



# A Test Lab Techno Corp.

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## SAR EVALUATION REPORT

<b>Test Report No.</b>	: 0810FS12-01
<b>Applicant</b>	: Quanta Computer Inc.
<b>FCC ID</b>	: HFS-NL
<b>Product Type</b>	: Notebook Computer
<b>Trade Mark</b>	: QCI
<b>Model Number</b>	: NL**(**=0~9 or a~z or A~Z or Blank)
<b>Dates of Test</b>	: Oct. 08 ~ Nov. 20, 2008
<b>Test Environment</b>	: Ambient Temperature : 22 ± 2 ° C Relative Humidity : 40 - 70 %
<b>Test Specification</b>	: Standard C95.1-1999 IEEE Std. 1528-2003 2.1093;FCC/OET Bulletin 65 Supplement C [July 2001] FCC : SAR Measurement Requirements For 802.11 a/b/g Transmitters RSS-102 Issue 2 -2005
<b>Max. SAR</b>	: 0.403 W/kg Body SAR
<b>Test Lab</b>	: Chang-An Lab



1. The test operations have to be performed with cautious behavior, the test results are as attached.
2. The test results are under chamber environment of A Test Lab Techno Corp. A Test Lab Techno Corp. does not assume responsibility for any conclusions and generalizations drawn from the test results with regard to other specimens or samples.
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## 1. Description of Equipment Under Test (EUT)

Applicant :

**Quanta Computer Inc.**

188 Wen Hwa 2nd Rd., Kuei Shan Hsiang, Tao Yuan Shien, Taiwan

**Manufacturer** : Quanta Computer Inc.  
**Manufacturer Address** : 188 Wen Hwa 2nd Rd., Kuei Shan Hsiang, Tao Yuan Shien, Taiwan  
**FCC ID** : HFS-NL  
**Model Name** : Notebook Computer  
**Trade Mark** : QCI  
**Model Number** : NL\*\*( \*\*=0~9 or a~z or A~Z or Blank)  
**Test Device** : Production Unit  
**Tx Frequency** : 2412 - 2462 MHz (802.11b/802.11g/802.11n 2.4G\_HT20)  
2422 - 2452 MHz (802.11n 2.4G\_HT40 )  
**Avg. RF Output Power** : 0.035 W (15.44 dBm ) 802.11b  
(Avg. Conducted Power) 0.025 W (14.00 dBm ) 802.11g  
0.029 W (14.56 dBm ) 802.11n 2.4G\_HT20  
0.028 W (14.47 dBm ) 802.11n 2.4G\_HT40  
**Max. SAR Measurement** : 0.403 W/kg Body SAR  
**HW Version** : NA  
**SW Version** : NA  
**Antenna Type** : Internal Type  
**Antenna Gain** : 0.3 dBi  
**Device Category** : Portable  
**RF Exposure Environment** : General Population / Uncontrolled  
**Power Option** : Standard  
**Application Type** : Certification

This wireless portable device has been shown to be capable of compliance for localized specific absorption rate (SAR) for uncontrolled environment / general population exposure limits specified in Standard C95.1-1999 and had been tested in accordance with the measurement procedures specified in IEEE Std. 1528-2003.



Figure 1. EUT Photo

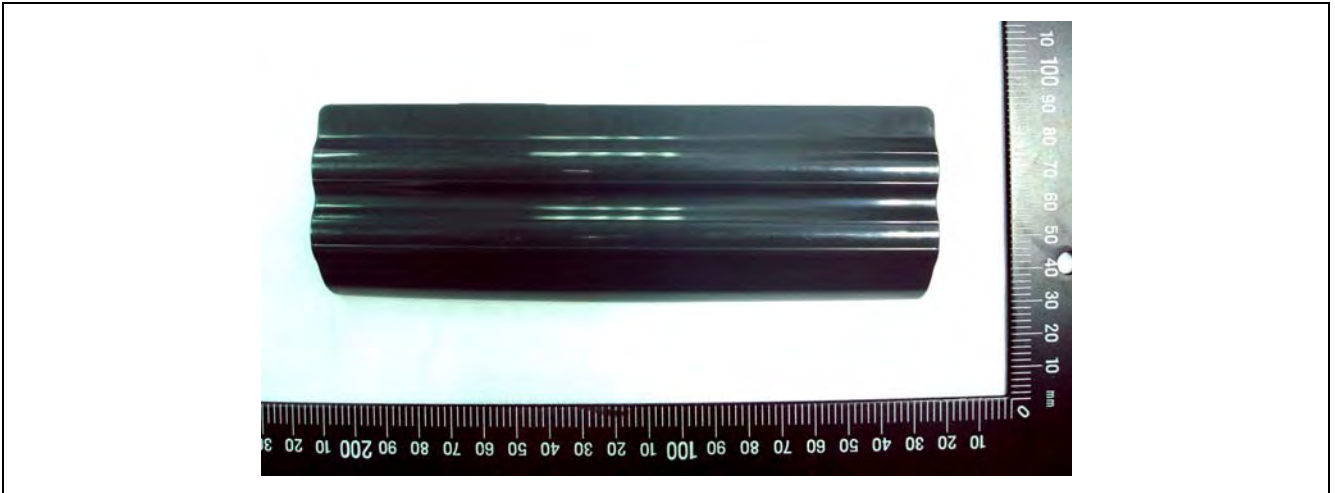


Figure 2. Battery



Figure 3. Adapter



## 2. Introduction

The A Test Lab Techno Corp. has performed measurements of the maximum potential exposure to the user of **Quanta Computer Inc. Trade Mark : QCI Model(s) : NL\*\*(\*\*=0~9 or a~z or A~Z or Blank)**. The test procedures, as described in American National Standards, Institute C95.1 - 1999 [ 1 ] , FCC/OET Bulletin 65 Supplement C [July 2001] were employed and they specify the maximum exposure limit of 1.6mW/g as averaged over any 1 gram of tissue for portable devices being used within 20cm between user and EUT in the uncontrolled environment. A description of the product and operating configuration, detailed summary of the test results, methodology and procedures used in the equipment used are included within this test report.



### 3. SAR Definition

Specific Absorption Rate (SAR) is defined as the time derivative (rate) of the incremental energy (dw) absorbed by (dissipated in) an incremental mass (dm) contained in a volume element (dv) of a given density ( $\rho$ ). It is also defined as the rate of RF energy absorption per unit mass at a point in an absorbing body (see Figure 4).

$$\text{SAR} = \frac{d}{dt} \left( \frac{dw}{dm} \right) = \frac{d}{dt} \left( \frac{dw}{\rho dv} \right)$$

Figure 4. SAR Mathematical Equation

**SAR is expressed in units of Watts per kilogram (W/kg)**

$$\text{SAR} = \frac{\sigma E^2}{\rho}$$

Where :

$\sigma$  = conductivity of the tissue (S/m)

$\rho$  = mass density of the tissue (kg/m<sup>3</sup>)

$E$  = RMS electric field strength (V/m)

\* **Note** :

The primary factors that control rate of energy absorption were found to be the wavelength of the incident field in relations to the dimensions and geometry of the irradiated organism, the orientation of the organism in relation to the polarity of field vectors, the presence of reflecting surfaces, and whether conductive contact is made by the organism with a ground plane [ 2 ]

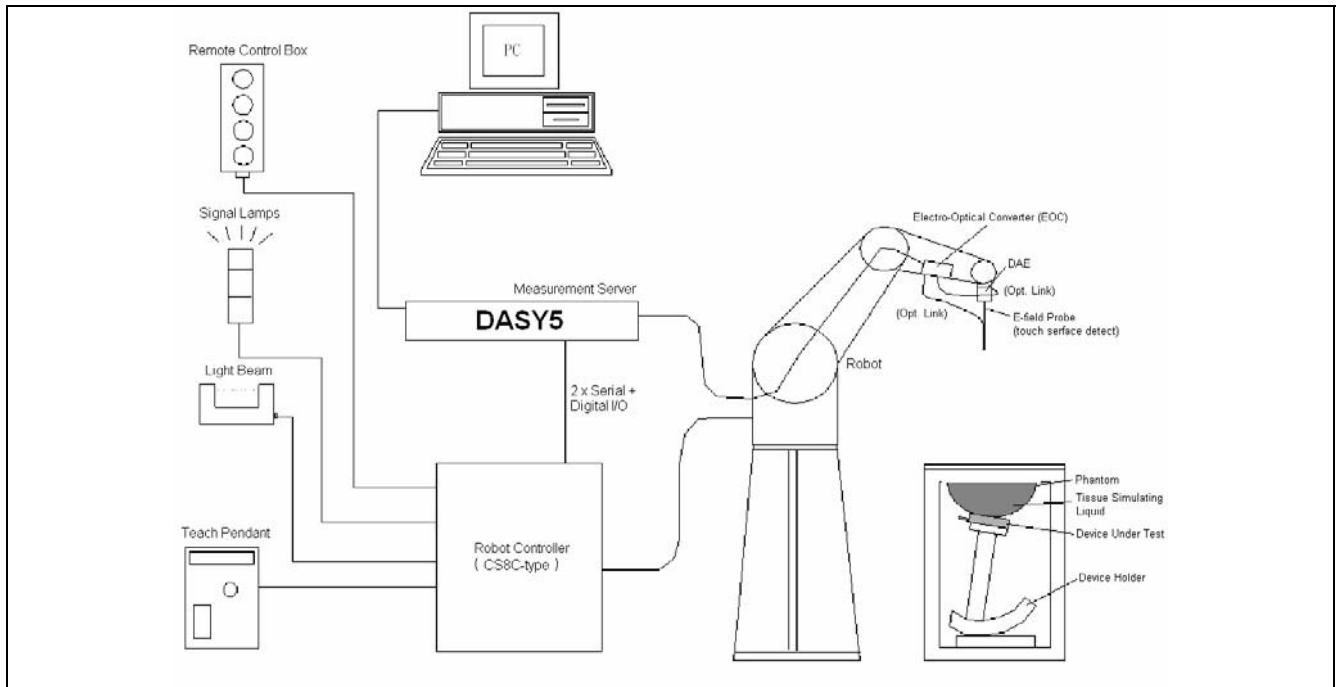


#### **4. SAR Measurement Setup**

These measurements were performed with the automated near-field scanning system DASY5 from Schmid & Partner Engineering AG (SPEAG). The system is based on a high precision robot (working range greater than 0.9m) which positions the probes with a positional repeatability of better than  $\pm 0.02\text{mm}$ . Special E- and H-field probes have been developed for measurements close to material discontinuity, the sensors of which are directly loaded with a Schottky diode and connected via highly resistive lines (length = 300mm) to the data acquisition unit.

A cell controller system contains the power supply, robot controller, teach pendant (Joystick), and remote control, is used to drive the robot motors. The Measurement Server is based on a PC/104 CPU board with a 400MHz intel ULV Celeron, 128MB chipdisk and 128MB RAM. The necessary circuits for communication with either the DAE4 (or DAE3) electronic box as well as the 16-bit AD-converter system for optical detection and digital I/O interface are contained on the DASY5 I/O-board, which is directly connected to the PC/104 bus of the CPU board. The PC consists of the Intel Core(TM)2 CPU @1.86GHz computer with Windows XP system and SAR Measurement Software DASY5, Post Processor SEMCAD, monitor, mouse, and keyboard. The Staubli Robot is connected to the cell controller to allow software manipulation of the robot. A data acquisition electronic (DAE) circuit performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection...etc. is connected to the Electro-optical converter (EOC). The EOC performs the conversion from the optical into digital electric signal of the DAE and transfers data to the Measurement Server.





**Figure 5. SAR Lab Test Measurement Setup**

The DAE4 (or DAE3) consists of a highly sensitive electrometer-grade preamplifier with auto-zeroing, a channel and gain-switching multiplexer, a fast 16 bit AD-converter and a command decoder and control logic unit. Transmission to the PC-card is accomplished through an optical downlink for data and status information and an optical uplink for commands and clock lines. The mechanical probe mounting device includes two different sensor systems for frontal and sidewise probe contacts. They are also used for mechanical surface detection and probe collision detection. The robot uses its own controller with a built in VME-bus computer. The system is described in detail in [ 3 ] .



## **5. System Components**

### **5.1 DASYS E-Field Probe System**

The SAR measurements were conducted with the dosimetric probe (manufactured by SPEAG), designed in the classical triangular configuration [ 3 ] and optimized for dosimetric evaluation. The probe is constructed using the thick film technique; with printed resistive lines on ceramic substrates. The probe is equipped with an optical multi-fiber line ending at the front of the probe tip. It is connected to the EOC box on the robot arm and provides an automatic detection of the phantom surface. Half of the fibers are connected to a pulsed infrared transmitter, the other half to a synchronized receiver. As the probe approaches the surface, the reflection from the surface produces a coupling from the transmitting to the receiving fibers. This reflection increases first during the approach, reaches maximum and then decreases. If the probe is flatly touching the surface, the coupling is zero. The distance of the coupling maximum to the surface is independent of the surface reflectivity and largely independent of the surface to probe angle. The DASYS software reads the reflection during a software approach and looks for the maximum using a 2nd order fitting. The approach is stopped when reaching the maximum.

### 5.1.1 E-Field Probe Specification

<b>Construction</b>	<p>Symmetrical design with triangular core</p> <p>Built-in optical fiber for surface detection System</p> <p>Built-in shielding against static charges</p> <p>PEEK enclosure material</p> <p>(resistant to organic solvents, e.q., glycol)</p>
<b>Calibration</b>	<p>In air from 10 MHz to 6 GHz</p> <p>In brain and muscle simulating tissue at frequencies of 450MHz, 900MHz, 1800MHz, 2000MHz, 1950MHz, 2300MHz, 2450MHz, 2600MHz, 3500MHz, 5200MHz, 5500MHz and 5800MHz (accuracy <math>\pm 8\%</math>)</p> <p>Calibration for other liquids and frequencies upon request</p>
<b>Frequency</b>	<p>10 MHz to &gt; 6 GHz; Linearity: <math>\pm 0.2</math> dB</p> <p>(30 MHz to 3 GHz)</p>
<b>Directivity</b>	<p><math>\pm 0.3</math> dB in brain tissue (rotation around probe axis)</p> <p><math>\pm 0.5</math> dB in brain tissue (rotation normal probe axis)</p>
<b>Dynamic Range</b>	<p>10 <math>\mu</math> W/g to &gt; 100mW/g; Linearity: <math>\pm 0.2</math>dB</p>
<b>Surface Detection</b>	<p><math>\pm 0.2</math> mm repeatability in air and clear liquids over diffuse reflecting surface</p>
<b>Dimensions</b>	<p>Overall length: 330mm</p> <p>Tip length: 20mm</p> <p>Body diameter: 12mm</p> <p>Tip diameter: 2.5mm</p> <p>Distance from probe tip to dipole centers: 1.0mm</p>
<b>Application</b>	<p>General dosimetry up to 6GHz</p> <p>Compliance tests of mobile phones</p> <p>Fast automatic scanning in arbitrary phantoms</p>



**Figure 6.**  
E-field Probe



**Figure 7.**  
Probe setup on robot



### 5.1.2 E-Field Probe Calibration

Each probe is calibrated according to a dosimetric assessment procedure described in [ 4 ] with accuracy better than  $\pm 10\%$ . The spherical isotropy was evaluated with the procedure described in [ 5 ] and found to be better than  $\pm 0.25\text{dB}$ . The sensitivity parameters (NormX, NormY, and NormZ), the diode compression parameter (DCP) and the conversion factor (ConvF) of the probe are tested.

The free space E-field from amplified probe outputs is determined in a test chamber. This is performed in a TEM cell for frequencies below 1GHz, and in a wave guide above 1GHz for free space. For the free space calibration, the probe is placed in the volumetric center of the cavity and at the proper orientation with the field. The probe is then rotated 360 degrees.

E-field temperature correlation calibration is performed in a flat phantom filled with the appropriate simulated brain tissue. The measured free space E-field in the medium correlates to temperature rise in a dielectric medium. For temperature correlation calibration a RF transparent thermistor-based temperature probe is used in conjunction with the E-field probe.

$$\text{SAR} = C \frac{\Delta T}{\Delta t}$$

Where :

$\Delta t$  = Exposure time (30 seconds),

$C$  = Heat capacity of tissue (head or body),

$\Delta T$  = Temperature increase due to RF exposure.

Or

$$\text{SAR} = \frac{|E|^2 \sigma}{\rho}$$

Where :

$\sigma$  = Simulated tissue conductivity,

$\rho$  = Tissue density ( $\text{kg/m}^3$ ).



## 5.2 Data Acquisition Electronic (DAE) System

### Cell Controller

Processor : Intel Core(TM)2 CPU  
Clock Speed : @ 1.86GHz  
Operating System : Windows XP Professional

### Data Converter

Features : Signal Amplifier, multiplexer, A/D converter, and control logic  
Software : DASY5 v5.0 (Build 120) & SEMCAD X Version 13.2 Build 87  
Connecting Lines : Optical downlink for data and status info  
Optical uplink for commands and clock

## 5.3 Robot

Positioner : Stäubli Unimation Corp. Robot Model: TX90XL  
Repeatability :  $\pm 0.02$  mm  
No. of Axis : 6

## 5.4 Measurement Server

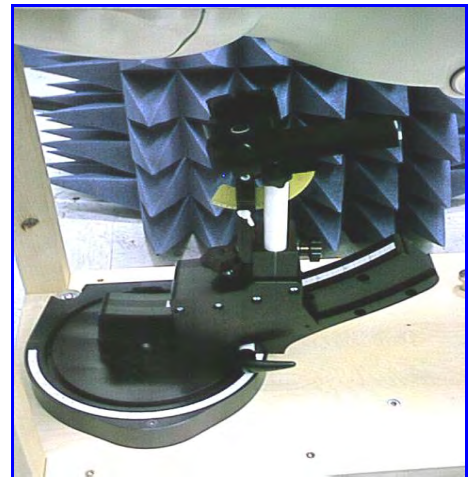
Processor : PC/104 with a 400MHz intel ULV Celeron  
I/O-board : Link to DAE4(or DAE3)  
16-bit A/D converter for surface detection system  
Digital I/O interface  
Serial link to robot  
Direct emergency stop output for robot

## 5.5 Device Holder for Transmitters

In combination with the SAM Twin Phantom V4.0, the Mounting Device (POM) enables the rotation of the mounted transmitter in spherical coordinates whereby the rotation points is the ear opening. The devices can be easily, accurately, and repeat ably positioned according to the IEEE SCC34-SC2 and CENELEC specifications. The device holder can be locked at different phantom locations (left head, right head, and flat phantom).

**\*Note** : A simulating human hand is not used due to the complex anatomical and geometrical structure of the hand that may produced infinite number of configurations [ 6 ] . To produce the worst-case condition (the hand absorbs antenna output power), the hand is omitted during the tests.

Larger DUT cannot be tested using this device holder. Instead a support of bigger polystyrene cubes and thin polystyrene plates is used to position the DUT in all relevant positions to find and measure spots with maximum SAR values. Therefore those devices are normally only tested at the flat part of the SAM.



**Figure 8. Device Holder**

## 5.6 Oval Flat Phantom - ELI 4.0

The shell corresponds to the specifications of the Specific Anthropomorphic Mannequin (Oval Flat) phantom defined in IEEE 1528-2003, CENELEC 50361 and IEC 62209. It enables the dosimetric evaluation of wireless portable device usage as well as body mounted usage at the flat phantom region. A cover prevents evaporation of the liquid. Reference markings on the phantom allow the complete setup of all predefined phantom positions and measurement grids by manually teaching three points with the robot.

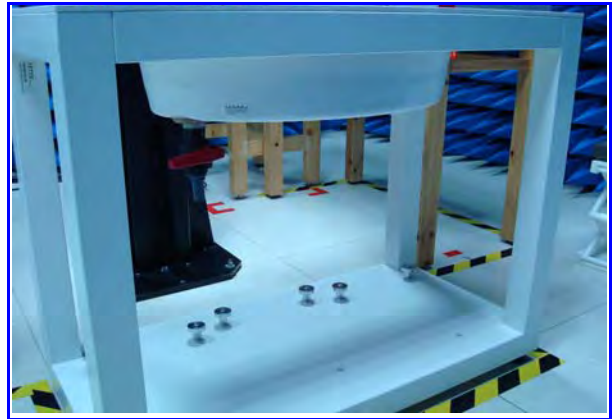


Figure 9. Oval Flat Phantom

<b>Shell Thickness</b>	2 ±0.2 mm
<b>Filling Volume</b>	Approx. 30 liters
<b>Dimensions</b>	190×600×400 mm (H×L×W)

Table 1. Specification of ELI 4.0

## 5.7 Data Storage and Evaluation

### 5.7.1 Data Storage

The DASY5 software stores the assessed data from the data acquisition electronics as raw data (in microvolt readings from the probe sensors), together with all the necessary software parameters for the data evaluation (probe calibration data, liquid parameters and device frequency and modulation data) in measurement files with the extension DA5. The post processing software evaluates the desired unit and format for output each time the data is visualized or exported. This allows verification of the complete software setup even after the measurement and allows correction of erroneous parameter settings. For example, if a measurement has been performed with an incorrect crest factor parameter in the device setup, the parameter can be corrected afterwards and the data can be reevaluated.



### 5.7.2 Data Evaluation

The DASY5 post processing software (SEMCAD) automatically executes the following procedures to calculate the field units from the microvolt readings at the probe connector. The parameters used in the evaluation are stored in the configuration modules of the software :

<b>Probe parameters :</b>	- Sensitivity	Normi, ai0, ai1, ai2
	- Conversion factor	ConvFi
	- Diode compression point	dcp <sub>i</sub>
<b>Device parameters :</b>	- Frequency	f
	- Crest factor	cf
<b>Media parameters :</b>	- Conductivity	$\sigma$
	- Density	$\rho$

These parameters must be set correctly in the software. They can be found in the component documents or they can be imported into the software from the configuration files issued for the DASY components. In the direct measuring mode of the multimeter option, the parameters of the actual system setup are used. In the scan visualization and export modes, the parameters stored in the corresponding document files are used.

The first step of the evaluation is a linearization of the filtered input signal to account for the compression characteristics of the detector diode. The compensation depends on the input signal, the diode type and the DC-transmission factor from the diode to the evaluation electronics. If the exciting field is pulsed, the crest factor of the signal must be known to correctly compensate for peak power. The formula for each channel can be given as :

$$V_i = U_i + U_i^2 \cdot \frac{cf}{dcp_i}$$

- with
- $V_i$  = compensated signal of channel  $i$  ( $i = x, y, z$ )
  - $U_i$  = input signal of channel  $i$  ( $i = x, y, z$ )
  - $cf$  = crest factor of exciting field (DASY parameter)
  - $dcp_i$  = diode compression point (DASY parameter)

From the compensated input signals the primary field data for each channel can be evaluated :

**E-field probes :**

$$E_i = \sqrt{\frac{V_i}{Norm_i \cdot ConvF}}$$





**H-field probes :**

$$H_i = \sqrt{V_i} \cdot \frac{a_{i0} + a_{i1}f + a_{i2}f^2}{f}$$

- with  $V_i$  = compensated signal of channel  $i$  ( $i = x, y, z$ )  
 $Norm_i$  = sensor sensitivity of channel  $i$  ( $i = x, y, z$ )  
 $\mu V/(V/m)^2$  for E-field Probes  
 $ConvF$  = sensitivity enhancement in solution  
 $a_{ij}$  = sensor sensitivity factors for H-field probes  
 $f$  = carrier frequency [GHz]  
 $E_i$  = electric field strength of channel  $i$  in V/m  
 $H_i$  = magnetic field strength of channel  $i$  in A/m

The RSS value of the field components gives the total field strength (Hermitian magnitude) :

$$E_{tot} = \sqrt{E_x^2 + E_y^2 + E_z^2}$$

The primary field data are used to calculate the derived field units.

$$SAR = E_{tot}^2 \cdot \frac{\sigma}{\rho \cdot 1000}$$

- with  $SAR$  = local specific absorption rate in mW/g  
 $E_{tot}$  = total field strength in V/m  
 $\sigma$  = conductivity in [mho/m] or [Siemens/m]  
 $\rho$  = equivalent tissue density in  $g/cm^3$

**\*Note :** that the density is set to 1, to account for actual head tissue density rather than the density of the tissue simulating liquid.

The power flow density is calculated assuming the excitation field to be a free space field.

$$P_{pwe} = \frac{E_{tot}^2}{3770} \quad \text{or} \quad P_{pwe} = \frac{H_{tot}^2}{37.7}$$

- with  $P_{pwe}$  = equivalent power density of a plane wave in  $mW/cm^2$   
 $E_{tot}$  = total electric field strength in V/m  
 $H_{tot}$  = total magnetic field strength in A/m



## 6. Test Equipment List

Manufacturer	Name of Equipment	Type/Model	Serial Number	Calibration	
				Last Cal.	Due Date
SPEAG	Dosimetric E-Filed Probe	ES3DV3	3150	Jan. 09, 2008	Jan. 09, 2009
SPEAG	2450MHz System Validation Kit	D2450V2	712	Jan. 30, 2008	Jan. 30, 2009
SPEAG	Data Acquisition Electronics	DAE4	779	Nov. 30, 2007	Nov. 30, 2008
SPEAG	Data Acquisition Electronics	DAE3	393	Aug. 25, 2008	Aug. 25, 2009
SPEAG	Device Holder	N/A	N/A	NCR	NCR
SPEAG	Phantom ELI 4.0	QD OVA 001 BB	1036	NCR	NCR
SPEAG	Robot	Staubli TX90XL	F07/564ZA1/C/01	NCR	NCR
SPEAG	Software	DASY5 V5.0 Build 120	N/A	NCR	NCR
SPEAG	Software	SEMCAD V13.2 Build 87	N/A	NCR	NCR
SPEAG	Measurement Server	SE UMS 011 AA	1025	NCR	NCR
Agilent	ENA Series Network Analyzer	E5071B	MY42404650	Feb. 18, 2008	Feb. 18, 2009
Agilent	Dielectric Probe Kit	85070C	US99360094	NCR	NCR
R&S	Power Sensor	NRP-Z22	100179	Apr. 23, 2008	Apr. 23, 2009
Agilent	Signal Generator	E8257D	MY44320425	Jul. 03, 2008	Jul. 03, 2009
Agilent	Dual Directional Coupler	778D	50334	NCR	NCR
Mini-Circuits	Power Amplifier	ZHL-42W-SMA	D111103#5	NCR	NCR
Mini-Circuits	Power Amplifier	ZVE-8G-SMA	D042005 671800514	NCR	NCR

**Table 2. Test Equipment List**



## 7. Tissue Simulating Liquids

The mixture is calibrated to obtain proper dielectric constant (permittivity) and conductivity of the tissue.

The dielectric parameters of the liquids were verified prior to the SAR evaluation using an 85070C Dielectric Probe Kit and an 8720ES Network Analyzer.

INGREDIENT	FREQUENCY
	MSL2.4G (Body)
Water	68.64%
DGBE	31.37%

INGREDIENT	FREQUENCY
	MSL5G (Body)
Water	78%
Mineral Oil	11%
Emulsifiers	9%
Additives and Salt	2%

**Table 3. Recipes for Head & Body Tissue Simulating Liquids**

### IEEE SCC-34/SC-2 in 1528 recommended Tissue Dielectric Parameters

The head tissue dielectric parameters recommended by the IEEE SCC-34/SC-2 in 1528 have been incorporated in the following table. These head parameters are derived from planar layer models simulating the highest expected SAR for the dielectric properties and tissue thickness variations in human head. Other head and body tissue parameters that have not been specified in 1528 are derived from the tissue dielectric parameters computed from the 4-Cole-Cole equation and extrapolated according to the head parameter specified in 1528.



Target Frequency	Head		Body	
(MHz)	$\epsilon_r$	$\sigma$ (S/m)	$\epsilon_r$	$\sigma$ (S/m)
150	52.3	0.76	61.9	0.80
300	45.3	0.87	58.2	0.92
450	43.5	0.87	56.7	0.94
835	41.5	0.90	55.2	0.97
900	41.5	0.97	55.0	1.05
915	41.5	0.98	55.0	1.06
1450	40.5	1.20	54.0	1.30
1610	40.3	1.29	53.8	1.40
1800 - 2000	40.0	1.40	53.3	1.52
2300	-	-	52.9	1.80
2450	39.2	1.80	52.7	1.95
2600	-	-	52.5	2.16
3000	38.5	2.40	52.0	2.73
5200	36.0	4.66	49.0	5.30
5200	35.6	5.0	48.6	5.6
5800	35.3	5.27	48.2	6.00

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

**Table 4. Tissue dielectric parameters for head and body phantoms**



## 7.1 Liquid Confirmation

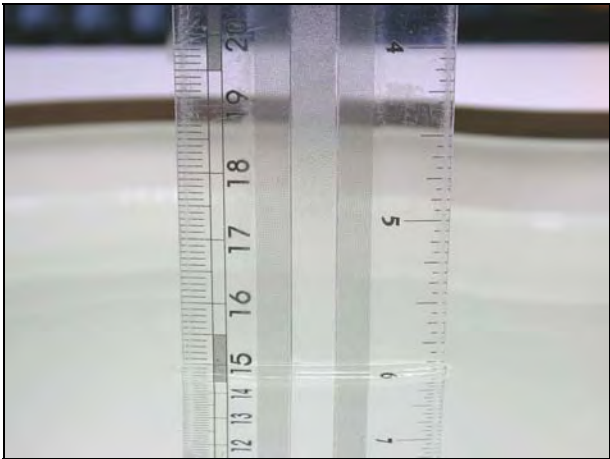
### 7.1.1 Parameters

<b>Liquid Verify</b>								
Ambient Temperature : 22 ± 2 °C ; Relative Humidity : 40 -70%								
Liquid Type	Frequency	Temp (°C)	Parameters	Target Value	Measured Value	Deviation (%)	Limit (%)	Measured Date
2450MHz Body	2450MHz	22.0	$\epsilon_r$	52.70	51.7	-1.93	± 5	Oct. 29, 2008
			$\sigma$	1.95	1.95	0.00	± 5	
2450MHz Body	2450MHz	22.0	$\epsilon_r$	52.70	51.7	-1.93	± 5	Oct. 30, 2008
			$\sigma$	1.95	1.95	0.00	± 5	
2450MHz Body	2450MHz	22.0	$\epsilon_r$	52.70	51.7	-1.93	± 5	Nov. 02, 2008
			$\sigma$	1.95	1.95	0.00	± 5	
2450MHz Body	2450MHz	22.0	$\epsilon_r$	52.70	50.5	-0.04	± 5	Nov. 19, 2008
			$\sigma$	1.95	1.95	0.00	± 5	
2450MHz Body	2412MHz	22.0	$\epsilon_r$	52.75	51.8	-0.02	± 5	Oct. 29, 2008
			$\sigma$	1.91	1.90	-0.01	± 5	
2450MHz Body	2422MHz	22.0	$\epsilon_r$	52.74	51.7	-0.02	± 5	Oct. 30, 2008
			$\sigma$	1.92	1.91	-0.01	± 5	
2450MHz Body	2437MHz	22.0	$\epsilon_r$	52.72	51.7	-0.02	± 5	Nov. 02, 2008
			$\sigma$	1.94	1.93	0.00	± 5	
2450MHz Body	2452MHz	22.0	$\epsilon_r$	52.70	51.7	-0.02	± 5	Nov. 02, 2008
			$\sigma$	1.95	1.95	0.00	± 5	
2450MHz Body	2462MHz	22.0	$\epsilon_r$	52.68	51.6	-0.02	± 5	Nov. 02, 2008
			$\sigma$	1.97	1.96	-0.01	± 5	

**Table 5. Measured Tissue dielectric parameters for head and body phantoms**

### 7.1.2 Liquid Depth

The liquid level was during measurement 15cm  $\pm$ 0.5cm.



**Figure 10. Head-Tissue-Simulating-Liquid**



**Figure 11. Body-Tissue-Simulating-Liquid**



## 8. Measurement Process

### 8.1 Device and Test Conditions

The Test Device was provided by **Quanta Computer Inc.** for this evaluation. The spatial peak SAR values were assessed for the lowest, middle and highest channels defined by below table. The antenna(s), battery and accessories shall be those specified by the manufacturer. The battery shall be fully charged before each measurement and there shall be no external connections.

#### Frequency & Conducted power list

<b>Usage</b>	Operates with a built-in test mode by client
<b>Simulating human Head/Body</b>	Body
<b>EUT Power Source</b>	USB Interface

Band	Rate	CH	Frequency (MHz)	Conducted power (dBm)		Worst Case
				Avg.	Peak	
802.11 b	1 M	1	2412	15.44	17.61	■
		6	2437	15.40	17.59	□
		11	2462	15.30	17.55	□
	11 M	1	2412	15.22		□
		6	2437	15.10		□
		11	2462	15.05		□
802.11 g	6 M	1	2412	13.50	21.10	□
		6	2437	14.00	21.12	■
		11	2462	13.50	20.30	□
	54 M	1	2412	13.20		□
		6	2437	13.15		□
		11	2462	13.08		□



Band	Rate	CH	Frequency (MHz)	Conducted power (dBm)		Worst Case
				Avg.	Peak	
802.11 n 2.4G _HT20	6.5 M	1	2412	14.50	20.66	<input type="checkbox"/>
		6	2437	14.56	20.67	<input checked="" type="checkbox"/>
		11	2462	14.42	20.10	<input type="checkbox"/>
	65 M	1	2412	14.22		<input type="checkbox"/>
		6	2437	14.35		<input type="checkbox"/>
		11	2462	14.10		<input type="checkbox"/>
802.11 n 2.4G_HT40	13 M	3	2422	14.32	20.61	<input type="checkbox"/>
		6	2437	14.47	20.72	<input checked="" type="checkbox"/>
		9	2452	14.28	20.71	<input type="checkbox"/>
	130 M	3	2422	14.09		<input type="checkbox"/>
		6	2437	14.15		<input type="checkbox"/>
		9	2452	14.02		<input type="checkbox"/>





Test Mode of Body						
Channel				Frequency (MHz)	Normal Mode	Tablet Mode
802.11 b	Rate 1	Lowest	1	2412	■	■
		Middle	6	2437	□	□
		Highest	11	2462	□	□
	Rate 11	Lowest	1	2412	■	■
		Middle	6	2437	□	■
		Highest	11	2462	□	■
802.11 g	Rate 6	Lowest	1	2412	■	■
		Middle	6	2437	□	■
		Highest	11	2462	□	■
	Rate 54	Lowest	1	2412	■	■
		Middle	6	2437	□	□
		Highest	11	2462	□	□
802.11 n 2.4G_HT20	Rate 6.5	Lowest	1	2412	■	■
		Middle	6	2437	□	■
		Highest	11	2462	□	■
802.11 n 2.4G_HT40	Rate 13	Lowest	3	2422	■	■
		Middle	6	2437	□	■
		Highest	9	2452	□	■
Comment: 1. The 802.11b (Rate11)'s SAR value was more high than 802.11b (Rate1) condition and the tablet mode SAR value was more high than normal mode. 2. The 802.11g (Rate6)'s SAR value was more high than 802.11g (Rate54) condition and the tablet mode SAR value was more high than normal mode. 3. The 802.11n_HT20's (tablet mode) SAR value was more high than 802.11 n_HT20 (normal mode) condition. 4. The 802.11n_HT40's (tablet mode) SAR value was more high than 802.11 n_HT40 (normal mode) condition.						

Note: ■ be test, □ not to test.

## 8.2 System Performance Check

### 8.2.1 Symmetric Dipoles for System Validation

<b>Construction</b>	Symmetrical dipole with 1/4 balun enables measurement of feed point impedance with NWA matched for use near flat phantoms filled with head simulating solutions Includes distance holder and tripod adaptor Calibration Calibrated SAR value for specified position and input power at the flat phantom in head simulating solutions.
<b>Frequency</b>	450, 900, 1800, 2000, 2450, 5200MHz, 5800MHz
<b>Return Loss</b>	> 20 dB at specified validation position
<b>Power Capability</b>	> 100 W (f < 1GHz); > 40 W (f > 1GHz)
<b>Options</b>	Dipoles for other frequencies or solutions and other calibration conditions are available upon request
<b>Dimensions</b>	D450V2 : dipole length 270 mm; overall height 330 mm D900V2 : dipole length 149 mm; overall height 330 mm D1800V2 : dipole length 72 mm; overall height 300 mm D2000V2 : dipole length 65 mm; overall height 300 mm D2450V2 : dipole length 51.5 mm; overall height 300 mm D5GHzV2 : dipole length 20.6 mm; overall height 450 mm



**Figure 12. Validation Kit**



## 8.2.2 Validation

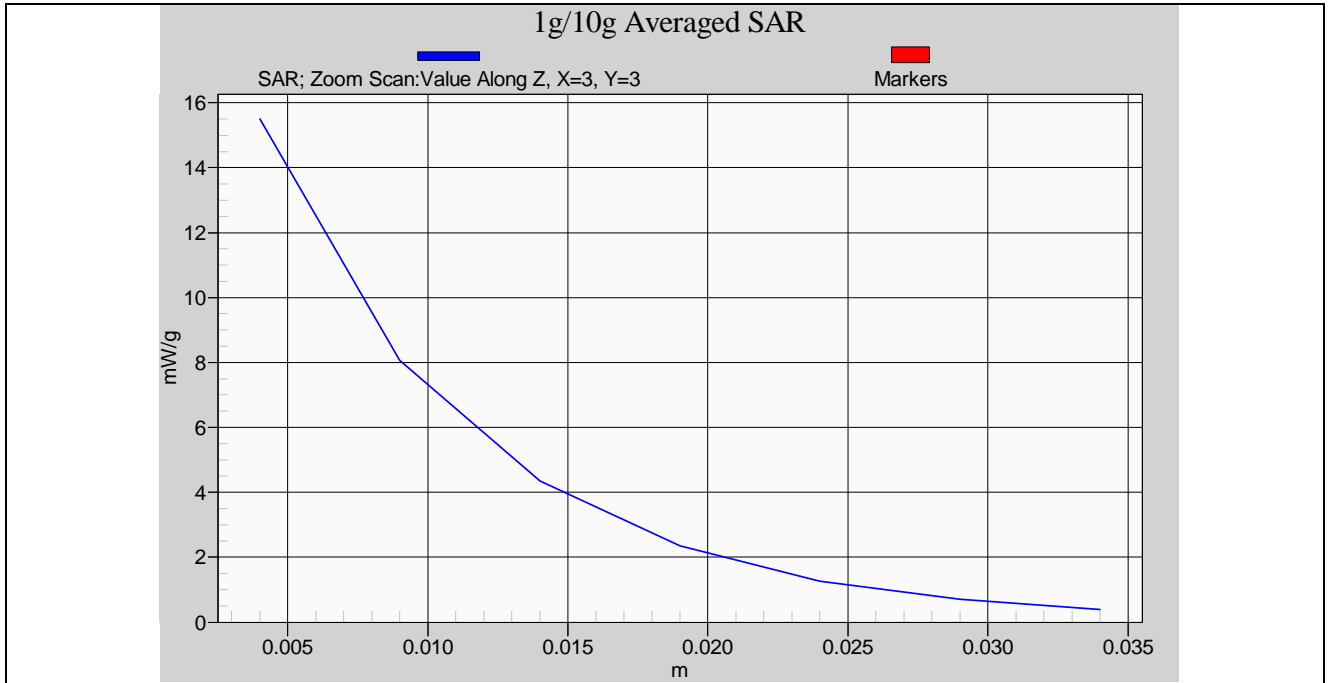
Prior to the assessment, the system validation kit was used to test whether the system was operating within its specifications of  $\pm 7\%$ . The validation was performed at 2450MHz.

Validation kit		Mixture Type	SAR <sub>1g</sub> [mW/g]		SAR <sub>10g</sub> [mW/g]		Date of Calibration
D2450V2-SN712		Body	53.6		24.8		Jan. 30, 2008
Frequency (MHz)	Power	SAR <sub>1g</sub> (mW/g)	SAR <sub>10g</sub> (mW/g)	Drift (dB)	Difference percentage		Date
					1g	10g	
2450 (Body)	250mW	13.4	6.32	-0.078	0.0 %	1.9 %	Oct. 29, 2008
	Normalize to 1 Watt	53.6	25.28				
2450 (Body)	250mW	13.5	6.43	-0.106	0.7 %	3.7 %	Oct. 30, 2008
	Normalize to 1 Watt	54	25.72				
2450 (Body)	250mW	13.7	6.48	0.015	2.2 %	4.5 %	Nov. 02, 2008
	Normalize to 1 Watt	54.8	25.92				
2450 (Body)	250mW	13.7	6.15	-0.074	2.2 %	-0.8 %	Nov. 19, 2008
	Normalize to 1 Watt	54.8	24.6				

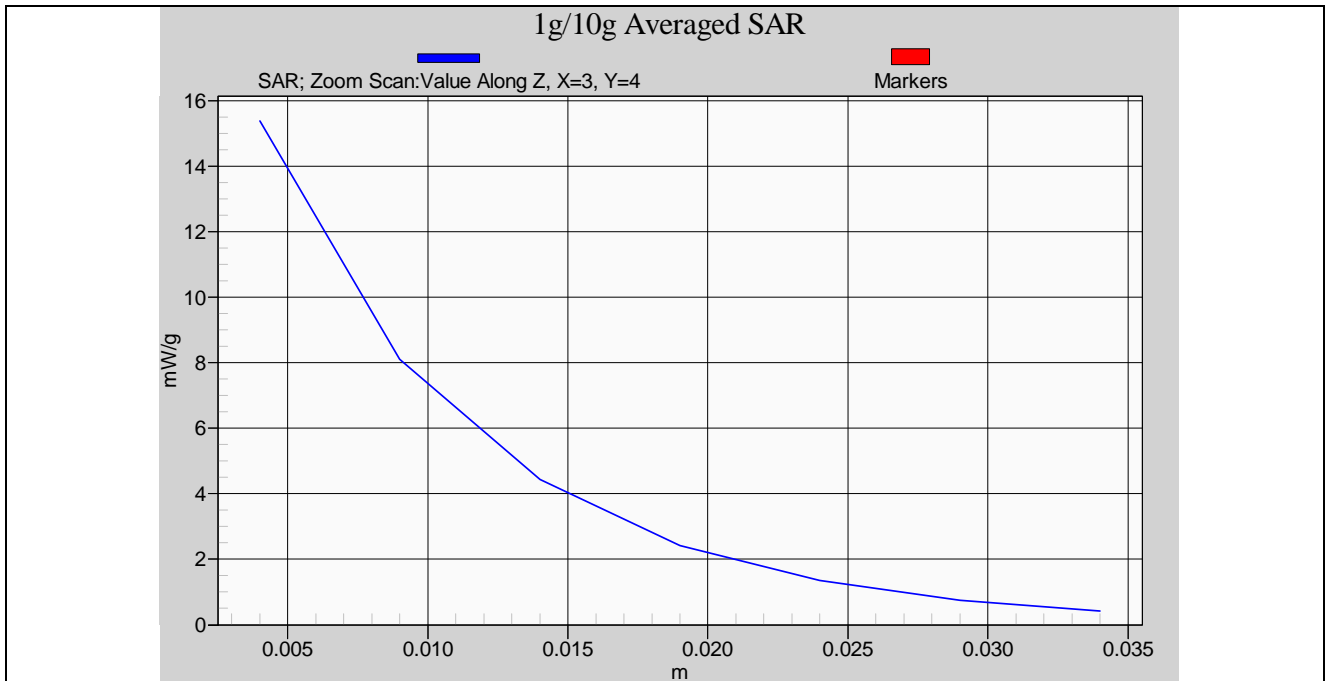
Detail results see Appendix A.



### Z-axis Plot of System Performance Check



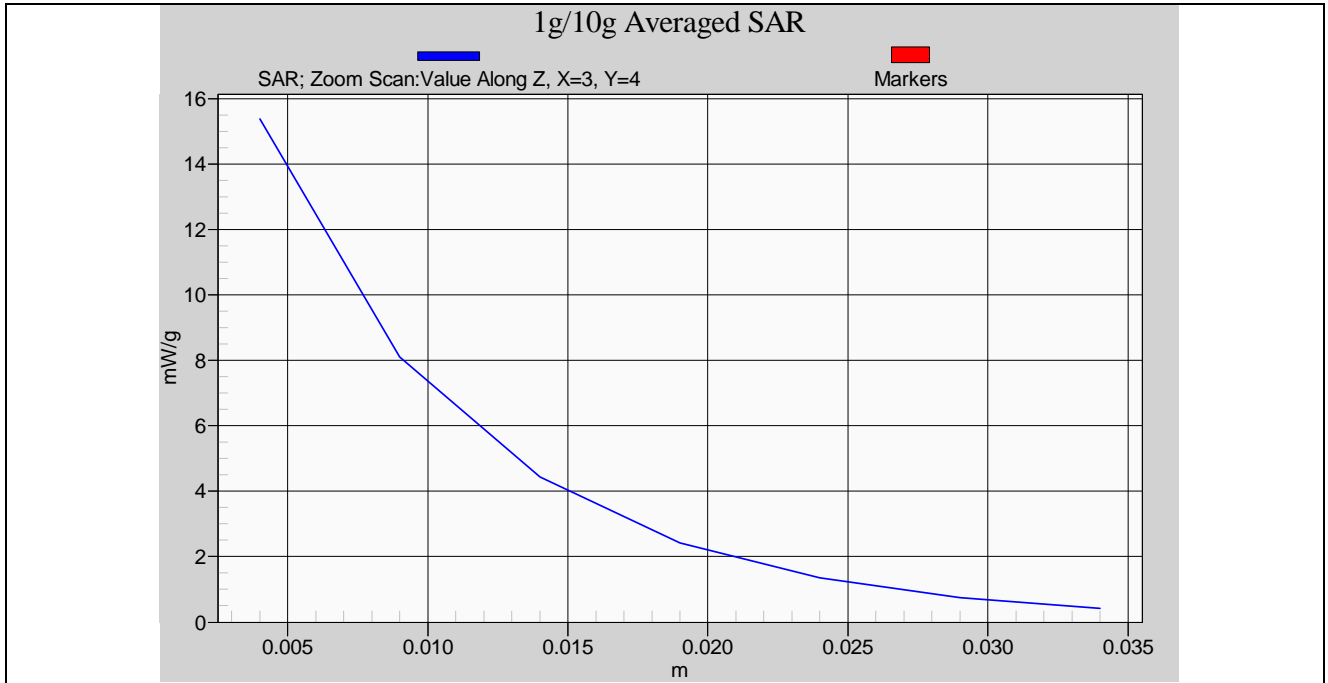
Body-Tissue-Simulating-Liquid 2.4GHz (2008/10/29)



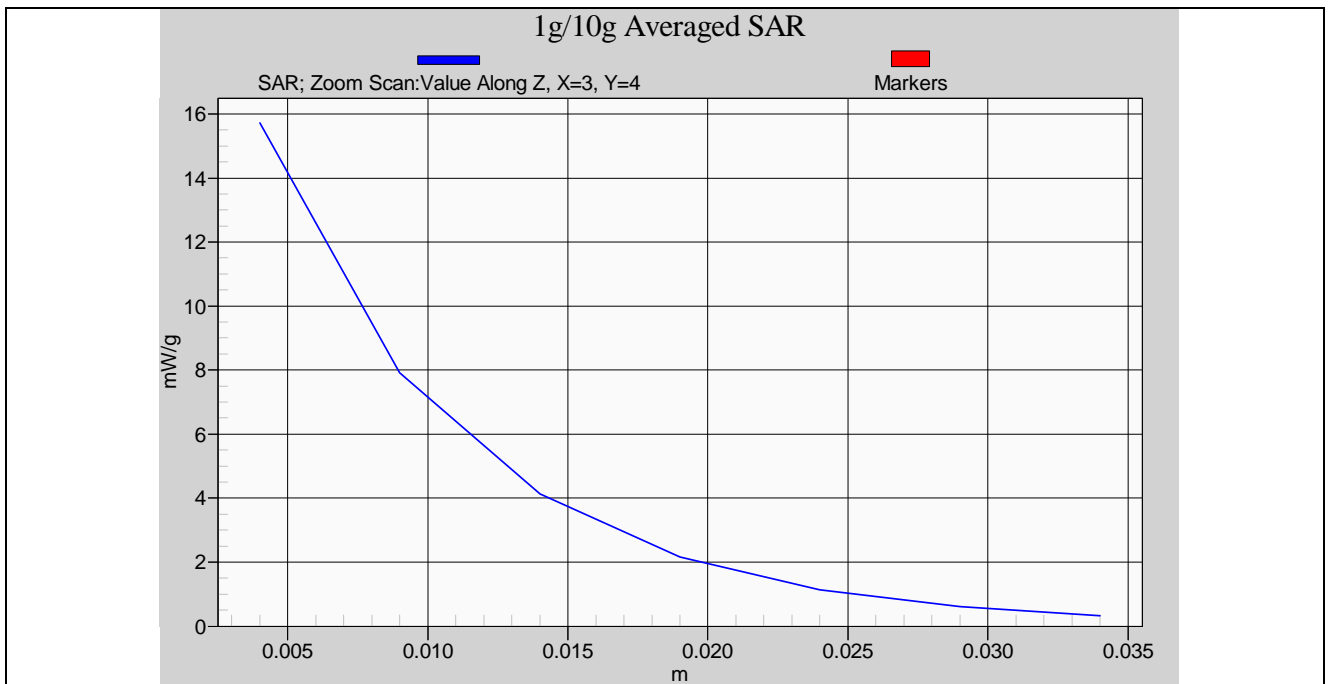
Body-Tissue-Simulating-Liquid 2.4GHz (2008/10/31)



### Z-axis Plot of System Performance Check



Body-Tissue-Simulating-Liquid 2.4GHz (2008/11/02)



Body-Tissue-Simulating-Liquid 2.4GHz (2008/11/19)



## 8.3 Dosimetric Assessment Setup

### 8.3.1 Body-Worn Test Position

#### Body-Worn Configuration

Body-worn operating configurations should be tested with the belt-clips and holsters attached to the device and positioned against a flat phantom in normal use configurations. Devices with a headset output should be tested with a headset connected to the device.

Body-worn accessories may not always be supplied or available as options for some devices that are intended to be authorized for body-worn use. A separation distance of 1.5 cm between the back of the device and a flat phantom is recommended for testing body-worn SAR compliance under such circumstances.

For this test :

- The EUT is placed into the holster/belt clip and the holster is positioned against the surface of the phantom in a normal operating position.
- Since this EUT doesn't supply any body-worn accessory to the end user, a distance of 2 mm was tested to confirm the necessary "minimum SAR separation distance".  
(\* Note : This distance includes the 2 mm phantom shell thickness.)



### 8.3.2 Measurement Procedures

The evaluation was performed with the following procedures :

- Surface Check :** A surface check job gathers data used with optical surface detection. It determines the distance from the phantom surface where the reflection from the optical detector has its peak. Any following measurement jobs using optical surface detection will then rely on this value. The surface check performs its search a specified number of times, so that the repeatability can be verified. The probe tip distance is 1.3mm to phantom inner surface during scans.
- Reference :** The reference job measures the field at a specified reference position, at 4 mm from the selected section's grid reference point.
- Area Scan :** The area scan is used as a fast scan in two dimensions to find the area of high field values, before doing a finer measurement around the hot spot. The sophisticated interpolation routines can find the maximum locations even in relatively coarse grids. When an area scan has measured all reachable points, it computes the field maxima found in the scanned area, within a range of the global maximum. Any following zoom scan within the same procedure will then perform fine scans around these maxima. The area covered the entire dimension of the EUT and the horizontal grid spacing was 15 mm x 15 mm.
- Zoom Scan :** Zoom scans are used to assess the highest averaged SAR for cubic averaging volumes with 1 g and 10 g of simulated tissue. The zoom scan measures 5 x 5 x 7 points in a 32 x 32 x 30 mm cube whose base faces are centered around the maxima returned from a preceding area scan within the same procedure.
- Drift :** The drift job measures the field at the same location as the most recent reference job within the same procedure, with the same settings. The drift measurement gives the field difference in dB from the last reference measurement. Several drift measurements are possible for each reference measurement. This allows monitoring of the power drift of the device in the batch process. If the value changed by more than 5%, the evaluation was repeated.



## 8.4 Spatial Peak SAR Evaluation

The DASY5 software includes all numerical procedures necessary to evaluate the spatial peak SAR values. Based on the Draft: SCC-34, SC-2, WG-2 - Computational Dosimetry, IEEE P1529/D0.0 (Draft Recommended Practice for Determining the Spatial-Peak Specific Absorption Rate (SAR) Associated with the Use of Wireless Handsets - Computational Techniques), a new algorithm has been implemented. The spatial-peak SAR can be computed over any required mass.

The base for the evaluation is a “cube” measurement in a volume of  $(32 \times 32 \times 30) \text{mm}^3$  ( $5 \times 5 \times 7$  points). The measured volume must include the 1g and 10g cubes with the highest averaged SAR values. For that purpose, the center of the measured volume is aligned to the interpolated peak SAR value of a previously performed area scan. If the 10g cube or both cubes are not entirely inside the measured volumes, the system issues a warning regarding the evaluated spatial peak values within the Postprocessing engine (SEMCAD). This means that if the measured volume is shifted, higher values might be possible. To get the correct values you can use a finer measurement grid for the area scan. In complicated field distributions, a large grid spacing for the area scan might miss some details and give an incorrectly interpolated peak location.

The entire evaluation of the spatial peak values is performed within the Postprocessing engine (SEMCAD). The system always gives the maximum values for the 1g and 10g cubes. The algorithm to find the cube with highest averaged SAR is divided into three stages:

### Interpolation and Extrapolation

The probe is calibrated at the center of the dipole sensors which is located 1 to 2.7mm away from the probe tip. During measurements, the probe stops shortly above the phantom surface, depending on the probe and the surface detecting system. Both distances are included as parameters in the probe configuration file. The software always knows exactly how far away the measured point is from the surface. As the probe cannot directly measure at the surface, the values between the deepest measured point and the surface must be extrapolated.

In DASY5, the choice of the coordinate system defining the location of the measurement points has no influence on the uncertainty of the interpolation, Maxima Search and SAR extrapolation routines. The interpolation, Maxima Search and extrapolation routines are all based on the modified Quadratic Shepard's method [7].





## 9. Measurement Uncertainty

Measurement uncertainties in SAR measurements are difficult to quantify due to several variables including biological, physiological, and environmental. However, we estimate the measurement uncertainties in SAR to be less than  $\pm 21.5\%$  [ 8 ] .

According to Std. C95.3 [ 9 ] , the overall uncertainties are difficult to assess and will vary with the type of meter and usage situation. However, accuracy's of  $\pm 1$  to 3 dB can be expected in practice, with greater uncertainties in near-field situations and at higher frequencies (shorter wavelengths), or areas where large reflecting objects are present. Under optimum measurement conditions, SAR measurement uncertainties of at least  $\pm 2$ dB can be expected.

According to CENELEC [ 10 ] , typical worst-case uncertainty of field measurements is  $\pm 5$  dB. For well-defined modulation characteristics the uncertainty can be reduced to  $\pm 3$  dB.



Uncertainty Component	Uncertainty Value	Probability Distribution	Divisor	$c_i$ (1g)	$c_i$ (10g)	Standard Uncertainty $\pm 1\%$ (1-g)	Standard Uncertainty $\pm 1\%$ (10-g)	$v_i$ or $V_{eff}$
<b>Measurement System</b>								
Probe Calibration ( $k=1$ )	4.8	Normal	1	1	1	4.8	4.8	$\infty$
Axial Isotropy	4.7	Rectangular	$\sqrt{3}$	$\sqrt{0.5}$	$\sqrt{0.5}$	1.9	1.9	$\infty$
Hemispherical Isotropy	9.6	Rectangular	$\sqrt{3}$	$\sqrt{0.5}$	$\sqrt{0.5}$	3.9	3.9	$\infty$
Boundary Effect	0.8	Rectangular	$\sqrt{3}$	1	1	0.5	0.5	$\infty$
Linearity	4.7	Rectangular	$\sqrt{3}$	1	1	2.7	2.7	$\infty$
System Detection Limit	1.0	Rectangular	$\sqrt{3}$	1	1	0.6	0.6	$\infty$
Readout Electronics	1.0	Normal	1	1	1	1.0	1.0	$\infty$
Response Time	1.0	Rectangular	$\sqrt{3}$	1	1	0.6	0.6	$\infty$
Integration Time	1.9	Rectangular	$\sqrt{3}$	1	1	1.1	1.1	$\infty$
RF Ambient Conditions	3.0	Rectangular	$\sqrt{3}$	1	1	1.7	1.7	$\infty$
Probe Positioner Mechanical Tolerance	1.4	Rectangular	$\sqrt{3}$	1	1	0.8	0.8	$\infty$
Probe Positioning with respect to Phantom Shell	2.9	Rectangular	$\sqrt{3}$	1	1	1.7	1.7	$\infty$
Extrapolation, interpolation and integration Algorithms for Max. SAR Evaluation	4.5	Rectangular	$\sqrt{3}$	1	1	2.6	2.6	$\infty$
<b>Test sample Related</b>								
Test sample Positioning	2.9	Normal	1	1	1	2.9	2.9	145
Device Holder Uncertainty	3.6	Normal	1	1	1	3.6	3.6	5
Output Power Variation – SAR drift measurement	5.0	Rectangular	$\sqrt{3}$	1	1	2.9	2.9	$\infty$
<b>Phantom and Tissue Parameters</b>								
Phantom Uncertainty ( shape and thickness tolerances)	4.0	Rectangular	$\sqrt{3}$	1	1	2.3	2.3	$\infty$
Liquid Conductivity – deviation from target values	5.0	Rectangular	$\sqrt{3}$	0.64	0.43	1.8	1.2	$\infty$
Liquid Conductivity – measurement uncertainty	5.0	Normal	1	0.64	0.43	3.2	2.2	$\infty$
Liquid Permittivity - deviation from target values	5.0	Rectangular	$\sqrt{3}$	0.6	0.49	1.7	1.4	$\infty$
Liquid Permittivity - measurement uncertainty	5.0	Normal	1	0.6	0.49	3.0	2.5	$\infty$
<b>Combined standard uncertainty</b>		RSS				11.2	10.7	388
<b>Expanded uncertainty (95% CONFIDENCE LEVEL)</b>		$k=2$				22.4	21.5	

Table 6. Uncertainty Budget of DASy



## 10. SAR Test Results Summary

### 10.1 802.11b Body SAR

**Ambient :**

Temperature (°C) : 22 ± 2      Relative HUMIDITY (%) : 40 - 70

**Liquid :**

Mixture Type : MSL2450      Liquid Temperature (°C) : 22.0  
 Depth of liquid (cm) : 15

**Measurement :**

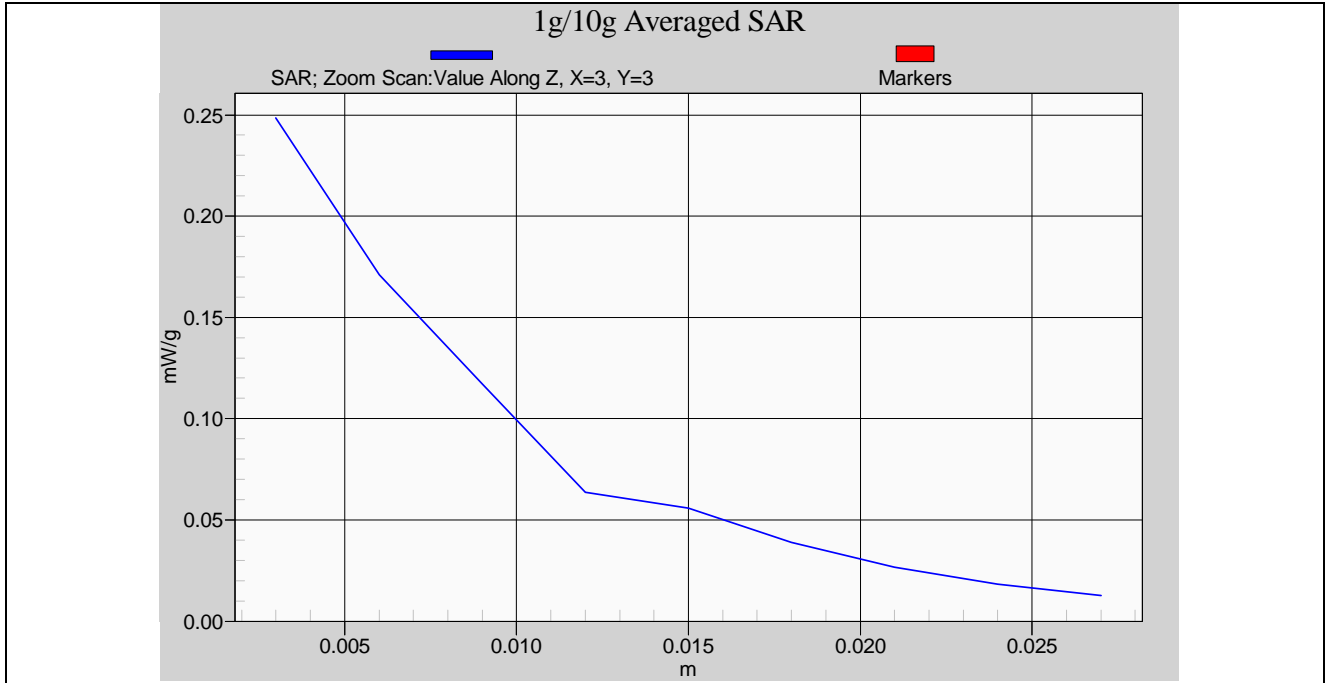
Crest Factor : 1      Probe S/N : 3150

Frequency (MHz)	Data Rate	Phantom Position	EUT to Phantom Setup	SAR <sub>1g</sub> [mW/g]	Power Drift (dB)	Amb. Temp.	Remark
2412	1 M	Flat	Normal Mode	0.015	-0.126	22.0	-
2412	1 M	Flat	Tablet Mode	0.016	0.147	22.0	-
2412	11 M	Flat	Normal Mode	0.015	0.086	22.0	-
2412	11 M	Flat	Tablet Mode Bottom	0.019	0.066	22.0	-
2412	11 M	Flat	Tablet Mode Tip	0.195	-0.122	22.0	-
2412	11 M	Flat	Tablet Mode Left Side	0.115	0.160	22.0	-
2437	11 M	Flat	Tablet Mode	0.022	0.081	22.0	-
2462	11 M	Flat	Tablet Mode	0.014	0.126	22.0	-
Std. C95.1-1999 - Safety Limit Spatial Peak Uncontrolled Exposure/General Population				1.6 W/kg (mW/g) Averaged over 1 gram			

Detail results see Appendix B.



**Z-axis Plot of SAR Measurement**



**SAR Measurement (Flat Section\_ Tablet mode EUT tip to phantom) \_ 802.11b Rate11 CH1**



## 10.2 802.11g Body SAR

**Ambient :**

Temperature (°C) : 22 ± 2      Relative HUMIDITY (%) : 40 - 70

**Liquid :**

Mixture Type : MSL2450      Liquid Temperature (°C) : 22.0  
 Depth of liquid (cm) : 15

**Measurement :**

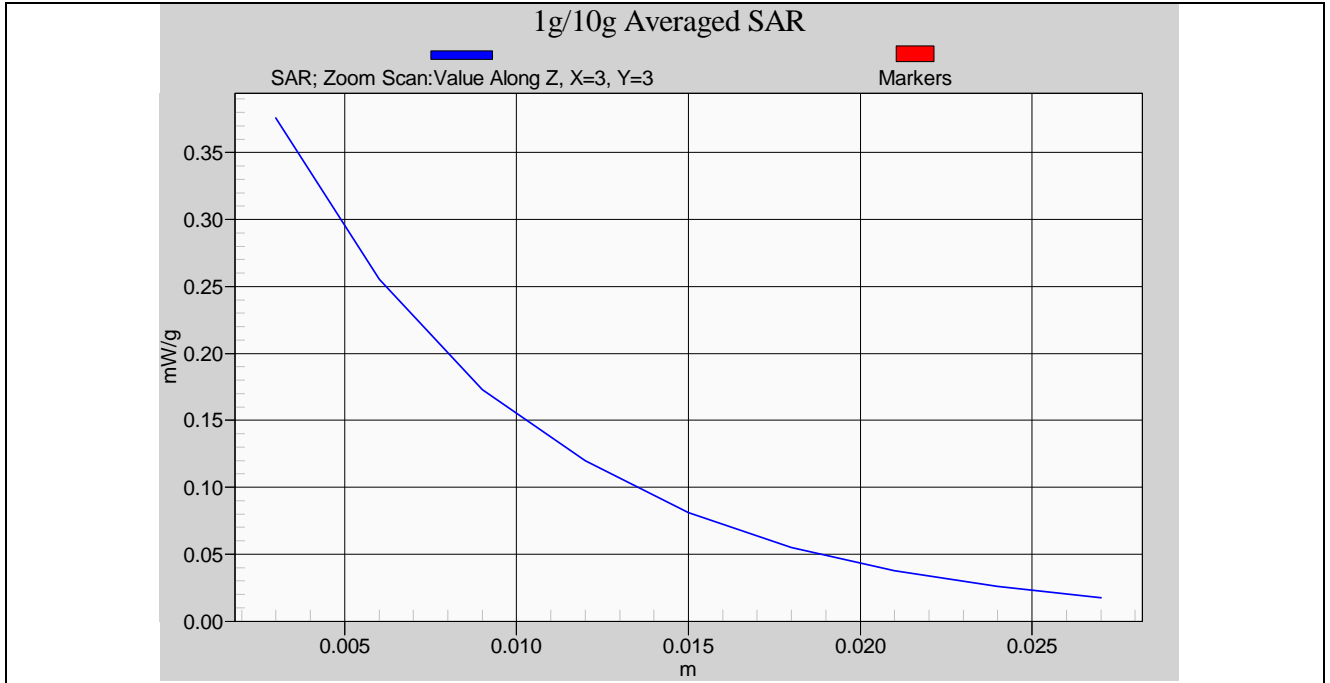
Crest Factor : 1      Probe S/N : 3150

Frequency (MHz)	Data Rate	Phantom Position	EUT to Phantom Setup	SAR <sub>1g</sub> [mW/g]	Power Drift (dB)	Amb. Temp.	Remark
2412	6 M	Flat	Normal Mode	0.013	0.10500	22.0	-
2412	6 M	Flat	Tablet Mode Bottom	0.016	-0.08600	22.0	-
2412	6 M	Flat	Tablet Mode Tip	0.286	-0.00241	22.0	
2412	6 M	Flat	Tablet Mode Left Side	0.148	0.081	22.0	
2412	54 M	Flat	Normal Mode	0.012	0.00195	22.0	-
2412	54 M	Flat	Tablet Mode	0.014	0.01000	22.0	-
2437	6 M	Flat	Normal Mode	0.015	-0.12900	22.0	-
2462	6 M	Flat	Normal Mode	0.016	-0.10600	22.0	-
Std. C95.1-1999 - Safety Limit Spatial Peak Uncontrolled Exposure/General Population				1.6 W/kg (mW/g) Averaged over 1 gram			

Detail results see Appendix B.



**Z-axis Plot of SAR Measurement**



**SAR Measurement (Flat Section\_ Tablet mode EUT tip to phantom) \_ 802.11g Rate6 CH1**



### 10.3 802.11n 2.4G\_HT20 Body SAR

**Ambient :**

Temperature (°C) : 22 ± 2      Relative HUMIDITY (%) : 40 - 70

**Liquid :**

Mixture Type : MSL2450      Liquid Temperature (°C) : 22.0  
 Depth of liquid (cm) : 15

**Measurement :**

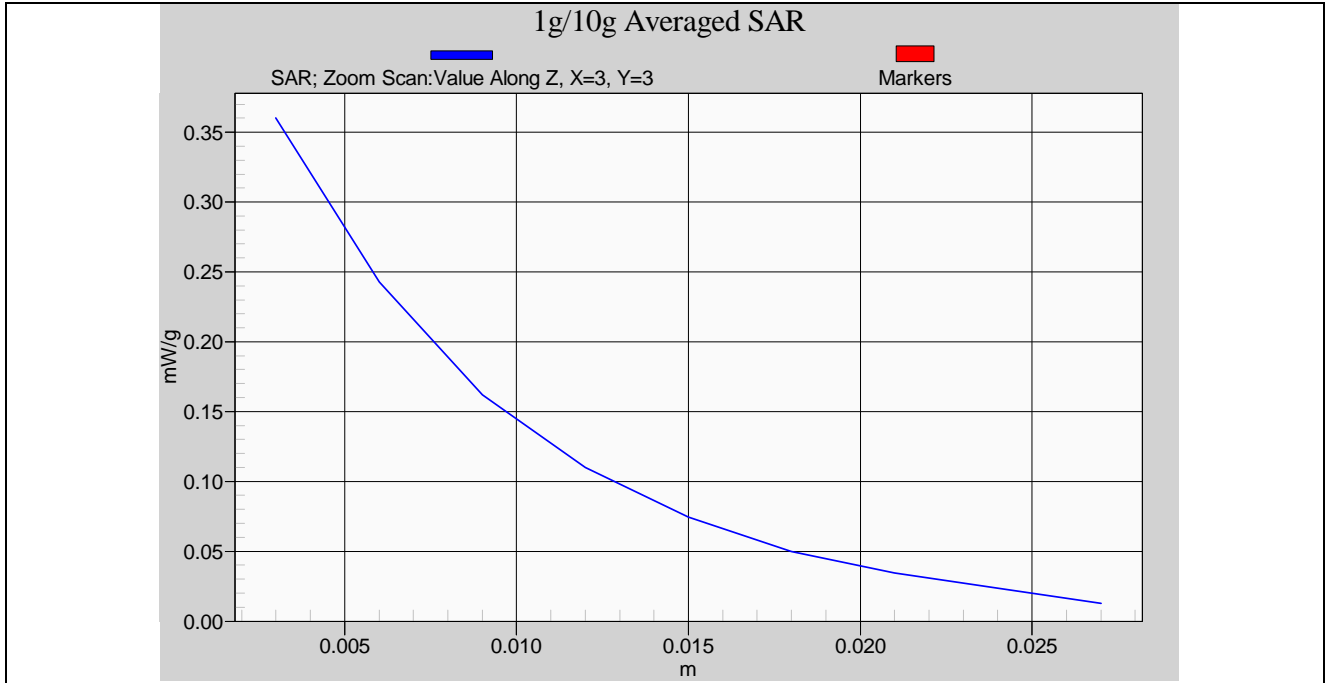
Crest Factor : 1      Probe S/N : 3150

Frequency (MHz)	Data Rate	Phantom Position	EUT to Phantom Setup	SAR <sub>1g</sub> [mW/g]	Power Drift (dB)	Amb. Temp.	Remark
2412	6.5 M	Flat	Normal Mode	0.012	0.140	22.0	-
2412	6.5 M	Flat	Tablet Mode Bottom	0.016	-0.049	22.0	-
2412	6.5 M	Flat	Tablet Mode Tip	0.269	0.038	22.0	
2412	6.5 M	Flat	Tablet Mode Left Side	0.126	0.192	22.0	
2437	6.5 M	Flat	Tablet Mode	0.013	-0.117	22.0	-
2462	6.5 M	Flat	Tablet Mode	0.014	-0.017	22.0	-
<b>Std. C95.1-1999 - Safety Limit            Spatial Peak            Uncontrolled Exposure/General Population</b>				<b>1.6 W/kg (mW/g)            Averaged over 1 gram</b>			

Detail results see Appendix B.



**Z-axis Plot of SAR Measurement**



**SAR Measurement (Flat Section\_ Tablet mode EUT tip to phantom) \_ 802.11n HT20 Rate6.5 CH1**





## 10.4 802.11n 2.4G\_HT40 Body SAR

**Ambient :**

Temperature (°C) : 22 ± 2      Relative HUMIDITY (%) : 40 - 70

**Liquid :**

Mixture Type : MSL2450      Liquid Temperature (°C) : 22.0  
 Depth of liquid (cm) : 15

**Measurement :**

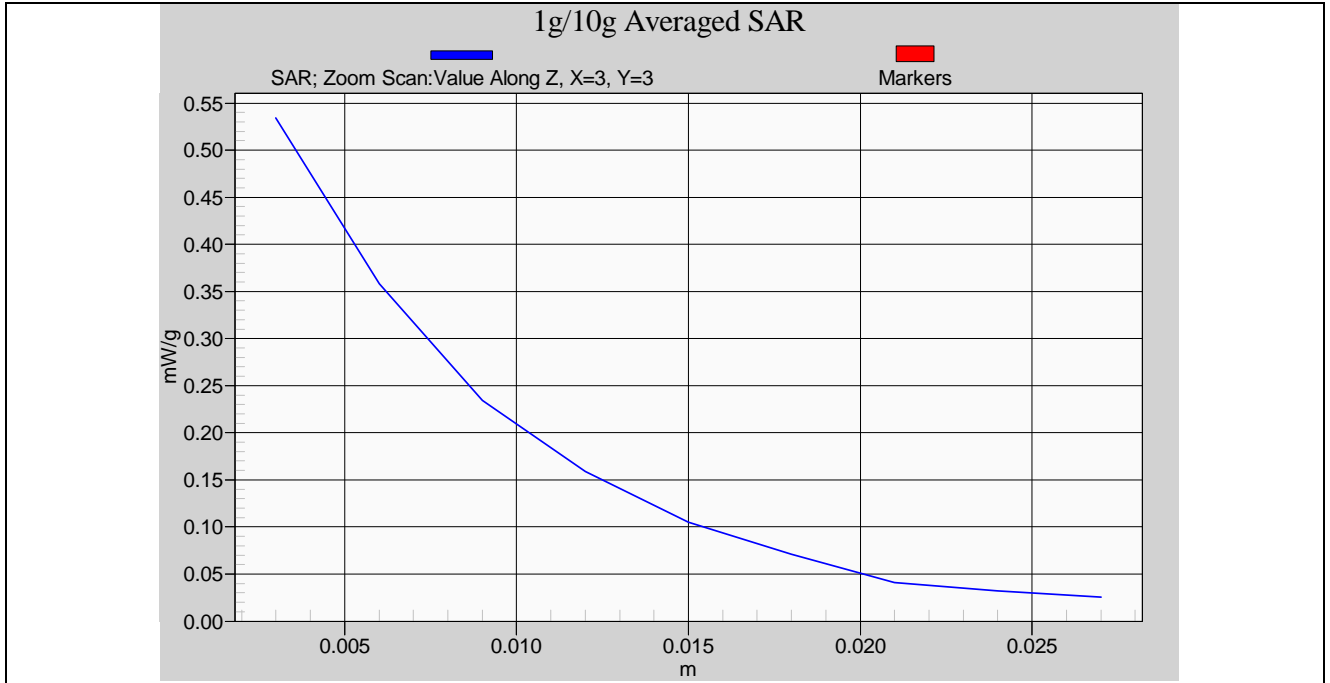
Crest Factor : 1      Probe S/N : 3150

Frequency (MHz)	Data Rate	Phantom Position	EUT to Phantom Setup	SAR <sub>1g</sub> [mW/g]	Power Drift (dB)	Amb. Temp.	Remark
2422	13 M	Flat	Normal Mode	0.016	0.04000	22.0	-
2422	13 M	Flat	Tablet Mode Bottom	0.025	-0.07300	22.0	-
2422	13 M	Flat	Tablet Mode Tip	0.403	0.11400	22.0	
2422	13 M	Flat	Tablet Mode Left Side	0.177	-0.11600	22.0	
2437	13 M	Flat	Tablet Mode	0.019	0.10700	22.0	-
2452	13 M	Flat	Tablet Mode	0.017	-0.00393	22.0	-
<b>Std. C95.1-1999 - Safety Limit            Spatial Peak            Uncontrolled Exposure/General Population</b>				<b>1.6 W/kg (mW/g)            Averaged over 1 gram</b>			

Detail results see Appendix B.



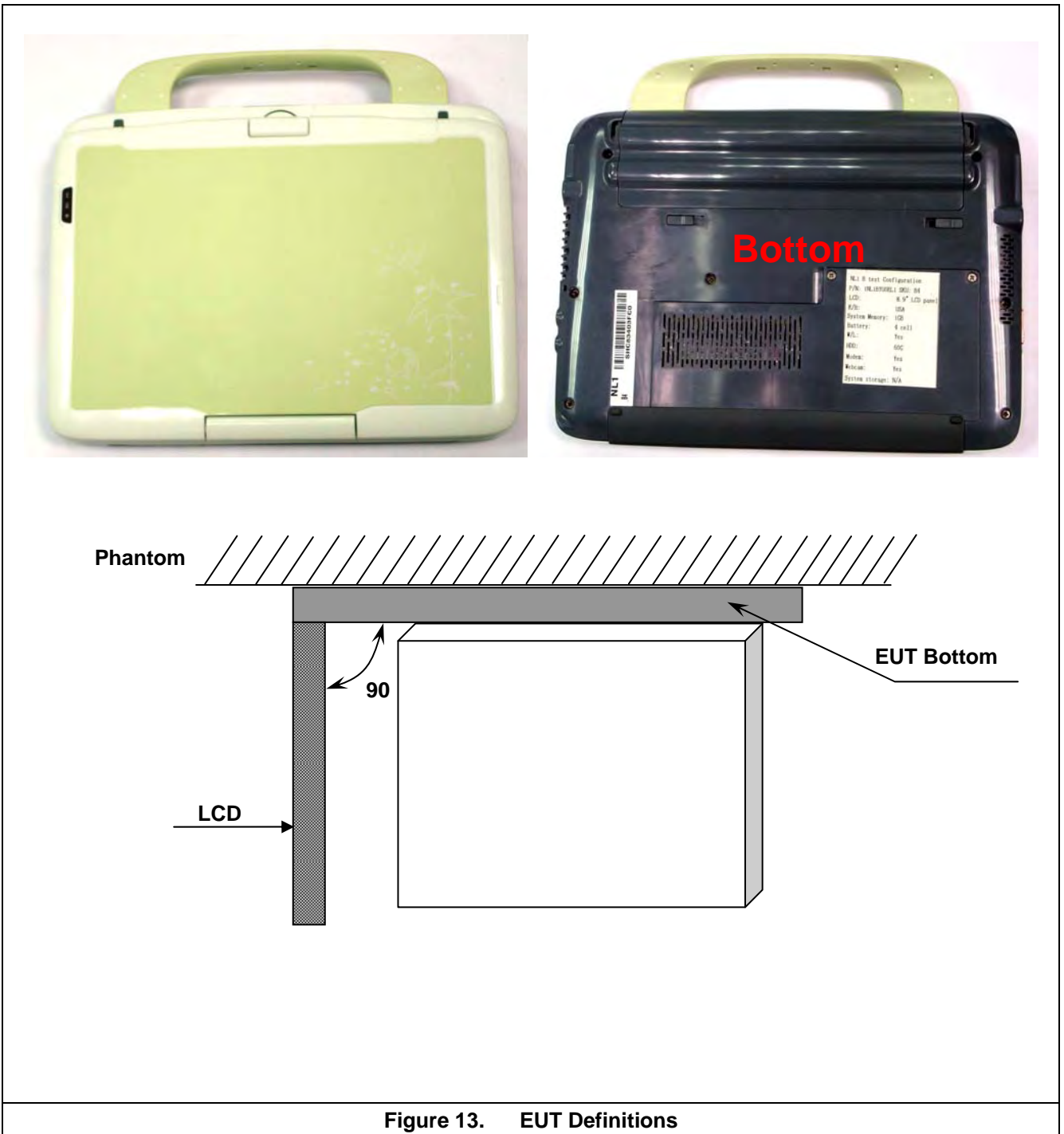
### Z-axis Plot of SAR Measurement



SAR Measurement (Flat Section\_ Tablet mode EUT tip to phantom) \_ 802.11n HT40 Rate13 CH3

## 10.5 Test Setup Description

### 10.5.1 Normal Mode \_ EUT Bottom to Phantom LCD open 90°



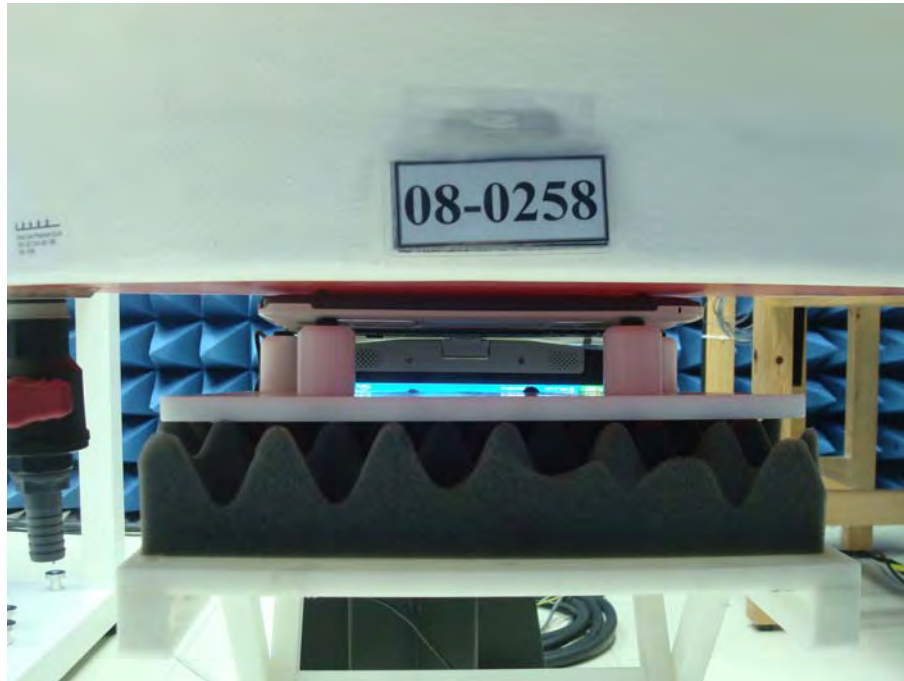


Figure 14. Body SAR Test Setup (Flat Section) \_ Normal Mode(LCD open 90° )

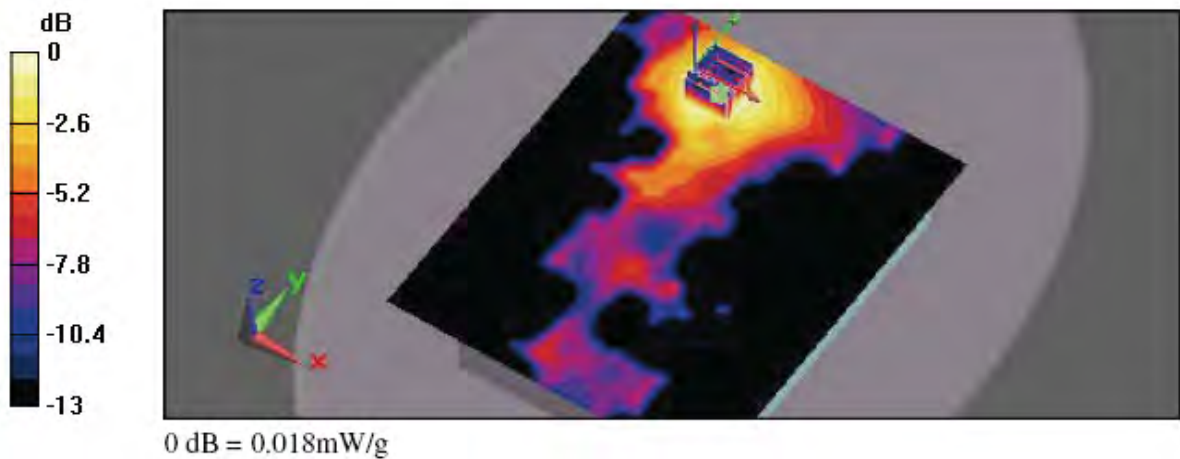


Figure 15. Hot Spot Plot

10.5.2 Tablet Mode EUT Bottom to Phantom

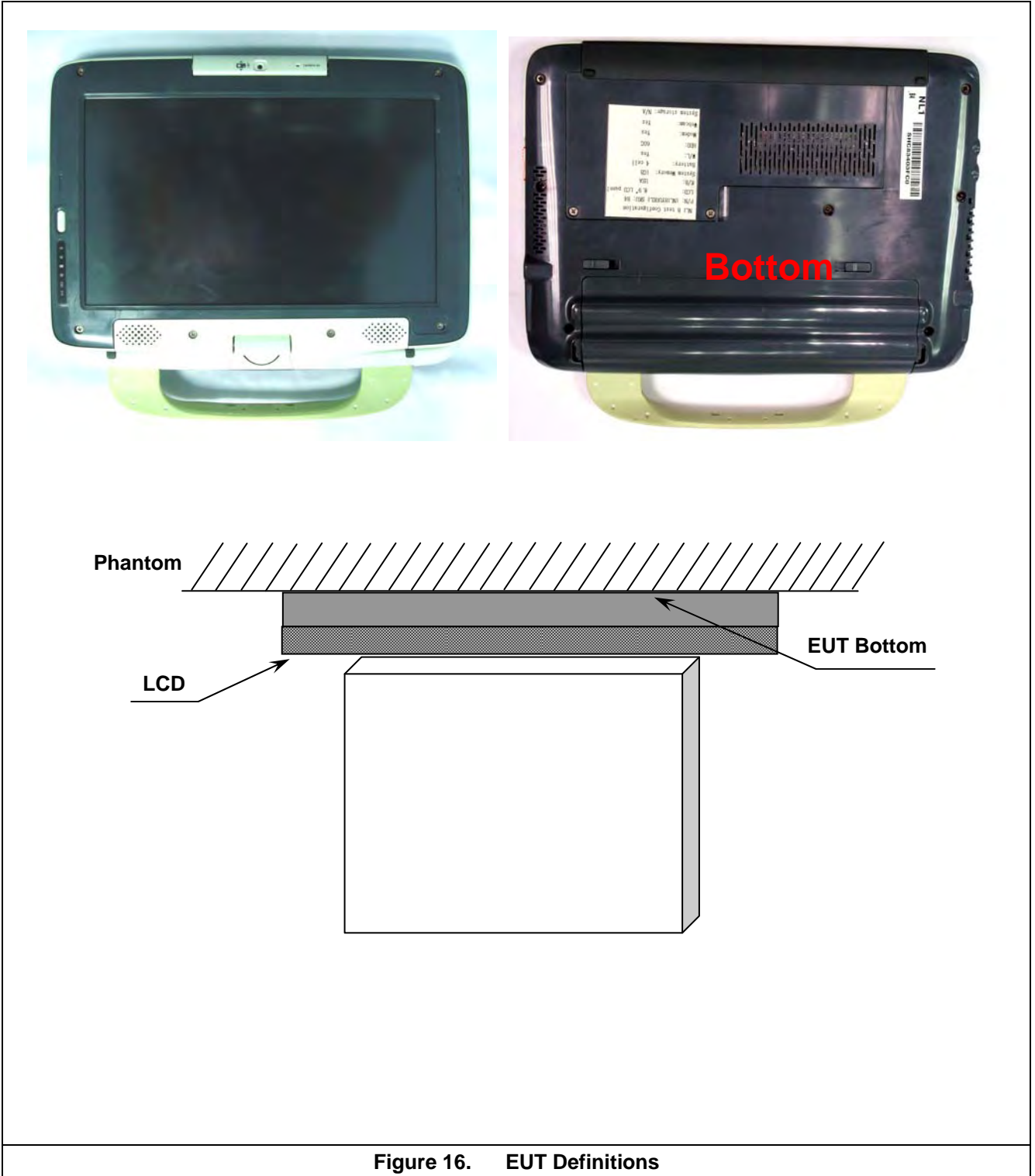


Figure 16. EUT Definitions

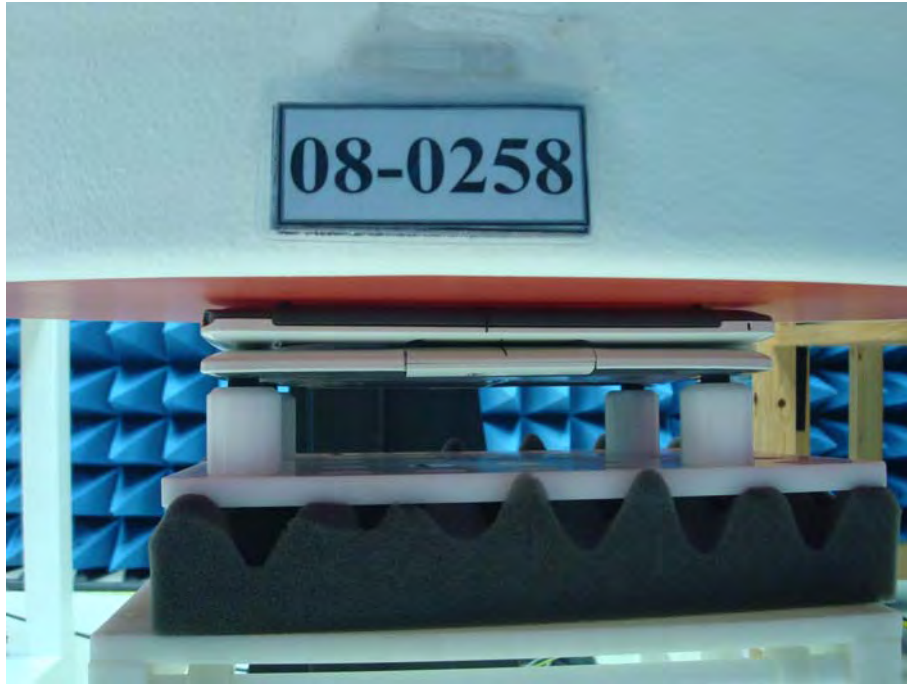


Figure 17. Body SAR Test Setup (Flat Section) \_ Tablet Mode EUT Bottom to Phantom

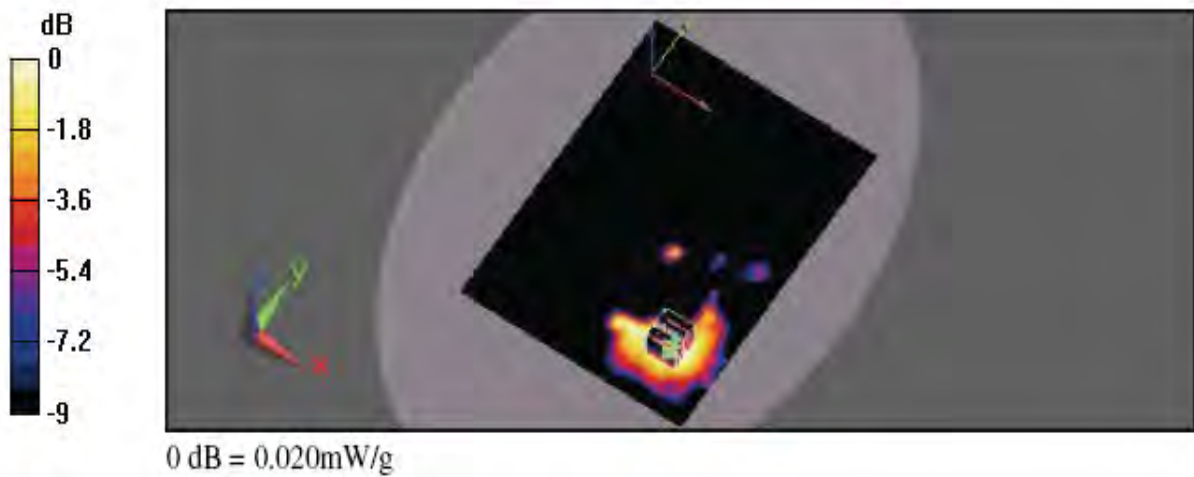
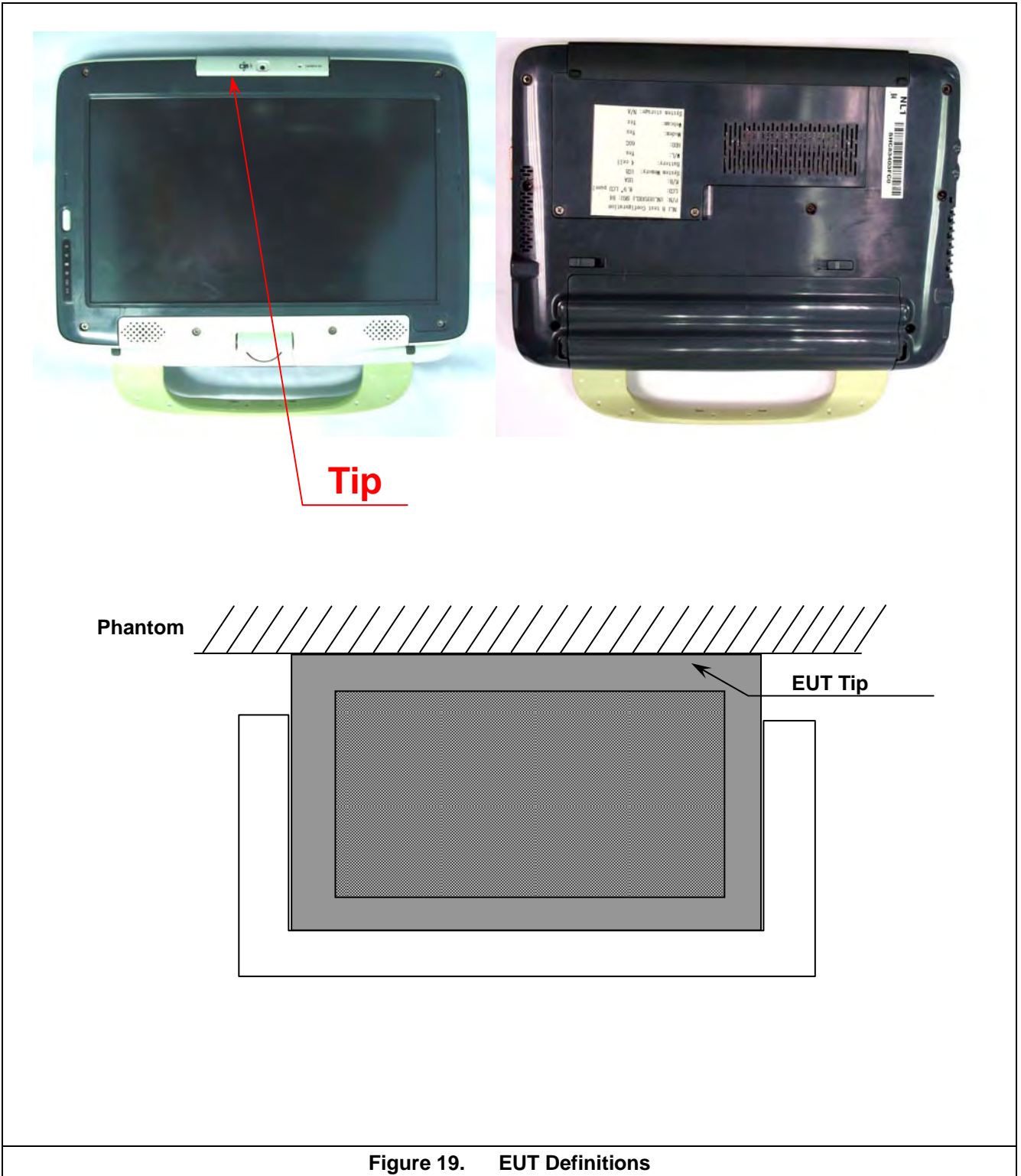


Figure 18. Hot Spot Plot

### 10.5.3 Tablet Mode EUT Tip to Phantom



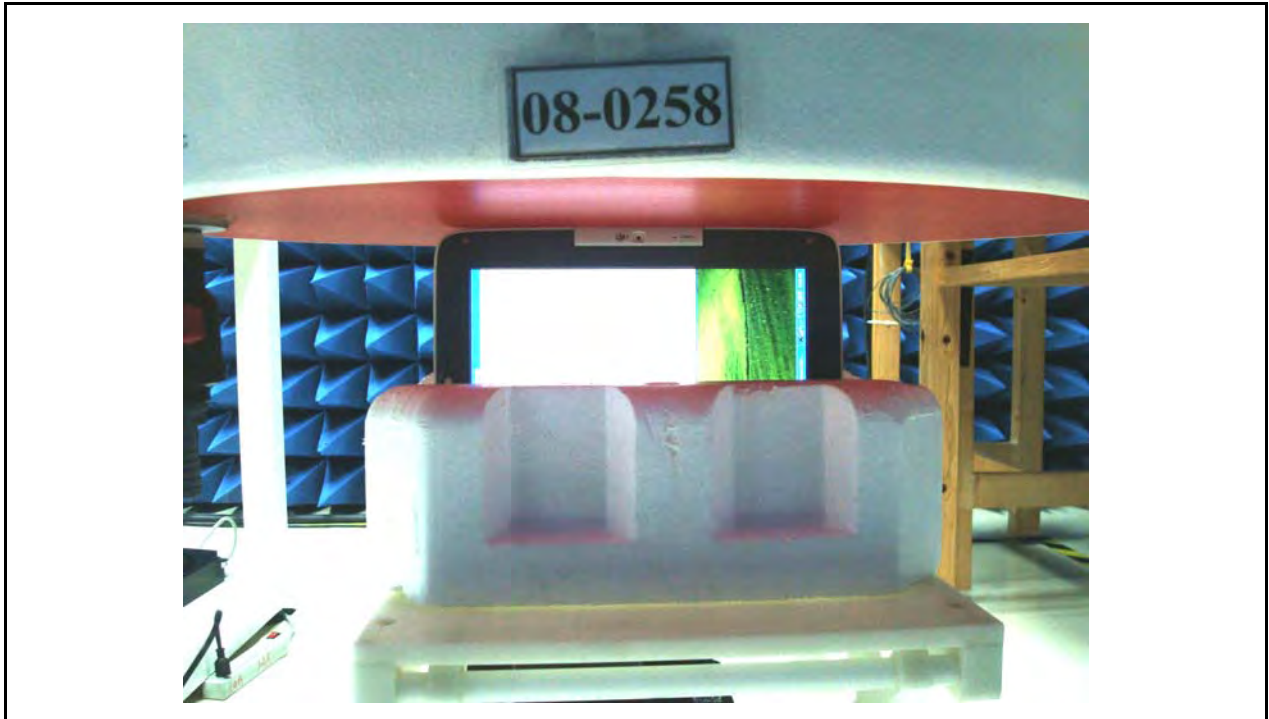


Figure 20. Body SAR Test Setup (Flat Section) \_ Tablet Mode EUT Tip to Phantom

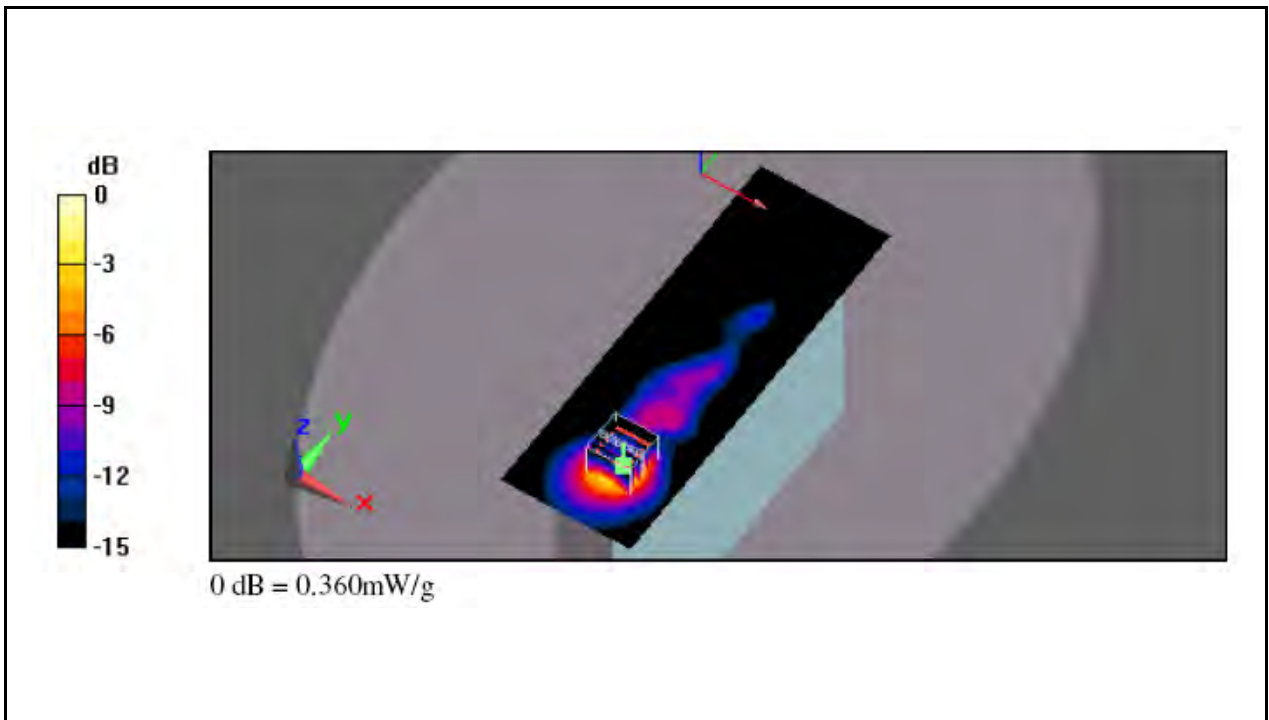


Figure 21. Hot Spot Plot



10.5.4 Tablet Mode EUT Left Side Phantom

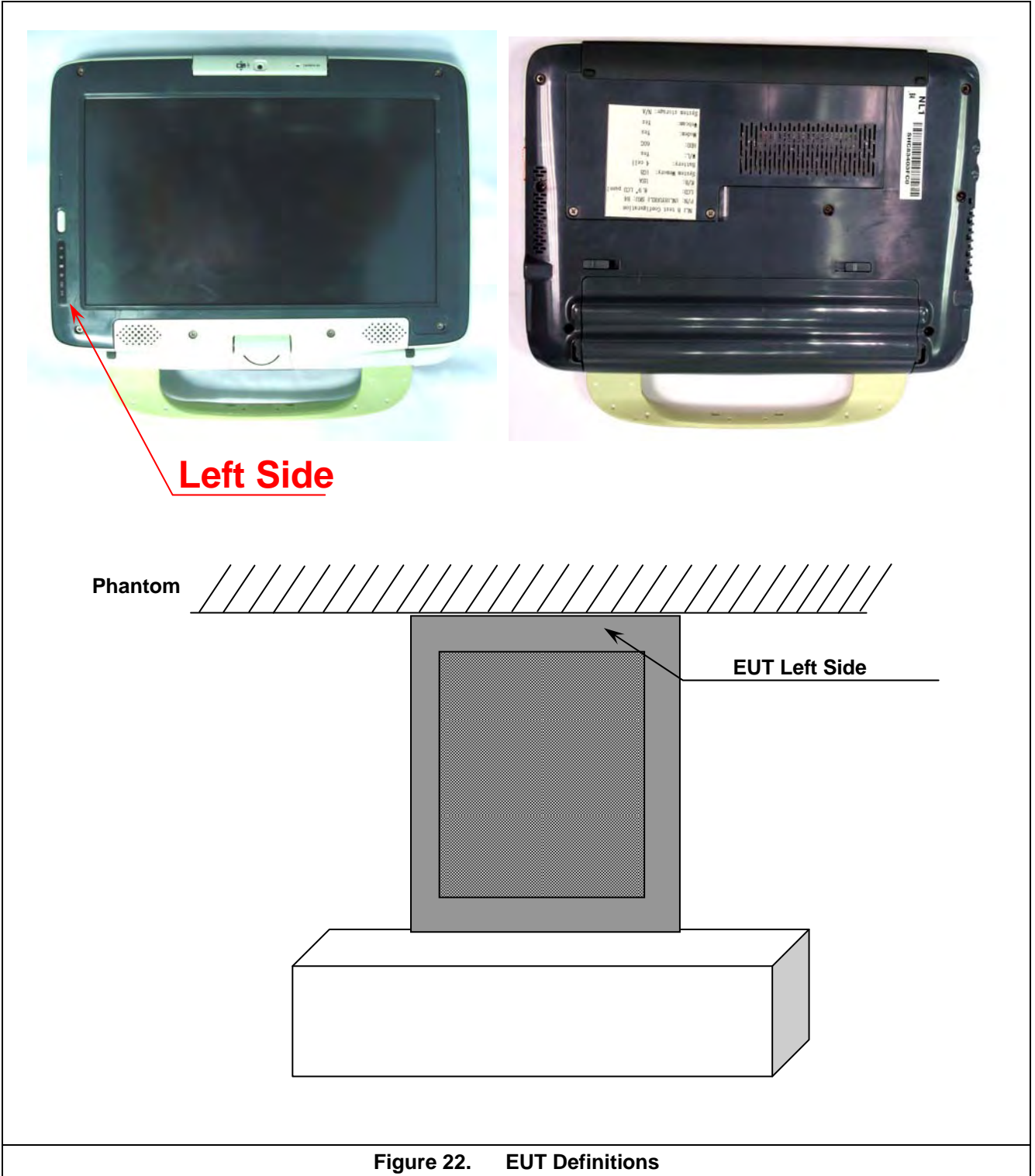


Figure 22. EUT Definitions

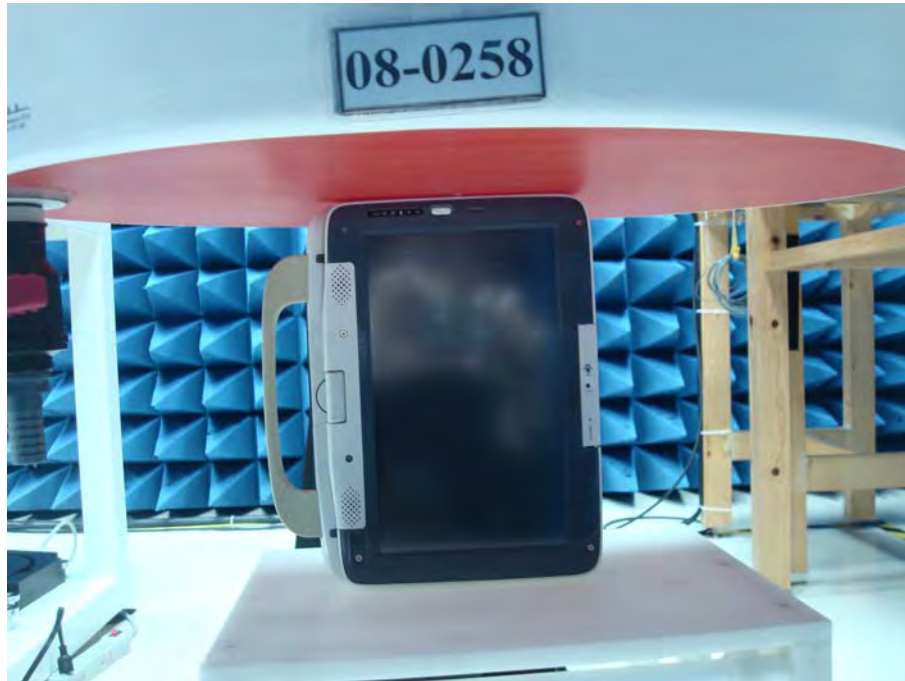


Figure 23. Body SAR Test Setup (Flat Section) \_ Tablet Mode EUT Left Side Phantom

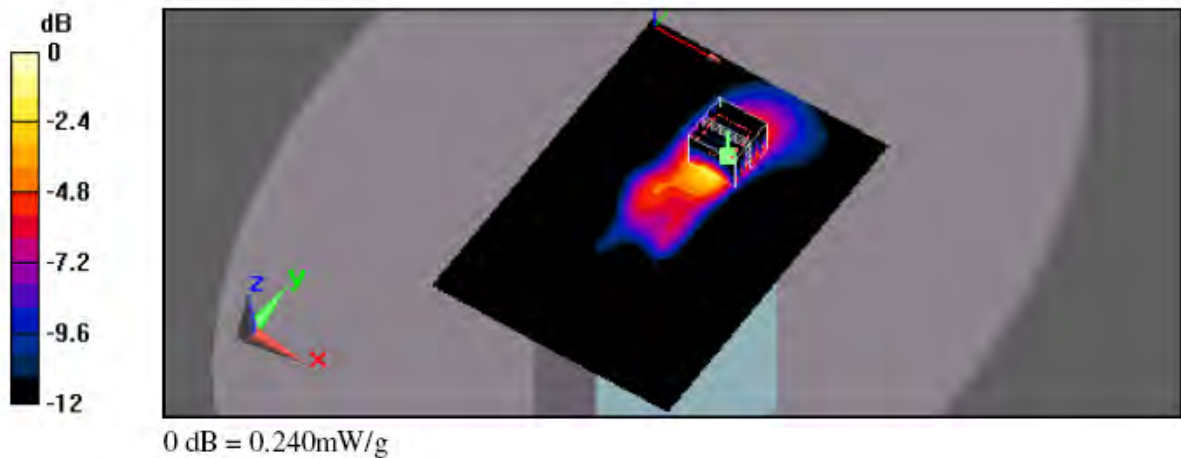


Figure 24. Hot Spot Plot



## 10.6 Std. C95.1-1999 RF Exposure Limit

Human Exposure	Population Uncontrolled Exposure ( W/kg ) or (mW/g)	Occupational Controlled Exposure ( W/kg ) or (mW/g)
Spatial Peak SAR* (head)	1.60	8.00
Spatial Peak SAR** (Whole Body)	0.08	0.40
Spatial Peak SAR*** (Partial-Body)	1.60	8.00
Spatial Peak SAR**** (Hands / Feet / Ankle / Wrist )	4.00	20.00

**Table 7. Safety Limits for Partial Body Exposure**

**Notes :**

- \* The Spatial Peak value of the SAR averaged over any 1 gram of tissue.  
( defined as a tissue volume in the shape of a cube ) and over the appropriate averaging time.
- \*\* The Spatial Average value of the SAR averaged over the whole - body.
- \*\*\* The Spatial Average value of the SAR averaged over the partial - body.
- \*\*\*\* The Spatial Peak value of the SAR averaged over any 10 grams of tissue.  
( defined as a tissue volume in the shape of a cube ) and over the appropriate averaging time.

**Population / Uncontrolled Environments :** are defined as locations where there is the exposure of individuals who have no knowledge or control of their exposure.

**Occupational / Controlled Environments :** are defined as locations where there is exposure that may be incurred by persons who are aware of the potential for exposure, (i.e. as a result of employment or occupation).



## 11. Conclusion

The SAR test values found for the portable mobile phone **Quanta Computer Inc.** **Trade Mark : QCI**  
**Model (s): NL\*\*(\*\*=0~9 or a~z or A~Z or Blank)** is below the maximum recommended level of 1.6 W/kg  
( mW/g ).



## 12. References

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- [6] N. Kuster, and Q. Balzano, “*Energy absorption mechanism by biological bodies in the near field of dipole antennas above 300MHz*”, IEEE Transaction on Vehicular Technology, vol. 41, no. 1, Feb. 1992, pp. 17-23.
- [7] Robert J. Renka, “*Multivariate Interpolation Of Large Sets Of Scattered Data*”, University of North Texas ACM Transactions on Mathematical Software, vol. 14, no. 2, June 1988 , pp. 139-148.
- [8] N. Kuster, R. Kastle, T. Schmid, *Dosimetric evaluation of mobile communications equipment with known precision*, IEEE Transaction on Communications, vol. E80-B, no. 5, May 1997, pp. 645-652.
- [9] Std. C95.3-1991, “*IEEE Recommended Practice for the Measurement of Potentially Hazardous Electromagnetic Fields - RF and Microwave*, New York: IEEE”, Aug. 1992.
- [10] CENELEC CLC/SC111B, European Prestandard (prENV 50166-2), *Human Exposure to Electromagnetic Fields High-frequency. 10KHz-300GHz*, Jan. 1995.
- [11] RSS-102 - Radio Frequency Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands) Issue 2 November 2005.



***Appendix A - System Performance Check***

See following attached pages for System Performance Check.



Test Laboratory: A Test Lab Techno Corp.

Date/Time: 10/29/2008 6:05:57 PM

### System Performance Check at 2450MHz\_20081029\_Body

**DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN:712**

Communication System: CW; Frequency: 2450 MHz; Duty Cycle: 1:1

Medium parameters used:  $f = 2450 \text{ MHz}$ ;  $\sigma = 1.95 \text{ mho/m}$ ;  $\epsilon_r = 51.7$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DASYS (IEEE/IEC)

DASY5 Configuration:

- Probe: ES3DV3 - SN3150; ConvF(4.19, 4.19, 4.19); Calibrated: 1/9/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn779; Calibrated: 11/30/2007
- Phantom: ELI 4.0; Type: QDOVA001BB; Serial: 1036
- Measurement SW: DASYS, V5.0 Build 120; SEMCAD X Version 13.2 Build 87

### System Performance Check at 2450MHz/Area Scan (61x81x1):

Measurement grid:  $dx=15\text{mm}$ ,  $dy=15\text{mm}$

Maximum value of SAR (interpolated) = 15.6 mW/g

### System Performance Check at 2450MHz/Zoom Scan (7x7x7)/Cube 0:

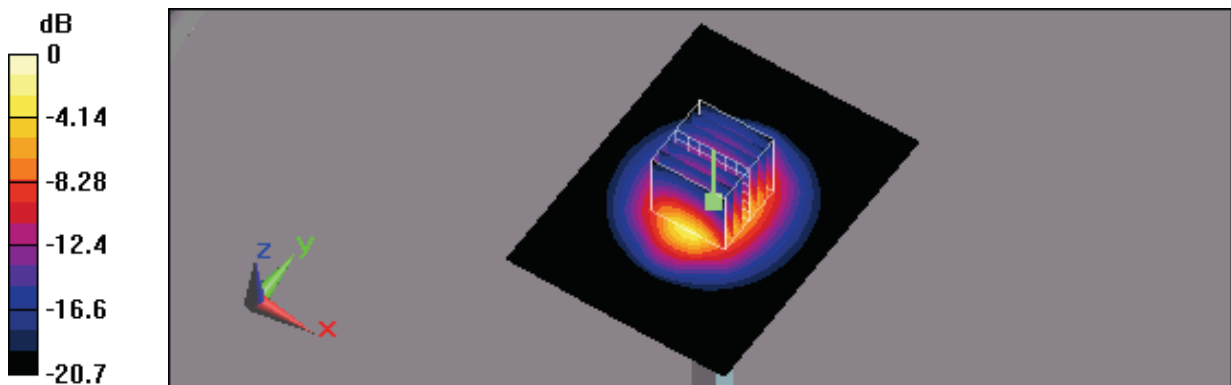
Measurement grid:  $dx=5\text{mm}$ ,  $dy=5\text{mm}$ ,  $dz=5\text{mm}$

Reference Value = 91.6 V/m; Power Drift = -0.078 dB

Peak SAR (extrapolated) = 27 W/kg

**SAR(1 g) = 13.4 mW/g; SAR(10 g) = 6.32 mW/g**

Maximum value of SAR (measured) = 15.5 mW/g



0 dB = 15.5mW/g



Test Laboratory: A Test Lab Techno Corp.

Date/Time: 10/30/2008 5:31:04 PM

### System Performance Check at 2450MHz\_20081030\_Body

**DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN:712**

Communication System: CW; Frequency: 2450 MHz; Duty Cycle: 1:1

Medium parameters used:  $f = 2450$  MHz;  $\sigma = 1.95$  mho/m;  $\epsilon_r = 51.7$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASYS (IEEE/IEC)

DASY5 Configuration:

- Probe: ES3DV3 - SN3150; ConvF(4.19, 4.19, 4.19); Calibrated: 1/9/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn779; Calibrated: 11/30/2007
- Phantom: ELI 4.0; Type: QDOVA001BB; Serial: 1036
- Measurement SW: DASY5, V5.0 Build 120; SEMCAD X Version 13.2 Build 87

### System Performance Check at 2450MHz/Area Scan (61x81x1):

Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 16.2 mW/g

### System Performance Check at 2450MHz/Zoom Scan (7x7x7)/Cube 0:

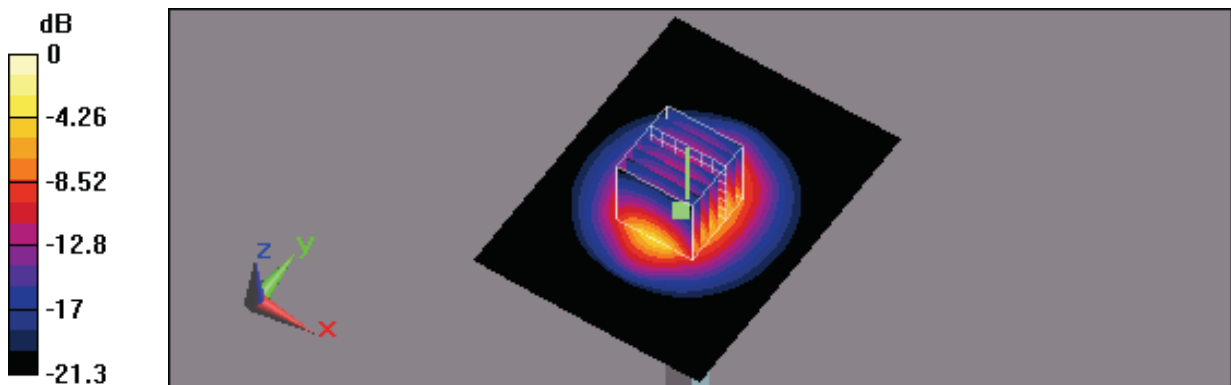
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 91.8 V/m; Power Drift = -0.106 dB

Peak SAR (extrapolated) = 26.8 W/kg

**SAR(1 g) = 13.5 mW/g; SAR(10 g) = 6.43 mW/g**

Maximum value of SAR (measured) = 15.4 mW/g



0 dB = 15.4mW/g





Test Laboratory: A Test Lab Techno Corp.

Date/Time: 11/2/2008 4:58:08 AM

### System Performance Check at 2450MHz\_20081102\_Body

**DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN:712**

Communication System: CW; Frequency: 2450 MHz; Duty Cycle: 1:1

Medium parameters used:  $f = 2450 \text{ MHz}$ ;  $\sigma = 1.95 \text{ mho/m}$ ;  $\epsilon_r = 51.7$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DASYS (IEEE/IEC)

DASY5 Configuration:

- Probe: ES3DV3 - SN3150; ConvF(4.19, 4.19, 4.19); Calibrated: 1/9/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn779; Calibrated: 11/30/2007
- Phantom: ELI 4.0; Type: QDOVA001BB; Serial: 1036
- Measurement SW: DASY5, V5.0 Build 120; SEMCAD X Version 13.2 Build 87

### System Performance Check at 2450MHz/Area Scan (71x71x1):

Measurement grid:  $dx=15\text{mm}$ ,  $dy=15\text{mm}$

Maximum value of SAR (interpolated) = 15.6 mW/g

### System Performance Check at 2450MHz/Zoom Scan (7x7x7)/Cube 0:

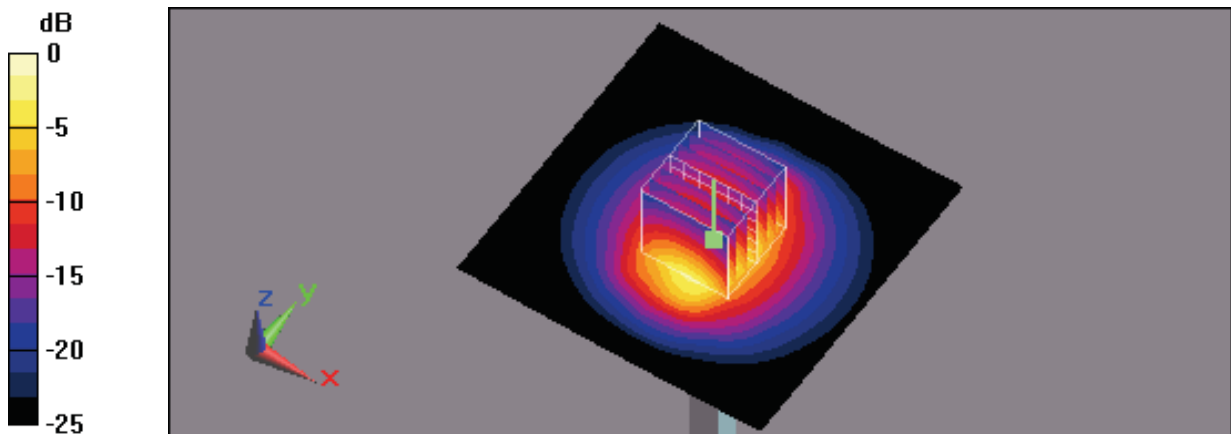
Measurement grid:  $dx=5\text{mm}$ ,  $dy=5\text{mm}$ ,  $dz=5\text{mm}$

Reference Value = 91.3 V/m; Power Drift = 0.015 dB

Peak SAR (extrapolated) = 27.2 W/kg

**SAR(1 g) = 13.7 mW/g; SAR(10 g) = 6.48 mW/g**

Maximum value of SAR (measured) = 15.8 mW/g



0 dB = 15.8mW/g



Test Laboratory: A Test Lab Techno Corp.

Date/Time: 11/19/2008 6:10:37 PM Date/Time: 11/19/2008 6:16:59 PM

### System Performance Check at 2450MHz\_20081119\_Body

**DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN:712**

Communication System: CW; Frequency: 2450 MHz; Duty Cycle: 1:1

Medium parameters used:  $f = 2450 \text{ MHz}$ ;  $\sigma = 1.95 \text{ mho/m}$ ;  $\epsilon_r = 50.5$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DASYS (IEEE/IEC)

DASY5 Configuration:

- Probe: ES3DV3 - SN3150; ConvF(4.19, 4.19, 4.19); Calibrated: 1/9/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn393; Calibrated: 8/25/2008
- Phantom: ELI 4.0; Type: QDOVA001BB; Serial: 1036
- Measurement SW: DASYS, V5.0 Build 120; SEMCAD X Version 13.2 Build 87

### System Performance Check at 2450MHz/Area Scan (61x81x1):

Measurement grid:  $dx=15\text{mm}$ ,  $dy=15\text{mm}$

Maximum value of SAR (interpolated) = 16.4 mW/g

### System Performance Check at 2450MHz/Zoom Scan (7x7x7)/Cube 0:

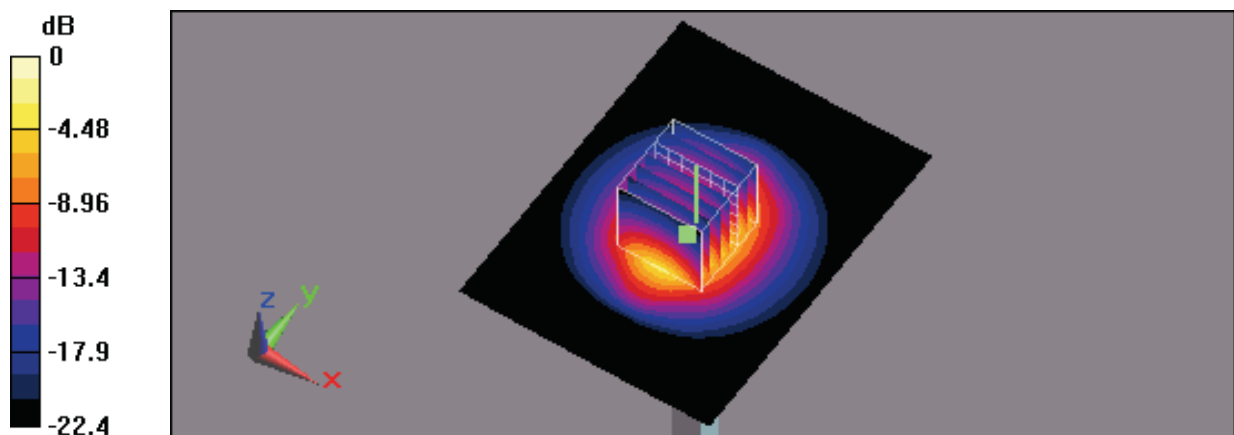
Measurement grid:  $dx=5\text{mm}$ ,  $dy=5\text{mm}$ ,  $dz=5\text{mm}$

Reference Value = 92.2 V/m; Power Drift = -0.074 dB

Peak SAR (extrapolated) = 28.6 W/kg

**SAR(1 g) = 13.8 mW/g; SAR(10 g) = 6.36 mW/g**

Maximum value of SAR (measured) = 15.7 mW/g



0 dB = 15.7mW/g



***Appendix B - SAR Measurement Data***

See following attached pages for SAR Measurement Data.



Test Laboratory: A Test Lab Techno Corp.

Date/Time: 11/2/2008 3:53:19 PM

### Flat\_802.11b CH1\_1M\_Bottom Close Body\_Normal Mode\_LCD Open90

**DUT: NL\*\*;** Type: NB; FCC ID: HFS-NL

Communication System: IEEE 802.11b; Frequency: 2412 MHz; Duty Cycle: 1:1  
Medium parameters used:  $f = 2412$  MHz;  $\sigma = 1.9$  mho/m;  $\epsilon_r = 51.8$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Flat Section  
Measurement Standard: DASYS (IEEE/IEC)

DASY5 Configuration:

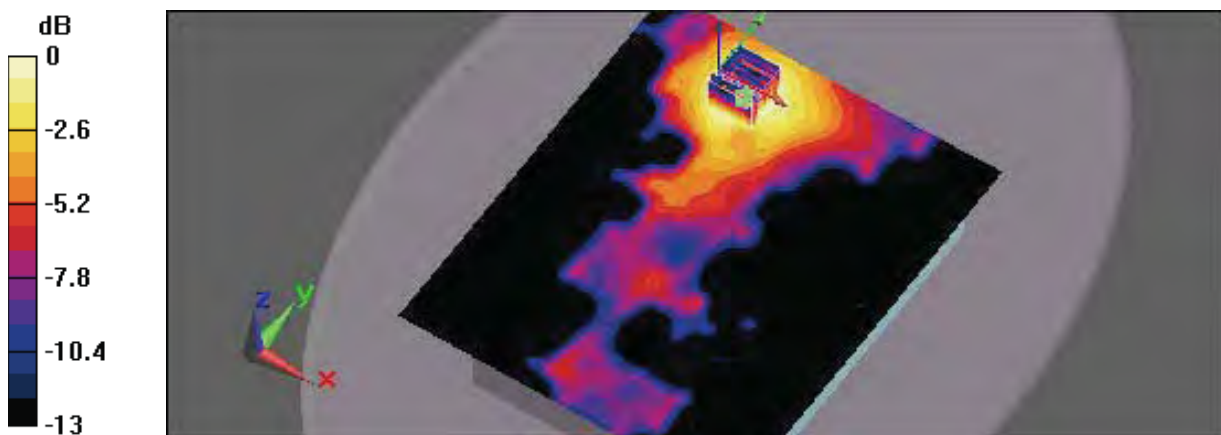
- Probe: ES3DV3 - SN3150; ConvF(4.19, 4.19, 4.19); Calibrated: 1/9/2008
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn779; Calibrated: 11/30/2007
- Phantom: ELI 4.0; Type: QDOVA001BB; Serial: 1036
- Measurement SW: DASYS, V5.0 Build 120; SEMCAD X Version 13.2 Build 87

#### Flat/Area Scan (151x181x1):

Measurement grid:  $dx=15$ mm,  $dy=15$ mm  
Maximum value of SAR (interpolated) = 0.018 mW/g

#### Flat/Zoom Scan (7x7x9)/Cube 0:

Measurement grid:  $dx=5$ mm,  $dy=5$ mm,  $dz=3$ mm  
Reference Value = 0.845 V/m; Power Drift = -0.126 dB  
Peak SAR (extrapolated) = 0.035 W/kg  
**SAR(1 g) = 0.015 mW/g; SAR(10 g) = 0.00896 mW/g**  
Maximum value of SAR (measured) = 0.018 mW/g



0 dB = 0.018mW/g



Test Laboratory: A Test Lab Techno Corp.

Date/Time: 10/29/2008 10:23:08 PM

### Flat\_802.11b CH1\_1M\_Bottom Close Body\_Tablet Mode

**DUT: NL\*\*;** Type: NB; FCC ID: HFS-NL

Communication System: IEEE 802.11b; Frequency: 2412 MHz; Duty Cycle: 1:1  
Medium parameters used:  $f = 2412$  MHz;  $\sigma = 1.9$  mho/m;  $\epsilon_r = 51.8$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Flat Section  
Measurement Standard: DASYS (IEEE/IEC)

DASY5 Configuration:

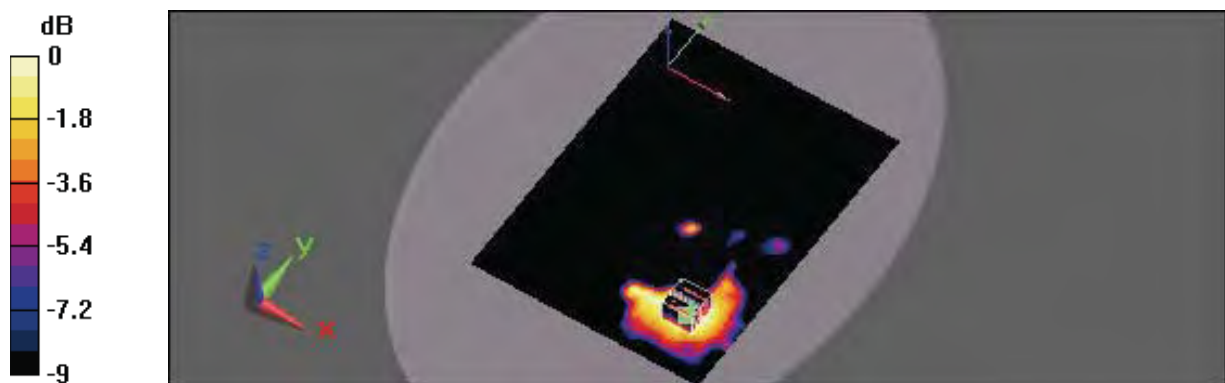
- Probe: ES3DV3 - SN3150; ConvF(4.19, 4.19, 4.19); Calibrated: 1/9/2008
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn779; Calibrated: 11/30/2007
- Phantom: ELI 4.0; Type: QDOVA001BB; Serial: 1036
- Measurement SW: DASYS, V5.0 Build 120; SEMCAD X Version 13.2 Build 87

#### Flat/Area Scan (151x201x1):

Measurement grid:  $dx=15$ mm,  $dy=15$ mm  
Maximum value of SAR (interpolated) = 0.021 mW/g

#### Flat/Zoom Scan (7x7x9)/Cube 0:

Measurement grid:  $dx=5$ mm,  $dy=5$ mm,  $dz=3$ mm  
Reference Value = 0.790 V/m; Power Drift = 0.147 dB  
Peak SAR (extrapolated) = 0.037 W/kg  
**SAR(1 g) = 0.016 mW/g; SAR(10 g) = 0.00959 mW/g**  
Maximum value of SAR (measured) = 0.020 mW/g



0 dB = 0.020mW/g



Test Laboratory: A Test Lab Techno Corp.

Date/Time: 11/2/2008 4:47:11 PM

## Flat\_802.11b CH1\_11M\_Bottom Close Body\_Normal Mode\_LCD Open90

**DUT: NL\*\*;** Type: NB; FCC ID: HFS-NL

Communication System: IEEE 802.11b; Frequency: 2412 MHz; Duty Cycle: 1:1  
Medium parameters used:  $f = 2412$  MHz;  $\sigma = 1.9$  mho/m;  $\epsilon_r = 51.8$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Flat Section  
Measurement Standard: DASYS (IEEE/IEC)

DASY5 Configuration:

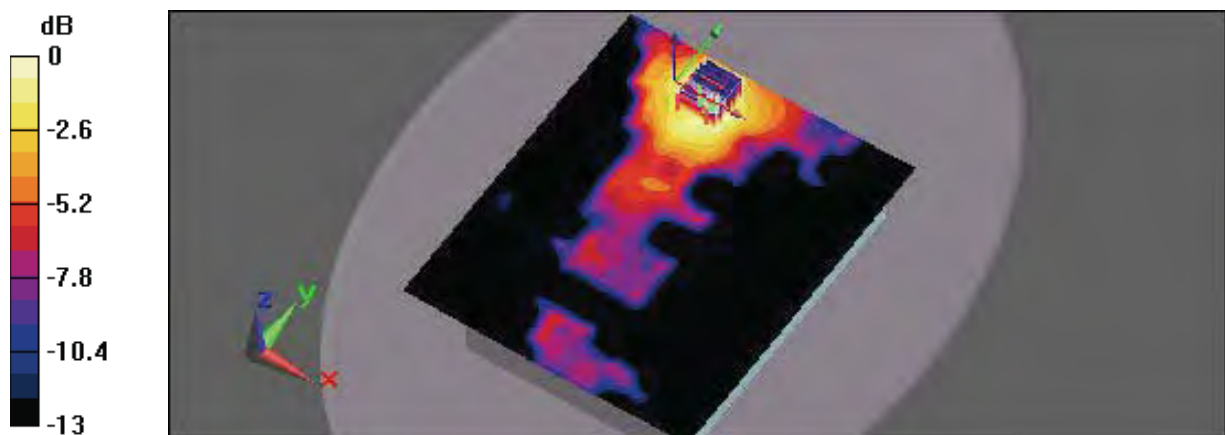
- Probe: ES3DV3 - SN3150; ConvF(4.19, 4.19, 4.19); Calibrated: 1/9/2008
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn779; Calibrated: 11/30/2007
- Phantom: ELI 4.0; Type: QDOVA001BB; Serial: 1036
- Measurement SW: DASYS, V5.0 Build 120; SEMCAD X Version 13.2 Build 87

### Flat/Area Scan (151x181x1):

Measurement grid:  $dx=15$ mm,  $dy=15$ mm  
Maximum value of SAR (interpolated) = 0.017 mW/g

### Flat/Zoom Scan (7x7x9)/Cube 0:

Measurement grid:  $dx=5$ mm,  $dy=5$ mm,  $dz=3$ mm  
Reference Value = 0.939 V/m; Power Drift = 0.086 dB  
Peak SAR (extrapolated) = 0.029 W/kg  
**SAR(1 g) = 0.015 mW/g; SAR(10 g) = 0.00866 mW/g**  
Maximum value of SAR (measured) = 0.018 mW/g



0 dB = 0.018mW/g



Test Laboratory: A Test Lab Techno Corp.

Date/Time: 10/29/2008 9:26:20 PM

### Flat\_802.11b CH1\_11M\_Bottom Close Body\_Tablet Mode

**DUT: NL\*\*;** Type: NB; FCC ID: HFS-NL

Communication System: IEEE 802.11b; Frequency: 2412 MHz; Duty Cycle: 1:1  
Medium parameters used:  $f = 2412$  MHz;  $\sigma = 1.9$  mho/m;  $\epsilon_r = 51.8$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Flat Section  
Measurement Standard: DASYS (IEEE/IEC)

DASY5 Configuration:

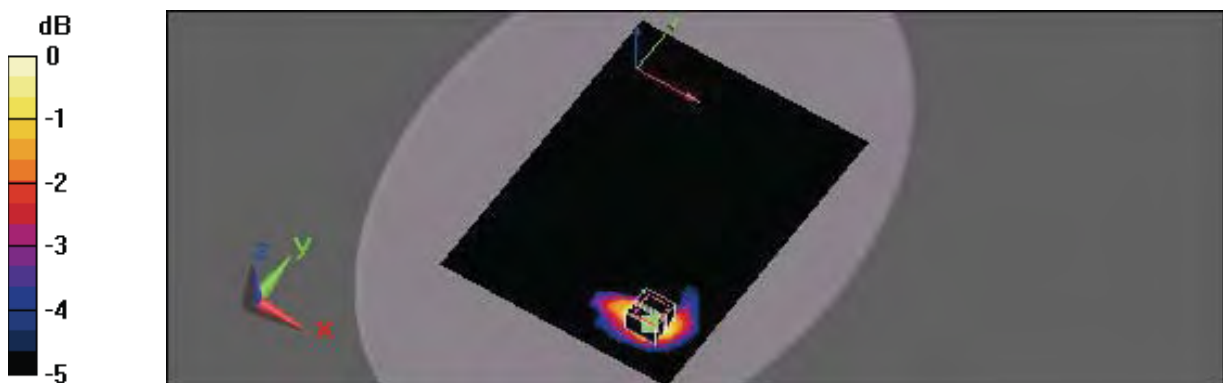
- Probe: ES3DV3 - SN3150; ConvF(4.19, 4.19, 4.19); Calibrated: 1/9/2008
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn779; Calibrated: 11/30/2007
- Phantom: ELI 4.0; Type: QDOVA001BB; Serial: 1036
- Measurement SW: DASYS, V5.0 Build 120; SEMCAD X Version 13.2 Build 87

#### Flat/Area Scan (151x201x1):

Measurement grid:  $dx=15$ mm,  $dy=15$ mm  
Maximum value of SAR (interpolated) = 0.023 mW/g

#### Flat/Zoom Scan (7x7x9)/Cube 0:

Measurement grid:  $dx=5$ mm,  $dy=5$ mm,  $dz=3$ mm  
Reference Value = 0.789 V/m; Power Drift = 0.066 dB  
Peak SAR (extrapolated) = 0.035 W/kg  
**SAR(1 g) = 0.019 mW/g; SAR(10 g) = 0.011 mW/g**  
Maximum value of SAR (measured) = 0.024 mW/g



0 dB = 0.024mW/g



Test Laboratory: A Test Lab Techno Corp.

Date/Time: 11/20/2008 2:20:15 AM

### Flat\_802.11b CH1\_11M\_Tablet Mode\_LCD Tip Side\_Close Body

**DUT: NL\*\*;** Type: NB; FCC ID: HFS-NL

Communication System: IEEE 802.11b; Frequency: 2412 MHz; Duty Cycle: 1:1  
Medium parameters used:  $f = 2412$  MHz;  $\sigma = 1.91$  mho/m;  $\epsilon_r = 50.6$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Flat Section  
Measurement Standard: DASYS (IEEE/IEC)

DASY5 Configuration:

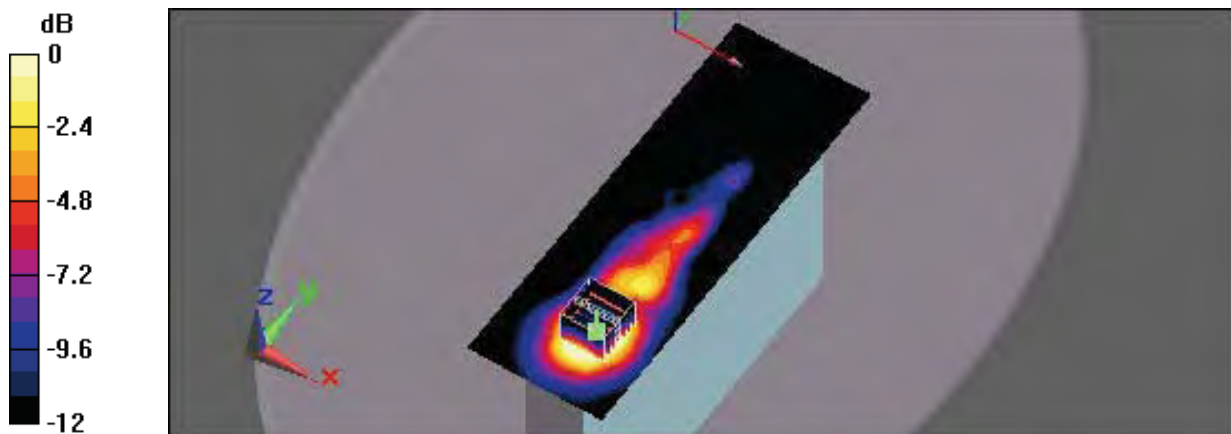
- Probe: ES3DV3 - SN3150; ConvF(4.19, 4.19, 4.19); Calibrated: 1/9/2008
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn393; Calibrated: 8/25/2008
- Phantom: ELI 4.0; Type: QDOVA001BB; Serial: 1036
- Measurement SW: DASYS, V5.0 Build 120; SEMCAD X Version 13.2 Build 87

#### Flat/Area Scan (61x181x1):

Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 0.965 mW/g

#### Flat/Zoom Scan (7x7x9)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=3mm  
Reference Value = 4.3 V/m; Power Drift = -0.122 dB  
Peak SAR (extrapolated) = 0.358 W/kg  
**SAR(1 g) = 0.195 mW/g; SAR(10 g) = 0.098 mW/g**  
Maximum value of SAR (measured) = 0.248 mW/g



0 dB = 0.248mW/g





Test Laboratory: A Test Lab Techno Corp.

Date/Time: 11/19/2008 10:43:13 PM

### **Flat\_802.11b CH1\_11M\_Tablet Mode\_LCD Left Side\_Close Body**

**DUT: NL\*\*; Type: NB; FCC ID: HFS-NL**

Communication System: IEEE 802.11b; Frequency: 2412 MHz; Duty Cycle: 1:1  
Medium parameters used:  $f = 2412$  MHz;  $\sigma = 1.91$  mho/m;  $\epsilon_r = 50.6$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Flat Section  
Measurement Standard: DASYS (IEEE/IEC)

DASY5 Configuration:

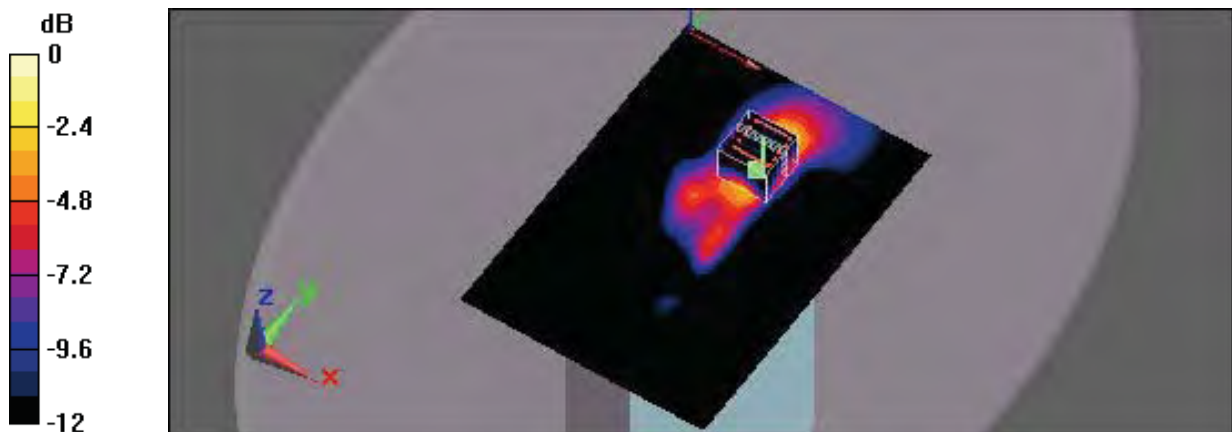
- Probe: ES3DV3 - SN3150; ConvF(4.19, 4.19, 4.19); Calibrated: 1/9/2008
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn393; Calibrated: 8/25/2008
- Phantom: ELI 4.0; Type: QDOVA001BB; Serial: 1036
- Measurement SW: DASYS, V5.0 Build 120; SEMCAD X Version 13.2 Build 87

#### **Flat/Area Scan (101x141x1):**

Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 0.097 mW/g

#### **Flat/Zoom Scan (7x7x9)/Cube 0:**

Measurement grid: dx=5mm, dy=5mm, dz=3mm  
Reference Value = 3.42 V/m; Power Drift = 0.160 dB  
Peak SAR (extrapolated) = 0.270 W/kg  
**SAR(1 g) = 0.115 mW/g; SAR(10 g) = 0.054 mW/g**  
Maximum value of SAR (measured) = 0.152 mW/g



0 dB = 0.152mW/g



Test Laboratory: A Test Lab Techno Corp.

Date/Time: 11/2/2008 5:14:25 AM

### Flat\_802.11b CH6\_11M\_Bottom Close Body\_Tablet Mode

**DUT: NL\*\*;** Type: NB; FCC ID: HFS-NL

Communication System: IEEE 802.11b; Frequency: 2437 MHz; Duty Cycle: 1:1  
Medium parameters used:  $f = 2437$  MHz;  $\sigma = 1.93$  mho/m;  $\epsilon_r = 51.7$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Flat Section  
Measurement Standard: DASYS (IEEE/IEC)

DASY5 Configuration:

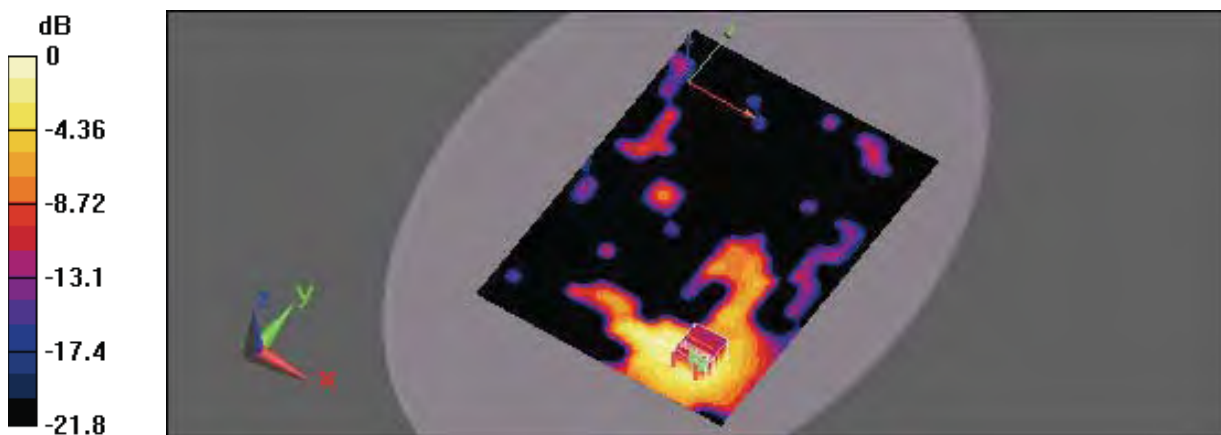
- Probe: ES3DV3 - SN3150; ConvF(4.19, 4.19, 4.19); Calibrated: 1/9/2008
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn779; Calibrated: 11/30/2007
- Phantom: ELI 4.0; Type: QDOVA001BB; Serial: 1036
- Measurement SW: DASYS, V5.0 Build 120; SEMCAD X Version 13.2 Build 87

#### Flat/Area Scan (151x201x1):

Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 0.025 mW/g

#### Flat/Zoom Scan (7x7x9)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=3mm  
Reference Value = 0.645 V/m; Power Drift = -0.081 dB  
Peak SAR (extrapolated) = 0.045 W/kg  
**SAR(1 g) = 0.022 mW/g; SAR(10 g) = 0.012 mW/g**  
Maximum value of SAR (measured) = 0.028 mW/g



0 dB = 0.028mW/g



Test Laboratory: A Test Lab Techno Corp.

Date/Time: 11/2/2008 11:27:12 AM

### Flat\_802.11b CH11\_11M\_Bottom Close Body\_Tablet Mode

**DUT: NL\*\*;** Type: NB; FCC ID: HFS-NL

Communication System: IEEE 802.11b; Frequency: 2462 MHz; Duty Cycle: 1:1  
Medium parameters used:  $f = 2462$  MHz;  $\sigma = 1.96$  mho/m;  $\epsilon_r = 51.6$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Flat Section  
Measurement Standard: DASYS (IEEE/IEC)

DASY5 Configuration:

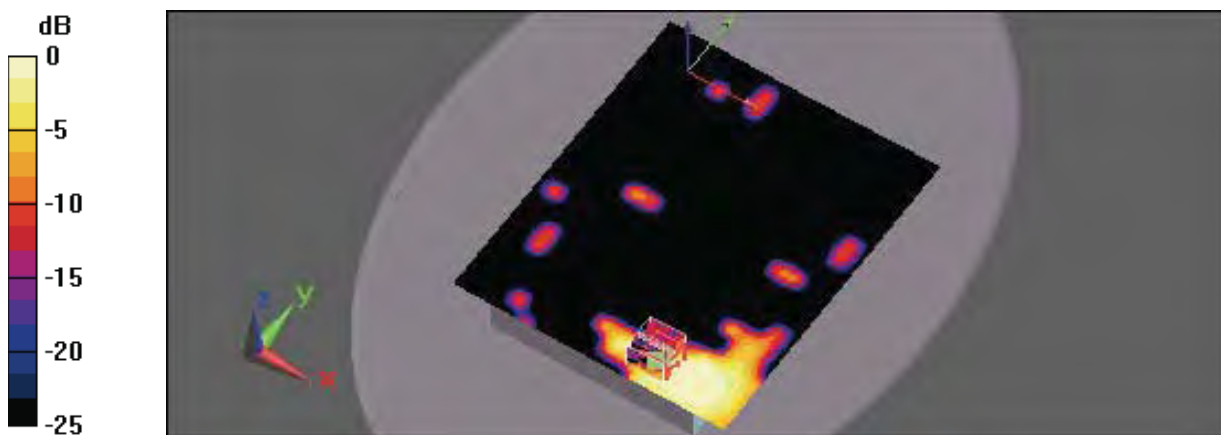
- Probe: ES3DV3 - SN3150; ConvF(4.19, 4.19, 4.19); Calibrated: 1/9/2008
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn779; Calibrated: 11/30/2007
- Phantom: ELI 4.0; Type: QDOVA001BB; Serial: 1036
- Measurement SW: DASYS, V5.0 Build 120; SEMCAD X Version 13.2 Build 87

#### Flat/Area Scan (151x181x1):

Measurement grid:  $dx=15$ mm,  $dy=15$ mm  
Maximum value of SAR (interpolated) = 0.021 mW/g

#### Flat/Zoom Scan (7x7x9)/Cube 0:

Measurement grid:  $dx=5$ mm,  $dy=5$ mm,  $dz=3$ mm  
Reference Value = 0.525 V/m; Power Drift = 0.126 dB  
Peak SAR (extrapolated) = 0.026 W/kg  
**SAR(1 g) = 0.014 mW/g; SAR(10 g) = 0.00666 mW/g**  
Maximum value of SAR (measured) = 0.018 mW/g



0 dB = 0.018mW/g



Test Laboratory: A Test Lab Techno Corp.

Date/Time: 11/19/2008 6:53:18 PM

**Flat\_802.11b CH11\_11M\_Bottom Close Body\_Tablet Mode\_Zoom out**

**DUT: NL\*\*; Type: NB; FCC ID: HFS-NL**

Communication System: IEEE 802.11b; Frequency: 2462 MHz; Duty Cycle: 1:1  
Medium parameters used:  $f = 2462$  MHz;  $\sigma = 1.97$  mho/m;  $\epsilon_r = 50.5$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASYS5 (IEEE/IEC)

DASY5 Configuration:

- Probe: ES3DV3 - SN3150; ConvF(4.19, 4.19, 4.19); Calibrated: 1/9/2008
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn393; Calibrated: 8/25/2008
- Phantom: ELI 4.0; Type: QDOVA001BB; Serial: 1036
- Measurement SW: DASYS5, V5.0 Build 120; SEMCAD X Version 13.2 Build 87

**Flat/Area Scan (121x121x1):**

Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.024 mW/g

**Flat/Zoom Scan (7x7x9)/Cube 0: M**

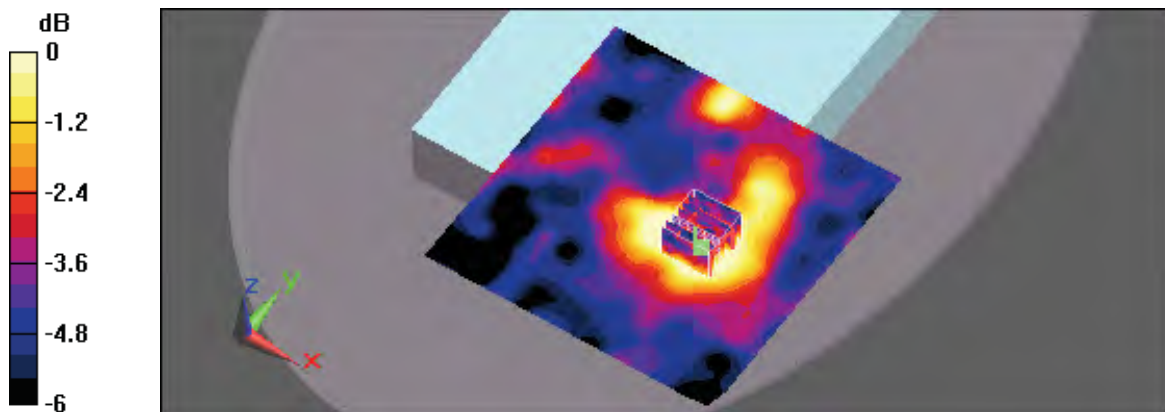
Measurement grid: dx=5mm, dy=5mm, dz=3mm

Reference Value = 1.84 V/m; Power Drift = -0.144 dB

Peak SAR (extrapolated) = 0.018 W/kg

**SAR(1 g) = 0.014 mW/g; SAR(10 g) = 0.010 mW/g**

Maximum value of SAR (measured) = 0.016 mW/g



0 dB = 0.016mW/g



Test Laboratory: A Test Lab Techno Corp.

Date/Time: 11/2/2008 8:27:41 PM

### Flat\_802.11g CH1\_6M\_Bottom Close Body\_Normal Mode\_LCD Open90

**DUT: NL\*\*;** Type: NB; FCC ID: HFS-NL

Communication System: IEEE 802.11g; Frequency: 2412 MHz; Duty Cycle: 1:1  
Medium parameters used:  $f = 2412$  MHz;  $\sigma = 1.9$  mho/m;  $\epsilon_r = 51.8$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Flat Section  
Measurement Standard: DASYS (IEEE/IEC)

DASY5 Configuration:

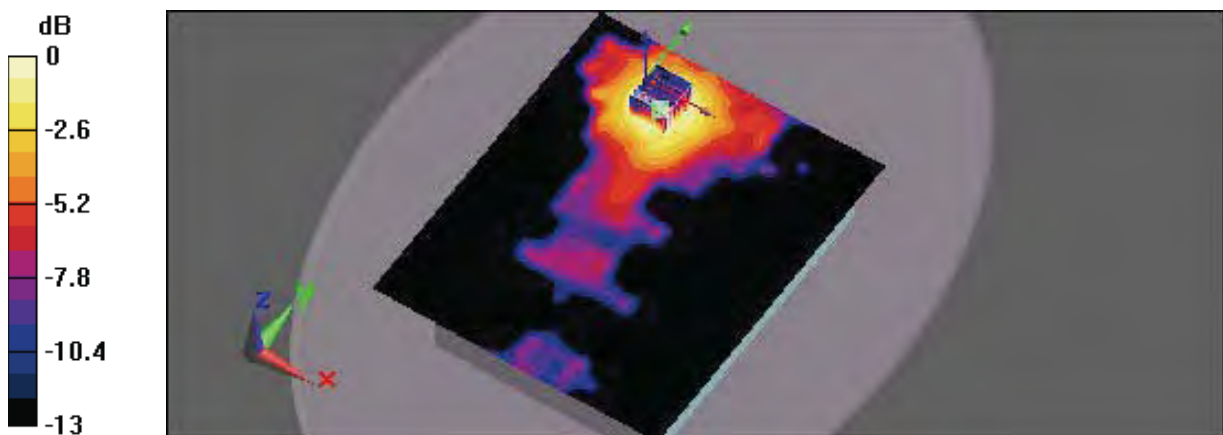
- Probe: ES3DV3 - SN3150; ConvF(4.19, 4.19, 4.19); Calibrated: 1/9/2008
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn779; Calibrated: 11/30/2007
- Phantom: ELI 4.0; Type: QDOVA001BB; Serial: 1036
- Measurement SW: DASYS, V5.0 Build 120; SEMCAD X Version 13.2 Build 87

#### Flat/Area Scan (151x181x1):

Measurement grid:  $dx=15$ mm,  $dy=15$ mm  
Maximum value of SAR (interpolated) = 0.015 mW/g

#### Flat/Zoom Scan (7x7x9)/Cube 0:

Measurement grid:  $dx=5$ mm,  $dy=5$ mm,  $dz=3$ mm  
Reference Value = 0.784 V/m; Power Drift = 0.105 dB  
Peak SAR (extrapolated) = 0.032 W/kg  
**SAR(1 g) = 0.013 mW/g; SAR(10 g) = 0.00792 mW/g**  
Maximum value of SAR (measured) = 0.016 mW/g



0 dB = 0.016mW/g



Test Laboratory: A Test Lab Techno Corp.

Date/Time: 10/30/2008 9:35:47 AM

### Flat\_802.11g CH1\_6M\_Bottom Close Body\_Tablet Mode

**DUT: NL\*\*;** Type: NB; FCC ID: HFS-NL

Communication System: IEEE 802.11g; Frequency: 2412 MHz; Duty Cycle: 1:1  
Medium parameters used:  $f = 2412$  MHz;  $\sigma = 1.9$  mho/m;  $\epsilon_r = 51.8$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Flat Section  
Measurement Standard: DASYS (IEEE/IEC)

DASY5 Configuration:

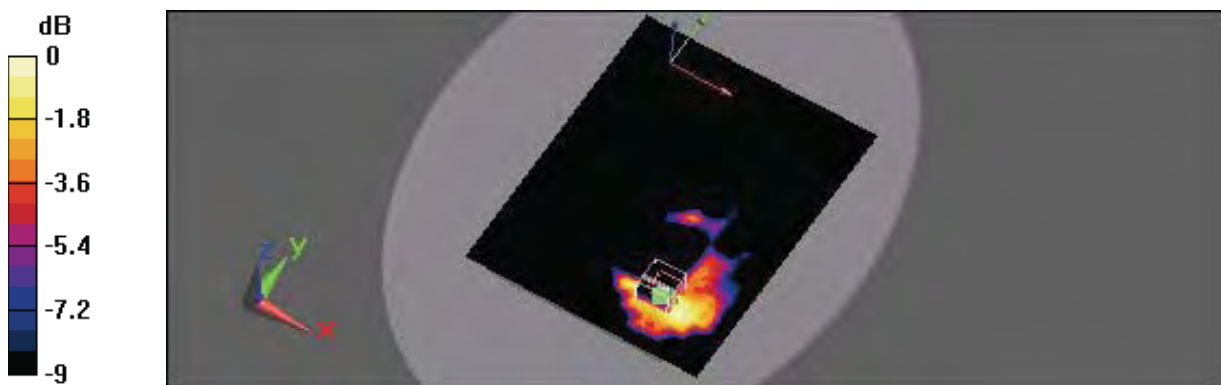
- Probe: ES3DV3 - SN3150; ConvF(4.19, 4.19, 4.19); Calibrated: 1/9/2008
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn779; Calibrated: 11/30/2007
- Phantom: ELI 4.0; Type: QDOVA001BB; Serial: 1036
- Measurement SW: DASYS, V5.0 Build 120; SEMCAD X Version 13.2 Build 87

#### Flat/Area Scan (151x201x1):

Measurement grid:  $dx=15$ mm,  $dy=15$ mm  
Maximum value of SAR (interpolated) = 0.019 mW/g

#### Flat/Zoom Scan (7x7x9)/Cube 0:

Measurement grid:  $dx=5$ mm,  $dy=5$ mm,  $dz=3$ mm  
Reference Value = 0.542 V/m; Power Drift = -0.086 dB  
Peak SAR (extrapolated) = 0.039 W/kg  
**SAR(1 g) = 0.016 mW/g; SAR(10 g) = 0.00889 mW/g**  
Maximum value of SAR (measured) = 0.021 mW/g



0 dB = 0.021mW/g



Test Laboratory: A Test Lab Techno Corp.

Date/Time: 11/20/2008 2:51:39 AM

### Flat\_802.11g CH1\_6M\_Tablet Mode\_LCD Tip Side\_Close Body

**DUT: NL\*\*;** Type: NB; FCC ID: HFS-NL

Communication System: IEEE 802.11g; Frequency: 2412 MHz; Duty Cycle: 1:1  
Medium parameters used:  $f = 2412$  MHz;  $\sigma = 1.91$  mho/m;  $\epsilon_r = 50.6$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Flat Section  
Measurement Standard: DASYS (IEEE/IEC)

DASY5 Configuration:

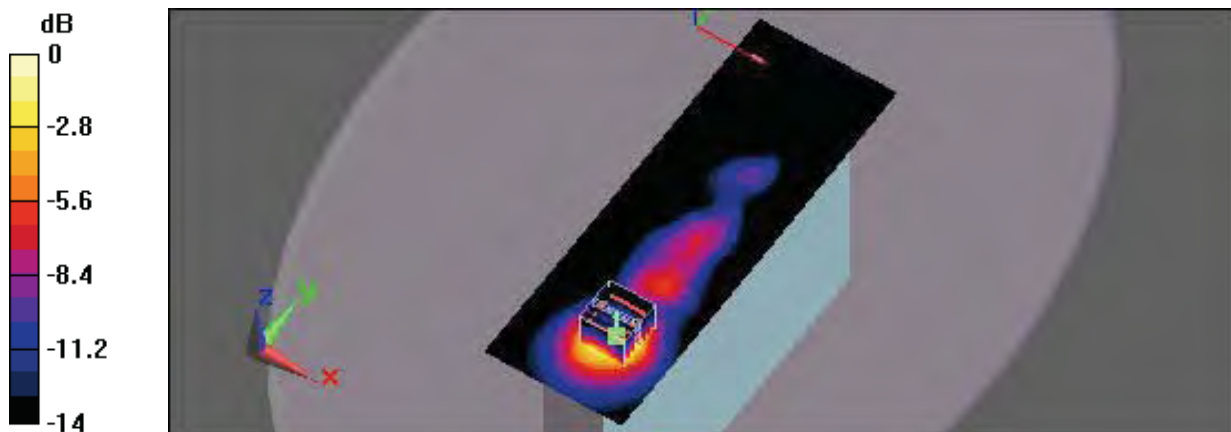
- Probe: ES3DV3 - SN3150; ConvF(4.19, 4.19, 4.19); Calibrated: 1/9/2008
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn393; Calibrated: 8/25/2008
- Phantom: ELI 4.0; Type: QDOVA001BB; Serial: 1036
- Measurement SW: DASYS, V5.0 Build 120; SEMCAD X Version 13.2 Build 87

#### Flat/Area Scan (61x181x1):

Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 0.562 mW/g

#### Flat/Zoom Scan (7x7x9)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=3mm  
Reference Value = 4.4 V/m; Power Drift = -0.00241 dB  
Peak SAR (extrapolated) = 0.619 W/kg  
**SAR(1 g) = 0.286 mW/g; SAR(10 g) = 0.138 mW/g**  
Maximum value of SAR (measured) = 0.376 mW/g



0 dB = 0.376mW/g



Test Laboratory: A Test Lab Techno Corp.

Date/Time: 11/19/2008 11:19:36 PM

### Flat\_802.11g CH1\_6M\_Tablet Mode\_LCD Left Side\_Close Body

**DUT: NL\*\*;** Type: NB; FCC ID: HFS-NL

Communication System: IEEE 802.11g; Frequency: 2412 MHz; Duty Cycle: 1:1  
Medium parameters used:  $f = 2412$  MHz;  $\sigma = 1.91$  mho/m;  $\epsilon_r = 50.6$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Flat Section  
Measurement Standard: DASYS (IEEE/IEC)

DASY5 Configuration:

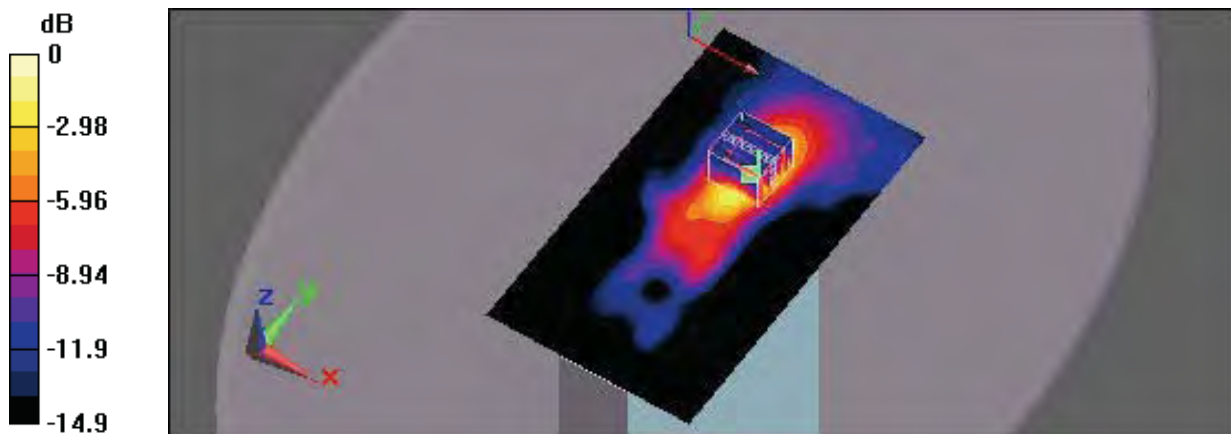
- Probe: ES3DV3 - SN3150; ConvF(4.19, 4.19, 4.19); Calibrated: 1/9/2008
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn393; Calibrated: 8/25/2008
- Phantom: ELI 4.0; Type: QDOVA001BB; Serial: 1036
- Measurement SW: DASYS, V5.0 Build 120; SEMCAD X Version 13.2 Build 87

#### Flat/Area Scan (81x141x1):

Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 0.172 mW/g

#### Flat/Zoom Scan (7x7x9)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=3mm  
Reference Value = 5.09 V/m; Power Drift = 0.081 dB  
Peak SAR (extrapolated) = 0.364 W/kg  
**SAR(1 g) = 0.148 mW/g; SAR(10 g) = 0.069 mW/g**  
Maximum value of SAR (measured) = 0.200 mW/g



0 dB = 0.200mW/g





Test Laboratory: A Test Lab Techno Corp.

Date/Time: 11/2/2008 9:20:52 PM

### Flat\_802.11g CH1\_54M\_Bottom Close Body\_Normal Mode\_LCD Open90

**DUT: NL\*\*;** Type: NB; FCC ID: HFS-NL

Communication System: IEEE 802.11g; Frequency: 2412 MHz; Duty Cycle: 1:1  
Medium parameters used:  $f = 2412$  MHz;  $\sigma = 1.9$  mho/m;  $\epsilon_r = 51.8$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Flat Section  
Measurement Standard: DASYS (IEEE/IEC)

DASY5 Configuration:

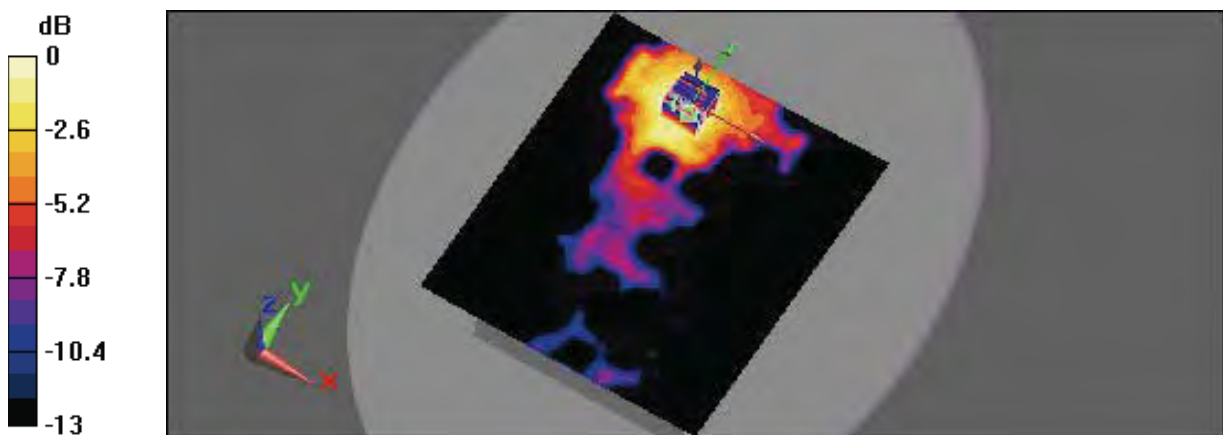
- Probe: ES3DV3 - SN3150; ConvF(4.19, 4.19, 4.19); Calibrated: 1/9/2008
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn779; Calibrated: 11/30/2007
- Phantom: ELI 4.0; Type: QDOVA001BB; Serial: 1036
- Measurement SW: DASYS, V5.0 Build 120; SEMCAD X Version 13.2 Build 87

#### Flat/Area Scan (151x181x1):

Measurement grid:  $dx=15$ mm,  $dy=15$ mm  
Maximum value of SAR (interpolated) = 0.014 mW/g

#### Flat/Zoom Scan (7x7x9)/Cube 0:

Measurement grid:  $dx=5$ mm,  $dy=5$ mm,  $dz=3$ mm  
Reference Value = 0.791 V/m; Power Drift = 0.00195 dB  
Peak SAR (extrapolated) = 0.031 W/kg  
**SAR(1 g) = 0.012 mW/g; SAR(10 g) = 0.00719 mW/g**  
Maximum value of SAR (measured) = 0.015 mW/g



0 dB = 0.015mW/g



Test Laboratory: A Test Lab Techno Corp.

Date/Time: 10/30/2008 10:32:04 AM

### Flat\_802.11g CH1\_54M\_Bottom Close Body\_Tablet Mode

**DUT: NL\*\*;** Type: NB; FCC ID: HFS-NL

Communication System: IEEE 802.11g; Frequency: 2412 MHz; Duty Cycle: 1:1  
Medium parameters used:  $f = 2412$  MHz;  $\sigma = 1.9$  mho/m;  $\epsilon_r = 51.8$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Flat Section  
Measurement Standard: DASYS (IEEE/IEC)

DASY5 Configuration:

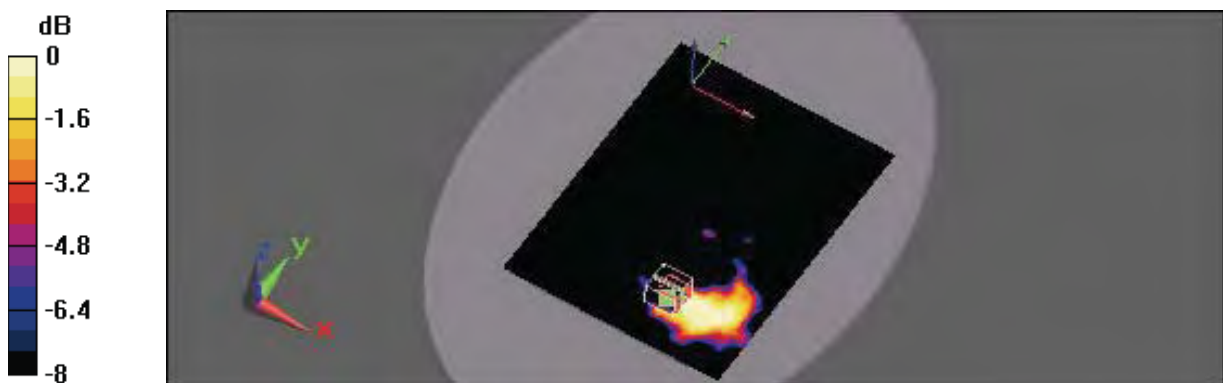
- Probe: ES3DV3 - SN3150; ConvF(4.19, 4.19, 4.19); Calibrated: 1/9/2008
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn779; Calibrated: 11/30/2007
- Phantom: ELI 4.0; Type: QDOVA001BB; Serial: 1036
- Measurement SW: DASYS, V5.0 Build 120; SEMCAD X Version 13.2 Build 87

#### Flat/Area Scan (151x201x1):

Measurement grid:  $dx=15$ mm,  $dy=15$ mm  
Maximum value of SAR (interpolated) = 0.022 mW/g

#### Flat/Zoom Scan (7x7x9)/Cube 0:

Measurement grid:  $dx=5$ mm,  $dy=5$ mm,  $dz=3$ mm  
Reference Value = 0.822 V/m; Power Drift = 0.010 dB  
Peak SAR (extrapolated) = 0.034 W/kg  
**SAR(1 g) = 0.014 mW/g; SAR(10 g) = 0.00768 mW/g**  
Maximum value of SAR (measured) = 0.019 mW/g



0 dB = 0.019mW/g



Test Laboratory: A Test Lab Techno Corp.

Date/Time: 11/2/2008 11:24:31 PM

### Flat\_802.11g CH6\_6M\_Bottom Close Body\_Tablet Mode

**DUT: NL\*\*;** Type: NB; FCC ID: HFS-NL

Communication System: IEEE 802.11g; Frequency: 2437 MHz; Duty Cycle: 1:1  
Medium parameters used:  $f = 2437$  MHz;  $\sigma = 1.93$  mho/m;  $\epsilon_r = 51.7$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Flat Section  
Measurement Standard: DASYS (IEEE/IEC)

DASY5 Configuration:

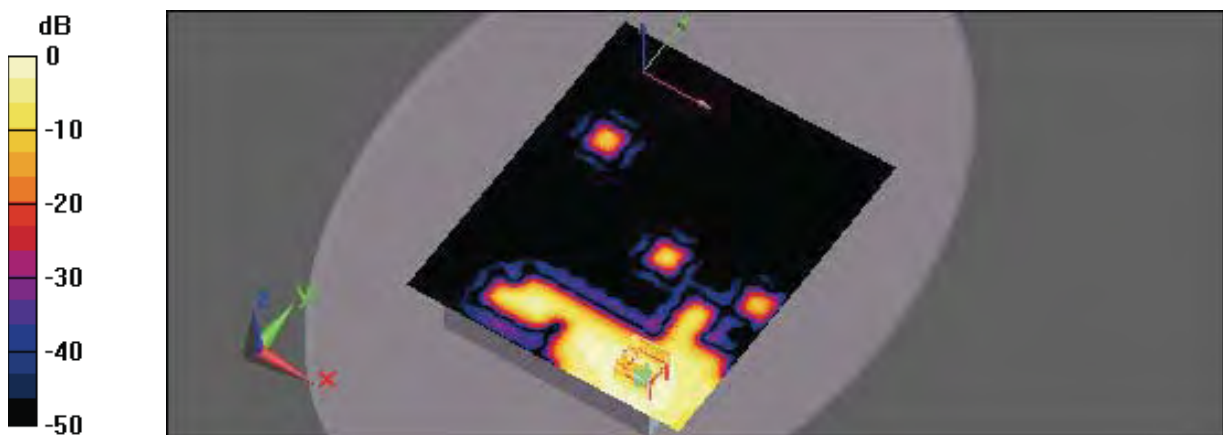
- Probe: ES3DV3 - SN3150; ConvF(4.19, 4.19, 4.19); Calibrated: 1/9/2008
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn779; Calibrated: 11/30/2007
- Phantom: ELI 4.0; Type: QDOVA001BB; Serial: 1036
- Measurement SW: DASYS, V5.0 Build 120; SEMCAD X Version 13.2 Build 87

#### Flat/Area Scan (151x181x1):

Measurement grid:  $dx=15$ mm,  $dy=15$ mm  
Maximum value of SAR (interpolated) = 0.017 mW/g

#### Flat/Zoom Scan (7x7x9)/Cube 0:

Measurement grid:  $dx=5$ mm,  $dy=5$ mm,  $dz=3$ mm  
Reference Value = 0.601 V/m; Power Drift = -0.129 dB  
Peak SAR (extrapolated) = 0.031 W/kg  
**SAR(1 g) = 0.015 mW/g; SAR(10 g) = 0.0085 mW/g**  
Maximum value of SAR (measured) = 0.019 mW/g



0 dB = 0.019mW/g



Test Laboratory: A Test Lab Techno Corp.

Date/Time: 11/19/2008 9:13:03 PM

### Flat\_802.11g CH6\_6M\_Bottom Close Body\_Tablet Mode\_Zoom out

**DUT: NL\*\*;** Type: NB; FCC ID: HFS-NL

Communication System: IEEE 802.11g; Frequency: 2437 MHz; Duty Cycle: 1:1  
Medium parameters used:  $f = 2437$  MHz;  $\sigma = 1.95$  mho/m;  $\epsilon_r = 50.6$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Flat Section  
Measurement Standard: DASYS (IEEE/IEC)

DASY5 Configuration:

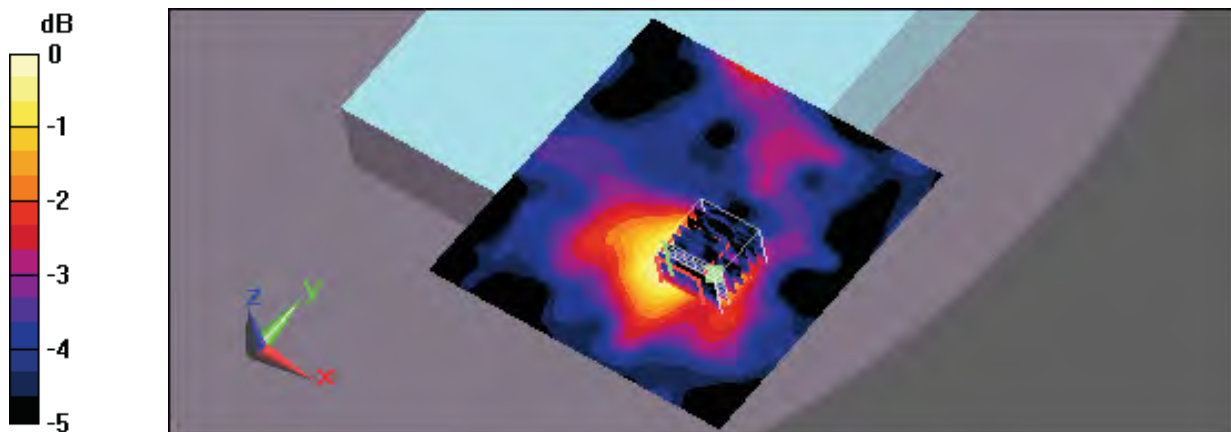
- Probe: ES3DV3 - SN3150; ConvF(4.19, 4.19, 4.19); Calibrated: 1/9/2008
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn393; Calibrated: 8/25/2008
- Phantom: ELI 4.0; Type: QDOVA001BB; Serial: 1036
- Measurement SW: DASYS, V5.0 Build 120; SEMCAD X Version 13.2 Build 87

#### Flat/Area Scan (101x101x1):

Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 0.016 mW/g

#### Flat/Zoom Scan (7x7x9)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=3mm  
Reference Value = 1.56 V/m; Power Drift = -0.124 dB  
Peak SAR (extrapolated) = 0.029 W/kg  
**SAR(1 g) = 0.013 mW/g; SAR(10 g) = 0.00954 mW/g**  
Maximum value of SAR (measured) = 0.017 mW/g



0 dB = 0.017mW/g



Test Laboratory: A Test Lab Techno Corp.

Date/Time: 11/3/2008 12:15:30 AM

### Flat\_802.11g CH11\_6M\_Bottom Close Body\_Tablet Mode

**DUT: NL\*\*;** Type: NB; FCC ID: HFS-NL

Communication System: IEEE 802.11g; Frequency: 2462 MHz; Duty Cycle: 1:1  
Medium parameters used:  $f = 2462$  MHz;  $\sigma = 1.96$  mho/m;  $\epsilon_r = 51.6$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Flat Section  
Measurement Standard: DASYS (IEEE/IEC)

DASY5 Configuration:

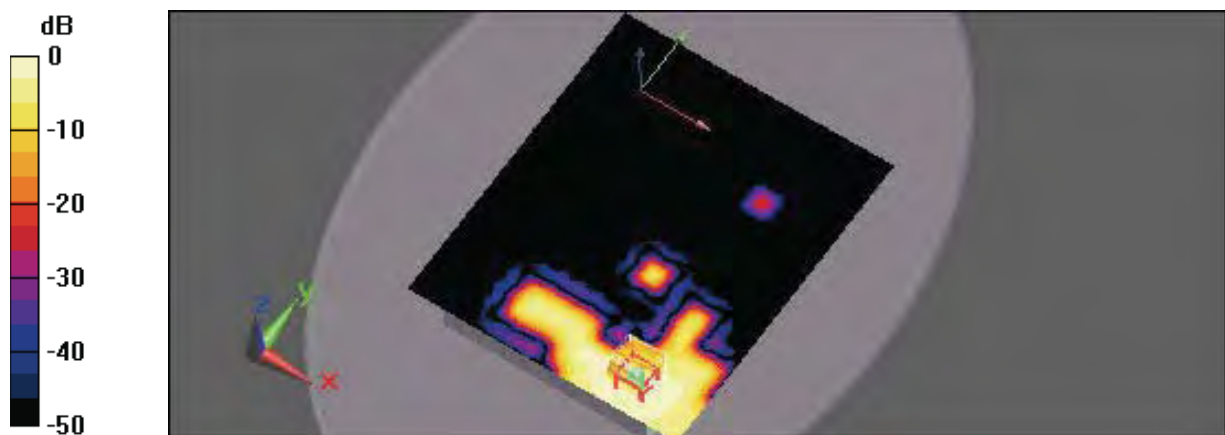
- Probe: ES3DV3 - SN3150; ConvF(4.19, 4.19, 4.19); Calibrated: 1/9/2008
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn779; Calibrated: 11/30/2007
- Phantom: ELI 4.0; Type: QDOVA001BB; Serial: 1036
- Measurement SW: DASYS, V5.0 Build 120; SEMCAD X Version 13.2 Build 87

#### Flat/Area Scan (151x181x1):

Measurement grid:  $dx=15$ mm,  $dy=15$ mm  
Maximum value of SAR (interpolated) = 0.019 mW/g

#### Flat/Zoom Scan (7x7x9)/Cube 0:

Measurement grid:  $dx=5$ mm,  $dy=5$ mm,  $dz=3$ mm  
Reference Value = 0.671 V/m; Power Drift = -0.106 dB  
Peak SAR (extrapolated) = 0.039 W/kg  
**SAR(1 g) = 0.016 mW/g; SAR(10 g) = 0.0083 mW/g**  
Maximum value of SAR (measured) = 0.020 mW/g



0 dB = 0.020mW/g



Test Laboratory: A Test Lab Techno Corp.

Date/Time: 11/19/2008 9:44:28 PM

### Flat\_802.11g CH11\_6M\_Bottom Close Body\_Tablet Mode\_Zoom out

**DUT: NL\*\*;** Type: NB; FCC ID: HFS-NL

Communication System: IEEE 802.11g; Frequency: 2462 MHz; Duty Cycle: 1:1  
Medium parameters used:  $f = 2462$  MHz;  $\sigma = 1.97$  mho/m;  $\epsilon_r = 50.5$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Flat Section  
Measurement Standard: DASYS (IEEE/IEC)

DASY5 Configuration:

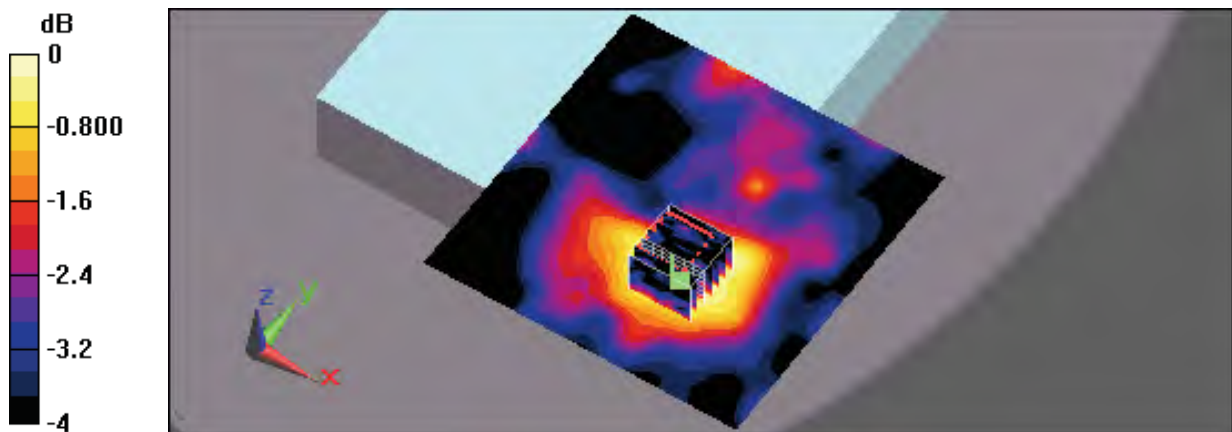
- Probe: ES3DV3 - SN3150; ConvF(4.19, 4.19, 4.19); Calibrated: 1/9/2008
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn393; Calibrated: 8/25/2008
- Phantom: ELI 4.0; Type: QDOVA001BB; Serial: 1036
- Measurement SW: DASYS, V5.0 Build 120; SEMCAD X Version 13.2 Build 87

#### Flat/Area Scan (101x101x1):

Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 0.016 mW/g

#### Flat/Zoom Scan (7x7x9)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=3mm  
Reference Value = 1.96 V/m; Power Drift = 0.028 dB  
Peak SAR (extrapolated) = 0.020 W/kg  
**SAR(1 g) = 0.014 mW/g; SAR(10 g) = 0.010 mW/g**  
Maximum value of SAR (measured) = 0.016 mW/g



0 dB = 0.016mW/g



Test Laboratory: A Test Lab Techno Corp.

Date/Time: 11/2/2008 6:11:35 PM

## Flat\_802.11n\_CH1\_6.5M\_HT20\_Bottom Close Body\_Normal Mode\_LCD Open90

**DUT: NL\*\*;** Type: NB; FCC ID: HFS-NL

Communication System: IEEE 802.11n(2.4GHz); Frequency: 2412 MHz;Duty Cycle: 1:1

Medium parameters used:  $f = 2412$  MHz;  $\sigma = 1.9$  mho/m;  $\epsilon_r = 51.8$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASYS (IEEE/IEC)

DASY5 Configuration:

- Probe: ES3DV3 - SN3150; ConvF(4.19, 4.19, 4.19); Calibrated: 1/9/2008
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn779; Calibrated: 11/30/2007
- Phantom: ELI 4.0; Type: QDOVA001BB; Serial: 1036
- Measurement SW: DASYS, V5.0 Build 120; SEMCAD X Version 13.2 Build 87

### Flat/Area Scan (141x181x1):

Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.014 mW/g

### Flat/Zoom Scan (7x7x9)/Cube 0:

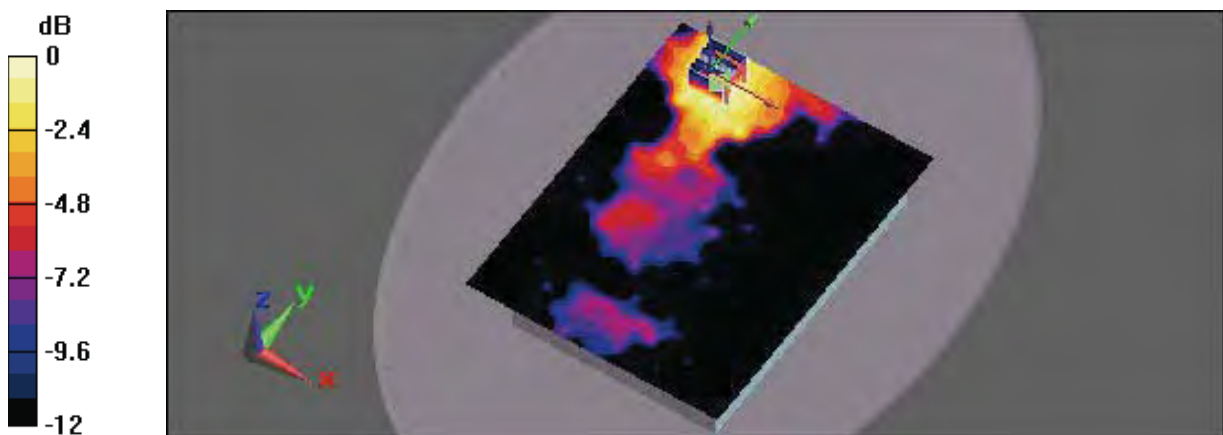
Measurement grid: dx=5mm, dy=5mm, dz=3mm

Reference Value = 0.414 V/m; Power Drift = 0.140 dB

Peak SAR (extrapolated) = 0.026 W/kg

**SAR(1 g) = 0.012 mW/g; SAR(10 g) = 0.00714 mW/g**

Maximum value of SAR (measured) = 0.015 mW/g



0 dB = 0.015mW/g



Test Laboratory: A Test Lab Techno Corp.

Date/Time: 11/2/2008 10:00:27 PM

### Flat\_802.11n\_CH1\_6.5M\_HT20\_Bottom Close Body\_Tablet Mode

**DUT: NL\*\*;** Type: NB; FCC ID: HFS-NL

Communication System: IEEE 802.11n(2.4GHz); Frequency: 2412 MHz;Duty Cycle: 1:1

Medium parameters used:  $f = 2412$  MHz;  $\sigma = 1.9$  mho/m;  $\epsilon_r = 51.8$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASYS (IEEE/IEC)

DASY5 Configuration:

- Probe: ES3DV3 - SN3150; ConvF(4.19, 4.19, 4.19); Calibrated: 1/9/2008
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn779; Calibrated: 11/30/2007
- Phantom: ELI 4.0; Type: QDOVA001BB; Serial: 1036
- Measurement SW: DASYS, V5.0 Build 120; SEMCAD X Version 13.2 Build 87

#### Flat/Area Scan (151x191x1):

Measurement grid: dx=15mm, dy=15mm

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

#### Flat/Zoom Scan (7x7x9)/Cube 0:

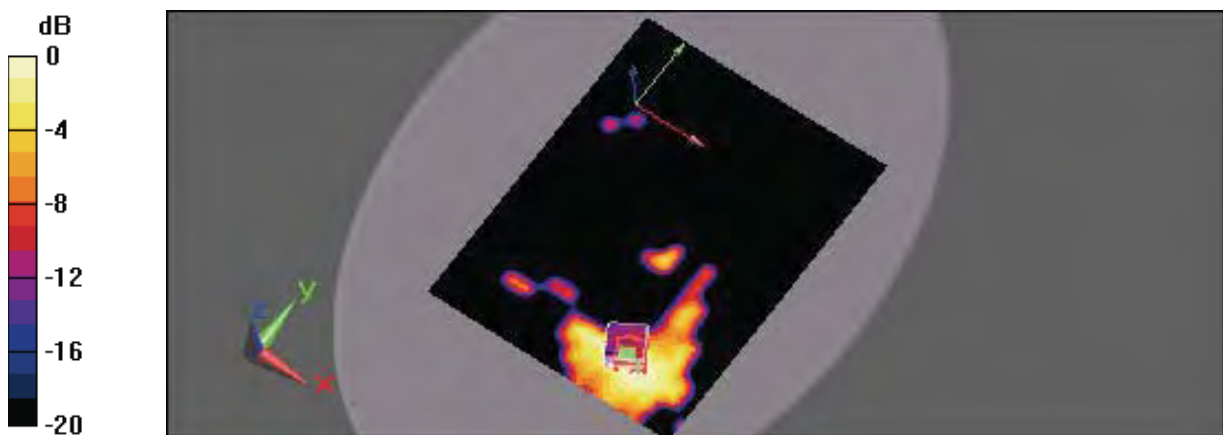
Measurement grid: dx=5mm, dy=5mm, dz=3mm

Reference Value = 0.633 V/m; Power Drift = -0.049 dB

Peak SAR (extrapolated) = 0.031 W/kg

**SAR(1 g) = 0.016 mW/g; SAR(10 g) = 0.00863 mW/g**

Maximum value of SAR (measured) = 0.020 mW/g



0 dB = 0.020mW/g





Test Laboratory: A Test Lab Techno Corp.

Date/Time: 11/20/2008 1:44:54 AM

### Flat\_802.11n\_CH1\_6.5M\_HT20\_Tablet Mode\_LCD Tip Side\_Close Body

**DUT: NL\*\*;** Type: NB; FCC ID: HFS-NL

Communication System: IEEE 802.11n(2.4GHz); Frequency: 2412 MHz;Duty Cycle: 1:1

Medium parameters used:  $f = 2412$  MHz;  $\sigma = 1.91$  mho/m;  $\epsilon_r = 50.6$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASYS (IEEE/IEC)

DASY5 Configuration:

- Probe: ES3DV3 - SN3150; ConvF(4.19, 4.19, 4.19); Calibrated: 1/9/2008
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn393; Calibrated: 8/25/2008
- Phantom: ELI 4.0; Type: QDOVA001BB; Serial: 1036
- Measurement SW: DASYS, V5.0 Build 120; SEMCAD X Version 13.2 Build 87

#### Flat/Area Scan (61x181x1):

Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.336 mW/g

#### Flat/Zoom Scan (7x7x9)/Cube 0:

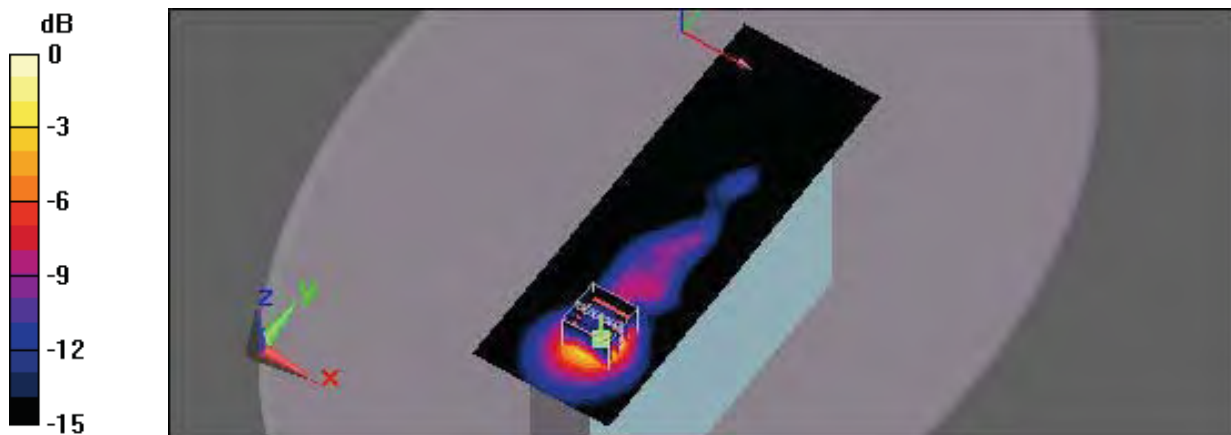
Measurement grid: dx=5mm, dy=5mm, dz=3mm

Reference Value = 3.13 V/m; Power Drift = 0.038 dB

Peak SAR (extrapolated) = 0.558 W/kg

**SAR(1 g) = 0.269 mW/g; SAR(10 g) = 0.125 mW/g**

Maximum value of SAR (measured) = 0.360 mW/g



0 dB = 0.360mW/g



Test Laboratory: A Test Lab Techno Corp.

Date/Time: 11/19/2008 11:55:32 PM

### Flat\_802.11n CH1\_6.5M\_HT20\_Tablet Mode\_LCD Left Side\_Close Body

**DUT: NL\*\*;** Type: NB; FCC ID: HFS-NL

Communication System: IEEE 802.11n(2.4GHz); Frequency: 2412 MHz;Duty Cycle: 1:1

Medium parameters used:  $f = 2412$  MHz;  $\sigma = 1.91$  mho/m;  $\epsilon_r = 50.6$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASYS (IEEE/IEC)

DASY5 Configuration:

- Probe: ES3DV3 - SN3150; ConvF(4.19, 4.19, 4.19); Calibrated: 1/9/2008
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn393; Calibrated: 8/25/2008
- Phantom: ELI 4.0; Type: QDOVA001BB; Serial: 1036
- Measurement SW: DASYS, V5.0 Build 120; SEMCAD X Version 13.2 Build 87

#### Flat/Area Scan (81x141x1):

Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.134 mW/g

#### Flat/Zoom Scan (7x7x9)/Cube 0:

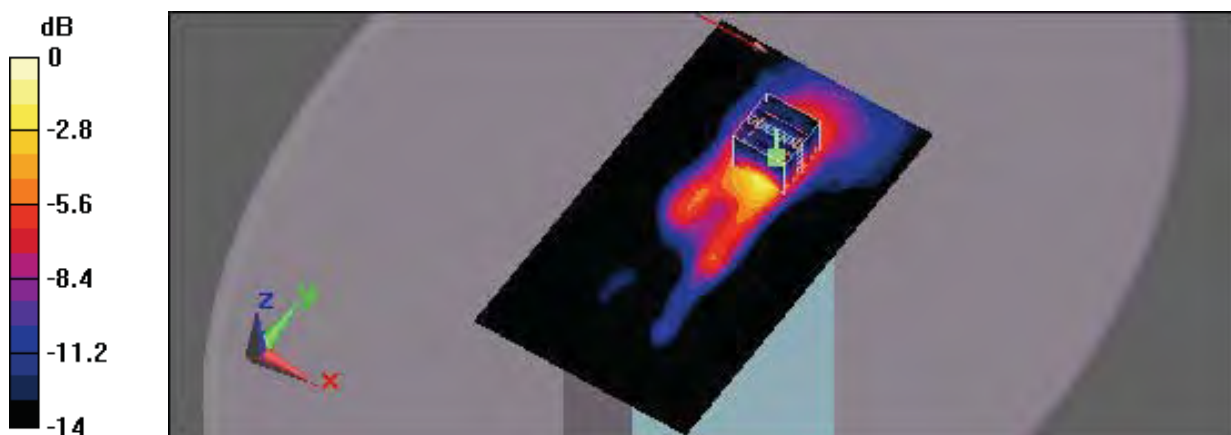
Measurement grid: dx=5mm, dy=5mm, dz=3mm

Reference Value = 3.63 V/m; Power Drift = 0.192 dB

Peak SAR (extrapolated) = 0.306 W/kg

**SAR(1 g) = 0.126 mW/g; SAR(10 g) = 0.060 mW/g**

Maximum value of SAR (measured) = 0.173 mW/g



0 dB = 0.173mW/g



Test Laboratory: A Test Lab Techno Corp.

Date/Time: 11/2/2008 5:31:51 PM

### Flat\_802.11n CH6\_6.5M\_HT20\_Bottom Close Body\_Tablet Mode

**DUT: NL\*\*;** Type: NB; FCC ID: HFS-NL

Communication System: IEEE 802.11n(2.4GHz); Frequency: 2437 MHz;Duty Cycle: 1:1  
Medium parameters used:  $f = 2437 \text{ MHz}$ ;  $\sigma = 1.93 \text{ mho/m}$ ;  $\epsilon_r = 51.7$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DASYS (IEEE/IEC)

DASY5 Configuration:

- Probe: ES3DV3 - SN3150; ConvF(4.19, 4.19, 4.19); Calibrated: 1/9/2008
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn779; Calibrated: 11/30/2007
- Phantom: ELI 4.0; Type: QDOVA001BB; Serial: 1036
- Measurement SW: DASYS, V5.0 Build 120; SEMCAD X Version 13.2 Build 87

#### Flat/Area Scan (151x191x1):

Measurement grid:  $dx=15\text{mm}$ ,  $dy=15\text{mm}$

Maximum value of SAR (interpolated) = 0.015 mW/g

#### Flat/Zoom Scan (7x7x9)/Cube 0:

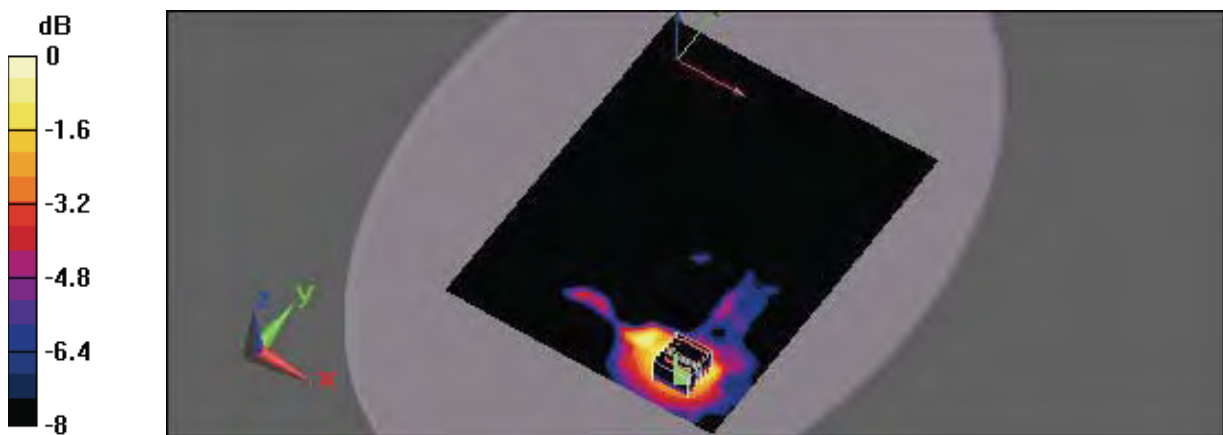
Measurement grid:  $dx=5\text{mm}$ ,  $dy=5\text{mm}$ ,  $dz=3\text{mm}$

Reference Value = 0.558 V/m; Power Drift = -0.117 dB

Peak SAR (extrapolated) = 0.029 W/kg

**SAR(1 g) = 0.013 mW/g; SAR(10 g) = 0.00748 mW/g**

Maximum value of SAR (measured) = 0.016 mW/g



0 dB = 0.016mW/g



Test Laboratory: A Test Lab Techno Corp.

Date/Time: 11/2/2008 6:54:37 PM

### Flat\_802.11n\_CH11\_6.5M\_HT20\_Bottom Close Body\_Tablet Mode

**DUT: NL\*\*;** Type: NB; FCC ID: HFS-NL

Communication System: IEEE 802.11n(2.4GHz); Frequency: 2462 MHz;Duty Cycle: 1:1  
Medium parameters used:  $f = 2462$  MHz;  $\sigma = 1.96$  mho/m;  $\epsilon_r = 51.6$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASYS (IEEE/IEC)

DASY5 Configuration:

- Probe: ES3DV3 - SN3150; ConvF(4.19, 4.19, 4.19); Calibrated: 1/9/2008
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn779; Calibrated: 11/30/2007
- Phantom: ELI 4.0; Type: QDOVA001BB; Serial: 1036
- Measurement SW: DASYS, V5.0 Build 120; SEMCAD X Version 13.2 Build 87

#### Flat/Area Scan (151x191x1):

Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.016 mW/g

#### Flat/Zoom Scan (7x7x9)/Cube 0:

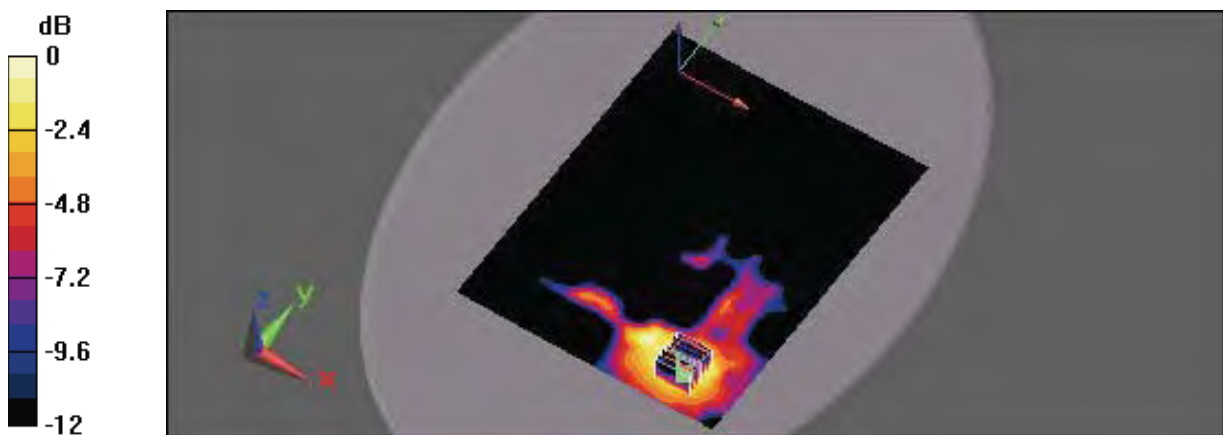
Measurement grid: dx=5mm, dy=5mm, dz=3mm

Reference Value = 0.561 V/m; Power Drift = -0.017 dB

Peak SAR (extrapolated) = 0.030 W/kg

**SAR(1 g) = 0.014 mW/g; SAR(10 g) = 0.00767 mW/g**

Maximum value of SAR (measured) = 0.017 mW/g



0 dB = 0.017mW/g



Test Laboratory: A Test Lab Techno Corp.

Date/Time: 11/3/2008 2:18:50 AM

**Flat\_802.11n CH3\_13M\_HT40\_Bottom Close Body\_Normal Mode\_LCD Open90**

**DUT: NL\*\*; Type: NB; FCC ID: HFS-NL**

Communication System: IEEE 802.11n(2.4GHz); Frequency: 2422 MHz;Duty Cycle: 1:1

Medium parameters used:  $f = 2422$  MHz;  $\sigma = 1.91$  mho/m;  $\epsilon_r = 51.7$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASYS (IEEE/IEC)

DASY5 Configuration:

- Probe: ES3DV3 - SN3150; ConvF(4.19, 4.19, 4.19); Calibrated: 1/9/2008
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn779; Calibrated: 11/30/2007
- Phantom: ELI 4.0; Type: QDOVA001BB; Serial: 1036
- Measurement SW: DASYS, V5.0 Build 120; SEMCAD X Version 13.2 Build 87

**Flat/Area Scan (151x181x1):**

Measurement grid: dx=15mm, dy=15mm

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

**Flat/Zoom Scan (7x7x9)/Cube 0:**

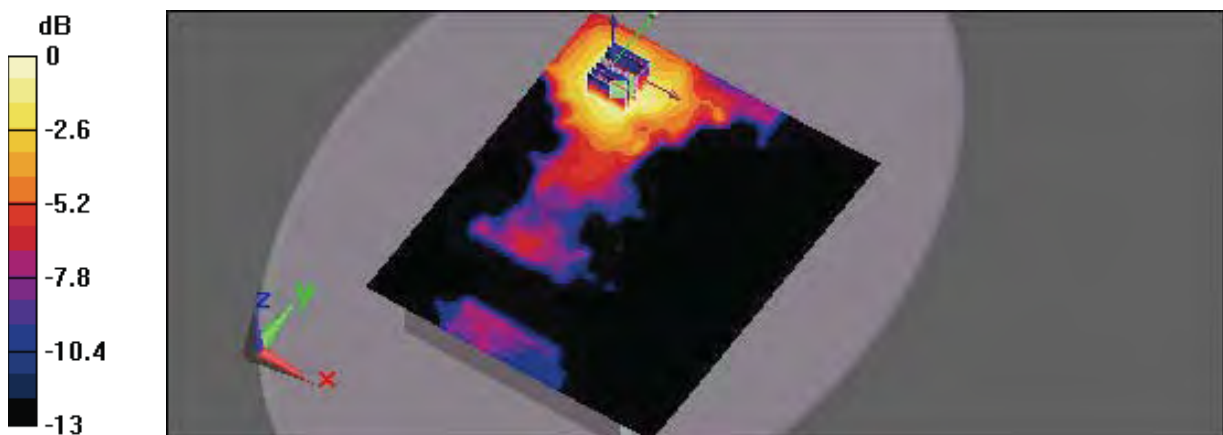
Measurement grid: dx=5mm, dy=5mm, dz=3mm

Reference Value = 0.929 V/m; Power Drift = 0.040 dB

Peak SAR (extrapolated) = 0.032 W/kg

**SAR(1 g) = 0.016 mW/g; SAR(10 g) = 0.00952 mW/g**

Maximum value of SAR (measured) = 0.020 mW/g



0 dB = 0.020mW/g



Test Laboratory: A Test Lab Techno Corp.

Date/Time: 10/31/2008 7:10:56 AM

### Flat\_802.11n CH3\_13M\_HT40\_Bottom Close Body\_Tablet Mode

**DUT: NL\*\*;** Type: NB; FCC ID: HFS-NL

Communication System: IEEE 802.11n; Frequency: 2422 MHz; Duty Cycle: 1:1  
Medium parameters used:  $f = 2422$  MHz;  $\sigma = 1.91$  mho/m;  $\epsilon_r = 51.7$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Flat Section  
Measurement Standard: DASYS (IEEE/IEC)

DASY5 Configuration:

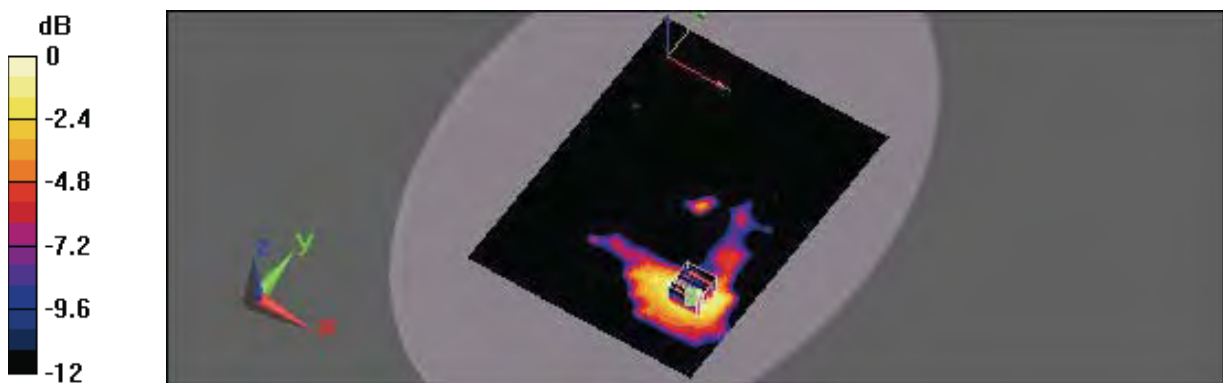
- Probe: ES3DV3 - SN3150; ConvF(4.19, 4.19, 4.19); Calibrated: 1/9/2008
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn779; Calibrated: 11/30/2007
- Phantom: ELI 4.0; Type: QDOVA001BB; Serial: 1036
- Measurement SW: DASYS, V5.0 Build 120; SEMCAD X Version 13.2 Build 87

#### Flat/Area Scan (151x201x1):

Measurement grid:  $dx=15$ mm,  $dy=15$ mm  
Maximum value of SAR (interpolated) = 0.029 mW/g

#### Flat/Zoom Scan (7x7x9)/Cube 0:

Measurement grid:  $dx=5$ mm,  $dy=5$ mm,  $dz=3$ mm  
Reference Value = 0.596 V/m; Power Drift = -0.073 dB  
Peak SAR (extrapolated) = 0.049 W/kg  
**SAR(1 g) = 0.025 mW/g; SAR(10 g) = 0.014 mW/g**  
Maximum value of SAR (measured) = 0.031 mW/g



0 dB = 0.031mW/g



Test Laboratory: A Test Lab Techno Corp.

Date/Time: 11/3/2008 3:12:27 AM

### Flat\_802.11n CH6\_13M\_HT40\_Bottom Close Body\_Tablet Mode

**DUT: NL\*\*;** Type: NB; FCC ID: HFS-NL

Communication System: IEEE 802.11n(2.4GHz); Frequency: 2437 MHz;Duty Cycle: 1:1  
Medium parameters used:  $f = 2437$  MHz;  $\sigma = 1.93$  mho/m;  $\epsilon_r = 51.7$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASYS (IEEE/IEC)

DASY5 Configuration:

- Probe: ES3DV3 - SN3150; ConvF(4.19, 4.19, 4.19); Calibrated: 1/9/2008
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn779; Calibrated: 11/30/2007
- Phantom: ELI 4.0; Type: QDOVA001BB; Serial: 1036
- Measurement SW: DASYS, V5.0 Build 120; SEMCAD X Version 13.2 Build 87

#### Flat/Area Scan (151x181x1):

Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.022 mW/g

#### Flat/Zoom Scan (7x7x9)/Cube 0:

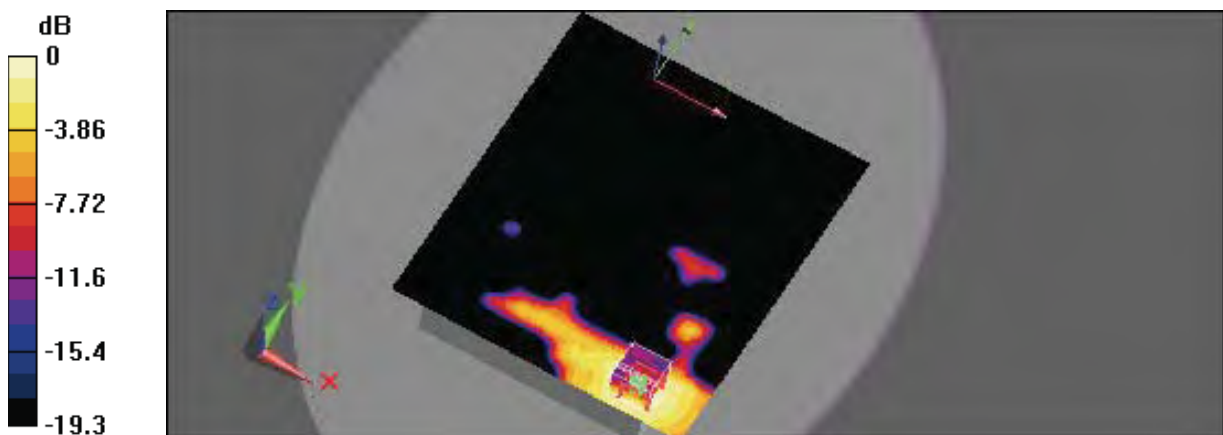
Measurement grid: dx=5mm, dy=5mm, dz=3mm

Reference Value = 0.711 V/m; Power Drift = 0.107 dB

Peak SAR (extrapolated) = 0.039 W/kg

**SAR(1 g) = 0.019 mW/g; SAR(10 g) = 0.011 mW/g**

Maximum value of SAR (measured) = 0.024 mW/g



0 dB = 0.024mW/g



Test Laboratory: A Test Lab Techno Corp.

Date/Time: 11/19/2008 8:31:40 PM

### Flat\_802.11n CH6\_13M\_HT40\_Bottom Close Body\_Tablet Mode\_Zoom out

**DUT: NL\*\*;** Type: NB; FCC ID: HFS-NL

Communication System: IEEE 802.11n(2.4GHz); Frequency: 2437 MHz;Duty Cycle: 1:1

Medium parameters used:  $f = 2437$  MHz;  $\sigma = 1.95$  mho/m;  $\epsilon_r = 50.6$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASYS (IEEE/IEC)

DASY5 Configuration:

- Probe: ES3DV3 - SN3150; ConvF(4.19, 4.19, 4.19); Calibrated: 1/9/2008
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn393; Calibrated: 8/25/2008
- Phantom: ELI 4.0; Type: QDOVA001BB; Serial: 1036
- Measurement SW: DASYS, V5.0 Build 120; SEMCAD X Version 13.2 Build 87

#### Flat/Area Scan (101x101x1):

Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.020 mW/g

#### Flat/Zoom Scan (7x7x9)/Cube 0:

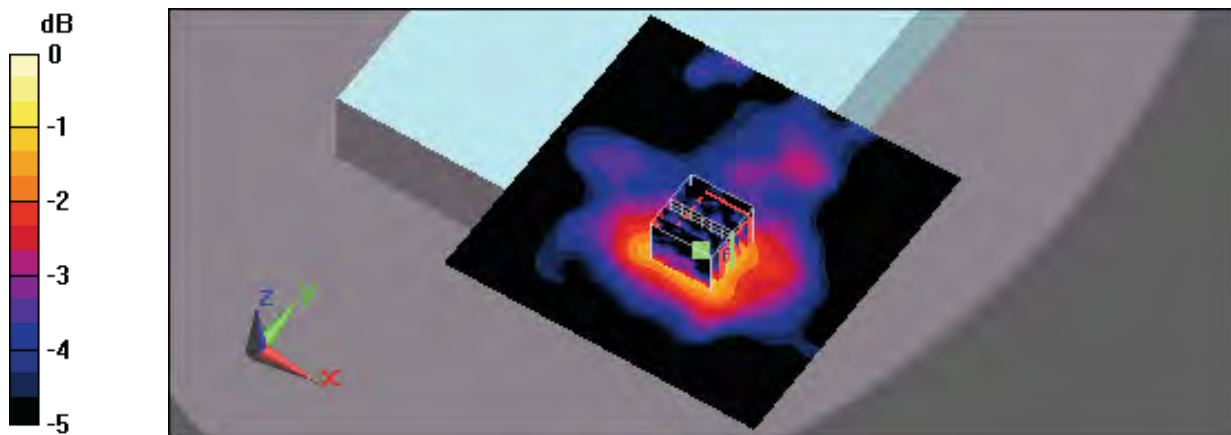
Measurement grid: dx=5mm, dy=5mm, dz=3mm

Reference Value = 1.77 V/m; Power Drift = 0.077 dB

Peak SAR (extrapolated) = 0.034 W/kg

**SAR(1 g) = 0.017 mW/g; SAR(10 g) = 0.012 mW/g**

Maximum value of SAR (measured) = 0.022 mW/g



0 dB = 0.022mW/g





Test Laboratory: A Test Lab Techno Corp.

Date/Time: 11/20/2008 1:07:17 AM

### Flat\_802.11n CH3\_13M\_HT40\_Tablet Mode\_LCD Tip Side\_Close Body

**DUT: NL\*\*;** Type: NB; FCC ID: HFS-NL

Communication System: IEEE 802.11n(2.4GHz); Frequency: 2422 MHz;Duty Cycle: 1:1

Medium parameters used:  $f = 2422$  MHz;  $\sigma = 1.92$  mho/m;  $\epsilon_r = 50.5$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASYS (IEEE/IEC)

DASY5 Configuration:

- Probe: ES3DV3 - SN3150; ConvF(4.19, 4.19, 4.19); Calibrated: 1/9/2008
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn393; Calibrated: 8/25/2008
- Phantom: ELI 4.0; Type: QDOVA001BB; Serial: 1036
- Measurement SW: DASYS, V5.0 Build 120; SEMCAD X Version 13.2 Build 87

#### Flat/Area Scan (81x201x1):

Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.491 mW/g

#### Flat/Zoom Scan (7x7x9)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=3mm

Reference Value = 3.22 V/m; Power Drift = 0.114 dB

Peak SAR (extrapolated) = 0.796 W/kg

**SAR(1 g) = 0.403 mW/g; SAR(10 g) = 0.181 mW/g**

Maximum value of SAR (measured) = 0.534 mW/g



0 dB = 0.534mW/g



Test Laboratory: A Test Lab Techno Corp.

Date/Time: 11/20/2008 12:31:38 AM

### Flat\_802.11n CH3\_13M\_HT40\_Tablet Mode\_LCD Left Side\_Close Body

**DUT: NL\*\*;** Type: NB; FCC ID: HFS-NL

Communication System: IEEE 802.11n(2.4GHz); Frequency: 2422 MHz;Duty Cycle: 1:1

Medium parameters used:  $f = 2422 \text{ MHz}$ ;  $\sigma = 1.92 \text{ mho/m}$ ;  $\epsilon_r = 50.5$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DASYS (IEEE/IEC)

DASY5 Configuration:

- Probe: ES3DV3 - SN3150; ConvF(4.19, 4.19, 4.19); Calibrated: 1/9/2008
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn393; Calibrated: 8/25/2008
- Phantom: ELI 4.0; Type: QDOVA001BB; Serial: 1036
- Measurement SW: DASYS, V5.0 Build 120; SEMCAD X Version 13.2 Build 87

#### Flat/Area Scan (101x141x1):

Measurement grid:  $dx=15\text{mm}$ ,  $dy=15\text{mm}$

Maximum value of SAR (interpolated) = 0.186 mW/g

#### Flat/Zoom Scan (7x7x9)/Cube 0:

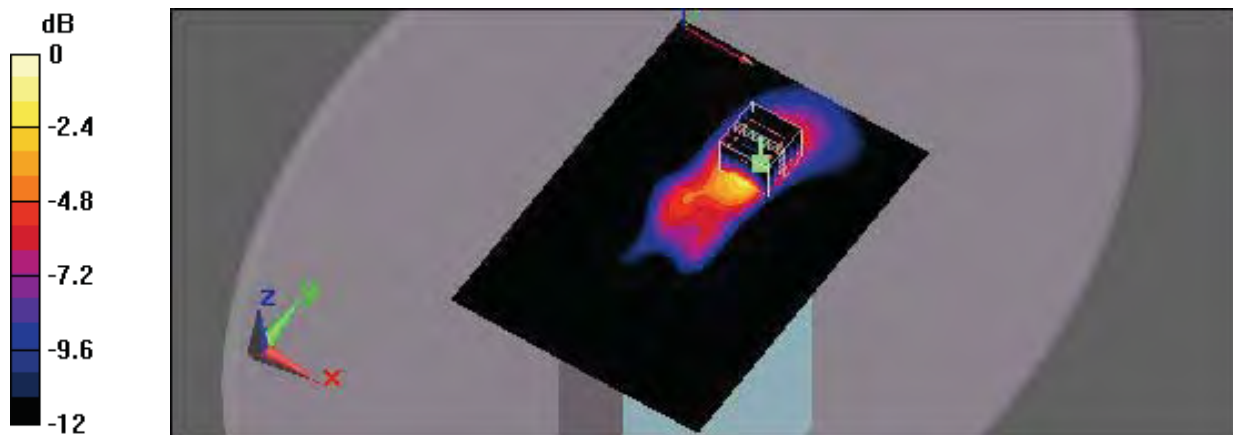
Measurement grid:  $dx=5\text{mm}$ ,  $dy=5\text{mm}$ ,  $dz=3\text{mm}$

Reference Value = 5.24 V/m; Power Drift = -0.116 dB

Peak SAR (extrapolated) = 0.469 W/kg

**SAR(1 g) = 0.177 mW/g; SAR(10 g) = 0.082 mW/g**

Maximum value of SAR (measured) = 0.240 mW/g



0 dB = 0.240mW/g



Test Laboratory: A Test Lab Techno Corp.

Date/Time: 11/3/2008 4:06:24 AM

### Flat\_802.11n CH9\_13M\_HT40\_Bottom Close Body\_Tablet Mode

**DUT: NL\*\*;** Type: NB; FCC ID: HFS-NL

Communication System: IEEE 802.11n(2.4GHz); Frequency: 2452 MHz;Duty Cycle: 1:1

Medium parameters used:  $f = 2452$  MHz;  $\sigma = 1.95$  mho/m;  $\epsilon_r = 51.7$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASYS (IEEE/IEC)

DASY5 Configuration:

- Probe: ES3DV3 - SN3150; ConvF(4.19, 4.19, 4.19); Calibrated: 1/9/2008
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn779; Calibrated: 11/30/2007
- Phantom: ELI 4.0; Type: QDOVA001BB; Serial: 1036
- Measurement SW: DASYS, V5.0 Build 120; SEMCAD X Version 13.2 Build 87

#### Flat/Area Scan (151x181x1):

Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.020 mW/g

#### Flat/Zoom Scan (7x7x9)/Cube 0:

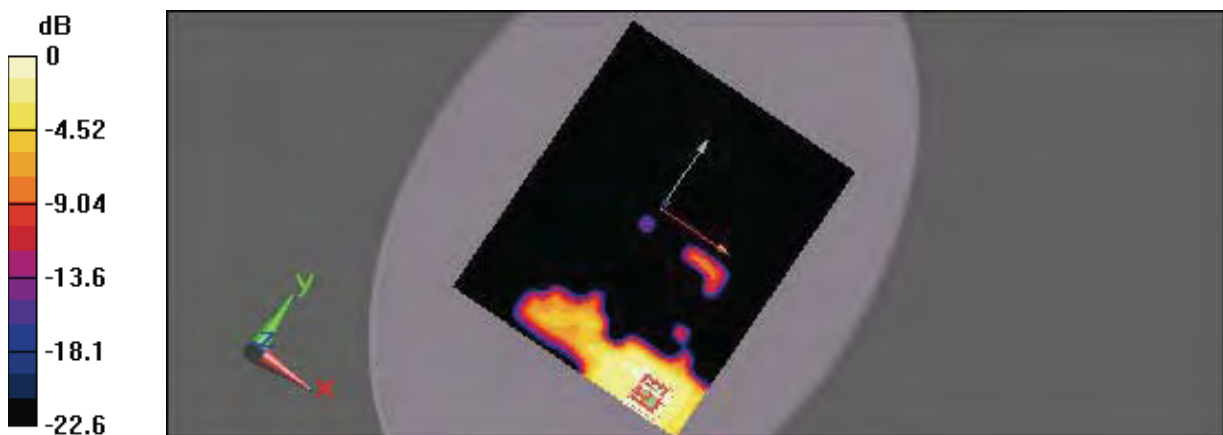
Measurement grid: dx=5mm, dy=5mm, dz=3mm

Reference Value = 0.794 V/m; Power Drift = -0.00393 dB

Peak SAR (extrapolated) = 0.038 W/kg

**SAR(1 g) = 0.017 mW/g; SAR(10 g) = 0.00969 mW/g**

Maximum value of SAR (measured) = 0.020 mW/g



0 dB = 0.020mW/g



Test Laboratory: A Test Lab Techno Corp.

Date/Time: 11/19/2008 7:48:06 PM

### Flat\_802.11n CH9\_13M\_HT40\_Bottom Close Body\_Tablet Mode\_Zoom out

**DUT: NL\*\*;** Type: NB; FCC ID: HFS-NL

Communication System: IEEE 802.11n(2.4GHz); Frequency: 2452 MHz;Duty Cycle: 1:1

Medium parameters used:  $f = 2452 \text{ MHz}$ ;  $\sigma = 1.96 \text{ mho/m}$ ;  $\epsilon_r = 50.5$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DASYS (IEEE/IEC)

DASY5 Configuration:

- Probe: ES3DV3 - SN3150; ConvF(4.19, 4.19, 4.19); Calibrated: 1/9/2008
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn393; Calibrated: 8/25/2008
- Phantom: ELI 4.0; Type: QDOVA001BB; Serial: 1036
- Measurement SW: DASYS, V5.0 Build 120; SEMCAD X Version 13.2 Build 87

#### Flat/Area Scan (121x121x1):

Measurement grid:  $dx=15\text{mm}$ ,  $dy=15\text{mm}$

Maximum value of SAR (interpolated) = 0.018 mW/g

#### Flat/Zoom Scan (7x7x9)/Cube 0:

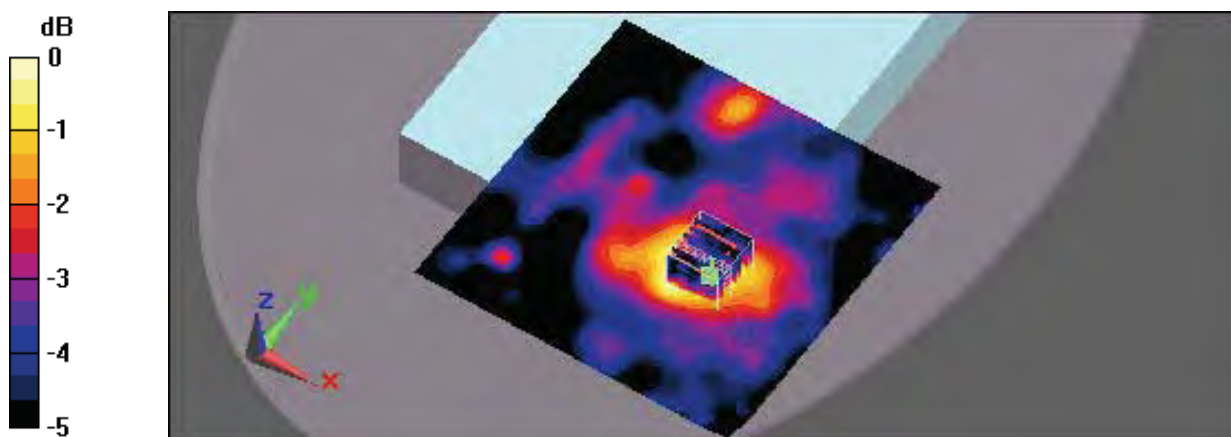
Measurement grid:  $dx=5\text{mm}$ ,  $dy=5\text{mm}$ ,  $dz=3\text{mm}$

Reference Value = 1.52 V/m; Power Drift = 0.184 dB

Peak SAR (extrapolated) = 0.036 W/kg

**SAR(1 g) = 0.015 mW/g; SAR(10 g) = 0.011 mW/g**

Maximum value of SAR (measured) = 0.018 mW/g



0 dB = 0.018mW/g



## ***Appendix C - Calibration***

All of the instruments Calibration information are listed below.

- Dipole \_ D2450V2 SN:712 Calibration No.D2450V2-712\_Jan08
- Probe \_ ES3DV3 SN:3150 Calibration No.ES3-3150\_Jan08
- DAE \_ DAE4 SN:779 Calibration No.DAE4-779\_Nov07
- DAE \_ DAE3 SN:393 Calibration No.DAE3-393\_Aug08