

# SAR EVALUATION REPORT FCC 2.1093 & IEEE 1528:2003

For

Hospira, Inc.

755 Jarvis Drive  
Morgan Hill, CA 95037

**FCC ID: STJ-20791**

<b>This Report Concerns:</b> <input checked="" type="checkbox"/> Original Report	<b>Product Name:</b> 802.11 a/b/g Wireless Module
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<b>Report Number:</b> R0612073-SAR	
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## DECLARATION OF COMPLIANCE SAR EVALUATION

<b>Rule Part(s):</b>	<b>FCC §2.1093</b>
<b>Test Standard</b>	<b>IEEE 1528:2003</b>
<b>Test Procedure(s):</b>	<b>FCC OET Bulletin 65 Supplement C &amp; IEEE 1528:2003</b>
<b>Device Type:</b>	<b>802.11 a/b/g Wireless Module</b>
<b>FCC ID:</b>	<b>STJ-20791</b>
<b>Modulation:</b>	<b>OFDM</b>
<b>TX Frequency Range:</b>	<b>802.11 b/g : 2412-2462 MHz</b>
<b>Max. Conducted Power Tested:</b>	<b>17.63 dBm (High Channel)</b>
<b>Antenna Type(s):</b>	<b>Internal Antenna</b>
<b>Measured SAR Value:</b>	<b>1.27 W/kg for 802.11b (2462 MHz); 1.32 W/kg for 802.11g (2462 MHz)</b>

BACL Corp. declares under its sole responsibility that this wireless portable device has been determined to be in compliance for localized specific absorption rate (SAR) for uncontrolled exposure and general population exposure limits specified in FCC OET Bulletin 65 Supplement C and has been tested in accordance with the measurement procedures specified in ANSI IEEE C95.3:2002 & IEEE 1528.

All measurements reported herein were performed under my supervision and believed to be accurate to the best of my knowledge. I further attest for the completeness of these measurements and vouch for the qualifications any and all personnel performing such measurements.

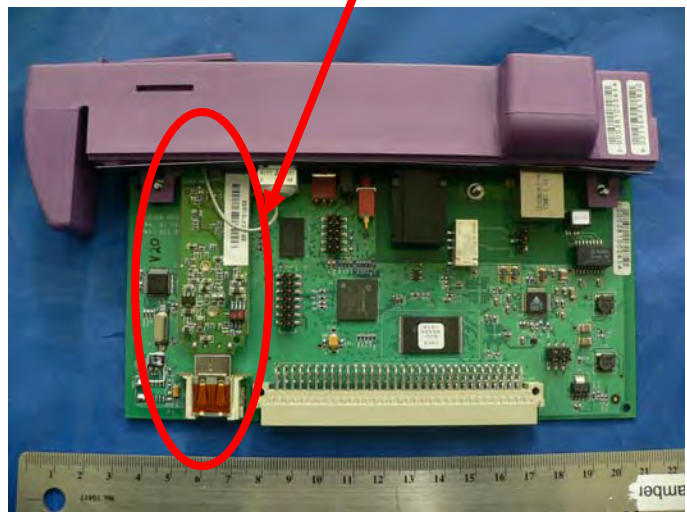
The results and statements contained in this report pertain only to the device(s) evaluated.

/signature/

*Hong*

**Eric Hong**  
Bay Area Compliance Laboratories Corp.

**Wireless Module**



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## REFERENCE, STANDARDS, AND GUIDELINES

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### FCC:

The Report and Order requires routine SAR evaluation prior to equipment authorization of portable transmitter devices, including portable telephones. For consumer products, the applicable limit is 1.6 mW/g as recommended by the ANSI/IEEE standard C95.1-1992 [6] for an uncontrolled environment (Paragraph 65). According to the Supplement C of OET Bulletin 65 "Evaluating Compliance with FCC Guide-lines for Human Exposure to Radio frequency Electromagnetic Fields", released on Jun 29, 2001 by the FCC, the device should be evaluated at maximum output power (radiated from the antenna) under "worst-case" conditions for normal or intended use, incorporating normal antenna operating positions, device peak performance frequencies and positions for maximum RF energy coupling.

This report describes the methodology and results of experiments performed on wireless data terminal. The objective was to determine if there is RF radiation and if radiation is found, what is the extent of radiation with respect to safety limits. SAR (Specific Absorption Rate) is the measure of RF exposure determined by the amount of RF energy absorbed by human body (or its parts) – to determine how the RF energy couples to the body or head which is a primary health concern for body worn devices. The limit below which the exposure to RF is considered safe by regulatory bodies in North America is 1.6 mw/g average over 1 gram of tissue mass.

### CE:

The order requires routine SAR evaluation prior to equipment authorization of portable transmitter devices, including portable telephones. For consumer products, the applicable limit is 2 mw/g as recommended by the EN50360 for an uncontrolled environment. According to the Standard, the device should be evaluated at maximum output power (radiated from the antenna) under "worst-case" conditions for normal or intended use, incorporating normal antenna operating positions, device peak performance frequencies and positions for maximum RF energy coupling.

This report describes the methodology and results of experiments performed on wireless data terminal. The objective was to determine if there is RF radiation and if radiation is found, what is the extent of radiation with respect to safety limits. SAR (Specific Absorption Rate) is the measure of RF exposure determined by the amount of RF energy absorbed by human body (or its parts) – to determine how the RF energy couples to the body or head which is a primary health concern for body worn devices. The limit below which the exposure to RF is considered safe by regulatory bodies in Europe is 2 mw/g average over 10 gram of tissue mass.

The test configurations were laid out on a specially designed test fixture to ensure the reproducibility of measurements. Each configuration was scanned for SAR. Analysis of each scan was carried out to characterize the above effects in the device.

There was no SAR of any concern measured on the device for any of the investigated configurations.

**SAR Limits**

FCC Limit (1g)

<b>EXPOSURE LIMITS</b>	<b>SAR (W/kg)</b>	
	<b>(General Population / Uncontrolled Exposure Environment)</b>	<b>(Occupational / Controlled Exposure Environment)</b>
Spatial Average (averaged over the whole body)	0.08	0.4
Spatial Peak (averaged over any 1 g of tissue)	1.60	8.0
Spatial Peak (hands/wrists/feet/ankles averaged over 10 g)	4.0	20.0

CE Limit (10g)

<b>EXPOSURE LIMITS</b>	<b>SAR (W/kg)</b>	
	<b>(General Population / Uncontrolled Exposure Environment)</b>	<b>(Occupational / Controlled Exposure Environment)</b>
Spatial Average (averaged over the whole body)	0.08	0.4
Spatial Peak (averaged over any 1 g of tissue)	2.0	10
Spatial Peak (hands/wrists/feet/ankles averaged over 10 g)	4.0	20.0

Population/Uncontrolled Environments are defined as locations where there is the exposure of individual 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 people who are aware of the potential for exposure (i.e. as a result of employment or occupation).

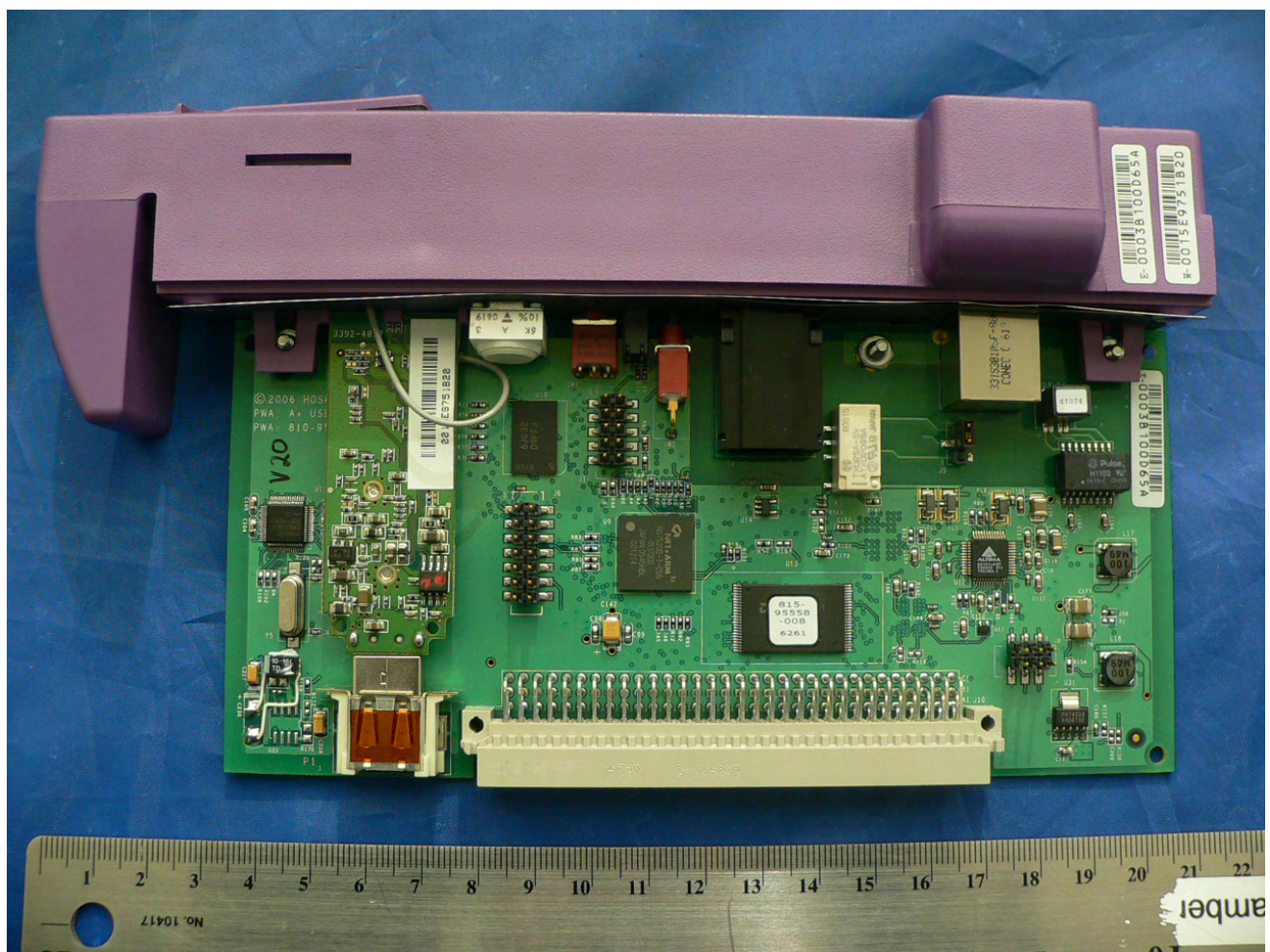
General Population/Uncontrolled environments Spatial Peak limit 1.6 w/kg (FCC) & 2 w/kg (CE) applied to the EUT.

## EUT DESCRIPTION

### Product Description for Equipment under Test (EUT)

This Bay Area Compliance Laboratories Corp. measurement and test report has been prepared on behalf of *Hospira Inc.* and their device MedNet 802.11 a/b/g Wireless Upgrade Module *FCC ID: STJ-20791*, which will be referred to as the EUT in the rest of this report. The EUT is an 802.11 a/b/g device that is designed as an upgrade module for *Hospira PlumA+ Infusion Systems* models: 20792-04-XX, 20679-04-XX and 12391-04-XX, 11971-04-XX. Accordingly, the EUT consists of two models with identical function and layout. These models are designated 20791-04-XX and 20677-04-XX respectively corresponding to the host units that they are designed to upgrade, where the -XX in the two respective DUT models refer to versions 77 and up. The host units are mobile infusion devices designed to be employed in the medical care environment. The wireless functionality afforded to the host units by the EUT include the ability to download drug library information for simultaneously operating hosts without requiring a physical connection and the time spent visiting the rooms they occupy.

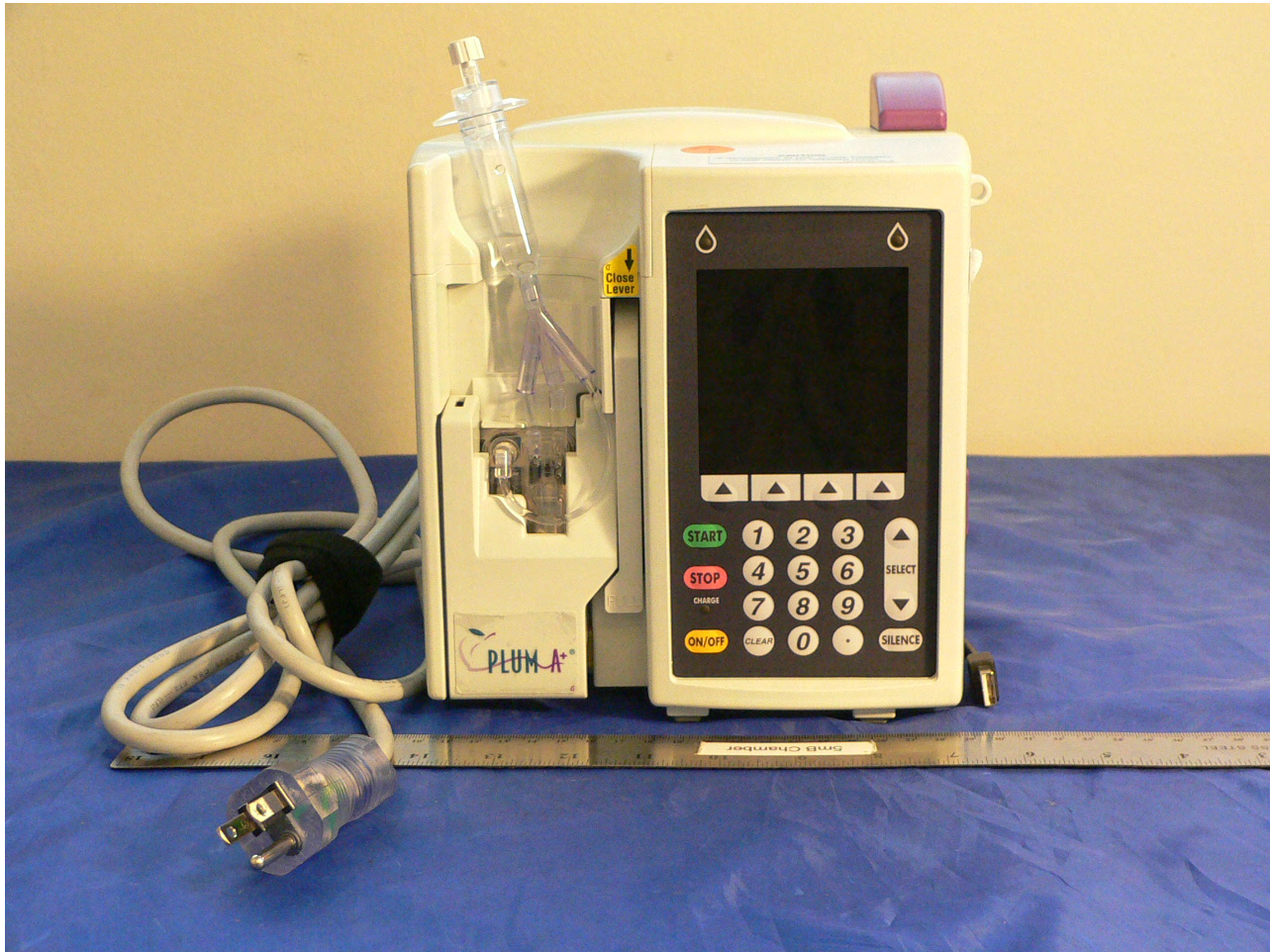
### EUT Photo



*Additional EUT photos in Photos Exhibit*



## Host Device



## Mechanical Description

The EUT is a PCB Board with integrated Wireless 802.11 a/b/g USB Dongle, designed as an upgrade module for Hospira Inc. Plum A + Infusion System. It's approximate dimensions are 80 mm L x 25 mm W x 12 mm H and weighs 50 g.

*\* The test data gathered are from production sample, with serial number: 0015E9751C08, provided by the manufacturer.*

## DESCRIPTION OF TEST SYSTEM

These measurements were performed with the automated near-field scanning system DASY4 from Schmid & Partner Engineering AG (SPEAG) which is the fourth generation of the system shown in the figure hereinafter:



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 to the data acquisition unit.

The SAR measurements were conducted with the dosimetric probe ET3DV6 SN: 1604 (manufactured by SPEAG), designed in the classical triangular configuration and optimized for dosimetric evaluation. The probe has been calibrated according to the procedure with accuracy of better than  $\pm 10\%$ . The spherical isotropy was evaluated with the procedure and found to be better than  $\pm 0.25\text{dB}$ .



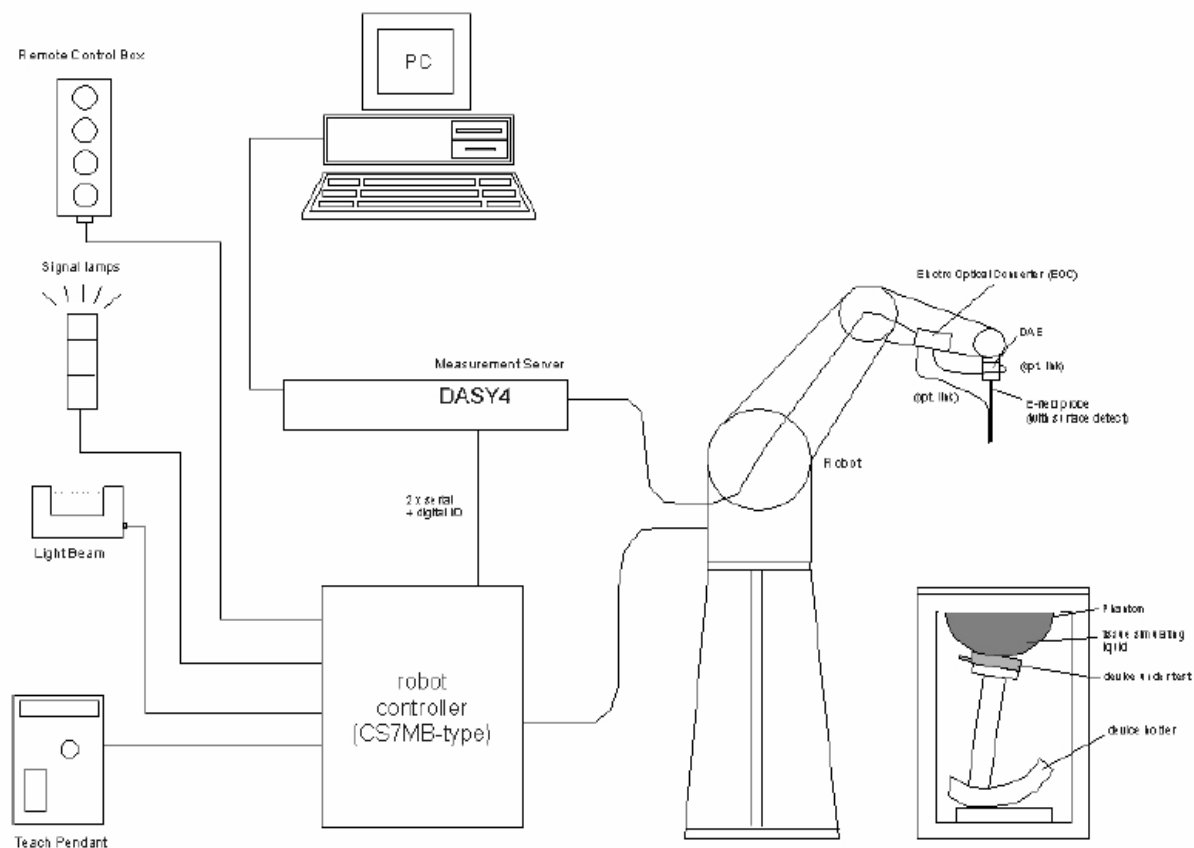
The phantom used was the Generic Twin Phantom. The ear was simulated as a spacer of 4 mm thickness between the earpiece of the phone and the tissue simulating liquid. The Tissue simulation liquid used for each test is in according with the FCC OET65 supplement C as listed below.

Ingredients (% by weight)	Frequency (MHz)									
	450		835		915		1900		2450	
Tissue Type	Head	Body	Head	Body	Head	Body	Head	Body	Head	Body
Water	38.56	51.16	41.45	52.4	41.05	56.0	54.9	40.4	62.7	73.2
Salt (Nacl)	3.95	1.49	1.45	1.4	1.35	0.76	0.18	0.5	0.5	0.04
Sugar	56.32	46.78	56.0	45.0	56.5	41.76	0.0	58.0	0.0	0.0
HEC	0.98	0.52	1.0	1.0	1.0	1.21	0.0	1.0	0.0	0.0
Bactericide	0.19	0.05	0.1	0.1	0.1	0.27	0.0	0.1	0.0	0.0
Triton x-100	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	36.8	0.0
DGBE	0.0	0.0	0.0	0.0	0.0	0.0	44.92	0.0	0.0	26.7
Dielectric Constant	43.42	58.0	42.54	56.1	42.0	56.8	39.9	54.0	39.8	52.5
Conductivity (s/m)	0.85	0.83	0.91	0.95	1.0	1.07	1.42	1.45	1.88	1.78

#### IEEE SCC-34/SC-2 P1528 Recommended Tissue Dielectric Parameters

Frequency (MHz)	Head		Body	
	$\epsilon_r$	$\sigma$ (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
2450	39.2	1.80	52.7	1.95
3000	38.5	2.40	52.0	2.73
5800	35.3	5.27	48.2	6.00

### Measurement System Diagram



The DASY4 system for performing compliance tests consists of the following items:

- A standard high precision 6-axis robot (Stäubli RX family) with controller, teach pendant and software. An arm extension for accommodating the data acquisition electronics (DAE).
- A dosimetric probe, i.e., an isotropic E-field probe optimized and calibrated for usage in tissue simulating liquid. The probe is equipped with an optical surface detector system.
- A data acquisition electronics (DAE) which performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. The unit is battery powered with standard or rechargeable batteries. The signal is optically transmitted to the EOC.
- The Electro-optical converter (EOC) performs the conversion between optical and electrical of the signals for the digital communication to the DAE and for the analog signal from the optical surface detection. The EOC is connected to the measurement server.
- The function of the measurement server is to perform the time critical tasks such as signal filtering, control of the robot operation and fast movement interrupts.
- A probe alignment unit which improves the (absolute) accuracy of the probe positioning.
- A computer operating Windows 2000 or Windows XP.

- DASY4 software.
- Remote control with teach pendant and additional circuitry for robot safety such as warning lamps, etc.
- The SAM twin phantom enabling testing left-hand and right-hand usage.
- The device holder for handheld mobile phones.
- Tissue simulating liquid mixed according to the given recipes.
- Validation dipole kits allowing to validate the proper functioning of the system.

## System Components

- DASY4 Measurement Server
- Data Acquisition Electronics
- Probes
- Light Beam Unit
- Medium
- SAM Twin Phantom
- Device Holder for SAM Twin Phantom
- System Validation Kits
- Robot

## DASY4 Measurement Server

The DASY4 measurement server is based on a PC/104 CPU board with a 166MHz low-power Pentium, 32MB chip disk and 64MB 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 DASY4 I/O-board, which is directly connected to the PC/104 bus of the CPU board.



The measurement server performs all real-time data evaluation for field measurements and surface detection, controls robot movements and handles safety operation. The PC-operating system cannot interfere with these time critical processes. All connections are supervised by a watchdog, and disconnection of any of the cables to the measurement server will automatically disarm the robot and disable all program-controlled robot movements. Furthermore, the measurement server is equipped with two expansion slots which are reserved for future applications. Please note that the expansion slots do not have a standardized pinout and therefore only the expansion cards provided by SPEAG can be inserted. Expansion cards from any other supplier could seriously damage the measurement server.

## Data Acquisition Electronics

The data acquisition electronics 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 measurement server is accomplished through an optical downlink for data and status information as well as an optical uplink for commands and the clock.



## Probes

The DASY system can support many different probe types.

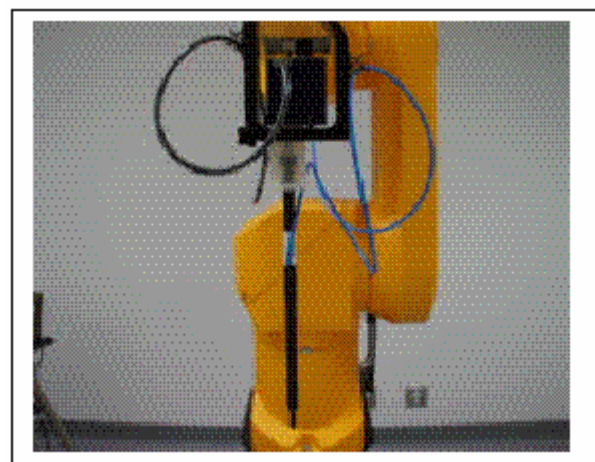
**Dosimetric Probes:** These probes are specially designed and calibrated for use in liquids with high permittivities. They should not be used in air, since the spherical isotropy in air is poor ( $\pm 2$  dB). The dosimetric probes have special calibrations in various liquids at different frequencies.

**Free Space Probes:** These are electric and magnetic field probes specially designed for measurements in free space. The z-sensor is aligned to the probe axis and the rotation angle of the x-sensor is specified. This allows the DASY system to automatically align the probe to the measurement grid for field component measurement. The free space probes are generally not calibrated in liquid. (The H-field probes can be used in liquids without any change of parameters.)

**Temperature Probes:** Small and sensitive temperature probes for general use. They use a completely different parameter set and different evaluation procedures. Temperature rise features allow direct SAR evaluations with these probes.

### ET3DV6 Probe Specification

Construction Symmetrical design with triangular core  
 Built-in optical fiber for surface detection System  
 Built-in shielding against static charges  
 Calibration In air from 10 MHz to 2.5 GHz  
 In brain and muscle simulating tissue at  
 Frequencies of 450 MHz, 900 MHz and  
 1.8 GHz (accuracy  $\pm 8\%$ )  
 Frequency 10 MHz to  $> 6$  GHz; Linearity:  $\pm 0.2$  dB  
 (30 MHz to 3 GHz)  
 Directivity  $\pm 0.2$  dB in brain tissue (rotation around  
 probe axis)  
 $\pm 0.4$  dB in brain tissue (rotation normal probe axis)  
 Dynamic 5 mw/g to  $> 100$  mw/g;  
 Range Linearity:  $\pm 0.2$  dB  
 Surface  $\pm 0.2$  mm repeatability in air and clear liquids  
 Detection over diffuse reflecting surfaces.  
 Dimensions Overall length: 330 mm  
 Tip length: 16 mm

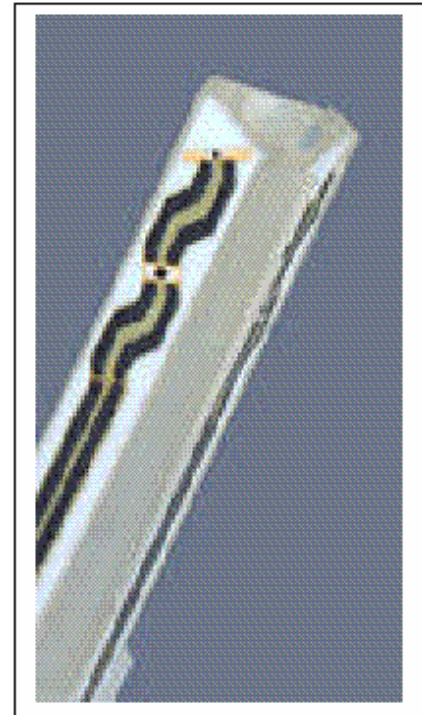


**Photograph of the probe**



Body diameter: 12 mm  
Tip diameter: 6.8 mm  
Distance from probe tip to dipole centers: 2.7 mm  
Application General dosimetric up to 3 GHz  
Compliance tests of mobile phones  
Fast automatic scanning in arbitrary phantoms

The SAR measurements were conducted with the dosimetric probe ET3DV6 designed in the classical triangular configuration 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 DASY3 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.



**Inside view of  
ET3DV6 E-field Probe**

### **E-Field Probe Calibration Process**

Each probe is calibrated according to a dosimetric assessment procedure described in [6] with accuracy better than  $\pm 10\%$ . The spherical isotropy was evaluated with the procedure described in [7] and found to be better than  $\pm 0.25\text{dB}$ . The sensitivity parameters (NormX, NormY, 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 1 GHz, and in a waveguide above 1 GHz 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 dielectric medium. For temperature correlation calibration a RF transparent thermistor-based temperature probe is used in conjunction with the E-field probe.

### **Data Evaluation**

The DASY4 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:

Probe parameters: - Sensitivity	Normi, ai0, ai1, ai2
- Conversion factor	ConvFi
- Diode compression point	dcpi

Device parameters: - Frequency	f
- Crest factor	cf
Media parameters: - 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 multi-meter 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:

$$\text{E - fieldprobes : } E_i = \sqrt{\frac{V_i}{Norm_i \cdot ConvF}}$$

$$\text{H - fieldprobes : } H_i = \sqrt{V_i} \cdot \frac{a_{i0} + a_{i1}f + a_{i2}f^2}{f}$$

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  
 $H_i$  = diode compression point (DASY parameter)

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.

$$SAR = E_{tot}^2 \cdot \frac{\sigma}{\rho \cdot 1'000}$$

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

Note that the density is normally set to 1, to account for actual brain density rather than the density of the simulation liquid.

## Light Beam Unit

The light beam switch allows automatic "tooling" of the probe. During the process, the actual position of the probe tip with respect to the robot arm is measured, as well as the probe length and the horizontal probe offset. The software then corrects all movements, so that the robot coordinates are valid for the probe tip. The repeatability of this process is better than 0.1 mm. If a position has been taught with an aligned probe, the same position will be reached with another aligned probe within 0.1 mm, even if the other probe has different dimensions. During probe rotations, the probe tip will keep its actual position.

## Medium

### Parameters

The parameters of the tissue simulating liquid strongly influence the SAR in the liquid. The parameters for the different frequencies are defined in the corresponding compliance standards (e.g., EN 50361, IEEE 1528-2003).

### Parameter measurements

Several measurement systems are available for measuring the dielectric parameters of liquids:

- The open coax test method (e.g., HP85070 dielectric probe kit) is easy to use, but has only moderate accuracy. It is calibrated with open, short, and deionized water and the calibrations a critical process.
- The transmission line method (e.g., model 1500T from DAMASKOS, INC.) measures the transmission and reflection in a liquid filled high precision line. It needs standard two port calibration and is probably more accurate than the open coax method.
- The reflection line method measures the reflection in a liquid filled shorted precision lined, the method is not suitable for these liquids because of its low sensitivity.
- The slotted line method scans the field magnitude and phase along a liquid filled line. The evaluation is straight forward and only needs a simple response calibration. The method is very accurate, but can only be used in high loss liquids and at frequencies above 100 to 200MHz. Cleaning the line can be tedious.

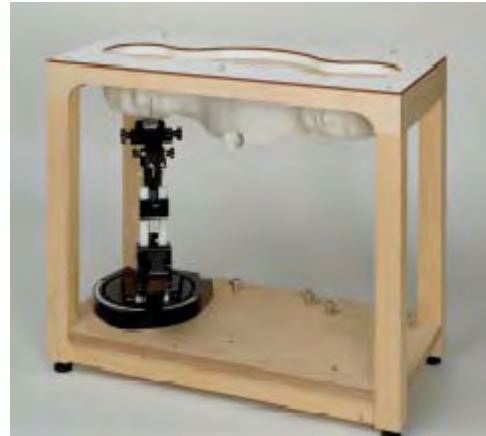
## SAM Twin Phantom

The SAM twin phantom is a fiberglass shell phantom with 2mm shell thickness (except the ear region where shell thickness increases to 6mm). It has three measurement areas:

- Left hand
- Right hand
- Flat phantom

The phantom table comes in two sizes: A 100 x 50 x 85 cm (L x W x H) table for use with free standing robots (DASY4 professional system option) or as a second phantom and a 100 x 75 x 85 cm(L x W x H) table with reinforcements for table mounted robots (DASY4 compact system option) .

The bottom plate contains three pair of bolts for locking the device holder. The device holder positions are adjusted to the standard measurement positions in the three sections. Only one device holder is necessary if two phantoms are used (e.g., for different liquids) A white cover is provided to tap the phantom during o\_- periods to prevent water evaporation and changes in the liquid parameters. Free space scans of devices on the cover are possible. On the phantom top, three reference markers are provided to identify the phantom position with respect to the robot.



The phantom can be used with the following tissue simulating liquids:

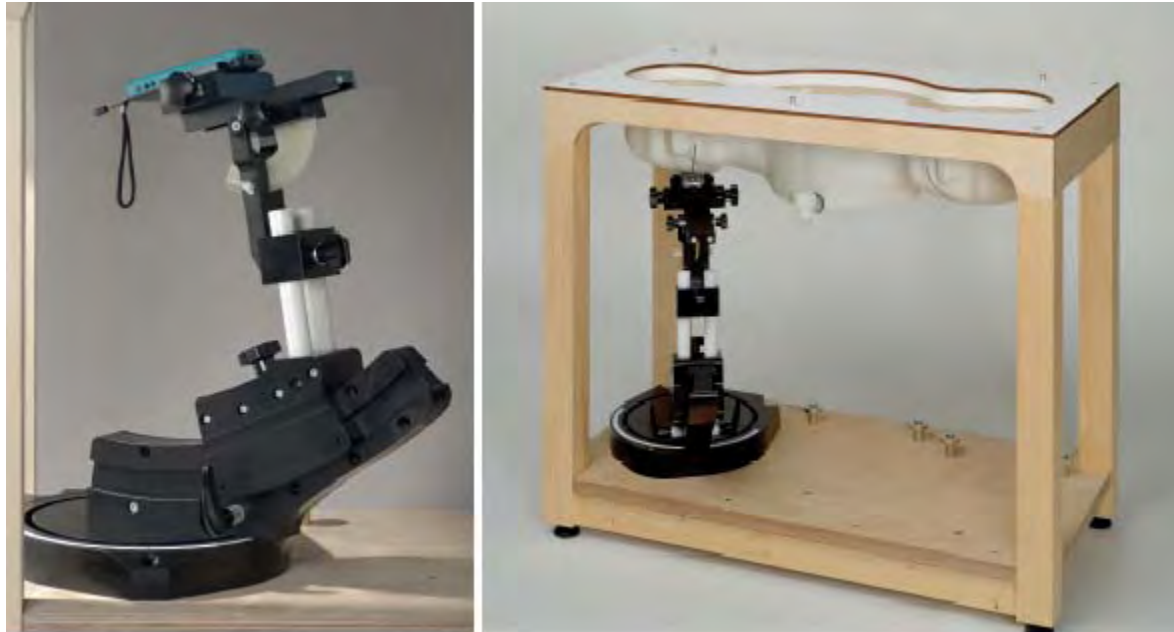
- Water-sugar based liquids can be left permanently in the phantom. Always cover the liquid if the system is not used, otherwise the parameters will change due to water evaporation.
- Glycol based liquids should be used with care. As glycol is a softener for most plastics, the liquid should be taken out of the phantom and the phantom should be dried when the system is not used (desirable at least once a week).
- Do not use other organic solvents without previously testing the phantom resistiveness.



### Device Holder for SAM Twin Phantom

The SAR in the phantom is approximately inversely proportional to the square of the distance between the source and the liquid surface. For a source in 5mm distance, a positioning uncertainty of  $\pm 0.5\text{mm}$  would produce a SAR uncertainty of  $\pm 20\%$ . An accurate device positioning is therefore crucial for accurate and repeatable measurements. The positions, in which the devices must be measured, are defined by the standards.

The DASY device holder is designed to cope with different positions given in the standard. It has two scales for the device rotation (with respect to the body axis) and the device inclination (with respect to the line between the ear reference points). The rotation centers for both scales is the ear reference point (ERP). Thus the device needs no repositioning when changing the angles.



The DASY device holder has been made out of low-loss POM material having the following dielectric parameters: relative permittivity  $\epsilon_r=3$  and loss tangent  $\tan \delta=0.02$ . The amount of dielectric material has been reduced in the closest vicinity of the device, since measurements have suggested that the influence of the clamp on the test results could thus be lowered.

### System Validation Kits

Each DASY system is equipped with one or more system validation kits. These units, together with the predefined measurement procedures within the DASY software, enable the user to conduct the system performance check and system validation. For that purpose a well defined SAR distribution in the flat section of the SAM twin phantom is produced.

System validation kit includes a dipole, tripod holder to fix it underneath the flat phantom and a corresponding distance holder. Dipoles are available for the variety of frequencies between 300MHz and 6 GHz (dipoles for other frequencies or media and other calibration conditions are available upon request).

The dipoles are highly symmetric and matched at the center frequency for the specified liquid and distance to the flat phantom (or flat section of the SAM-twin phantom). The accurate distance between the liquid surface and the dipole center is achieved with a distance holder that snaps on the dipole.

## Robot

The DASY4 system uses the high precision industrial robots RX60L, RX90 and RX90L, as well as the RX60BL and RX90BL types out of the newer series from Stäubli SA (France). The RX robot series offers many features that are important for our application:

- High precision (repeatability 0.02mm)
- High reliability (industrial design)
- Low maintenance costs (virtually maintenance-free due to direct drive gears; no belt drives)
- Jerk-free straight movements (brushless synchrony motors; no stepper motors)
- Low ELF interference (the closed metallic construction shields against motor control fields)

For the newly delivered DASY4 systems as well as for the older DASY3 systems delivered since 1999, the CS7MB robot controller version from Stäubli is used. Previously delivered systems have either a CS7 or CS7M controller; the differences to the CS7MB are mainly in the hardware, but some procedures in the robot software from Stäubli are also not completely the same. The following descriptions about robot hard- and software correspond to CS7MB controller with software version 13.1 (edit S5). The actual commands, procedures and configurations, also including details in hardware, might differ if an older robot controller is in use. In this case please also refer to the Stäubli manuals for further information.



## TESTING EQUIPMENT

### Equipments List & Calibration Info

Type / Model	Cal. Due Date	S/N:
DASY4 Professional Dosimetric System	N/A	N/A
Robot RX60L	N/A	CS7MBSP / 467
Robot Controller	N/A	F01/5J72A1/A/01
Dell Computer Demension 3000	N/A	N/A
SPEAG EDC3	N/A	N/A
SPEAG DAE3	2007-11-22	456
DASY4 Measurement Server	N/A	1176
SPEAG E-Field Probe ET3DV6	2007-05-02	1604
Antenna Dipole D-2450-S-1 (2450MHz)	2007-08-28	BCL-141
SPEAG Generic Twin Phantom	N/A	N/A
SPEAG Light Alignment Sensor	N/A	278
Brain Equivalent Matter (2450MHz)	N/A	N/A
Muscle Equivalent Matter (2450MHz)	N/A	N/A
Robot Table	N/A	N/A
Phone Holder	N/A	N/A
Phantom Cover	N/A	N/A
Agilent, Spectrum Analyzer 8565EC	2007-01-11	3946A00131
Microwave Amp. 8349A	N/A	2644A02662
Power Meter Agilent E4419B	2007-09-13	MY4121511
Power Sensor Agilent E4412A	2007-10-12	MY41497252
Agilent, Wireless Communications Test Set 8960 Series 10	2007-08-08	E5515C
Dielectric Probe Kit HP85070A	N/A	US99360201
HP, Microwave Frequency Counter 5342A	2006-12-12	2232A06383
Amplifier, ST181-20	N/A	E012-0101
Antenna, Horn SAS-200/571	2007-04-20	A052704

## SAR MEASUREMENT SYSTEM VERIFICATION

### System Accuracy Verification

Prior to the assessment, the system validation kit was used to test whether the system was operating within its specifications of  $\pm 10\%$ . The validation results are tabulated below. And also the corresponding SAR plot is attached as well in the SAR plots files.

#### IEEE P1528 recommended reference value for head

Frequency (MHz)	1 g SAR	10 g SAR	Local SAR at surface (above feed point)	Local SAR at surface (v=2cm offset from feed point)
300	3.0	2.0	4.4	2.1
450	4.9	3.3	7.2	3.2
835	9.5	6.2	14.1	4.9
900	10.8	6.9	16.4	5.4
1450	29.0	16.0	50.2	6.5
1800	38.1	19.8	69.5	6.8
1900	39.7	20.5	72.1	6.6
2000	41.1	21.1	74.6	6.5
2450	52.4	24.0	104.2	7.7
3000	63.8	25.7	140.2	9.5

#### Validation Dipole SAR Reference Test Result for Body (2450 MHz)

Validation Measurement	SAR @ 0.025mW Input averaged over 1g	SAR @ 1W Input averaged over 1g	SAR @ 0.025mW Input averaged over 10g	SAR @ 1W Input averaged over 10g
Test 1	14.2	56.80	6.33	25.32
Test 2	14.3	57.20	6.34	25.36
Test 3	14.2	56.80	6.33	25.32
Test 4	14.1	56.40	6.32	25.28
Test 5	14.3	57.20	6.33	25.32
Test 6	14.0	56.00	6.31	25.24
Test 7	14.2	56.80	6.33	25.32
Test 8	14.2	56.80	6.33	25.32
Test 9	14.4	57.60	6.34	25.36
Test 10	14.2	56.80	6.32	25.28
Average	14.21	56.84	6.32	25.31



## EUT TEST STRATEGY AND METHODOLOGY

---

### SAR Evaluation Procedure

The evaluation was performed with the following procedure:

**Step 1:** Measurement of the SAR value at a fixed location above the ear point or central position was used as a reference value for assessing the power drop.

**Step 2:** The SAR distribution at the exposed side of the head was measured at a distance of 3.9 mm from the inner surface of the shell. The area covered the entire dimension of the head or EUT and the horizontal grid spacing was 20 mm x 20 mm. Based on these data, the area of the maximum absorption was determined by spline interpolation.

**Step 3:** Around this point, a volume of 32 mm x 32 mm x 34 mm was assessed by measuring 5 x 5 x 7 points. On the basis of this data set, the spatial peak SAR value was evaluated under the following procedure:

1. The data at the surface were extrapolated, since the center of the dipoles is 2.7 mm away from the tip of the probe and the distance between the surface and the lowest measuring point is 1.2 mm. The extrapolation was based on a least square algorithm [11]. A polynomial of the fourth order was calculated through the points in z-axes. This polynomial was then used to evaluate the points between the surface and the probe tip.
2. The maximum interpolated value was searched with a straightforward algorithm. Around this maximum the SAR values averaged over the spatial volumes (1 g or 10 g) were computed by the 3D-Spline interpolation algorithm. The 3D-Spline is composed of three one dimensional splines with the "Not a knot"-condition (in x, y and z-directions) [11], [12]. The volume was integrated with the trapezoidal-algorithm. One thousand points (10 x 10 x 10) were interpolated to calculate the average.
3. All neighboring volumes were evaluated until no neighboring volume with a higher average value was found.

**Step 4:** Re-measurement of the SAR value at the same location as in Step 1. If the value changed by more than 5%, the evaluation was repeated.

## CONCLUSION

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This page summarizes the results of the performed dosimetric evaluation. The plots with the corresponding SAR distributions, which reveal information about the location of the maximum SAR with respect to the device could be found in Appendix E.

### SAR Body Worst-Case Test Data

#### Environmental Conditions

Ambient Temperature:	21° C
Relative Humidity:	52%
ATM Pressure:	1016 mbar

\* Testing was performed by Eric Hong from 2006-12-12 & 2006-12-13 for 2.4GHz

**802.11b (2412-2462 MHz)**

Serial number for Plum A+ Device	EUT position	Frequency (MHz)	Conducted Power (mW)	Liquid	Phantom	Notes / Accessories	Measured (mw/g) (1 g)	Limit (mw/g)	Plot #
16072930	Top touching to the flat phantom	2412	52.8	Body	Flat	none	0.982	1.6	1
16072930 (Worst Case for Power Adaptor Mode)	Top touching to the flat phantom	2437	55.2	Body	Flat	none	1.06	1.6	2
16072930 (Battery Mode)	Top touching to the flat phantom	2437	55.2	Body	Flat	none	0.992	1.6	3
16072930	Top touching to the flat phantom	2462	57.4	Body	Flat	none	1.13	1.6	4
13872846	Top touching to the flat phantom	2412	52.8	Body	Flat	none	1.15	1.6	5
13872846 (Worst Case for Power Adaptor Mode)	Top touching to the flat phantom	2437	55.2	Body	Flat	none	1.23	1.6	6
13872846 (Battery Mode)	Top touching to the flat phantom	2437	55.2	Body	Flat	none	1.02	1.6	7
13872846	Top touching to the flat phantom	2462	57.4	Body	Flat	none	1.25	1.6	8
13124499	Top touching to the flat phantom	2412	52.8	Body	Flat	none	0.988	1.6	9
13124499 (Worst Case for Power Adaptor Mode)	Top touching to the flat phantom	2437	55.2	Body	Flat	none	1.18	1.6	10
13124499 (Battery Mode)	Top touching to the flat phantom	2437	55.2	Body	Flat	none	0.983	1.6	11
13124499	Top touching to the flat phantom	2462	57.4	Body	Flat	none	1.27	1.6	12

**802.11g (2412-2462 MHz)**

<b>Serial number for Plum A+ Device</b>	<b>EUT position</b>	<b>Frequency (MHz)</b>	<b>Conducted Power (mW)</b>	<b>Liquid</b>	<b>Phantom</b>	<b>Notes / Accessories</b>	<b>Measured (mw/g) (1 g)</b>	<b>Limit (mw/g)</b>	<b>Plot #</b>
16072930	Top touching to the flat phantom	2412	53.2	Body	Flat	none	0.978	1.6	13
16072930	Top touching to the flat phantom	2437	54	Body	Flat	none	1.04	1.6	14
16072930	Top touching to the flat phantom	2462	57.4	Body	Flat	none	1.09	1.6	15
13872846	Top touching to the flat phantom	2412	53.2	Body	Flat	none	1.06	1.6	16
13872846	Top touching to the flat phantom	2437	54	Body	Flat	none	1.27	1.6	17
13872846	Top touching to the flat phantom	2462	57.4	Body	Flat	none	1.24	1.6	18
13124499	Top touching to the flat phantom	2412	53.2	Body	Flat	none	0.933	1.6	19
13124499	Top touching to the flat phantom	2437	54	Body	Flat	none	1.22	1.6	20
13124499	Top touching to the flat phantom	2462	57.4	Body	Flat	none	1.32	1.6	21



## APPENDIX A – MEASUREMENT UNCERTAINTY

The uncertainty budget has been determined for the DASY4 measurement system and is given in the following Table.

<b>DASY4 Uncertainty Budget</b> According to IEEE 1528 [1]								
Error Description	Uncertainty value	Prob. Dist.	Div.	( $c_k$ ) 1g	( $c_k$ ) 10g	Std. Unc. (1g)	Std. Unc. (10g)	( $c_k$ ) $c_{eff}$
<b>Measurement System</b>								
Probe Calibration	±5.9%	N	1	1	1	±5.9%	±5.9%	∞
Axial Isotropy	±4.7%	R	$\sqrt{3}$	0.7	0.7	±1.9%	±1.9%	∞
Hemispherical Isotropy	±9.6%	R	$\sqrt{3}$	0.7	0.7	±3.9%	±3.9%	∞
Boundary Effects	±1.0%	R	$\sqrt{3}$	1	1	±0.6%	±0.6%	∞
Linearity	±4.7%	R	$\sqrt{3}$	1	1	±2.7%	±2.7%	∞
System Detection Limits	±1.0%	R	$\sqrt{3}$	1	1	±0.6%	±0.6%	∞
Readout Electronics	±0.3%	N	1	1	1	±0.3%	±0.3%	∞
Response Time	±0.8%	R	$\sqrt{3}$	1	1	±0.5%	±0.5%	∞
Integration Time	±2.6%	R	$\sqrt{3}$	1	1	±1.5%	±1.5%	∞
RF Ambient Conditions	±3.0%	R	$\sqrt{3}$	1	1	±1.7%	±1.7%	∞
Probe Positioner	±0.4%	R	$\sqrt{3}$	1	1	±0.2%	±0.2%	∞
Probe Positioning	±2.9%	R	$\sqrt{3}$	1	1	±1.7%	±1.7%	∞
Max. SAR Eval.	±1.0%	R	$\sqrt{3}$	1	1	±0.6%	±0.6%	∞
<b>Test Sample Related</b>								
Device Positioning	±2.9%	N	1	1	1	±2.9%	±2.9%	145
Device Holder	±3.6%	N	1	1	1	±3.6%	±3.6%	5
Power Drift	±5.0%	R	$\sqrt{3}$	1	1	±2.9%	±2.9%	∞
<b>Phantom and Setup</b>								
Phantom Uncertainty	±4.0%	R	$\sqrt{3}$	1	1	±2.3%	±2.3%	∞
Liquid Conductivity (target)	±5.0%	R	$\sqrt{3}$	0.64	0.43	±1.8%	±1.2%	∞
Liquid Conductivity (meas.)	±2.5%	N	1	0.64	0.43	±1.6%	±1.1%	∞
Liquid Permittivity (target)	±5.0%	R	$\sqrt{3}$	0.6	0.49	±1.7%	±1.4%	∞
Liquid Permittivity (meas.)	±2.5%	N	1	0.6	0.49	±1.5%	±1.2%	∞
Combined Std. Uncertainty						±10.8%	±10.6%	330
<b>Expanded STD Uncertainty</b>						<b>±21.6%</b>	<b>±21.1%</b>	

## DASY4 Uncertainty Budget

According to CENELEC EN 50361 [2]

Error Description	Uncertainty value	Prob. Dist.	Div.	$(c_i)$ 1g	$(c_i)$ 10g	Std. Unc. (1g)	Std. Unc. (10g)	$(v_i)$ $v_{eff}$
<b>Measurement Equipment</b>								
Probe Calibration	$\pm 5.9\%$	N	1	1	1	$\pm 5.9\%$	$\pm 5.9\%$	$\infty$
Axial Isotropy	$\pm 4.7\%$	R	$\sqrt{3}$	0.7	0.7	$\pm 1.9\%$	$\pm 1.9\%$	$\infty$
Spherical Isotropy	$\pm 9.6\%$	R	$\sqrt{3}$	0.7	0.7	$\pm 3.9\%$	$\pm 3.9\%$	$\infty$
Probe Linearity	$\pm 4.7\%$	R	$\sqrt{3}$	1	1	$\pm 2.7\%$	$\pm 2.7\%$	$\infty$
Detection Limit	$\pm 1.0\%$	R	$\sqrt{3}$	1	1	$\pm 0.6\%$	$\pm 0.6\%$	$\infty$
Boundary Effects	$\pm 1.0\%$	R	$\sqrt{3}$	1	1	$\pm 0.6\%$	$\pm 0.6\%$	$\infty$
Readout Electronics	$\pm 0.3\%$	N	1	1	1	$\pm 0.3\%$	$\pm 0.3\%$	$\infty$
Response Time	$\pm 0.8\%$	N	1	1	1	$\pm 0.8\%$	$\pm 0.8\%$	$\infty$
Noise	$\pm 0\%$	N	1	1	1	$\pm 0\%$	$\pm 0\%$	$\infty$
Integration Time	$\pm 2.6\%$	N	1	1	1	$\pm 2.6\%$	$\pm 2.6\%$	$\infty$
<b>Mechanical Constraints</b>								
Scanning System	$\pm 0.4\%$	R	$\sqrt{3}$	1	1	$\pm 0.2\%$	$\pm 0.2\%$	$\infty$
Phantom Shell	$\pm 4.0\%$	R	$\sqrt{3}$	1	1	$\pm 2.3\%$	$\pm 2.3\%$	$\infty$
Probe Positioning	$\pm 2.9\%$	R	$\sqrt{3}$	1	1	$\pm 1.7\%$	$\pm 1.7\%$	$\infty$
Device Positioning	$\pm 2.9\%$	N	1	1	1	$\pm 2.9\%$	$\pm 2.9\%$	145
<b>Physical Parameters</b>								
Liquid Conductivity (target)	$\pm 5.0\%$	R	$\sqrt{3}$	0.7	0.5	$\pm 2.0\%$	$\pm 1.4\%$	$\infty$
Liquid Conductivity (meas.)	$\pm 4.3\%$	R	$\sqrt{3}$	0.7	0.5	$\pm 1.7\%$	$\pm 1.2\%$	$\infty$
Liquid Permittivity (target)	$\pm 5.0\%$	R	$\sqrt{3}$	0.6	0.5	$\pm 1.7\%$	$\pm 1.4\%$	$\infty$
Liquid Permittivity (meas.)	$\pm 4.3\%$	R	$\sqrt{3}$	0.6	0.5	$\pm 1.5\%$	$\pm 1.2\%$	$\infty$
Power Drift	$\pm 5.0\%$	R	$\sqrt{3}$	1	1	$\pm 2.9\%$	$\pm 2.9\%$	$\infty$
RF Ambient Conditions	$\pm 3.0\%$	R	$\sqrt{3}$	1	1	$\pm 1.7\%$	$\pm 1.7\%$	$\infty$
<b>Post-Processing</b>								
Extrap. and Integration	$\pm 1.0\%$	R	$\sqrt{3}$	1	1	$\pm 0.6\%$	$\pm 0.6\%$	$\infty$
Combined Std. Uncertainty						$\pm 10.9\%$	$\pm 10.6\%$	18125
Expanded Std. Uncertainty						$\pm 21.7\%$	$\pm 12.1\%$	

**APPENDIX B – PROBE CALIBRATION CERTIFICATES**

**Calibration Laboratory of**  
**Schmid & Partner**  
**Engineering AG**  
Zeughausstrasse 43, 8004 Zurich, Switzerland



**S** Schweizerischer Kalibrierdienst  
**C** Service suisse d'étalonnage  
**S** Servizio svizzero di taratura  
**S** Swiss Calibration Service

Accredited by the Swiss Federal Office of Metrology and Accreditation  
The Swiss Accreditation Service is one of the signatories to the EA  
Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

Client **Bay Area**

Certificate No: **ET3-1604\_May06**

**CALIBRATION CERTIFICATE**

Object **ET3DV6 - SN: 1604**

Calibration procedure(s) **QA CAL-01.v5 and QA CAL-12.v4**  
**Calibration procedure for dosimetric E-field probes**

Calibration date: **May 2, 2006**

Condition of the calibrated item **In Tolerance**

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).  
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature ( $22 \pm 3$ )°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	5-Apr-06 (METAS, No. 251-00557)	Apr-07
Power sensor E4412A	MY41495277	5-Apr-06 (METAS, No. 251-00557)	Apr-07
Power sensor E4412A	MY41498087	5-Apr-06 (METAS, No. 251-00557)	Apr-07
Reference 3 dB Attenuator	SN: S5054 (3c)	11-Aug-05 (METAS, No. 251-00499)	Aug-06
Reference 20 dB Attenuator	SN: S5086 (20b)	4-Apr-06 (METAS, No. 251-00558)	Apr-07
Reference 30 dB Attenuator	SN: S5129 (30b)	11-Aug-05 (METAS, No. 251-00500)	Aug-06
Reference Probe ES3DV2	SN: 3013	2-Jan-06 (SPEAG, No. ES3-3013_Jan06)	Jan-07
DAE4	SN: 654	2-Feb-06 (SPEAG, No. DAE4-654_Feb06)	Feb-07

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (SPEAG, in house check Nov-05)	In house check: Nov-07
Network Analyzer HP 8753E	US37390585	18-Oct-01 (SPEAG, in house check Nov-05)	In house check: Nov-06

	Name	Function	Signature
Calibrated by:	Katja Pokovic	Technical Manager	
Approved by:	Niels Kuster	Quality Manager	

Issued: May 3, 2006

This calibration certificate shall not be reproduced except in full without written approval of the laboratory.

Certificate No: ET3-1604\_May06

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**Calibration Laboratory of**  
**Schmid & Partner**  
**Engineering AG**  
 Zeughausstrasse 43, 8004 Zurich, Switzerland



**S** Schweizerischer Kalibrierdienst  
**C** Service suisse d'étalonnage  
**S** Servizio svizzero di taratura  
**S** Swiss Calibration Service

Accredited by the Swiss Federal Office of Metrology and Accreditation  
 The Swiss Accreditation Service is one of the signatories to the EA  
 Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

#### Glossary:

TSL	tissue simulating liquid
NORM <sub>x,y,z</sub>	sensitivity in free space
ConvF	sensitivity in TSL / NORM <sub>x,y,z</sub>
DCP	diode compression point
Polarization $\varphi$	$\varphi$ rotation around probe axis
Polarization $\vartheta$	$\vartheta$ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., $\vartheta = 0$ is normal to probe axis

#### Calibration is Performed According to the Following Standards:

- IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
- CENELEC EN 50361, "Basic standard for the measurement of Specific Absorption Rate related to human exposure to electromagnetic fields from mobile phones (300 MHz - 3 GHz), July 2001

#### Methods Applied and Interpretation of Parameters:

- NORM<sub>x,y,z</sub>**: Assessed for E-field polarization  $\vartheta = 0$  ( $f \leq 900$  MHz in TEM-cell;  $f > 1800$  MHz: R22 waveguide). NORM<sub>x,y,z</sub> are only intermediate values, i.e., the uncertainties of NORM<sub>x,y,z</sub> does not effect the  $E^2$ -field uncertainty inside TSL (see below *ConvF*).
- NORM(f)<sub>x,y,z</sub> = NORM<sub>x,y,z</sub> \* frequency\_response** (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of *ConvF*.
- DCP<sub>x,y,z</sub>**: DCP are numerical linearization parameters assessed based on the data of power sweep (no uncertainty required). DCP does not depend on frequency nor media.
- ConvF and Boundary Effect Parameters**: Assessed in flat phantom using E-field (or Temperature Transfer Standard for  $f \leq 800$  MHz) and inside waveguide using analytical field distributions based on power measurements for  $f > 800$  MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to NORM<sub>x,y,z</sub> \* *ConvF* whereby the uncertainty corresponds to that given for *ConvF*. A frequency dependent *ConvF* is used in DASY version 4.4 and higher which allows extending the validity from  $\pm 50$  MHz to  $\pm 100$  MHz.
- Spherical isotropy (3D deviation from isotropy)**: in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- Sensor Offset**: The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.

ET3DV6 SN:1604

May 2, 2006

# Probe ET3DV6

## SN:1604

Manufactured:	July 30, 2001
Last calibrated:	March 18, 2005
Recalibrated:	May 2, 2006

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)



ET3DV6 SN:1604

May 2, 2006

**DASY - Parameters of Probe: ET3DV6 SN:1604****Sensitivity in Free Space<sup>A</sup>****Diode Compression<sup>B</sup>**

NormX	1.87 ± 10.1%	$\mu\text{V}/(\text{V}/\text{m})^2$	DCP X	93 mV
NormY	1.80 ± 10.1%	$\mu\text{V}/(\text{V}/\text{m})^2$	DCP Y	93 mV
NormZ	1.91 ± 10.1%	$\mu\text{V}/(\text{V}/\text{m})^2$	DCP Z	93 mV

**Sensitivity in Tissue Simulating Liquid (Conversion Factors)**

Please see Page 8.

**Boundary Effect****TSL                    900 MHz      Typical SAR gradient: 5 % per mm**

Sensor Center to Phantom Surface Distance		<b>3.7 mm</b>	<b>4.7 mm</b>
SAR <sub>be</sub> [%]	Without Correction Algorithm	7.9	4.1
SAR <sub>be</sub> [%]	With Correction Algorithm	0.1	0.2

**TSL                    1810 MHz      Typical SAR gradient: 10 % per mm**

Sensor Center to Phantom Surface Distance		<b>3.7 mm</b>	<b>4.7 mm</b>
SAR <sub>be</sub> [%]	Without Correction Algorithm	7.0	4.1
SAR <sub>be</sub> [%]	With Correction Algorithm	0.1	0.3

**Sensor Offset**Probe Tip to Sensor Center                    **2.7 mm**

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

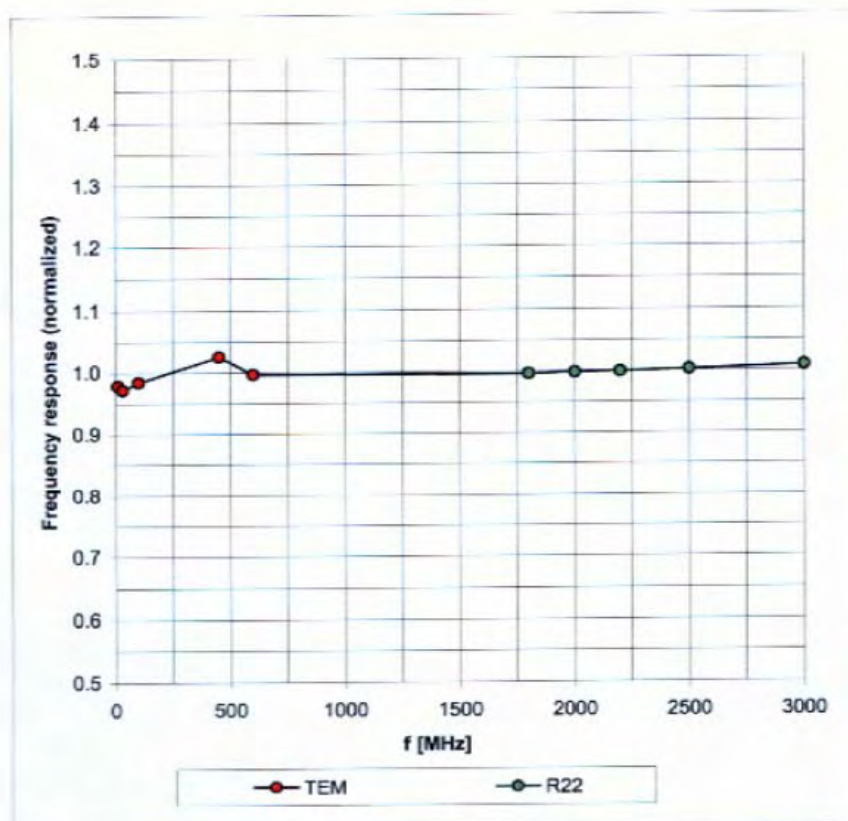
<sup>A</sup> The uncertainties of NormX,Y,Z do not affect the E<sup>2</sup>-field uncertainty inside TSL (see Page 8).<sup>B</sup> Numerical linearization parameter: uncertainty not required.

ET3DV6 SN:1604

May 2, 2006

## Frequency Response of E-Field

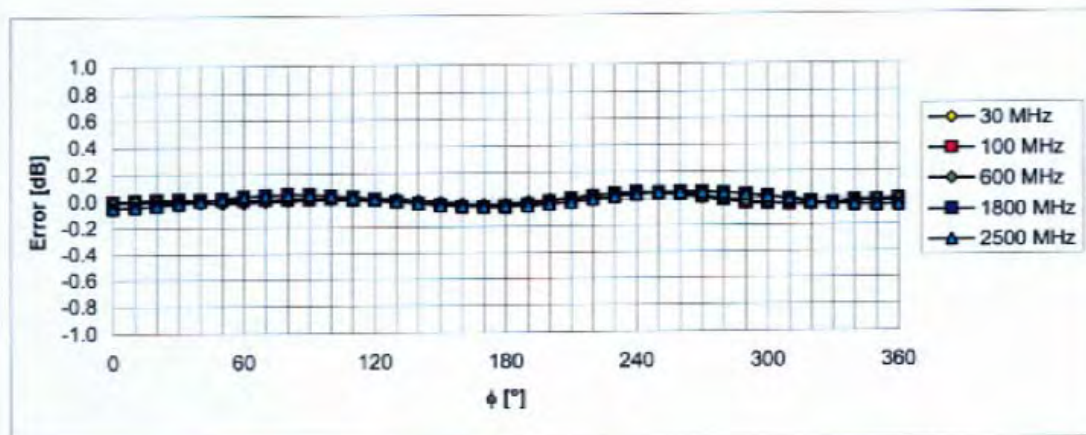
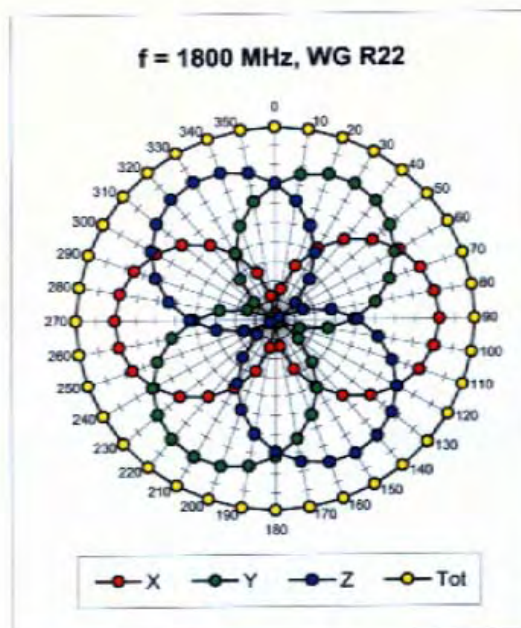
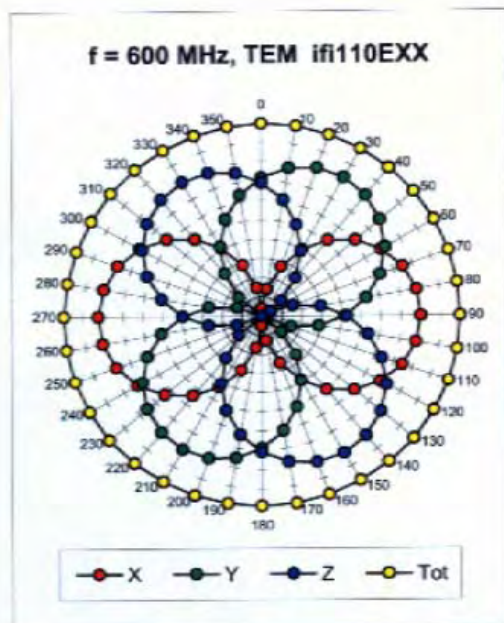
(TEM-Cell:ifi110 EXX, Waveguide: R22)

Uncertainty of Frequency Response of E-field:  $\pm 6.3\%$  ( $k=2$ )



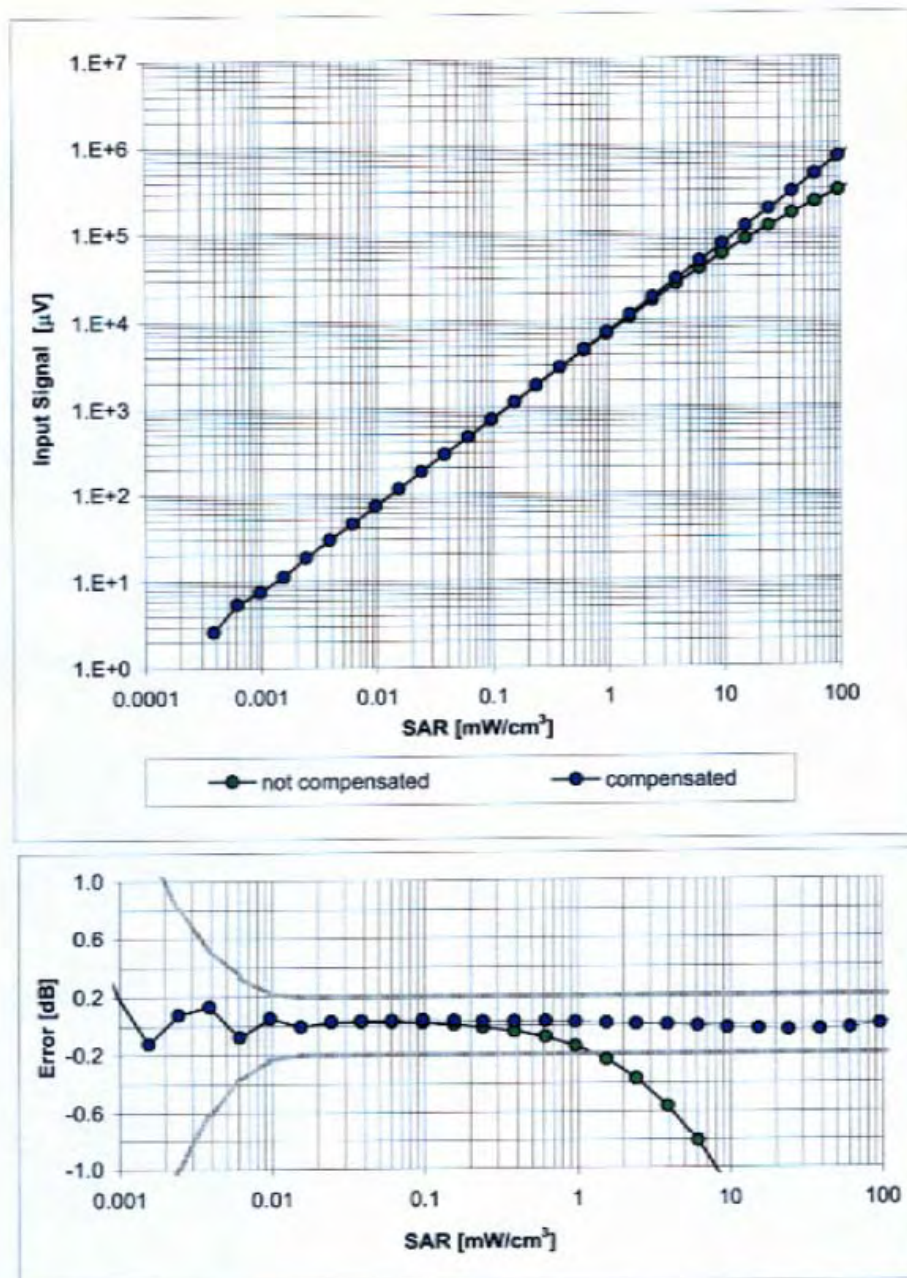
ET3DV6 SN:1604

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Receiving Pattern ( $\phi$ ),  $\theta = 0^\circ$ Uncertainty of Axial Isotropy Assessment:  $\pm 0.5\%$  (k=2)

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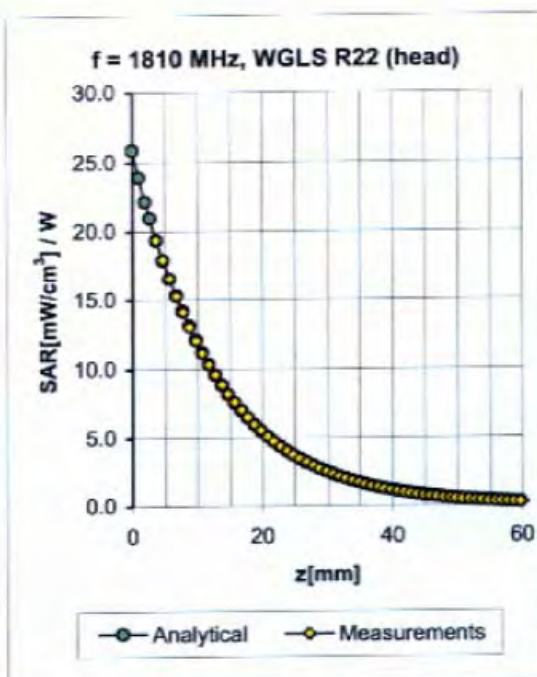
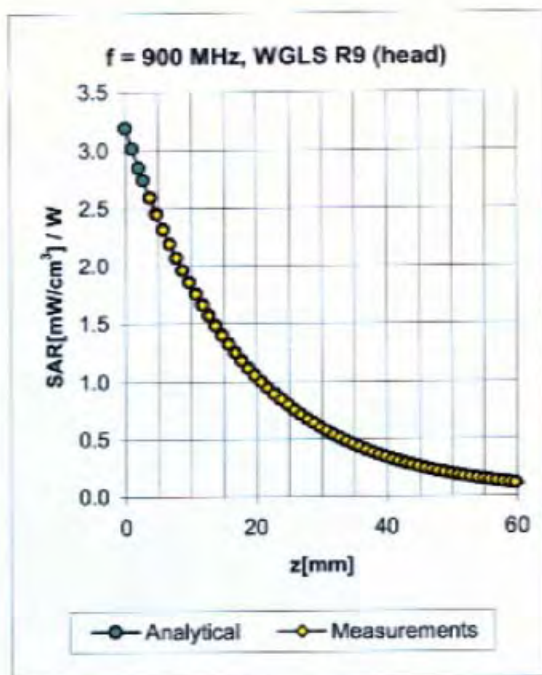
**Dynamic Range  $f(\text{SAR}_{\text{head}})$** (Waveguide R22,  $f = 1800$  MHz)Uncertainty of Linearity Assessment:  $\pm 0.6\%$  ( $k=2$ )



ET3DV6 SN:1604

May 2, 2006

## Conversion Factor Assessment



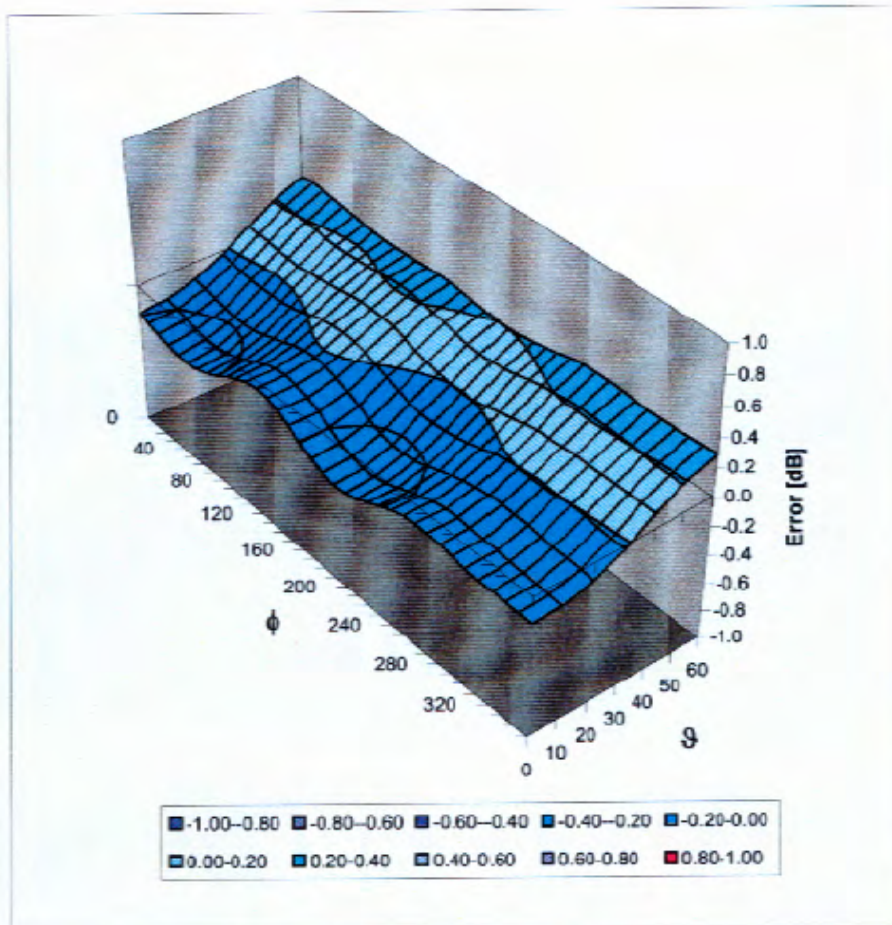
f [MHz]	Validity [MHz] <sup>c</sup>	TSL	Permittivity	Conductivity	Alpha	Depth	ConvF Uncertainty
450	± 50 / ± 100	Head	43.5 ± 5%	0.87 ± 5%	0.26	2.94	7.14 ± 13.3% (k=2)
900	± 50 / ± 100	Head	41.5 ± 5%	0.97 ± 5%	0.56	1.81	6.60 ± 11.0% (k=2)
1810	± 50 / ± 100	Head	40.0 ± 5%	1.40 ± 5%	0.50	2.59	5.29 ± 11.0% (k=2)
2450	± 50 / ± 100	Head	39.2 ± 5%	1.80 ± 5%	0.68	1.85	4.60 ± 11.8% (k=2)
450	± 50 / ± 100	Body	56.7 ± 5%	0.94 ± 5%	0.25	4.44	7.42 ± 13.3% (k=2)
900	± 50 / ± 100	Body	55.0 ± 5%	1.05 ± 5%	0.47	2.08	6.27 ± 11.0% (k=2)
1810	± 50 / ± 100	Body	53.3 ± 5%	1.52 ± 5%	0.56	2.66	4.88 ± 11.0% (k=2)
2450	± 50 / ± 100	Body	52.7 ± 5%	1.95 ± 5%	0.66	1.95	4.27 ± 11.8% (k=2)

<sup>c</sup> The validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2). The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

ET3DV6 SN:1604

May 2, 2006

## Deviation from Isotropy in HSL

Error ( $\phi$ ,  $\theta$ ),  $f = 900$  MHzUncertainty of Spherical Isotropy Assessment:  $\pm 2.6\%$  ( $k=2$ )

**APPENDIX C – DIPOLE CALIBRATION CERTIFICATES****NCL CALIBRATION LABORATORIES**

Calibration File No: DC-713  
Project Number: BACL-CAL-D-2450-5249

**CERTIFICATE OF CALIBRATION**

It is certified that the equipment identified below has been calibrated in the  
**NCL CALIBRATION LABORATORIES** by qualified personnel following recognized  
procedures and using transfer standards traceable to NRC/NIST.

BACL Validation Dipole

Manufacturer: APREL Laboratories

Part number: D-2450-S-1

Frequency: 2450 MHz

Serial No: BCL-141

Customer: Bay Area Compliance Laboratory

Calibrated: 28<sup>th</sup> August 2006  
Released on: 28<sup>th</sup> August 2006

Released By: \_\_\_\_\_

**NCL CALIBRATION LABORATORIES**

51 SPECTRUM WAY  
NEPEAN, ONTARIO  
CANADA K2R 1E6

Division of APREL Lab.  
TEL: (613) 820-4988  
FAX: (613) 820-4162



**NCL Calibration Laboratories**

Division of APREL Laboratories.


**Conditions**

Dipole BCL-141 was received from customer in good condition for re-calibration, SMA connector required cleaning prior to calibration.

**Ambient Temperature of the Laboratory:** 22 °C +/- 0.5°C

**Temperature of the Tissue:** 21 °C +/- 0.5°C

**We the undersigned attest that to the best of our knowledge the calibration of this device has been accurately conducted and that all information contained within this report has been reviewed for accuracy.**



**D. Brooks**  
**Member of Engineering Staff**  
**(Calibration Engineer)**

This page has been reviewed for content and attested to by signature within this document.

**NCL Calibration Laboratories**

Division of APREL Laboratories.

**Calibration Results Summary**

The following results relate the Calibrated Dipole and should be used as a quick reference for the user.

**Mechanical Dimensions**

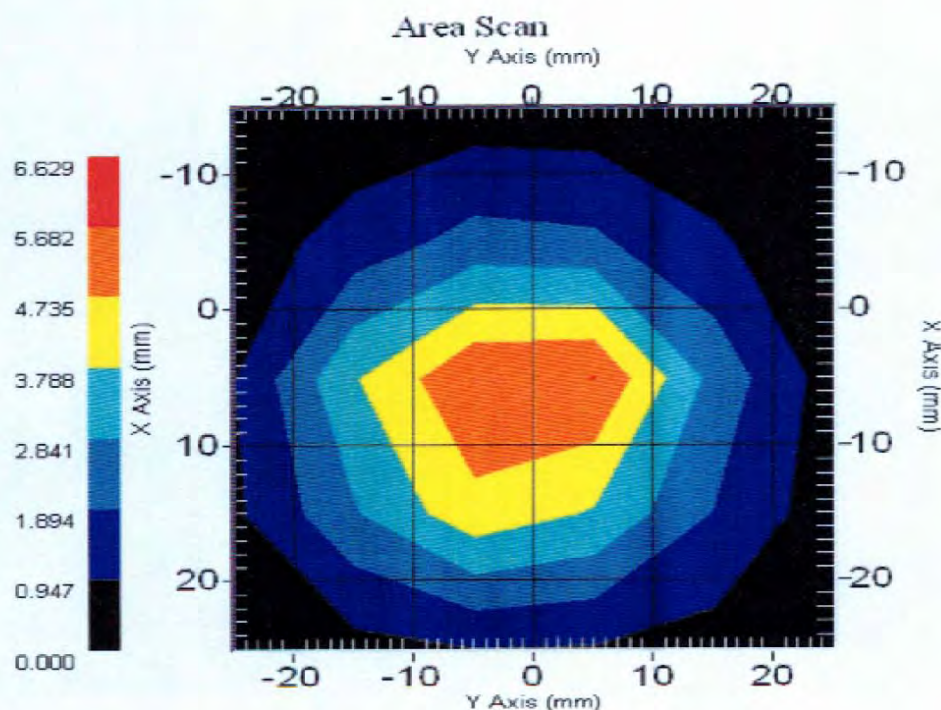
**Length:** 51.5 mm  
**Height:** 30.4 mm

**Electrical Specification**

**SWR:** 1.095 U to 1.397 U  
**Return Loss:** -26.77 dB to -15.52 dB  
**Impedance:** 47.81  $\Omega$  to 63.37  $\Omega$

**System Validation Results**

Frequency	1 Gram	10 Gram	Peak
2450 MHz	5.31	2.44	10.18



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**NCL Calibration Laboratories**

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**Introduction**

This Calibration Report has been produced in line with the SSI Dipole Calibration Procedure SSI-TP-018-ALSAS. The results contained within this report are for Validation Dipole BCL-141. The calibration routine consisted of a three-step process. Step 1 was a mechanical verification of the dipole to ensure that it meets the mechanical specifications. Step 2 was an Electrical Calibration for the Validation Dipole, where the SWR, Impedance, and the Return loss were assessed. Step 3 involved a System Validation using the ALSAS-10U, along with APREL E-020 130 MHz to 26 GHz E-Field Probe Serial Number 212.

**References**

SSI-TP-018-ALSAS Dipole Calibration Procedure

SSI-TP-016 Tissue Calibration Procedure

IEEE 1528 "Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Body Due to Wireless Communications Devices: Experimental Techniques"

**Conditions**

Dipole BCL-141 was received from customer in good condition for re-calibration, SMA connector required cleaning prior to calibration.

**Ambient Temperature of the Laboratory:** 22 °C +/- 0.5°C

**Temperature of the Tissue:** 20 °C +/- 0.5°C

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**NCL Calibration Laboratories**

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**Dipole Calibration Results****Mechanical Verification**

<b>APREL Length</b>	<b>APREL Height</b>	<b>Measured Length</b>	<b>Measured Height</b>
51.5 mm	30.4 mm	51.6 mm	30.5 mm

**Tissue Validation**

<b>Head Tissue 2450 MHz</b>	<b>Measured</b>
<b>Dielectric constant, <math>\epsilon_r</math></b>	39.2
<b>Conductivity, <math>\sigma</math> [S/m]</b>	1.80

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**Electrical Calibration**

Test	Result
S11 R/L	-26.77 dB to -15.52 dB
SWR	1.095 U to 1.397 U
Impedance	47.81 $\Omega$ to 63.37 $\Omega$

The Following Graphs are the results as displayed on the Vector Network Analyzer.

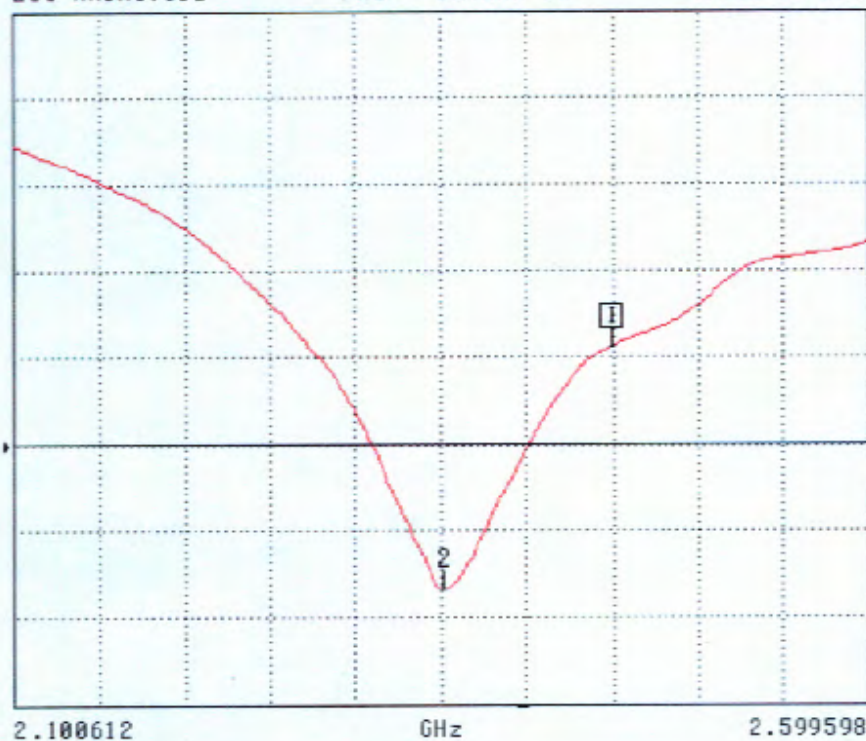
**S11 Parameter Return Loss**

S22 REVERSE REFLECTION

LOG MAGNITUDE

REF = -20.000 dB

4.000 dB/DIV



CH 4 - S22  
REFERENCE PLANE  
0.0000 mm

MARKER 1  
2.450046 GHz  
-15.516 dB

MARKER TO MAX  
▶ MARKER TO MIN

2 2.352262 GHz  
-26.773 dB

MARKER READOUT  
FUNCTIONS

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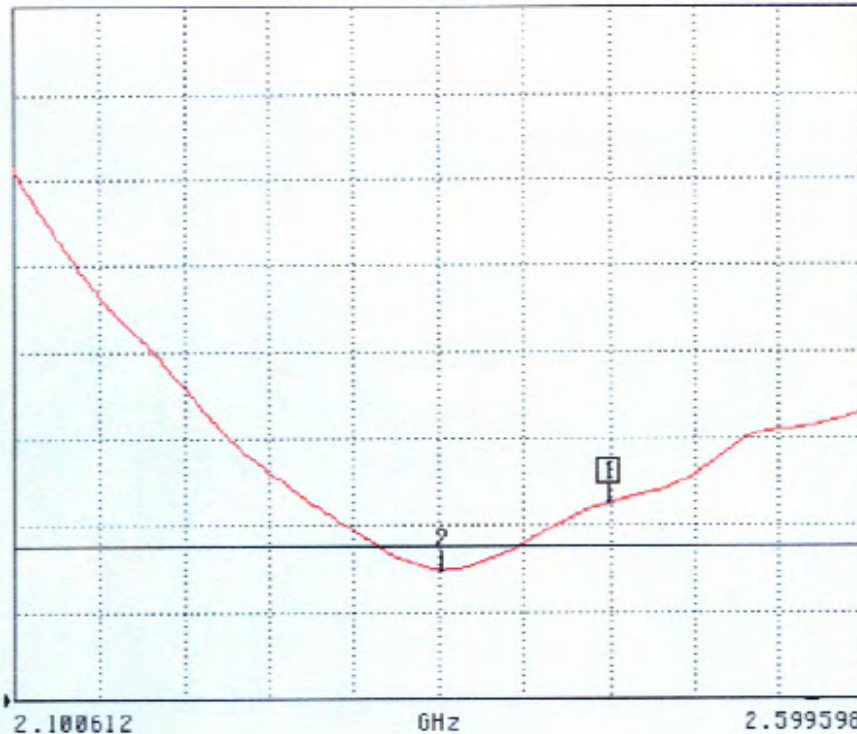
**SWR**

S22 REVERSE REFLECTION

SWR

REF = 500.000 mU

400.000 mU/DIV

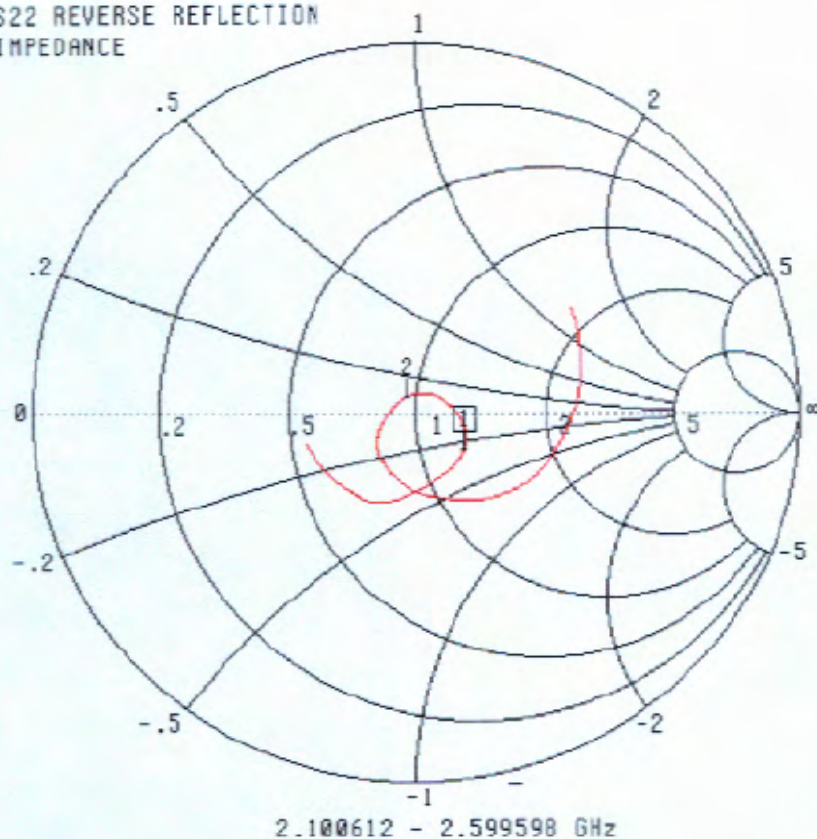
CH 4 - S22  
REFERENCE PLANE  
0.0000 mmMARKER 1  
2.450046 GHz  
1.397 UMARKER TO MAX  
▶ MARKER TO MIN  
2 2.352262 GHz  
1.095 UMARKER READOUT  
FUNCTIONS

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**Smith Chart Dipole Impedance**S22 REVERSE REFLECTION  
IMPEDANCECH 4 - S22  
REFERENCE PLANE  
0.0000 mmMARKER 1  
2.450046 GHz  
63.373  $\Omega$   
-13.350 j $\Omega$ MARKER TO MAX  
▶ MARKER TO MIN2 2.352262 GHz  
47.808  $\Omega$   
3.861 j $\Omega$ MARKER READOUT  
FUNCTIONS

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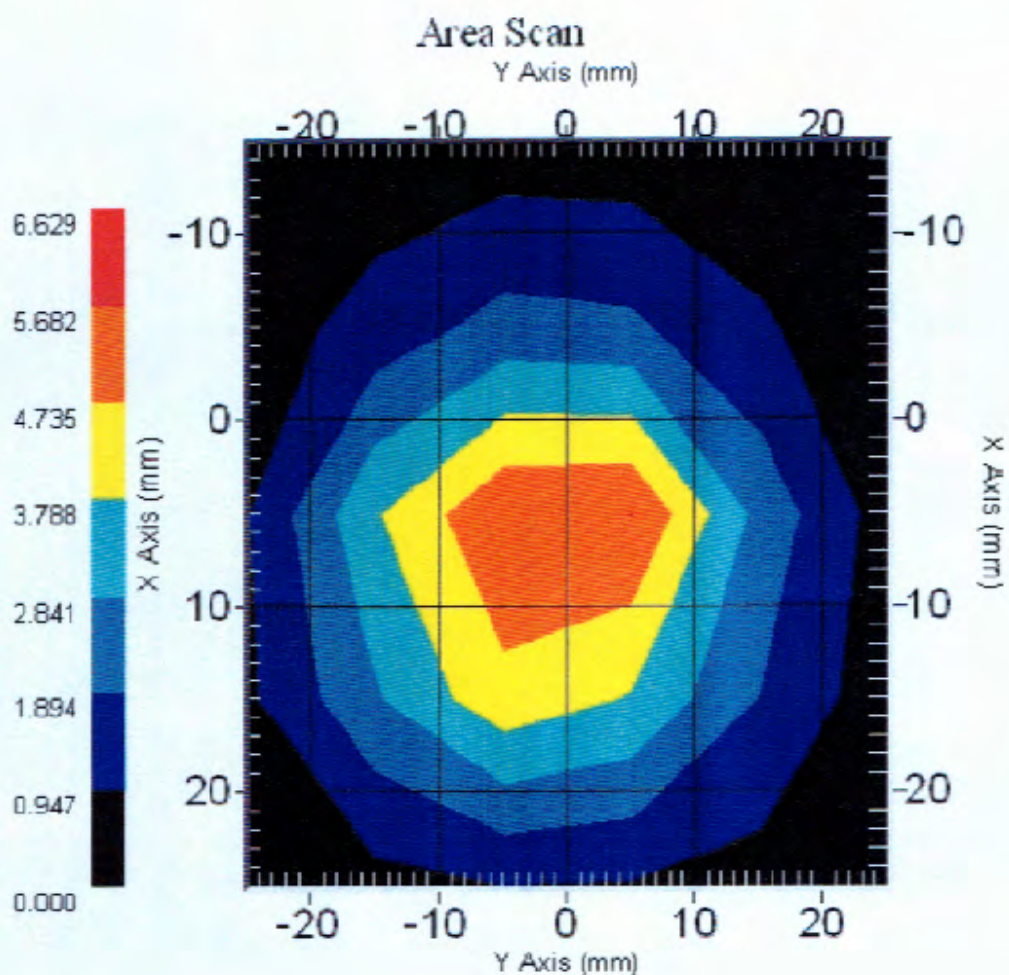
8

**NCL Calibration Laboratories**

Division of APREL Laboratories.

**System Validation Results Using the Electrically Calibrated Dipole**

Head Tissue Frequency	1 Gram	10 Gram	Peak Above Feed Point
2450 MHz	5.31	2.44	10.18





**NCL Calibration Laboratories**

Division of APREL Laboratories.

**Test Equipment**

The test equipment used during Probe Calibration, manufacturer, model number and, current calibration status are listed and located on the main APREL server R:\NCL\Calibration Equipment\Instrument List

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**APPENDIX D - TEST SYSTEM VERIFICATIONS SCANS****Liquid Measurement Result**

2006-12-12 &amp; 2006-12-13

Stimulant	Freq [MHz]	Parameters	Liquid Temp [°C]	Target Value	Measured Value	Deviation [%]	Limits [%]
Head	2450	$\epsilon$	22	39.2	38.9	0.77	$\pm 5$
		$\sigma$	22	1.80	1.81	-0.55	$\pm 5$
		1g SAR	22	52.4	51.2	2.34	$\pm 10$
Body	2450	$\epsilon$	21	52.7	53.1	-0.75	$\pm 5$
		$\sigma$	21	1.95	1.96	-0.51	$\pm 5$
		1g SAR	21	56.84	55.9	1.68	$\pm 10$

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

**Test Laboratory: Bay Area Compliance Lab Corp. (BACL)****System Performance Check for Head****Dipole 2450 MHz; Type: D-2450-S-1; Serial: BCL-141**

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

Medium parameters used:  $f = 2450$  MHz;  $\sigma = 1.81$  mho/m;  $\epsilon_r = 38.9$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

**DASY4 Configuration:**

- Probe: ET3DV6 - SN1604; ConvF(4.60, 4.60, 4.60); Calibrated: 5/2/2006
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn456; Calibrated: 11/22/2006
- Phantom: SAM with CRP; Type: Twin SAM; Serial: TP-1032
- Measurement SW: DASY4, V4.6 Build 23; Post processing SW: SEMCAD, V1.8 Build 161

**Pin=1W, d=10mm/Area Scan (81x81x1):** Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 53.7 mW/g

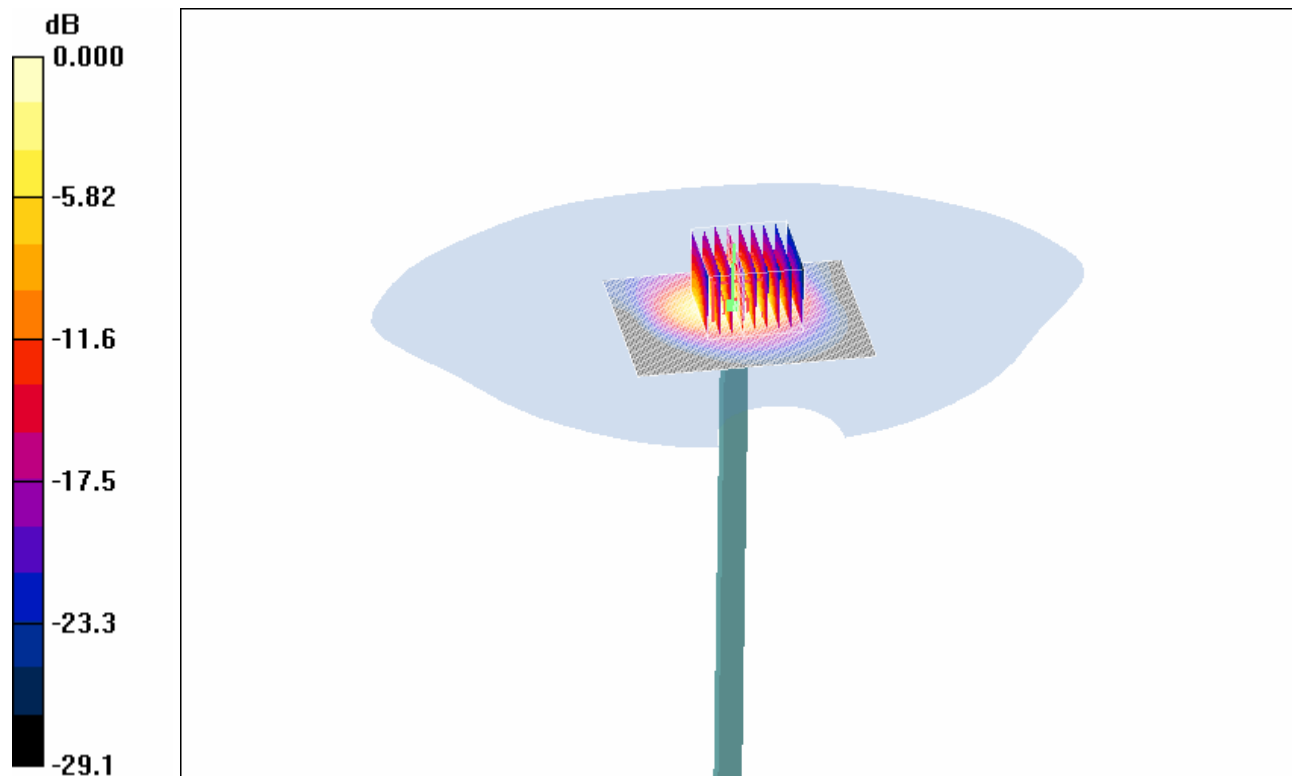
**Pin=1W, d=10mm/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 185.2 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 103.5 W/kg

**SAR(1 g) = 51.2 mW/g; SAR(10 g) = 23.4 mW/g**

Maximum value of SAR (measured) = 53.3 mW/g



0 dB = 53.3 mW/g

**Test Laboratory: Bay Area Compliance Lab Corp. (BACL)****System Performance Check for Body****Dipole 2450 MHz; Type: D-2450-S-1; Serial: BCL-141**

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

Medium parameters used:  $f = 2450$  MHz;  $\sigma = 1.96$  mho/m;  $\epsilon_r = 53$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

## DASY4 Configuration:

- Probe: ET3DV6 - SN1604; ConvF(4.27, 4.27, 4.27); Calibrated: 5/2/2006
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn456; Calibrated: 11/22/2006
- Phantom: SAM with CRP; Type: Twin SAM; Serial: TP-1032
- Measurement SW: DASY4, V4.6 Build 23; Post processing SW: SEMCAD, V1.8 Build 161

**Pin=1W, d=10mm/Area Scan (81x81x1):** Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 59.3 mW/g

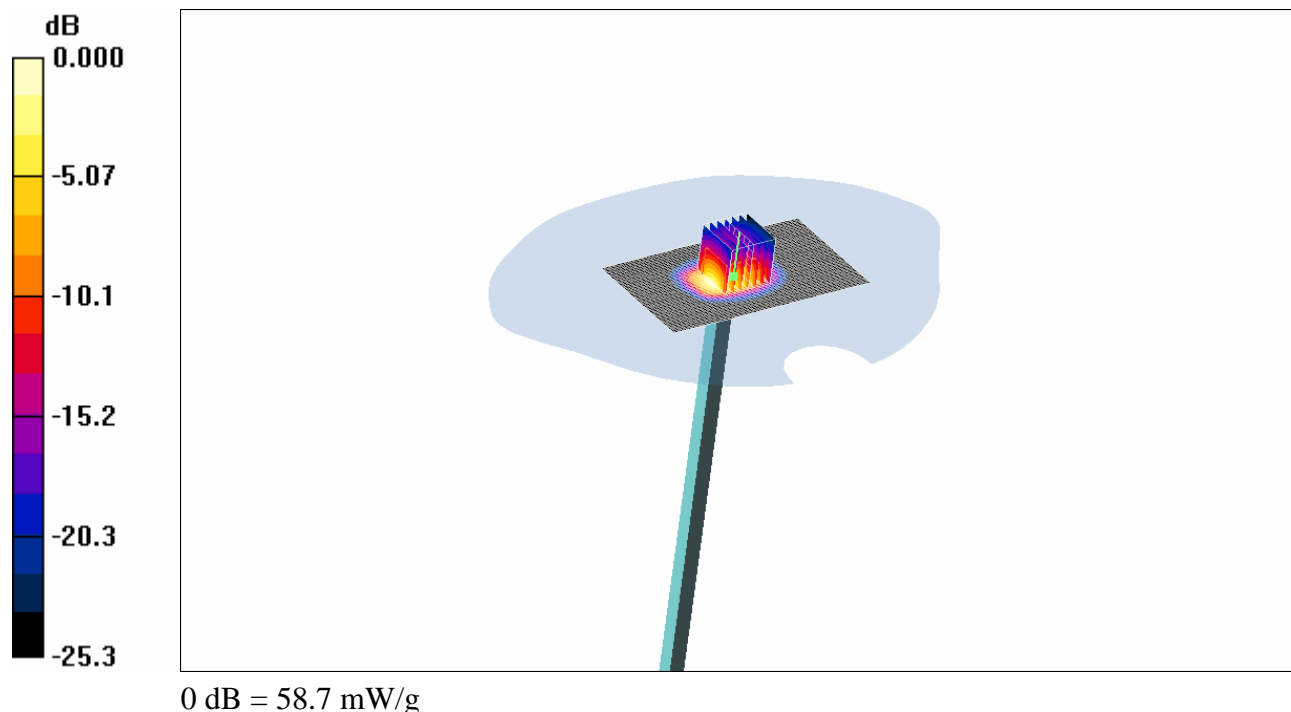
**Pin=1W, d=10mm/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 187.3 V/m; Power Drift = -0.041 dB

Peak SAR (extrapolated) = 124.6 W/kg

**SAR(1 g) = 55.9 mW/g; SAR(10 g) = 24.86 mW/g**

Maximum value of SAR (measured) = 58.7 mW/g



## APPENDIX E - EUT SCANS

**Test Laboratory: Bay Area Compliance Lab Corp. (BACL)**

**Device top touching to the flat phantom (Low Channel)**

**Hospira Inc.; DUT Type: WL UD 2554 17A0 B10; Serial: 16072930; 802.11b**

Communication System: CW; Frequency: 2412 MHz; Duty Cycle: 1:1

Medium parameters used:  $f = 2450$  MHz;  $\sigma = 1.96$  mho/m;  $\epsilon_r = 53.1$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

DASY4 Configuration:

- Probe: ET3DV6 - SN1604; ConvF(4.27, 4.27, 4.27); Calibrated: 5/2/2006
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn456; Calibrated: 11/22/2006
- Phantom: SAM with CRP; Type: Twin SAM; Serial: TP-1032
- Measurement SW: DASY4, V4.6 Build 23; Post processing SW: SEMCAD, V1.8 Build 161

**Hospira, Model Plum A+, 2412 MHz (Low Channel)/Area Scan (51x81x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.992 mW/g

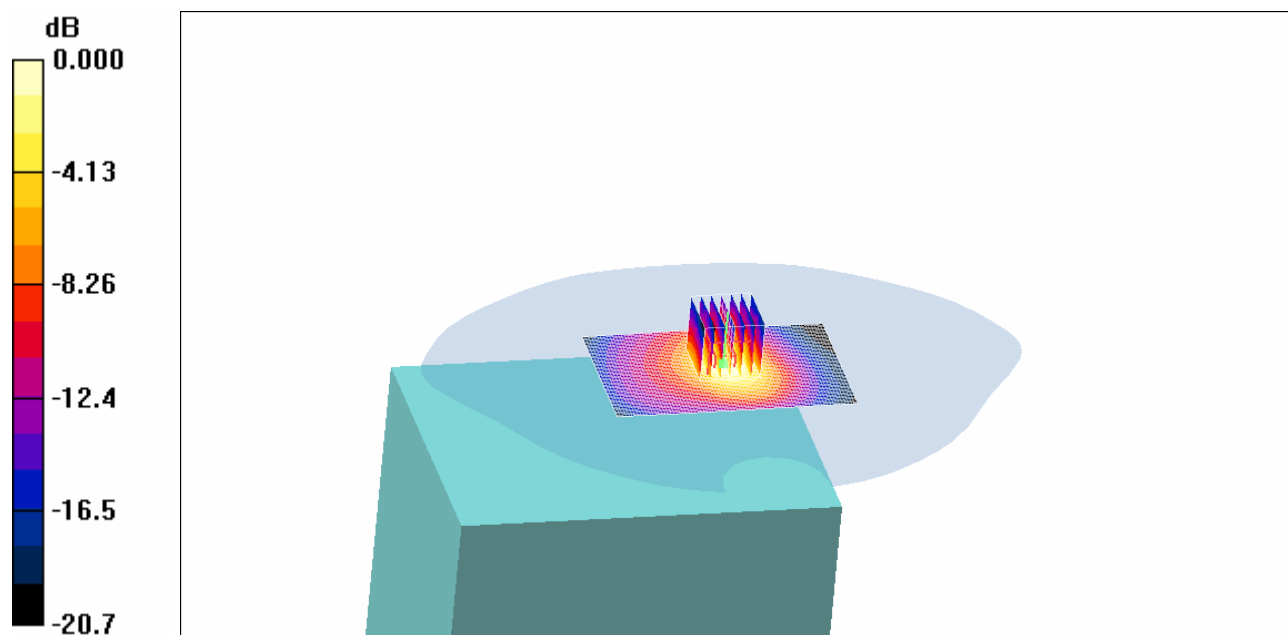
**Hospira, Model Plum A+, 2412 MHz (Low Channel)/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 25.9 V/m; Power Drift = -0.014 dB

Peak SAR (extrapolated) = 3.13 W/kg

**SAR(1 g) = 0.982 mW/g; SAR(10 g) = 0.475 mW/g**

Maximum value of SAR (measured) = 0.986 mW/g



0 dB = 0.986 mW/g

**Plot#1**

**Test Laboratory: Bay Area Compliance Lab Corp. (BACL)****Device top touching to the flat phantom (Middle Channel)****Hospira Inc.; DUT Type: WL UD 2554 17A0 B10; Serial: 16072930; 802.11b**

Communication System: CW; Frequency: 2437 MHz; Duty Cycle: 1:1

Medium parameters used:  $f = 2450$  MHz;  $\sigma = 1.96$  mho/m;  $\epsilon_r = 53.1$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

**DASY4 Configuration:**

- Probe: ET3DV6 - SN1604; ConvF(4.27, 4.27, 4.27); Calibrated: 5/2/2006
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn456; Calibrated: 11/22/2006
- Phantom: SAM with CRP; Type: Twin SAM; Serial: TP-1032
- Measurement SW: DASY4, V4.6 Build 23; Post processing SW: SEMCAD, V1.8 Build 161

**Hospira, Model: Plum A+, 2437 MHz (Middle Channel)/Area Scan (51x81x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 1.16 mW/g

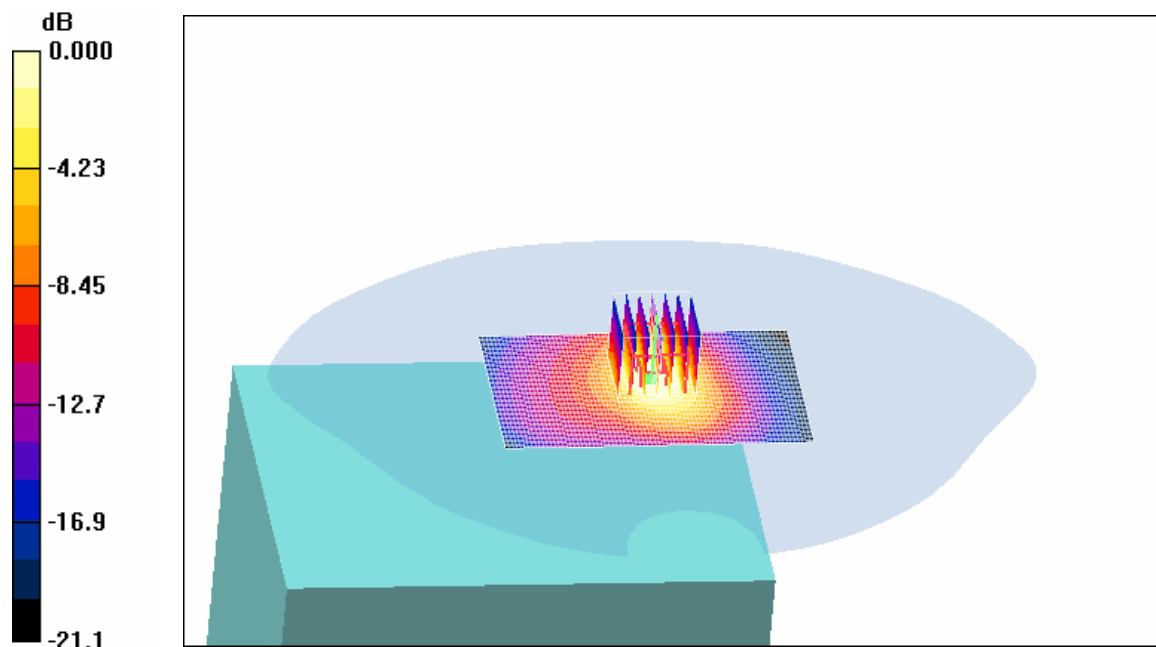
**Hospira, Model: Plum A+, 2437 MHz (Middle Channel)/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 27.5 V/m; Power Drift = 0.04 dB

Peak SAR (extrapolated) = 3.22 W/kg

**SAR(1 g) = 1.06 mW/g; SAR(10 g) = 0.605 mW/g**

Maximum value of SAR (measured) = 1.12 mW/g

**Plot#2**

**Test Laboratory: Bay Area Compliance Lab Corp. (BACL)****Device top touching to the flat phantom (Middle Channel)****Hospira Inc.; DUT Type: WL UD 2554 17A0 B10; Serial: 16072930; 802.11b (Battery Mode)**

Communication System: CW; Frequency: 2437 MHz; Duty Cycle: 1:1

Medium parameters used:  $f = 2450$  MHz;  $\sigma = 1.96$  mho/m;  $\epsilon_r = 53.1$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

## DASY4 Configuration:

- Probe: ET3DV6 - SN1604; ConvF(4.27, 4.27, 4.27); Calibrated: 5/2/2006
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn456; Calibrated: 11/22/2006
- Phantom: SAM with CRP; Type: Twin SAM; Serial: TP-1032
- Measurement SW: DASY4, V4.6 Build 23; Post processing SW: SEMCAD, V1.8 Build 161

**Hospira, Model Plum A+, 2437 MHz (Middle Channel)/Area Scan (51x81x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 1.03 mW/g

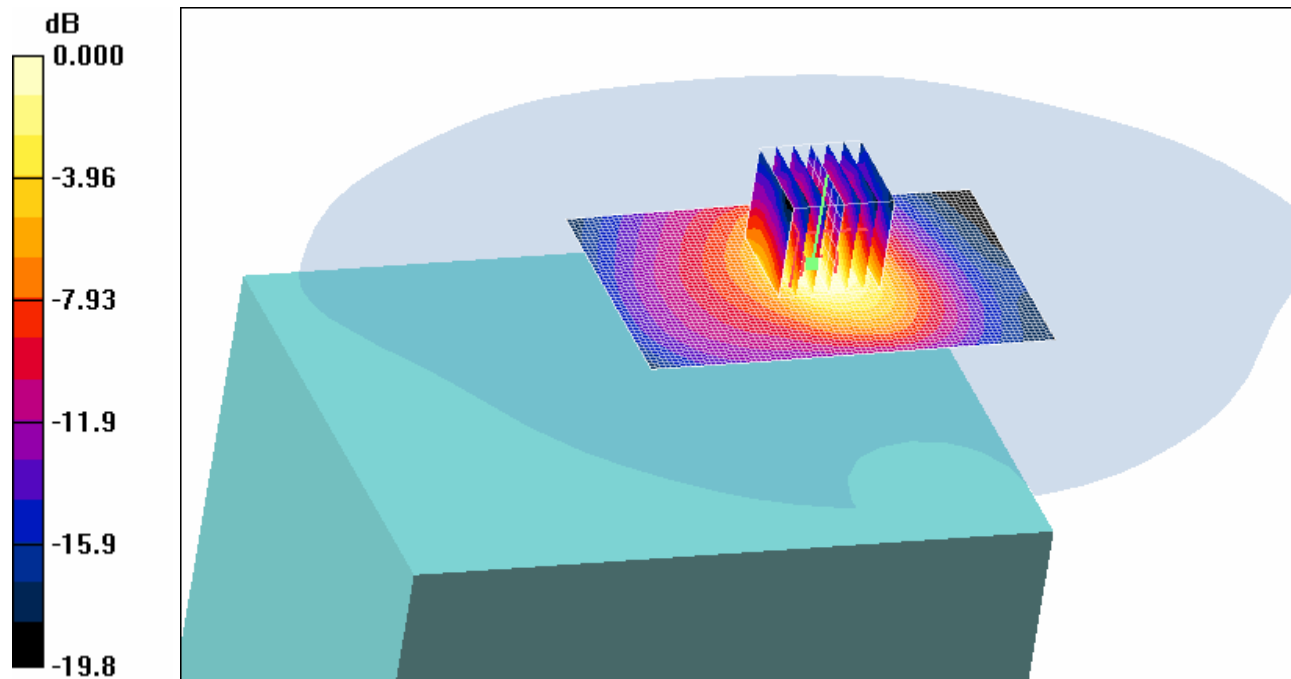
**Hospira, Model Plum A+, 2437 MHz (Middle Channel)/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 27.8 V/m; Power Drift = -0.04 dB

Peak SAR (extrapolated) = 2.96 W/kg

**SAR(1 g) = 0.992 mW/g; SAR(10 g) = 0.486 mW/g**

Maximum value of SAR (measured) = 0.995 mW/g



0 dB = 0.995 mW/g

**Plot#3**

**Test Laboratory: Bay Area Compliance Lab Corp. (BACL)****Device top touching to the flat phantom (High Channel)****Hospira Inc.; DUT Type: WL UD 2554 17A0 B10; Serial: 16072930; 802.11b**

Communication System: CW; Frequency: 2462 MHz; Duty Cycle: 1:1

Medium parameters used:  $f = 2450$  MHz;  $\sigma = 1.96$  mho/m;  $\epsilon_r = 53.1$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

## DASY4 Configuration:

- Probe: ET3DV6 - SN1604; ConvF(4.27, 4.27, 4.27); Calibrated: 5/2/2006
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn456; Calibrated: 11/22/2006
- Phantom: SAM with CRP; Type: Twin SAM; Serial: TP-1032
- Measurement SW: DASY4, V4.6 Build 23; Post processing SW: SEMCAD, V1.8 Build 161

**Hospira, Model Plum A+, 2462 MHz (High Channel)/Area Scan (51x81x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 1.18 mW/g

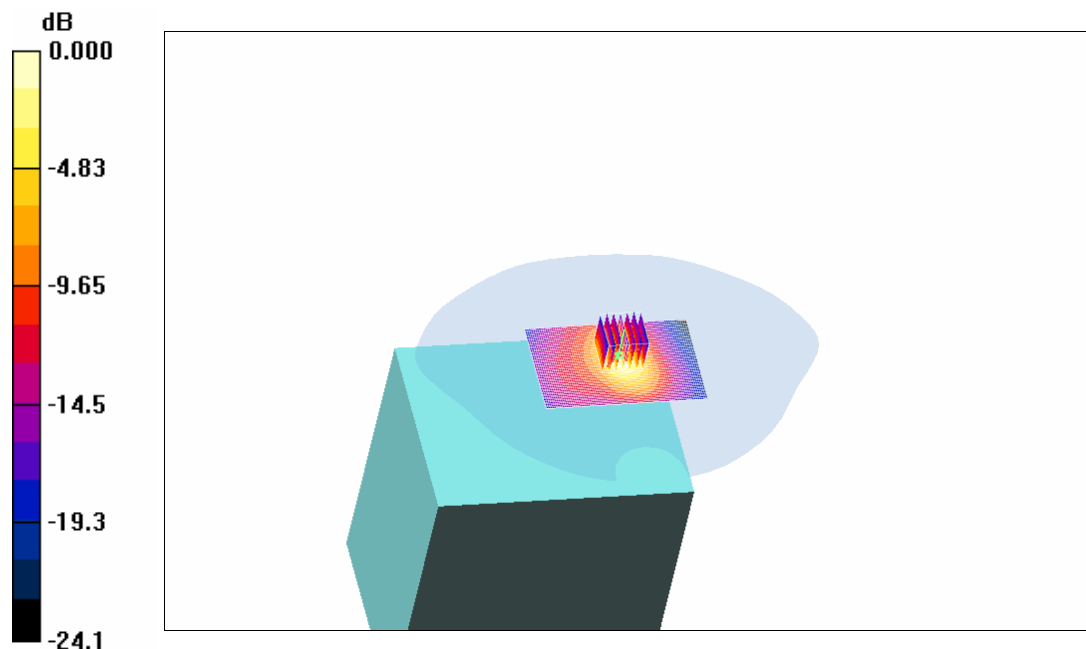
**Hospira, Model Plum A+, 2462 MHz (High Channel)/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 25.3 V/m; Power Drift = 0.02 dB

Peak SAR (extrapolated) = 3.31 W/kg

**SAR(1 g) = 1.13 mW/g; SAR(10 g) = 0.601 mW/g**

Maximum value of SAR (measured) = 1.16 mW/g



0 dB = 1.16 mW/g

**Plot#4**



**Test Laboratory: Bay Area Compliance Lab Corp. (BACL)****Device top touching to the flat phantom (Low Channel)****Hospira Inc.; DUT Type: WL UD 2554 17A0 B10; Serial: 13872846; 802.11b**

Communication System: CW; Frequency: 2412 MHz; Duty Cycle: 1:1

Medium parameters used:  $f = 2450$  MHz;  $\sigma = 1.96$  mho/m;  $\epsilon_r = 53.1$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

## DASY4 Configuration:

- Probe: ET3DV6 - SN1604; ConvF(4.27, 4.27, 4.27); Calibrated: 5/2/2006
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn456; Calibrated: 11/22/2006
- Phantom: SAM with CRP; Type: Twin SAM; Serial: TP-1032
- Measurement SW: DASY4, V4.6 Build 23; Post processing SW: SEMCAD, V1.8 Build 161

**Hospira, Model Plum A+, 2412 MHz (Low Channel)/Area Scan (51x81x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 1.34 mW/g

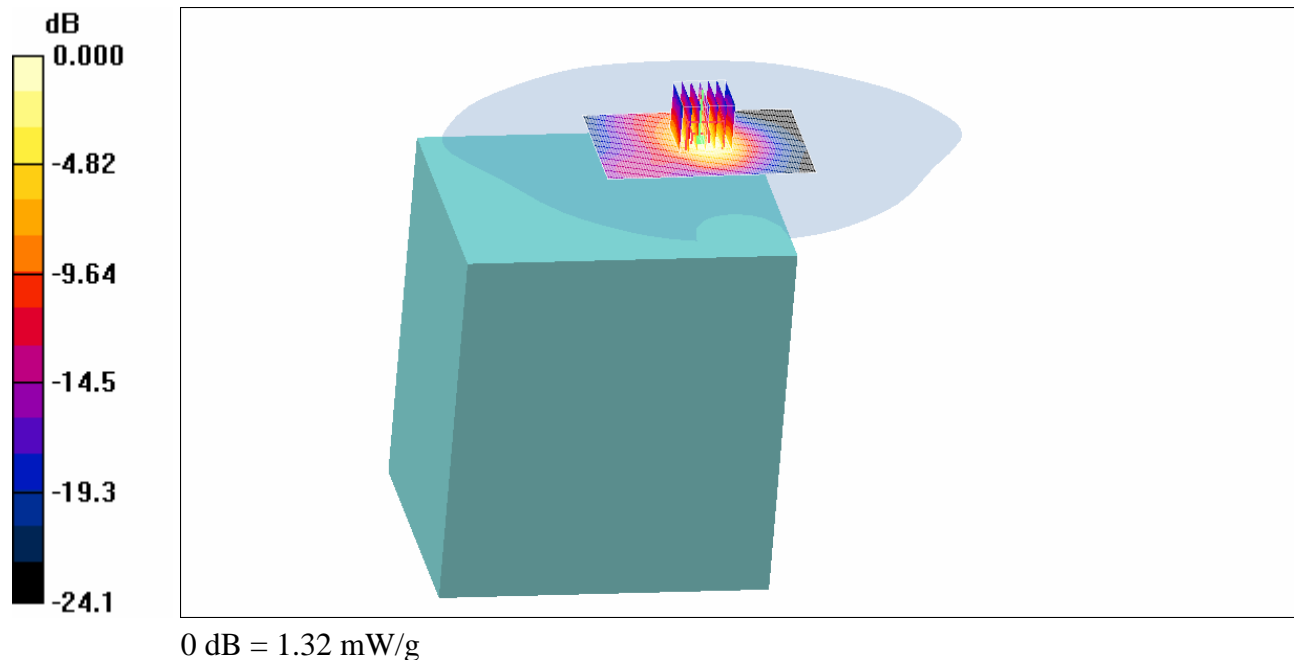
**Hospira, Model Plum A+, 2412 MHz (Low Channel)/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 24.9 V/m; Power Drift = 0.019 dB

Peak SAR (extrapolated) = 3.04 W/kg

**SAR(1 g) = 1.15 mW/g; SAR(10 g) = 0.502 mW/g**

Maximum value of SAR (measured) = 1.32 mW/g

**Plot #5**

**Test Laboratory: Bay Area Compliance Lab Corp. (BACL)****Device top touching to the flat phantom (Middle Channel)****Hospira Inc.; DUT Type: WL UD 2554 17A0 B10; Serial: 13872846; 802.11b**

Communication System: CW; Frequency: 2437 MHz; Duty Cycle: 1:1

Medium parameters used:  $f = 2450$  MHz;  $\sigma = 2.01$  mho/m;  $\epsilon_r = 53$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

## DASY4 Configuration:

- Probe: ET3DV6 - SN1604; ConvF(4.27, 4.27, 4.27); Calibrated: 5/2/2006
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn456; Calibrated: 11/22/2006
- Phantom: SAM with CRP; Type: Twin SAM; Serial: TP-1032
- Measurement SW: DASY4, V4.6 Build 23; Post processing SW: SEMCAD, V1.8 Build 161

**Hospira, Model Plum A+, 2437 MHz (Middle Channel)/Area Scan (51x81x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 1.48 mW/g

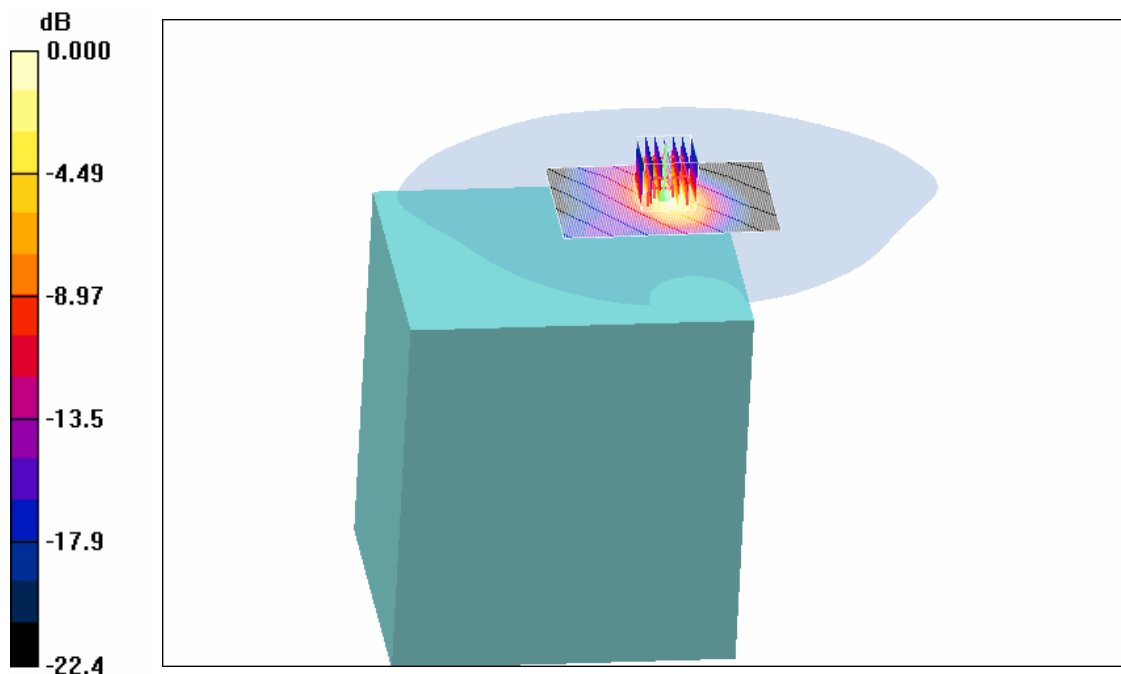
**Hospira, Model Plum A+, 2437 MHz (Middle Channel)/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 24.7 V/m; Power Drift = -0.580 dB

Peak SAR (extrapolated) = 3.36 W/kg

**SAR(1 g) = 1.23 mW/g; SAR(10 g) = 0.537 mW/g**

Maximum value of SAR (measured) = 1.42 mW/g

**Plot#6**

**Test Laboratory: Bay Area Compliance Lab Corp. (BACL)****Device top touching to the flat phantom (Middle Channel)****Hospira Inc.; DUT Type: WL UD 2554 17A0 B10; Serial: 13872846; 802.11b (Battery Mode)**

Communication System: CW; Frequency: 2437 MHz; Duty Cycle: 1:1

Medium parameters used:  $f = 2450$  MHz;  $\sigma = 1.96$  mho/m;  $\epsilon_r = 53.1$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

**DASY4 Configuration:**

- Probe: ET3DV6 - SN1604; ConvF(4.27, 4.27, 4.27); Calibrated: 5/2/2006
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn456; Calibrated: 11/22/2006
- Phantom: SAM with CRP; Type: Twin SAM; Serial: TP-1032
- Measurement SW: DASY4, V4.6 Build 23; Post processing SW: SEMCAD, V1.8 Build 161

**Hospira, Model Plum A+, 2437 MHz (Middle Channel)/Area Scan (51x81x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 1.13 mW/g

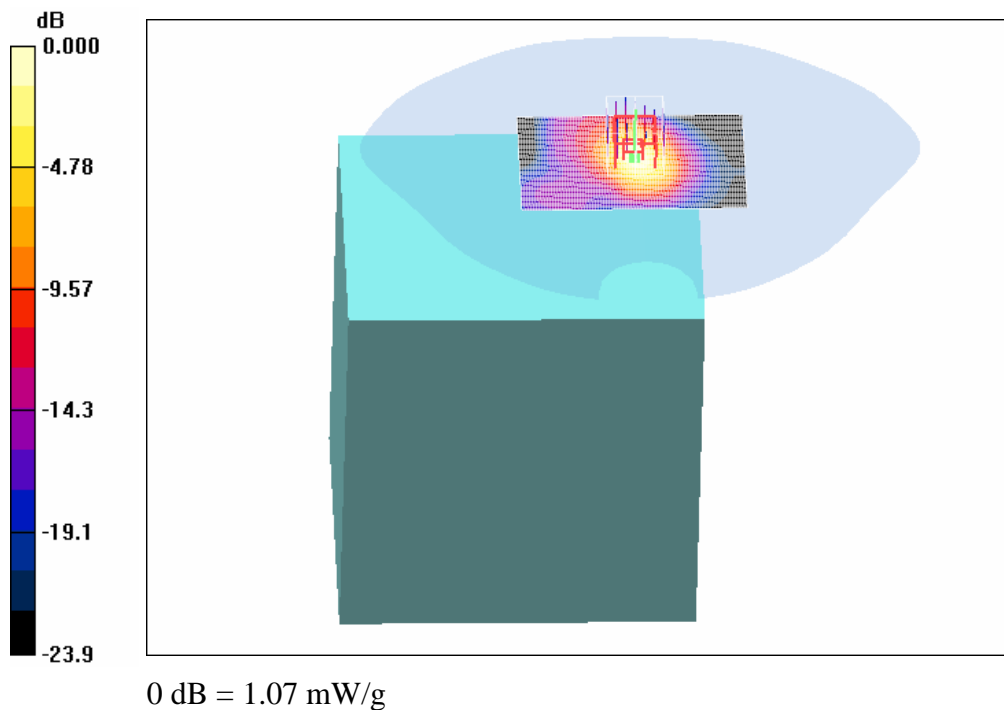
**Hospira, Model Plum A+, 2437 MHz (Middle Channel)/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 20.5 V/m; Power Drift = -0.022 dB

Peak SAR (extrapolated) = 2.96 W/kg

**SAR(1 g) = 1.02 mW/g; SAR(10 g) = 0.391 mW/g**

Maximum value of SAR (measured) = 1.07 mW/g

**Plot#7**

**Test Laboratory: Bay Area Compliance Lab Corp. (BACL)****Device top touching to the flat phantom (High Channel)****Hospira Inc.; DUT Type: WL UD 2554 17A0 B10; Serial: 13872846; 802.11b**

Communication System: CW; Frequency: 2462 MHz; Duty Cycle: 1:1

Medium parameters used:  $f = 2450$  MHz;  $\sigma = 1.96$  mho/m;  $\epsilon_r = 53.1$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

## DASY4 Configuration:

- Probe: ET3DV6 - SN1604; ConvF(4.27, 4.27, 4.27); Calibrated: 5/2/2006
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn456; Calibrated: 11/22/2006
- Phantom: SAM with CRP; Type: Twin SAM; Serial: TP-1032
- Measurement SW: DASY4, V4.6 Build 23; Post processing SW: SEMCAD, V1.8 Build 161

**Hospira, Model Plum A+, 2462 MHz (High Channel)/Area Scan (51x81x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 1.51 mW/g

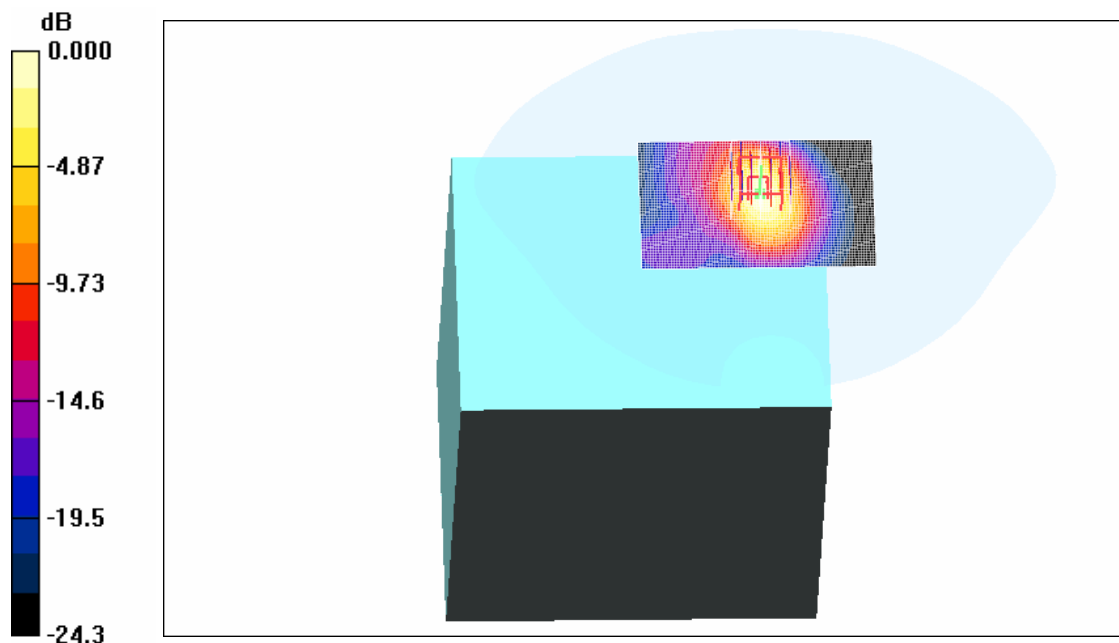
**Hospira, Model Plum A+, 2462 MHz (High Channel)/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 25.2 V/m; Power Drift = 0.07 dB

Peak SAR (extrapolated) = 3.39 W/kg

**SAR(1 g) = 1.25 mW/g; SAR(10 g) = 0.606 mW/g**

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



0 dB = 1.46 mW/g

**Plot#8**

**Test Laboratory: Bay Area Compliance Lab Corp. (BACL)****Device top touching to the flat phantom (Low Channel)****Hospira Inc.; DUT Type: WL UD 2554 17A0 B10; Serial: 13124499; 802.11b**

Communication System: CW; Frequency: 2412 MHz; Duty Cycle: 1:1

Medium parameters used:  $f = 2450$  MHz;  $\sigma = 1.96$  mho/m;  $\epsilon_r = 53.1$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

**DASY4 Configuration:**

- Probe: ET3DV6 - SN1604; ConvF(4.27, 4.27, 4.27); Calibrated: 5/2/2006
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn456; Calibrated: 11/22/2006
- Phantom: SAM with CRP; Type: Twin SAM; Serial: TP-1032
- Measurement SW: DASY4, V4.6 Build 23; Post processing SW: SEMCAD, V1.8 Build 161

**Hospira, Model Plum A+, 2412 MHz (Low Channel)/Area Scan (51x81x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 1.09 mW/g

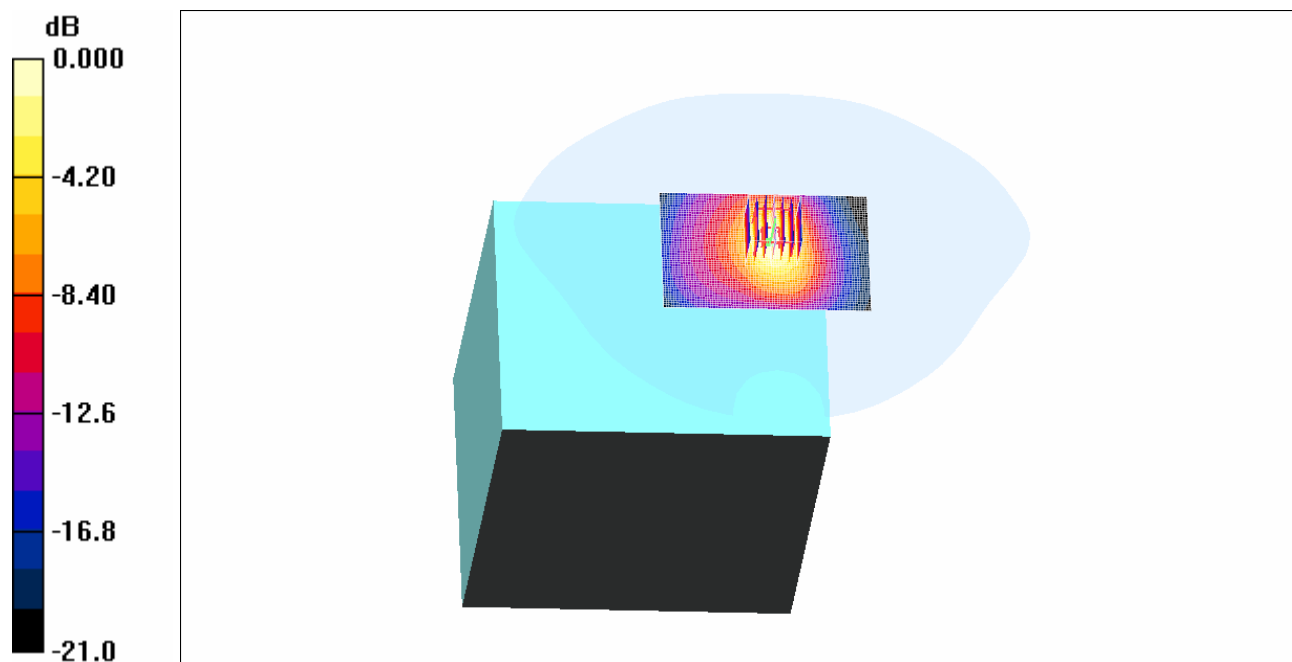
**Hospira, Model Plum A+, 2412 MHz (Low Channel)/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 25.9 V/m; Power Drift = -0.014 dB

Peak SAR (extrapolated) = 2.94 W/kg

**SAR(1 g) = 0.988 mW/g; SAR(10 g) = 0.465 mW/g**

Maximum value of SAR (measured) = 1.07 mW/g

**Plot#9**

**Test Laboratory: Bay Area Compliance Lab Corp. (BACL)****Device top touching to the flat phantom (Middle Channel)****Hospira Inc.; DUT Type: WL UD 2554 17A0 B10; Serial: 1312499; 802.11b**

Communication System: CW; Frequency: 2437 MHz; Duty Cycle: 1:1

Medium parameters used:  $f = 2450$  MHz;  $\sigma = 1.96$  mho/m;  $\epsilon_r = 53.1$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

## DASY4 Configuration:

- Probe: ET3DV6 - SN1604; ConvF(4.27, 4.27, 4.27); Calibrated: 5/2/2006
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn456; Calibrated: 11/22/2006
- Phantom: SAM with CRP; Type: Twin SAM; Serial: TP-1032
- Measurement SW: DASY4, V4.6 Build 23; Post processing SW: SEMCAD, V1.8 Build 161

**Hospira, Model Plum A+, 2437 MHz (Middle Channel)/Area Scan (51x81x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 1.26 mW/g

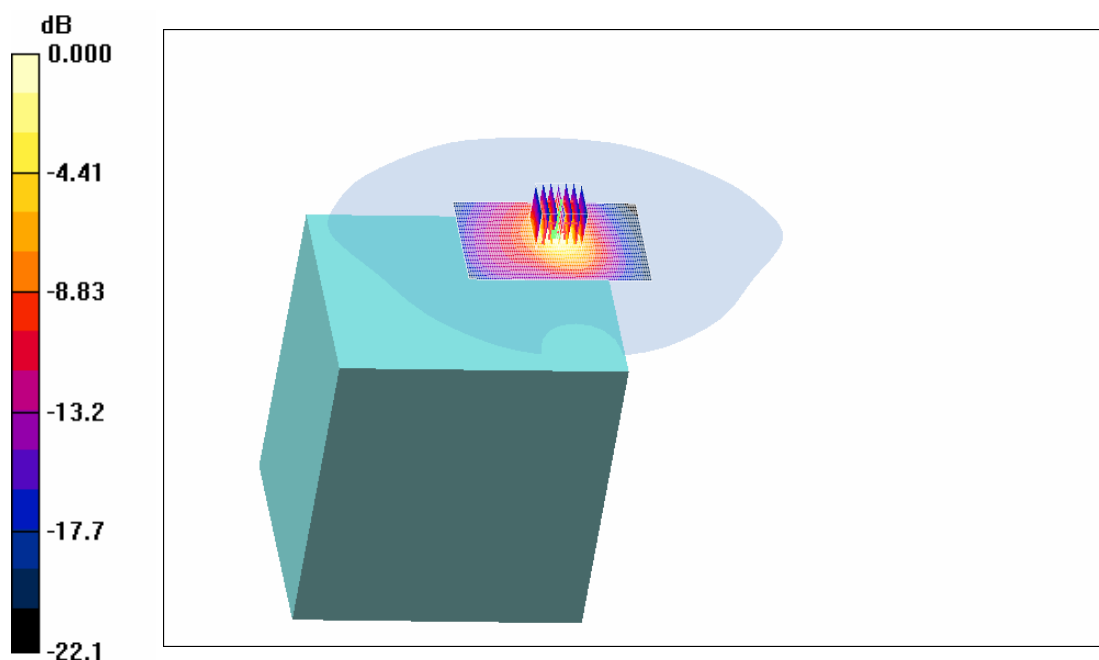
**Hospira, Model Plum A+, 2437 MHz (Middle Channel)/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 27.5 V/m; Power Drift = 0.015 dB

Peak SAR (extrapolated) = 3.28 W/kg

**SAR(1 g) = 1.18 mW/g; SAR(10 g) = 0.605 mW/g**

Maximum value of SAR (measured) = 1.39 mW/g

**Plot#10**

**Test Laboratory: Bay Area Compliance Lab Corp. (BACL)****Device top touching to the flat phantom (Middle Channel)****Hospira Inc.; DUT Type: WL UD 2554 17A0 B10; Serial: 13124499; 802.11b (Battery Mode)**

Communication System: CW; Frequency: 2437 MHz; Duty Cycle: 1:1

Medium parameters used:  $f = 2450$  MHz;  $\sigma = 2.01$  mho/m;  $\epsilon_r = 53$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

## DASY4 Configuration:

- Probe: ET3DV6 - SN1604; ConvF(4.27, 4.27, 4.27); Calibrated: 5/2/2006
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn456; Calibrated: 11/22/2006
- Phantom: SAM with CRP; Type: Twin SAM; Serial: TP-1032
- Measurement SW: DASY4, V4.6 Build 23; Post processing SW: SEMCAD, V1.8 Build 161

**Hospira, Model Plum A+, 2437 MHz (Middle Channel)/Area Scan (51x81x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.997 mW/g

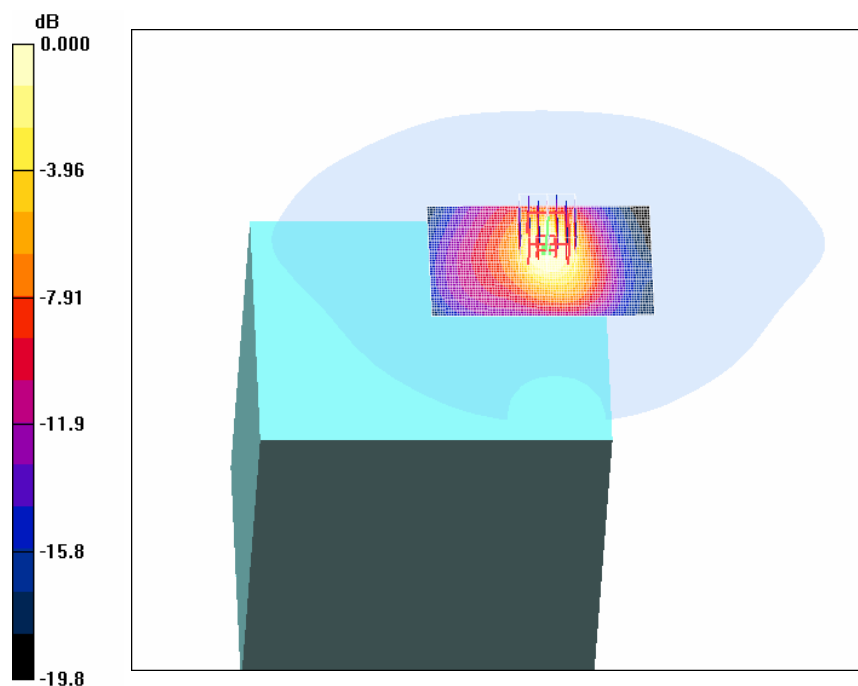
**Hospira, Model Plum A+, 2437 MHz (Middle Channel)/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 27.8 V/m; Power Drift = -0.104 dB

Peak SAR (extrapolated) = 2.86 W/kg

**SAR(1 g) = 0.983 mW/g; SAR(10 g) = 0.486 mW/g**

Maximum value of SAR (measured) = 0.988 mW/g



0 dB = 0.988 mW/g

**Plot#11**

**Test Laboratory: Bay Area Compliance Lab Corp. (BACL)****Device top touching to the flat phantom (High Channel)****Hospira Inc.; DUT Type: WL UD 2554 17A0 B10; Serial: 1312499; 802.11b**

Communication System: CW; Frequency: 2462 MHz; Duty Cycle: 1:1

Medium parameters used:  $f = 2450$  MHz;  $\sigma = 1.96$  mho/m;  $\epsilon_r = 53.1$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

## DASY4 Configuration:

- Probe: ET3DV6 - SN1604; ConvF(4.27, 4.27, 4.27); Calibrated: 5/2/2006
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn456; Calibrated: 11/22/2006
- Phantom: SAM with CRP; Type: Twin SAM; Serial: TP-1032
- Measurement SW: DASY4, V4.6 Build 23; Post processing SW: SEMCAD, V1.8 Build 161

**Hospira, Model Plum A+, 2462 MHz (High Channel)/Area Scan (51x81x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 1.45 mW/g

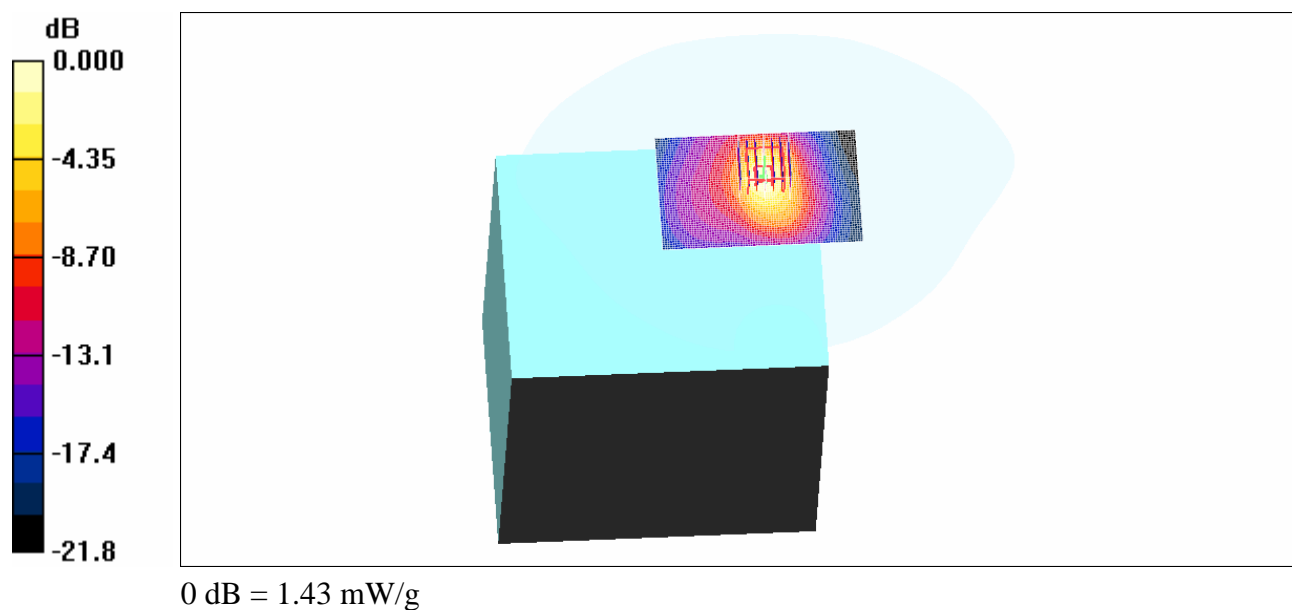
**Hospira, Model Plum A+, 2462 MHz (High Channel)/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 25.3 V/m; Power Drift = 0.06 dB

Peak SAR (extrapolated) = 3.38 W/kg

**SAR(1 g) = 1.27 mW/g; SAR(10 g) = 0.601 mW/g**

Maximum value of SAR (measured) = 1.43 mW/g

**Plot#12**



**Test Laboratory: Bay Area Compliance Lab Corp. (BACL)****Device back touching to the flat phantom (Low Channel)****Hospira Inc.; DUT Type: WL UD 2554 17A0 B10; Serial: 16072930; 802.11g**

Communication System: CW; Frequency: 2412 MHz; Duty Cycle: 1:1

Medium parameters used:  $f = 2450$  MHz;  $\sigma = 1.96$  mho/m;  $\epsilon_r = 53.1$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

## DASY4 Configuration:

- Probe: ET3DV6 - SN1604; ConvF(4.27, 4.27, 4.27); Calibrated: 5/2/2006
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn456; Calibrated: 11/22/2006
- Phantom: SAM with CRP; Type: Twin SAM; Serial: TP-1032
- Measurement SW: DASY4, V4.6 Build 23; Post processing SW: SEMCAD, V1.8 Build 161

**Hospira, Model Plum A+, 2412 MHz (Low Channel)/Area Scan (51x81x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.984 mW/g

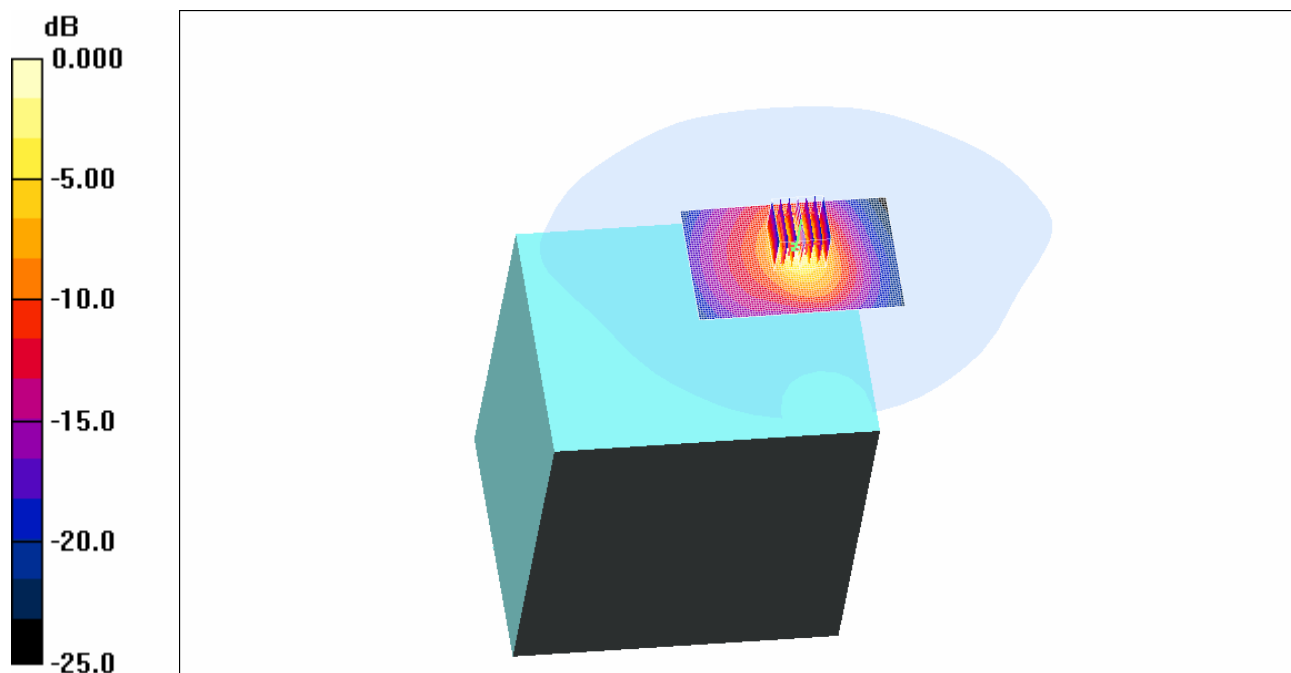
**Hospira, Model Plum A+, 2412 MHz (Low Channel)/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 25.7 V/m; Power Drift = 0.209 dB

Peak SAR (extrapolated) = 3.07 W/kg

**SAR(1 g) = 0.978 mW/g; SAR(10 g) = 0.397 mW/g**

Maximum value of SAR (measured) = 0.982 mW/g

**Plot#13**

**Test Laboratory: Bay Area Compliance Lab Corp. (BACL)****Device back touching to the flat phantom (Middle Channel)****Hospira Inc.; DUT Type: WL UD 2554 17A0 B10; Serial: 16072930; 802.11g**

Communication System: CW; Frequency: 2437 MHz; Duty Cycle: 1:1

Medium parameters used:  $f = 2450$  MHz;  $\sigma = 1.96$  mho/m;  $\epsilon_r = 53.1$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

**DASY4 Configuration:**

- Probe: ET3DV6 - SN1604; ConvF(4.27, 4.27, 4.27); Calibrated: 5/2/2006
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn456; Calibrated: 11/22/2006
- Phantom: SAM with CRP; Type: Twin SAM; Serial: TP-1032
- Measurement SW: DASY4, V4.6 Build 23; Post processing SW: SEMCAD, V1.8 Build 161

**Hospira, model Plum A+, 2437 MHz (Middle Channel)/Area Scan (51x81x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 1.14 mW/g

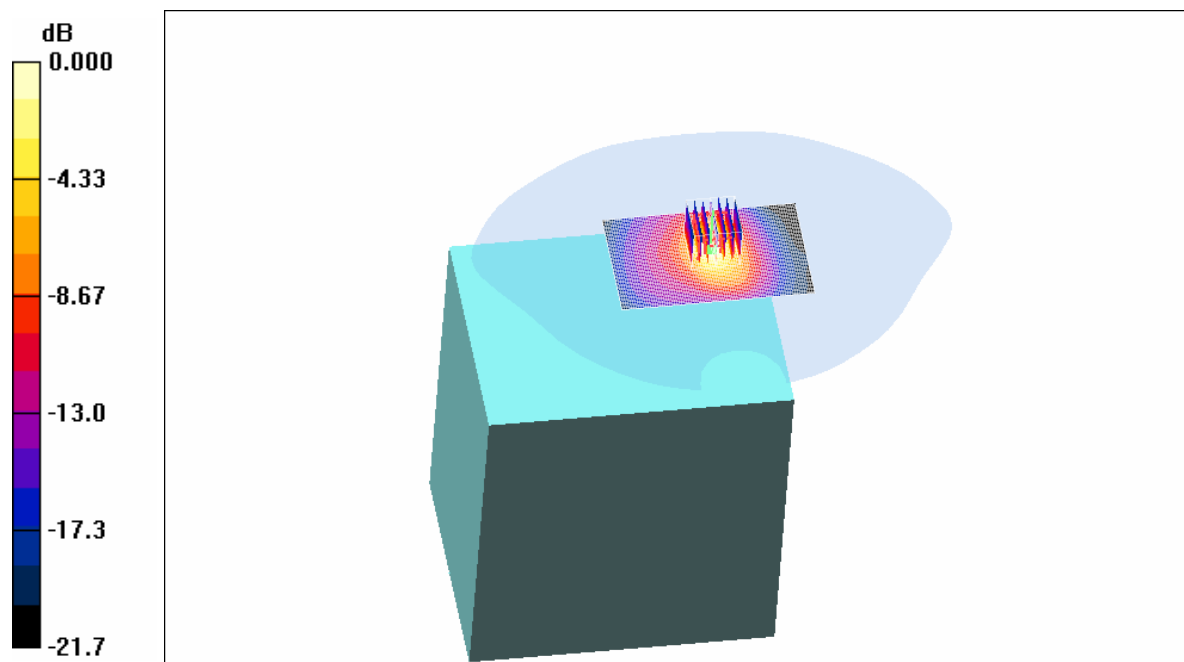
**Hospira, model Plum A+, 2437 MHz (Middle Channel)/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 23.0 V/m; Power Drift = -0.09 dB

Peak SAR (extrapolated) = 3.24 W/kg

**SAR(1 g) = 1.04 mW/g; SAR(10 g) = 0.450 mW/g**

Maximum value of SAR (measured) = 1.08 mW/g



0 dB = 1.08 mW/g

**Plot#14**

**Test Laboratory: Bay Area Compliance Lab Corp. (BACL)****Device top touching to the flat phantom (High Channel)****Hospira Inc.; DUT Type: WL UD 2554 17A0 B10; Serial: 16072930; 802.11g**

Communication System: CW; Frequency: 2462 MHz; Duty Cycle: 1:1

Medium parameters used:  $f = 2450$  MHz;  $\sigma = 1.96$  mho/m;  $\epsilon_r = 53.1$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

## DASY4 Configuration:

- Probe: ET3DV6 - SN1604; ConvF(4.27, 4.27, 4.27); Calibrated: 5/2/2006
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn456; Calibrated: 11/22/2006
- Phantom: SAM with CRP; Type: Twin SAM; Serial: TP-1032
- Measurement SW: DASY4, V4.6 Build 23; Post processing SW: SEMCAD, V1.8 Build 161

**Hospira, Model Plum A+, 2462 MHz (High Channel)/Area Scan (51x81x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 1.18 mW/g

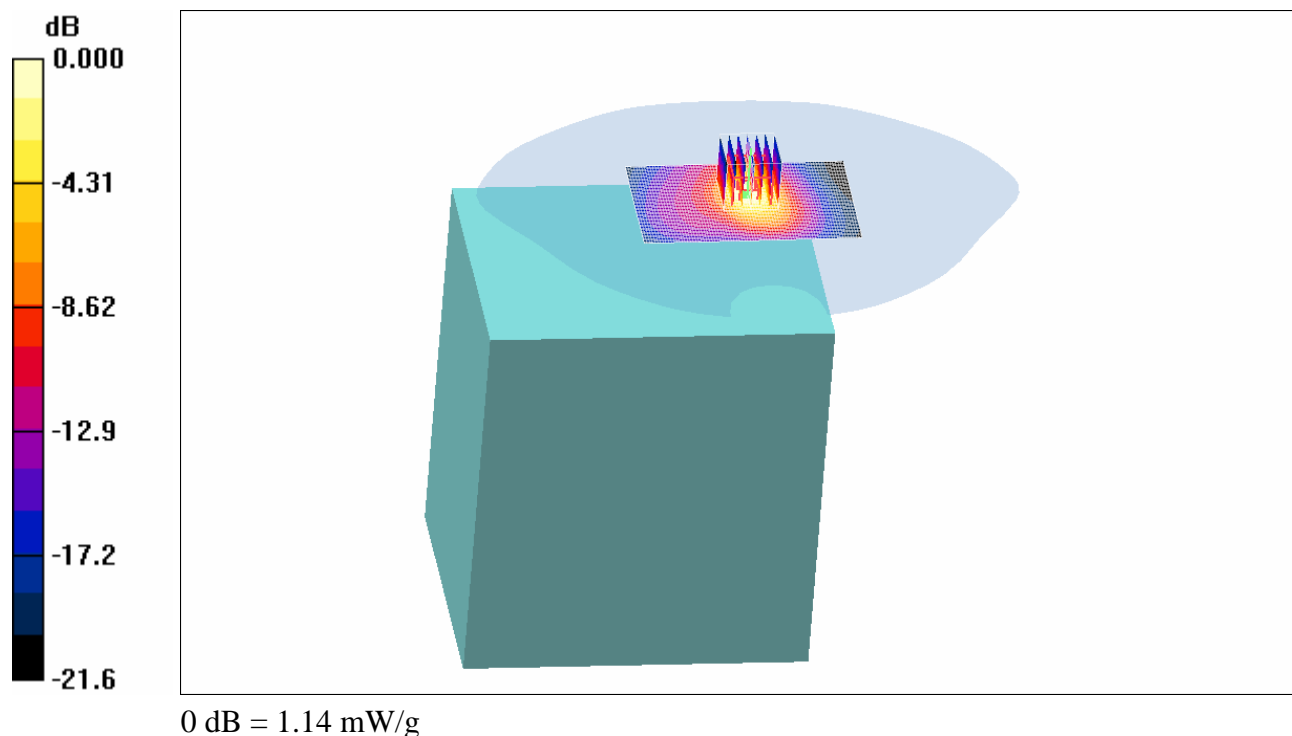
**Hospira, Model Plum A+, 2462 MHz (High Channel)/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 23.0 V/m; Power Drift = 0.07 dB

Peak SAR (extrapolated) = 3.34 W/kg

**SAR(1 g) = 1.09 mW/g; SAR(10 g) = 0.506 mW/g**

Maximum value of SAR (measured) = 1.14 mW/g

**Plot#15**

**Test Laboratory: Bay Area Compliance Lab Corp. (BACL)****Device top touching to the flat phantom (Low Channel)****Hospira Inc.; DUT Type: WL UD 2554 17A0 B10; Serial: 13872846; 802.11g**

Communication System: CW; Frequency: 2412 MHz; Duty Cycle: 1:1

Medium parameters used:  $f = 2450$  MHz;  $\sigma = 1.96$  mho/m;  $\epsilon_r = 53.1$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

**DASY4 Configuration:**

- Probe: ET3DV6 - SN1604; ConvF(4.27, 4.27, 4.27); Calibrated: 5/2/2006
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn456; Calibrated: 11/22/2006
- Phantom: SAM with CRP; Type: Twin SAM; Serial: TP-1032
- Measurement SW: DASY4, V4.6 Build 23; Post processing SW: SEMCAD, V1.8 Build 161

**Hospira, Model Plum A+, 2412 MHz (Low Channel)/Area Scan (51x81x1):** Measurement grid: dx=15mm, dy=15mm

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

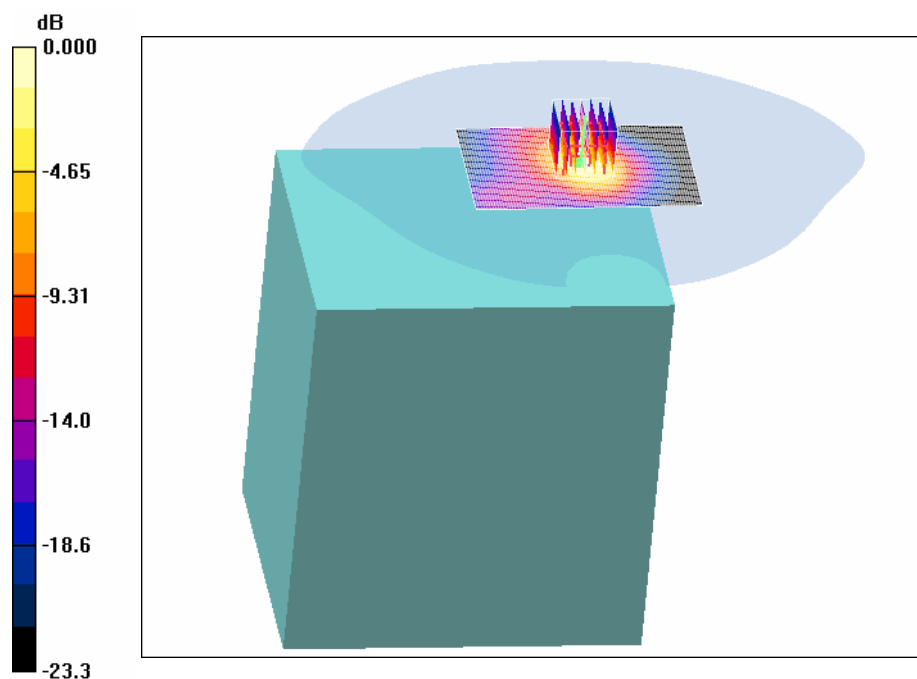
**Hospira, Model Plum A+, 2412 MHz (Low Channel)/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 22.5 V/m; Power Drift = -0.102 dB

Peak SAR (extrapolated) = 2.72 W/kg

**SAR(1 g) = 1.06 mW/g; SAR(10 g) = 0.475 mW/g**

Maximum value of SAR (measured) = 1.17 mW/g



0 dB = 1.17 mW/g

**Plot#16**

**Test Laboratory: Bay Area Compliance Lab Corp. (BACL)****Device back touching to the flat phantom (Middle Channel)****Hospira Inc.; DUT Type: WL UD 2554 17A0 B10; Serial: 13872846; 802.11g**

Communication System: CW; Frequency: 2437 MHz; Duty Cycle: 1:1

Medium parameters used:  $f = 2450$  MHz;  $\sigma = 1.96$  mho/m;  $\epsilon_r = 53.1$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

## DASY4 Configuration:

- Probe: ET3DV6 - SN1604; ConvF(4.27, 4.27, 4.27); Calibrated: 5/2/2006
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn456; Calibrated: 11/22/2006
- Phantom: SAM with CRP; Type: Twin SAM; Serial: TP-1032
- Measurement SW: DASY4, V4.6 Build 23; Post processing SW: SEMCAD, V1.8 Build 161

**Hospira, Model Plum A+, 2437 MHz (Middle Channel)/Area Scan (51x81x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 1.47 mW/g

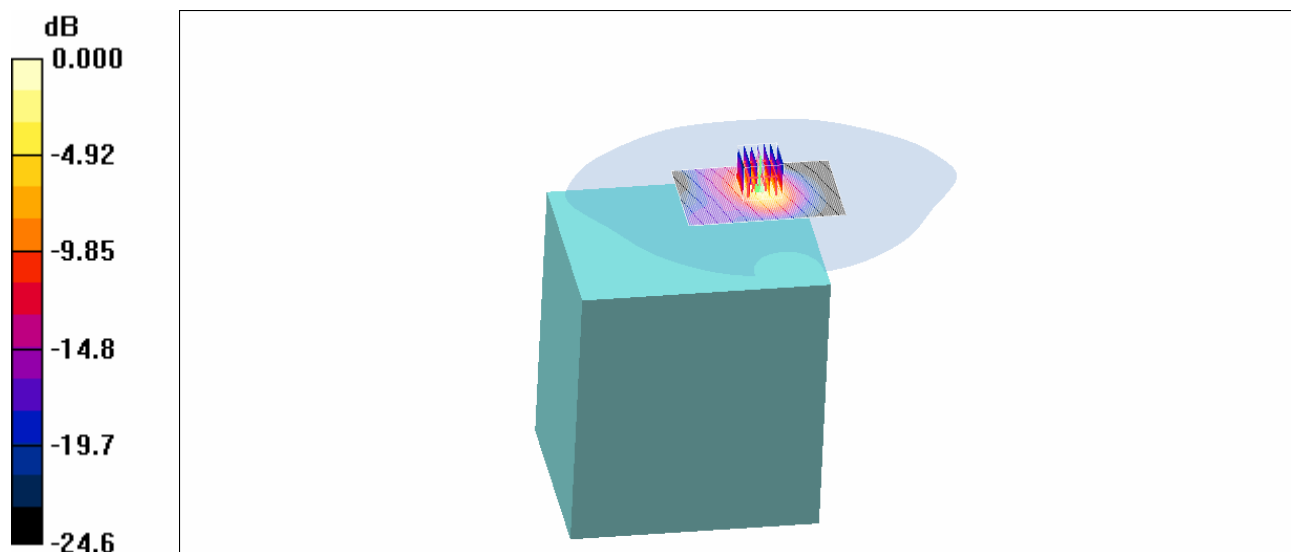
**Hospira, Model Plum A+, 2437 MHz (Middle Channel)/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 20.1 V/m; Power Drift = 0.06 dB

Peak SAR (extrapolated) = 3.38 W/kg

**SAR(1 g) = 1.27 mW/g; SAR(10 g) = 0.614 mW/g**

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



0 dB = 1.44 mW/g

**Plot#17**

**Test Laboratory: Bay Area Compliance Lab Corp. (BACL)****Device top touching to the flat phantom (High Channel)****Hospira Inc.; DUT Type: WL UD 2554 17A0 B10; Serial: 13872846; 802.11g**

Communication System: CW; Frequency: 2462 MHz; Duty Cycle: 1:1

Medium parameters used:  $f = 2450$  MHz;  $\sigma = 1.96$  mho/m;  $\epsilon_r = 53.1$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

## DASY4 Configuration:

- Probe: ET3DV6 - SN1604; ConvF(4.27, 4.27, 4.27); Calibrated: 5/2/2006
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn456; Calibrated: 11/22/2006
- Phantom: SAM with CRP; Type: Twin SAM; Serial: TP-1032
- Measurement SW: DASY4, V4.6 Build 23; Post processing SW: SEMCAD, V1.8 Build 161

**Hospira, Model Plum A+, 2462 MHz (High Channel)/Area Scan (51x81x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 1.45 mW/g

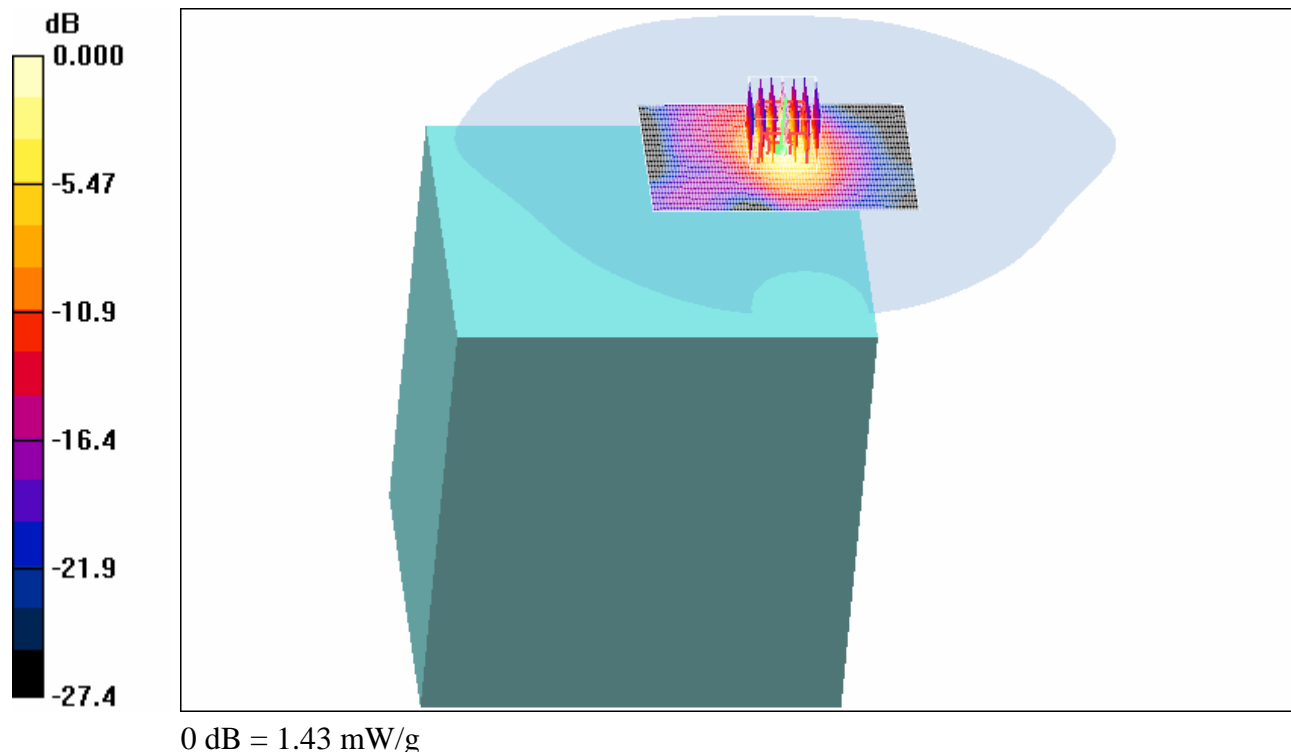
**Hospira, Model Plum A+, 2462 MHz (High Channel)/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 21.6 V/m; Power Drift = -0.064 dB

Peak SAR (extrapolated) = 3.36 W/kg

**SAR(1 g) = 1.24 mW/g; SAR(10 g) = 0.624 mW/g**

Maximum value of SAR (measured) = 1.43 mW/g

**Plot#18**



**Test Laboratory: Bay Area Compliance Lab Corp. (BACL)****Device top touching to the flat phantom (Low Channel)****Hospira Inc.; DUT Type: WL UD 2554 17A0 B10; Serial: 13124499; 802.11g**

Communication System: CW; Frequency: 2412 MHz; Duty Cycle: 1:1

Medium parameters used:  $f = 2450$  MHz;  $\sigma = 1.96$  mho/m;  $\epsilon_r = 53.1$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

## DASY4 Configuration:

- Probe: ET3DV6 - SN1604; ConvF(4.27, 4.27, 4.27); Calibrated: 5/2/2006
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn456; Calibrated: 11/22/2006
- Phantom: SAM with CRP; Type: Twin SAM; Serial: TP-1032
- Measurement SW: DASY4, V4.6 Build 23; Post processing SW: SEMCAD, V1.8 Build 161

**Hospira, Model Plum A+, 2412 MHz (Low Channel)/Area Scan (51x81x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 1.08 mW/g

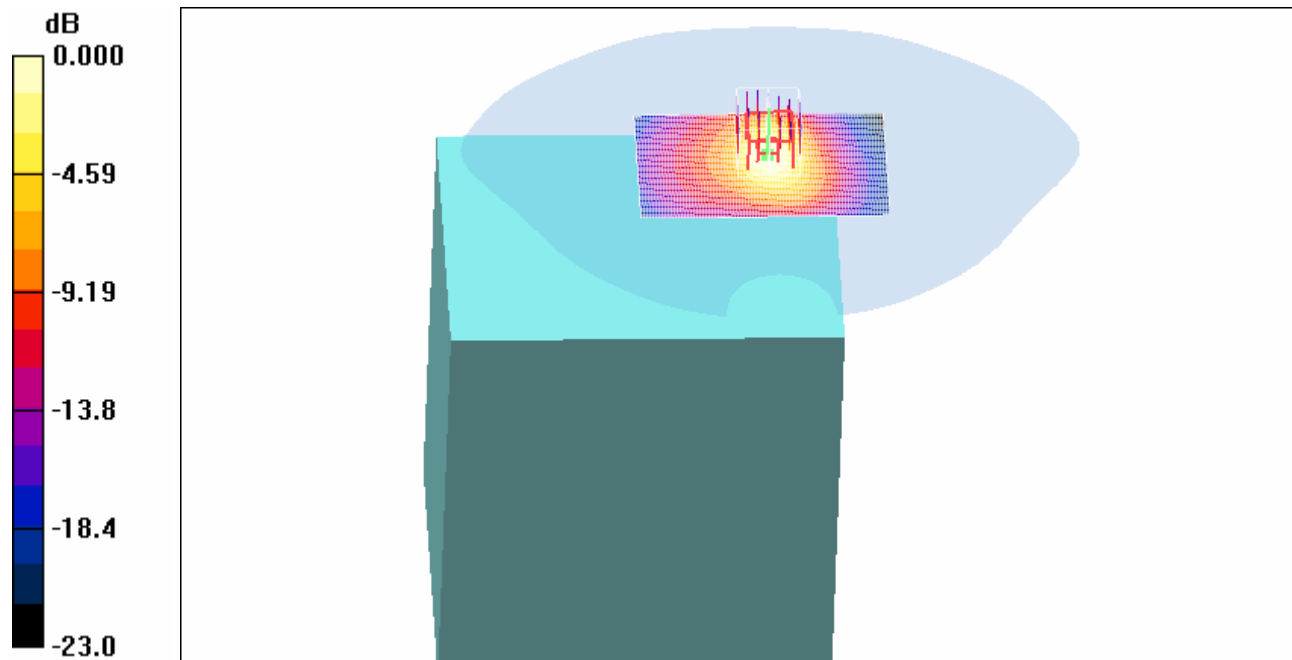
**Hospira, Model Plum A+, 2412 MHz (Low Channel)/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 25.7 V/m; Power Drift = 0.09 dB

Peak SAR (extrapolated) = 3.02 W/kg

**SAR(1 g) = 0.993 mW/g; SAR(10 g) = 0.492 mW/g**

Maximum value of SAR (measured) = 1.03 mW/g



0 dB = 1.03 mW/g

**Plot#19**

**Test Laboratory: Bay Area Compliance Lab Corp. (BACL)****Device top touching to the flat phantom (Middle Channel)****Hospira Inc.; DUT Type: WL UD 2554 17A0 B10; Serial: 13124499; 802.11g**

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

Medium parameters used:  $f = 2450$  MHz;  $\sigma = 1.96$  mho/m;  $\epsilon_r = 53.1$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

## DASY4 Configuration:

- Probe: ET3DV6 - SN1604; ConvF(4.27, 4.27, 4.27); Calibrated: 5/2/2006
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn456; Calibrated: 11/22/2006
- Phantom: SAM with CRP; Type: Twin SAM; Serial: TP-1032
- Measurement SW: DASY4, V4.6 Build 23; Post processing SW: SEMCAD, V1.8 Build 161

**Hospira, Model Plum A+, 2437 MHz (Middle Channel)/Area Scan (51x81x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 1.41 mW/g

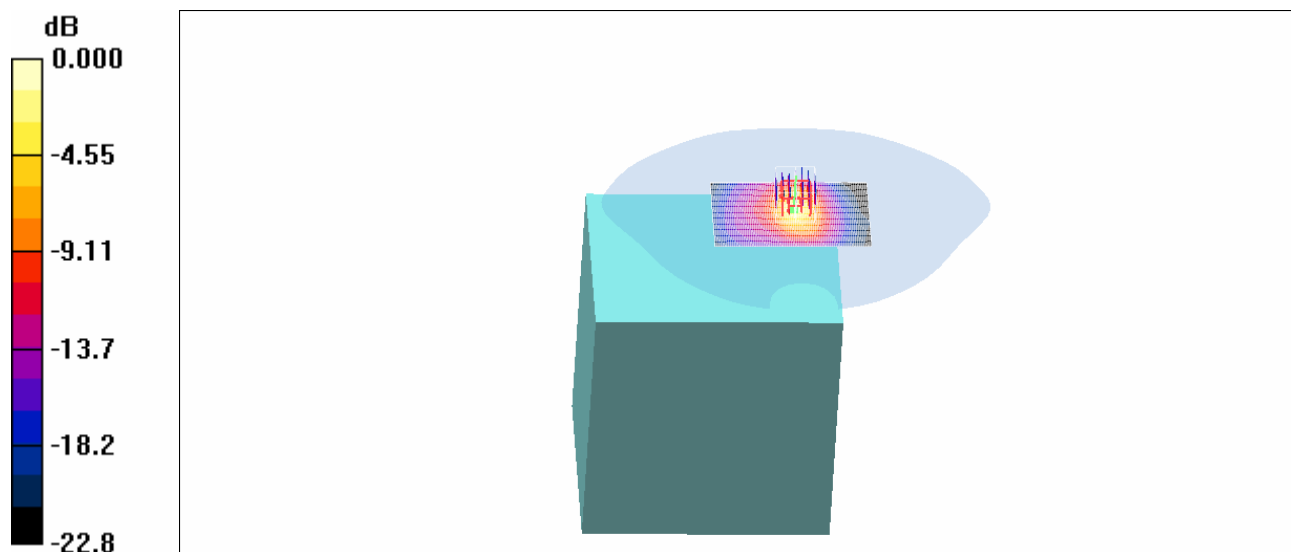
**Hospira, Model Plum A+, 2437 MHz (Middle Channel)/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 23.0 V/m; Power Drift = -0.029 dB

Peak SAR (extrapolated) = 3.31 W/kg

**SAR(1 g) = 1.22 mW/g; SAR(10 g) = 0.550 mW/g**

Maximum value of SAR (measured) = 1.40 mW/g



0 dB = 1.40 mW/g

**Plot#20**

**Test Laboratory: Bay Area Compliance Lab Corp. (BACL)****Device top touching to the flat phantom (High Channel)****Hospira Inc.; DUT Type: WL UD 2554 17A0 B10; Serial: 13124499; 802.11g**

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

Medium parameters used:  $f = 2450$  MHz;  $\sigma = 1.96$  mho/m;  $\epsilon_r = 53.1$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

## DASY4 Configuration:

- Probe: ET3DV6 - SN1604; ConvF(4.27, 4.27, 4.27); Calibrated: 5/2/2006
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn456; Calibrated: 11/22/2006
- Phantom: SAM with CRP; Type: Twin SAM; Serial: TP-1032
- Measurement SW: DASY4, V4.6 Build 23; Post processing SW: SEMCAD, V1.8 Build 161

**Hospira, Model Plum A+, 2462 MHz (High Channel)/Area Scan (51x81x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 1.49 mW/g

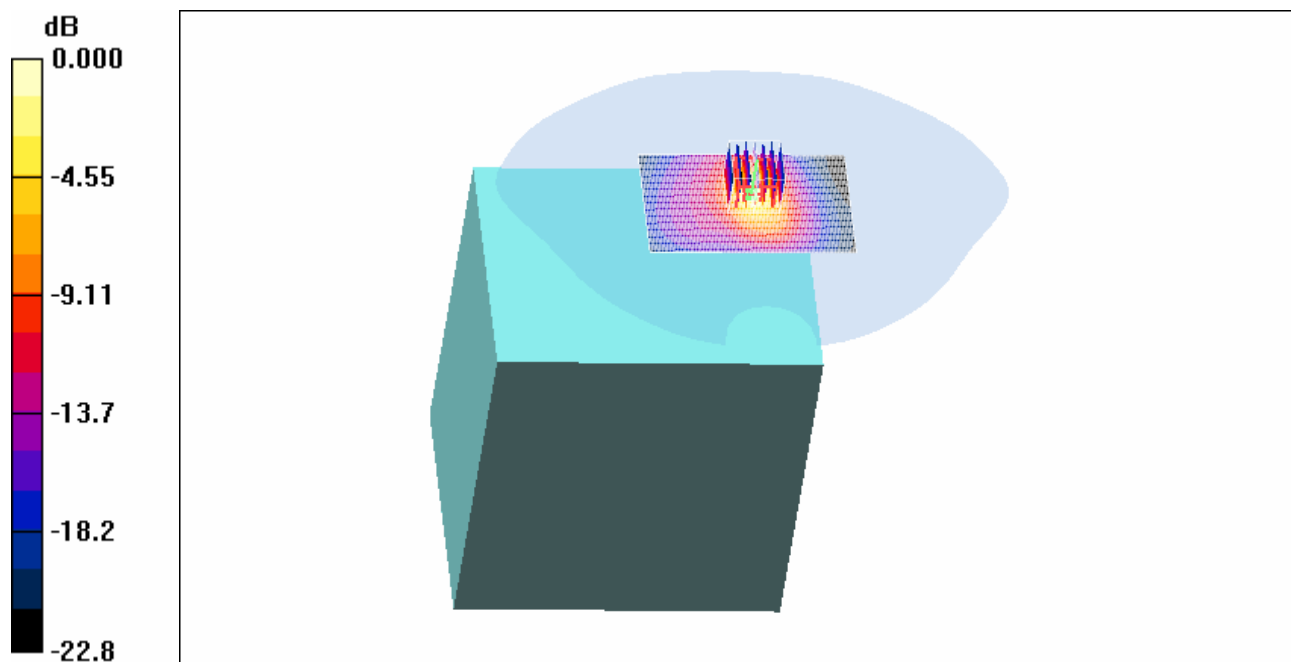
**Hospira, Model Plum A+, 2462 MHz (High Channel)/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 23.0 V/m; Power Drift = 0.03 dB

Peak SAR (extrapolated) = 3.42 W/kg

**SAR(1 g) = 1.32 mW/g; SAR(10 g) = 0.626 mW/g**

Maximum value of SAR (measured) = 1.51 mW/g

**Plot#21**

## APPENDIX F – CONDUCTED OUTPUT POWER MEASUREMENT

### Provision Applicable

The measured peak output power should be greater and within 5% than EMI measurement.

### Test Procedure

The RF output of the transmitter was connected to the input of the spectrum analyzer through sufficient attenuation.

### Test equipment

Agilent, Spectrum Analyzer 8565EC	2007-01-11	3946A00131
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### Test Results

2.4GHz

Frequency Band	Low Channel (2412 MHz) Output Power (dBm)	Middle Channel (2437 MHz) Output Power (dBm)	High Channel 2462 MHz)Output Power (dBm)
802.11b (2412-2462 MHz)	17.23	17.42	17.63

Frequency Band	Low Channel (2412 MHz) Output Power (dBm)	Middle Channel (2437 MHz) Output Power (dBm)	High Channel 2462 MHz)Output Power (dBm)
802.11g (2412-2462 MHz)	17.26	17.32	17.59

## APPENDIX H – DUT TEST POSITION PHOTOS

**Wireless module installed in the Plum A+ device with top touching to the flat phantom**





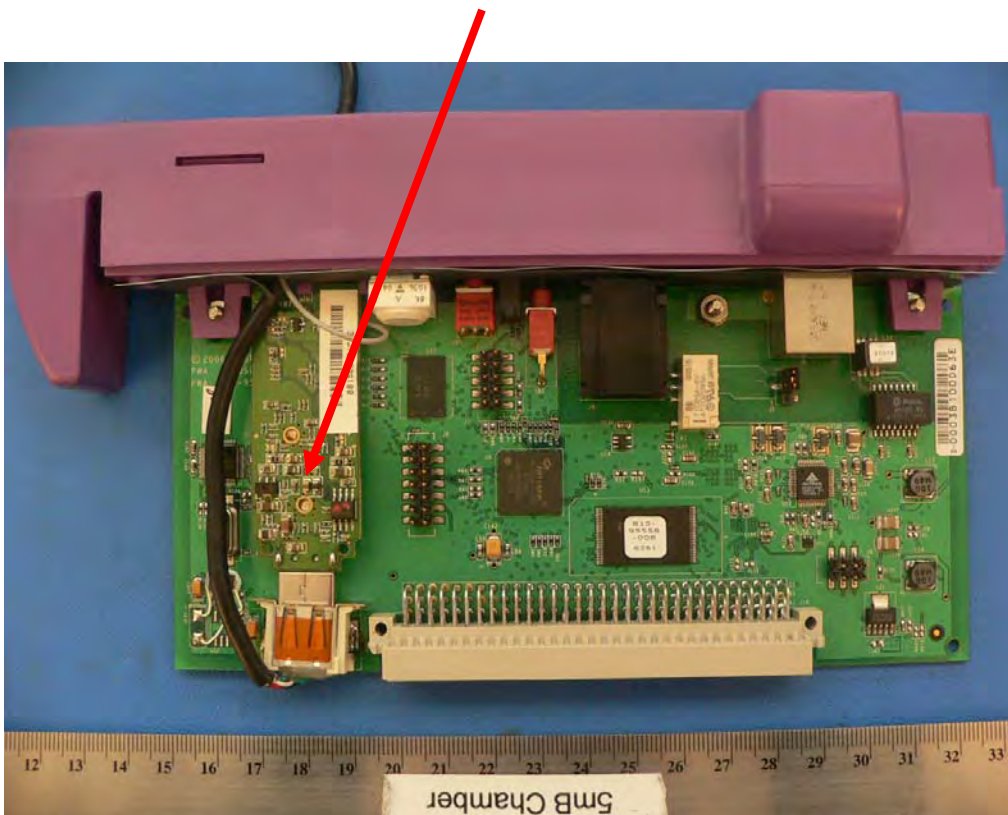
## APPENDIX G – DUT PHOTO

### DUT – Plum A+ Device Front View



### DUT – Plum A+ Device Rear View



**DUT – Plum A+ Device Top View****DUT – Wireless Module installed in Plum A+ Device Top View**

## APPENDIX J - INFORMATIVE REFERENCES

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