad (mm)	8.0	9.0	10.0	11.0	12.0	13.0	14.0	15.0
Proximity Sensor Status	ON	ON	ON	OFF	OFF	OFF	OFF	OFF

Proximity Sensor Status Table –Top Edge Secondary Portrait In Conservative Proximity Sensor Operation

Distance to Top Edge of iPad (mm)	8.5	9.5	10.5	11.5	12.5	13.5	14.5	15.5
Proximity Sensor Status	ON	ON	OFF	OFF	OFF	OFF	OFF	OFF

11.3. Method of SAR Measurement With and Without Back-off Enabled

Based on the above proximity sensor activation vs. distance results, the iPad was tested at zero spacing, back-off enabled and additionally at a conservative test distance of 9.5 mm on the top edge and 10 mm on back surface with back-off disabled (maximum power).

To test SAR with back-off enabled at zero spacing, the iPad was placed in maximum power transmit mode (with back-off enabled) with a base station simulator. The device was then positioned under the tissue equivalent liquid-filled flat phantom at zero distance.

To test SAR with back-off disabled at 9.5 mm, the iPad utilized special development software. The ability to disable the back-off is not available in the production release of software. The device was placed in maximum power transmit mode with a base station simulator. The iPad was then positioned under the tissue equivalent liquid-filled flat phantom at a distance of 9.5mm when in the “Top Edge – Secondary Portrait” orientation and at 10mm when in “Tablet Mode-Back surface” and tested with the back-off disabled.

11.4. Summary Table of Power Reduction dB Levels per Mode and Band

Back Sensor/Cellular band

A1396 Back Surface, Cellular Band																	
Distance in mm	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Proximity sensor with reduced power activation	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	OFF	OFF	OFF	OFF	OFF	OFF
GPRS 1 Slot / Cellular Band /dBm (by 2.3 db)	30.70	30.70	30.70	30.70	30.70	30.70	30.70	30.70	30.70	30.70	30.70	33	33	33	33	33	33
GPRS 2 Slots / Cellular Band /dBm (by 4.4 dB)	27.8	27.8	27.8	27.8	27.8	27.8	27.8	27.8	27.8	27.8	27.8	32.2	32.2	32.2	32.2	32.2	32.2
EDGE 1 Slot / Cellular Band / dBm (NO REDUCTION)	27.6	27.6	27.6	27.6	27.6	27.6	27.6	27.6	27.6	27.6	27.6	27.6	27.6	27.6	27.6	27.6	27.6
EDGE 2 Slots / Cellular Band / dBm (NO REDUCTION)	27.6	27.6	27.6	27.6	27.6	27.6	27.6	27.6	27.6	27.6	27.6	27.6	27.6	27.6	27.6	27.6	27.6
R99 / Cellular Band / dBm (by 2.5 dB)	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	24.1	24.1	24.1	24.1	24.1	24.1
HSDPA Sub-Test 1 / Cellular Band / dBm (by 2.5 dB)	21.5	21.5	21.5	21.5	21.5	21.5	21.5	21.5	21.5	21.5	21.5	24.1	24.1	24.1	24.1	24.1	24.1
HSDPA Sub-Test 2 / Cellular Band / dBm (by 1.8 dB)	20.5	20.5	20.5	20.5	20.5	20.5	20.5	20.5	20.5	20.5	20.5	22.3	22.3	22.3	22.3	22.3	22.3
HSDPA Sub-Test 3 / Cellular Band / dBm (by 1.8 dB)	20	20	20	20	20	20	20	20	20	20	20	21.8	21.8	21.8	21.8	21.8	21.8
HSDPA Sub-Test 4 / Cellular Band / dBm (by 1.8 dB)	19.9	19.9	19.9	19.9	19.9	19.9	19.9	19.9	19.9	19.9	19.9	21.7	21.7	21.7	21.7	21.7	21.7
HSUPA Sub-Test 1 / Cellular Band / dBm (by 2.6 dB)	21.5	21.5	21.5	21.5	21.5	21.5	21.5	21.5	21.5	21.5	21.5	24.1	24.1	24.1	24.1	24.1	24.1
HSUPA Sub-Test 2 / Cellular Band / dBm (by 0.9 dB)	21.5	21.5	21.5	21.5	21.5	21.5	21.5	21.5	21.5	21.5	21.5	22.4	22.4	22.4	22.4	22.4	22.4
HSUPA Sub-Test 3 / Cellular Band / dBm (by 1.7 dB)	21.5	21.5	21.5	21.5	21.5	21.5	21.5	21.5	21.5	21.5	21.5	23.2	23.2	23.2	23.2	23.2	23.2
HSUPA Sub-Test 4 / Cellular Band / dBm (by 0.8 dB)	21.5	21.5	21.5	21.5	21.5	21.5	21.5	21.5	21.5	21.5	21.5	22.3	22.3	22.3	22.3	22.3	22.3
HSUPA Sub-Test 5 / Cellular Band / dBm (by 2.5 dB)	21.5	21.5	21.5	21.5	21.5	21.5	21.5	21.5	21.5	21.5	21.5	24	24	24	24	24	24

Back Sensor/PCS band

A1396 Back Surface, PCS Band																	
Distance in mm	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Proximity sensor with reduced power activation	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	OFF	OFF	OFF	OFF	OFF	OFF
GPRS 1 Slot / PCS Band /dBm (by 5.1 dB)	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	30.6	30.6	30.6	30.6	30.6	30.6
GPRS 2 Slots / PCS Band /dBm (by 6 dB)	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	28.6	28.6	28.6	28.6	28.6	28.6
EDGE 1 Slot / PCS Band / dBm (NO REDUCTION)	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5
EDGE 2 Slots / PCS Band / dBm (By 4 dB)	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	26.5	26.5	26.5	26.5	26.5	26.5
R99 / PCS Band / dBm (by 6.1 dB)	16.4	16.4	16.4	16.4	16.4	16.4	16.4	16.4	16.4	16.4	16.4	22.5	22.5	22.5	22.5	22.5	22.5
HSDPA Sub-Test 1 / PCS Band / dBm (by 6.1 dB)	16.4	16.4	16.4	16.4	16.4	16.4	16.4	16.4	16.4	16.4	16.4	22.5	22.5	22.5	22.5	22.5	22.5
HSDPA Sub-Test 2 / PCS Band / dBm (by 6 dB)	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	21.8	21.8	21.8	21.8	21.8	21.8
HSDPA Sub-Test 3 / PCS Band / dBm (by 6 dB)	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	21.3	21.3	21.3	21.3	21.3	21.3
HSDPA Sub-Test 4 / PCS Band / dBm (by 6.2 dB)	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	21.2	21.2	21.2	21.2	21.2	21.2
HSUPA Sub-Test 1 / PCS Band / dBm (by 6.1 dB)	16.3	16.3	16.3	16.3	16.3	16.3	16.3	16.3	16.3	16.3	16.3	22.4	22.4	22.4	22.4	22.4	22.4
HSUPA Sub-Test 2 / PCS Band / dBm (by 4.4 dB)	16.3	16.3	16.3	16.3	16.3	16.3	16.3	16.3	16.3	16.3	16.3	20.7	20.7	20.7	20.7	20.7	20.7
HSUPA Sub-Test 3 / PCS Band / dBm (by 5.3 dB)	16.3	16.3	16.3	16.3	16.3	16.3	16.3	16.3	16.3	16.3	16.3	21.6	21.6	21.6	21.6	21.6	21.6
HSUPA Sub-Test 4 / PCS Band / dBm (by 4.4 dB)	16.3	16.3	16.3	16.3	16.3	16.3	16.3	16.3	16.3	16.3	16.3	20.7	20.7	20.7	20.7	20.7	20.7
HSUPA Sub-Test 5 / PCS Band / dBm (by 6.1 dB)	16.3	16.3	16.3	16.3	16.3	16.3	16.3	16.3	16.3	16.3	16.3	22.4	22.4	22.4	22.4	22.4	22.4

Top Edge Sensor/Cellular band

Model 1396 Top Edge (Secondary Portrait) / Cellular Band																	
Distance in mm	0	0.5	1.5	2.5	3.5	4.5	5.5	6.5	7.5	8.5	9.5	10.5	11.5	12.5	13.5	14.5	15.5
Proximity sensor with reduced power activation	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	OFF	OFF	OFF	OFF	OFF	OFF
GPRS 1 Slot / Cellular Band /dBm (by 2.3 db)	30.70	30.70	30.70	30.70	30.70	30.70	30.70	30.70	30.70	30.70	30.70	33	33	33	33	33	33
GPRS 2 Slots / Cellular Band /dBm (by 4.4 dB)	27.8	27.8	27.8	27.8	27.8	27.8	27.8	27.8	27.8	27.8	27.8	32.2	32.2	32.2	32.2	32.2	32.2
EDGE 1 Slot / Cellular Band / dBm (NO REDUCTION)	27.6	27.6	27.6	27.6	27.6	27.6	27.6	27.6	27.6	27.6	27.6	27.6	27.6	27.6	27.6	27.6	27.6
EDGE 2 Slots / Cellular Band / dBm (NO REDUCTION)	27.6	27.6	27.6	27.6	27.6	27.6	27.6	27.6	27.6	27.6	27.6	27.6	27.6	27.6	27.6	27.6	27.6
R99 / Cellular Band / dBm (by 2.5 dB)	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	24.1	24.1	24.1	24.1	24.1	24.1
HSDPA Sub-Test 1 / Cellular Band / dBm (by 2.5 dB)	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	24.1	24.1	24.1	24.1	24.1	24.1
HSDPA Sub-Test 2 / Cellular Band / dBm (by 1.8 dB)	20.5	20.5	20.5	20.5	20.5	20.5	20.5	20.5	20.5	20.5	20.5	22.3	22.3	22.3	22.3	22.3	22.3
HSDPA Sub-Test 3 / Cellular Band / dBm (by 1.8 dB)	20	20	20	20	20	20	20	20	20	20	20	21.8	21.8	21.8	21.8	21.8	21.8
HSDPA Sub-Test 4 / Cellular Band / dBm (by 1.8 dB)	19.9	19.9	19.9	19.9	19.9	19.9	19.9	19.9	19.9	19.9	19.9	21.7	21.7	21.7	21.7	21.7	21.7
HSUPA Sub-Test 1 / Cellular Band / dBm (by 2.6 dB)	21.5	21.5	21.5	21.5	21.5	21.5	21.5	21.5	21.5	21.5	21.5	24.1	24.1	24.1	24.1	24.1	24.1
HSUPA Sub-Test 2 / Cellular Band / dBm (by 0.9 dB)	21.5	21.5	21.5	21.5	21.5	21.5	21.5	21.5	21.5	21.5	21.5	22.4	22.4	22.4	22.4	22.4	22.4
HSUPA Sub-Test 3 / Cellular Band / dBm (by 1.7 dB)	21.5	21.5	21.5	21.5	21.5	21.5	21.5	21.5	21.5	21.5	21.5	23.2	23.2	23.2	23.2	23.2	23.2
HSUPA Sub-Test 4 / Cellular Band / dBm (by 0.8 dB)	21.5	21.5	21.5	21.5	21.5	21.5	21.5	21.5	21.5	21.5	21.5	22.3	22.3	22.3	22.3	22.3	22.3
HSUPA Sub-Test 5 / Cellular Band / dBm (by 2.5 dB)	21.5	21.5	21.5	21.5	21.5	21.5	21.5	21.5	21.5	21.5	21.5	24	24	24	24	24	24

Top Edge Sensor/PCS band

Model 1396 Top Edge (Secondary Portrait) / PCS Band																	
Distance in mm	0	0.5	1.5	2.5	3.5	4.5	5.5	6.5	7.5	8.5	9.5	10.5	11.5	12.5	13.5	14.5	15.5
Proximity sensor with reduced power activation	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	OFF	OFF	OFF	OFF	OFF	OFF
GPRS 1 Slot / PCS Band /dBm (by 5.1 dB)	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	30.6	30.6	30.6	30.6	30.6	30.6
GPRS 2 Slots / PCS Band /dBm (by 6 dB)	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	28.6	28.6	28.6	28.6	28.6	28.6
EDGE 1 Slot / PCS Band / dBm (NO REDUCTION)	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5
EDGE 2 Slots / PCS Band / dBm (by 4 dB)	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	26.5	26.5	26.5	26.5	26.5	26.5
R99 / PCS Band / dBm (by 6.1 dB)	16.4	16.4	16.4	16.4	16.4	16.4	16.4	16.4	16.4	16.4	16.4	22.5	22.5	22.5	22.5	22.5	22.5
HSDPA Sub-Test 1 / PCS Band / dBm (by 6.1 dB)	16.4	16.4	16.4	16.4	16.4	16.4	16.4	16.4	16.4	16.4	16.4	22.5	22.5	22.5	22.5	22.5	22.5
HSDPA Sub-Test 2 / PCS Band / dBm (by 6 dB)	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	21.8	21.8	21.8	21.8	21.8	21.8
HSDPA Sub-Test 3 / PCS Band / dBm (by 6 dB)	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	21.3	21.3	21.3	21.3	21.3	21.3
HSDPA Sub-Test 4 / PCS Band / dBm (by 6.2 dB)	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	21.2	21.2	21.2	21.2	21.2	21.2
HSUPA Sub-Test 1 / PCS Band / dBm (by 6.1 dB)	16.3	16.3	16.3	16.3	16.3	16.3	16.3	16.3	16.3	16.3	16.3	22.4	22.4	22.4	22.4	22.4	22.4
HSUPA Sub-Test 2 / PCS Band / dBm (by 4.4 dB)	16.3	16.3	16.3	16.3	16.3	16.3	16.3	16.3	16.3	16.3	16.3	20.7	20.7	20.7	20.7	20.7	20.7
HSUPA Sub-Test 3 / PCS Band / dBm (by 5.3 dB)	16.3	16.3	16.3	16.3	16.3	16.3	16.3	16.3	16.3	16.3	16.3	21.6	21.6	21.6	21.6	21.6	21.6
HSUPA Sub-Test 4 / PCS Band / dBm (by 4.4 dB)	16.3	16.3	16.3	16.3	16.3	16.3	16.3	16.3	16.3	16.3	16.3	20.7	20.7	20.7	20.7	20.7	20.7
HSUPA Sub-Test 5 / PCS Band / dBm (by 6.1 dB)	16.3	16.3	16.3	16.3	16.3	16.3	16.3	16.3	16.3	16.3	16.3	22.4	22.4	22.4	22.4	22.4	22.4

12. RF OUTPUT POWER VERIFICATION

12.1. GPRS & EGPRS

GPRS (GMSK) - Coding Scheme: CS1

Band	Ch #	Freq. (MHz)	Tx Conducted Power (dBm)							
			Avg burst Pwr				w/ Proximity Sensor Power Back-off			
			1 slot	Frame Avg Pwr	2 slot	Frame Avg Pwr	1 slot	Frame Avg Pwr	2 slot	Frame Avg Pwr
GSM850	128	824.2	33.0	24.0	32.1	**26.1**	31	**21.7**	28	**21.7**
	190	836.6	33.0	24.0	32.1	**26.1**	31	**21.7**	28	**21.8**
	251	848.8	33.0	24.0	32.2	**26.2**	31	**21.7**	28	**21.7**
GSM1900	512	1850.2	30.6	21.6	28.4	**22.4**	25.5	16.5	22.5	16.5
	661	1880	30.6	21.6	28.5	**22.5**	25.5	16.5	22.6	16.6
	810	1909.8	30.5	21.5	28.6	**22.6**	25.5	16.5	22.5	16.5

EGPRS (8PSK) - Coding Scheme: MCS5

Band	Ch #	Freq. (MHz)	Tx Conducted Power (dBm)							
			Avg burst Pwr				w/ Proximity Sensor Power Back-off			
			1 slot	Frame Avg Pwr	2 slot	Frame Avg Pwr	1 slot	Frame Avg Pwr	2 slot	Frame Avg Pwr
GSM850	128	824.2	27.5	18.5	27.5	**21.5**	27.5	18.5	27.5	**21.5**
	190	836.6	27.5	18.5	27.6	**21.6**	27.5	18.5	27.6	**21.6**
	251	848.8	27.6	18.6	27.6	**21.6**	27.6	18.6	27.6	**21.6**
GSM1900	512	1850.2	26.5	17.5	26.5	**20.5**	26.5	16.5	22.5	16.5
	661	1880	26.5	17.5	26.5	**20.5**	26.5	16.5	22.5	16.5
	810	1909.8	26.4	17.4	26.4	**20.4**	26.4	16.4	22.5	16.5

Note: 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.

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.
2. Based on output power above and time slots, the following worst-case configurations were chosen for Body SAR testing.
    a. GPRS850 2 time slots
    b. GPRS1900 2 time slots

12.2. UMTS (WCDMA)

RELEASE 99

The following tests were completed according to the test requirements outlined in section 5.2 of the 3GPP TS34.121-1 specification. The EUT supports power Class 3, which has a nominal maximum output power of 24 dBm (+1.7/-3.7).

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

Results

Rel 99 (12.2kps RMC)

Band	Mode	UL Ch #	DL Ch #	f (MHz)	Tx Conducted Power (dBm)	
					Avg Pwr	w/ Proximity Sensor Power Back-off
UMTS850 (Band V)	Rel 99 12.2kbps RMC	4132	4357	826.4	24.1	21.6
		4183	4408	836.6	24.1	21.5
		4233	4458	846.6	24.1	21.6
UMTS1900 (Band II)	Rel 99 12.2kbps RMC	9262	9662	1852.4	22.5	16.4
		9400	9800	1880.0	22.4	16.4
		9538	9938	1907.6	22.4	16.3

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	Rel6 HSDPA	Rel6 HSDPA	Rel6 HSDPA	Rel6 HSDPA
	Subtest	1	2	3	4
WCDMA General Settings	Loopback Mode	Test Mode 1			
	Rel99 RMC	12.2kbps RMC			
	HSDPA FRC	H-Set1			
	Power Control Algorithm	Algorithm 2			
	βc	2/15	12/15	15/15	15/15
	βd	15/15	15/15	8/15	4/15
	Bd (SF)	64			
	βc/βd	2/15	12/15	15/8	15/4
	βhs	4/15	24/15	30/15	30/15
	MPR (dB)	0	0	0.5	0.5
HSDPA Specific Settings	D_{ACK}	8			
	D_{NAK}	8			
	DCQI	8			
	Ack-Nack repetition factor	3			
	CQI Feedback (Table 5.2B.4)	4ms			
	CQI Repetition Factor (Table 5.2B.4)	2			
	Ahs =βhs/βc	30/15			

Results

Rel 6 HSDPA

Band	Mode	UL Ch No.	DL Ch No.	f (MHz)	Tx Conducted Power (dBm)	
					Avg Pwr	w/ Proximity sensor power back-off
UMTS850 (Band V)	Subtest 1	4132	4357	826.4	24.1	21.5
		4183	4408	836.6	24.1	21.5
		4233	4458	846.6	24.1	21.5
	Subtest 2	4132	4357	826.4	22.3	20.5
		4183	4408	836.6	22.2	20.4
		4233	4458	846.6	22.3	20.3
	Subtest 3	4132	4357	826.4	21.8	20.0
		4183	4408	836.0	21.7	19.9
		4233	4458	846.6	21.8	19.8
	Subtest 4	4132	4357	826.4	21.7	19.9
		4183	4408	836.4	21.7	19.8
		4233	4458	846.6	21.7	19.8
UMTS1900 (Band II)	Subtest 1	9262	9662	1852.4	22.5	16.4
		9400	9800	1880.0	22.4	16.4
		9538	9938	1907.6	22.4	16.3
	Subtest 2	9262	9662	1852.4	21.8	15.8
		9400	9800	1880.0	21.8	15.8
		9538	9938	1907.6	21.8	15.8
	Subtest 3	9262	9662	1852.4	21.3	15.3
		9400	9800	1880.0	21.2	15.2
		9538	9938	1907.6	21.2	15.3
	Subtest 4	9262	9662	1852.4	21.2	15.2
		9400	9800	1880.0	21.2	15.2
		9538	9938	1907.6	21.2	15.3

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	Rel6 HSPA	Rel6 HSPA	Rel6 HSPA	Rel6 HSPA	Rel6 HSPA
	Subtest	1	2	3	4	5
WCDMA General Settings	Loopback Mode	Test Mode 1				
	Rel99 RMC	12.2kbps RMC				
	HSDPA FRC	H-Set1				
	HSUPA Test	HSUPA Loopback				
	Power Control Algorithm	Algorithm2				
	βc	11/15	6/15	15/15	2/15	15/15
	βd	15/15	15/15	9/15	15/15	15/15
	βec	209/225	12/15	30/15	2/15	24/15
	βc/βd	11/15	6/15	15/9	2/15	15/15
	βhs	22/15	12/15	30/15	4/15	30/15
	βed	1309/225	94/75	47/15 47/15	56/75	134/15
	CM (dB)	1.0	3.0	2.0	3.0	1.0
	MPR (dB)	0	2	1	2	0
HSDPA Specific Settings	DACK	8				
	DNAK	8				
	DCQI	8				
	Ack-Nack repetition factor	3				
	CQI Feedback (Table 5.2B.4)	4ms				
	CQI Repetition Factor (Table 5.2B.4)	2				
	Ahs = βhs/βc	30/15				
HSUPA Specific Settings	D E-DPCCH	6	8	8	5	7
	DHARQ	0	0	0	0	0
	AG Index	20	12	15	17	21
	ETFCI (from 34.121 Table C.11.1.3)	75	67	92	71	81
	Associated Max UL Data Rate kbps	242.1	174.9	482.8	205.8	308.9
	Reference E_TFCIs	E-TFCI 11 E-TFCI PO 4 E-TFCI 67 E-TFCI PO 18 E-TFCI 71 E-TFCI PO 23 E-TFCI 75 E-TFCI PO 26 E-TFCI 81 E-TFCI PO 27		E-TFCI 11 E-TFCI PO 4 E-TFCI 92 E-TFCI PO 18	E-TFCI 11 E-TFCI PO 4 E-TFCI 67 E-TFCI PO 18 E-TFCI 71 E-TFCI PO 23 E-TFCI 75 E-TFCI PO 26 E-TFCI 81 E-TFCI PO 27	

Results

Rel 6 HSDPA/HSUPA

Band	Mode	UL Ch No.	DL Ch No.	f (MHz)	Avg Tx Pwr (dBm)	
					Avg Pwr	w/ Proximity sensor power back-off
UMTS850 (Band V)	Subtest 1	4132	4357	826.4	24.1	21.5
		4182	4407	836.4	23.8	21.5
		4233	4458	846.6	24.0	21.5
	Subtest 2	4132	4357	826.4	22.4	21.3
		4182	4407	836.4	22.2	21.5
		4233	4458	846.6	22.3	21.5
	Subtest 3	4132	4357	826.4	23.2	21.5
		4182	4407	836.4	23.0	21.5
		4233	4458	846.6	23.1	21.3
	Subtest 4	4132	4357	826.4	22.3	21.5
		4182	4407	836.4	22.1	21.5
		4233	4458	846.6	22.2	21.4
	Subtest 5	4132	4357	826.4	24.0	21.5
		4182	4407	836.4	23.8	21.5
		4233	4458	846.6	24.0	21.5
UMTS1900 (Band II)	Subtest 1	9262	9662	1852.4	22.4	16.3
		9400	9800	1880.0	22.4	16.3
		9538	9938	1907.6	22.4	16.2
	Subtest 2	9262	9662	1852.4	20.7	16.3
		9400	9800	1880.0	20.7	16.3
		9538	9938	1907.6	20.6	16.3
	Subtest 3	9262	9662	1852.4	21.5	16.2
		9400	9800	1880.0	21.6	16.3
		9538	9938	1907.6	21.6	16.3
	Subtest 4	9262	9662	1852.4	20.6	16.2
		9400	9800	1880.0	20.7	16.3
		9538	9938	1907.6	20.6	16.3
	Subtest 5	9262	9662	1852.4	22.4	16.2
		9400	9800	1880.0	22.4	16.3
		9538	9938	1907.6	22.4	16.3

Note: 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.

12.3. WiFi

The following procedures had been used to prepare the EUT for the SAR test.
The client provided a special driver and program, wl_tools, which enable then engineer to control the frequency and output power of the module. Such program is not accessible by the end user.

802.11bg mode (2.4 GHz band)

Mode	Channel	Freq. (MHz)	Avg Pwr (dBm)
802.11b	1	2412	15.7
	6	2437	15.6
	11	2462	15.5
802.11g	1	2412	14.0
	6	2437	15.5
	11	2462	15.0
802.11n (HT20)	1	2412	13.0
	6	2437	15.5
	11	2462	14.0

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

802.11a mode

Band	Mode	Channel	Freq. (MHz)	Avg Pwr (dBm)
5.2 GHz	802.11a	36	5180	15.5
		40	5200	15.7
		48	5240	15.5
5.3 GHz	802.11a	52	5260	15.6
		60	5300	15.6
		64	5320	15.5
5.6 GHz	802.11a	100	5500	15.5
		120	5600	15.7
		140	5700	15.5
5.8 GHz	802.11a	149	5745	17.0
		157	5785	17.0
		165	5825	17.0

802.11n HT20

Band	Mode	Channel	Freq. (MHz)	Avg Pwr (dBm)
5.2 GHz	802.11n HT20	36	5180	14.0
		40	5200	14.0
		48	5240	14.0
5.3 GHz	802.11n HT20	52	5260	15.5
		60	5300	15.5
		64	5320	15.5
5.6 GHz	802.11n HT20	100	5500	15.5
		120	5600	15.5
		140	5700	15.5
5.8 GHz	802.11n HT20	149	5745	17.0
		157	5785	17.0
		165	5825	17.0

13. SUMMARY OF SAR TEST RESULTS

13.1. GPRS/EGPRS

Back surface - With Proximity sensor activated with power back-off

Direct contact/0 mm between EUT-to-Flat Phantoms (8 mm distance from WWAN Main antenna-to-user)

Band	Mode	Slot	Ch No.	Freq. (MHz)	Avg Pwr (dBm)	SAR (mW/g) 1-g	SAR (mW/g) 10-g
850	GPRS	2	128	824.2	27.7	0.808	0.438
			190	836.6	27.8	0.908	0.493
			251	848.8	27.7	1.010	0.546
		1	128	824.2	30.7	0.814	0.442
			190	836.6	30.7	0.918	0.495
			251	848.8	30.7	1.000	0.546
	*EGPRS	2	128	824.2	27.5		
			190	836.6	27.6		
			251	848.8	27.6	0.961	0.518
		1	128	824.2	27.5		
			190	836.6	27.5		
			251	848.8	27.6	0.492	0.270
Band	Mode	Slot	Ch No.	Freq. (MHz)	Avg Pwr (dBm)	SAR (mW/g) 1-g	SAR (mW/g) 10-g
1900	GPRS	2	512	1850.2	22.5	0.969	0.450
			661	1880.0	22.6	1.020	0.467
			512	1850.2	22.5	1.010	0.458
		1	512	1850.2	25.5	0.949	0.442
			661	1880.0	25.5	0.992	0.456
			512	1850.2	25.5	1.030	0.465
	*EGPRS	2	512	1850.2	22.5		
			661	1880.0	22.5	0.950	0.435
			512	1850.2	22.5		
		1	512	1850.2	26.5		
			661	1880.0	26.5		
			512	1850.2	26.4	0.969	0.443

*EGPRS output power is not higher than GPRS but are selected tested to verify the SAR value. (KDB 941225)

Back surface – Use Special Development Software to disable Proximity sensor – No power back-off.

With 10 mm separation distance from Back Surface of the EUT-to-user.

Band	Mode	Slot	Ch No.	Freq. (MHz)	Avg Pwr (dBm)	SAR (mW/g) 1-g	SAR (mW/g) 10-g
850	GPRS	2	128	824.2	32.1		
			190	836.6	32.1	0.463	0.294
			251	848.8	32.2		
Band	Mode	Slot	Ch No.	Freq. (MHz)	Avg Pwr (dBm)	SAR (mW/g) 1-g	SAR (mW/g) 10-g
1900	GPRS	2	512	1850.2	28.4		
			661	1880.0	28.5	0.686	0.392
			512	1850.2	28.6		

Primary Landscape (no power back-off)

Direct contact / 0 mm between EUT-to-Flat Phantoms (WWAN Antenna-to-user distance: 35.3 mm)

Band	Mode	Slot	Ch No.	Freq. (MHz)	Avg Pwr (dBm)	SAR (mW/g) 1-g	SAR (mW/g) 10-g
850	GPRS	2	190	836.6	32.1	0.104	0.056
		1	190	836.6	33.0	0.103	0.056
Band	Mode	Slot	Ch No.	Freq. (MHz)	Avg Pwr (dBm)	SAR (mW/g) 1-g	SAR (mW/g) 10-g
1900	GPRS	2	661	1880.0	28.5	0.060	0.029
		1	661	1880.0	30.6	0.058	0.028

Secondary Landscape (no power back-off)

Direct contact / 0 cm between EUT-to-Flat phantom (WWAN Antenna-to-User distance: 100 mm)

Band	Mode	Slot	Ch No.	Freq. (MHz)	Avg Pwr (dBm)	SAR (mW/g) 1-g	SAR (mW/g) 10-g
850	GPRS	2	190	836.6	32.1	0.028	0.014
		1	190	836.6	33.0	0.027	0.014
Band	Mode	Slot	Ch No.	Freq. (MHz)	Avg Pwr (dBm)	SAR (mW/g) 1-g	SAR (mW/g) 10-g
1900	GPRS	2	661	1880.0	28.5	0.086	0.044
		1	661	1880.0	30.6	0.084	0.043

Primary Portrait (No SAR)

With 227 mm separation distance from WWAN Main antenna-to-user.

Note: 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.

Secondary Portrait / Top Edge - With Proximity sensor activated with power back-off

Direct contact / 0 cm between EUT-to-Flat phantom (WWAN-To-user distance: 3.68 mm)

Band	Mode	Slot	Ch No.	Freq. (MHz)	Avg Pwr (dBm)	SAR (mW/g) 1-g	SAR (mW/g) 10-g
850	GPRS	2	128	824.2	27.7	1.080	0.639
			190	836.6	27.8	1.130	0.651
			251	848.8	27.7	**1.180**	0.674
		1	128	824.2	30.7	1.090	0.648
			190	836.6	30.7	1.150	0.660
			251	848.8	30.7	1.180	0.674
	*EGPRS	2	128	824.2	27.5		
			190	836.6	27.6		
			251	848.8	27.6	1.140	0.654
		1	128	824.2	27.5		
			190	836.6	27.5		
			251	848.8	27.6	0.578	0.332
Band	Mode	Slot	Ch No.	Freq. (MHz)	Avg Pwr (dBm)	SAR (mW/g) 1-g	SAR (mW/g) 10-g
1900	GPRS	2	512	1850.2	22.5	**1.190**	0.592
			661	1880.0	22.6	1.140	0.560
			512	1850.2	22.5	1.040	0.509
		1	512	1850.2	25.5	1.180	0.584
			661	1880.0	25.5	1.080	0.532
			512	1850.2	25.5	1.040	0.510
	*EGPRS	2	512	1850.2	22.5	1.150	0.570
			661	1880.0	22.5		
			512	1850.2	22.5		
		1	512	1850.2	26.5	1.120	0.558
			661	1880.0	26.5		
			512	1850.2	26.4		

*EGPRS output power is not higher than GPRS but are selected tested to verify the SAR value. (KDB 941225)

Secondary Portrait / Top Edge - Use Special Development Software to disable Proximity sensor – No power back-off.

With 9.5 mm separation distance from Top Edge of the EUT-to-user.

Band	Mode	Slot	Ch No.	Freq. (MHz)	Avg Pwr (dBm)	SAR (mW/g) 1-g	SAR (mW/g) 10-g
850	GPRS	2	128	824.2	32.1		
			190	836.6	32.1	0.420	0.273
			251	848.8	32.2		
Band	Mode	Slot	Ch No.	Freq. (MHz)	Avg Pwr (dBm)	SAR (mW/g) 1-g	SAR (mW/g) 10-g
1900	GPRS	2	512	1850.2	28.4	**1.300**	0.728
			661	1880.0	28.5	1.250	0.697
			512	1850.2	28.6	1.190	0.658
		1	512	1850.2	30.6	1.000	0.563
			661	1880.0	30.6	0.983	0.549
			512	1850.2	30.5	0.950	0.529

WORST-CASE SAR TEST LPOTS FOR GPRS850

Date/Time: 1/23/2011 12:52:47 PM

Test Laboratory: Compliance Certification Services (UL CCS)

Secondary portrait_GSM835

DUT: Apple; Type: NA; Serial: NA

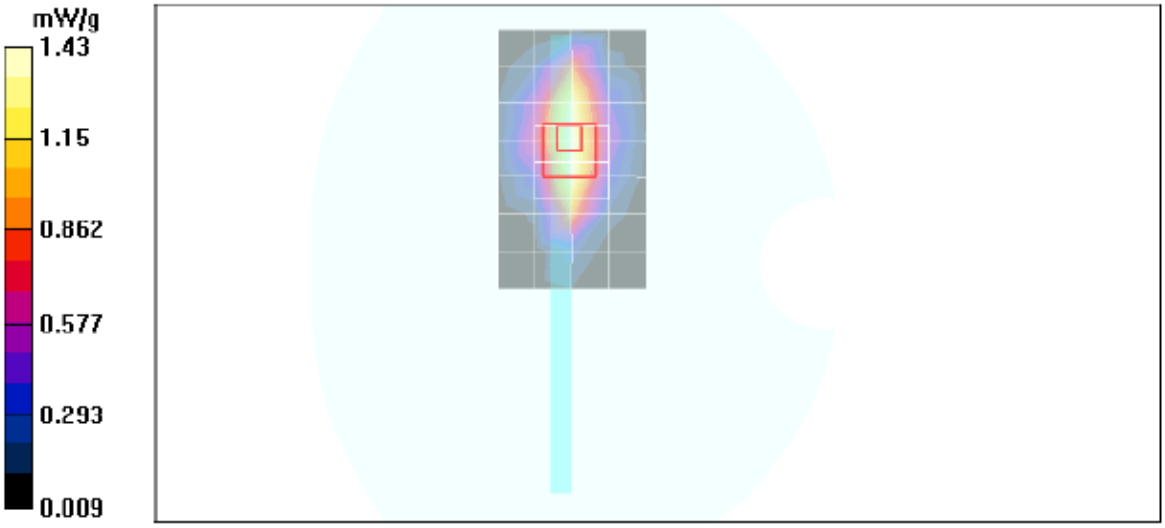
Communication System: GSM850; Frequency: 848.8 MHz;Duty Cycle: 1:4
Medium parameters used (interpolated): f = 848.8 MHz; σ = 0.995 mho/m; ε_r = 54.6; ρ = 1000 kg/m^3
Phantom section: Flat Section

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

DASY4 Configuration:
- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Probe: EX3DV4 - SN3749; ConvF(8.79, 8.79, 8.79); Calibrated: 12/13/2010
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn427; Calibrated: 7/21/2010
- Phantom: SAM 2 (Twin); Type: SAM 2; Serial: 1050
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

GPRS_2 slot_H ch/Area Scan (5x8x1): Measurement grid: dx=15mm, dy=15mm
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.43 mW/g

GPRS_2 slot_H ch/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=3mm
Reference Value = 38.3 V/m; Power Drift = -0.104 dB
Peak SAR (extrapolated) = 2.35 W/kg
SAR(1 g) = 1.18 mW/g; SAR(10 g) = 0.674 mW/g
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.46 mW/g



Z-axis Plot

Date/Time: 1/23/2011 1:10:19 PM

Test Laboratory: Compliance Certification Services (UL CCS)

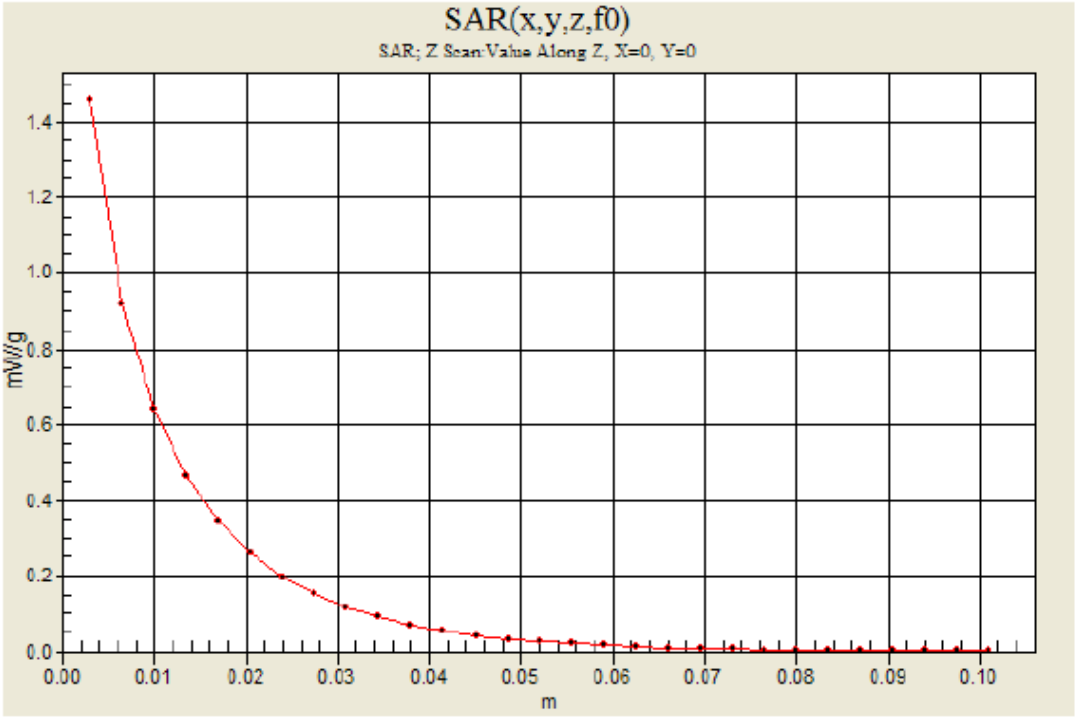
Secondary portrait_GSM835

DUT: Apple; Type: NA; Serial: NA

Communication System: GSM850; Frequency: 848.8 MHz;Duty Cycle: 1:4

GPRS_2 slot_H ch/Z Scan (1x1x29): Measurement grid: dx=20mm, dy=20mm, dz=3.5mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.46 mW/g



WORST-CASE SAR TEST LPOTS FOR GPRS1900

Date/Time: 1/21/2011 2:11:12 PM

Test Laboratory: Compliance Certification Services (UL CCS)

Secondary portrait_GSM1900

DUT: Apple; Type: NA; Serial: NA

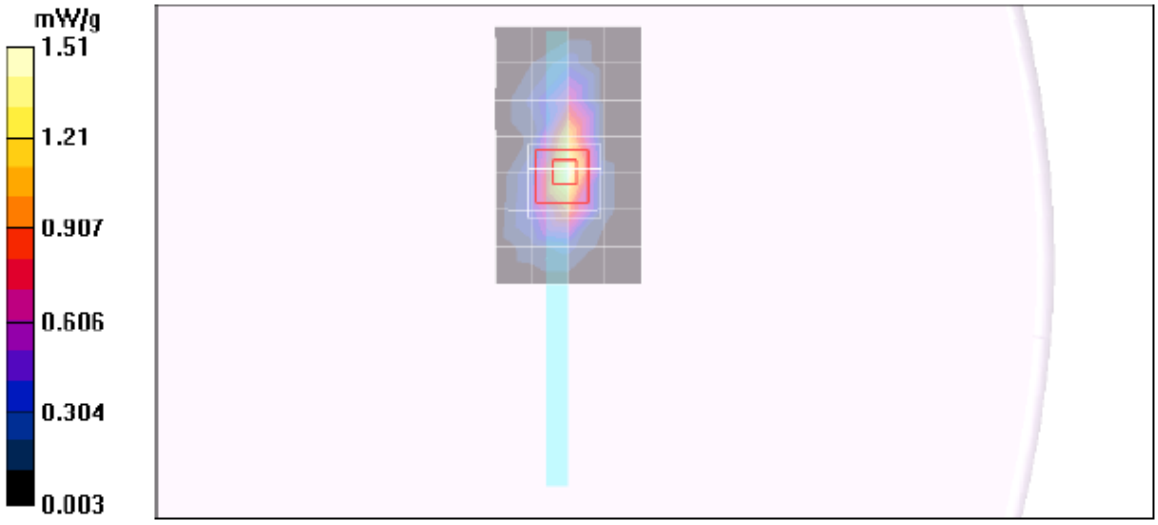
Communication System: PCS1900; Frequency: 1850.2 MHz;Duty Cycle: 1:4
Medium parameters used (interpolated): f = 1850.2 MHz; σ = 1.46 mho/m; ε_r = 51.9; ρ = 1000 kg/m^3
Phantom section: Flat Section

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

DASY4 Configuration:
- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Probe: EX3DV4 - SN3749; ConvF(7.33, 7.33, 7.33); Calibrated: 12/13/2010
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn427; Calibrated: 7/21/2010
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: SN:1003
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

GPRS_2 slot_L ch/Area Scan (5x8x1): Measurement grid: dx=15mm, dy=15mm
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.51 mW/g

GPRS_2 slot_L ch/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=3mm
Reference Value = 32.2 V/m; Power Drift = 0.182 dB
Peak SAR (extrapolated) = 2.25 W/kg
SAR(1 g) = 1.19 mW/g; SAR(10 g) = 0.592 mW/g
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.55 mW/g



Z-axis Plot

Date/Time: 1/21/2011 2:29:10 PM

Test Laboratory: Compliance Certification Services (UL CCS)

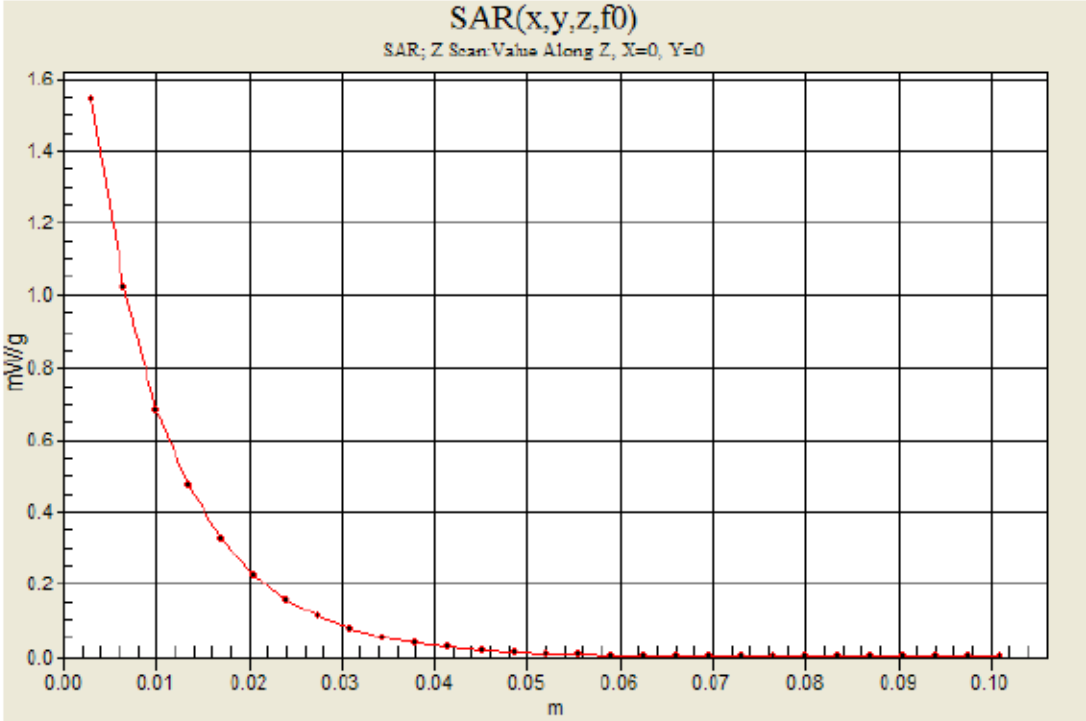
Secondary portrait_GSM1900

DUT: Apple; Type: NA; Serial: NA

Communication System: PCS1900; Frequency: 1850.2 MHz;Duty Cycle: 1:4

GPRS_2 slot_L ch/Z Scan (1x1x29): Measurement grid: dx=20mm, dy=20mm, dz=3.5mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.55 mW/g



Date/Time: 2/26/2011 4:03:16 PM

Test Laboratory: Compliance Certification Services (UL CCS)

Secondary portrait_GSM1900

DUT: Apple; Type: NA; Serial: NA

Communication System: PCS1900; Frequency: 1850.2 MHz;Duty Cycle: 1:4
Medium parameters used (interpolated): f = 1850.2 MHz; σ = 1.43 mho/m; ε_r = 53.1; ρ = 1000 kg/m^3
Phantom section: Flat Section

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

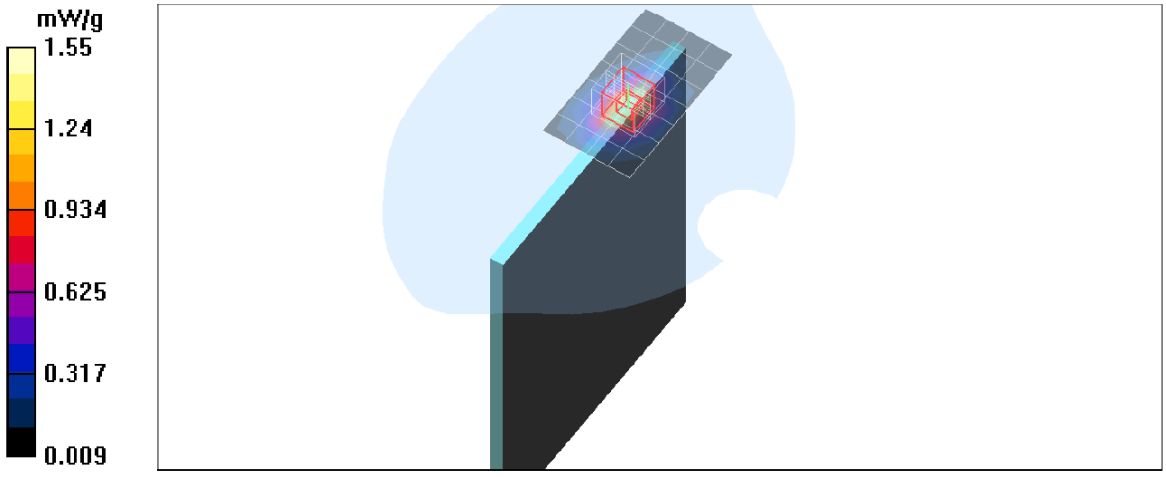
DASY4 Configuration:
- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Probe: EX3DV4 - SN3749; ConvF(7.33, 7.33, 7.33); Calibrated: 12/13/2010
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn427; Calibrated: 7/21/2010
- Phantom: SAM 2 (Twin); Type: SAM 2; Serial: 1050
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

GPRS_2 slot_L ch/Area Scan (5x8x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.55 mW/g

GPRS_2 slot_L ch/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=3mm

Reference Value = 32.9 V/m; Power Drift = -0.146 dB
Peak SAR (extrapolated) = 2.21 W/kg
SAR(1 g) = 1.3 mW/g; SAR(10 g) = 0.728 mW/g
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.60 mW/g



Date/Time: 2/26/2011 4:23:56 PM

Test Laboratory: Compliance Certification Services (UL CCS)

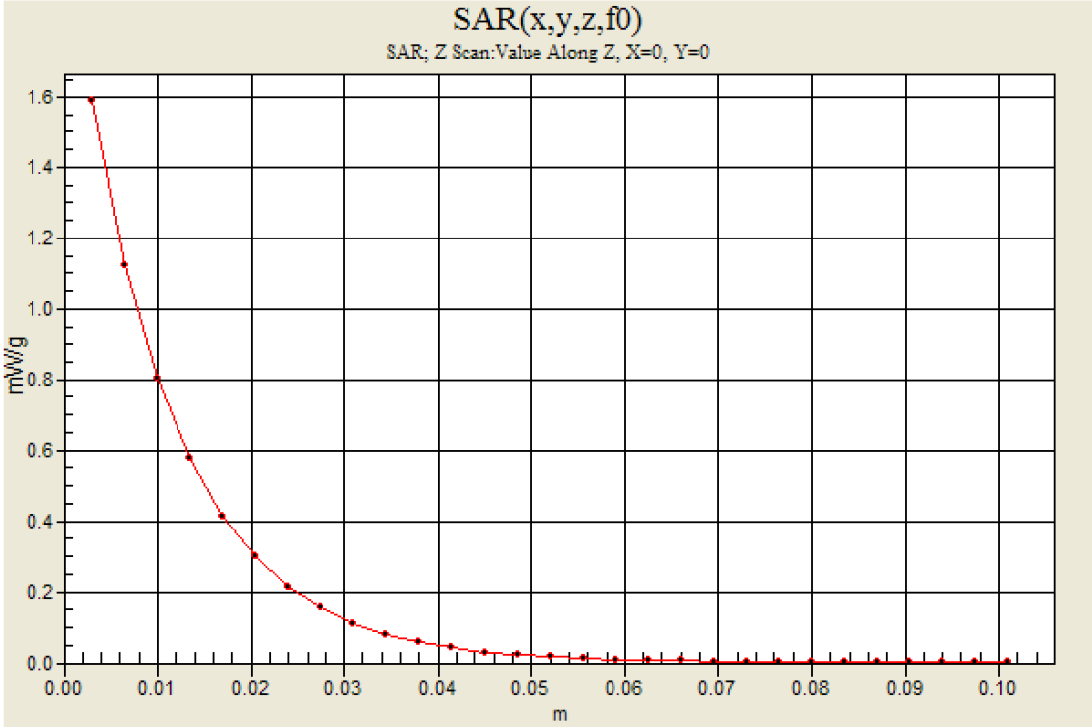
Secondary portrait_GSM1900

DUT: Apple; Type: NA; Serial: NA

Communication System: PCS1900; Frequency: 1850.2 MHz;Duty Cycle: 1:4

GPRS_2 slot_L ch/Z Scan (1x1x29): Measurement grid: dx=20mm, dy=20mm, dz=3.5mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.59 mW/g



13.2. UMTS (WCDMA)

Back Surface - With Proximity sensor activated with power back-off

Direct contact/0 mm between EUT-to-Flat Phantoms (8 mm distance from WWAN Main antenna-to-user)

Band	Mode	UL Ch No.	DL Ch No.	f (MHz)	Avg Pwr	SAR (mW/g)	
					(dBm)	1-g	10-g
Band V	R99 12.2kbps RMC	4132	4357	826.4	21.6	0.759	0.409
		4183	4408	836.6	21.5	0.902	0.486
		4233	4458	846.6	21.6	0.917	0.495
Band	Mode	UL Ch No.	DL Ch No.	f (MHz)	Avg Pwr	SAR (mW/g)	
					(dBm)	1-g	10-g
Band II	R99 12.2kbps RMC	9262	9662	1850.2	16.4	0.882	0.406
		9400	9800	1880.0	16.4	1.050	0.482
		9538	9938	1907.6	16.3	1.090	0.490

Back Surface - Use Special Development Software to disable Proximity sensor – No power back-off.

With 10 mm separation distance from Back of the EUT-to-user.

Band	Mode	UL Ch No.	DL Ch No.	f (MHz)	Avg Pwr	SAR (mW/g)	
					(dBm)	1-g	10-g
Band V	R99 12.2kbps RMC	4132	4357	826.4	24.1		
		4183	4408	836.6	24.1	0.410	0.261
		4233	4458	846.6	24.1		
Band	Mode	UL Ch No.	DL Ch No.	f (MHz)	Avg Pwr	SAR (mW/g)	
					(dBm)	1-g	10-g
Band II	R99 12.2kbps RMC	9262	9662	1850.2	22.5		
		9400	9800	1880.0	22.4	0.762	0.434
		9538	9938	1907.6	22.4		

Primary Landscape (no power back-off)

Direct contact/0 mm between EUT-to-Flat Phantoms (35.3 mm distance from WWAN Main antenna-to-user.)

Band	Mode	UL Ch No.	DL Ch No.	f (MHz)	Avg Pwr	SAR (mW/g)	
					(dBm)	1-g	10-g
Band V	R99 12.2kbps RMC	4132	4357	826.4	24.1		
		4183	4408	836.6	24.1	0.177	0.097
		4233	4458	846.6	24.1		
Band	Mode	UL Ch No.	DL Ch No.	f (MHz)	Avg Pwr	SAR (mW/g)	
					(dBm)	1-g	10-g
Band II	R99 12.2kbps RMC	9262	9662	1850.2	22.5		
		9400	9800	1880.0	22.4	0.238	0.117
		9538	9938	1907.6	22.4		

Secondary Landscape (no power back-off)

Direct contact/0 mm between EUT-to-Flat Phantoms (100 mm distance from WWAN Main antenna-to-user)

Band	Mode	UL Ch No.	DL Ch No.	f (MHz)	Avg Pwr	SAR (mW/g)	
					(dBm)	1-g	10-g
Band V	R99 12.2kbps RMC	4132	4357	826.4	24.1		
		4183	4408	836.6	24.1	0.048	0.024
		4233	4458	846.6	24.1		
Band	Mode	UL Ch No.	DL Ch No.	f (MHz)	Avg Pwr	SAR (mW/g)	
					(dBm)	1-g	10-g
Band II	R99 12.2kbps RMC	9262	9662	1850.2	22.5		
		9400	9800	1880.0	22.4	0.346	0.176
		9538	9938	1907.6	22.4		

Primary Portrait (No SAR)

With 227 mm separation distance from WWAN Main antenna-to-user.

Note: 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.

Secondary Portrait / Top Edge - With Proximity sensor activated with power back-off

Direct contact/0 mm between EUT-to-Flat Phantoms (3.68 mm distance from WWAN Main antenna-to-user.)

Band	Mode	UL Ch No.	DL Ch No.	f (MHz)	Avg Pwr	SAR (mW/g)	
					(dBm)	1-g	10-g
Band V	R99 12.2kbps RMC	4132	4357	826.4	21.6	1.050	0.618
		4183	4408	836.6	21.5	1.110	0.637
		4233	4458	846.6	21.6	**1.120**	0.639
Band	Mode	UL Ch No.	DL Ch No.	f (MHz)	Avg Pwr	SAR (mW/g)	
					(dBm)	1-g	10-g
Band II	R99 12.2kbps RMC	9262	9662	1850.2	16.4	1.130	0.559
		9400	9800	1880.0	16.4	**1.160**	0.574
		9538	9938	1907.6	16.3	1.090	0.534

Secondary Portrait / Top Edge - - Use Special Development Software to disable Proximity sensor – No power back-off.

With 9.5 mm separation distance from Top Edge of the EUT-to-user.

Band	Mode	UL Ch No.	DL Ch No.	f (MHz)	Avg Pwr	SAR (mW/g)	
					(dBm)	1-g	10-g
Band V	R99 12.2kbps RMC	4132	4357	826.4	24.1		
		4183	4408	836.6	24.1	0.413	0.269
		4233	4458	846.6	24.1		

Band	Mode	UL Ch No.	DL Ch No.	f (MHz)	Avg Pwr	SAR (mW/g)	
					(dBm)	1-g	10-g
Band II	R99 12.2kbps RMC	9262	9662	1850.2	22.5	1.230	0.682
		9400	9800	1880.0	22.4	**1.440**	0.798
		9538	9938	1907.6	22.4	1.280	0.707
	Rel 6 HSDPA Subtest 1	9262	9662	1850.2	22.5	1.110	0.622
		9400	9800	1880.0	22.4	1.340	0.749
		9538	9938	1907.6	22.4	1.180	0.660

WORST-CASE SAR TEST LPOTS FOR UMTS BAND V

Date/Time: 1/23/2011 4:22:22 PM

Test Laboratory: Compliance Certification Services (UL CCS)

Secondary portrait_UMTS Band V

DUT: Apple; Type: NA; Serial: NA

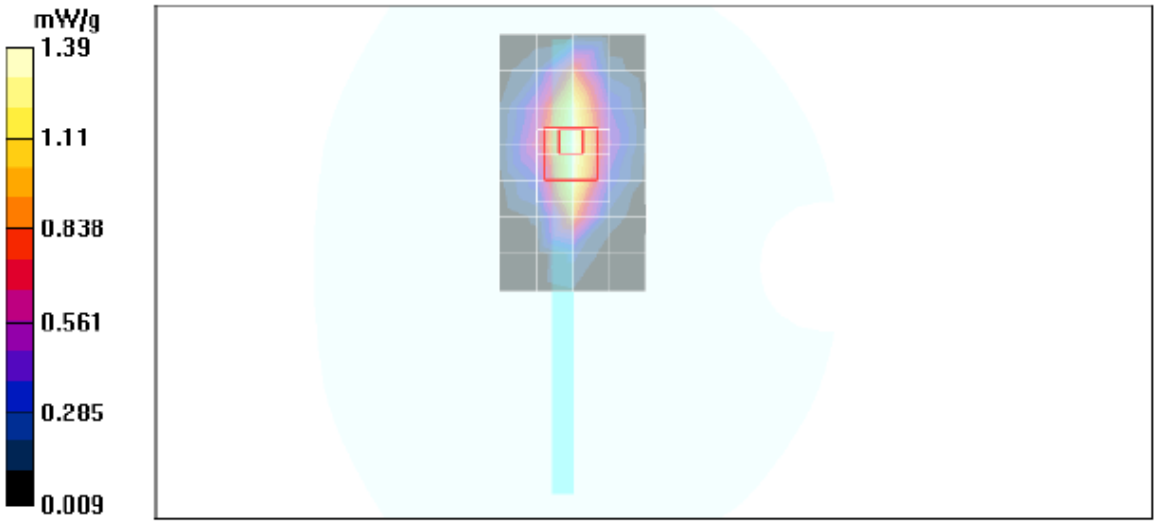
Communication System: UMTS Band V; Frequency: 846.6 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 846.6 MHz; σ = 0.994 mho/m; ε_r = 54.6; ρ = 1000 kg/m^3
Phantom section: Flat Section

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

DASY4 Configuration:
- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Probe: EX3DV4 - SN3749; ConvF(8.79, 8.79, 8.79); Calibrated: 12/13/2010
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn427; Calibrated: 7/21/2010
- Phantom: SAM 2 (Twin); Type: SAM 2; Serial: 1050
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

UMTS Band V_H ch/Area Scan (5x8x1): Measurement grid: dx=15mm, dy=15mm
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.39 mW/g

UMTS Band V_H ch/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=3mm
Reference Value = 37.4 V/m; Power Drift = -0.070 dB
Peak SAR (extrapolated) = 2.26 W/kg
SAR(1 g) = 1.12 mW/g; SAR(10 g) = 0.639 mW/g
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.40 mW/g



Z-axis Plot

Date/Time: 1/23/2011 4:39:57 PM

Test Laboratory: Compliance Certification Services (UL CCS)

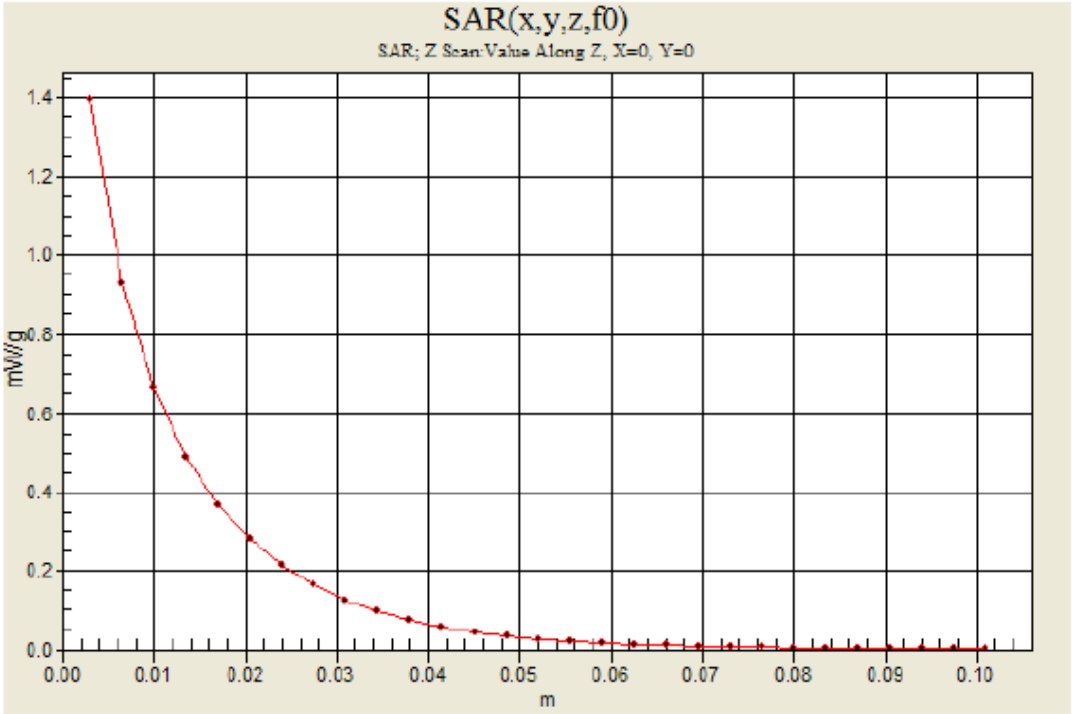
Secondary portrait_UMTS Band V

DUT: Apple; Type: NA; Serial: NA

Communication System: UMTS Band V; Frequency: 846.6 MHz;Duty Cycle: 1:1

UMTS Band V_H ch/Z Scan (1x1x29): Measurement grid: dx=20mm, dy=20mm, dz=3.5mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.40 mW/g



WORST-CASE SAR TEST LPOTS FOR UMTS BAND II

Date/Time: 1/21/2011 4:57:37 PM

Test Laboratory: Compliance Certification Services (UL CCS)

Secondary portrait_UMTS Band II

DUT: Apple; Type: NA; Serial: NA

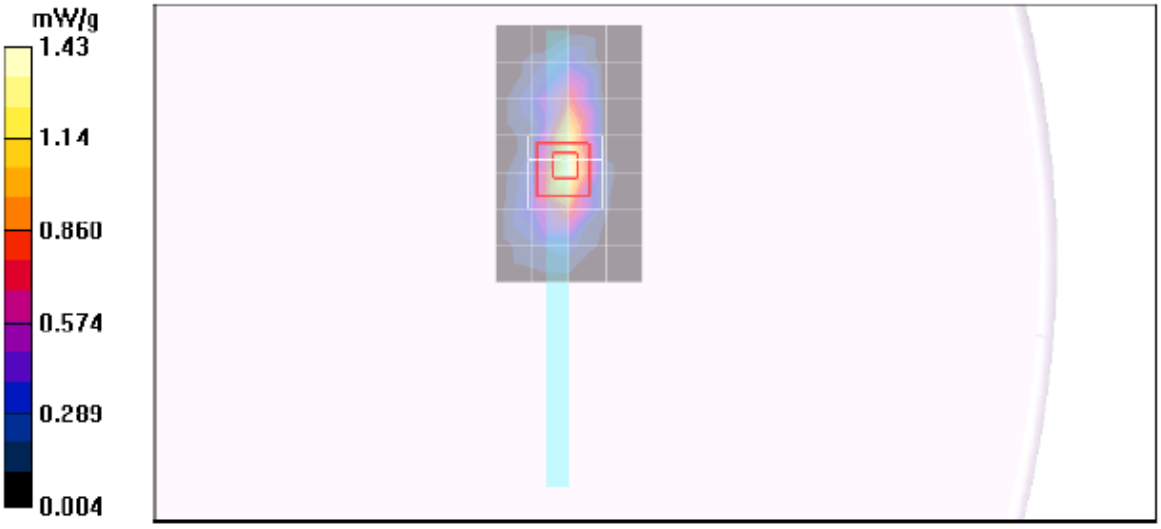
Communication System: UMTS Band II; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1880 MHz; σ = 1.49 mho/m; ε_r = 51.8; ρ = 1000 kg/m^3
Phantom section: Flat Section

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

DASY4 Configuration:
- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Probe: EX3DV4 - SN3749; ConvF(7.33, 7.33, 7.33); Calibrated: 12/13/2010
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn427; Calibrated: 7/21/2010
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: SN:1003
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

UMTS Band II_M ch/Area Scan (5x8x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 1.43 mW/g

UMTS Band II_M ch/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=3mm
Reference Value = 31.2 V/m; Power Drift = 0.168 dB
Peak SAR (extrapolated) = 2.24 W/kg
SAR(1 g) = 1.16 mW/g; SAR(10 g) = 0.574 mW/g
Maximum value of SAR (measured) = 1.51 mW/g



Z-axis Plot

Date/Time: 1/21/2011 5:15:38 PM

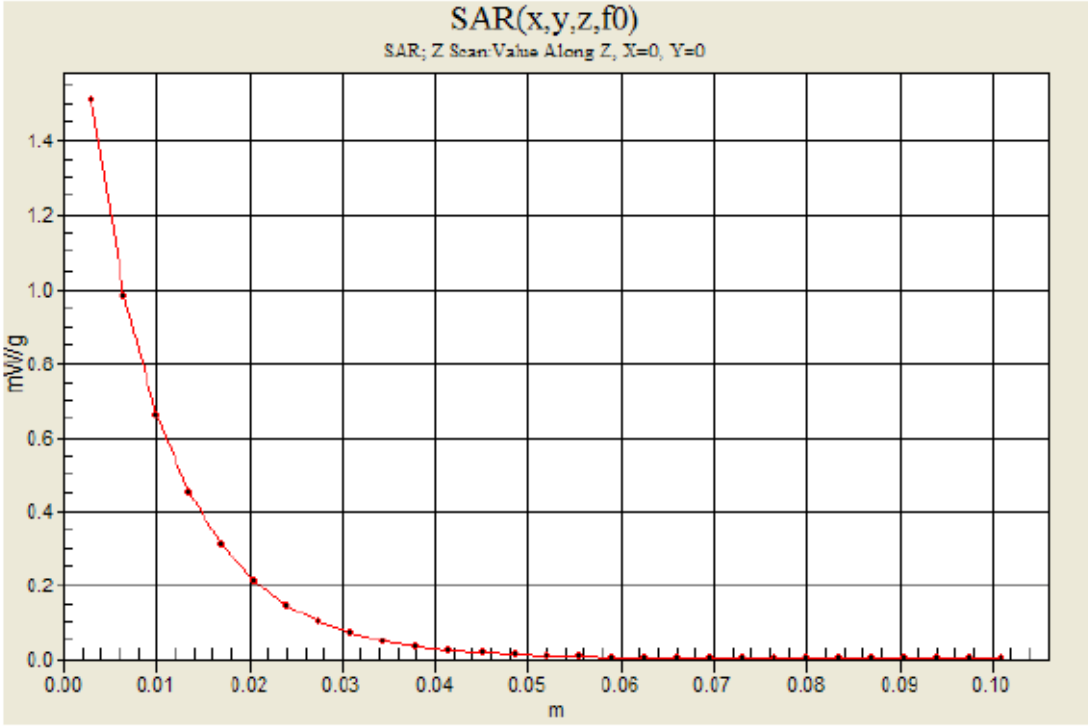
Test Laboratory: Compliance Certification Services (UL CCS)

Secondary portrait_UMTS Band II

DUT: Apple; Type: NA; Serial: NA

Communication System: UMTS Band II; Frequency: 1880 MHz;Duty Cycle: 1:1

UMTS Band II_M ch/Z Scan (1x1x29): Measurement grid: dx=20mm, dy=20mm, dz=3.5mm
Maximum value of SAR (measured) = 1.51 mW/g



Date/Time: 2/26/2011 12:43:21 PM

Test Laboratory: Compliance Certification Services (UL CCS)

Secondary portrait_UMTS Band II

DUT: Apple; Type: NA; Serial: NA

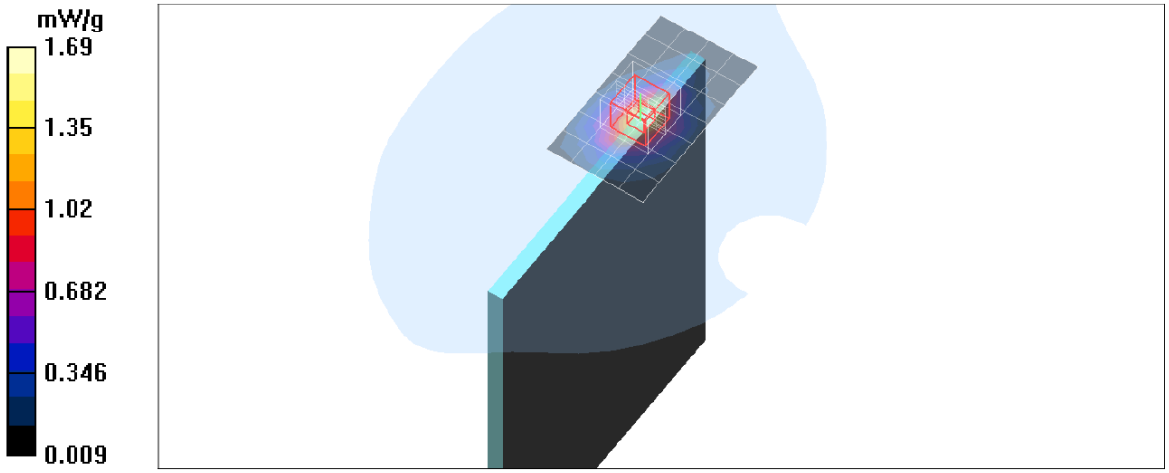
Communication System: UMTS Band II; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1880 MHz; σ = 1.46 mho/m; ε_r = 53; ρ = 1000 kg/m^3
Phantom section: Flat Section

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

DASY4 Configuration:
- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Probe: EX3DV4 - SN3749; ConvF(7.33, 7.33, 7.33); Calibrated: 12/13/2010
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn427; Calibrated: 7/21/2010
- Phantom: SAM 2 (Twin); Type: SAM 2; Serial: 1050
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

UMTS Band II_M ch/Area Scan (5x8x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 1.69 mW/g

UMTS Band II_M ch/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=3mm
Reference Value = 34.8 V/m; Power Drift = 0.013 dB
Peak SAR (extrapolated) = 2.42 W/kg
SAR(1 g) = 1.44 mW/g; SAR(10 g) = 0.798 mW/g
Maximum value of SAR (measured) = 1.75 mW/g



Date/Time: 2/26/2011 1:01:16 PM

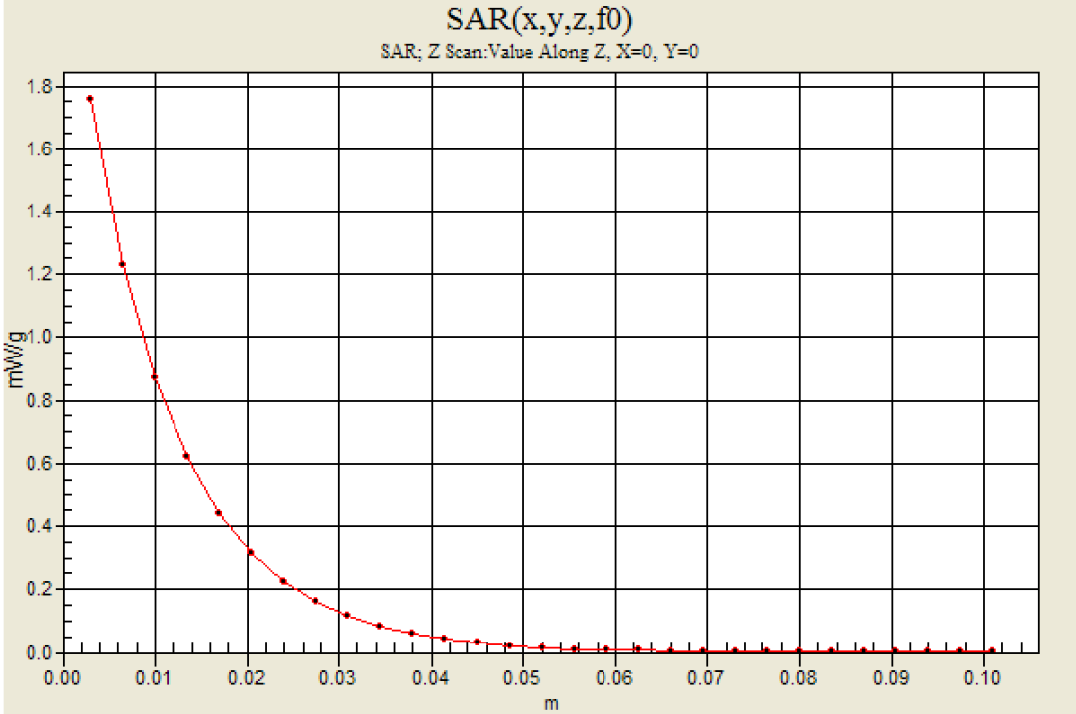
Test Laboratory: Compliance Certification Services (UL CCS)

Secondary portrait_UMTS Band II

DUT: Apple; Type: NA; Serial: NA

Communication System: UMTS Band II; Frequency: 1880 MHz;Duty Cycle: 1:1

UMTS Band II_M ch/Z Scan (1x1x29): Measurement grid: dx=20mm, dy=20mm, dz=3.5mm
Maximum value of SAR (measured) = 1.76 mW/g



13.3. 2.4 GHZ BAND

Back Surface

Direct contact / 0 cm from device-to-flat phantom. (WiFi/BT antenna-to-user distance: 8 mm).

Mode	Channel	f (MHz)	Avg Pwr	Results (mW/g)	
			(dBm)	1g-SAR	10g-SAR
802.11b	6	2437	15.7	0.083	0.040

Primary Landscape

Direction contact / 0 cm from device-to-flat phantom (WiFi/BT antenna-to-user: 44.6 mm)

Mode	Channel	f (MHz)	Avg Pwr	Results (mW/g)	
			(dBm)	1g-SAR	10g-SAR
802.11b	6	2437	15.7	0.042	0.020

Secondary Landscape (No SAR)

With 112 mm separation distance from WiFi/BT antenna-to-user.

Note: 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.

Primary Portrait

Direct contact / 0 cm from device-to-flat phantom (WiFi/BT antenna-to-user: 3.75 mm).

Mode	Channel	f (MHz)	Avg Pwr	Results (mW/g)	
			(dBm)	1g-SAR	10g-SAR
802.11b	1	2412	15.7	**1.070**	0.361
	6	2437	15.7	0.922	0.310
	11	2462	15.5	0.893	0.303

Secondary Portrait (No SAR)

Separation distance: 227 mm from WiFi/BT antenna-to-phantom

Note: 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.

WORST-CASE SAR TEST LPOTS FOR 2.4 GHz

Date/Time: 1/17/2011 5:29:07 PM

Test Laboratory: Compliance Certification Services (UL CCS)

11b_Primary portrait

DUT: Apple; Type: NA; Serial: NA

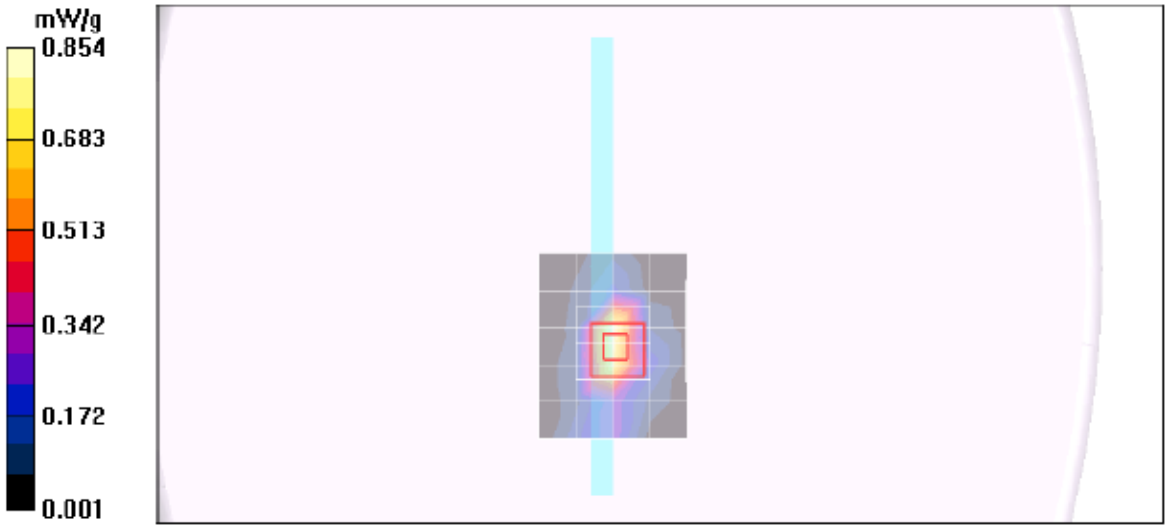
Communication System: 802.11bgn; Frequency: 2412 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 2412 MHz; σ = 1.94 mho/m; ε_r = 52.2; ρ = 1000 kg/m^3
Phantom section: Flat Section

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

DASY4 Configuration:
- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Probe: EX3DV4 - SN3749; ConvF(6.9, 6.9, 6.9); Calibrated: 12/13/2010
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn427; Calibrated: 7/21/2010
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: SN:1003
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

802.11b L-ch/Area Scan (5x6x1): Measurement grid: dx=15mm, dy=15mm
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.854 mW/g

802.11b L-ch/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=3mm
Reference Value = 21.2 V/m; Power Drift = 0.054 dB
Peak SAR (extrapolated) = 3.45 W/kg
SAR(1 g) = 1.07 mW/g; SAR(10 g) = 0.361 mW/g
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.65 mW/g



Z-axis Plot

Date/Time: 1/17/2011 5:46:29 PM

Test Laboratory: Compliance Certification Services (UL CCS)

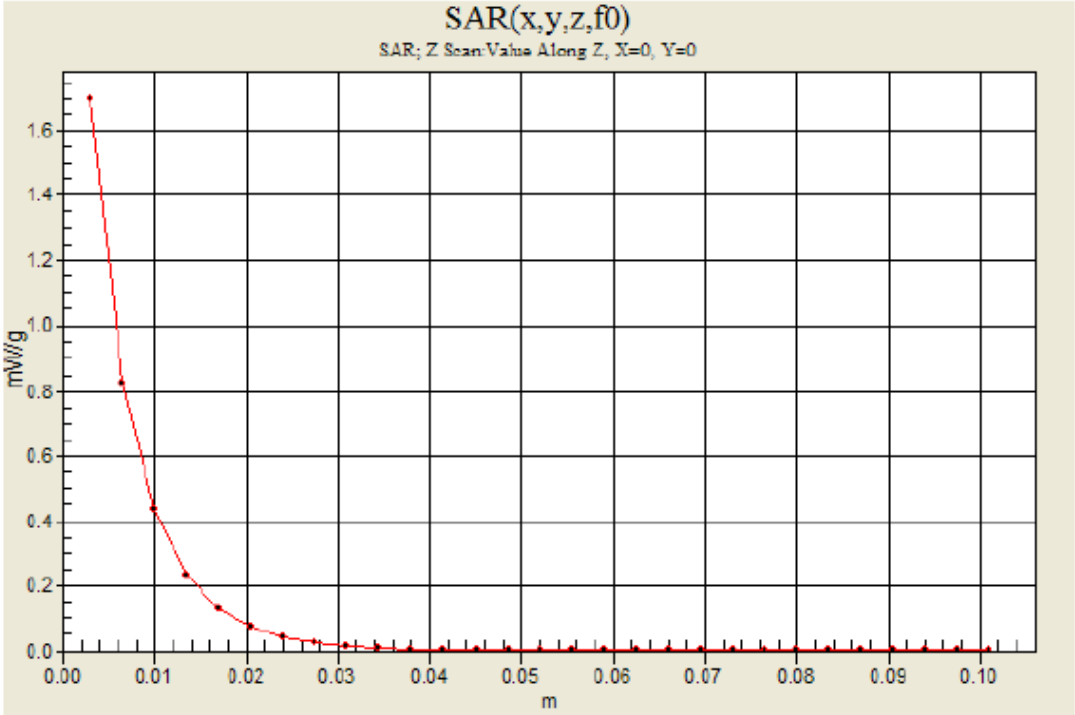
11b_Primary portrait

DUT: Apple; Type: NA; Serial: NA

Communication System: 802.11bgn; Frequency: 2412 MHz;Duty Cycle: 1:1

802.11b L-ch/Z Scan (1x1x29): Measurement grid: dx=20mm, dy=20mm, dz=3.5mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.70 mW/g



13.4. 5 GHZ BANDS

Back Surface

Direct contact / 0 cm distance from device-to-flat phantom (WiFi/BT antenna-to-user: 8 mm).

Band	Mode	Channel	f (MHz)	Avg Pwr	Results (mW/g)	
				(dBm)	1g-SAR	10g-SAR
5.2 GHz	802.11a Legacy	40	5200	15.7	0.063	0.026
5.3 GHz	802.11a Legacy	60	5300	15.6	0.046	0.016
5.6 GHz	802.11a Legacy	120	5600	15.7	0.086	0.037
5.8 GHz	802.11a Legacy	157	5785	17.0	0.064	0.026

Primary Landscape

Direct contact / 0 cm distance from device-to-flat phantom (WiFi/BT antenna-to-user: 44.6 mm).

Band	Mode	Channel	f (MHz)	Avg Pwr	Results (mW/g)	
				(dBm)	1g-SAR	10g-SAR
5.2 GHz	802.11a Legacy	40	5200	15.7	0.013	0.00461
5.3 GHz	802.11a Legacy	60	5300	15.6	0.019	0.0078
5.6 GHz	802.11a Legacy	120	5600	15.7	0.040	0.015
5.8 GHz	802.11a Legacy	157	5785	17.0	0.053	0.021

Secondary Landscape (No SAR)

With 112 mm separation distance from WiFi/BT antenna-to-user.

Note: 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.

Primary Portrait

Direct contact/ 0 cm distance from device-to-flat phantom. (WiFi/BT antenna-to-user:3.75 mm).

Band	Mode	Channel	f (MHz)	Avg Pwr	Results (mW/g)	
				(dBm)	1g-SAR	10g-SAR
5.2 GHz	802.11a Legacy	40	5200	15.7	**0.788**	0.246
5.3 GHz	802.11a Legacy	52	5260	15.6	0.810	0.281
		60	5300	15.6	**0.822**	0.292
		64	5320	15.5	0.758	0.266
5.6 GHz	802.11a Legacy	120	5600	15.7	**0.679**	0.231
5.8 GHz	802.11a Legacy	157	5785	17.0	**0.621**	0.198

Secondary Portrait /Top Edge (No SAR)

Separation distance: 227 mm from WiFi/BT antenna-to-phantom

Note: 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.

WORST-CASE SAR PLOTS FOR 5 GHz BANDS

5.2 GHz Band

Date/Time: 1/11/2011 12:18:24 PM

Test Laboratory: Compliance Certification Services (UL CCS)

5.2GHz_Primary portrait

DUT: Apple; Type: NA; Serial: NA

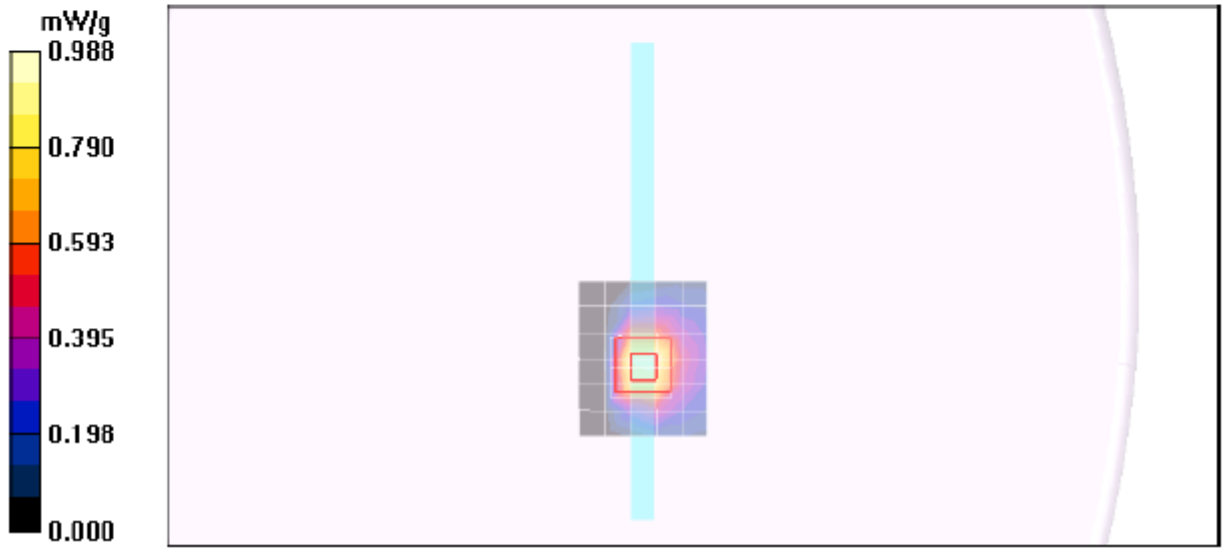
Communication System: 802.11abgn; Frequency: 5200 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5200 MHz; σ = 5.29 mho/m; ε_r = 47.7; ρ = 1000 kg/m^3
Phantom section: Flat Section

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

DASY4 Configuration:
- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Probe: EX3DV4 - SN3749; ConvF(4.07, 4.07, 4.07); Calibrated: 12/13/2010
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn427; Calibrated: 7/21/2010
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: SN:1003
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

802.11a_ch 40/Area Scan (6x7x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 0.988 mW/g

802.11a_ch 40/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 14.8 V/m; Power Drift = 0.131 dB
Peak SAR (extrapolated) = 2.52 W/kg
SAR(1 g) = 0.788 mW/g; SAR(10 g) = 0.246 mW/g
Maximum value of SAR (measured) = 1.38 mW/g



5.2 GHz Band - Z-axis Plot

Date/Time: 1/11/2011 12:36:30 PM

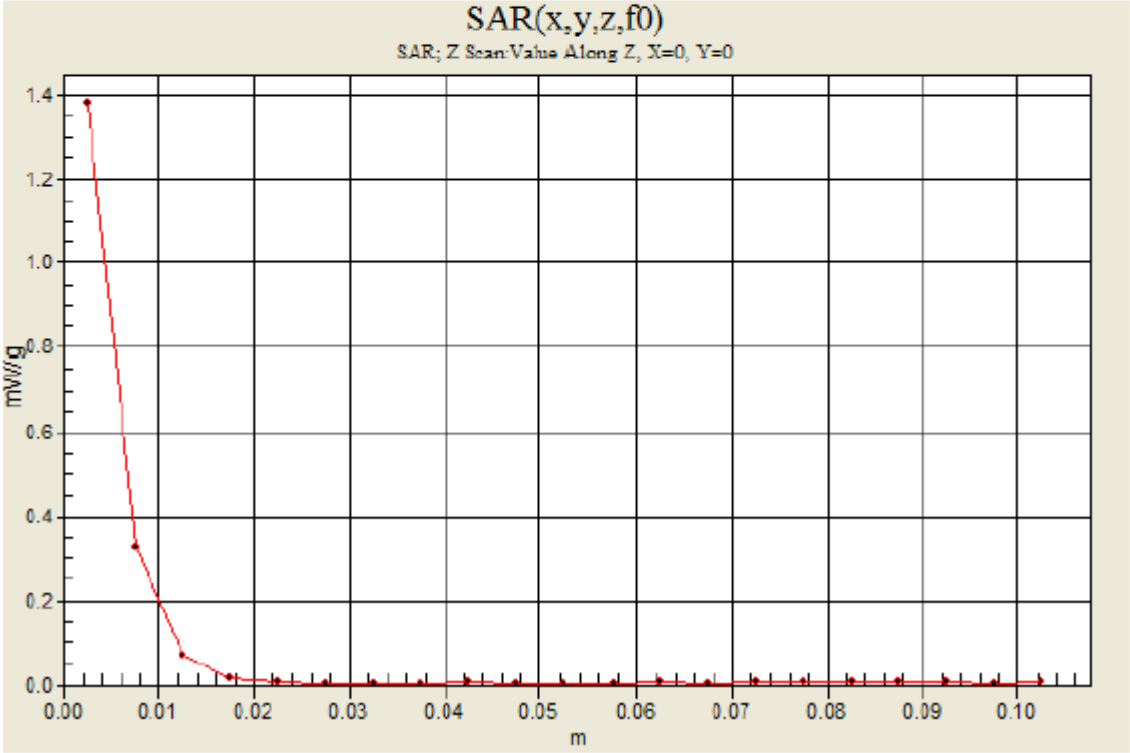
Test Laboratory: Compliance Certification Services (UL CCS)

5.2GHz_Primary portrait

DUT: Apple; Type: NA; Serial: NA

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

802.11a_ch 40/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Maximum value of SAR (measured) = 1.38 mW/g



5.3 GHz Band

Date/Time: 1/11/2011 1:29:35 PM

Test Laboratory: Compliance Certification Services (UL CCS)

5.3GHz_Primary portrait

DUT: Apple; Type: NA; Serial: NA

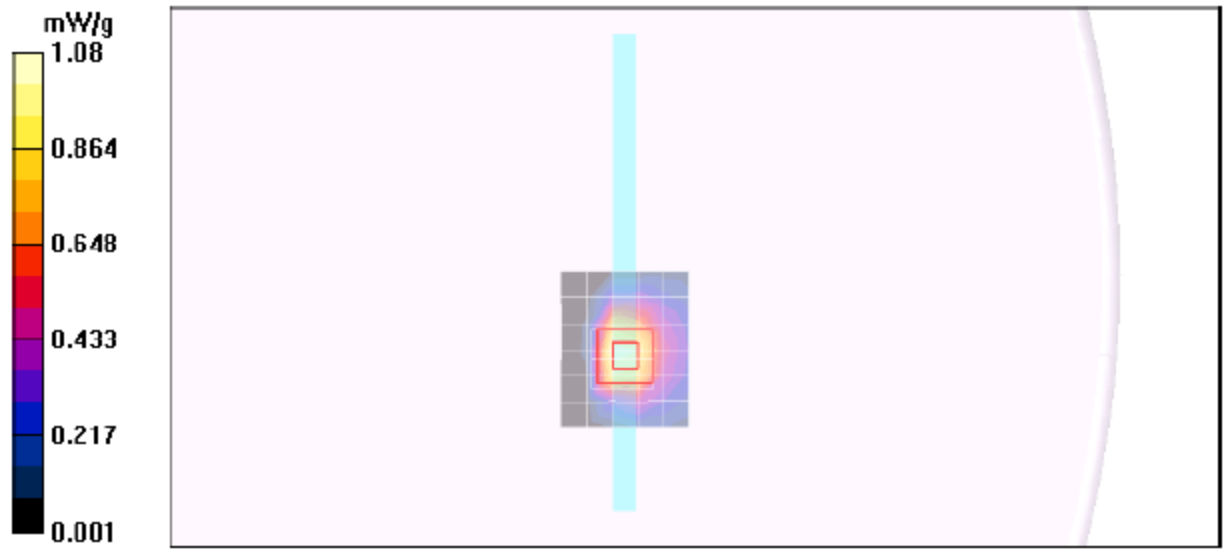
Communication System: 802.11abgn; Frequency: 5300 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5300 MHz; σ = 5.36 mho/m; ε_r = 47.3; ρ = 1000 kg/m^3
Phantom section: Flat Section

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

DASY4 Configuration:
- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Probe: EX3DV4 - SN3749; ConvF(3.88, 3.88, 3.88); Calibrated: 12/13/2010
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn427; Calibrated: 7/21/2010
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: SN:1003
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

802.11a_ch 60/Area Scan (6x7x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 1.08 mW/g

802.11a_ch 60/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 15.5 V/m; Power Drift = -0.139 dB
Peak SAR (extrapolated) = 2.61 W/kg
SAR(1 g) = 0.822 mW/g; SAR(10 g) = 0.292 mW/g
Maximum value of SAR (measured) = 1.41 mW/g



5.3 GHz Band - Z-axis Plot

Date/Time: 1/11/2011 1:47:33 PM

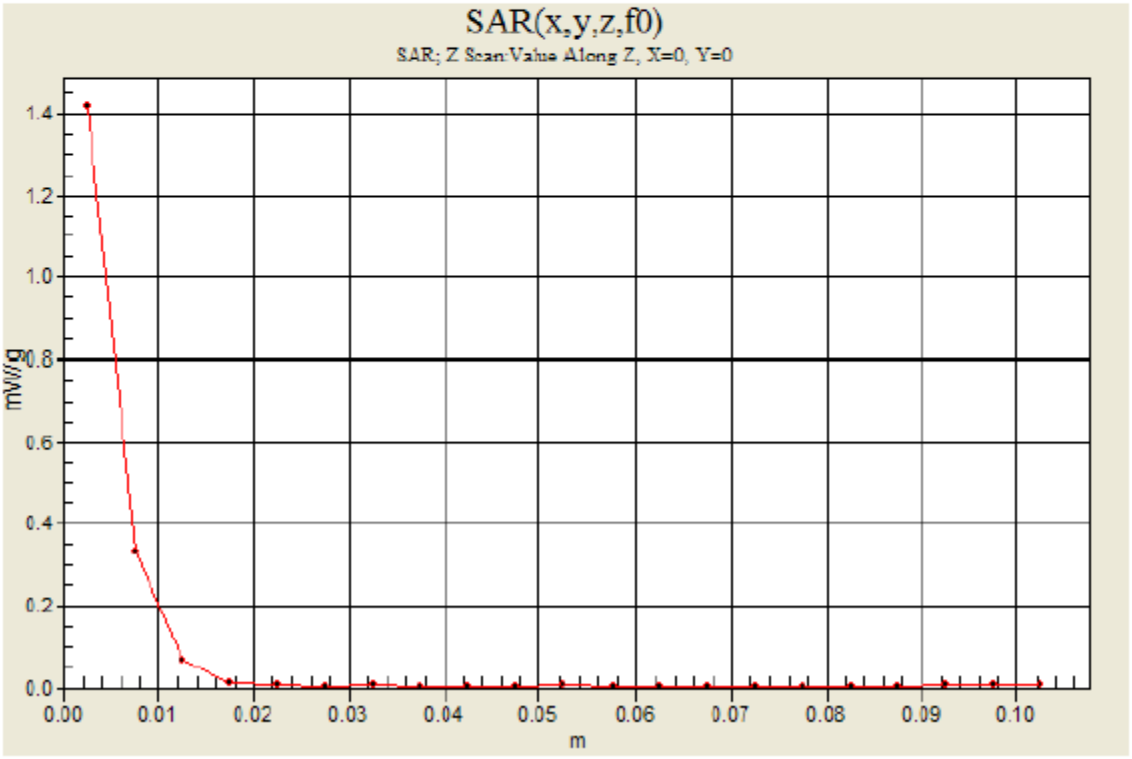
Test Laboratory: Compliance Certification Services (UL CCS)

5.3GHz_Primary portrait

DUT: Apple; Type: NA; Serial: NA

Communication System: 802.11abgn; Frequency: 5300 MHz;Duty Cycle: 1:1

802.11a_ch 60/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Maximum value of SAR (measured) = 1.42 mW/g



5.6 GHz Band

Date/Time: 1/11/2011 3:56:01 PM

Test Laboratory: Compliance Certification Services (UL CCS)

5.6GHz_Primary portrait

DUT: Apple; Type: NA; Serial: NA

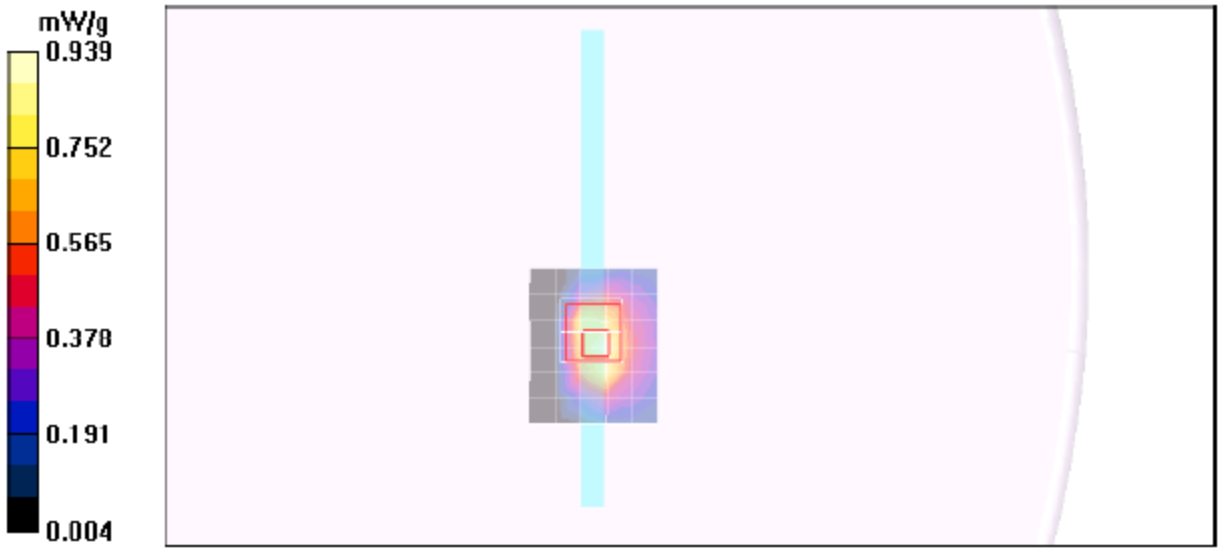
Communication System: 802.11abgn; Frequency: 5600 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5600 MHz; σ = 5.61 mho/m; ε_r = 47.2; ρ = 1000 kg/m^3
Phantom section: Flat Section

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

DASY4 Configuration:
- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Probe: EX3DV4 - SN3749; ConvF(3.36, 3.36, 3.36); Calibrated: 12/13/2010
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn427; Calibrated: 7/21/2010
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: SN:1003
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

802.11a_ch 120/Area Scan (6x7x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 0.939 mW/g

802.11a_ch 120/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 14.6 V/m; Power Drift = 0.051 dB
Peak SAR (extrapolated) = 2.20 W/kg
SAR(1 g) = 0.679 mW/g; SAR(10 g) = 0.231 mW/g
Maximum value of SAR (measured) = 1.16 mW/g



5.6 GHz Band - Z-axis Plot

Date/Time: 1/11/2011 4:14:07 PM

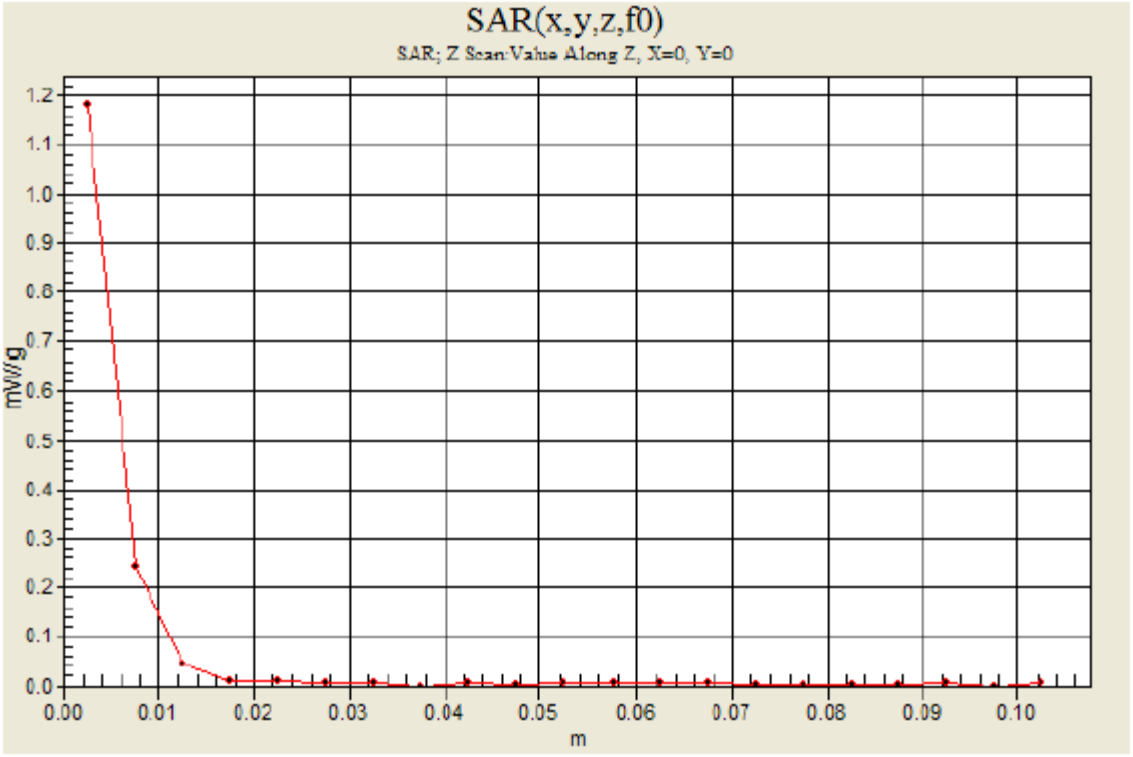
Test Laboratory: Compliance Certification Services (UL CCS)

5.6GHz_Primary portrait

DUT: Apple; Type: NA; Serial: NA

Communication System: 802.11abgn; Frequency: 5600 MHz;Duty Cycle: 1:1

802.11a_ch 120/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Maximum value of SAR (measured) = 1.18 mW/g



5.8 GHz Band

Date/Time: 1/11/2011 4:47:36 PM

Test Laboratory: Compliance Certification Services (UL CCS)

5.8GHz_Primary portrait

DUT: Apple; Type: NA; Serial: NA

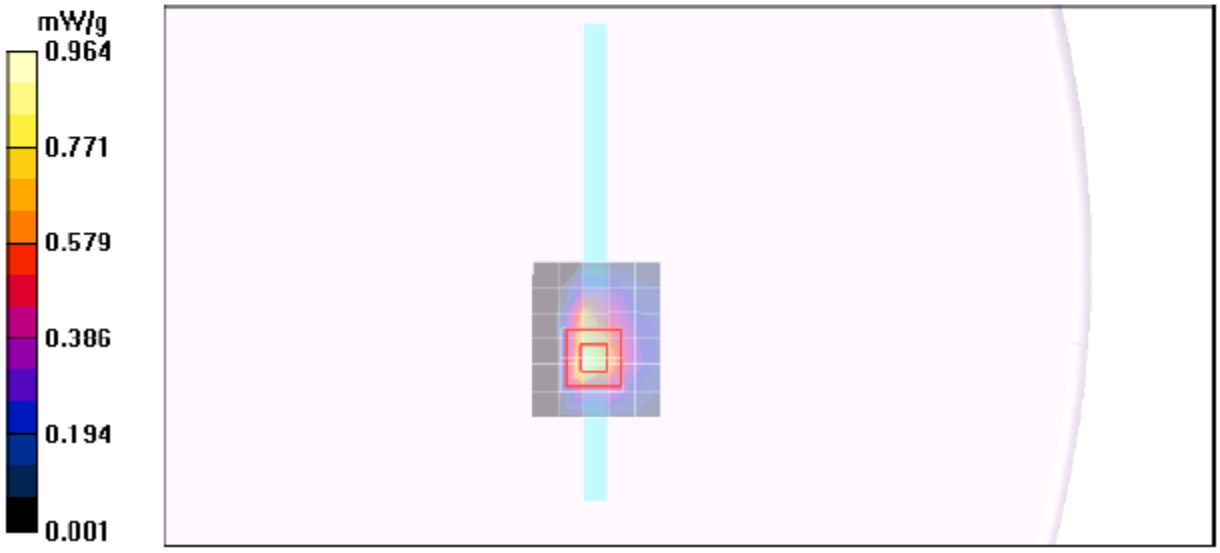
Communication System: 802.11abgn; Frequency: 5785 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 5785 MHz; σ = 6.06 mho/m; ε_r = 46.5; ρ = 1000 kg/m^3
Phantom section: Flat Section

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

DASY4 Configuration:
- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Probe: EX3DV4 - SN3749; ConvF(3.65, 3.65, 3.65); Calibrated: 12/13/2010
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn427; Calibrated: 7/21/2010
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: SN:1003
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

802.11a_ch 157/Area Scan (6x7x1): Measurement grid: dx=10mm, dy=10mm
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.964 mW/g

802.11a_ch 157/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 14.3 V/m; Power Drift = -0.035 dB
Peak SAR (extrapolated) = 2.10 W/kg
SAR(1 g) = 0.621 mW/g; SAR(10 g) = 0.198 mW/g
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.12 mW/g



5.8 GHz Band - Z-axis Plot

Date/Time: 1/11/2011 5:05:47 PM

Test Laboratory: Compliance Certification Services (UL CCS)

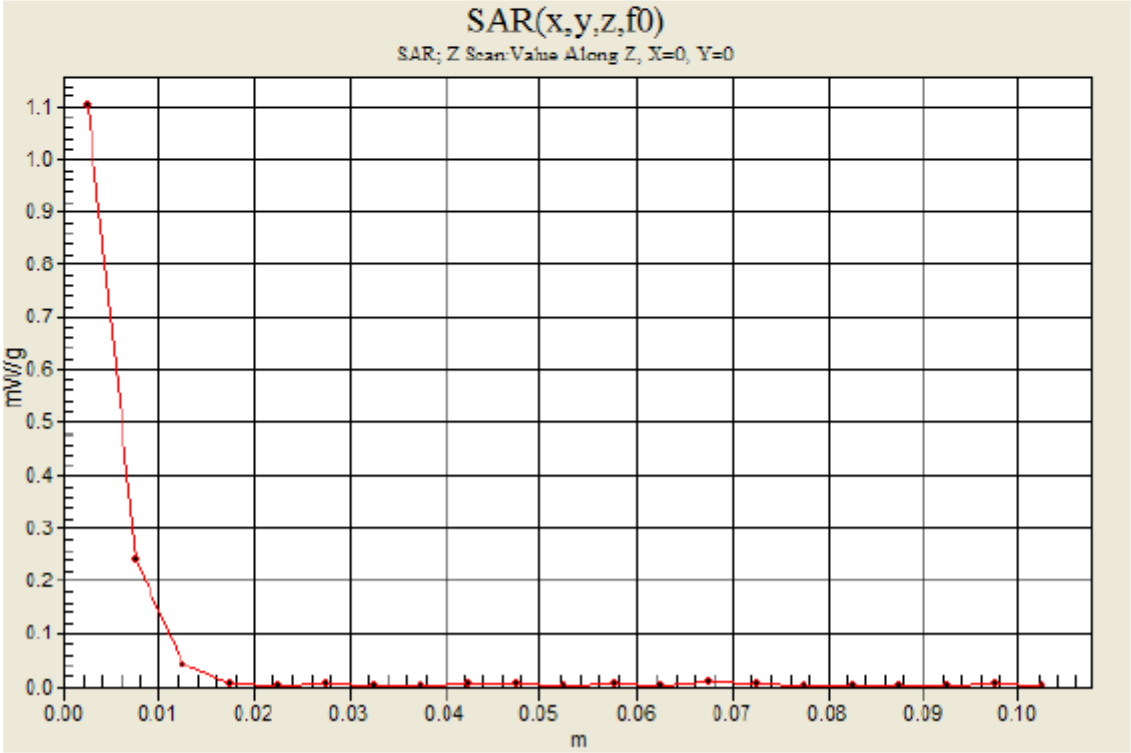
5.8GHz_Primary portrait

DUT: Apple; Type: NA; Serial: NA

Communication System: 802.11abgn; Frequency: 5785 MHz;Duty Cycle: 1:1

802.11a_ch 157/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.10 mW/g



14. KDB 447498 SIMULTANEOUS TRANSMISSION SAR EVAULATIONS

Acc. to KDB 447498 3) b) ii)
(1) for the antennas that are located < 5 cm from the persons

Finding: When the EUT is positioned at the bottom face configuration, WWAN and WiFi antennas are located < 5 cm from persons.

The sum of the stand-alone SAR and the SAR to peak location separation ratios

WWAN (GSM/UMTS) and WiFi (2.4 & 5 GHz bands)						
Test position	Highest 1-g SAR (W/kg)			∑ 1g SAR (W/kg)	SAR to peak location	
	WWAN		WiFi 2.4G		Separation (cm)	Ratio
Secondary portrait / top Edge with Power back-off	GPRS850	1.180	n/a*	1.180	n/a	n/a
	GPRS1900	1.190		1.190	n/a	n/a
	Highest 1-g SAR (W/kg)			∑ 1g SAR (W/kg)	SAR to peak location	
	WWAN		WiFi 5G		Separation (cm)	Ratio
	GPRS850	1.180	n/a*	1.180	n/a	n/a
	GPRS1900	1.190		1.190	n/a	n/a
Test position	Highest 1-g SAR (W/kg)			∑ 1g SAR (W/kg)	SAR to peak location	
	WWAN		WiFi 2.4G		Separation (cm)	Ratio
Back Surface / With Power Back-off	GPRS850	1.010	0.083	1.093	n/a	n/a
	UMTS 1900	1.090		1.173	n/a	n/a
	Highest 1-g SAR (W/kg)			∑ 1g SAR (W/kg)	SAR to peak location	
	WWAN		WiFi 5G		Separation (cm)	Ratio
	GPRS850	1.010	0.086	1.096	n/a	n/a
	UMTS 1900	1.090		1.176	n/a	n/a
Test position	Highest 1-g SAR (W/kg)			∑ 1g SAR (W/kg)	SAR to peak location	
	WWAN		WiFi 2.4G		Separation (cm)	Ratio
Secondary portrait / Top Edge with special development software to	GPRS850	0.420	n/a*	0.420	n/a	n/a
	UMTS 1900	1.440		1.440	n/a	n/a
	Highest 1-g SAR (W/kg)			∑ 1g SAR (W/kg)	SAR to peak location	
	WWAN		WiFi 5G		Separation (cm)	Ratio
	GPRS850	0.420	n/a*	0.420	n/a	n/a
	UMTS 1900	1.440		1.440	n/a	n/a
Test position	Highest 1-g SAR (W/kg)			∑ 1g SAR (W/kg)	SAR to peak location	
	WWAN		WiFi 2.4G		Separation (cm)	Ratio
Back Surface with special development software to disable the sensor- no	GPRS850	0.463	0.083	0.546	n/a	n/a
	UMTS 1900	0.762		0.845	n/a	n/a
	Highest 1-g SAR (W/kg)			∑ 1g SAR (W/kg)	SAR to peak location	
	WWAN		WiFi 5G		Separation (cm)	Ratio
	GPRS850	0.463	0.086	0.549	n/a	n/a
	UMTS 1900	0.762		0.848	n/a	n/a

WiFi (2.4 & 5 GHz bands) and WWAN (GSM/UMTS)						
Test position	Highest 1-g SAR (W/kg)			∑ 1g SAR (W/kg)	SAR to peak location	
	WWAN		WiFi 2.4G		Separation (cm)	Ratio
Primary portrait	UMTS Cell	n/a**	1.07	1.07	n/a	n/a
	UMTS PCS	n/a**		1.07	n/a	n/a
	Highest 1-g SAR (W/kg)			∑ 1g SAR (W/kg)	SAR to peak location	
	WWAN		WiFi 5G		Separation (cm)	Ratio
	UMTS Cell	n/a**	0.822	0.822	n/a	n/a
	UMTS PCS	n/a**		0.822	n/a	n/a

Notes:

*: WiFi antenna is located at Bottom edge (Primary portrait); antenna-to-top edge distance is more than 20 cm. Therefore secondary portrait is excluded from SAR evaluation for WiFi.

**: WWAN (GSM/UMTS) antenna is located at Top edge (Secondary portrait); antenna-to-bottom edge distance is more than 20 cm. Therefore primary portrait is excluded from SAR evaluation for WWAN (GSM/UMTS).

CONCLUSIONS:

WWAN (GSM/UMTS) and WiFi (2.4 GHz & 5 GHz bands):
Simultaneous transmission is SAR not required for WWAN & WiFi because the sum of the 1-g SAR is < 1.6 W/kg.

WWAN (GSM/UMTS) and Bluetooth:
Simultaneous transmission is SAR not required for WWAN & Bluetooth because stand alone SAR is not required for Bluetooth (output power is ≤ 60/f(GHz) mW).

WiFi 5GHz bands and Bluetooth:
Simultaneous transmission is SAR not required for WiFi 5GHz bands & Bluetooth because stand alone SAR is not required for Bluetooth (output power is ≤ 60/f(GHz) mW).

COMPLIANCE CERTIFICATION SERVICES (UL CCS) FORM NO: CCSUP4031B-0810
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15. ATTACHMENTS

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