



**FCC OET BULLETIN 65 SUPPLEMENT C Edition 01-01  
Class II Permissive Change  
IC RSS-102 ISSUE 4**

**SAR EVALUATION REPORT**

*For*

**802.11agn WLAN + Bluetooth PCI-E Mini Card  
(Tested inside of MacBook Air)**

**MODEL: BCM943224PCIEBT2  
FCC ID: QDS-BRCM1052  
IC: 4324A-BRCM1052**

**REPORT NUMBER: 10U13403-1**

**ISSUE DATE: October 11, 2010**

*Prepared for*

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**NVLAP LAB CODE 200065-0**

Revision History

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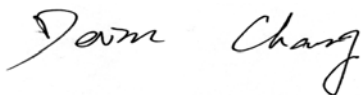
## TABLE OF CONTENTS

<b>1. ATTESTATION OF TEST RESULTS</b> .....	<b>5</b>
<b>2. TEST METHODOLOGY</b> .....	<b>6</b>
<b>3. FACILITIES AND ACCREDITATION</b> .....	<b>6</b>
<b>4. CALIBRATION AND UNCERTAINTY</b> .....	<b>7</b>
4.1. <i>MEASURING INSTRUMENT CALIBRATION</i> .....	7
4.2. <i>MEASUREMENT UNCERTAINTY</i> .....	8
<b>5. EQUIPMENT UNDER TEST</b> .....	<b>9</b>
<b>6. SYSTEM SPECIFICATIONS</b> .....	<b>10</b>
<b>7. COMPOSITION OF INGREDIENTS FOR TISSUE SIMULATING LIQUIDS</b> .....	<b>11</b>
<b>8. LIQUID PARAMETERS CHECK</b> .....	<b>12</b>
8.1. <i>LIQUID CHECK RESULTS FOR 2450 MHZ</i> .....	13
8.2. <i>LIQUID CHECK RESULTS FOR 5 GHZ</i> .....	17
<b>9. SYSTEM VERIFICATION</b> .....	<b>24</b>
9.1. <i>SYSTEM CHECK RESULTS FOR D2450V2</i> .....	25
9.2. <i>SYSTEM CHECK RESULTS FOR D5GHZV2</i> .....	26
9.3. <i>SYSTEM CHECK PLOTS</i> .....	27
<b>10. RF OUTPUT POWER VERIFICATION</b> .....	<b>58</b>
10.1. <i>RF OUTPUT POWER FOR 2.4 GHZ BAND</i> .....	58
10.2. <i>RF OUTPUT POWER FOR 5 GHZ BANDS</i> .....	59
<b>11. SUMMARY OF SAR TEST RESULTS</b> .....	<b>61</b>
11.1. <i>SAR TEST RESULT FOR 2.4 GHZ BAND (11 inch MacBook Air)</i> .....	61
11.2. <i>SAR TEST RESULT FOR 2.4 GHZ BAND (13 inch MacBook Air)</i> .....	62
11.2.1. <i>WORST-CASE SAR TEST LPOTS FOR 2.4 GHZ BAND</i> .....	63
11.3. <i>SAR TEST RESULTS FOR 5 GHZ BANDS (11 inch MacBook Air)</i> .....	65
11.4. <i>SAR TEST RESULTS FOR 5 GHZ BANDS (13 inch MacBook Air)</i> .....	67
11.4.1. <i>WORST-CASE SAR PLOTS FOR 5 GHZ BANDS</i> .....	69
<b>12. ATTACHMENTS</b> .....	<b>77</b>
<b>13. ANTENNA LOCATIONS AND SEPARATION DISTANCES</b> .....	<b>78</b>
13.1. <i>ANTENNA-TO-USERS AND NEARBY PERSONS</i> .....	78
13.2. <i>ANTENNA-TO-ANTENNA</i> .....	79

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<b>14. TEST SETUP PHOTOS .....</b>	<b>80</b>
<b>15. HOST DEVICE PHOTOS.....</b>	<b>82</b>

# 1. ATTESTATION OF TEST RESULTS

Applicant name:	BROADCOM CORPORATION 190 MATHILDA PLACE SUNNYVALE, CA 94086, USA		
EUT description:	802.11agn WLAN + Bluetooth PCI-E Mini Card (Tested inside of MacBook Air)		
Model number:	BCM943224PCIEBT2 Serial number: PT548958 [K16 (13 inch) ]; PT545786 [K99 (11 inch)]		
Device category::	Portable		
Exposure category:	General Population/Uncontrolled Exposure		
Date tested:	September 15 – October 4, 2010		
FCC / IC rule parts	Frequency Range [MHz]	Highest 1-g SAR (mW/g)	Limit (mW/g)
15.247 / RSS-102	2412 – 2462	1.07 (13 inch MacBook Air)	1.6
15.407 / RSS-102	5150 – 5250	0.767 (13 inch MacBook Air)	
	5250 – 5350	1.10 (13 inch MacBook Air)	
	5500 – 5700	1.19 (13 inch MacBook Air)	
15.247 / RSS-102	5725 – 5850	1.19 (13 inch MacBook Air)	
Applicable Standards			Test Results
FCC OET Bulletin 65 Supplement C Edition 01-01 IC RSS 102 Issue 4			Pass
<p>Compliance Certification Services (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.</p> <p><b>Note:</b> 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.</p>			
Approved & Released For UL CCS By:		Tested By:	
			
Sunny Shih Engineering Team Leader Compliance Certification Services (UL CCS)		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 Edition 01-01, IEEE STD 1528-2003, IC RSS 102 Issue 4 and the following specific FCC Test Procedures.

- KDB 248227 SAR measurement procedures for 802.11a/b/g transmitters
- 616217 D01 SAR for Laptop with Screen Ant v01r01
- 616217 D03 SAR Supp Note and Netbook Laptop V01

## 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		
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		
Dielectric Probe Kit	HP	85070C	N/A	N/A		
S-Parameter Network Analyzer	Agilent	8753ES-6	MY40001647	11	22	2010
Signal Generator	Agilent	8753ES-6	MY40001647	11	22	2010
E-Field Probe	SPEAG	EX3DV3	3531	2	23	2011
Data Acquisition Electronics	SPEAG	DAE3 V1	427	7	21	2011
System Validation Dipole	SPEAG	D2450V2	706	4	19	2013
System Validation Dipole	SPEAG	D5GHzV2	1075	9	3	2011
Thermometer	ERTCO	639-1S	1718	7	19	2011
Power Meter	Giga-tronics	8651A	8651404	5	13	2012
Power Sensor	Giga-tronics	80701A	1834588	5	13	2012
Power Meter	Boonton	4541	12414	2	26	2011
Power Sensor	Boonton	57006	6871	2	23	2011
Amplifier	Mini-Circuits	ZVE-8G	90606	N/A		
Amplifier	Mini-Circuits	ZHL-42W	D072701-5	N/A		
Simulating Liquid	SPEAG	M2450	N/A	Within 24 hrs of first test		
Simulating Liquid	SPEAG	M5800 (5-5.8GHz)	N/A	Within 24 hrs of first test		

**Note:** Per KDB 450824 D02 requirements for dipole calibration, UL CCS has adopted three 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 ( test data on file in UL CCS)
4. Impedance is within 5Ω of calibrated measurement (test data on file in UL CCS)

## 4.2. MEASUREMENT UNCERTAINTY

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

Component	error, %	Probe Distribution	Divisor	Sensitivity	U (Xi), %
<b>Measurement System</b>					
Probe Calibration (k=1) @ Body 2450 MHz	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
<b>Test Sample Related</b>					
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
<b>Phantom and Tissue Parameters</b>					
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 (5.8GHz)	2.49	Normal	1	0.64	1.59
Liquid Permittivity - deviation from target	5.00	Rectangular	1.732	0.6	1.73
Liquid Permittivity - measurement (5GHz)	-2.13	Normal	1	0.6	-1.28
Combined Standard Uncertainty Uc(y) =					9.66
Expanded Uncertainty U, Coverage Factor = 2, > 95 % Confidence =				19.32	%
Expanded Uncertainty U, Coverage Factor = 2, > 95 % Confidence =				1.53	dB

3 to 6 GHz averaged over 1 gram

Component	error, %	Distribution	Divisor	Sensitivity	U (Xi), %
<b>Measurement System</b>					
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
<b>Test Sample Related</b>					
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
<b>Phantom and Tissue Parameters</b>					
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 (5.8GHz)	3.92	Normal	1	0.64	2.51
Liquid Permittivity - deviation from target	5.00	Rectangular	1.732	0.6	1.73
Liquid Permittivity - measurement (5.8GHz)	-6.64	Normal	1	0.6	-3.98
Combined Standard Uncertainty Uc(y), %:					11.06
Expanded Uncertainty U, Coverage Factor = 1.96, > 95 % Confidence =				21.68	%
Expanded Uncertainty U, Coverage Factor = 1.96, > 95 % Confidence =				1.70	dB



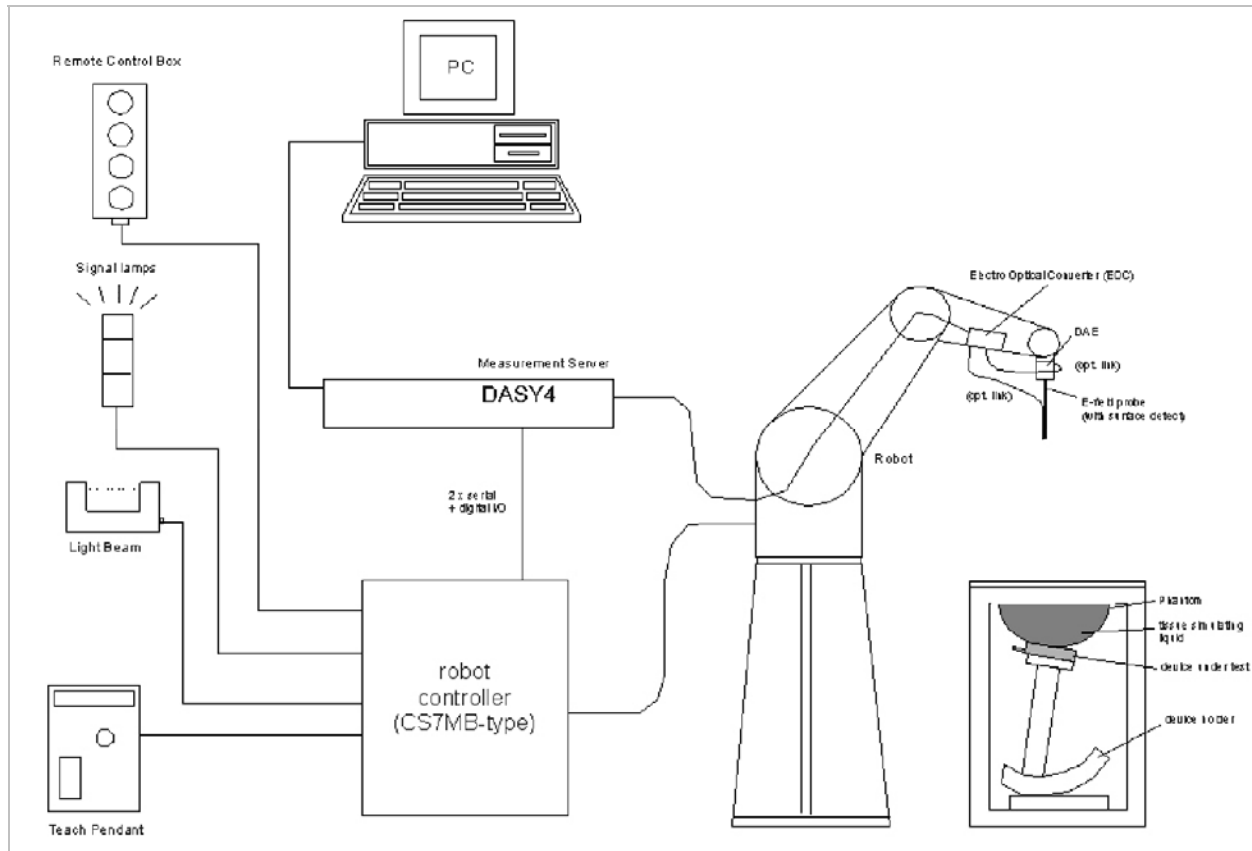
## 5. EQUIPMENT UNDER TEST

The EUT is an 802.11agn WLAN + Bluetooth PCI-E Minicard. The radio module is manufactured by Broadcom.

(Tested inside of 11 and 13 inch MacBook Air)

Normal operation:	Lap-held (with display open at 90° to the keyboard)												
Antennas tested:	<p>Installed inside of 13 inch MacBook Air</p> <table border="0"> <tr> <td><u>Manufacturer</u></td> <td><u>Antenna name</u></td> </tr> <tr> <td>Amphenol / Tyco</td> <td>631-1546 WiFi 1 / Main (Shared w/ BT)</td> </tr> <tr> <td></td> <td>631-1546 WiFi 2 / Aux</td> </tr> </table> <p>Installed inside of 11 inch MacBook Air</p> <table border="0"> <tr> <td><u>Manufacturer</u></td> <td><u>Antenna name</u></td> </tr> <tr> <td>Amphenol / Tyco</td> <td>631-1547 WiFi 1 / Main (Shared w/ BT)</td> </tr> <tr> <td></td> <td>631-1547 WiFi 2 / Aux</td> </tr> </table>	<u>Manufacturer</u>	<u>Antenna name</u>	Amphenol / Tyco	631-1546 WiFi 1 / Main (Shared w/ BT)		631-1546 WiFi 2 / Aux	<u>Manufacturer</u>	<u>Antenna name</u>	Amphenol / Tyco	631-1547 WiFi 1 / Main (Shared w/ BT)		631-1547 WiFi 2 / Aux
<u>Manufacturer</u>	<u>Antenna name</u>												
Amphenol / Tyco	631-1546 WiFi 1 / Main (Shared w/ BT)												
	631-1546 WiFi 2 / Aux												
<u>Manufacturer</u>	<u>Antenna name</u>												
Amphenol / Tyco	631-1547 WiFi 1 / Main (Shared w/ BT)												
	631-1547 WiFi 2 / Aux												
Antenna-to-antenna/user separation distances:	See Section 13 for details of antenna locations and separation distances												
Simultaneous transmission:	<p>WiFi 2 (5 GHz bands) can transmit simultaneously with Bluetooth</p> <p>WiFi 2 (2.4 GHz band) cannot transmit simultaneously with Bluetooth</p>												
Assessment for SAR evaluation for Simultaneous transmission:	<p>WiFi (5 GHz bands) vs Bluetooth</p> <p>Due to Bluetooth's output is 0.013 mW [<math>&lt;60/f(\text{GHz})</math> mW]. Thus both WiFi 2 (5 GHz bands) and Bluetooth are not considered as co-located transmitters each other.</p>												

## 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		900		1800 - 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 CHECK

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

### Reference Values of Tissue Dielectric Parameters for Head & Body Phantom

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

Target Frequency (MHz)	Head		Body	
	$\epsilon_r$	$\sigma$ (S/m)	$\epsilon_r$	$\sigma$ (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

( $\epsilon_r$  = relative permittivity,  $\sigma$  = conductivity and  $\rho = 1000 \text{ kg/m}^3$ )

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

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

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

( $\epsilon_r$  = relative permittivity,  $\sigma$  = conductivity and  $\rho = 1000 \text{ kg/m}^3$ )

### 8.1. LIQUID CHECK RESULTS FOR 2450 MHZ

Simulating Liquid Dielectric Parameter Check Result @ Body 2450 MHz

Measured by: Devin Chang

f (MHz)	Liquid Parameters			Measured	Target	Delta (%)	Limit (%)
2450	e'	51.58	Relative Permittivity ( $\epsilon_r$ ):	51.577	52.7	-2.13	± 5
	e''	14.56	Conductivity ( $\sigma$ ):	1.984	1.95	1.76	± 5

**Liquid Check**

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

September 15, 2010 02:18 PM

Frequency	e'	e''
2400000000.	51.7547	14.3592
2405000000.	51.7368	14.3802
2410000000.	51.7185	14.4036
2415000000.	51.7008	14.4241
2420000000.	51.6853	14.4416
2425000000.	51.6674	14.4600
2430000000.	51.6475	14.4813
2435000000.	51.6292	14.5008
2440000000.	51.6116	14.5210
2445000000.	51.5937	14.5389
<b>2450000000.</b>	<b>51.5772</b>	<b>14.5591</b>
2455000000.	51.5562	14.5783
2460000000.	51.5403	14.5985
2465000000.	51.5206	14.6185
2470000000.	51.5034	14.6388
2475000000.	51.4872	14.6590
2480000000.	51.4669	14.6792
2485000000.	51.4515	14.6997
2490000000.	51.4357	14.7189
2495000000.	51.4211	14.7416
2500000000.	51.4060	14.7627

The conductivity ( $\sigma$ ) can be given as:

$$\sigma = \omega \epsilon_0 e'' = 2 \pi f \epsilon_0 e''$$

where  $f = \text{target } f * 10^6$

$$\epsilon_0 = 8.854 * 10^{-12}$$

Simulating Liquid Dielectric Parameter Check Result @ Head 2450 MHz

Measured by: Devin Chang

f (MHz)	Liquid Parameters			Measured	Target	Delta (%)	Limit (%)
2450	e'	39.87	Relative Permittivity ( $\epsilon_r$ ):	39.869	39.2	1.71	± 5
	e''	13.54	Conductivity ( $\sigma$ ):	1.845	1.80	2.49	± 5

Liquid Check

Ambient temperature: 24 deg. C; Liquid temperature: 23 deg. C; Relative humidity = 39%

September 28, 2010 07:18 AM

Frequency	e'	e''
2400000000.	40.0554	13.3768
2405000000.	40.0325	13.3926
2410000000.	40.0317	13.4154
2415000000.	40.0027	13.4151
2420000000.	39.9962	13.4399
2425000000.	39.9729	13.4478
2430000000.	39.9474	13.4651
2435000000.	39.9334	13.4636
2440000000.	39.9368	13.4880
2445000000.	39.9150	13.5164
<b>2450000000.</b>	<b>39.8686</b>	<b>13.5356</b>
2455000000.	39.8389	13.5443
2460000000.	39.8356	13.5539
2465000000.	39.8017	13.5815
2470000000.	39.7556	13.6046
2475000000.	39.7240	13.6045
2480000000.	39.7035	13.6298
2485000000.	39.6982	13.6525
2490000000.	39.6703	13.6700
2495000000.	39.6539	13.6932
2500000000.	39.6283	13.7141

The conductivity ( $\sigma$ ) can be given as:

$$\sigma = \omega \epsilon_0 e'' = 2 \pi f \epsilon_0 e''$$

where  $f = \text{target } f * 10^6$

$$\epsilon_0 = 8.854 * 10^{-12}$$

Simulating Liquid Dielectric Parameter Check Result @ Body 2450 MHz

Measured by: Devin Chang

f (MHz)	Liquid Parameters			Measured	Target	Delta (%)	Limit (%)
2450	e'	51.78	Relative Permittivity ( $\epsilon_r$ ):	51.781	52.7	-1.74	± 5
	e''	14.58	Conductivity ( $\sigma$ ):	1.987	1.95	1.90	± 5

Liquid Check

Ambient temperature: 24 deg. C; Liquid temperature: 23 deg. C; Relative humidity = 41%

September 28, 2010 02:04 PM

Frequency	e'	e''
2400000000.	51.9533	14.3693
2405000000.	51.9377	14.3949
2410000000.	51.9201	14.4165
2415000000.	51.9028	14.4393
2420000000.	51.8875	14.4625
2425000000.	51.8704	14.4837
2430000000.	51.8555	14.5015
2435000000.	51.8357	14.5230
2440000000.	51.8180	14.5403
2445000000.	51.8016	14.5600
<b>2450000000.</b>	<b>51.7806</b>	<b>14.5782</b>
2455000000.	51.7633	14.5973
2460000000.	51.7459	14.6161
2465000000.	51.7260	14.6340
2470000000.	51.7048	14.6553
2475000000.	51.6890	14.6709
2480000000.	51.6732	14.6926
2485000000.	51.6538	14.7097
2490000000.	51.6358	14.7317
2495000000.	51.6173	14.7515
2500000000.	51.5973	14.7717

The conductivity ( $\sigma$ ) can be given as:

$$\sigma = \omega \epsilon_0 e'' = 2 \pi f \epsilon_0 e''$$

where  $f = \text{target } f * 10^6$

$$\epsilon_0 = 8.854 * 10^{-12}$$

Simulating Liquid Dielectric Parameter Check Result @ Body 2450 MHz

Measured by: Devin Chang

f (MHz)	Liquid Parameters			Measured	Target	Delta (%)	Limit (%)
2450	e'	52.07	Relative Permittivity ( $\epsilon_r$ ):	52.075	52.7	-1.19	± 5
	e"	14.67	Conductivity ( $\sigma$ ):	1.999	1.95	2.51	± 5

Liquid Check

Ambient temperature: 24 deg. C; Liquid temperature: 23 deg. C; Relative humidity = 41%

October 4, 2010 08:06 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
<b>2450000000.</b>	<b>52.0746</b>	<b>14.6668</b>
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 ( $\sigma$ ) can be given as:

$$\sigma = \omega \epsilon_0 e'' = 2 \pi f \epsilon_0 e''$$

where  $f = \text{target } f * 10^6$

$$\epsilon_0 = 8.854 * 10^{-12}$$



## 8.2. LIQUID CHECK RESULTS FOR 5 GHZ

Simulating Liquid Dielectric Parameter Check Result @ Body 5 GHz

Measured by: Devin Chang

f (MHz)	Muscle Liquid Parameters			Measured	Target	Delta (%)	Limit (%)
5200	e'	49.2573	Relative Permittivity ( $\epsilon_r$ ):	49.2573	49.0	0.53	± 10
	e''	18.4191	Conductivity ( $\sigma$ ):	5.32833	5.30	0.53	± 5
5500	e'	48.6772	Relative Permittivity ( $\epsilon_r$ ):	48.6772	48.6	0.16	± 10
	e''	18.8090	Conductivity ( $\sigma$ ):	5.75503	5.65	1.86	± 5
5800	e'	48.0943	Relative Permittivity ( $\epsilon_r$ ):	48.0943	48.2	-0.22	± 10
	e''	19.2064	Conductivity ( $\sigma$ ):	6.19716	6.00	3.29	± 5

### Liquid Check

Ambient temperature: 25 deg. C; Liquid temperature: 24 deg. C; Relative humidity = 39%  
 September 21, 2010 10:30 AM

Frequency	e'	e''
4600000000.	50.4047	17.4276
4650000000.	50.3340	17.5059
4700000000.	50.2322	17.6079
4750000000.	50.1659	17.6865
4800000000.	50.0520	17.7824
4850000000.	49.9822	17.8599
4900000000.	49.8598	17.9433
4950000000.	49.7807	18.0292
5000000000.	49.6713	18.1048
5050000000.	49.5664	18.1773
5100000000.	49.4536	18.2676
5150000000.	49.3681	18.3344
<b>5200000000.</b>	<b>49.2573</b>	<b>18.4191</b>
5250000000.	49.1780	18.4821
5300000000.	49.0666	18.5521
5350000000.	48.9660	18.6145
5400000000.	48.8623	18.6910
5450000000.	48.7839	18.7503
<b>5500000000.</b>	<b>48.6772</b>	<b>18.8090</b>
5550000000.	48.5604	18.8629
5600000000.	48.4564	18.9439
5650000000.	48.3885	19.0090
5700000000.	48.2711	19.0700
5750000000.	48.1972	19.1445
<b>5800000000.</b>	<b>48.0943</b>	<b>19.2064</b>
5850000000.	48.0391	19.2880
5900000000.	47.9370	19.3209
5950000000.	47.8109	19.3863
6000000000.	47.7095	19.4621

The conductivity ( $\sigma$ ) can be given as:

$$\sigma = \omega \epsilon_0 e'' = 2 \pi f \epsilon_0 e''$$

where  $f = \text{target } f * 10^6$

$$\epsilon_0 = 8.854 * 10^{-12}$$

Simulating Liquid Dielectric Parameter Check Result @ Body 5 GHz

Measured by: Devin Chang

f (MHz)	Muscle Liquid Parameters			Measured	Target	Delta (%)	Limit (%)
5200	e'	48.33	Relative Permittivity ( $\epsilon_r$ ):	48.3300	49.0	-1.37	± 10
	e"	17.9590	Conductivity ( $\sigma$ ):	5.19523	5.30	-1.98	± 5
5500	e'	47.7598	Relative Permittivity ( $\epsilon_r$ ):	47.7598	48.6	-1.73	± 10
	e"	18.3158	Conductivity ( $\sigma$ ):	5.60412	5.65	-0.81	± 5
5800	e'	47.2127	Relative Permittivity ( $\epsilon_r$ ):	47.2127	48.2	-2.05	± 10
	e"	18.6583	Conductivity ( $\sigma$ ):	6.02031	6.00	0.34	± 5

Liquid Check

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

September 24, 2010 7:48 AM

Frequency	e'	e"
4600000000.	49.4356	17.0658
4650000000.	49.3620	17.1216
4700000000.	49.2547	17.2191
4750000000.	49.1834	17.2855
4800000000.	49.0909	17.3814
4850000000.	49.0108	17.4408
4900000000.	48.8948	17.5278
4950000000.	48.8303	17.6029
5000000000.	48.7242	17.6751
5050000000.	48.6304	17.7400
5100000000.	48.5212	17.8209
5150000000.	48.4295	17.8709
<b>5200000000.</b>	<b>48.3300</b>	<b>17.9590</b>
5250000000.	48.2410	18.0036
5300000000.	48.1335	18.0865
5350000000.	48.0648	18.1370
5400000000.	47.9505	18.1948
5450000000.	47.8636	18.2517
<b>5500000000.</b>	<b>47.7598</b>	<b>18.3158</b>
5550000000.	47.6801	18.3691
5600000000.	47.5665	18.4239
5650000000.	47.4862	18.4890
5700000000.	47.4015	18.5526
5750000000.	47.3177	18.5983
<b>5800000000.</b>	<b>47.2127</b>	<b>18.6583</b>
5850000000.	47.1490	18.7228
5900000000.	47.0322	18.7631
5950000000.	46.9538	18.8434
6000000000.	46.8591	18.8951

The conductivity ( $\sigma$ ) can be given as:

$$\sigma = \omega \epsilon_0 e'' = 2 \pi f \epsilon_0 e''$$

where  $f = \text{target } f * 10^6$

$$\epsilon_0 = 8.854 * 10^{-12}$$

Simulating Liquid Dielectric Parameter Check Result @ Body 5 GHz

Measured by: Devin Chang

f (MHz)	Muscle Liquid Parameters			Measured	Target	Delta (%)	Limit (%)
5200	e'	47.7893	Relative Permittivity ( $\epsilon_r$ ):	47.7893	49.0	-2.47	± 10
	e"	17.9052	Conductivity ( $\sigma$ ):	5.17966	5.30	-2.27	± 5
5500	e'	47.9126	Relative Permittivity ( $\epsilon_r$ ):	47.9126	48.6	-1.41	± 10
	e"	18.6588	Conductivity ( $\sigma$ ):	5.70907	5.65	1.05	± 5
5800	e'	46.8128	Relative Permittivity ( $\epsilon_r$ ):	46.8128	48.2	-2.88	± 10
	e"	19.0694	Conductivity ( $\sigma$ ):	6.15296	6.00	2.55	± 5

Liquid Check

Ambient temperature: 25 deg. C; Liquid temperature: 24 deg. C; Relative humidity = 43%

September 26, 2010 10:01 AM

Frequency	e'	e"
4600000000	49.1310	17.0587
4650000000	49.1697	17.2768
4700000000	49.0162	17.1564
4750000000	48.7963	17.4133
4800000000	48.9811	17.3849
4850000000	48.5659	17.3927
4900000000	48.6974	17.7360
4950000000	48.3271	17.4904
5000000000	48.2083	17.8573
5050000000	48.1967	17.7749
5100000000	47.7769	17.8607
5150000000	47.9712	17.9066
<b>5200000000</b>	<b>47.7893</b>	<b>17.9052</b>
5250000000	48.2733	18.4886
5300000000	48.1273	18.4793
5350000000	48.0269	18.7027
5400000000	48.0924	18.5964
5450000000	47.7683	18.7408
<b>5500000000</b>	<b>47.9126</b>	<b>18.6588</b>
5550000000	47.5634	18.7189
5600000000	47.5749	18.8228
5650000000	47.3424	18.8006
5700000000	47.2995	18.9990
5750000000	47.3074	18.9650
<b>5800000000</b>	<b>46.8128</b>	<b>19.0694</b>
5850000000	47.0667	19.2454
5900000000	46.8323	19.0349
5950000000	46.5167	19.2636
6000000000	46.9208	19.5076

The conductivity ( $\sigma$ ) can be given as:

$$\sigma = \omega \epsilon_0 e'' = 2 \pi f \epsilon_0 e''$$

where  $f = \text{target } f * 10^6$

$$\epsilon_0 = 8.854 * 10^{-12}$$

Simulating Liquid Dielectric Parameter Check Result @ Body 5 GHz

Measured by: Devin Chang

f (MHz)	Muscle Liquid Parameters			Measured	Target	Delta (%)	Limit (%)
5200	e'	48.1393	Relative Permittivity ( $\epsilon_r$ ):	48.1393	49.0	-1.76	± 10
	e''	18.1252	Conductivity ( $\sigma$ ):	5.24331	5.30	-1.07	± 5
5500	e'	48.0626	Relative Permittivity ( $\epsilon_r$ ):	48.0626	48.6	-1.11	± 10
	e''	18.8388	Conductivity ( $\sigma$ ):	5.76415	5.65	2.02	± 5
5800	e'	46.9628	Relative Permittivity ( $\epsilon_r$ ):	46.9628	48.2	-2.57	± 10
	e''	19.2494	Conductivity ( $\sigma$ ):	6.21104	6.00	3.52	± 5

Liquid Check

Ambient temperature: 25 deg. C; Liquid temperature: 24 deg. C; Relative humidity = 40%

September 29, 2010 08:11 AM

Frequency	e'	e''
4600000000	49.481	17.2787
4650000000	49.5197	17.4968
4700000000	49.3662	17.3764
4750000000	49.1463	17.6333
4800000000	49.3311	17.6049
4850000000	48.9159	17.6127
4900000000	49.0474	17.956
4950000000	48.6771	17.7104
5000000000	48.5583	18.0773
5050000000	48.5467	17.9949
5100000000	48.1269	18.0807
5150000000	48.3212	18.1266
<b>5200000000</b>	<b>48.1393</b>	<b>18.1252</b>
5250000000	48.4233	18.6686
5300000000	48.2773	18.6593
5350000000	48.1769	18.8827
5400000000	48.2424	18.7764
5450000000	47.9183	18.9208
<b>5500000000</b>	<b>48.0626</b>	<b>18.8388</b>
5550000000	47.7134	18.8989
5600000000	47.7249	19.0028
5650000000	47.4924	18.9806
5700000000	47.4495	19.179
5750000000	47.4574	19.145
<b>5800000000</b>	<b>46.9628</b>	<b>19.2494</b>
5850000000	47.2167	19.4254
5900000000	46.9823	19.2149
5950000000	46.6667	19.4436
6000000000	47.0708	19.6876

The conductivity ( $\sigma$ ) can be given as:

$$\sigma = \omega \epsilon_0 e'' = 2 \pi f \epsilon_0 e''$$

where  $f = \text{target } f * 10^6$

$$\epsilon_0 = 8.854 * 10^{-12}$$

Simulating Liquid Dielectric Parameter Check Result @ Body 5 GHz Measured by: Devin Chang

f (MHz)	Muscle Liquid Parameters		Measured	Target	Delta (%)	Limit (%)	
5200	e'	47.6714	Relative Permittivity ( $\epsilon_r$ ):	47.6714	49.0	-2.71	± 10
	e''	18.1482	Conductivity ( $\sigma$ ):	5.24996	5.30	-0.94	± 5
5500	e'	48.1375	Relative Permittivity ( $\epsilon_r$ ):	48.1375	48.6	-0.95	± 10
	e''	18.3473	Conductivity ( $\sigma$ ):	5.61376	5.65	-0.64	± 5
5800	e'	46.903	Relative Permittivity ( $\epsilon_r$ ):	46.9030	48.2	-2.69	± 10
	e''	18.4807	Conductivity ( $\sigma$ ):	5.96301	6.00	-0.62	± 5

Liquid Check

Ambient temperature: 25 deg. C; Liquid temperature: 24 deg. C; Relative humidity = 39%

September 30, 2010 7:15 AM

Frequency	e'	e''
4600000000.	48.5938	17.0828
4650000000.	50.1295	17.3855
4700000000.	48.5128	16.7245
4750000000.	49.4672	17.8506
4800000000.	49.1801	16.7590
4850000000.	48.5287	17.7900
4900000000.	49.6199	17.3219
4950000000.	47.8884	17.4130
5000000000.	49.3533	17.9111
5050000000.	47.9709	17.2103
5100000000.	48.4268	18.2272
5150000000.	48.4796	17.3156
<b>5200000000.</b>	<b>47.6714</b>	<b>18.1482</b>
5250000000.	48.8653	17.7389
5300000000.	47.4578	17.9014
5350000000.	48.6062	18.2822
5400000000.	47.6686	17.6592
5450000000.	47.8596	18.4954
<b>5500000000.</b>	<b>48.1375</b>	<b>18.3473</b>
5550000000.	47.2511	18.3596
5600000000.	48.1444	18.1262
5650000000.	46.9988	18.1239
5700000000.	47.8395	18.5243
5750000000.	47.4231	18.0402
<b>5800000000.</b>	<b>46.9030</b>	<b>18.4807</b>
5850000000.	47.5188	18.3901
5900000000.	46.7377	18.2389
5950000000.	46.7642	18.4594
6000000000.	46.8300	18.6063

The conductivity ( $\sigma$ ) can be given as:

$$\sigma = \omega \epsilon_0 e'' = 2 \pi f \epsilon_0 e''$$

where  $f = \text{target } f * 10^6$

$$\epsilon_0 = 8.854 * 10^{-12}$$

Simulating Liquid Dielectric Parameter Check Result @ Body 5 GHz

Measured by: Devin Chang

f (MHz)	Muscle Liquid Parameters			Measured	Target	Delta (%)	Limit (%)
5200	e'	46.0047	Relative Permittivity ( $\epsilon_r$ ):	46.0047	49.0	-6.11	± 10
	e''	18.8043	Conductivity ( $\sigma$ ):	5.43976	5.30	2.64	± 5
5500	e'	46.3271	Relative Permittivity ( $\epsilon_r$ ):	46.3271	48.6	-4.68	± 10
	e''	18.5209	Conductivity ( $\sigma$ ):	5.66688	5.65	0.30	± 5
5800	e'	44.998	Relative Permittivity ( $\epsilon_r$ ):	44.9980	48.2	-6.64	± 10
	e''	19.3247	Conductivity ( $\sigma$ ):	6.23533	6.00	3.92	± 5

Liquid Check

Ambient temperature: 25 deg. C; Liquid temperature: 24 deg. C; Relative humidity = 38%

October 1, 2010 07:30 AM

Frequency	e'	e''
4600000000.	47.1337	17.5947
4650000000.	48.5234	17.9020
4700000000.	47.0386	17.3054
4750000000.	47.8251	18.3672
4800000000.	47.5918	17.3979
4850000000.	46.9440	18.3133
4900000000.	47.9793	17.9670
4950000000.	46.3127	17.9999
5000000000.	47.6513	18.5465
5050000000.	46.3740	17.8808
5100000000.	46.7703	18.8293
5150000000.	46.8181	18.0808
<b>5200000000.</b>	<b>46.0047</b>	<b>18.8043</b>
5250000000.	47.0805	18.5570
5300000000.	45.7488	18.6155
5350000000.	46.7409	19.0471
5400000000.	45.9377	18.4350
5450000000.	46.0431	19.2641
<b>5500000000.</b>	<b>46.3271</b>	<b>18.5209</b>
5550000000.	45.4278	19.1384
5600000000.	46.2555	18.9636
5650000000.	45.1755	18.9234
5700000000.	45.8879	19.3665
5750000000.	45.5334	18.9249
<b>5800000000.</b>	<b>44.9980</b>	<b>19.3247</b>
5850000000.	45.5912	19.3274
5900000000.	44.8148	19.1021
5950000000.	44.7893	19.3539
6000000000.	44.8432	19.5039

The conductivity ( $\sigma$ ) can be given as:

$$\sigma = \omega \epsilon_0 e'' = 2 \pi f \epsilon_0 e''$$

where  $f = \text{target } f * 10^6$

$$\epsilon_0 = 8.854 * 10^{-12}$$

Simulating Liquid Dielectric Parameter Check Result @ Body 5 GHz

Measured by: Devin Chang

f (MHz)	Muscle Liquid Parameters			Measured	Target	Delta (%)	Limit (%)
5200	e'	47.6714	Relative Permittivity ( $\epsilon_r$ ):	47.6714	49.0	-2.71	± 10
	e''	18.1482	Conductivity ( $\sigma$ ):	5.24996	5.30	-0.94	± 5
5500	e'	48.1375	Relative Permittivity ( $\epsilon_r$ ):	48.1375	48.6	-0.95	± 10
	e''	17.6473	Conductivity ( $\sigma$ ):	5.39958	5.65	-4.43	± 5
5800	e'	46.903	Relative Permittivity ( $\epsilon_r$ ):	46.9030	48.2	-2.69	± 10
	e''	18.4807	Conductivity ( $\sigma$ ):	5.96301	6.00	-0.62	± 5

Liquid Check

Ambient temperature: 25 deg. C; Liquid temperature: 24 deg. C; Relative humidity = 38%

October 2, 2010 07:42 AM

Frequency	e'	e''
4600000000.	48.5938	17.0828
4650000000.	50.1295	17.3855
4700000000.	48.5128	16.7245
4750000000.	49.4672	17.8506
4800000000.	49.1801	16.7590
4850000000.	48.5287	17.7900
4900000000.	49.6199	17.3219
4950000000.	47.8884	17.4130
5000000000.	49.3533	17.9111
5050000000.	47.9709	17.2103
5100000000.	48.4268	18.2272
5150000000.	48.4796	17.3156
<b>5200000000.</b>	<b>47.6714</b>	<b>18.1482</b>
5250000000.	48.8653	17.7389
5300000000.	47.4578	17.9014
5350000000.	48.6062	18.2822
5400000000.	47.6686	17.6592
5450000000.	47.8596	18.4954
<b>5500000000.</b>	<b>48.1375</b>	<b>17.6473</b>
5550000000.	47.2511	18.3596
5600000000.	48.1444	18.1262
5650000000.	46.9988	18.1239
5700000000.	47.8395	18.5243
5750000000.	47.4231	18.0402
<b>5800000000.</b>	<b>46.9030</b>	<b>18.4807</b>
5850000000.	47.5188	18.3901
5900000000.	46.7377	18.2389
5950000000.	46.7642	18.4594
6000000000.	46.8300	18.6063

The conductivity ( $\sigma$ ) can be given as:

$$\sigma = \omega \epsilon_0 e'' = 2 \pi f \epsilon_0 e''$$

where  $f = \text{target } f * 10^6$

$$\epsilon_0 = 8.854 * 10^{-12}$$

## 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  $\pm 10\%$ .

### 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 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
D2450V2	D2450V2-706_Apr10	4/19/10	2.4	SAR <sub>1g</sub> :	51.6	52.4
				SAR <sub>10g</sub> :	24.4	24.5
D5GHzV2	D5GHzV2-1075_Sep09	9/3/09	5.2	SAR <sub>1g</sub> :		79.0
				SAR <sub>10g</sub> :		22.0
			5.5	SAR <sub>1g</sub> :		85.4
				SAR <sub>10g</sub> :		23.5
			5.8	SAR <sub>1g</sub> :		73.2
				SAR <sub>10g</sub> :		20.1



### 9.1. SYSTEM CHECK RESULTS FOR D2450V2

Measured by: Devin Chang

System validation dipole	Date Tested	Measured (Normalized to 1 W)		Target	Delta (%)	Tolerance (%)
		Tissue:	Body			
D2450V2	9/15/10	SAR <sub>1g</sub> :	51.6	52.4	-1.53	±10
		SAR <sub>10g</sub> :	24.5	24.5	0.00	
D2450V2	10/4/10	SAR <sub>1g</sub> :	53.5	52.4	2.10	±10
		SAR <sub>10g</sub> :	25.3	24.5	3.27	

Measured by: Devin Chang

System validation dipole	Date Tested	Measured (Normalized to 1 W)		Target	Delta (%)	Tolerance (%)
		Tissue:	Head			
D2450V2	9/28/10	SAR <sub>1g</sub> :	52.0	51.6	0.78	±10
		SAR <sub>10g</sub> :	24.3	24.4	-0.41	

## 9.2. SYSTEM CHECK RESULTS FOR D5GHzV2

Measured by: Devin Chang

System validation dipole	Date Tested	Measured (Normalized to 1 W)		Target	Delta (%)	Tolerance (%)
		Tissue:	Body			
D5GHzV2 (5.2GHz)	9/21/10	SAR <sub>1g</sub> :	77.0	79.0	-2.53	±10
		SAR <sub>10g</sub> :	22.3	22.0	1.36	
D5GHzV2 (5.5GHz)	9/21/10	SAR <sub>1g</sub> :	81.1	85.4	-5.04	±10
		SAR <sub>10g</sub> :	23.2	23.5	-1.28	
D5GHzV2 (5.8GHz)	9/21/10	SAR <sub>1g</sub> :	71.8	73.2	-1.91	±10
		SAR <sub>10g</sub> :	20.5	20.1	1.99	
D5GHzV2 (5.2GHz)	9/24/10	SAR <sub>1g</sub> :	76.9	79.0	-2.66	±10
		SAR <sub>10g</sub> :	22.2	22.0	0.91	
D5GHzV2 (5.5GHz)	9/26/10	SAR <sub>1g</sub> :	81.8	85.4	-4.22	±10
		SAR <sub>10g</sub> :	23.4	23.5	-0.43	
D5GHzV2 (5.8GHz)	9/26/10	SAR <sub>1g</sub> :	73.4	73.2	0.27	±10
		SAR <sub>10g</sub> :	21.1	20.1	4.98	
D5GHzV2 (5.5GHz)	9/29/10	SAR <sub>1g</sub> :	83.8	85.4	-1.87	±10
		SAR <sub>10g</sub> :	23.8	23.5	1.28	
D5GHzV2 (5.8GHz)	9/29/10	SAR <sub>1g</sub> :	71.0	73.2	-3.01	±10
		SAR <sub>10g</sub> :	20.4	20.1	1.49	
D5GHzV2 (5.5GHz)	9/30/10	SAR <sub>1g</sub> :	80.5	85.4	-5.74	±10
		SAR <sub>10g</sub> :	23.0	23.5	-2.13	
D5GHzV2 (5.8GHz)	9/30/10	SAR <sub>1g</sub> :	71.2	73.2	-2.73	±10
		SAR <sub>10g</sub> :	20.5	20.1	1.99	
D5GHzV2 (5.2GHz)	10/01/10	SAR <sub>1g</sub> :	74.7	79.0	-5.44	±10
		SAR <sub>10g</sub> :	21.7	22.0	-1.36	
D5GHzV2 (5.5GHz)	10/01/10	SAR <sub>1g</sub> :	80.5	85.4	-5.74	±10
		SAR <sub>10g</sub> :	23.0	23.5	-2.13	
D5GHzV2 (5.8GHz)	10/01/10	SAR <sub>1g</sub> :	70.8	73.2	-3.28	±10
		SAR <sub>10g</sub> :	20.4	20.1	1.49	
D5GHzV2 (5.2GHz)	10/02/10	SAR <sub>1g</sub> :	76.3	79.0	-3.42	±10
		SAR <sub>10g</sub> :	22.0	22.0	0.00	
D5GHzV2 (5.5GHz)	10/02/10	SAR <sub>1g</sub> :	78.5	85.4	-8.08	±10
		SAR <sub>10g</sub> :	22.3	23.5	-5.11	
D5GHzV2 (5.8GHz)	10/02/10	SAR <sub>1g</sub> :	68.2	73.2	-6.83	±10
		SAR <sub>10g</sub> :	19.6	20.1	-2.49	
D5GHzV2 (5.2GHz)	10/07/10	SAR <sub>1g</sub> :	74.6	79.0	-5.57	±10
		SAR <sub>10g</sub> :	21.7	22.0	-1.36	

### 9.3. SYSTEM CHECK PLOTS

#### SYSTEM CHECK PLOT

Date/Time: 9/15/2010 2:29:39 PM

Test Laboratory: Compliance Certification Services

#### System Performance Check - D2450V2

DUT: D2450V2; Type: D2450V2; Serial: 706

Communication System: System Check Signal - CW; Frequency: 2450 MHz; Duty Cycle: 1:1  
Medium parameters used:  $f = 2450$  MHz;  $\sigma = 1.98$  mho/m;  $\epsilon_r = 51.6$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Flat Section

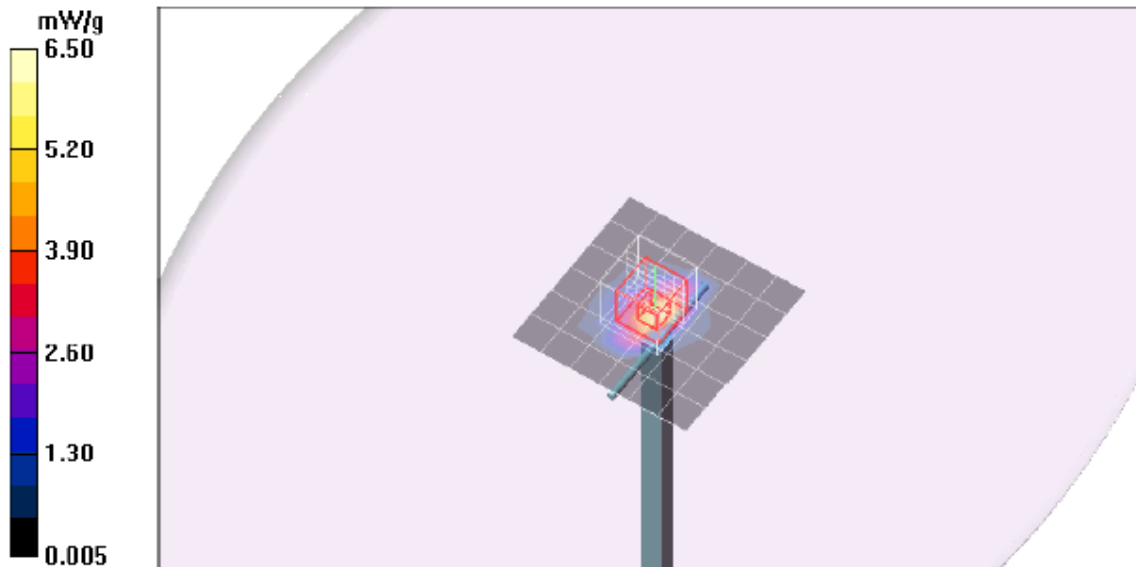
Room Ambient Temperature: 24.0 deg. C; Liquid Temperature: 23.0 deg. C

DASY4 Configuration:

- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Probe: EX3DV3 - SN3531; ConvF(7.58, 7.58, 7.58); Calibrated: 2/23/2010
- 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) = 6.50 mW/g

**d=10mm, Pin=100mW/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm  
Reference Value = 57.5 V/m; Power Drift = 0.141 dB  
Peak SAR (extrapolated) = 10.3 W/kg  
**SAR(1 g) = 5.16 mW/g; SAR(10 g) = 2.45 mW/g**  
Maximum value of SAR (measured) = 6.68 mW/g



**SYSTEM CHECK – Z Plot**

Date/Time: 9/15/2010 2:47:02 PM

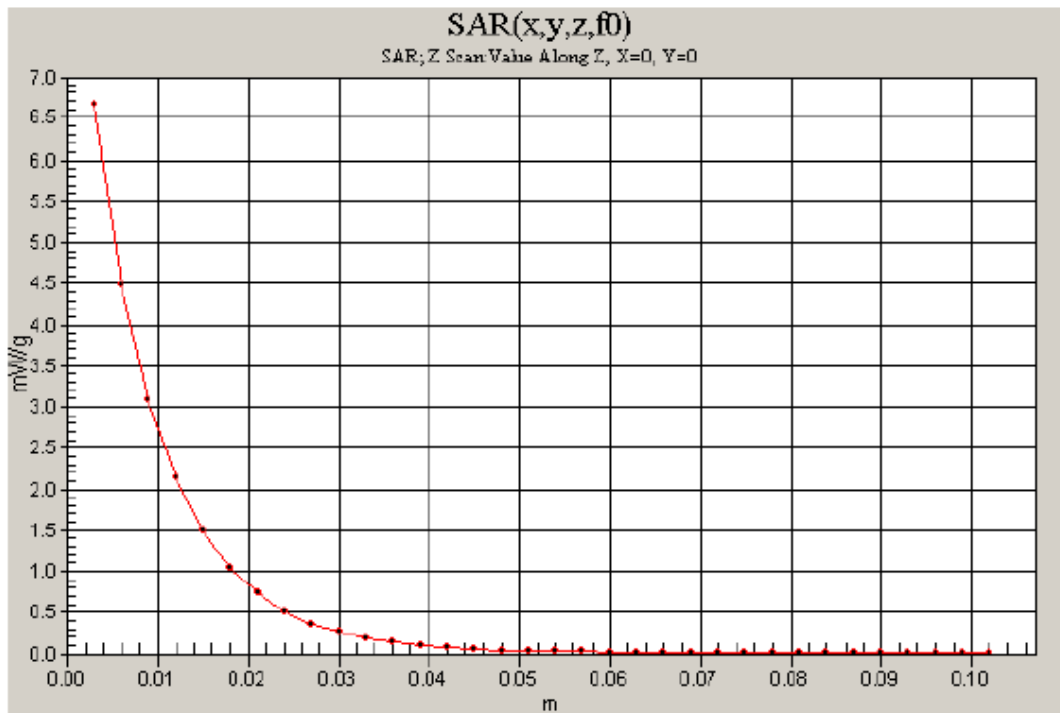
Test Laboratory: Compliance Certification Services

**System Performance Check - D2450V2**

DUT: D2450V2; 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) = 6.66 mW/g



### SYSTEM CHECK PLOT

Date/Time: 9/28/2010 8:48:48 AM

Test Laboratory: Compliance Certification Services

#### System Performance Check - D2450V2

DUT: D2450V2; Type: D2450V2; Serial: 706

Communication System: CW 2450MHz; Frequency: 2450 MHz; Duty Cycle: 1:1  
Medium parameters used:  $f = 2450$  MHz;  $\sigma = 2$  mho/m;  $\epsilon_r = 52.7$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
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: EX3DV3 - SN3531; ConvF(7.58, 7.58, 7.58); Calibrated: 2/23/2010
- 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) = 6.33 mW/g

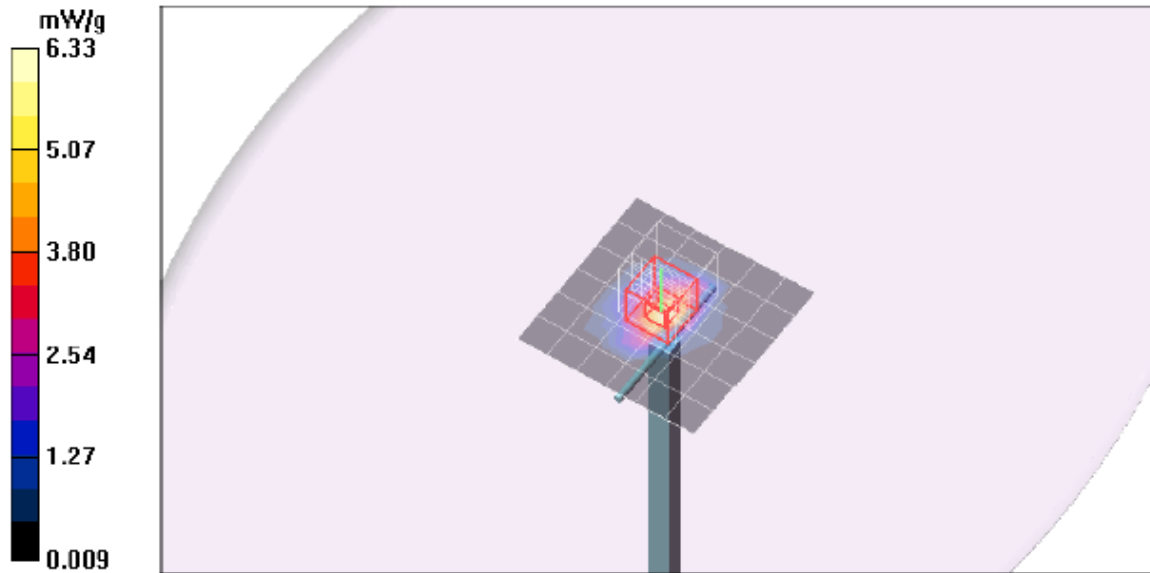
**d=10mm, Pin=100mW/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 57.2 V/m; Power Drift = 0.197 dB

Peak SAR (extrapolated) = 10.8 W/kg

**SAR(1 g) = 5.2 mW/g; SAR(10 g) = 2.43 mW/g**

Maximum value of SAR (measured) = 6.87 mW/g



**SYSTEM CHECK – Z Plot**

Date/Time: 9/28/2010 9:05:53 AM

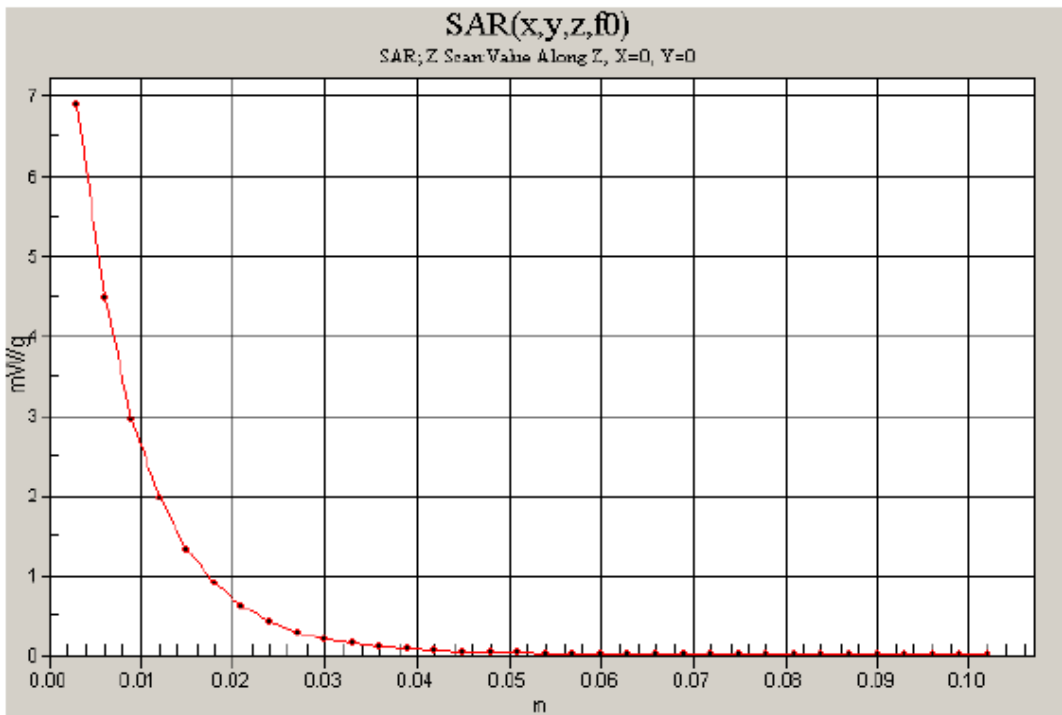
Test Laboratory: Compliance Certification Services

**System Performance Check - D2450V2**

DUT: D2450V2; Type: D2450V2; Serial: 706

Communication System: CW 2450MHz; 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) = 6.89 mW/g



### SYSTEM CHECK PLOT

Date/Time: 10/4/2010 8:34:32 AM

Test Laboratory: Compliance Certification Services

#### System Performance Check - D2450V2

DUT: D2450V2; Type: D2450V2; Serial: 706

Communication System: CW 2450MHz; Frequency: 2450 MHz; Duty Cycle: 1:1  
Medium parameters used:  $f = 2450$  MHz;  $\sigma = 2$  mho/m;  $\epsilon_r = 52.1$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Flat Section

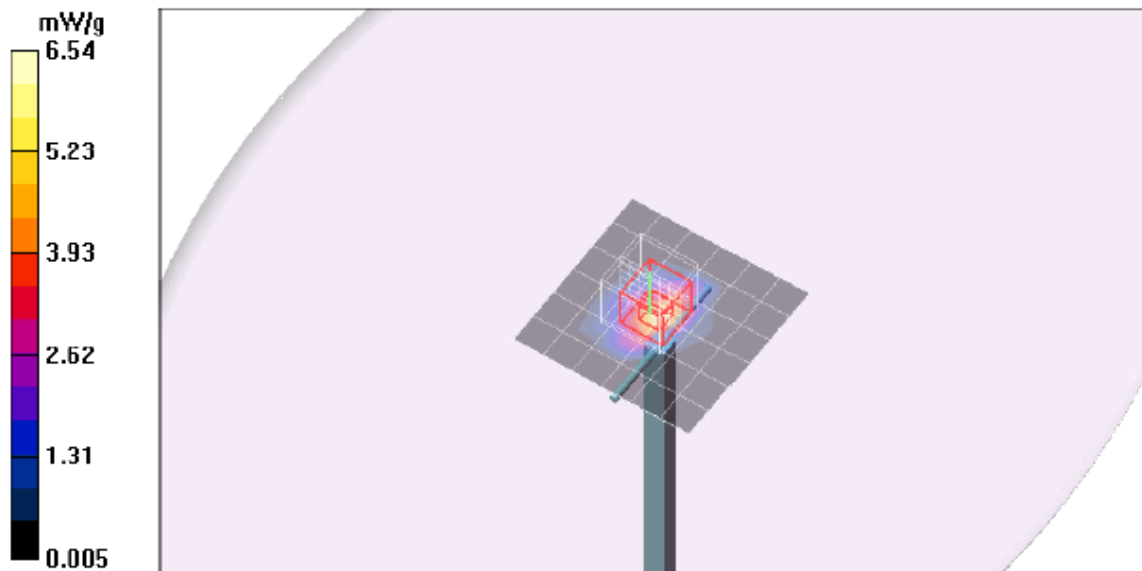
Room Ambient Temperature: 24.0 deg. C; Liquid Temperature: 23.0 deg. C

DASY4 Configuration:

- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Probe: EX3DV3 - SN3531; ConvF(7.58, 7.58, 7.58); Calibrated: 2/23/2010
- 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) = 6.54 mW/g

**d=10mm, Pin=100mW/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm  
Reference Value = 57.5 V/m; Power Drift = 0.173 dB  
Peak SAR (extrapolated) = 10.6 W/kg  
**SAR(1 g) = 5.35 mW/g; SAR(10 g) = 2.53 mW/g**  
Maximum value of SAR (measured) = 6.87 mW/g



**SYSTEM CHECK – Z Plot**

Date/Time: 10/4/2010 8:51:44 AM

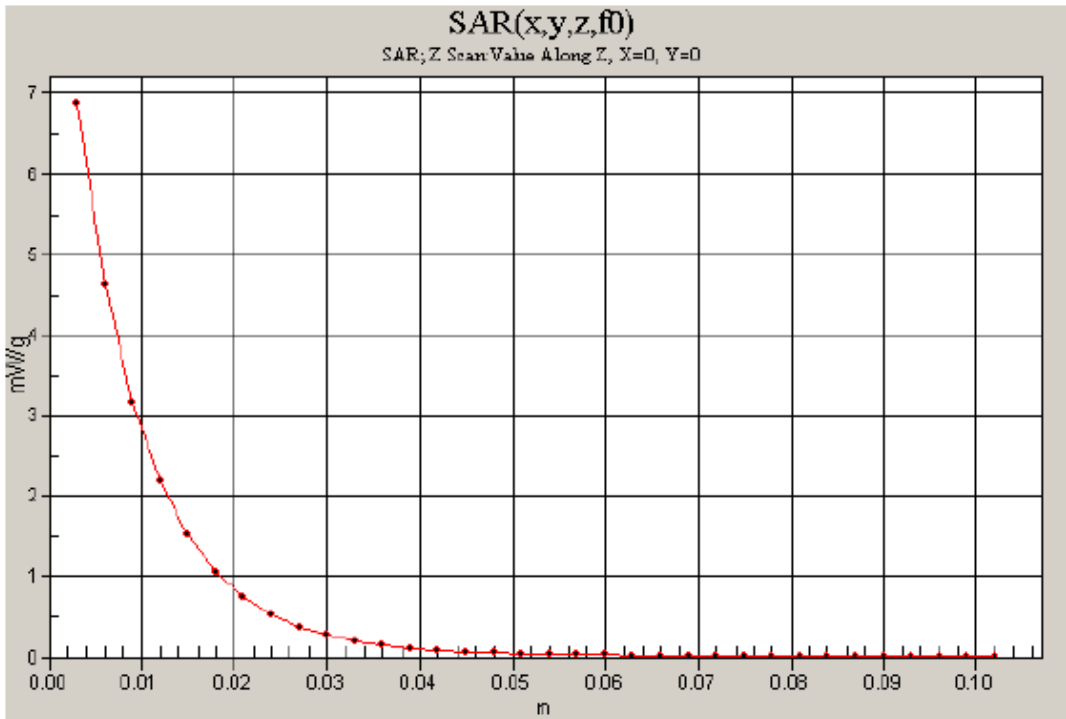
Test Laboratory: Compliance Certification Services

**System Performance Check - D2450V2**

DUT: D2450V2; Type: D2450V2; Serial: 706

Communication System: CW 2450MHz; 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) = 6.87 mW/g





### SYSTEM CHECK PLOT

Date/Time: 9/21/2010 11:27:22 AM

Test Laboratory: Compliance Certification Services

#### 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;  $\sigma = 5.33$  mho/m;  $\epsilon_r = 49.3$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
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: EX3DV3 - SN3531; ConvF(4.04, 4.04, 4.04); Calibrated: 2/23/2010
- 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) = 13.1 mW/g

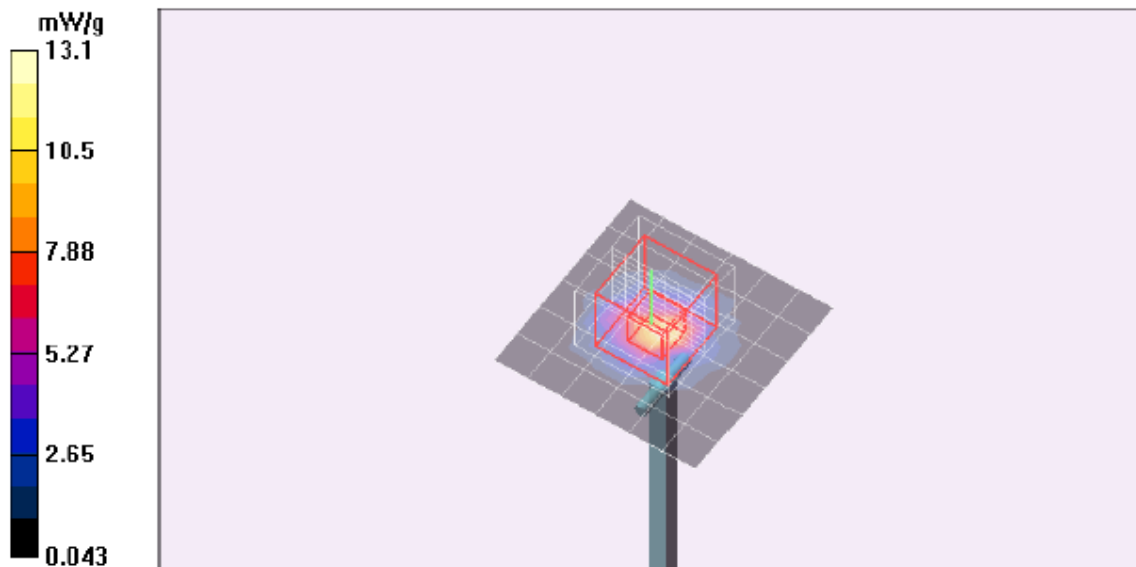
**d=10mm, Pin=100mW, 5.2GHz/Zoom Scan (8x8x10)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 52.3 V/m; Power Drift = 0.178 dB

Peak SAR (extrapolated) = 27.4 W/kg

**SAR(1 g) = 7.7 mW/g; SAR(10 g) = 2.23 mW/g**

Maximum value of SAR (measured) = 13.4 mW/g



**SYSTEM CHECK PLOT**

Date/Time: 9/21/2010 12:22:39 PM

Test Laboratory: Compliance Certification Services

**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;  $\sigma = 5.76$  mho/m;  $\epsilon_r = 48.7$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Flat Section

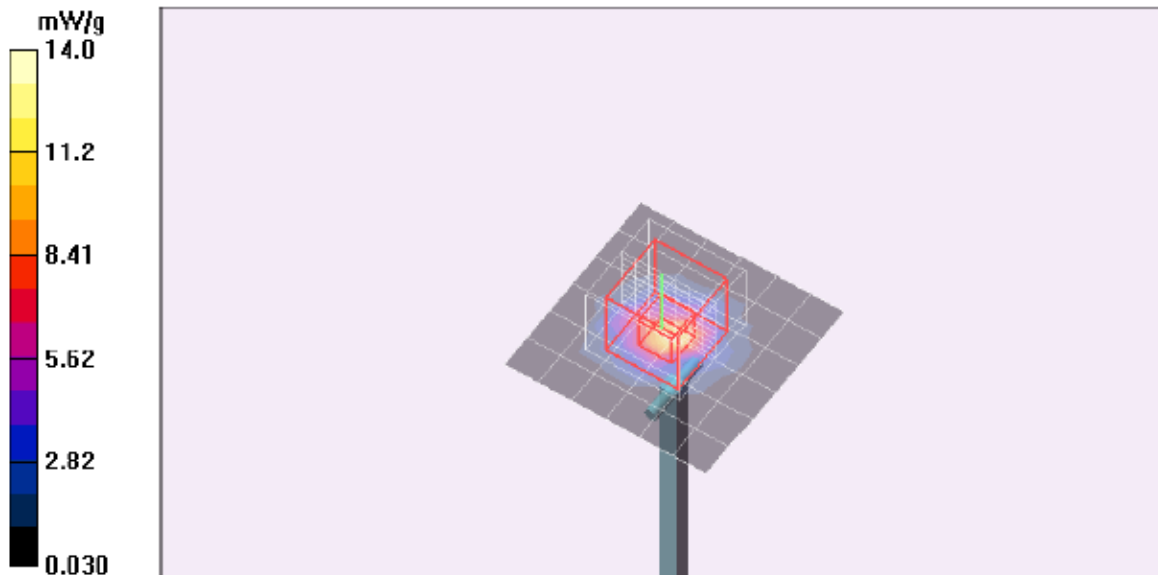
Room Ambient Temperature: 25.0 deg. C; Liquid Temperature: 24.0 deg. C

DASY4 Configuration:

- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Probe: EX3DV3 - SN3531; ConvF(3.57, 3.57, 3.57); Calibrated: 2/23/2010
- 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) = 14.0 mW/g

**d=10mm, Pin=100mW, 5.5GHz/Zoom Scan (8x8x10)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=2.5mm  
Reference Value = 52.9 V/m; Power Drift = 0.192 dB  
Peak SAR (extrapolated) = 29.8 W/kg  
**SAR(1 g) = 8.11 mW/g; SAR(10 g) = 2.32 mW/g**  
Maximum value of SAR (measured) = 14.1 mW/g



### SYSTEM CHECK PLOT

Date/Time: 9/21/2010 12:50:57 PM

Test Laboratory: Compliance Certification Services

#### 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;  $\sigma = 6.2$  mho/m;  $\epsilon_r = 48.1$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Flat Section

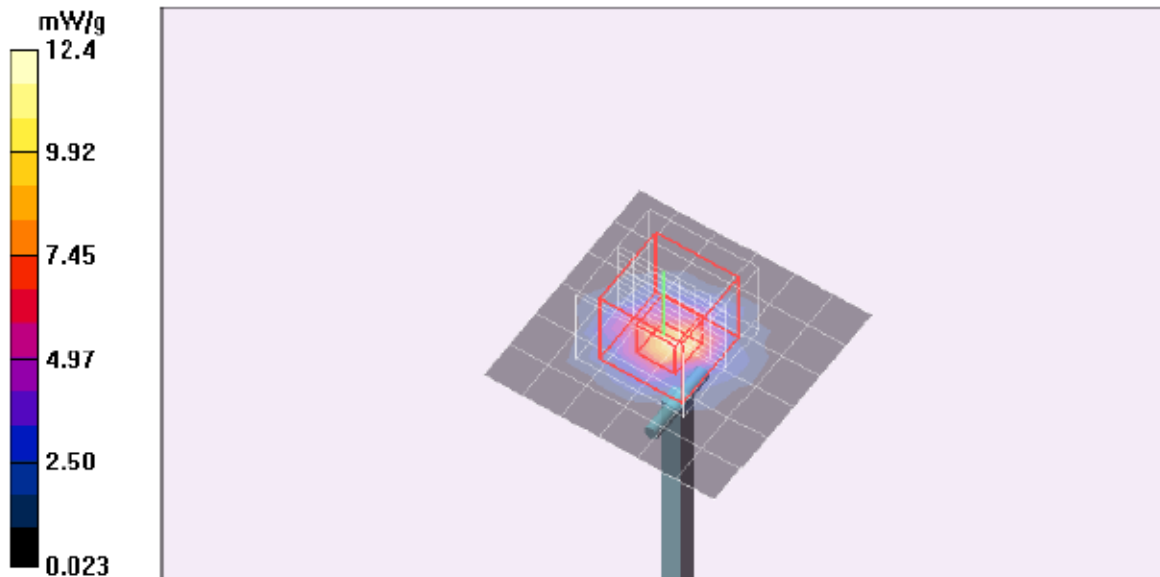
Room Ambient Temperature: 25.0 deg. C; Liquid Temperature: 24.0 deg. C

DASY4 Configuration:

- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Probe: EX3DV3 - SN3531; ConvF(3.48, 3.48, 3.48); Calibrated: 2/23/2010
- 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) = 12.4 mW/g

**d=10mm, Pin=100mW, 5.8GHz/Zoom Scan (8x8x10)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=2.5mm  
Reference Value = 48.2 V/m; Power Drift = 0.196 dB  
Peak SAR (extrapolated) = 27.8 W/kg  
**SAR(1 g) = 7.18 mW/g; SAR(10 g) = 2.05 mW/g**  
Maximum value of SAR (measured) = 12.7 mW/g



**SYSTEM CHECK – Z Plot**

Date/Time: 9/21/2010 1:17:05 PM

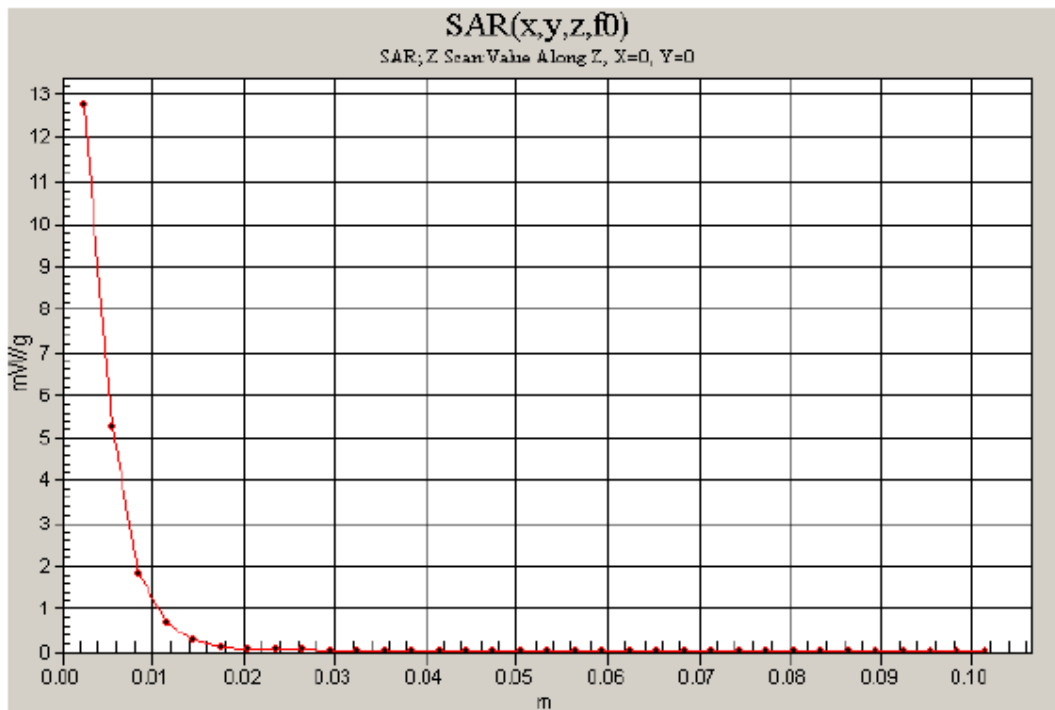
Test Laboratory: Compliance Certification Services

**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) = 12.8 mW/g



**SYSTEM CHECK PLOT**

Date/Time: 9/24/2010 8:53:12 AM

Test Laboratory: Compliance Certification Services

**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;  $\sigma = 5.2$  mho/m;  $\epsilon_r = 48.3$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Flat Section

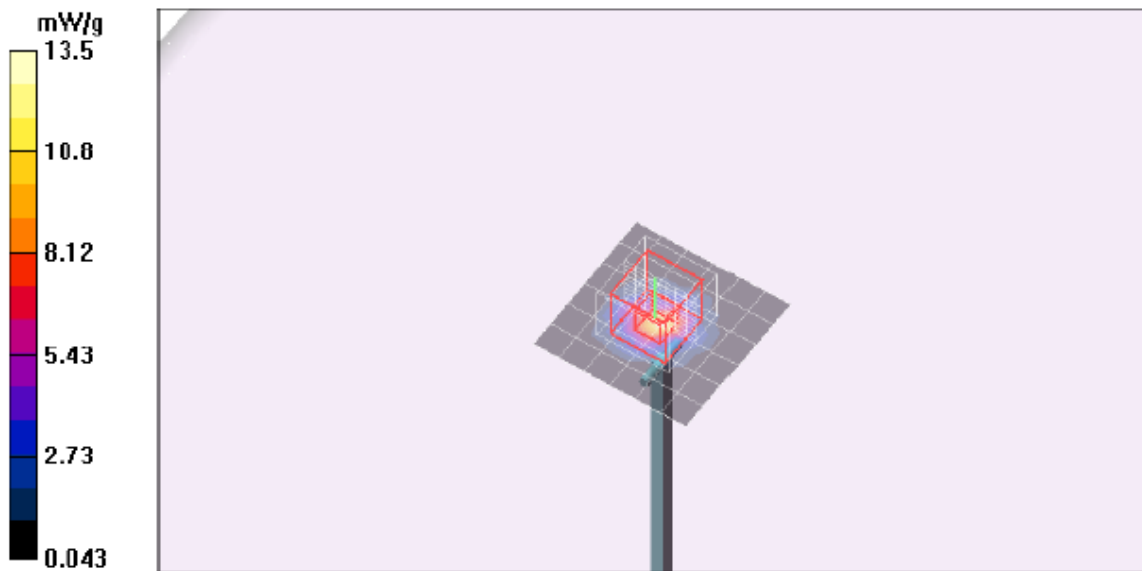
Room Ambient Temperature: 25.0 deg. C; Liquid Temperature: 24.0 deg. C

DASY4 Configuration:

- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Probe: EX3DV3 - SN3531; ConvF(4.04, 4.04, 4.04); Calibrated: 2/23/2010
- 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) = 13.5 mW/g

**d=10mm, Pin=100mW, 5.2GHz/Zoom Scan (8x8x10)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=2.5mm  
Reference Value = 54.4 V/m; Power Drift = 0.101 dB  
Peak SAR (extrapolated) = 27.4 W/kg  
**SAR(1 g) = 7.69 mW/g; SAR(10 g) = 2.22 mW/g**  
Maximum value of SAR (measured) = 13.3 mW/g



**SYSTEM CHECK – Z Plot**

Date/Time: 9/24/2010 9:19:26 AM

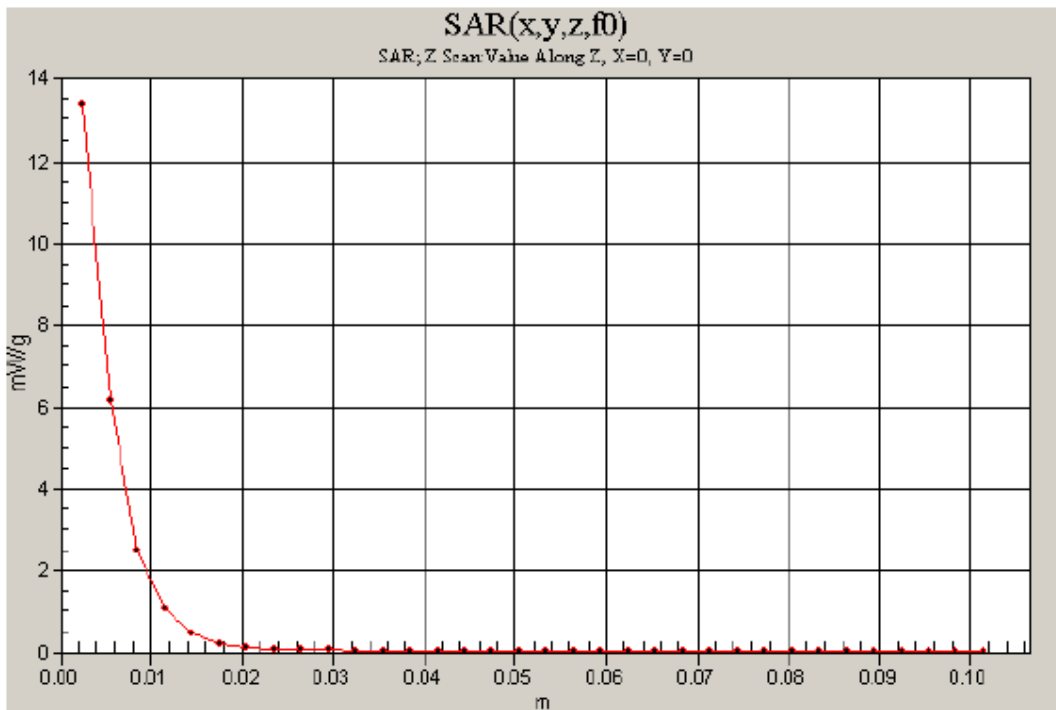
Test Laboratory: Compliance Certification Services

**System Performance Check - D5GHzV2\_5 GHz**

DUT: D5GHzV2; Type: D5GHzV2; Serial: 1075

Communication System: CW 5GHz; Frequency: 5200 MHz; Duty Cycle: 1:1

**d=10mm, Pin=100mW, 5.2GHz/Z Scan (1x1x34):** Measurement grid: dx=20mm, dy=20mm, dz=3mm  
Maximum value of SAR (measured) = 13.4 mW/g



### SYSTEM CHECK PLOT

Date/Time: 9/26/2010 11:02:42 AM

Test Laboratory: Compliance Certification Services

#### 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;  $\sigma = 5.71$  mho/m;  $\epsilon_r = 47.9$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
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: EX3DV3 - SN3531; ConvF(3.57, 3.57, 3.57); Calibrated: 2/23/2010
- 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) = 13.6 mW/g

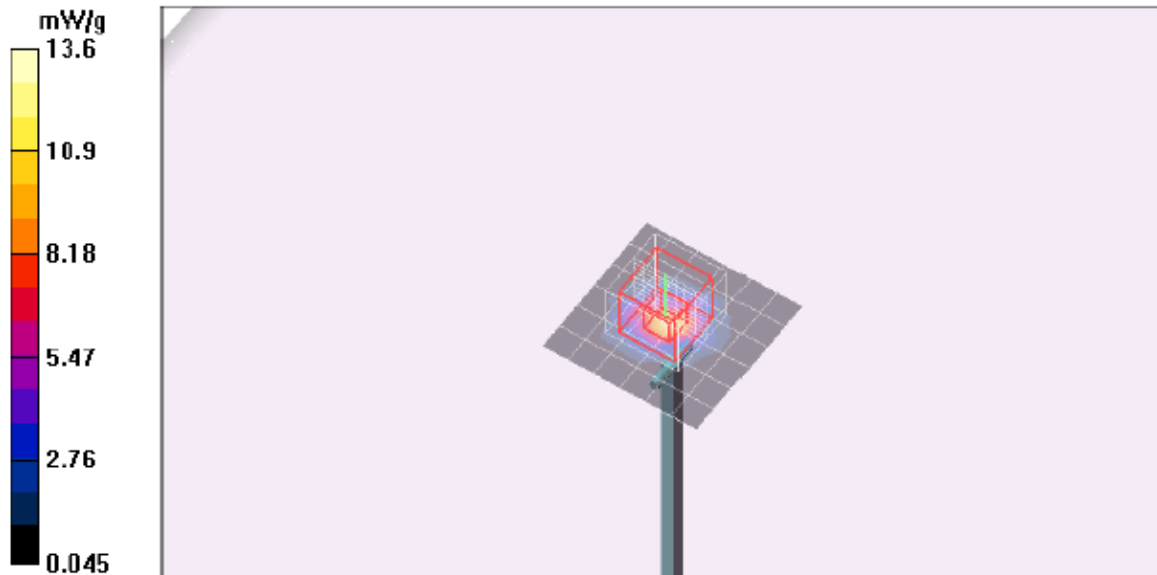
**d=10mm, Pin=100mW, 5.5GHz/Zoom Scan (8x8x10)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 52.8 V/m; Power Drift = 0.115 dB

Peak SAR (extrapolated) = 29.6 W/kg

**SAR(1 g) = 8.18 mW/g; SAR(10 g) = 2.34 mW/g**

Maximum value of SAR (measured) = 14.4 mW/g



### SYSTEM CHECK PLOT

Date/Time: 9/26/2010 11:35:58 AM

Test Laboratory: Compliance Certification Services

#### 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;  $\sigma = 6.15$  mho/m;  $\epsilon_r = 46.8$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
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: EX3DV3 - SN3531; ConvF(3.48, 3.48, 3.48); Calibrated: 2/23/2010
- 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) = 12.3 mW/g

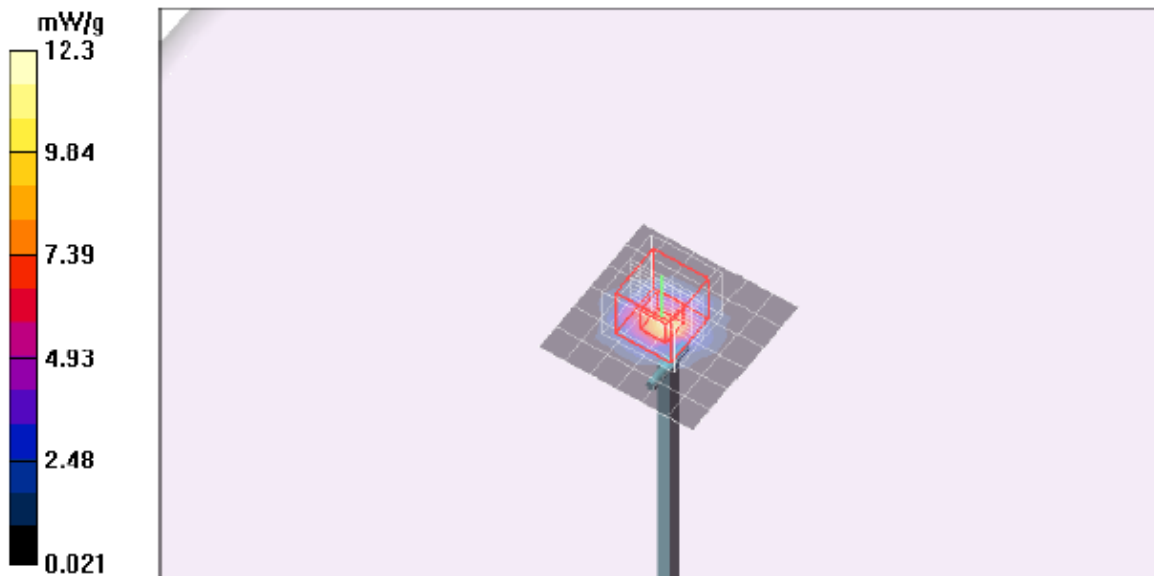
**d=10mm, Pin=100mW, 5.8GHz/Zoom Scan (8x8x10)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 48.2 V/m; Power Drift = 0.172 dB

Peak SAR (extrapolated) = 27.8 W/kg

**SAR(1 g) = 7.34 mW/g; SAR(10 g) = 2.11 mW/g**

Maximum value of SAR (measured) = 13.0 mW/g





**SYSTEM CHECK – Z Plot**

Date/Time: 9/26/2010 12:02:29 PM

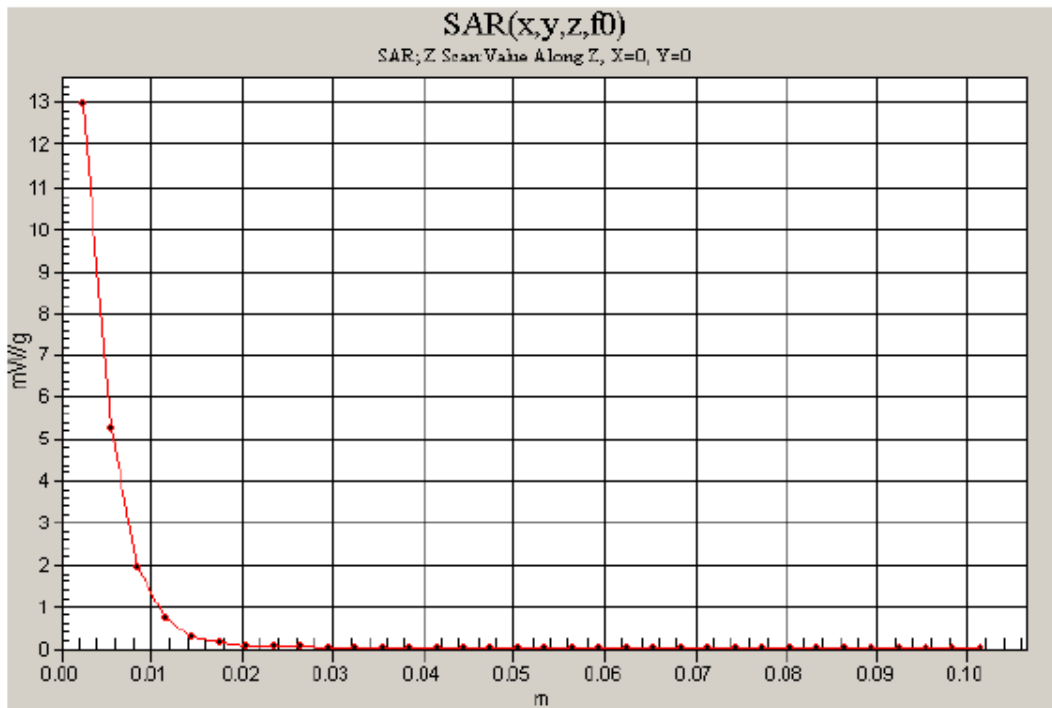
Test Laboratory: Compliance Certification Services

**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) = 13.0 mW/g



### SYSTEM CHECK PLOT

Date/Time: 9/29/2010 9:29:29 AM

Test Laboratory: Compliance Certification Services

### 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;  $\sigma = 5.76$  mho/m;  $\epsilon_r = 48.1$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Flat Section

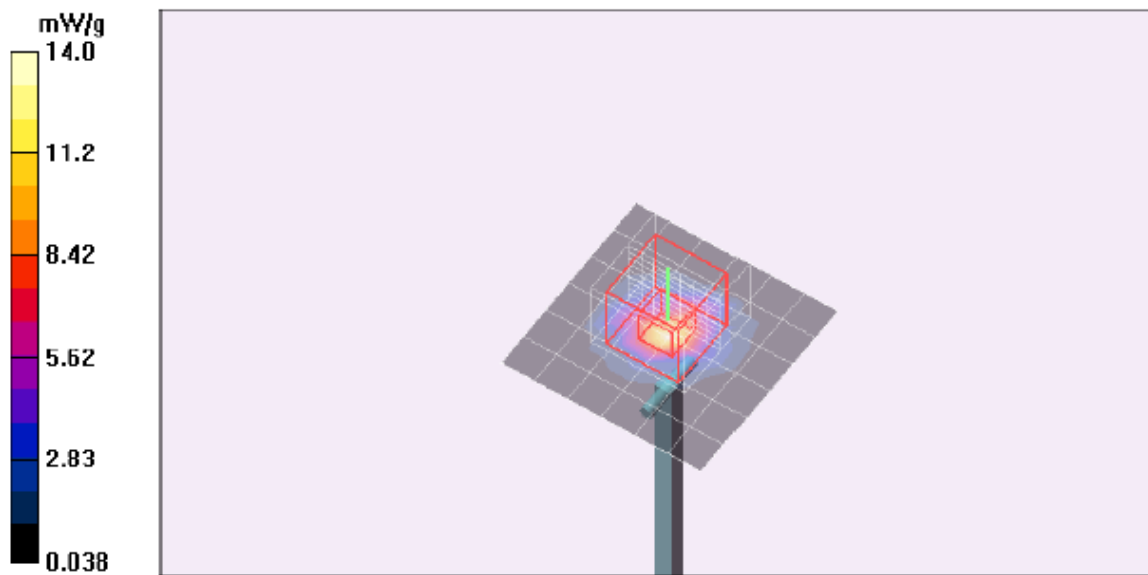
Room Ambient Temperature: 25.0 deg. C; Liquid Temperature: 24.0 deg. C

DASY4 Configuration:

- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Probe: EX3DV3 - SN3531; ConvF(3.57, 3.57, 3.57); Calibrated: 2/23/2010
- 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) = 14.0 mW/g

**d=10mm, Pin=100mW, 5.5GHz/Zoom Scan (8x8x10)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=2.5mm  
Reference Value = 53.1 V/m; Power Drift = 0.163 dB  
Peak SAR (extrapolated) = 31.1 W/kg  
**SAR(1 g) = 8.38 mW/g; SAR(10 g) = 2.38 mW/g**  
Maximum value of SAR (measured) = 14.5 mW/g



### SYSTEM CHECK PLOT

Date/Time: 9/29/2010 10:26:58 AM

Test Laboratory: Compliance Certification Services

#### 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;  $\sigma = 6.21$  mho/m;  $\epsilon_r = 47$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
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: EX3DV3 - SN3531; ConvF(3.48, 3.48, 3.48); Calibrated: 2/23/2010
- 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) = 11.9 mW/g

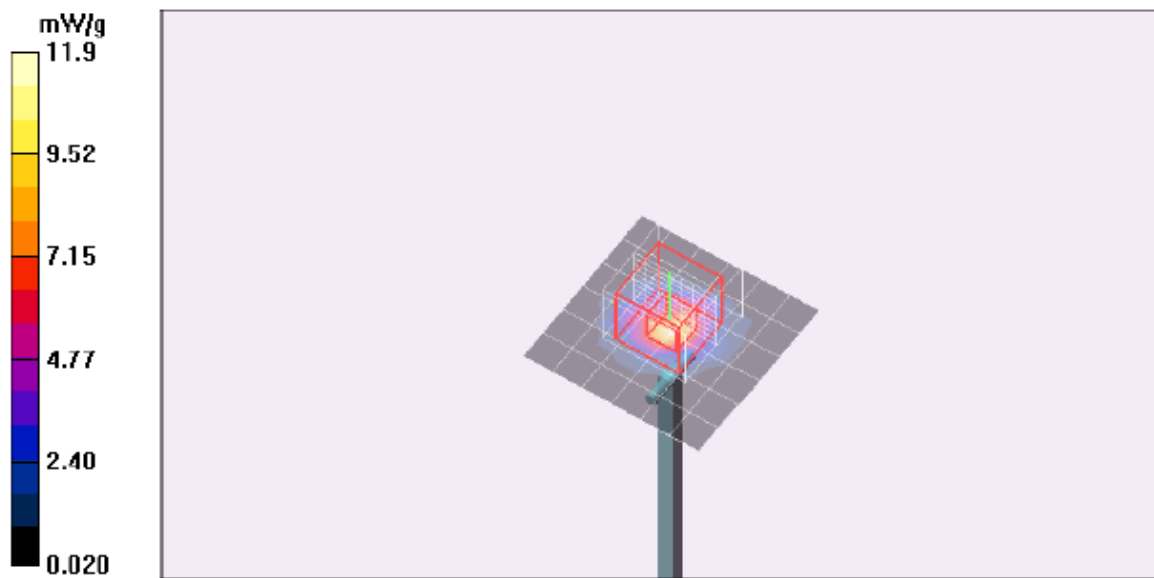
**d=10mm, Pin=100mW, 5.8GHz/Zoom Scan (8x8x10)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 47.4 V/m; Power Drift = 0.092 dB

Peak SAR (extrapolated) = 27.4 W/kg

**SAR(1 g) = 7.1 mW/g; SAR(10 g) = 2.04 mW/g**

Maximum value of SAR (measured) = 12.4 mW/g



**SYSTEM CHECK – Z Plot**

Date/Time: 9/29/2010 10:53:21 AM

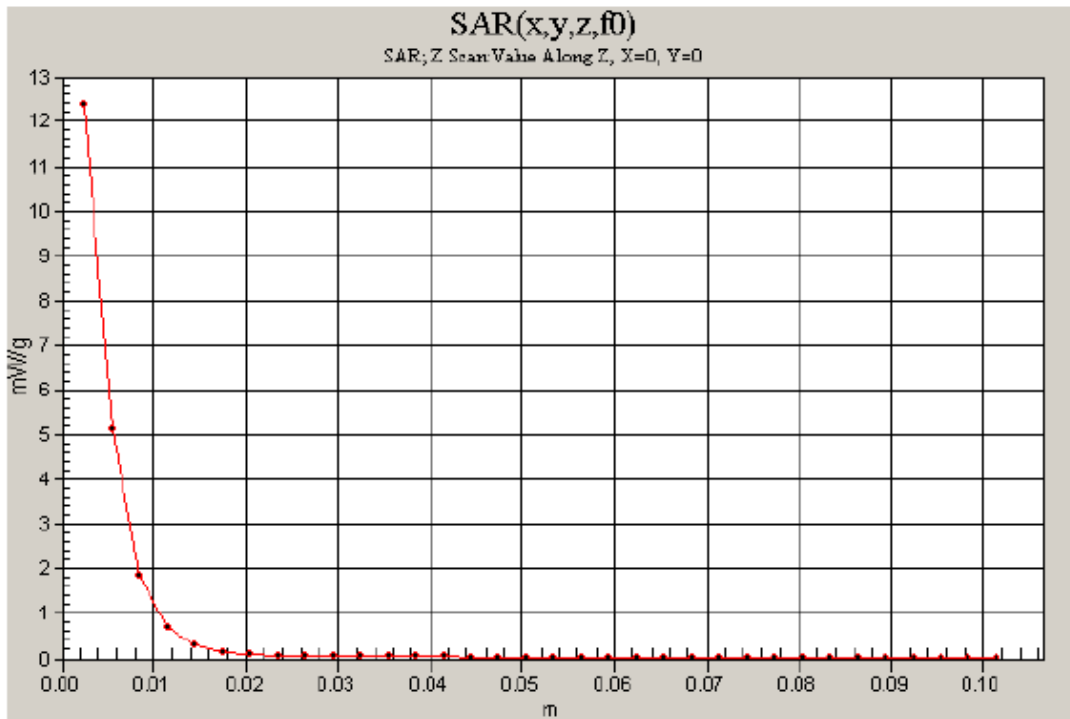
Test Laboratory: Compliance Certification Services

**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) = 12.4 mW/g



### SYSTEM CHECK PLOT

Date/Time: 9/30/2010 08:02:42 AM

Test Laboratory: Compliance Certification Services

#### 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;  $\sigma = 5.61$  mho/m;  $\epsilon_r = 48.1$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Flat Section

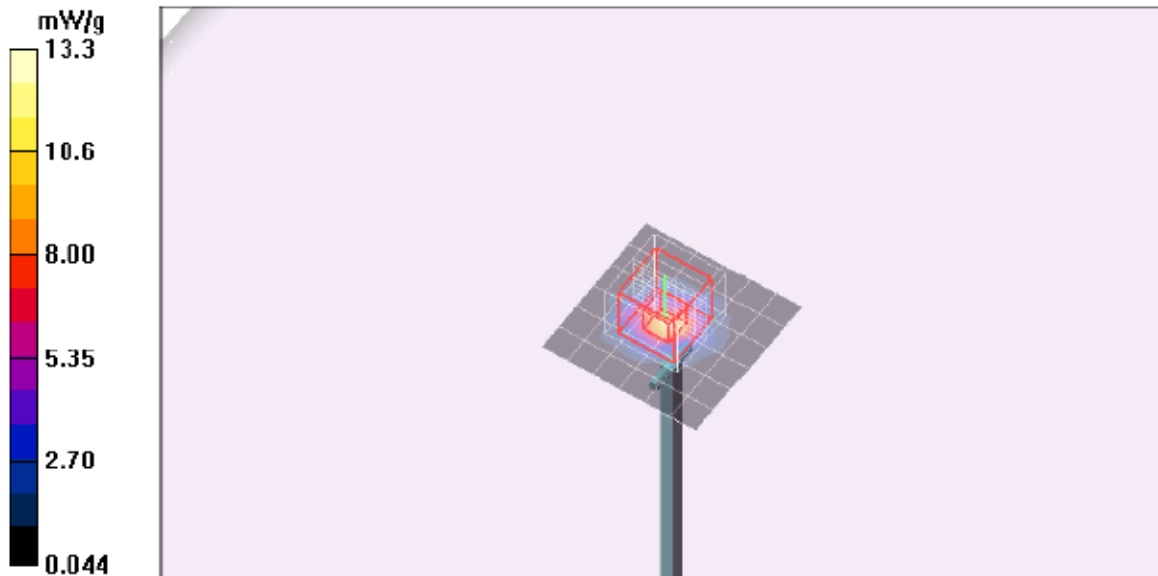
Room Ambient Temperature: 25.0 deg. C; Liquid Temperature: 24.0 deg. C

DASY4 Configuration:

- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Probe: EX3DV3 - SN3531; ConvF(3.57, 3.57, 3.57); Calibrated: 2/23/2010
- 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) = 13.3 mW/g

**d=10mm, Pin=100mW, 5.5GHz/Zoom Scan (8x8x10)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=2.5mm  
Reference Value = 52.8 V/m; Power Drift = 0.115 dB  
Peak SAR (extrapolated) = 29.1 W/kg  
**SAR(1 g) = 8.05 mW/g; SAR(10 g) = 2.3 mW/g**  
Maximum value of SAR (measured) = 14.2 mW/g



### SYSTEM CHECK PLOT

Date/Time: 9/30/2010 09:35:58 AM

Test Laboratory: Compliance Certification Services

#### 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;  $\sigma = 5.96$  mho/m;  $\epsilon_r = 46.9$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
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: EX3DV3 - SN3531; ConvF(3.48, 3.48, 3.48); Calibrated: 2/23/2010
- 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) = 11.9 mW/g

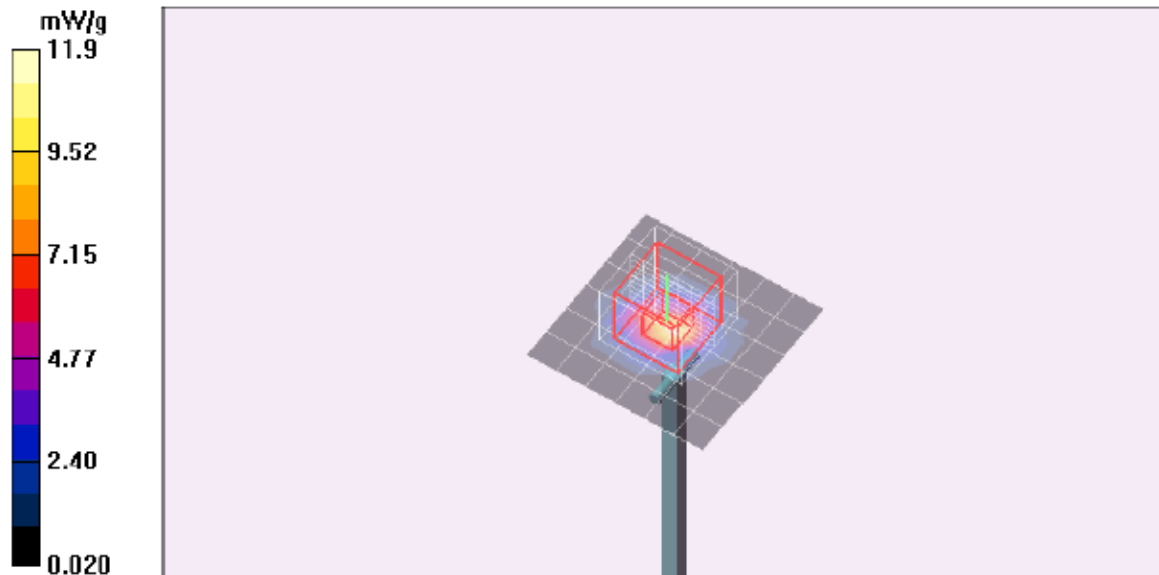
**d=10mm, Pin=100mW, 5.8GHz/Zoom Scan (8x8x10)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 48.2 V/m; Power Drift = 0.172 dB

Peak SAR (extrapolated) = 26.9 W/kg

**SAR(1 g) = 7.12 mW/g; SAR(10 g) = 2.05 mW/g**

Maximum value of SAR (measured) = 12.6 mW/g



**SYSTEM CHECK – Z Plot**

Date/Time: 9/30/2010 10:02:29 PM

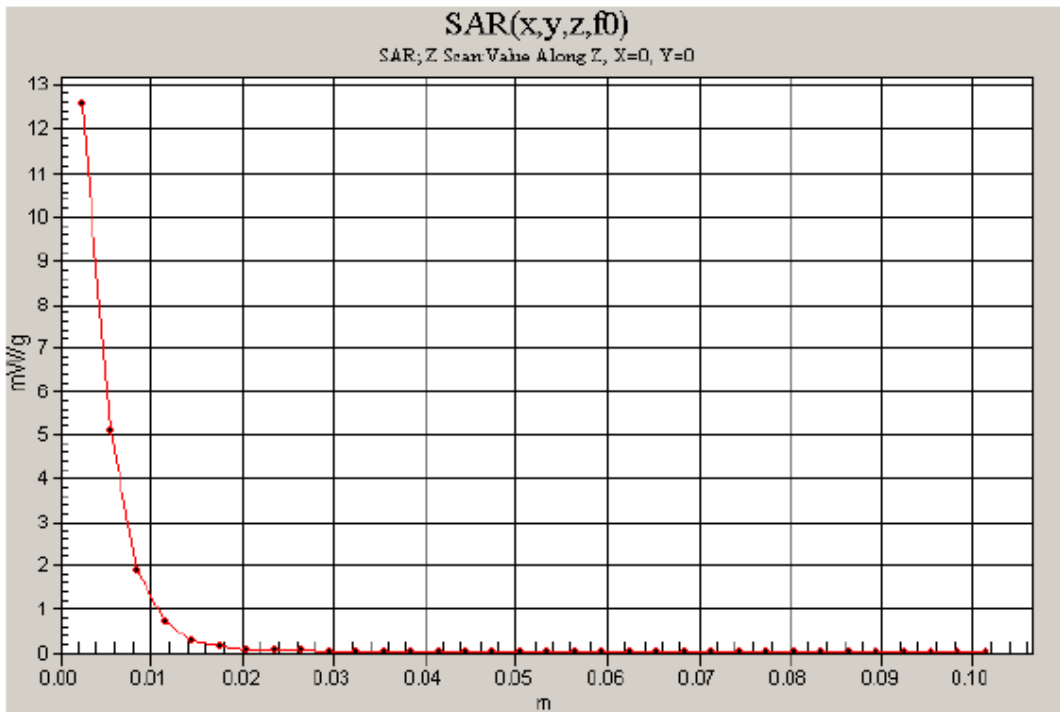
Test Laboratory: Compliance Certification Services

**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) = 12.6 mW/g



### SYSTEM CHECK PLOT

Date/Time: 10/1/2010 8:32:54 AM

Test Laboratory: Compliance Certification Services

#### 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;  $\sigma = 5.44$  mho/m;  $\epsilon_r = 46$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
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: EX3DV3 - SN3531; ConvF(4.04, 4.04, 4.04); Calibrated: 2/23/2010
- 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) = 11.1 mW/g

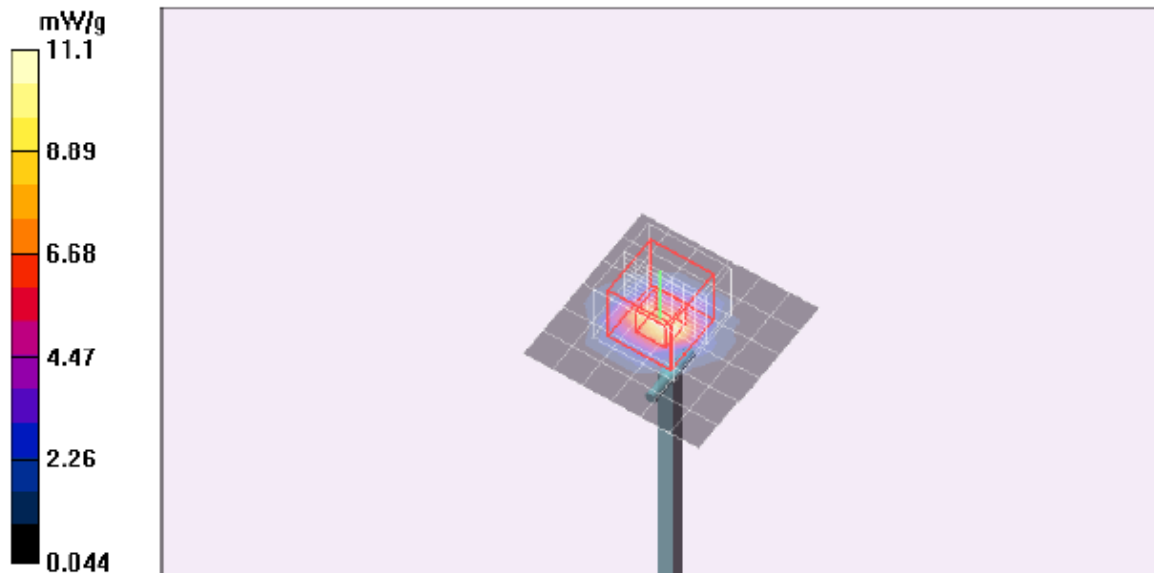
**d=10mm, Pin=100mW, 5.2GHz/Zoom Scan (8x8x10)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 48.0 V/m; Power Drift = 0.165 dB

Peak SAR (extrapolated) = 26.8 W/kg

**SAR(1 g) = 7.47 mW/g; SAR(10 g) = 2.17 mW/g**

Maximum value of SAR (measured) = 13.0 mW/g





**SYSTEM CHECK PLOT**

Date/Time: 10/1/2010 9:37:46 AM

Test Laboratory: Compliance Certification Services

**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;  $\sigma = 5.67$  mho/m;  $\epsilon_r = 46.3$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Flat Section

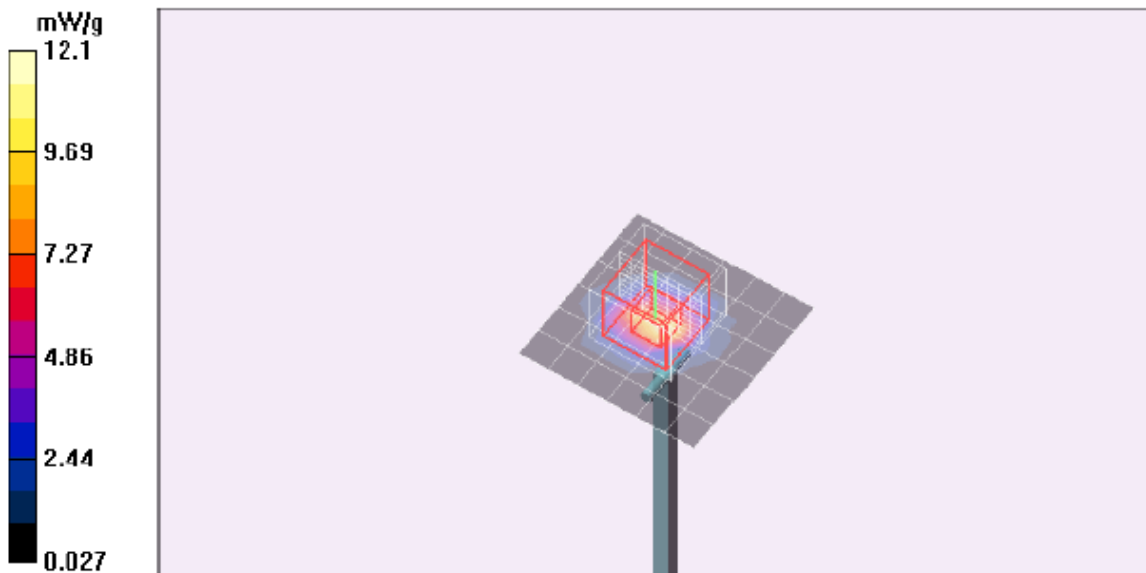
Room Ambient Temperature: 25.0 deg. C; Liquid Temperature: 24.0 deg. C

DASY4 Configuration:

- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Probe: EX3DV3 - SN3531; ConvF(3.57, 3.57, 3.57); Calibrated: 2/23/2010
- 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) = 12.1 mW/g

**d=10mm, Pin=100mW, 5.5GHz/Zoom Scan (8x8x10)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=2.5mm  
Reference Value = 48.7 V/m; Power Drift = 0.108 dB  
Peak SAR (extrapolated) = 30.0 W/kg  
**SAR(1 g) = 8.05 mW/g; SAR(10 g) = 2.3 mW/g**  
Maximum value of SAR (measured) = 14.3 mW/g



### SYSTEM CHECK PLOT

Date/Time: 10/1/2010 10:34:08 AM

Test Laboratory: Compliance Certification Services

#### 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;  $\sigma = 6.24$  mho/m;  $\epsilon_r = 45$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Flat Section

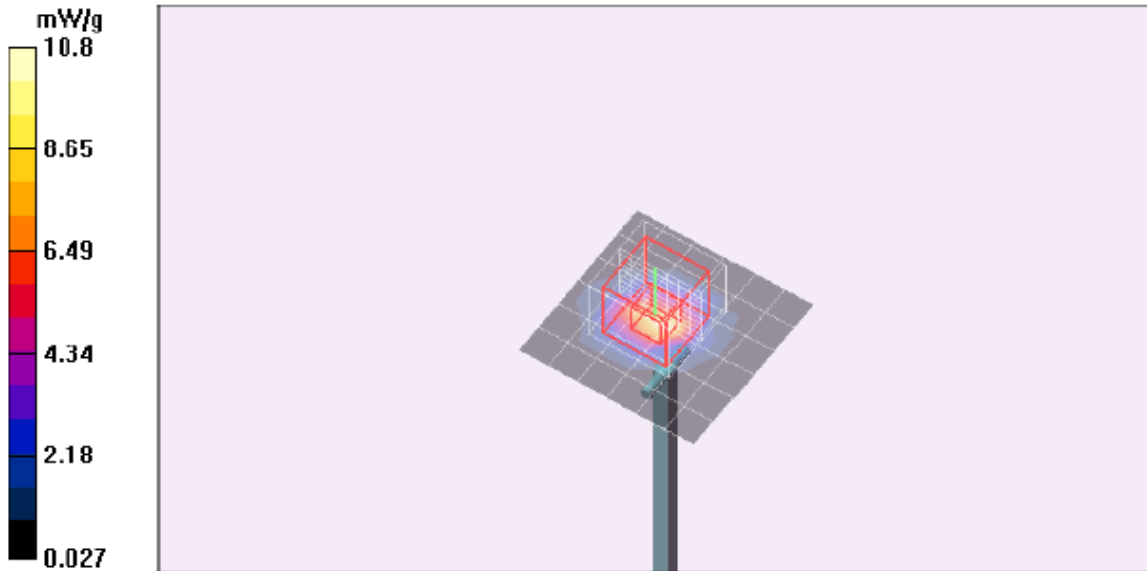
Room Ambient Temperature: 25.0 deg. C; Liquid Temperature: 24.0 deg. C

DASY4 Configuration:

- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Probe: EX3DV3 - SN3531; ConvF(3.48, 3.48, 3.48); Calibrated: 2/23/2010
- 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) = 10.8 mW/g

**d=10mm, Pin=100mW, 5.8GHz/Zoom Scan (8x8x10)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=2.5mm  
Reference Value = 44.0 V/m; Power Drift = 0.170 dB  
Peak SAR (extrapolated) = 27.4 W/kg  
**SAR(1 g) = 7.08 mW/g; SAR(10 g) = 2.04 mW/g**  
Maximum value of SAR (measured) = 12.7 mW/g



**SYSTEM CHECK – Z Plot**

Date/Time: 10/1/2010 11:00:17 AM

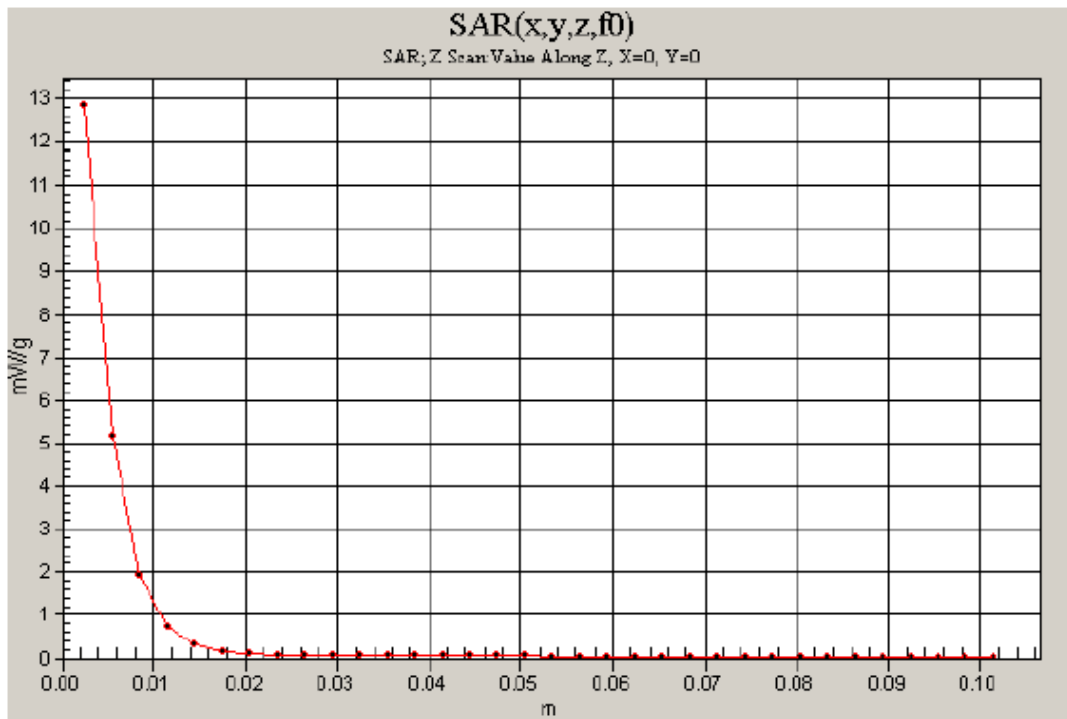
Test Laboratory: Compliance Certification Services

**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) = 12.8 mW/g



### SYSTEM CHECK PLOT

Date/Time: 10/2/2010 8:10:17 AM

Test Laboratory: Compliance Certification Services

#### 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;  $\sigma = 5.25$  mho/m;  $\epsilon_r = 47.7$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
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: EX3DV3 - SN3531; ConvF(4.04, 4.04, 4.04); Calibrated: 2/23/2010
- 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) = 12.3 mW/g

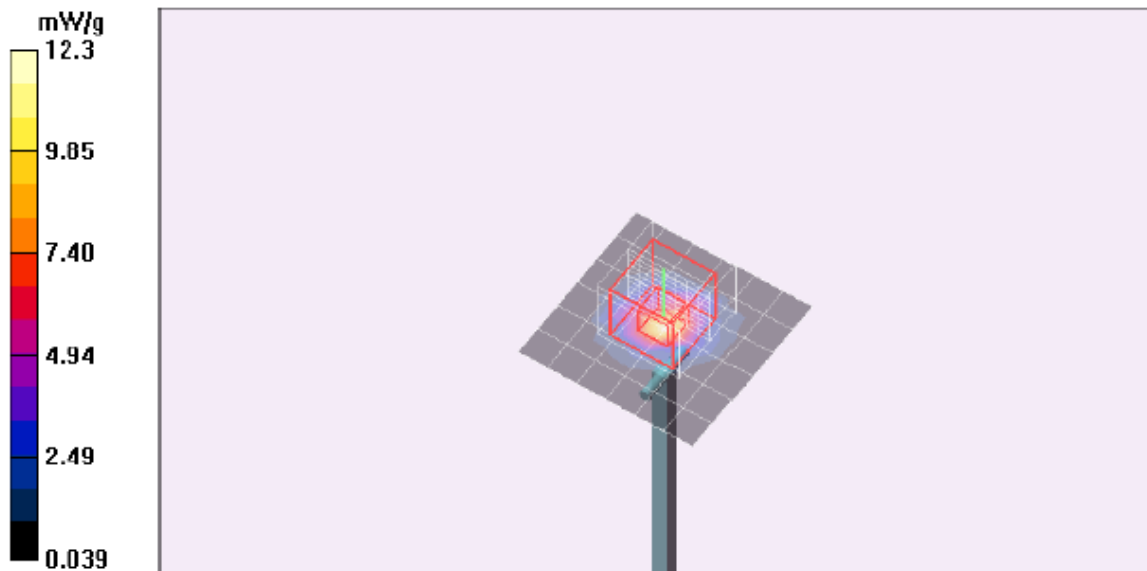
**d=10mm, Pin=100mW, 5.2GHz/Zoom Scan (8x8x10)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 52.1 V/m; Power Drift = 0.108 dB

Peak SAR (extrapolated) = 27.1 W/kg

**SAR(1 g) = 7.63 mW/g; SAR(10 g) = 2.2 mW/g**

Maximum value of SAR (measured) = 12.9 mW/g



### SYSTEM CHECK PLOT

Date/Time: 10/2/2010 9:13:11 AM

Test Laboratory: Compliance Certification Services

#### 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;  $\sigma = 5.4$  mho/m;  $\epsilon_r = 48.1$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Flat Section

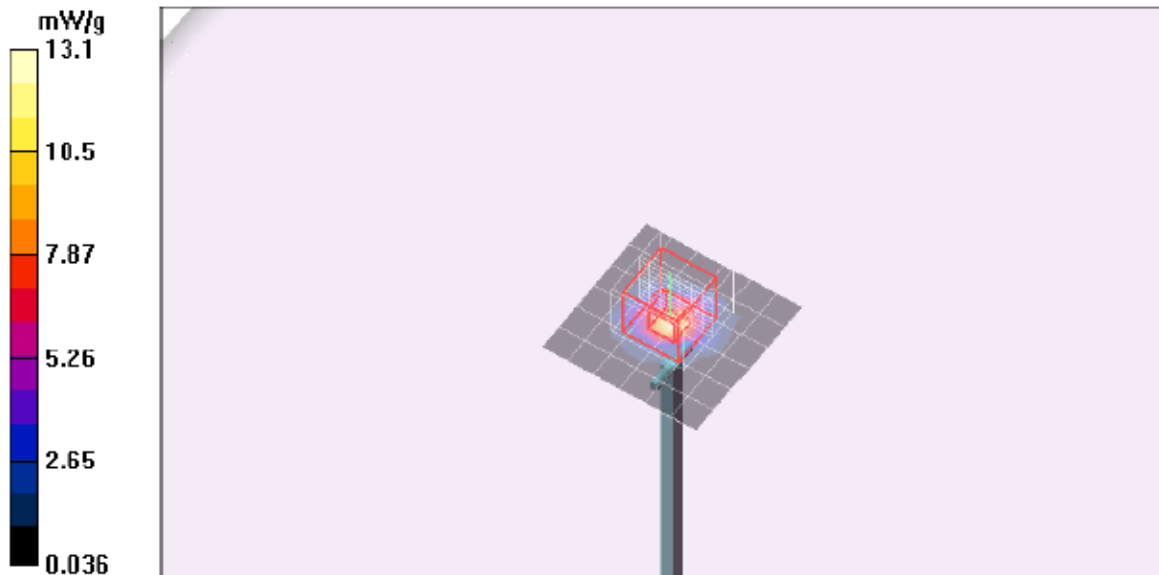
Room Ambient Temperature: 25.0 deg. C; Liquid Temperature: 24.0 deg. C

DASY4 Configuration:

- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Probe: EX3DV3 - SN3531; ConvF(3.57, 3.57, 3.57); Calibrated: 2/23/2010
- 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) = 13.1 mW/g

**d=10mm, Pin=100mW, 5.5GHz/Zoom Scan (8x8x10)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=2.5mm  
Reference Value = 53.1 V/m; Power Drift = 0.163 dB  
Peak SAR (extrapolated) = 29.1 W/kg  
**SAR(1 g) = 7.85 mW/g; SAR(10 g) = 2.23 mW/g**  
Maximum value of SAR (measured) = 13.6 mW/g



### SYSTEM CHECK PLOT

Date/Time: 10/2/2010 10:46:38 AM

Test Laboratory: Compliance Certification Services

#### 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;  $\sigma = 5.96$  mho/m;  $\epsilon_r = 46.9$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Flat Section

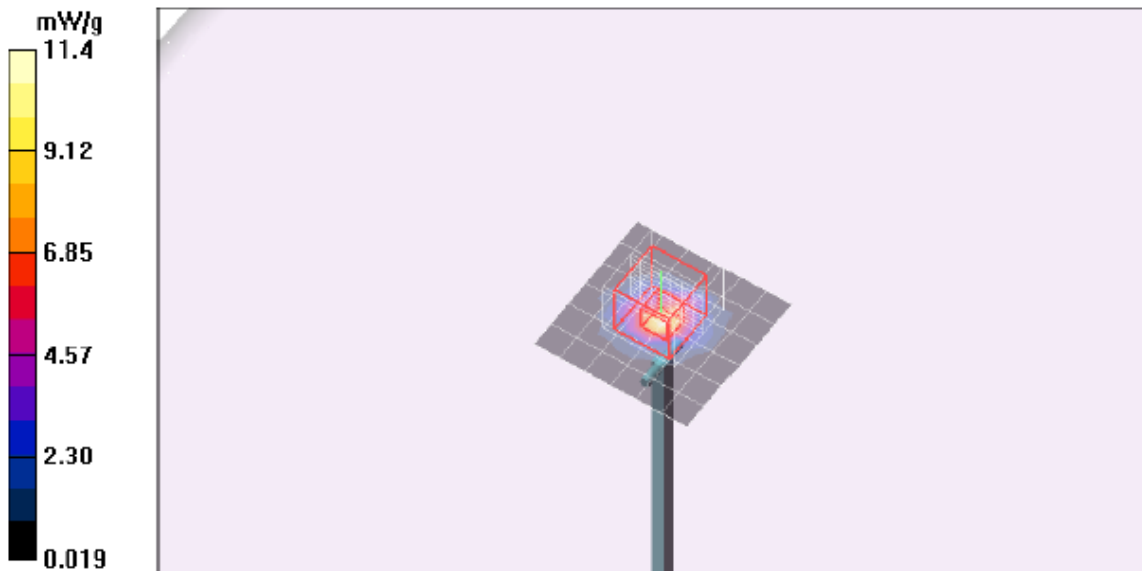
Room Ambient Temperature: 25.0 deg. C; Liquid Temperature: 24.0 deg. C

DASY4 Configuration:

- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Probe: EX3DV3 - SN3531; ConvF(3.48, 3.48, 3.48); Calibrated: 2/23/2010
- 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) = 11.4 mW/g

**d=10mm, Pin=100mW, 5.8GHz/Zoom Scan (8x8x10)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=2.5mm  
Reference Value = 47.4 V/m; Power Drift = 0.092 dB  
Peak SAR (extrapolated) = 26.3 W/kg  
**SAR(1 g) = 6.82 mW/g; SAR(10 g) = 1.96 mW/g**  
Maximum value of SAR (measured) = 11.9 mW/g



**SYSTEM CHECK – Z Plot**

Date/Time: 10/2/2010 10:57:12 AM

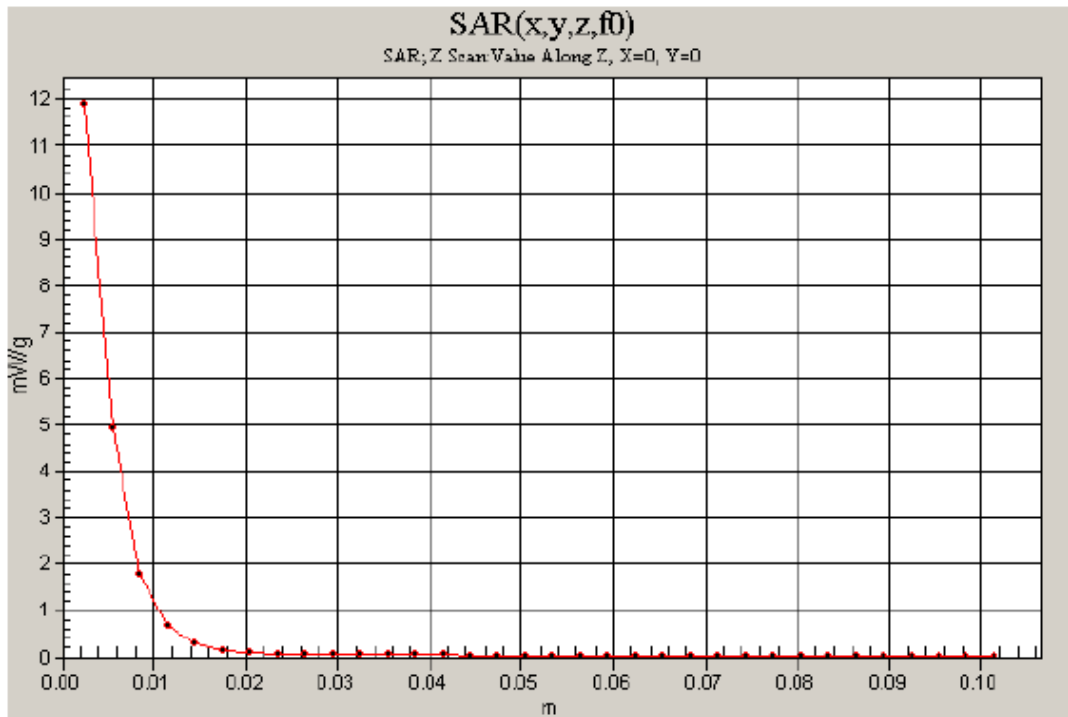
Test Laboratory: Compliance Certification Services

**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) = 11.9 mW/g



**SYSTEM CHECK PLOT**

Date/Time: 10/7/2010 9:48:10 AM

Test Laboratory: Compliance Certification Services

**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;  $\sigma = 5.48$  mho/m;  $\epsilon_r = 48.4$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Flat Section

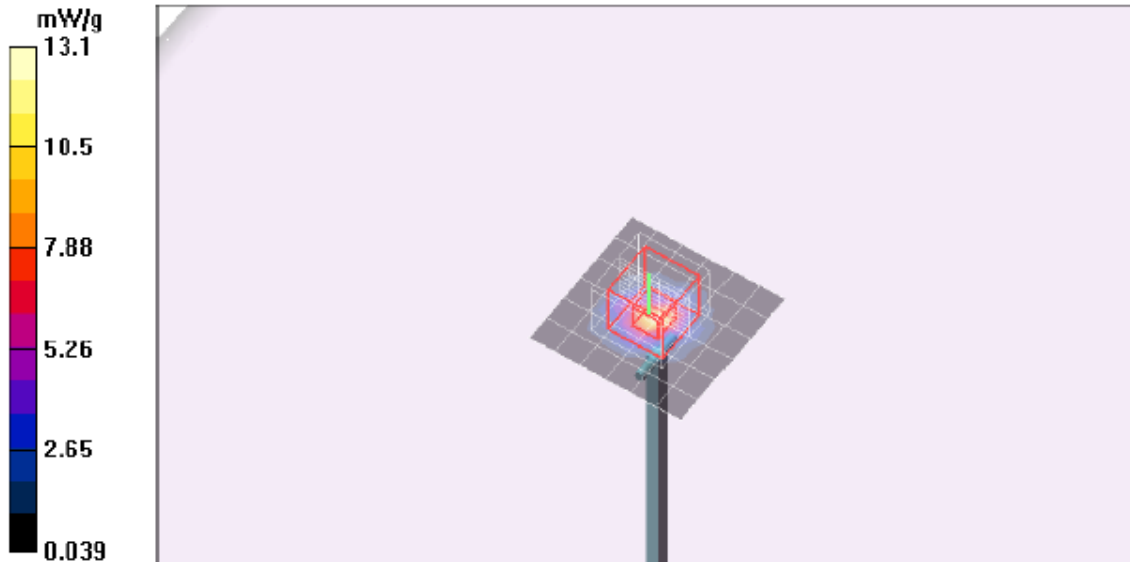
Room Ambient Temperature: 24.0 deg. C; Liquid Temperature: 23.0 deg. C

DASY4 Configuration:

- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Probe: EX3DV3 - SN3531; ConvF(4.04, 4.04, 4.04); Calibrated: 2/23/2010
- 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) = 13.1 mW/g

**d=10mm, Pin=100mW, 5.2GHz/Zoom Scan (8x8x10)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=2.5mm  
Reference Value = 51.9 V/m; Power Drift = 0.084 dB  
Peak SAR (extrapolated) = 27.6 W/kg  
**SAR(1 g) = 7.46 mW/g; SAR(10 g) = 2.17 mW/g**





### SYSTEM CHECK – Z Plot

Date/Time: 10/7/2010 10:14:25 AM

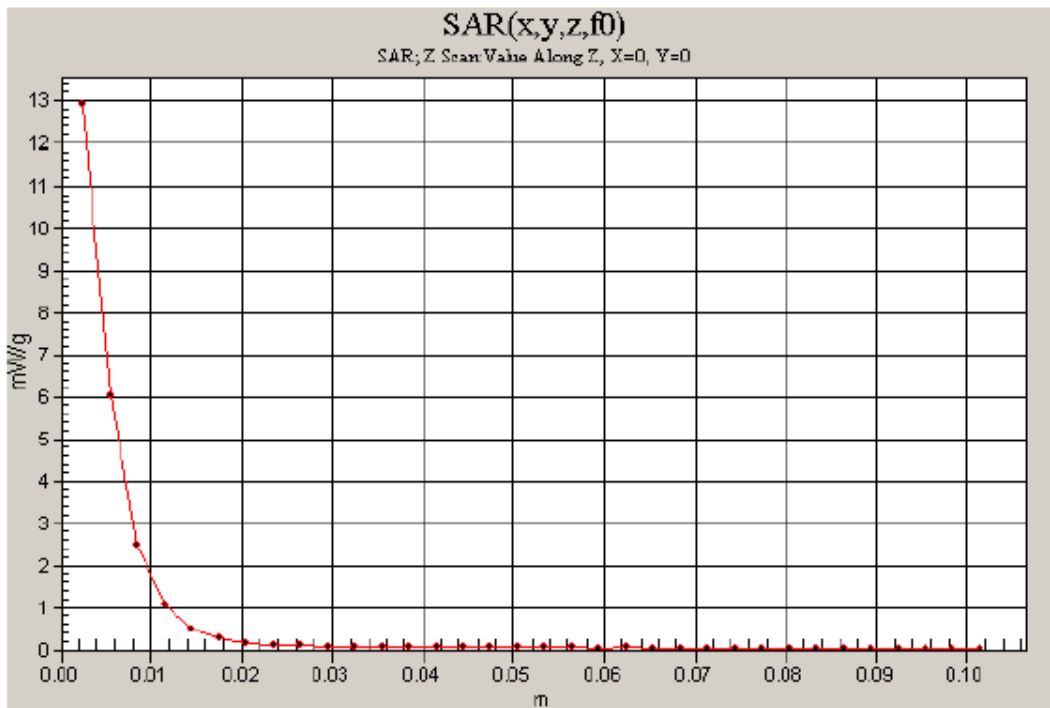
Test Laboratory: Compliance Certification Services

#### System Performance Check - D5GHzV2\_5 GHz

DUT: D5GHzV2; Type: D5GHzV2; Serial: 1075

Communication System: CW 5GHz; Frequency: 5200 MHz; Duty Cycle: 1:1

**d=10mm, Pin=100mW, 5.2GHz/Z Scan (1x1x34):** Measurement grid: dx=20mm, dy=20mm, dz=3mm  
Maximum value of SAR (measured) = 12.9 mW/g



## 10. RF OUTPUT POWER VERIFICATION

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 a user to control the frequency and output power of the module.

### 10.1. RF OUTPUT POWER FOR 2.4 GHZ BAND

#### Results for WiFi Module inside of 11 inch MacBook Air

802.11b					
Channel #	Freq. (MHz)	Conducted Avg Power			
		(dBm)		(mW)	
1	2412	18.1	64.6		
6	2437	<b>19.3</b>	85.1		
11	2462	18.2	66.1		
802.11g					
1	2412	14.0	25.1		
2	2417	16.0	39.8		
6	2437	17.0	50.1		
10	2457	15.0	31.6		
11	2462	12.0	15.8		
802.11n HT20					
Channel #	Freq. (MHz)	Conducted Avg Power			
		WiFi 1/BT (Main)		WiFi 2 (Aux)	
		dBm	mW	dBm	mW
1	2412	11.0	12.6	11.0	12.6
2	2417	15.0	31.6	15.0	31.6
6	2437	<b>17.0</b>	50.1	<b>17.2</b>	52.5
9	2452	16.5	44.7	16.5	44.7
10	2457	15.0	31.6	15.0	31.6
11	2462	10.5	11.2	10.5	11.2

#### Results for WiFi Module inside of 13 inch MacBook Air

802.11b			
Channel #	Freq. (MHz)	Conducted Avg Power	
		(dBm)	(mW)
1	2412	18.1	64.6
6	2437	<b>19.3</b>	85.1
11	2462	18.1	64.6

**Note:** According to the 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.

## 10.2. RF OUTPUT POWER FOR 5 GHZ BANDS

### 5.15 – 5.25 GHz Band

Mode	Channel	Freq. (MHz)	Conducted Avg Power	
			(dBm)	(mW)
802.11a Legacy	36	5180	<b>13.0</b>	20.0
	40	5200	<b>13.0</b>	20.0
	48	5240	<b>13.0</b>	20.0
802.11n 20 MHz SDM MCS8	36	5180	10.0	10.0
	48	5240	10.0	10.0
802.11n 20 MHz SDM MCS12	36	5180	11.0	12.6
	48	5240	11.0	12.6
802.11n 20 MHz SDM MCS15	36	5180	11.0	12.6
	48	5240	11.0	12.6
802.11n 40 MHz SISO	38	5190	<b>15.0</b>	31.6
	46	5230	<b>16.0</b>	39.8
802.11n 40 MHz SDM MCS8	38	5190	12.0	15.8
	46	5230	12.0	15.8
802.11n 40 MHz SDM MCS12	38	5190	<b>14.0</b>	25.1
	46	5230	<b>14.0</b>	25.1

### 5.25 – 5.35 GHz Band

Mode	Channel	Freq. (MHz)	Conducted Avg Power	
			(dBm)	(mW)
802.11a Legacy	52	5260	<b>17.5</b>	56.2
	60	5300	<b>17.5</b>	56.2
	64	5320	14.5	28.2
802.11n 20 MHz CDD/SDM	52	5260	13.0	20.0
	60	5300	13.0	20.0
	64	5320	13.0	20.0
802.11n 40 MHz SISO	54	5270	17.0	50.1
	62	5310	11.0	12.6
802.11n 40 MHz CDD/SDM	54	5270	15.5	35.5
	62	5310	10.0	10.0

**5.47 – 5.725 GHz Band**

Mode	Channel	Freq. (MHz)	Conducted Avg Power	
			(dBm)	(mW)
802.11a Legacy	100	5500	14.5	28.2
	120	5600	<b>17.0</b>	50.1
	140	5700	15.0	31.6
802.11n 20 MHz CDD/SDM	100	5500	12.5	17.8
	120	5600	12.5	17.8
	140	5700	12.5	17.8
802.11n 40 MHz SISO	102	5510	15.5	35.5
	118	5590	18.0	63.1
	134	5670	15.0	31.6
802.11n 40 MHz CDD/SDM	102	5510	12.0	15.8
	118	5590	17.0	50.1
	134	5670	15.5	35.5

**5.725 – 5.85 GHz Band**

Mode	Channel	Freq. (MHz)	Conducted Avg Power	
			(dBm)	(mW)
802.11a Legacy	149	5745	<b>17.5</b>	56.2
	157	5785	<b>17.5</b>	56.2
	165	5825	<b>17.5</b>	56.2
802.11n 20 MHz CDD/SDM	149	5745	17.5	56.2
	157	5785	17.5	56.2
	165	5825	17.5	56.2
802.11n 40 MHz SISO	151	5755	<b>18.5</b>	70.8
	159	5795	<b>18.6</b>	72.4
802.11n 40 MHz CDD/SDM	151	5755	18.0	63.1
	159	5795	18.0	63.1

## 11. SUMMARY OF SAR TEST RESULTS

### 11.1. SAR TEST RESULT FOR 2.4 GHZ BAND (11 inch MacBook Air)

#### 11 inch MacBook Air - Lap-held Configuration

Mode	Channel	f (MHz)	Antenna	Avg Pwr (dBm)	Results (mW/g)	
					1g-SAR	10g-SAR
802.11b	1	2412	Main	18.1	0.700	0.318
	6	2437	Main	19.3	1.010	0.433
	11	2462	Main	18.0	0.774	0.341
	1	2412	Aux	18.1	0.869	0.388
	6	2437	Aux	19.2	0.947	0.418
	11	2462	Aux	18.2	1.040	0.459
802.11n HT20	6	2437	Main / Aux	17.0 / 17.2	0.759	0.348

#### 11 inch MacBook Air - Nearby Person Configuration (w/ 2.0 cm separation distance)

Mode	Channel	f (MHz)	Antenna	Avg Pwr (dBm)	Results (mW/g)	
					1g-SAR	10g-SAR
802.11b	1	2412	Main	18.1		
	6	2437	Main	19.3	0.034	0.025
	11	2462	Main	18.0		
	1	2412	Aux	18.1		
	6	2437	Aux	19.2	0.029	0.022
	11	2462	Aux	18.2		
802.11n HT20	6	2437	Main / Aux	17.0 / 17.2	0.041	0.030

**Note:** Acc. to the KDB 248227, MIMO configurations (p16). If the antennas are in the close proximity to each other; within 3-5 cm, it would be necessary to consider the exposure from all antennas to determine the 1-g averaged SAR within the region.

**11.2. SAR TEST RESULT FOR 2.4 GHZ BAND (13 inch MacBook Air)**

**13 inch MacBook Air - Lap-held Configuration**

Mode	Channel	f (MHz)	Antenna	Avg Pwr (dBm)	Results (mW/g)	
					1g-SAR	10g-SAR
802.11b	1	2412	Main	18.1	0.821	0.377
	6	2437	Main	19.2	<b>1.070</b>	0.487
	11	2462	Main	18.1	0.737	0.337
	1	2412	Aux	18.1	0.958	0.427
	6	2437	Aux	19.2	0.870	0.390
	11	2462	Aux	18.1	1.050	0.463

**13 inch MacBook Air - Nearby Person Configuration (w/ 2.0 cm separation distance)**

Mode	Channel	f (MHz)	Antenna	Avg Pwr (dBm)	Results (mW/g)	
					1g-SAR	10g-SAR
802.11b	1	2412	Main	18.1		
	6	2437	Main	19.2	0.059	0.041
	11	2462	Main	18.1		
	1	2412	Aux	18.1		
	6	2437	Aux	19.2	0.061	0.042
	11	2462	Aux	18.1		

**Note:** According to the 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.

### 11.2.1. WORST-CASE SAR TEST LPOTS FOR 2.4 GHZ BAND

Date/Time: 9/16/2010 11:28:13 AM

Test Laboratory: Compliance Certification Services

#### WiFi\_2.4GHz\_Laptop Mode

DUT: Apple; Type: NA; Serial: K16\_PT548958

Communication System: 802.11b/g 2.4GHz; Frequency: 2437 MHz; Duty Cycle: 1:1  
Medium parameters used (interpolated):  $f = 2437$  MHz;  $\sigma = 1.97$  mho/m;  $\epsilon_r = 51.6$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
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: EX3DV3 - SN3531; ConvF(7.58, 7.58, 7.58); Calibrated: 2/23/2010
- 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 M-ch Main Ant/Area Scan (8x9x1):** Measurement grid: dx=15mm, dy=15mm

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

Maximum value of SAR (measured) = 1.46 mW/g

**802.11b M-ch Main Ant/Zoom Scan (7x7x9)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=3mm

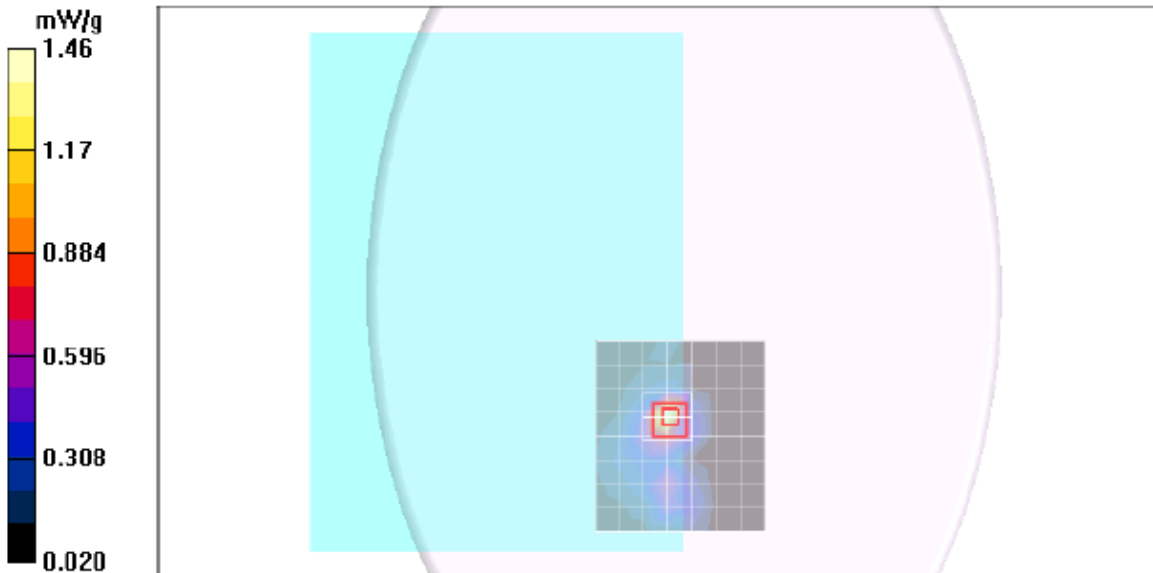
Reference Value = 27.3 V/m; Power Drift = -0.143 dB

Peak SAR (extrapolated) = 2.50 W/kg

**SAR(1 g) = 1.07 mW/g; SAR(10 g) = 0.487 mW/g**

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

Maximum value of SAR (measured) = 1.44 mW/g



### Z-axis Plot

Date/Time: 9/16/2010 11:53:34 AM

Test Laboratory: Compliance Certification Services

### WiFi\_2.4GHz\_Laptop Mode

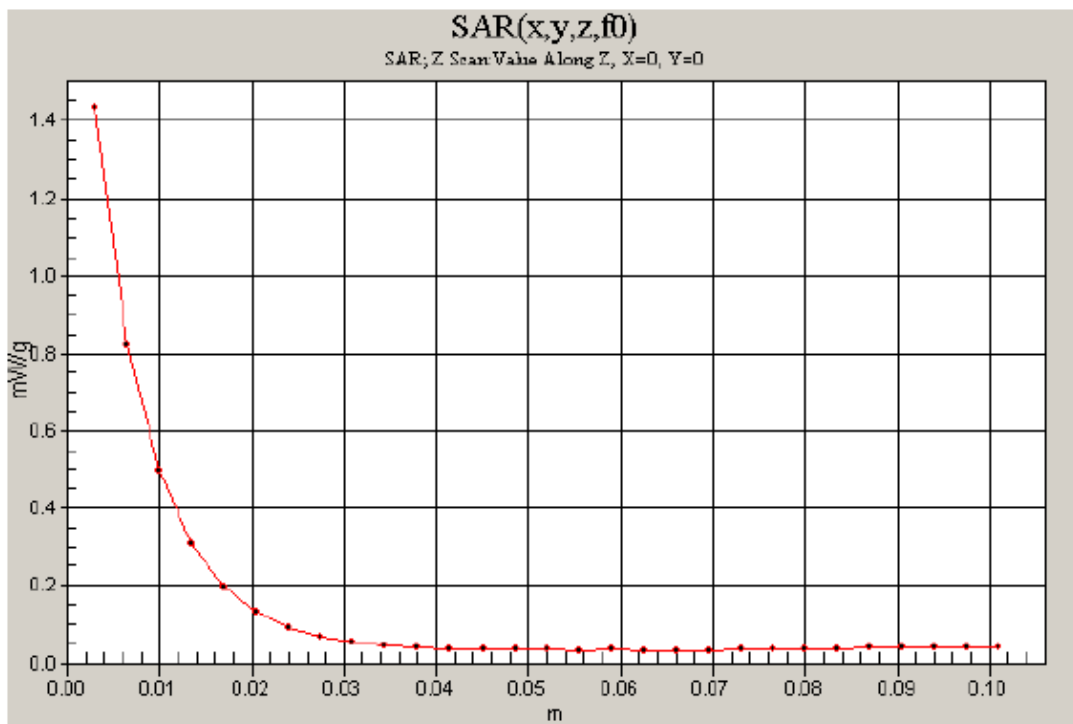
DUT: Apple; Type: NA; Serial: K16\_PT548958

Communication System: 802.11b/g 2.4GHz; Frequency: 2437 MHz; Duty Cycle: 1:1

### 802.11b M-ch Main Ant/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) = 1.43 mW/g





### 11.3. SAR TEST RESULTS FOR 5 GHZ BANDS (11 inch MacBook Air)

#### 11 inch MacBook Air - Lap-held Configuration

Band	Mode	Channel	f (MHz)	Antenna	Avg Pwr (dBm)	Results (mW/g)	
						1g-SAR	10g-SAR
5.2 GHz	802.11a Legacy	36	5180	Main	13.0		
		40	5200	Main	13.1	0.380	0.100
		48	5240	Main	13.0		
	802.11n 40MHz SISO	38	5190	Main	15.0		
		46	5230	Main	16.0	0.748	0.263
	802.11a Legacy	36	5180	Aux	13.0		
		40	5200	Aux	13.1	0.210	0.100
		48	5240	Aux	13.0		
	802.11n 40MHz SISO	38	5190	Aux	15.0		
		46	5230	Aux	16.0	0.758	0.292
802.11n 40MHz SDM MCS12 (MIMO)	38	5190	Main/Aux	14.0			
	46	5230	Main/Aux	14.0	0.616	0.232	
5.3 GHz	802.11a Legacy	52	5260	Main	17.6	1.040	0.287
		60	5300	Main	17.7	1.070	0.298
		64	5320	Main	14.6	0.526	0.147
		52	5260	Aux	17.7	0.856	0.274
		60	5300	Aux	17.7	1.050	0.340
		64	5320	Aux	14.6	0.377	0.121
	802.11n 40MHz SDM MCS12 (MIMO)	54	5270	Main/Aux	15.5	0.779	.282
		62	5310	Main/Aux	10.0		
5.5 GHz	802.11a Legacy	100	5500	Main	14.6	0.469	0.134
		120	5600	Main	17.0	0.911	0.267
		140	5700	Main	15.1	0.495	0.152
	802.11n 40MHz SISO	118	5590	Main	18.0	1.060	0.381
	802.11a Legacy	100	5500	Aux	14.7	0.584	0.180
		120	5600	Aux	17.1	0.811	0.253
		140	5700	Aux	15.2	0.493	0.157
	802.11n 40MHz SISO	118	5590	Aux	18.1	1.110	0.424
	802.11n 40MHz SDM MCS12 (MIMO)	118	5590	Main/Aux	17.1	1.040	0.385
134		5670	Main/Aux	15.5			
5.8 GHz	802.11a Legacy	149	5745	Main	17.7		
		157	5785	Main	17.5	0.636	0.195
		165	5825	Main	17.7		
	802.11n 40MHz SISO	151	5755	Main	18.5	0.900	0.370
		159	5795	Main	18.6	0.817	0.352
	802.11a Legacy	149	5745	Aux	17.7	0.827	0.270
		157	5785	Aux	17.6	0.815	0.271
		165	5825	Aux	17.5	0.773	0.259
	802.11n 40MHz SISO	151	5755	Aux	18.5	1.050	0.414
		159	5795	Aux	18.6	1.030	0.418
	802.11n 40MHz SDM MCS12 (MIMO)	151	5755	Main/Aux	18.0	1.100	0.429
		159	5795	Main/Aux	18.0	1.050	0.409

**11 inch MacBook Air - Nearby Person Configuration (w/ 2.0 cm separation distance)**

Band	Mode	Channel	f (MHz)	Antenna	Avg Pwr (dBm)	Results (mW/g)	
						1g-SAR	10g-SAR
5.2 GHz	802.11a Legacy	36	5180	Main	13.0		
		40	5200	Main	13.1	0.059	0.048
		48	5240	Main	13.0		
	802.11n 40MHz SISO	38	5190	Main	15.0		
		46	5230	Main	16.0	0.081	0.062
	802.11a Legacy	36	5180	Aux	13.0		
		40	5200	Aux	13.1	0.065	0.051
		48	5240	Aux	13.0		
	802.11n 40MHz SISO	38	5190	Aux	15.0		
		46	5230	Aux	16.0	0.104	0.070
5.3 GHz	802.11a Legacy	52	5260	Main	17.6		
		60	5300	Main	17.7	0.154	0.095
		64	5320	Main	14.6		
		52	5260	Aux	17.7		
		60	5300	Aux	17.7	0.192	0.112
		64	5320	Aux	14.6		
5.5 GHz	802.11a Legacy	100	5500	Main	14.6		
		120	5600	Main	17.0	0.086	0.069
		140	5700	Main	15.1		
	802.11n 40MHz SISO	118	5590	Main	18.0	0.088	0.072
		100	5500	Aux	14.7		
	802.11a Legacy	120	5600	Aux	17.1	0.086	0.069
		140	5700	Aux	15.2		
	802.11n 40MHz SISO	118	5590	Aux	18.1	0.140	0.094
5.8 GHz	802.11a Legacy	149	5745	Main	17.7		
		157	5785	Main	17.5	0.085	0.068
		165	5825	Main	17.7		
	802.11n 40MHz SISO	151	5755	Main	18.5	0.085	0.070
		159	5795	Main	18.6		
	802.11a Legacy	149	5745	Aux	17.7		
		157	5785	Aux	17.6	0.208	0.123
		165	5825	Aux	17.5		
	802.11n 40MHz SISO	151	5755	Aux	18.5	0.142	0.093
		159	5795	Aux	18.6		

### 11.4. SAR TEST RESULTS FOR 5 GHZ BANDS (13 inch MacBook Air)

#### 13 inch MacBook Air - Lap-held Configuration

Band	Mode	Channel	f (MHz)	Antenna	Avg Pwr (dBm)	Results (mW/g)	
						1g-SAR	10g-SAR
5.2 GHz	802.11a Legacy	36	5180	Main	13.0		
		40	5200	Main	13.1	0.372	0.181
		48	5240	Main	13.2		
	802.11n 40MHz SISO	38	5190	Main	15.0		
		46	5230	Main	16.0	0.628	0.286
	802.11a Legacy	36	5180	Aux	13.1		
		40	5200	Aux	13.0	0.393	0.181
		48	5240	Aux	13.3		
	802.11n 40MHz SISO	38	5190	Aux	15.0		
		46	5230	Aux	16.0	<b>0.767</b>	0.300
5.3 GHz	802.11a Legacy	52	5260	Main	17.5	1.070	0.409
		60	5300	Main	17.7	<b>1.100</b>	0.426
		64	5320	Main	14.7	0.394	0.134
		52	5260	Aux	17.6	0.931	0.347
		60	5300	Aux	17.5	0.980	0.359
		64	5320	Aux	14.5	0.506	0.145
5.5 GHz	802.11a Legacy	100	5500	Main	14.7	0.572	0.248
		120	5600	Main	17.2	1.130	0.423
		140	5700	Main	15.0	0.711	0.286
	802.11n 40MHz SISO	118	5590	Main	18.0	1.150	0.445
	802.11a Legacy	100	5500	Aux	14.5	0.514	0.214
		120	5600	Aux	17.2	1.140	0.390
		140	5700	Aux	15.1	0.493	0.213
802.11n 40MHz SISO	118	5590	Aux	18.1	<b>1.190</b>	0.469	
5.8 GHz	802.11a Legacy	149	5745	Main	17.5	1.120	0.407
		157	5785	Main	17.6	1.010	0.374
		165	5825	Main	17.7	0.927	0.395
	802.11n 40MHz SISO	151	5755	Main	18.5	1.150	0.434
		159	5795	Main	18.6	1.170	0.448
	802.11a Legacy	149	5745	Aux	17.5	0.881	0.328
		157	5785	Aux	17.5	1.070	0.384
		165	5825	Aux	17.7	1.100	0.407
	802.11n 40MHz SISO	151	5755	Aux	18.5	<b>1.190</b>	0.478
	159	5795	Aux	18.6	1.150	0.465	

**13 inch MacBook Air - Nearby Person Configuration (w/ 2.0 cm separation distance)**

Band	Mode	Channel	f (MHz)	Antenna	Avg Pwr (dBm)	Results (mW/g)	
						1g-SAR	10g-SAR
5.2 GHz	802.11a Legacy	36	5180	Main	13.0		
		40	5200	Main	13.1	0.065	0.051
		48	5240	Main	13.2		
	802.11n 40MHz SISO	38	5190	Main	15.0		
		46	5230	Main	16.0	0.095	0.075
	802.11a Legacy	36	5180	Aux	13.1		
		40	5200	Aux	13.0	0.053	0.048
		48	5240	Aux	13.3		
	802.11n 40MHz SISO	38	5190	Aux	15.0		
		46	5230	Aux	16.0	0.111	0.080
5.3 GHz	802.11a Legacy	52	5260	Main	17.5		
		60	5300	Main	17.7	0.092	0.068
		64	5320	Main	14.7		
		52	5260	Aux	17.6		
		60	5300	Aux	17.5	0.093	0.068
		64	5320	Aux	14.5		
5.5 GHz	802.11a Legacy	100	5500	Main	14.7		
		120	5600	Main	17.2	0.107	0.082
		140	5700	Main	15.0		
	802.11n 40MHz SISO	118	5590	Main	18.0	0.087	0.072
		100	5500	Aux	14.5		
	802.11a Legacy	120	5600	Aux	17.2	0.121	0.086
		140	5700	Aux	15.1		
	802.11n 40MHz SISO	118	5590	Aux	18.1	0.141	0.095
5.8 GHz	802.11a Legacy	149	5745	Main	17.5		
		157	5785	Main	17.6	0.101	0.081
		165	5825	Main	17.7		
	802.11n 40MHz SISO	151	5755	Main	18.5	0.094	0.700
		159	5795	Main	18.6		
	802.11a Legacy	149	5745	Aux	17.5		
		157	5785	Aux	17.5	0.089	0.074
		165	5825	Aux	17.7		
	802.11n 40MHz SISO	151	5755	Aux	18.5	0.149	0.096
		159	5795	Aux	18.6		

### 11.4.1. WORST-CASE SAR PLOTS FOR 5 GHZ BANDS

#### 5.2 GHz Band

Date/Time: 10/7/2010 6:07:04 PM

Test Laboratory: Compliance Certification Services

#### Lapheld\_5.2GHz HT40 SISO

DUT: Apple; Type: NA; Serial: K16\_PT548958

Communication System: 802.11a 5.2GHz; Frequency: 5230 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated):  $f = 5230$  MHz;  $\sigma = 5.52$  mho/m;  $\epsilon_r = 48.4$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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: EX3DV3 - SN3531; ConvF(4.04, 4.04, 4.04); Calibrated: 2/23/2010
- 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

**802.11n\_Aux Ant M-Ch 46/Area Scan (7x12x1):** Measurement grid: dx=10mm, dy=10mm

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

Maximum value of SAR (measured) = 0.999 mW/g

**802.11n\_Aux Ant M-Ch 46/Zoom Scan (7x7x9)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

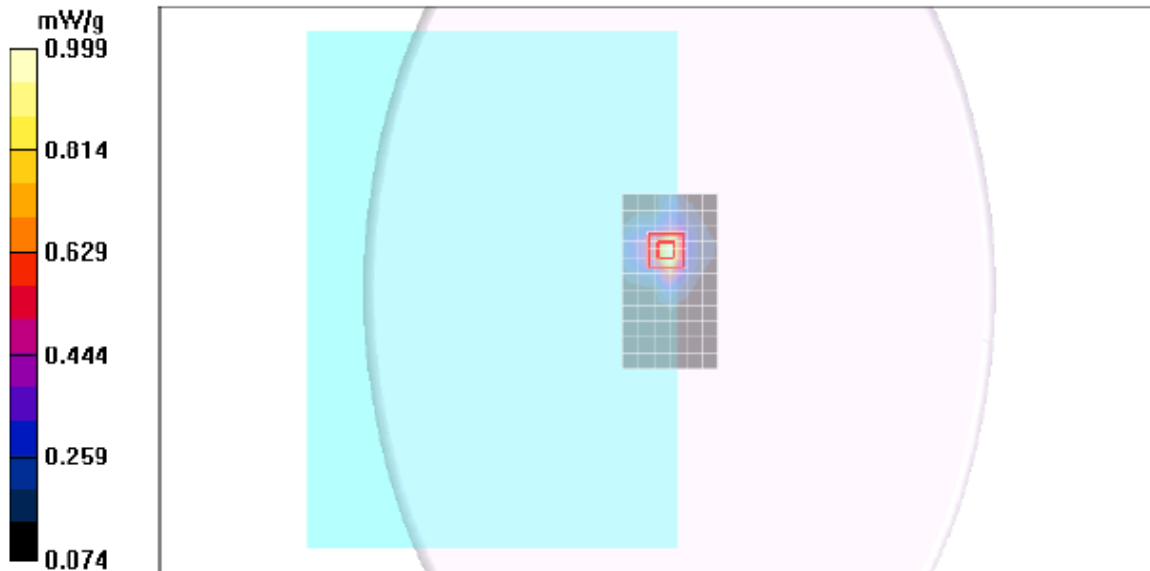
Reference Value = 14.0 V/m; Power Drift = 0.222 dB

Peak SAR (extrapolated) = 2.62 W/kg

**SAR(1 g) = 0.767 mW/g; SAR(10 g) = 0.300 mW/g**

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

Maximum value of SAR (measured) = 1.30 mW/g



5.2 GHz Band - Z-axis Plot

Date/Time: 10/7/2010 6:18:59 PM

Test Laboratory: Compliance Certification Services

**Lapheld\_5.2GHz HT40 SISO**

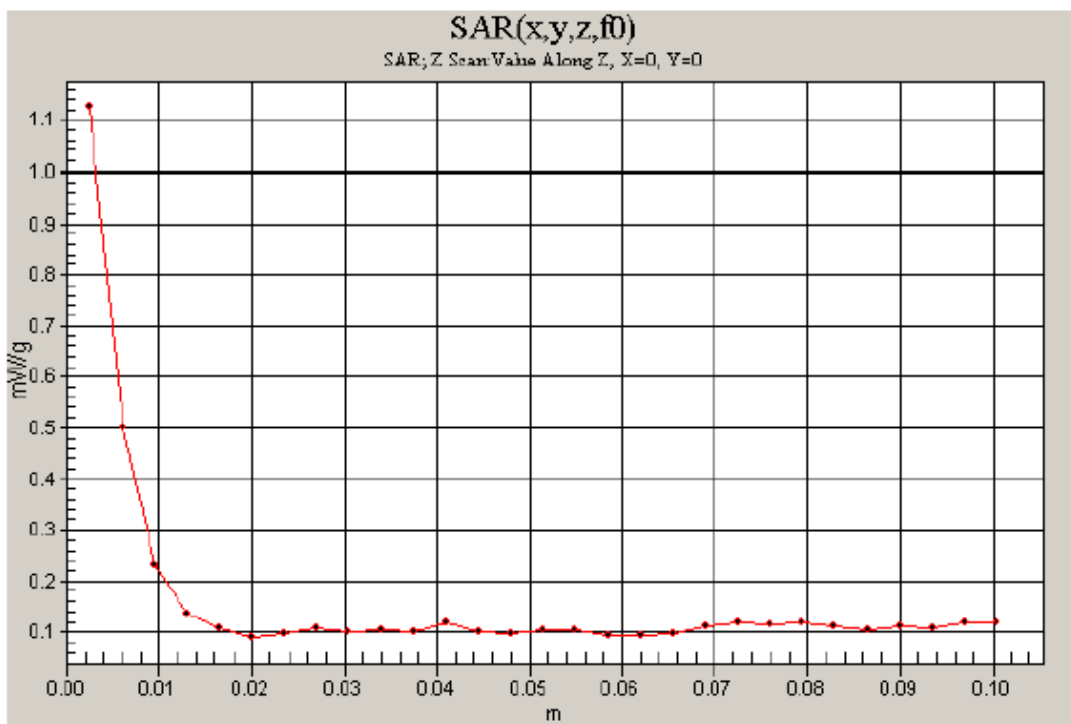
DUT: Apple; Type: NA; Serial: K16\_PT548958

Communication System: 802.11a 5.2GHz; Frequency: 5230 MHz; Duty Cycle: 1:1

**802.11n\_Aux Ant M-Ch 46/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) = 1.12 mW/g



### 5.3 GHz Band

Date/Time: 9/21/2010 2:09:40 PM

Test Laboratory: Compliance Certification Services

## Lapheld\_5.3GHz

DUT: Apple; Type: NA; Serial: K16\_PT548958

Communication System: 802.11a 5.2GHz; Frequency: 5300 MHz; Duty Cycle: 1:1  
Medium parameters used:  $f = 5300$  MHz;  $\sigma = 5.47$  mho/m;  $\epsilon_r = 49.1$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Flat Section

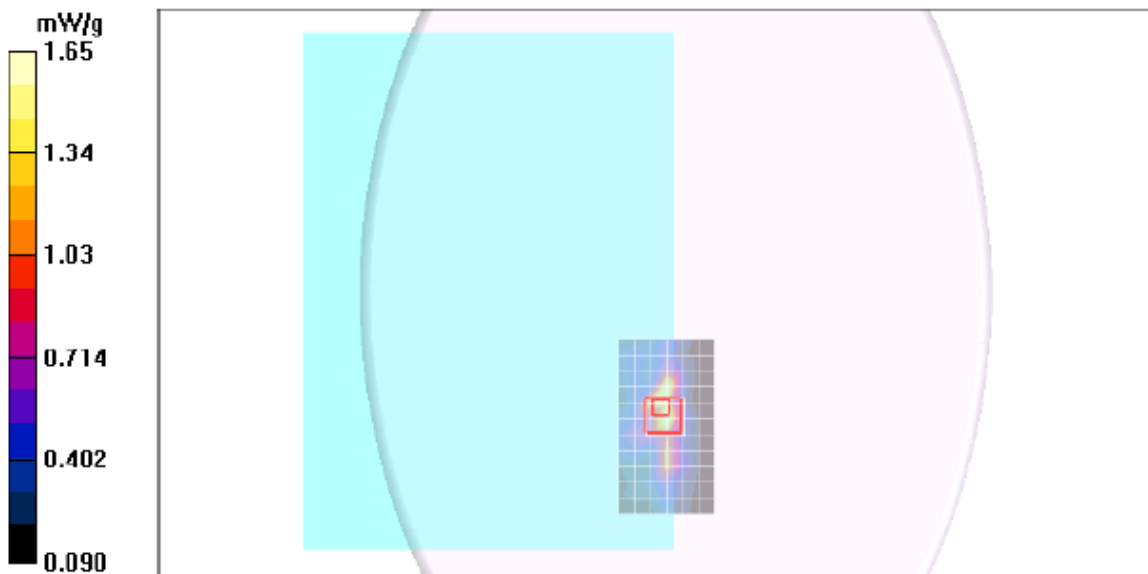
Room Ambient Temperature: 25.0 deg. C; Liquid Temperature: 24.0 deg. C

DASY4 Configuration:

- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Probe: EX3DV3 - SN3531; ConvF(3.79, 3.79, 3.79); Calibrated: 2/23/2010
- 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\_Main Ant M-Ch 60/Area Scan (7x12x1):** Measurement grid: dx=10mm, dy=10mm  
Maximum value of SAR (measured) = 1.65 mW/g

**802.11a\_Main Ant M-Ch 60/Zoom Scan (7x7x9)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=2.5mm  
Reference Value = 18.6 V/m; Power Drift = 0.069 dB  
Peak SAR (extrapolated) = 3.90 W/kg  
**SAR(1 g) = 1.1 mW/g; SAR(10 g) = 0.426 mW/g**  
Maximum value of SAR (measured) = 1.93 mW/g



5.3 GHz Band - Z-axis Plot

Date/Time: 9/21/2010 2:33:30 PM

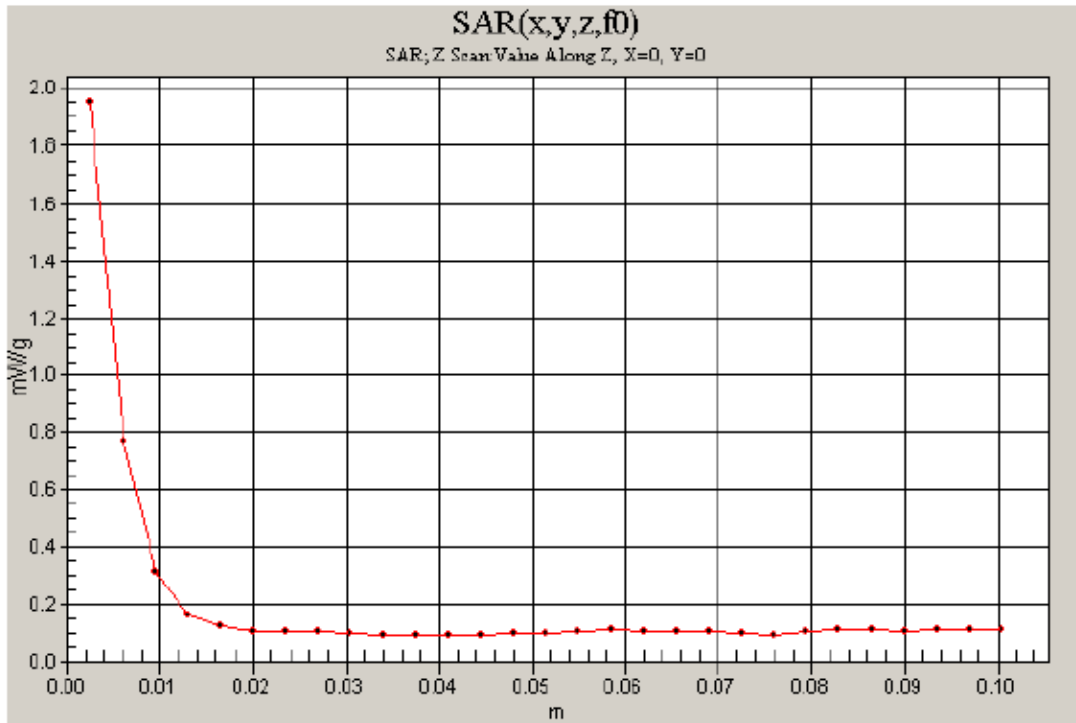
Test Laboratory: Compliance Certification Services

**Lapheld\_5.3GHz**

DUT: Apple; Type: NA; Serial: K16\_PT548958

Communication System: 802.11a 5.2GHz; Frequency: 5300 MHz; Duty Cycle: 1:1

**802.11a\_Main Ant M-Ch 60/Z Scan (1x1x29):** Measurement grid: dx=20mm, dy=20mm, dz=3.5mm  
Maximum value of SAR (measured) = 1.95 mW/g





5.5 GHz Band

Date/Time: 9/30/2010 6:48:12 PM

Test Laboratory: Compliance Certification Services

**Lapheld\_5.6GHz HT40 SISO**

DUT: Apple; Type: NA; Serial: K16\_PT548958

Communication System: 802.11a 5.6GHz; Frequency: 5590 MHz; Duty Cycle: 1:1  
Medium parameters used (interpolated):  $f = 5590$  MHz;  $\sigma = 5.65$  mho/m;  $\epsilon_r = 48$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
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: EX3DV3 - SN3531; ConvF(3.32, 3.32, 3.32); Calibrated: 2/23/2010
- 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

**802.11n\_Aux Ant M-Ch 118/Area Scan (7x12x1):** Measurement grid: dx=10mm, dy=10mm

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

Maximum value of SAR (measured) = 1.70 mW/g

**802.11n\_Aux Ant M-Ch 118/Zoom Scan (7x7x9)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

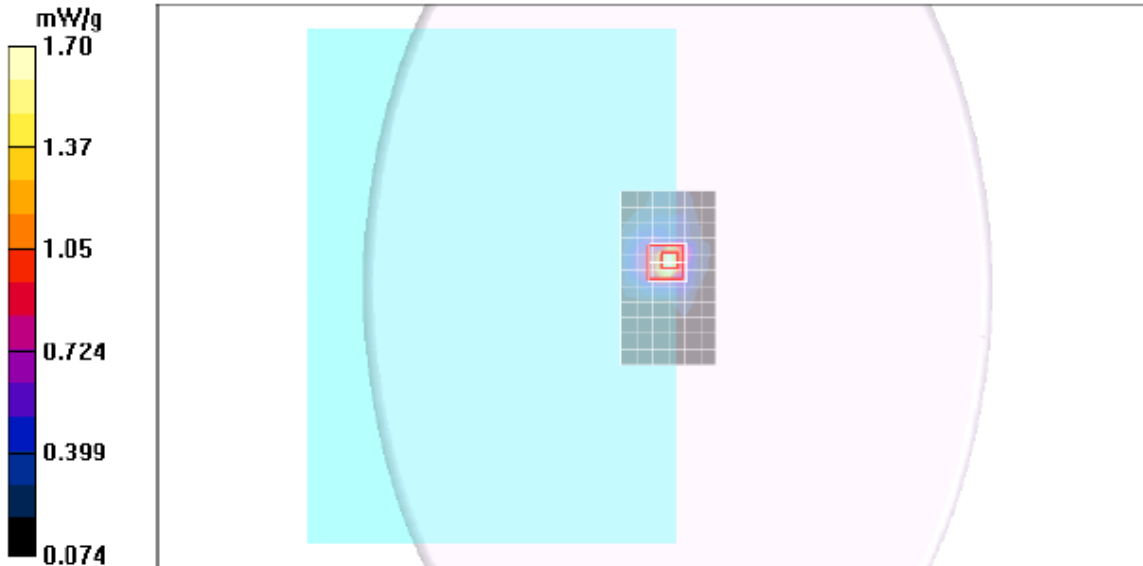
Reference Value = 18.7 V/m; Power Drift = -0.238 dB

Peak SAR (extrapolated) = 4.44 W/kg

**SAR(1 g) = 1.19 mW/g; SAR(10 g) = 0.469 mW/g**

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

Maximum value of SAR (measured) = 1.95 mW/g



5.5 GHz Band - Z-axis Plot

Date/Time: 9/30/2010 6:56:52 PM

Test Laboratory: Compliance Certification Services

**Lapheld\_5.6GHz HT40 SISO**

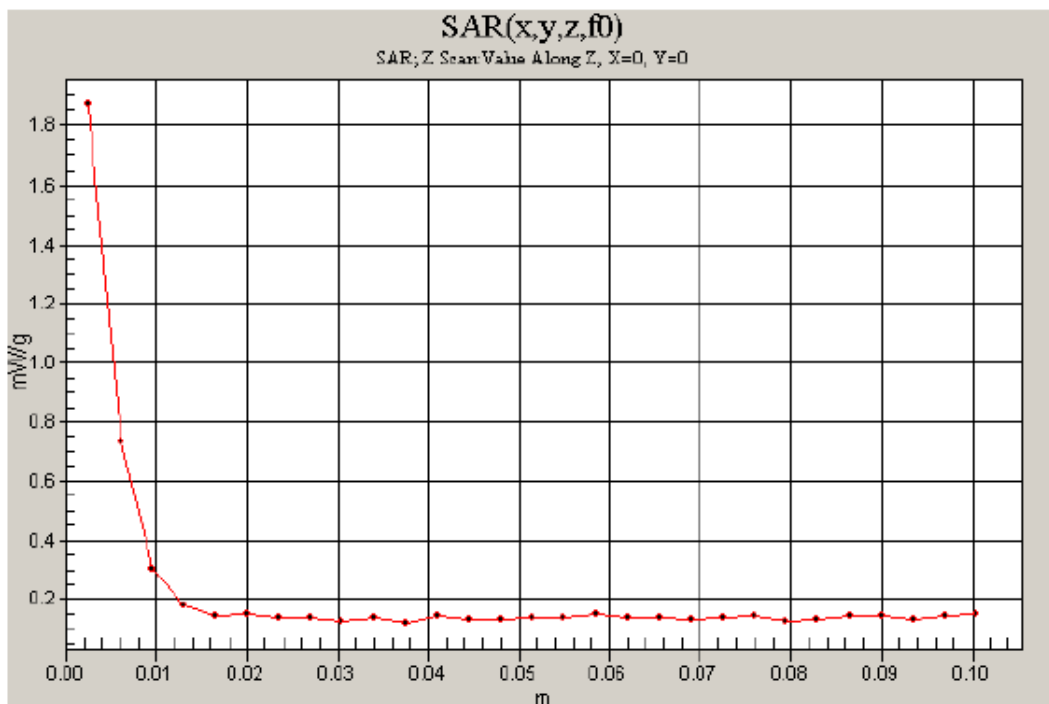
DUT: Apple; Type: NA; Serial: K16\_PT548958

Communication System: 802.11a 5.6GHz; Frequency: 5590 MHz; Duty Cycle: 1:1

**802.11n\_Aux Ant M-Ch118/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) = 1.87 mW/g



5.8 GHz Band

Date/Time: 9/30/2010 8:10:40 PM

Test Laboratory: Compliance Certification Services

**Lapheld\_5.8GHz HT40 SISO**

DUT: Apple; Type: NA; Serial: K16\_PT548958

Communication System: 802.11a 5.8GHz; Frequency: 5755 MHz; Duty Cycle: 1:1  
Medium parameters used (interpolated):  $f = 5755$  MHz;  $\sigma = 5.79$  mho/m;  $\epsilon_r = 47.4$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
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: EX3DV3 - SN3531; ConvF(3.48, 3.48, 3.48); Calibrated: 2/23/2010
- 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

**802.11n\_Aux Ant L-Ch 151/Area Scan (7x12x1):** Measurement grid: dx=10mm, dy=10mm

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

Maximum value of SAR (measured) = 1.77 mW/g

**802.11n\_Aux Ant L-Ch 151/Zoom Scan (7x7x9)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

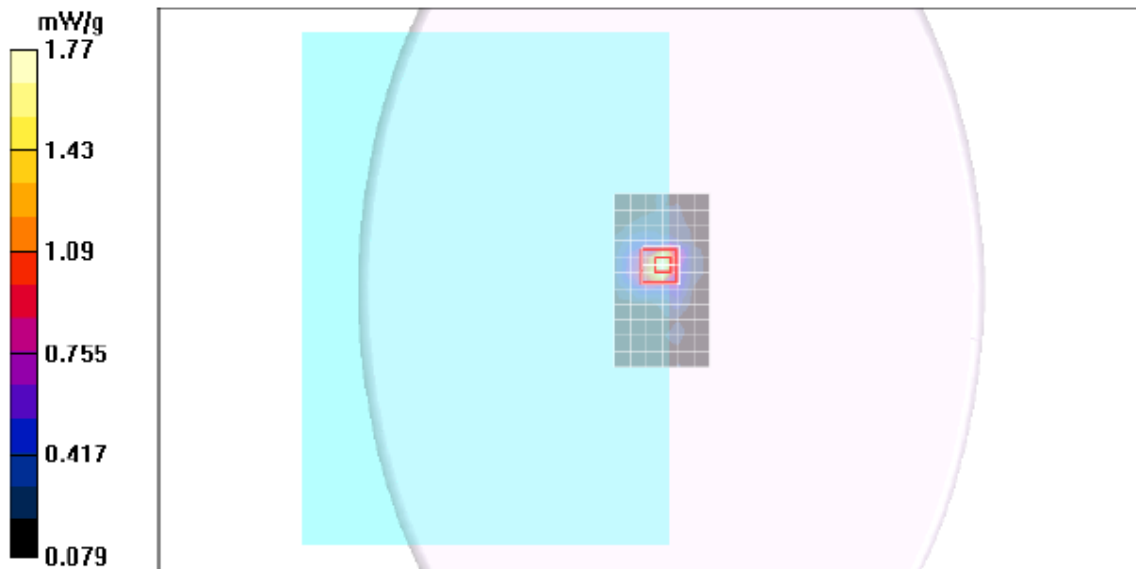
Reference Value = 19.2 V/m; Power Drift = -0.22 dB

Peak SAR (extrapolated) = 4.24 W/kg

**SAR(1 g) = 1.19 mW/g; SAR(10 g) = 0.478 mW/g**

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

Maximum value of SAR (measured) = 1.95 mW/g



5.8 GHz Band - Z-axis Plot

Date/Time: 9/30/2010 9:05:35 PM

Test Laboratory: Compliance Certification Services

**Lapheld\_5.8GHz HT40 SISO**

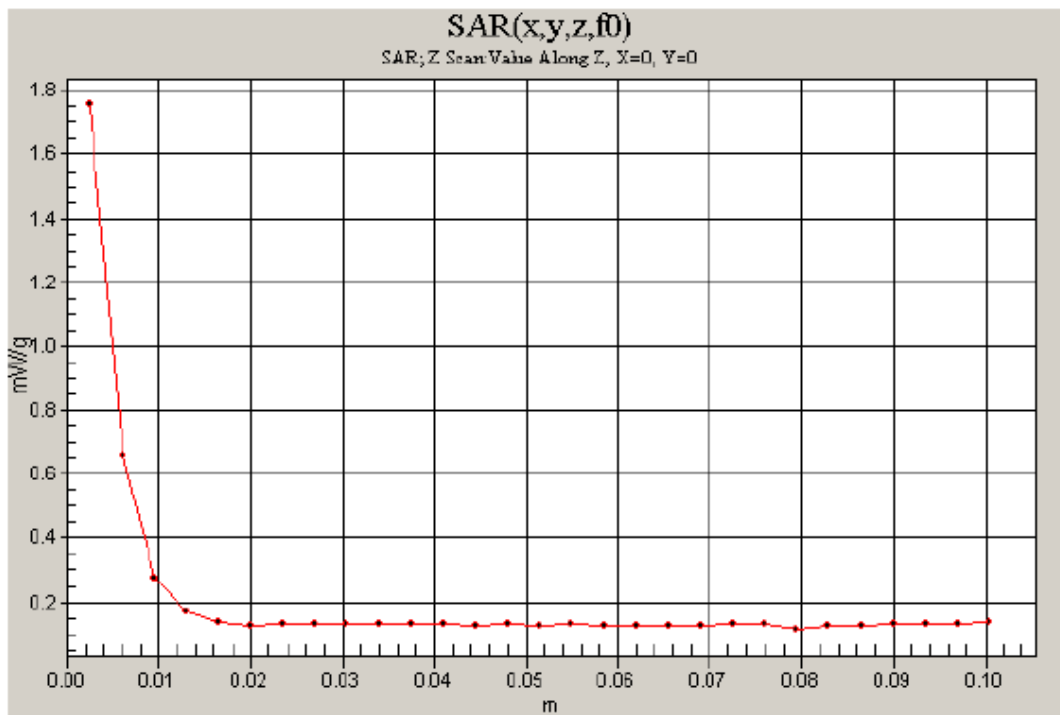
DUT: Apple; Type: NA; Serial: K16\_PT548958

Communication System: 802.11a 5.8GHz; Frequency: 5755 MHz; Duty Cycle: 1:1

**802.11n\_Aux Ant L-Ch 151/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) = 1.75 mW/g



## 12. ATTACHMENTS

<u>No.</u>	<u>Contents</u>	<u>No. of page (s)</u>
1-1	SAR Test Plots for 2.4 GHz for 11 inch MacBook Air	11
1-2	SAR Test Plots for 2.4 GHz for 13 inch MacBook Air	9
1-3	SAR Test Plots for 5 GHz for 11 inch MacBook Air	45
1-4	SAR Test Plots for 5 GHz for 13 inch MacBook Air	46
2	Certificate of E-Field Probe - EX3DV3 SN 3531	11
3	Certificate of System Validation Dipole - D2450 SN:706	9
4	Certificate of System Validation Dipole - D5GHzV2 SN:1075	9