



# PCTEST ENGINEERING LABORATORY, INC.

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<http://www.pctestlab.com>



## SAR COMPLIANCE EVALUATION REPORT

**Applicant Name:**

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

**Date of Testing:**

05/12/11 - 05/09/11

**Test Site/Location:**

PCTEST Lab, Columbia, MD, USA

**Test Report Serial No.:**

0Y1105090848-R3.A3L

**FCC ID:**

**A3LSHWM300S**

**APPLICANT:**

**SAMSUNG ELECTRONICS, CO. LTD.**

**EUT Type:**

1900 GSM/GPRS Tablet with Bluetooth and WLAN

**Application Type:**

Certification

**FCC Rule Part(s):**

CFR §2.1093; FCC/OET Bulletin 65 Supplement C [June 2001]

**Model(s):**

SHW-M300S

**Tx Frequency:**

1850.20 - 1909.80 MHz (GSM 1900)  
2412 - 2462 MHz (IEEE 802.11b/g/n)  
5180 - 5240 MHz (IEEE 802.11a/n) / 5260 - 5320 MHz (IEEE 802.11a/n)  
5500 - 5700 MHz (IEEE 802.11a/n) / 5745 - 5825 MHz (IEEE 802.11a/n)

**Conducted Power:**

28.22 dBm GSM 1900  
14.61 dBm 2.4 GHz IEEE 802.11b  
10.51 dBm 5.2 GHz IEEE 802.11a / 10.34 dBm 5.3 GHz IEEE 802.11a  
10.57 dBm 5.5 GHz IEEE 802.11a / 10.59 dBm 5.8 GHz IEEE 802.11a

**Max. SAR****Measurement:**

0.47 W/kg GSM 1900 Body SAR  
0.45 W/kg GPRS 1900 Body SAR  
0.21 W/kg 2.4 GHz IEEE 802.11b Body SAR  
0.67 W/kg 5.2 GHz IEEE 802.11a Body SAR  
0.65 W/kg 5.3 GHz IEEE 802.11a Body SAR  
0.66 W/kg 5.5 GHz IEEE 802.11a Body SAR  
0.63 W/kg 5.8 GHz IEEE 802.11a Body SAR

**Test Device Serial No.:**

Pre-Production [S/N: FCC #2, FCC #3]

**Note:** This revised Test Report (S/N: 0Y1105090848-R3.A3L) supersedes and replaces the previously issued test report on the same subject EUT for the same type of testing as indicated. Please discard or destroy the previously issued test report and dispose of it accordingly.

This wireless portable device has been shown to be capable of compliance for localized specific absorption rate (SAR) for uncontrolled environment/general population exposure limits specified in ANSI/IEEE C95.1-1992 and has been tested in accordance with the measurement procedures specified in FCC/OET Bulletin 65 Supplement C (2001), IEEE 1528-2003 and in applicable Industry Canada Radio Standards Specifications (RSS); for North American frequency bands only.

I attest to the accuracy of data. All measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them. Test results reported herein relate only to the item(s) tested.

PCTEST certifies that no party to this application has been subject to a denial of Federal benefits that includes FCC benefits pursuant to Section 5301 of the Anti-Drug Abuse Act of 1988, 21 U.S.C. 862.

  
Randy Ortanez  
President



|                                         |                                                                                     |                                                                  |                                                                                       |                                        |
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| <b>Filename:</b><br>0Y1105090848-R3.A3L | <b>Test Dates:</b><br>05/09/11 - 05/19/11                                           | <b>EUT Type:</b><br>1900 GSM/GPRS Tablet with Bluetooth and WLAN |                                                                                       | Page 1 of 40                           |

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# 1 INTRODUCTION

The FCC has adopted the guidelines for evaluating the environmental effects of radio frequency (RF) radiation in ET Docket 93-62 on Aug. 6, 1996 to protect the public and workers from the potential hazards of RF emissions due to FCC-regulated portable devices. [1]

The safety limits used for the environmental evaluation measurements are based on the criteria published by the American National Standards Institute (ANSI) for localized specific absorption rate (SAR) in IEEE/ANSI C95.1-1992 Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz [3] and Health Canada RF Exposure Guidelines Safety Code 6 [24]. The measurement procedure described in IEEE/ANSI C95.3-2002 Recommended Practice for the Measurement of Potentially Hazardous Electromagnetic Fields - RF and Microwave [4] is used for guidance in measuring the Specific Absorption Rate (SAR) due to the RF radiation exposure from the Equipment Under Test (EUT). These criteria for SAR evaluation are similar to those recommended by the International Committee for Non-Ionizing Radiation Protection (ICNIRP) in Biological Effects and Exposure Criteria for Radiofrequency Electromagnetic Fields,” Report No. Vol 74. SAR is a measure of the rate of energy absorption due to exposure to an RF transmitting source. SAR values have been related to threshold levels for potential biological hazards.

## 1.1 SAR Definition

Specific Absorption Rate is defined as the time derivative (rate) of the incremental energy (dU) absorbed by (dissipated in) an incremental mass (dm) contained in a volume element (dV) of a given density (ρ). It is also defined as the rate of RF energy absorption per unit mass at a point in an absorbing body (see Fig. 1-1).

$$SAR = \frac{d}{dt} \left( \frac{dU}{dm} \right) = \frac{d}{dt} \left( \frac{dU}{\rho dV} \right)$$

Figure 1-1  
SAR Mathematical Equation

SAR is expressed in units of Watts per Kilogram (W/kg).

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

where:

- σ = conductivity of the tissue-simulating material (S/m)
- ρ = mass density of the tissue-simulating material (kg/m<sup>3</sup>)
- E = Total RMS electric field strength (V/m)

NOTE: The primary factors that control rate of energy absorption were found to be the wavelength of the incident field in relation to the dimensions and geometry of the irradiated organism, the orientation of the organism in relation to the polarity of field vectors, the presence of reflecting surfaces, and whether conductive contact is made by the organism with a ground plane.[6]

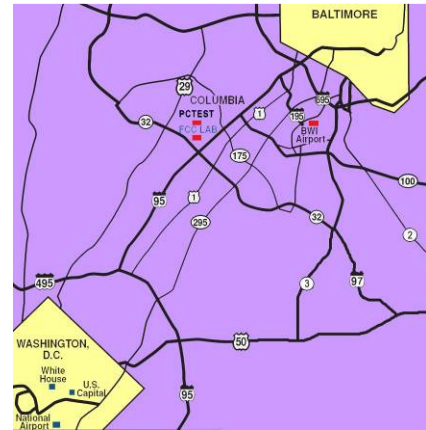
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## 2 TEST SITE LOCATION

### 2.1 INTRODUCTION

The map at the right shows the location of the PCTEST LABORATORY in Columbia, Maryland. It is in proximity to the FCC Laboratory, the Baltimore-Washington International (BWI) airport, the city of Baltimore and Washington, DC.

These measurement tests were conducted at the PCTEST Engineering Laboratory, Inc. facility in New Concept Business Park, Guilford Industrial Park, Columbia, Maryland. The site address is 6660-B Dobbin Road, Columbia, MD 21045. The test site is one of the highest points in the Columbia area with an elevation of 390 feet above mean sea level. The site coordinates are 39° 11'15" N latitude and 76° 49' 38" W longitude. The facility is 1.5 miles north of the FCC laboratory, and the ambient signal and ambient signal strength are approximately equal to those of the FCC laboratory. There are no FM or TV transmitters within 15 miles of the site. The detailed description of the measurement facility was found to be in compliance with the requirements of § 2.948 according to ANSI C63.4 on January 27, 2006 and Industry Canada.



## 3 SAR MEASUREMENT SETUP

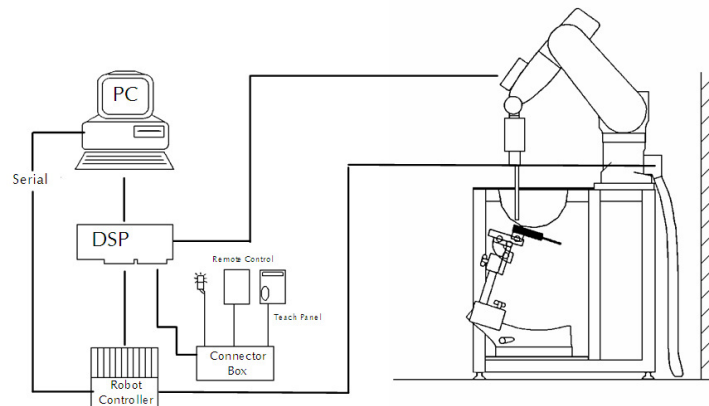
### 3.1 Robotic System

Measurements are performed using the DASY4 automated dosimetric assessment system. The DASY4 is made by Schmid & Partner Engineering AG (SPEAG) in Zurich, Switzerland and consists of a high precision robotics system (Staubli), robot controller, desktop computer, near-field probe, probe alignment sensor, and the SAM phantom containing the head or body equivalent material. The robot is a six-axis industrial robot, performing precise movements to position the probe to the location (points) of maximum electromagnetic field (EMF) (see Figure 3-1).

### 3.2 System Hardware

A cell controller system contains the power supply, robot controller, teach pendant (Joystick), and a remote control used to drive the robot motors. The PC consists of the SAR Measurement Software DASY4, A/D interface card, monitor, mouse, and keyboard. The Staubli Robot is connected to the cell controller to allow software manipulation of the robot. A data acquisition electronic (DAE) circuit that performs the signal amplification, signal multiplexing, A/D conversion, offset measurements, mechanical surface detection, collision detection, etc. is connected to the Electro-optical coupler (EOC). The EOC performs the conversion from the optical into digital electric signal from the DAE and transfers data to the PC card.

### 3.3 System Electronics



**Figure 3-1**  
**SAR Measurement System Setup**

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

|                                         |                                                                                     |                                                                  |                                                                                       |                                        |
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### 3.4 Automated Test System Specifications

Test Software: SPEAG DASY4 version 4.7 Measurement Software  
Robot: Stäubli Unimation Corp. Robot RX60L  
Repeatability: 0.02 mm  
No. of Axes: 6

Data Acquisition Electronic System (DAE)

Data Converter

Features: Signal Amplifier, multiplexer, A/D converter & control logic  
Software: SEMCAD software  
Connecting Lines: Optical Downlink for data and status info  
Optical upload for commands and clock

PC Interface Card

Function: Link to DAE  
16-bit A/D converter for surface detection system  
Two Serial & Ethernet link to robotics  
Direct emergency stop output for robot

Phantom

Type: SAM Twin Phantom (V4.0)  
Shell Material: Composite  
Thickness:  $2.0 \pm 0.2$  mm



**Figure 3-2**  
**SAR Measurement System**

|                                         |                                                                                     |                                                                  |                                                                                       |                                        |
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### 4.1 Probe Measurement System



**Figure 4-1  
SAR System**

The SAR measurements were conducted with the dosimetric probe designed in the classical triangular configuration (see Figure 4-3) and optimized for dosimetric evaluation [9]. 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 DASY4 software reads the reflection during a software approach and looks for the

maximum using a 2nd order curve fitting (see Figure 5-1). The approach is stopped at reaching the maximum.

### 4.2 Probe Specifications

|                          |                                                                                                   |
|--------------------------|---------------------------------------------------------------------------------------------------|
| <b>Model(s):</b>         | ES3DV2, ES3DV3, EX3DV4                                                                            |
| <b>Frequency Range:</b>  | 10 MHz – 6.0 GHz (EX3DV4)<br>10 MHz – 4 GHz (ES3DV3)                                              |
| <b>Calibration:</b>      | In head and body simulating tissue at<br>Frequencies from 300 up to 6000MHz                       |
| <b>Linearity:</b>        | ± 0.2 dB (30 MHz to 6 GHz) for EX3DV4<br>± 0.2 dB (30 MHz to 4 GHz) for ES3DV3                    |
| <b>Dynamic Range:</b>    | 10 mW/kg – 100 W/kg                                                                               |
| <b>Probe Length:</b>     | 330 mm                                                                                            |
| <b>Probe Tip Length:</b> | 20 mm                                                                                             |
| <b>Body Diameter:</b>    | 12 mm                                                                                             |
| <b>Tip Diameter:</b>     | 2.5 mm (3.9mm for ES3DV3)                                                                         |
| <b>Tip-Center:</b>       | 1 mm (2.0 mm for ES3DV3)                                                                          |
| <b>Application:</b>      | SAR Dosimetry Testing<br>Compliance tests of mobile phones<br>Dosimetry in strong gradient fields |



**Figure 4-2  
Near-Field Probe**



**Figure 4-3  
Triangular Probe  
Configuration**

|                                         |                                                                                     |                                                                  |                                                                                       |                                        |
|-----------------------------------------|-------------------------------------------------------------------------------------|------------------------------------------------------------------|---------------------------------------------------------------------------------------|----------------------------------------|
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## 5

## PROBE CALIBRATION PROCESS

### 5.1 Dosimetric Assessment Procedure

Each E-Probe/Probe Amplifier combination has unique calibration parameters. A TEM cell calibration procedure is conducted to determine the proper amplifier settings to enter in the probe parameters. The amplifier settings are determined for a given frequency by subjecting the probe to a known E-field density (1 mW/cm<sup>2</sup>) using an RF Signal generator, TEM cell, and RF Power Meter.

### 5.2 Free Space Assessment

The free space E-field from amplified probe outputs is determined in a test chamber. This calibration can be performed in a TEM cell if the frequency is below 1 GHz and in a waveguide or other methodologies 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 rotated 360 degrees until the three channels show the maximum reading. The power density readings equates to 1 mW/cm<sup>2</sup>.

### 5.3 Temperature Assessment

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

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

where:

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

$C$  = heat capacity of tissue (brain or muscle),

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

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

where:

$\sigma$  = simulated tissue conductivity,

$\rho$  = Tissue density (1.25 g/cm<sup>3</sup> for brain tissue)

SAR is proportional to  $\Delta T/\Delta t$ , the initial rate of tissue heating, before thermal diffusion takes place. The electric field in the simulated tissue can be used to estimate SAR by equating the thermally derived SAR to that with the E- field component.

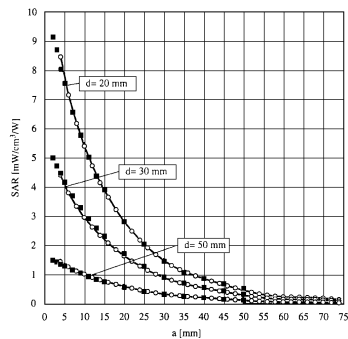


Figure 5-1 E-Field and Temperature measurements at 900MHz [9]

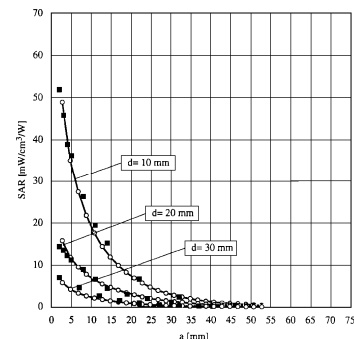


Figure 5-2 E-Field and temperature measurements at 1.9GHz [9]

|                                  |                                                                                                                            |                                                           |                                                                                       |                                 |
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## 6 PHANTOM AND EQUIVALENT TISSUES

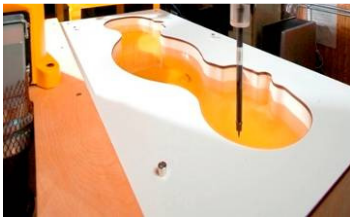
### 6.1 SAM Phantoms



**Figure 6-1  
SAM Phantoms**

The SAM Twin Phantom V4.0 is constructed of a fiberglass shell integrated in a table. The shape of the shell is based on data from an anatomical study designed to represent the 90<sup>th</sup> percentile of the population [12][13]. The phantom enables the dosimetric evaluation of SAR for both left and right handed handset usage, as well as body-worn usage using the flat phantom region. Reference markings on the Phantom allow the complete setup of all predefined phantom positions and measurement grids by manually teaching three points in the robot. The shell phantom has a 2mm shell thickness (except the ear region where shell thickness increases to 6 mm).

### 6.2 Tissue Simulating Mixture Characterization



**Figure 6-2  
SAM Phantom with  
Simulating Tissue**

**Table 6-1**  
Composition of the Tissue Equivalent Matter

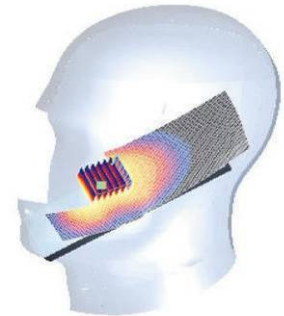
| Frequency (MHz)                | 1900  | 2450 | 5200-5800 |
|--------------------------------|-------|------|-----------|
| Tissue                         | Body  | Body | Body      |
| Ingredients (% by weight)      |       |      |           |
| DGBE                           | 29.44 | 26.7 |           |
| NaCl                           | 0.39  | 0.1  |           |
| Triton X-100                   |       |      | 10.67     |
| Diethylenglycol monohexylether |       |      | 10.67     |
| Water                          | 70.17 | 73.2 | 78.66     |

|                                  |                                                                                     |                                                           |                                                                                       |                                 |
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### 7.1 Measurement Procedure

The evaluation was performed using the following procedure:

1. The SAR distribution at the exposed side of the head was measured at a distance no greater than 5.0 mm from the inner surface of the shell. The area covered the entire dimension of the head and the horizontal grid spacing was 15mm x 15mm.
2. The point SAR measurement was taken at the maximum SAR region determined from Step 1 to enable the monitoring of SAR fluctuations/drifts during testing the 1 gram cube. This fixed point was measured and used as a reference value.
3. Based on the area scan data, the area of the maximum absorption was determined by spline interpolation. Around this point, a volume of 32mm x 32mm x 30mm (fine resolution volume scan, zoom scan) was assessed by measuring 5 x 5 x 7 points. On this basis of this data set, the spatial peak SAR value was evaluated with the following procedure (see references or the DASY manual for more details):
  - a. The data was extrapolated to the surface of the outer-shell of the phantom. The combined distance extrapolated was the combined distance from the center of the dipoles 2.7mm away from the tip of the probe housing plus the 1.2 mm distance between the surface and the lowest measuring point. The extrapolation was based on a least-squares algorithm. A polynomial of the fourth order was calculated through the points in the z-axis (normal to the phantom shell).
  - b. After the maximum interpolated values were calculated between the points in the cube, the SAR was averaged over the spatial volume (1g or 10g) using a 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). The volume was then integrated with the trapezoidal algorithm. One thousand points (10 x 10 x 10) were obtained through interpolation, in order to calculate the averaged SAR.
  - c. All neighboring volumes were evaluated until no neighboring volume with a higher average value was found.
4. The SAR reference value, at the same location as step 2, was re-measured after the zoom scan was complete. If the value deviated by more than 5%, the evaluation was repeated.
5. For 5 GHz testing finer resolution zoom scans were preformed as specified by FCC SAR Measurement Requirements for 3 – 6 GHz, KDB pub 865664. The 5 GHz zoom scan requires a minimum volume of 24mm x 24mm x 20mm and 7 x 7 x 11 points.



**Figure 7-1**  
**Sample SAR Area Scan**

### 7.2 Specific Anthropomorphic Mannequin (SAM) Specifications

The phantom for handset SAR assessment testing is a low-loss dielectric shell, with shape and dimensions derived from the anthropometric data of the 90th percentile adult male head dimensions as tabulated by the US Army. The SAM Twin Phantom shell is bisected along the mid-sagittal plane into right and left halves (see Figure 7-2). The perimeter sidewalls of each phantom halves are extended to allow filling with liquid to a depth that is sufficient to minimize reflections from the upper surface. The liquid depth is maintained at a minimum depth of 15 cm.



**Figure 7-2**  
**SAM Twin Phantom Shell**

|                                         |                                                                                                                                   |                                                                  |                                                                                       |                                        |
|-----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------|---------------------------------------------------------------------------------------|----------------------------------------|
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## 8 FCC RF EXPOSURE LIMITS

### 8.1 Uncontrolled Environment

UNCONTROLLED ENVIRONMENTS are defined as locations where there is the exposure of individuals who have no knowledge or control of their exposure. The general population/uncontrolled exposure limits are applicable to situations in which the general public may be exposed or in which persons who are exposed as a consequence of their employment may not be made fully aware of the potential for exposure or cannot exercise control over their exposure. Members of the general public would come under this category when exposure is not employment-related; for example, in the case of a wireless transmitter that exposes persons in its vicinity.

### 8.2 Controlled Environment

CONTROLLED ENVIRONMENTS are defined as locations where there is exposure that may be incurred by persons who are aware of the potential for exposure, (i.e. as a result of employment or occupation). In general, occupational/controlled exposure limits are applicable to situations in which persons are exposed as a consequence of their employment, who have been made fully aware of the potential for exposure and can exercise control over their exposure. This exposure category is also applicable when the exposure is of a transient nature due to incidental passage through a location where the exposure levels may be higher than the general population/uncontrolled limits, but the exposed person is fully aware of the potential for exposure and can exercise control over his or her exposure by leaving the area or by some other appropriate means.

**Table 8-1**  
**SAR Human Exposure Specified in ANSI/IEEE C95.1-1992 and Health Canada Safety Code 6**

| HUMAN EXPOSURE LIMITS                           |                                                                           |                                                                   |
|-------------------------------------------------|---------------------------------------------------------------------------|-------------------------------------------------------------------|
|                                                 | UNCONTROLLED ENVIRONMENT<br><i>General Population</i><br>(W/kg) or (mW/g) | CONTROLLED ENVIRONMENT<br><i>Occupational</i><br>(W/kg) or (mW/g) |
| SPATIAL PEAK SAR<br>Brain                       | 1.6                                                                       | 8.0                                                               |
| SPATIAL AVERAGE SAR<br>Whole Body               | 0.08                                                                      | 0.4                                                               |
| SPATIAL PEAK SAR<br>Hands, Feet, Ankles, Wrists | 4.0                                                                       | 20                                                                |

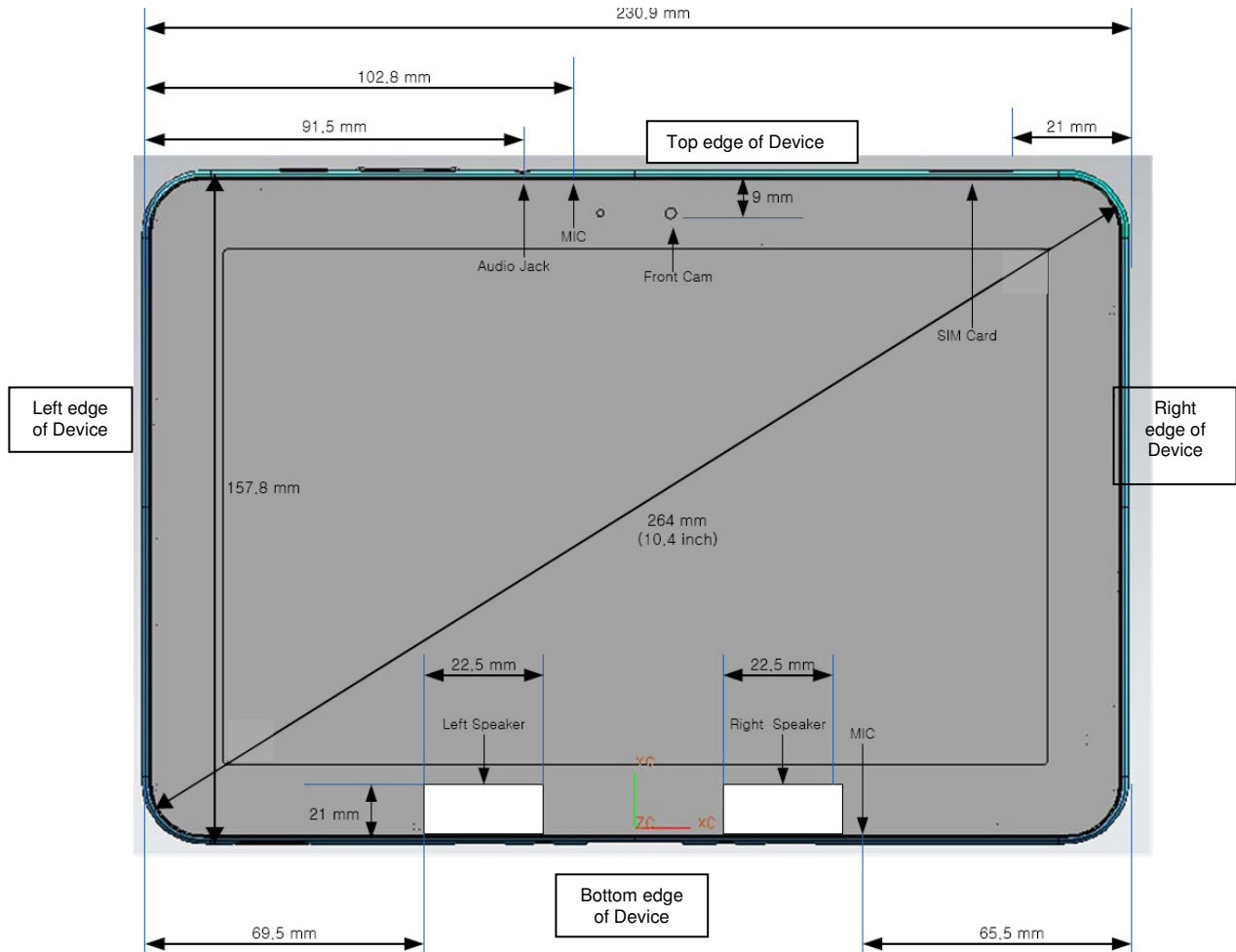
1. The Spatial Peak value of the SAR averaged over any 1 gram of tissue (defined as a tissue volume in the shape of a cube) and over the appropriate averaging time.
2. The Spatial Average value of the SAR averaged over the whole body.
3. The Spatial Peak value of the SAR averaged over any 10 grams of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

|                                         |                                                                                                                                   |                                                                  |                                                                                       |                                        |
|-----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------|---------------------------------------------------------------------------------------|----------------------------------------|
| FCC ID: A3LSHWM300S                     |  <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | <b>SAR COMPLIANCE REPORT</b>                                     |  | <b>Reviewed by:</b><br>Quality Manager |
| <b>Filename:</b><br>0Y1105090848-R3.A3L | <b>Test Dates:</b><br>05/09/11 - 05/19/11                                                                                         | <b>EUT Type:</b><br>1900 GSM/GPRS Tablet with Bluetooth and WLAN |                                                                                       | Page 11 of 40                          |

# 9

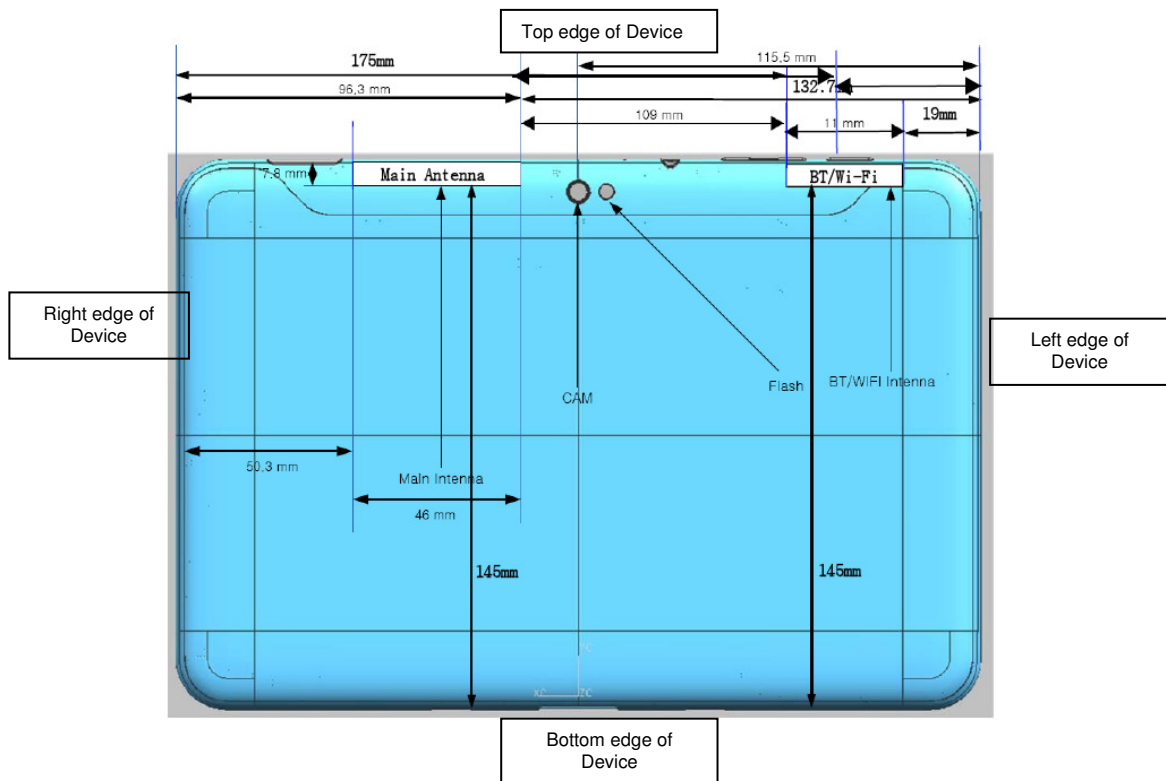
## ANTENNA LOCATIONS AND KEY FEATURES

### 9.1 Antenna and Key Feature Information

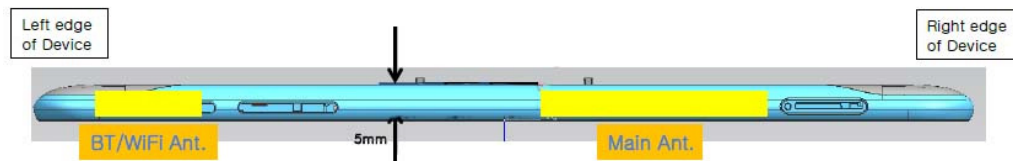


**Figure 9-1**  
**Front View of Device**

|                                  |                                                                                     |                                                           |                                                                                       |                                 |
|----------------------------------|-------------------------------------------------------------------------------------|-----------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------|
| FCC ID: A3LSHWM300S              |  | SAR COMPLIANCE REPORT                                     |  | Reviewed by:<br>Quality Manager |
| Filename:<br>0Y1105090848-R3.A3L | Test Dates:<br>05/09/11 - 05/19/11                                                  | EUT Type:<br>1900 GSM/GPRS Tablet with Bluetooth and WLAN |                                                                                       | Page 12 of 40                   |



**Figure 9-2**  
**Back View of Device**



**Figure 9-3**  
**Top View of Device**

The operational description contains information about designs including sensor size and location. Note: Rear camera is not for video calls but for standard digital functions.

## 9.2 Proximity Sensor Information

The sensor pad is located near the upper half of the device to cover exposure conditions to the main antenna. The technical description contains information about sensor size and location. Power reduction levels are provided in Section 10.3.

## 9.3 Display Orientations Capabilities

This device is capable of multiple display orientations supporting both portrait and landscape positions. Therefore per KDB 447498 4) b) ii) (2), SAR testing applies for the tablet edges with antennas located within 5 cm of each tablet edge closest to the user (with KDB 616217 applied to edges with antennas located  $\geq 5$  cm from the user). According to KDB 447498 4) b) ii) (2), for each antenna, SAR is only required for the edge with the most conservative exposure condition.

|                                         |                                               |                                                                  |                |                                        |
|-----------------------------------------|-----------------------------------------------|------------------------------------------------------------------|----------------|----------------------------------------|
| <b>FCC ID:</b> A3LSHWM300S              | <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | <b>SAR COMPLIANCE REPORT</b>                                     | <b>SAMSUNG</b> | <b>Reviewed by:</b><br>Quality Manager |
| <b>Filename:</b><br>0Y1105090848-R3.A3L | <b>Test Dates:</b><br>05/09/11 - 05/19/11     | <b>EUT Type:</b><br>1900 GSM/GPRS Tablet with Bluetooth and WLAN |                | Page 13 of 40                          |

## 10 SAR TESTING CONSIDERATIONS & FCC KDB INQUIRIES

### 10.1 Tablet testing for SAR

Lap-touching devices that have transmitting antennas located less than 20 cm from the body of the user require routine SAR evaluation. Such devices are considered portable, and are capable of being held to the body. Devices are to be setup according to KDB publication 447498 requirements and are configured with maximum output power during SAR assessment for a worst-case SAR evaluation.

### 10.2 SAR Testing for Tablet per KDB Publication 447498 Section 4

Per KDB 447498 4) b) i) the bottom face (back of the device) is required to be tested touching the flat phantom.

Per KDB Publication 447498 4) b) ii) (2), SAR testing applies for the tablet edges with antennas located within 5 cm of each tablet edge closest to the user (with KDB Publication 616217 applied to edges with antennas located  $\geq 5$  cm from the user). According to KDB Publication 447498 4) b) ii) (2), for each antenna, SAR is only required for the edge with the most conservative exposure condition.

**Table 10-1 SAR Requirement Table per KDB pub 616217 D01**

| Antenna Output Power (mW)                 | $\leq 60/f_{\text{(GHz)}}$                                                                                                                                   | $> 60/f_{\text{(GHz)}}$                                                                                                                                                   |
|-------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Individual Transmitter or Antenna</b>  | SAR not required                                                                                                                                             | Antenna-to-user distance –<br>$\geq (5 + \frac{1}{2}n)$ cm: test SAR on highest output channel only<br>$< (5 + \frac{1}{2}n)$ cm: test SAR according to normal procedures |
| <b>Simultaneous Transmitting Antennas</b> | SAR not required: antenna-to-antenna or antenna-to-person distance $\geq 5$ cm                                                                               | SAR not required: antenna-to-antenna $\geq (5 + \frac{1}{2}n_x + \frac{1}{2}n_y)$ and antenna-to-person $\geq (5 + \frac{1}{2}n_x)$ cm                                    |
|                                           | SAR not required: when $\sum (SAR_{ig}) < \text{SAR limit}$ , antenna-to-antenna distances $> 5$ cm and antenna-to-user distance $> 5$ cm if output $> 60/f$ |                                                                                                                                                                           |
|                                           | otherwise, test antenna(s) using highest SAR configuration for the individual transmitter/antenna                                                            |                                                                                                                                                                           |

**Table 10-2  
Distance Thresholds calculations KDB Publication 616217**

| Mode         | Freq (GHz) | Power dBm | Power (mW) | 60/f  | $n=\{P/(60/f)\}-1$ | distance threshold $(5+1/2n)$ (cm) |
|--------------|------------|-----------|------------|-------|--------------------|------------------------------------|
| GSM/GPRS1900 | 1.88       | 19.99     | 99.8       | 31.91 | 2.13               | 6                                  |
| WIFI b       | 2.437      | 11.02     | 12.6       | 24.62 | -0.49              | 5                                  |
| WIFI g       | 2.437      | 14.72     | 29.6       | 24.62 | 0.20               | 5                                  |
| WIFI n       | 2.437      | 11.19     | 13.2       | 24.62 | -0.47              | 5                                  |
| WIFI a       | 5.2        | 10.51     | 11.2       | 11.54 | -0.03              | 5                                  |
|              | 5.3        | 10.34     | 10.8       | 11.32 | -0.04              | 5                                  |
|              | 5.5        | 10.57     | 11.4       | 10.91 | 0.05               | 5                                  |
|              | 5.8        | 10.59     | 11.5       | 10.34 | 0.11               | 5                                  |

Note: GSM powers represent highest frame-averaged power

|                                  |                                                                                                                            |                                                           |                                                                                       |                                 |
|----------------------------------|----------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------|
| FCC ID: A3LSHWM300S              |  PCTEST<br>ENGINEERING LABORATORY, INC. | SAR COMPLIANCE REPORT                                     |  | Reviewed by:<br>Quality Manager |
| Filename:<br>OY1105090848-R3.A3L | Test Dates:<br>05/09/11 - 05/19/11                                                                                         | EUT Type:<br>1900 GSM/GPRS Tablet with Bluetooth and WLAN |                                                                                       | Page 14 of 40                   |

According to KDB publication 616217 and the antenna distances from the user to the edges of the device, WWAN antenna is required to be tested for SAR for the back side, top edge and right edge for GPRS1900. The WLAN antenna is required to be tested for SAR for the back, top and left edges of the device.

Per KDB publication 447498 4) b) since the output power of the antenna is  $\leq 60/f$  (GHz), Bluetooth SAR is not required for both back side and edge exposure conditions.

### 10.3 Additional SAR Testing for the Back and Top of the Device

Based on the type and implementation of the sensor, April 2011 FCC-TCB conference notes requires sensor information regarding: (1) additional SAR evaluation at a conservative distance from the device where power back-off is de-activated, and (2) reliability sensor activation data. Reliability sensor activation data is provided for both the back and top edge of the tablet at 0° to cover direct usage and also at 45° to cover angled usage (See Table 10-4 and Table 10-5).

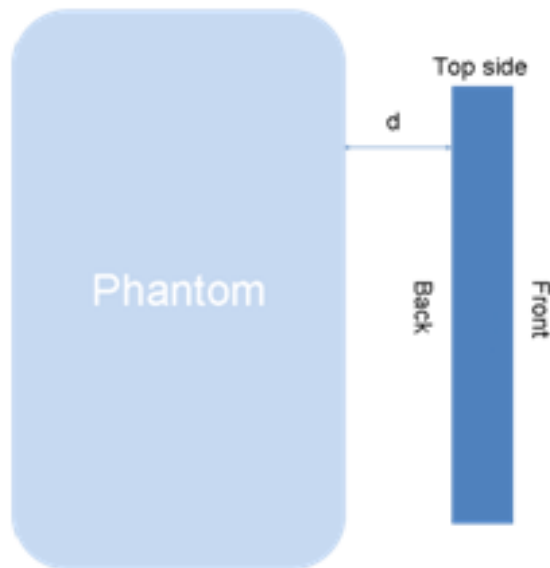
Details about sensing mechanism and sensor pad location are included in the technical description.

**Table 10-3**  
**Distance from Back of Tablet**

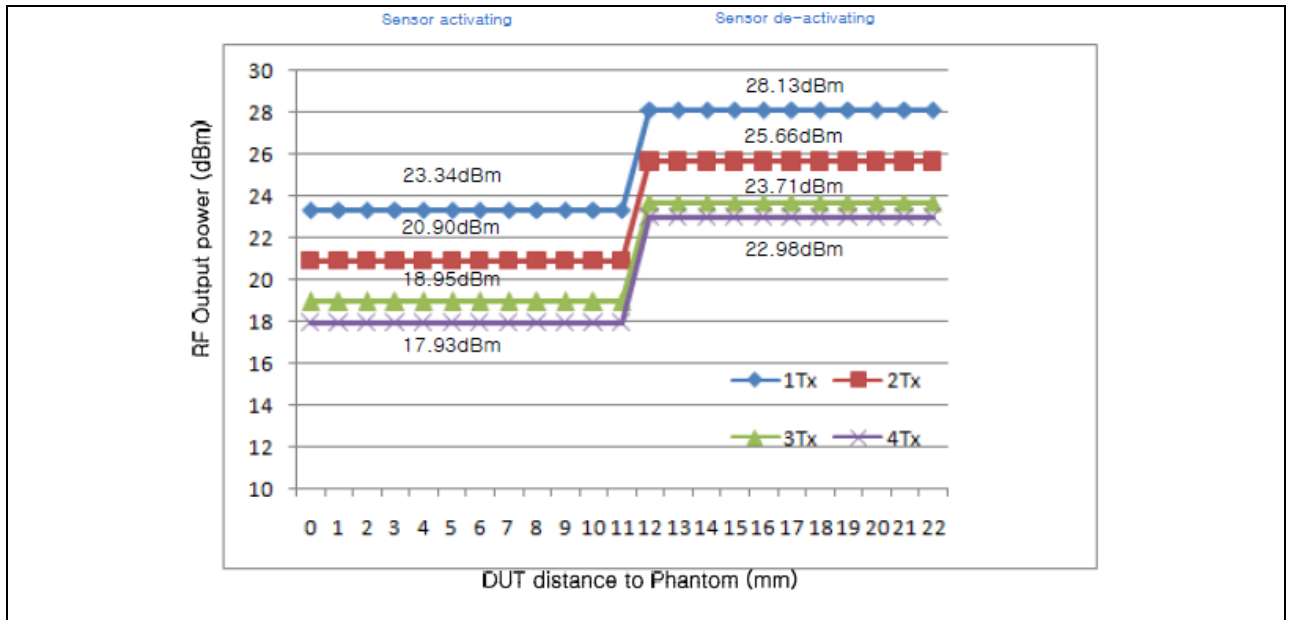
| distance in mm                                | 9  | 10 | 11 | 12  | 13  | 14  |
|-----------------------------------------------|----|----|----|-----|-----|-----|
| Condition of Sensor in the back of the device | on | on | on | off | off | off |

Please see Figure 10-1 for power vs. back-off distance plots for each GPRS multislots mode.

#### Backoff Sensor Power Reduction (back side)



|                                         |                                                                                     |                                                                  |                                                                                       |                                        |
|-----------------------------------------|-------------------------------------------------------------------------------------|------------------------------------------------------------------|---------------------------------------------------------------------------------------|----------------------------------------|
| <b>FCC ID:</b> A3LSHWM300S              |  | <b>SAR COMPLIANCE REPORT</b>                                     |  | <b>Reviewed by:</b><br>Quality Manager |
| <b>Filename:</b><br>0Y1105090848-R3.A3L | <b>Test Dates:</b><br>05/09/11 - 05/19/11                                           | <b>EUT Type:</b><br>1900 GSM/GPRS Tablet with Bluetooth and WLAN |                                                                                       | Page 15 of 40                          |



**Figure 10-1**  
**PCS GPRS Back off Power Reduction Graph – Back Side**

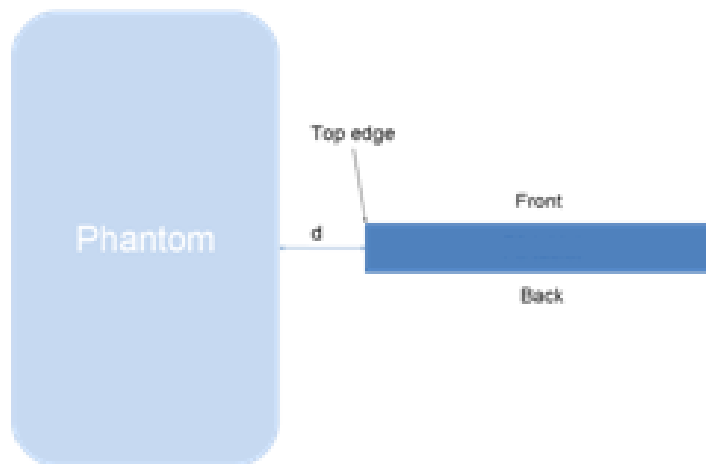
Data in Figure 10-1 demonstrates a power reduction of 5 dB for each multi-transmit slot mode at a back-off distance of 11 mm, as shown in Table 10-3

**Table 10-4**  
**Distance from Top edge of Tablet - 0° Angle**

|                                               |    |    |     |     |     |     |
|-----------------------------------------------|----|----|-----|-----|-----|-----|
| distance in mm                                | 5  | 6  | 7   | 8   | 9   | 10  |
| Condition of Sensor in the back of the device | on | on | off | off | off | off |

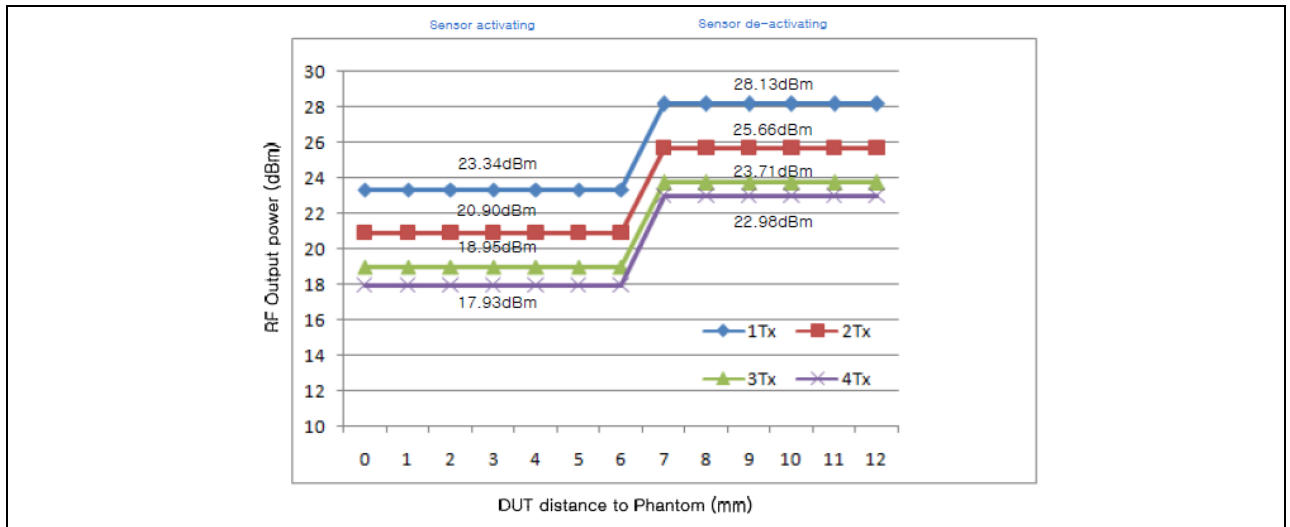
Please see Figure 10-2 for power vs. back-off distance plots for each GPRS multislot mode.

**Backoff Sensor Power Reduction (top side, 0° tilted)**



Note: Angle mentioned for top edge description is the perpendicular angle.  
Above figure represents "0 degrees"

|                                         |                                                                                     |                                                                  |                                                                                       |                                        |
|-----------------------------------------|-------------------------------------------------------------------------------------|------------------------------------------------------------------|---------------------------------------------------------------------------------------|----------------------------------------|
| <b>FCC ID:</b> A3LSHWM300S              |  | <b>SAR COMPLIANCE REPORT</b>                                     |  | <b>Reviewed by:</b><br>Quality Manager |
| <b>Filename:</b><br>0Y1105090848-R3.A3L | <b>Test Dates:</b><br>05/09/11 - 05/19/11                                           | <b>EUT Type:</b><br>1900 GSM/GPRS Tablet with Bluetooth and WLAN |                                                                                       | Page 16 of 40                          |



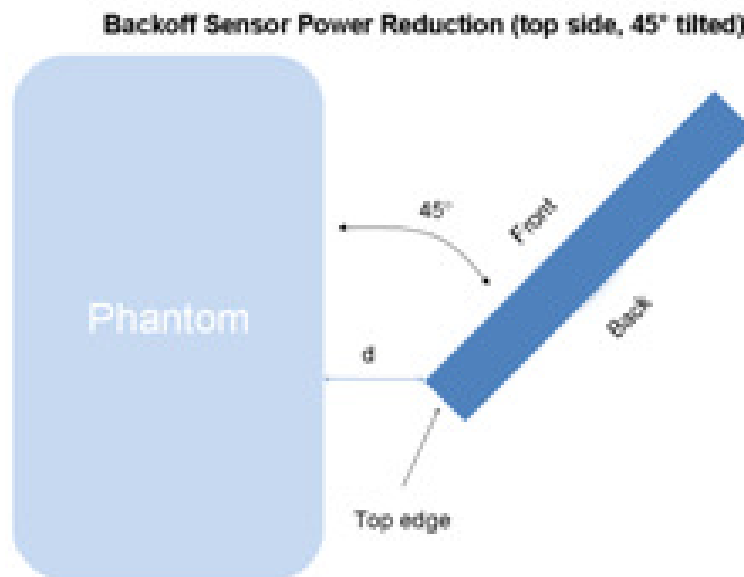
**Figure 10-2**  
**PCS GPRS Back off Power Reduction Graph – Top edge at 0° Angle**

Data in Figure 10-2 demonstrates a power reduction of 5 dB for each multi-transmit slot mode at a back-off distance of 6 mm, as shown in Table 10-4

**Table 10-5**  
**Distance from Top of Tablet - 45° Angle**

| distance in mm                                | 5  | 6  | 7   | 8   | 9   | 10  |
|-----------------------------------------------|----|----|-----|-----|-----|-----|
| Condition of Sensor in the back of the device | on | on | off | off | off | off |

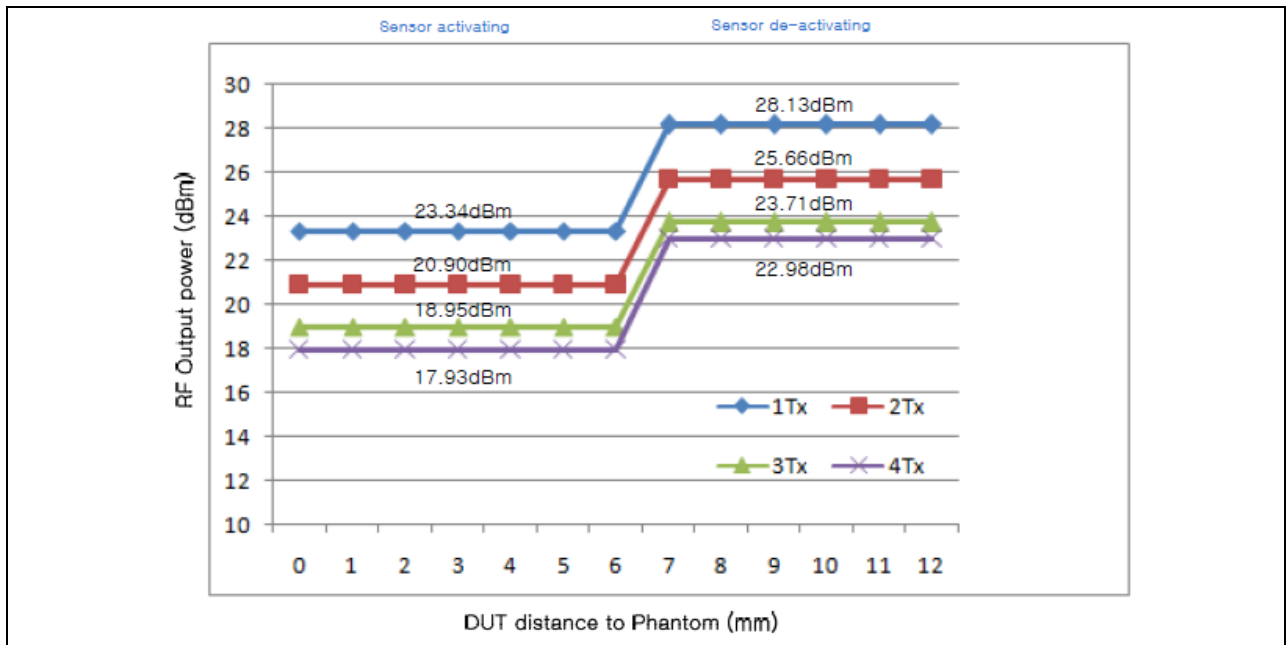
Please see Figure 10-3 for power vs. back-off distance plots for each GPRS multislot mode.



Note: Angle mentioned for top edge description is the perpendicular angle.  
Above figure represents "45 degrees" between the screen face and phantom face.

|                                         |                                               |                                                                  |                |                                        |
|-----------------------------------------|-----------------------------------------------|------------------------------------------------------------------|----------------|----------------------------------------|
| <b>FCC ID:</b> A3LSHWM300S              | <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | <b>SAR COMPLIANCE REPORT</b>                                     | <b>SAMSUNG</b> | <b>Reviewed by:</b><br>Quality Manager |
| <b>Filename:</b><br>0Y1105090848-R3.A3L | <b>Test Dates:</b><br>05/09/11 - 05/19/11     | <b>EUT Type:</b><br>1900 GSM/GPRS Tablet with Bluetooth and WLAN |                | Page 17 of 40                          |

Please note that the 45 degree angle tilt has been used to identify proximity sensor coverage for the top edge, since this angle is consistent with device use conditions and sensor implementation. All relevant directions of coverage, as described in the April 2011 TCB workshop slides, have been considered in order to determine the worst case activation and deactivation test distances.



**Figure 10-3**  
**PCS GPRS Back off Power Reduction Graph – Back at 45° Angle**

Data in Figure 10-3 demonstrates a power reduction of 5 dB for each multi-transmit slot mode at a back-off distance of 6 mm, as shown in Table 10-5

## 10.4 Method of SAR Measurement with Power Reduction

Based on the power-reduction activation vs. distance results for the sensors, the device was tested at 0mm distance from the phantom with the sensor activated and additionally at a conservative 10 mm distance with the sensor de-activated (max power, no power reduction) from the back side; and 5 mm from the top edge.

To test SAR with power back-off sensor active while touching (using FCC #3), the device was placed in maximum power transmit mode with a base station simulator. The device was then positioned to touching position under the tissue equivalent liquid-filled flat phantom, to activate the proximity sensors.

For the additional SAR measurements with the sensors de-activated when the device is positioned away from the user (using FCC #2), SAR is needed to be evaluated without power back-off at 10 mm (from the back) and 5mm (from the top edge). Since the device sensor detection mechanism is active at these distances, the sensor had to be disabled via manufacturer test software for SAR test purposes. The device was then placed in maximum power transmit mode with a base station simulator under the tissue equivalent liquid-filled flat phantom at a distance of 10 mm for the back and 5 mm for the top edge with the sensor deactivated (via manufacturer test software) and then tested at maximum power.

|                                         |                                                                                     |                                                                  |                                                                                       |                                        |
|-----------------------------------------|-------------------------------------------------------------------------------------|------------------------------------------------------------------|---------------------------------------------------------------------------------------|----------------------------------------|
| <b>FCC ID:</b> A3LSHWM300S              |  | <b>SAR COMPLIANCE REPORT</b>                                     |  | <b>Reviewed by:</b><br>Quality Manager |
| <b>Filename:</b><br>0Y1105090848-R3.A3L | <b>Test Dates:</b><br>05/09/11 - 05/19/11                                           | <b>EUT Type:</b><br>1900 GSM/GPRS Tablet with Bluetooth and WLAN |                                                                                       | Page 18 of 40                          |

## 11 FCC 3G MEASUREMENT PROCEDURES

Power measurements were performed using a base station simulator under digital average power.

### 11.1 Procedures Used to Establish RF Signal for SAR

The device was placed into a simulated call using a base station simulator in a shielded chamber. Such test signals offer a consistent means for testing SAR and are recommended for evaluating SAR [4]. SAR measurements were taken with a fully charged battery. In order to verify that the device was tested and maintained at full power, it was configured with the base station simulator. The SAR measurement software calculates a reference point at the start and end of the test to check for power drifts. If SAR deviations of more than 5% occurred, the tests were repeated.

### 11.2 RF Conducted Powers

#### 11.2.1 GSM/GPRS Conducted Powers

Table 11-1  
Maximum GSM/GPRS Powers (Proximity Sensor inactive)

| Maximum Burst-Averaged Output Power            |         |                             |                         |                         |                         |                         |
|------------------------------------------------|---------|-----------------------------|-------------------------|-------------------------|-------------------------|-------------------------|
|                                                |         | Voice                       | GPRS Data (GMSK)        |                         |                         |                         |
| Band                                           | Channel | GSM [dBm]<br>CS<br>(1 Slot) | GPRS [dBm]<br>1 Tx Slot | GPRS [dBm]<br>2 Tx Slot | GPRS [dBm]<br>3 Tx Slot | GPRS [dBm]<br>4 Tx Slot |
| PCS                                            | 512     | <b>28.22</b>                | 28.19                   | 25.71                   | 23.73                   | <b>23.00</b>            |
|                                                | 661     | <b>28.15</b>                | 28.13                   | 25.66                   | 23.71                   | <b>22.98</b>            |
|                                                | 810     | <b>28.16</b>                | 28.11                   | 25.62                   | 23.71                   | <b>22.96</b>            |
| Calculated Maximum Frame-Averaged Output Power |         |                             |                         |                         |                         |                         |
|                                                |         | Voice                       | GPRS Data (GMSK)        |                         |                         |                         |
| Band                                           | Channel | GSM [dBm]<br>CS<br>(1 Slot) | GPRS [dBm]<br>1 Tx Slot | GPRS [dBm]<br>2 Tx Slot | GPRS [dBm]<br>3 Tx Slot | GPRS [dBm]<br>4 Tx Slot |
| PCS                                            | 512     | <b>19.19</b>                | 19.16                   | 19.69                   | 19.47                   | <b>19.99</b>            |
|                                                | 661     | <b>19.12</b>                | 19.10                   | 19.64                   | 19.45                   | <b>19.97</b>            |
|                                                | 810     | <b>19.13</b>                | 19.08                   | 19.60                   | 19.45                   | <b>19.95</b>            |

Note: Frame-averaged power was calculated from the measured burst-averaged power by converting the slot powers into linear units and calculating the energy over 8 timeslots. The bolded GSM/GPRS modes were required for SAR testing according to the highest frame-averaged output power per KDB Publication 941225 D03. SAR was additionally tested for GPRS 2 Tx and 3 Tx due to the proximity on the calculated frame average power, although not required per 941225.

EDGE is not available in 1900 MHz Band.

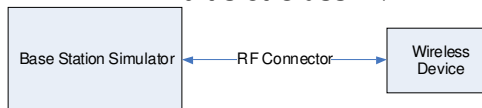
|                                         |                                                                                                                                   |                                                                  |                                                                                       |                                        |
|-----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------|---------------------------------------------------------------------------------------|----------------------------------------|
| FCC ID: A3LSHWM300S                     |  <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | <b>SAR COMPLIANCE REPORT</b>                                     |  | <b>Reviewed by:</b><br>Quality Manager |
| <b>Filename:</b><br>0Y1105090848-R3.A3L | <b>Test Dates:</b><br>05/09/11 - 05/19/11                                                                                         | <b>EUT Type:</b><br>1900 GSM/GPRS Tablet with Bluetooth and WLAN |                                                                                       | Page 19 of 40                          |

**Table 11-2**  
**Reduced GSM/GPRS Powers (Proximity Sensor active)**

| Maximum Burst-Averaged Output Power            |         |                             |                         |                         |                         |                         |
|------------------------------------------------|---------|-----------------------------|-------------------------|-------------------------|-------------------------|-------------------------|
|                                                |         | Voice                       | GPRS Data (GMSK)        |                         |                         |                         |
| Band                                           | Channel | GSM [dBm]<br>CS<br>(1 Slot) | GPRS [dBm]<br>1 Tx Slot | GPRS [dBm]<br>2 Tx Slot | GPRS [dBm]<br>3 Tx Slot | GPRS [dBm]<br>4 Tx Slot |
| PCS                                            | 512     | <b>23.31</b>                | 23.31                   | 20.95                   | 18.93                   | <b>17.83</b>            |
|                                                | 661     | <b>23.34</b>                | 23.34                   | 20.90                   | 18.95                   | <b>17.93</b>            |
|                                                | 810     | <b>23.30</b>                | 23.29                   | 20.87                   | 18.94                   | <b>17.85</b>            |
| Calculated Maximum Frame-Averaged Output Power |         |                             |                         |                         |                         |                         |
|                                                |         | Voice                       | GPRS Data (GMSK)        |                         |                         |                         |
| Band                                           | Channel | GSM [dBm]<br>CS<br>(1 Slot) | GPRS [dBm]<br>1 Tx Slot | GPRS [dBm]<br>2 Tx Slot | GPRS [dBm]<br>3 Tx Slot | GPRS [dBm]<br>4 Tx Slot |
| PCS                                            | 512     | <b>14.28</b>                | 14.28                   | 14.93                   | 14.67                   | <b>14.82</b>            |
|                                                | 661     | <b>14.31</b>                | 14.31                   | 14.88                   | 14.69                   | <b>14.92</b>            |
|                                                | 810     | <b>14.27</b>                | 14.26                   | 14.85                   | 14.68                   | <b>14.84</b>            |

Note: Frame-averaged power was calculated from the measured burst-averaged power by converting the slot powers into linear units and calculating the energy over 8 timeslots. The bolded GSM/GPRS modes were required for SAR testing according to the highest frame-averaged output power per KDB Publication 941225 D03. SAR was additionally tested for GPRS 2 Tx and 3 Tx due to the proximity on the calculated frame average power, although not required per 941225.

**GSM Class: B**  
**GPRS Multislot class: 33**  
 Uplink Slots: 4 ; Downlink Slots: 5  
 Max Slot Sum: 6 (eg: 4 UL + 2 DL, 1 UL + 5 DL etc)  
**EDGE Multislot class: N/A**  
**DTM Multislot Class: N/A**



**Figure 11-1**  
**Power Measurement Setup**

### 11.3 Summary of Power Reduction due to Proximity Sensor

| Power Reduction due to Proximity Sensor |         |                             |                         |                         |                         |                         |                  |
|-----------------------------------------|---------|-----------------------------|-------------------------|-------------------------|-------------------------|-------------------------|------------------|
|                                         |         | Voice                       | GPRS Data               |                         |                         |                         | Target Reduction |
| Band                                    | Channel | GSM [dBm]<br>CS<br>(1 Slot) | GPRS [dBm]<br>1 Tx Slot | GPRS [dBm]<br>2 Tx Slot | GPRS [dBm]<br>3 Tx Slot | GPRS [dBm]<br>4 Tx Slot |                  |
| PCS                                     | 512     | 4.91                        | 4.88                    | 4.76                    | 4.80                    | 5.17                    | 5                |
|                                         | 661     | 4.81                        | 4.79                    | 4.76                    | 4.76                    | 5.05                    | 5                |
|                                         | 810     | 4.86                        | 4.82                    | 4.75                    | 4.77                    | 5.11                    | 5                |

Note: There is no proximity sensor power reduction for WLAN modes.

|                                  |                                     |                                                           |  |               |                                 |
|----------------------------------|-------------------------------------|-----------------------------------------------------------|--|---------------|---------------------------------|
| FCC ID: A3LSHWM300S              | PCTEST ENGINEERING LABORATORY, INC. | SAR COMPLIANCE REPORT                                     |  |               | Reviewed by:<br>Quality Manager |
| Filename:<br>0Y1105090848-R3.A3L | Test Dates:<br>05/09/11 - 05/19/11  | EUT Type:<br>1900 GSM/GPRS Tablet with Bluetooth and WLAN |  | Page 20 of 40 |                                 |

## 12 SAR TESTING WITH IEEE 802.11 TRANSMITTERS

Normal network operating configurations are not suitable for measuring the SAR of 802.11 a/b/g transmitters. Unpredictable fluctuations in network traffic and antenna diversity conditions can introduce undesirable variations in SAR results. The SAR for these devices should be measured using chipset based test mode software to ensure the results are consistent and reliable.

### 12.1 General Device Setup

Chipset based test mode software is hardware dependent and generally varies among manufacturers. The device operating parameters established in test mode for SAR measurements must be identical to those programmed in production units, including output power levels, amplifier gain settings and other RF performance tuning parameters. The test frequencies should correspond to actual channel frequencies defined for domestic use. SAR for devices with switched diversity should be measured with only one antenna transmitting at a time during each SAR measurement, according to a fixed modulation and data rate. The same data pattern should be used for all measurements.

### 12.2 Frequency Channel Configurations [27]

802.11 a/b/g and 4.9 GHz operating modes are tested independently according to the service requirements in each frequency band. 802.11 b/g modes are tested on channels 1, 6 and 11. 802.11a is tested for UNII operations on channels 36 and 48 in the 5.15-5.25 GHz band; channels 52 and 64 in the 5.25-5.35 GHz band; channels 104, 116, 124 and 136 in the 5.470-5.725 GHz band; and channels 149 and 161 in the 5.8 GHz band. When 5.8 GHz §15.247 is also available, channels 149, 157 and 165 should be tested instead of the UNII channels. 4.9 GHz is tested on channels 1, 10 and 5 or 6, whichever has the higher output power, for 5 MHz channels; channels 11, 15 and 19 for 10 MHz channels; and channels 21 and 25 for 20 MHz channels. These are referred to as the "default test channels". 802.11g mode was evaluated only if the output power was 0.25 dB higher than the 802.11b mode.

**Table 12-1**  
**802.11 Test Channels per FCC Requirements**

| Mode            | GHz     | Channel | Turbo Channel  | "Default Test Channels" |         | UNII |
|-----------------|---------|---------|----------------|-------------------------|---------|------|
|                 |         |         |                | §15.247                 | 802.11g |      |
| 802.11 b/g      | 2.412   | 1       |                | √                       | √       |      |
|                 | 2.437   | 6       | 6              | √                       | √       |      |
|                 | 2.462   | 11      |                | √                       | √       |      |
| 802.11a         | 5.18    | 36      |                |                         |         | √    |
|                 | 5.20    | 40      | 42 (5.21 GHz)  |                         |         | *    |
|                 | 5.22    | 44      |                |                         |         | *    |
|                 | 5.24    | 48      | 50 (5.25 GHz)  |                         |         | √    |
|                 | 5.26    | 52      |                |                         |         | √    |
|                 | 5.28    | 56      | 58 (5.29 GHz)  |                         |         | *    |
|                 | 5.30    | 60      |                |                         |         | *    |
|                 | 5.32    | 64      |                |                         |         | √    |
|                 | 5.500   | 100     | Unknown        |                         |         | *    |
|                 | 5.520   | 104     |                |                         |         | √    |
|                 | 5.540   | 108     |                |                         |         | *    |
|                 | 5.560   | 112     |                |                         |         | *    |
|                 | 5.580   | 116     |                |                         |         | √    |
|                 | 5.600   | 120     |                |                         |         | *    |
|                 | 5.620   | 124     |                |                         |         | √    |
|                 | 5.640   | 128     |                |                         |         | *    |
|                 | 5.660   | 132     |                |                         |         | *    |
|                 | 5.680   | 136     |                |                         |         | √    |
|                 | 5.700   | 140     |                |                         |         | *    |
| UNII or §15.247 | 5.745   | 149     |                | √                       | √       | *    |
|                 | 5.765   | 153     | 152 (5.76 GHz) |                         | *       | *    |
|                 | 5.785   | 157     |                | √                       |         | *    |
|                 | 5.805   | 161     | 160 (5.80 GHz) |                         | *       | √    |
|                 | §15.247 | 5.825   | 165            | √                       |         |      |

|                                         |                                                                                                                                   |                                                                  |                                                                                       |                                        |
|-----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------|---------------------------------------------------------------------------------------|----------------------------------------|
| FCC ID: A3LSHWM300S                     |  <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | <b>SAR COMPLIANCE REPORT</b>                                     |  | <b>Reviewed by:</b><br>Quality Manager |
| <b>Filename:</b><br>OY1105090848-R3.A3L | <b>Test Dates:</b><br>05/09/11 - 05/19/11                                                                                         | <b>EUT Type:</b><br>1900 GSM/GPRS Tablet with Bluetooth and WLAN |                                                                                       | Page 21 of 40                          |

**Table 12-2**  
**IEEE 802.11b Average RF Power**

| Mode    | Freq<br>[MHz] | Channel | Conducted Power [dBm] |       |       |       |
|---------|---------------|---------|-----------------------|-------|-------|-------|
|         |               |         | Data Rate [Mbps]      |       |       |       |
|         |               |         | 1                     | 2     | 5.5   | 11    |
| 802.11b | 2412          | 1       | 10.71                 | 10.78 | 10.81 | 10.89 |
| 802.11b | 2437          | 6       | 10.83                 | 10.86 | 10.87 | 10.88 |
| 802.11b | 2462          | 11      | 10.86                 | 10.98 | 10.97 | 11.02 |

**Table 12-3**  
**IEEE 802.11g Average RF Power**

| Mode    | Freq<br>[MHz] | Channel | Conducted Power [dBm] |       |       |       |       |       |       |       |
|---------|---------------|---------|-----------------------|-------|-------|-------|-------|-------|-------|-------|
|         |               |         | Data Rate [Mbps]      |       |       |       |       |       |       |       |
|         |               |         | 6                     | 9     | 12    | 18    | 24    | 36    | 48    | 54    |
| 802.11g | 2412          | 1       | 13.92                 | 14.07 | 14.02 | 14.17 | 14.01 | 14.02 | 13.89 | 13.97 |
| 802.11g | 2437          | 6       | 14.23                 | 14.32 | 14.19 | 14.24 | 14.32 | 14.13 | 14.29 | 14.23 |
| 802.11g | 2462          | 11      | 14.61                 | 14.71 | 14.63 | 14.72 | 14.52 | 14.49 | 14.43 | 14.45 |

**Table 12-4**  
**IEEE 802.11n Average RF Power**

| Mode    | Freq<br>[MHz] | Channel | Conducted Power [dBm] |       |       |       |       |       |       |       |
|---------|---------------|---------|-----------------------|-------|-------|-------|-------|-------|-------|-------|
|         |               |         | Data Rate [Mbps]      |       |       |       |       |       |       |       |
|         |               |         | 6.5                   | 13    | 20    | 26    | 39    | 52    | 58    | 65    |
| 802.11n | 2412          | 1       | 11.04                 | 11.09 | 11.06 | 10.92 | 11.01 | 11.02 | 11.03 | 11.05 |
| 802.11n | 2437          | 6       | 11.12                 | 11.16 | 11.17 | 11.06 | 11.17 | 11.12 | 11.18 | 11.14 |
| 802.11n | 2462          | 11      | 11.19                 | 11.18 | 11.19 | 11.16 | 11.08 | 11.07 | 11.08 | 11.02 |

**Table 12-5**  
**IEEE 802.11a Average RF Power**

| Mode    | Freq<br>[MHz] | Channel | Conducted Power [dBm] |       |       |       |       |       |       |       |
|---------|---------------|---------|-----------------------|-------|-------|-------|-------|-------|-------|-------|
|         |               |         | Data Rate [Mbps]      |       |       |       |       |       |       |       |
|         |               |         | 6                     | 9     | 12    | 18    | 24    | 36    | 48    | 54    |
| 802.11a | 5180          | 36      | 10.51                 | 10.62 | 10.61 | 10.52 | 10.57 | 10.58 | 10.61 | 10.58 |
| 802.11a | 5200          | 40      | 10.49                 | 10.51 | 10.46 | 10.52 | 10.56 | 10.47 | 10.52 | 10.49 |
| 802.11a | 5220          | 44      | 10.38                 | 10.38 | 10.44 | 10.47 | 10.46 | 10.54 | 10.57 | 10.46 |
| 802.11a | 5240          | 48      | 10.43                 | 10.44 | 10.37 | 10.34 | 10.31 | 10.38 | 10.36 | 10.43 |
| 802.11a | 5260          | 52      | 10.33                 | 10.36 | 10.36 | 10.43 | 10.52 | 10.47 | 10.44 | 10.47 |
| 802.11a | 5280          | 56      | 10.32                 | 10.37 | 10.42 | 10.41 | 10.44 | 10.48 | 10.52 | 10.43 |
| 802.11a | 5300          | 60      | 10.34                 | 10.36 | 10.43 | 10.47 | 10.52 | 10.44 | 10.36 | 10.38 |
| 802.11a | 5320          | 64      | 10.31                 | 10.35 | 10.46 | 10.52 | 10.43 | 10.41 | 10.52 | 10.47 |
| 802.11a | 5500          | 100     | 10.08                 | 10.13 | 10.12 | 10.21 | 10.15 | 10.23 | 10.24 | 10.22 |
| 802.11a | 5520          | 104     | 10.12                 | 10.23 | 10.26 | 10.19 | 10.28 | 10.23 | 10.34 | 10.27 |
| 802.11a | 5540          | 108     | 10.18                 | 10.23 | 10.22 | 10.35 | 10.34 | 10.27 | 10.32 | 10.36 |
| 802.11a | 5560          | 112     | 10.33                 | 10.37 | 10.33 | 10.38 | 10.43 | 10.48 | 10.42 | 10.36 |
| 802.11a | 5580          | 116     | 10.44                 | 10.45 | 10.52 | 10.46 | 10.54 | 10.53 | 10.57 | 10.61 |
| 802.11a | 5600          | 120     | 10.57                 | 10.54 | 10.63 | 10.66 | 10.72 | 10.69 | 10.78 | 10.82 |
| 802.11a | 5620          | 124     | 10.48                 | 10.37 | 10.44 | 10.41 | 10.49 | 10.53 | 10.36 | 10.25 |
| 802.11a | 5640          | 128     | 10.44                 | 10.36 | 10.31 | 10.46 | 10.48 | 10.30 | 10.32 | 10.24 |
| 802.11a | 5660          | 132     | 10.38                 | 10.33 | 10.46 | 10.28 | 10.24 | 10.28 | 10.33 | 10.48 |
| 802.11a | 5680          | 136     | 10.43                 | 10.40 | 10.49 | 10.32 | 10.37 | 10.28 | 10.42 | 10.57 |
| 802.11a | 5700          | 140     | 10.51                 | 10.37 | 10.45 | 10.38 | 10.48 | 10.21 | 10.38 | 10.46 |
| 802.11a | 5745          | 149     | 10.51                 | 10.62 | 10.54 | 10.62 | 10.54 | 10.56 | 10.65 | 10.66 |
| 802.11a | 5765          | 153     | 10.59                 | 10.58 | 10.56 | 10.54 | 10.47 | 10.62 | 10.64 | 10.62 |
| 802.11a | 5785          | 157     | 10.56                 | 10.47 | 10.53 | 10.56 | 10.52 | 10.48 | 10.62 | 10.58 |
| 802.11a | 5805          | 161     | 10.48                 | 10.52 | 10.56 | 10.51 | 10.47 | 10.56 | 10.52 | 10.58 |
| 802.11a | 5825          | 165     | 10.38                 | 10.45 | 10.38 | 10.52 | 10.56 | 10.46 | 10.52 | 10.39 |

|                                  |                                                                                                                                   |                                                           |                                                                                       |                                 |
|----------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------|
| FCC ID: A3LSHWM300S              |  <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | <b>SAR COMPLIANCE REPORT</b>                              |  | Reviewed by:<br>Quality Manager |
| Filename:<br>0Y1105090848-R3.A3L | Test Dates:<br>05/09/11 - 05/19/11                                                                                                | EUT Type:<br>1900 GSM/GPRS Tablet with Bluetooth and WLAN |                                                                                       | Page 22 of 40                   |

**Table 12-6**  
**IEEE 802.11n Average RF Power**

| Mode    | Freq<br>[MHz] | Channel | Conducted Power [dBm] |       |       |       |       |       |       |       |
|---------|---------------|---------|-----------------------|-------|-------|-------|-------|-------|-------|-------|
|         |               |         | Data Rate [Mbps]      |       |       |       |       |       |       |       |
|         |               |         | 6.5                   | 13    | 20    | 26    | 39    | 52    | 58    | 65    |
| 802.11n | 5180          | 36      | 10.43                 | 10.41 | 10.33 | 10.61 | 10.51 | 10.51 | 10.43 | 10.54 |
| 802.11n | 5200          | 40      | 10.13                 | 10.24 | 10.20 | 10.34 | 10.26 | 10.16 | 10.17 | 10.52 |
| 802.11n | 5220          | 44      | 10.04                 | 10.17 | 10.21 | 10.18 | 10.15 | 10.14 | 10.18 | 10.31 |
| 802.11n | 5240          | 48      | 10.24                 | 10.16 | 10.35 | 10.37 | 10.28 | 10.20 | 10.38 | 10.20 |
| 802.11n | 5260          | 52      | 10.35                 | 10.20 | 10.40 | 10.20 | 10.32 | 10.27 | 10.17 | 10.14 |
| 802.11n | 5280          | 56      | 10.18                 | 10.13 | 10.16 | 10.18 | 10.21 | 10.26 | 10.04 | 10.23 |
| 802.11n | 5300          | 60      | 10.31                 | 10.26 | 10.20 | 10.17 | 10.19 | 10.24 | 10.29 | 10.34 |
| 802.11n | 5320          | 64      | 10.21                 | 10.43 | 10.37 | 10.58 | 10.37 | 10.23 | 10.44 | 10.48 |
| 802.11n | 5500          | 100     | 10.30                 | 10.37 | 10.23 | 10.38 | 10.39 | 10.41 | 10.42 | 10.28 |
| 802.11n | 5520          | 104     | 10.25                 | 10.28 | 10.17 | 10.31 | 10.46 | 10.32 | 10.33 | 10.23 |
| 802.11n | 5540          | 108     | 10.37                 | 10.28 | 10.21 | 10.35 | 10.28 | 10.28 | 10.20 | 10.17 |
| 802.11n | 5560          | 112     | 10.27                 | 10.21 | 10.16 | 10.13 | 10.36 | 10.31 | 10.26 | 10.22 |
| 802.11n | 5580          | 116     | 10.34                 | 10.31 | 10.46 | 10.70 | 10.32 | 10.34 | 10.20 | 10.40 |
| 802.11n | 5600          | 120     | 10.42                 | 10.46 | 10.32 | 10.28 | 10.29 | 10.20 | 10.31 | 10.46 |
| 802.11n | 5620          | 124     | 10.22                 | 10.27 | 10.17 | 10.19 | 10.25 | 10.34 | 10.31 | 10.24 |
| 802.11n | 5640          | 128     | 10.35                 | 10.37 | 10.25 | 10.21 | 10.34 | 10.41 | 10.27 | 10.19 |
| 802.11n | 5660          | 132     | 10.26                 | 10.21 | 10.28 | 10.18 | 10.14 | 10.18 | 10.27 | 10.30 |
| 802.11n | 5680          | 136     | 10.20                 | 10.40 | 10.28 | 10.31 | 10.22 | 10.16 | 10.18 | 10.30 |
| 802.11n | 5700          | 140     | 10.34                 | 10.20 | 10.41 | 10.36 | 10.21 | 10.36 | 10.23 | 10.34 |
| 802.11n | 5745          | 149     | 10.24                 | 10.23 | 10.16 | 10.27 | 10.11 | 9.96  | 9.93  | 10.04 |
| 802.11n | 5765          | 153     | 10.24                 | 10.16 | 10.11 | 10.24 | 10.21 | 10.24 | 10.16 | 10.12 |
| 802.11n | 5785          | 157     | 10.24                 | 10.26 | 10.14 | 10.17 | 10.26 | 10.24 | 10.35 | 10.31 |
| 802.11n | 5805          | 161     | 10.00                 | 10.24 | 10.31 | 10.27 | 10.14 | 10.18 | 10.23 | 10.28 |
| 802.11n | 5825          | 165     | 10.15                 | 10.11 | 10.04 | 10.09 | 10.24 | 9.96  | 9.92  | 9.98  |

Notes:

1. The maximum RF output power for all channels across all data rates was measured.
2. Per KDB Publication 248227, for 5 GHz bands with 1g SAR < 0.8 W/kg, the highest default channel per 5 GHz band across the lowest data rates were evaluated for SAR.
3. Justification for reduced test configurations for WIFI channels per KDB Publication 248227 and April 2010 FCC/TCB Meeting Notes: IEEE 802.11n for 5GHz bands and IEEE 802.11n for 2.4 GHz Bands and higher data rates for both bands were not investigated since the average output powers were not greater than 0.25 dB that of the corresponding channel in the lowest data rate. Bolded powers in Section 12.2 were tested for SAR.
4. WIFI has no power back-off capability in this device.



**Figure 12-1**  
**Power Measurement Setup**

|                                         |                                                                                     |                                                                  |                                                                                       |                                        |
|-----------------------------------------|-------------------------------------------------------------------------------------|------------------------------------------------------------------|---------------------------------------------------------------------------------------|----------------------------------------|
| <b>FCC ID:</b> A3LSHWM300S              |  | <b>SAR COMPLIANCE REPORT</b>                                     |  | <b>Reviewed by:</b><br>Quality Manager |
| <b>Filename:</b><br>0Y1105090848-R3.A3L | <b>Test Dates:</b><br>05/09/11 - 05/19/11                                           | <b>EUT Type:</b><br>1900 GSM/GPRS Tablet with Bluetooth and WLAN | Page 23 of 40                                                                         |                                        |

## 13 SYSTEM VERIFICATION

### 13.1 Tissue Verification

**Table 13-1**  
**Measured Tissue Properties**

| Calibrated for Tests Performed on: | Tissue Type | Measured Frequency (MHz) | Measured Conductivity, $\sigma$ (S/m) | Measured Dielectric Constant, $\epsilon$ | TARGET Conductivity, $\sigma$ (S/m) | TARGET Dielectric Constant, $\epsilon$ | % dev $\sigma$ | % dev $\epsilon$ |
|------------------------------------|-------------|--------------------------|---------------------------------------|------------------------------------------|-------------------------------------|----------------------------------------|----------------|------------------|
| 05/09/2011                         | 1900B       | 1850                     | 1.504                                 | 51.49                                    | 1.52                                | 53.30                                  | -1.05%         | -3.40%           |
|                                    |             | 1880                     | 1.533                                 | 51.40                                    | 1.52                                | 53.30                                  | 0.86%          | -3.56%           |
|                                    |             | 1910                     | 1.571                                 | 51.29                                    | 1.52                                | 53.30                                  | 3.36%          | -3.77%           |
| 05/19/2011                         | 1900B       | 1850                     | 1.445                                 | 51.24                                    | 1.52                                | 53.30                                  | -4.93%         | -3.86%           |
|                                    |             | 1880                     | 1.446                                 | 50.94                                    | 1.52                                | 53.30                                  | -4.87%         | -4.43%           |
|                                    |             | 1910                     | 1.516                                 | 50.78                                    | 1.52                                | 53.30                                  | -0.26%         | -4.73%           |
| 05/10/2011                         | 2450B       | 2401                     | 1.944                                 | 51.02                                    | 1.90                                | 52.77                                  | 2.15%          | -3.31%           |
|                                    |             | 2450                     | 2.012                                 | 50.89                                    | 1.95                                | 52.70                                  | 3.18%          | -3.43%           |
|                                    |             | 2499                     | 2.074                                 | 50.73                                    | 2.02                                | 52.64                                  | 2.72%          | -3.62%           |
| 05/13/2011                         | 5200B-5800B | 5170                     | 5.399                                 | 48.50                                    | 5.26                                | 49.06                                  | 2.56%          | -1.13%           |
|                                    |             | 5210                     | 5.466                                 | 48.20                                    | 5.31                                | 49.00                                  | 2.92%          | -1.63%           |
|                                    |             | 5250                     | 5.481                                 | 48.22                                    | 5.36                                | 48.95                                  | 2.30%          | -1.48%           |
|                                    |             | 5270                     | 5.523                                 | 48.32                                    | 5.38                                | 48.92                                  | 2.64%          | -1.22%           |
|                                    |             | 5310                     | 5.618                                 | 47.97                                    | 5.43                                | 48.87                                  | 3.50%          | -1.83%           |
|                                    |             | 5350                     | 5.697                                 | 48.06                                    | 5.47                                | 48.81                                  | 4.15%          | -1.54%           |
|                                    |             | 5470                     | 5.831                                 | 47.70                                    | 5.62                                | 48.65                                  | 3.85%          | -1.95%           |
|                                    |             | 5510                     | 5.923                                 | 47.69                                    | 5.66                                | 48.59                                  | 4.63%          | -1.86%           |
|                                    |             | 5550                     | 5.940                                 | 47.55                                    | 5.71                                | 48.54                                  | 4.06%          | -2.04%           |
|                                    |             | 5570                     | 5.984                                 | 47.46                                    | 5.73                                | 48.51                                  | 4.41%          | -2.17%           |
|                                    |             | 5610                     | 6.029                                 | 47.46                                    | 5.78                                | 48.46                                  | 4.34%          | -2.06%           |
|                                    |             | 5650                     | 6.090                                 | 47.23                                    | 5.83                                | 48.40                                  | 4.55%          | -2.43%           |
|                                    |             | 5670                     | 6.117                                 | 47.35                                    | 5.85                                | 48.38                                  | 4.60%          | -2.12%           |
|                                    |             | 5710                     | 6.143                                 | 47.29                                    | 5.90                                | 48.32                                  | 4.21%          | -2.14%           |
|                                    |             | 5750                     | 6.219                                 | 47.15                                    | 5.94                                | 48.27                                  | 4.66%          | -2.32%           |
|                                    |             | 5770                     | 6.234                                 | 47.28                                    | 5.97                                | 48.24                                  | 4.51%          | -1.99%           |
|                                    |             | 5810                     | 6.292                                 | 47.10                                    | 6.01                                | 48.19                                  | 4.66%          | -2.25%           |
|                                    |             | 5850                     | 6.347                                 | 46.97                                    | 6.06                                | 48.13                                  | 4.77%          | -2.41%           |

Note: KDB Publication 450824 was ensured to be applied for probe calibration frequencies greater than or equal to 50 MHz of the DUT frequencies.

The above measured tissue parameters were used in the DASY software to perform interpolation to determine actual dielectric parameters at the test frequencies (per IEEE 1528 6.6.1.2). The SAR test plots may slightly differ from the table above since the DASY software rounds to three significant digits.

Probe calibration used within  $\pm 100$  MHz of the test frequency in either 5.725 - 5.85 or 5.47-5.725 GHz is acceptable per KDB Publication 865664 since the design of the SAR probe supports the extended frequency, provided the DASY software version recommended is used for the tests, and the expanded calibration uncertainty ( $k=2$ ) is less than or equal to 15% (See SAR probe calibration certificate for this information). The dielectric and conductivities measured are within 10% and 5% respectively of the target parameters specified in Supplement C 01-01.

|                                         |                                                                                                                                   |                                                                  |                                                                                       |                                        |
|-----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------|---------------------------------------------------------------------------------------|----------------------------------------|
| FCC ID: A3LSHWM300S                     |  <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | <b>SAR COMPLIANCE REPORT</b>                                     |  | <b>Reviewed by:</b><br>Quality Manager |
| <b>Filename:</b><br>0Y1105090848-R3.A3L | <b>Test Dates:</b><br>05/09/11 - 05/19/11                                                                                         | <b>EUT Type:</b><br>1900 GSM/GPRS Tablet with Bluetooth and WLAN |                                                                                       | Page 24 of 40                          |

## 13.2 Measurement Procedure for Tissue verification

- 1) The network analyzer and probe system was configured and calibrated.
- 2) The probe was immersed in the sample which was placed in a nonmetallic container. Trapped air bubbles beneath the flange were minimized by placing the probe at a slight angle.
- 3) The complex admittance with respect to the probe aperture was measured
- 4) The complex relative permittivity , for example from the below equation (Pournaropoulos and Misra):

$$Y = \frac{j2\omega\epsilon_r\epsilon_0}{[\ln(b/a)]^2} \int_a^b \int_a^b \int_0^\pi \cos\phi' \frac{\exp[-j\omega r(\mu_0\epsilon_r'\epsilon_0)^{1/2}]}{r} d\phi' d\rho' d\rho$$

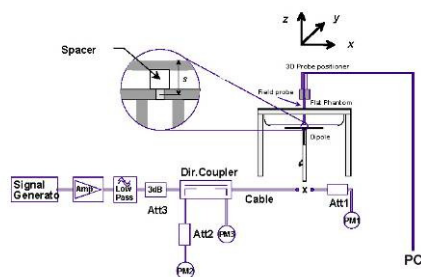
where  $Y$  is the admittance of the probe in contact with the sample, the primed and unprimed coordinates refer to source and observation points, respectively,  $r^2 = \rho^2 + \rho'^2 - 2\rho\rho'\cos\phi'$ ,  $\omega$  is the angular frequency, and  $j = \sqrt{-1}$ .

## 13.3 Test System Verification

Prior to assessment, the system is verified to  $\pm 10\%$  of the manufacturer SAR measurement on the reference dipole at the time of calibration.

**Table 13-2**  
**System Verification Results**

| System Verification<br>TARGET & MEASURED |                |                  |                 |                        |           |             |                                   |                                     |                                         |               |
|------------------------------------------|----------------|------------------|-----------------|------------------------|-----------|-------------|-----------------------------------|-------------------------------------|-----------------------------------------|---------------|
| Date:                                    | Amb. Temp (°C) | Liquid Temp (°C) | Input Power (W) | Tissue Frequency (MHz) | Dipole SN | Tissue Type | Measured SAR <sub>1g</sub> (W/kg) | 1 W Target SAR <sub>1g</sub> (W/kg) | 1 W Normalized SAR <sub>1g</sub> (W/kg) | Deviation (%) |
| 05/09/2011                               | 23.7           | 22.5             | 0.040           | 1900                   | 502       | Body        | 1.58                              | 41.100                              | 39.500                                  | -3.89%        |
| 05/19/2011                               | 24.1           | 22.5             | 0.040           | 1900                   | 502       | Body        | 1.6                               | 41.100                              | 40.000                                  | -2.68%        |
| 05/16/2011                               | 24.8           | 22.9             | 0.0158          | 2450                   | 797       | Body        | 0.774                             | 52.300                              | 48.987                                  | -6.33%        |
| 05/12/2011                               | 24.3           | 22.7             | 0.025           | 5200                   | 1057      | Body        | 1.99                              | 77.700                              | 79.600                                  | 2.45%         |
| 05/12/2011                               | 24.5           | 22.7             | 0.025           | 5500                   | 1057      | Body        | 2.1                               | 84.400                              | 84.000                                  | -0.47%        |
| 05/12/2011                               | 24.4           | 22.6             | 0.025           | 5800                   | 1057      | Body        | 1.93                              | 75.000                              | 77.200                                  | 2.93%         |



**Figure 13-1**  
**System Verification Setup Diagram**



**Figure 13-2**  
**System Verification Setup Photo**

|                                  |                                                                                                                                   |                                                           |                                                                                       |                                 |
|----------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------|
| FCC ID: A3LSHWM300S              |  <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | SAR COMPLIANCE REPORT                                     |  | Reviewed by:<br>Quality Manager |
| Filename:<br>0Y1105090848-R3.A3L | Test Dates:<br>05/09/11 - 05/19/11                                                                                                | EUT Type:<br>1900 GSM/GPRS Tablet with Bluetooth and WLAN |                                                                                       | Page 25 of 40                   |

# 14 SAR DATA SUMMARY

**Table 14-1**  
**Hotspot Body SAR Results**

| MEASUREMENT RESULTS                                                                               |     |          |         |                       |                  |                      |                                                 |               |                 |       |          |
|---------------------------------------------------------------------------------------------------|-----|----------|---------|-----------------------|------------------|----------------------|-------------------------------------------------|---------------|-----------------|-------|----------|
| FREQUENCY                                                                                         |     | Mode     | Service | Conducted Power [dBm] | Power Drift [dB] | Power Reduction (dB) | Spacing                                         | Serial Number | # of Time Slots | Side  | SAR (1g) |
| MHz                                                                                               | Ch. |          |         |                       |                  |                      |                                                 |               |                 |       | (W/kg)   |
| 1880.00                                                                                           | 661 | GSM 1900 | GPRS    | 20.90                 | 0.02             | 5                    | 0.0 cm                                          | FCC #3        | 2               | back* | 0.445    |
| 1880.00                                                                                           | 661 | GSM 1900 | GPRS    | 18.95                 | 0.00             | 5                    | 0.0 cm                                          | FCC #3        | 3               | back* | 0.420    |
| 1880.00                                                                                           | 661 | GSM 1900 | GPRS    | 17.93                 | 0.02             | 5                    | 0.0 cm                                          | FCC #3        | 4               | back* | 0.441    |
| 1880.00                                                                                           | 661 | GSM 1900 | GPRS    | 25.66                 | -0.02            | 0                    | 1.0 cm                                          | FCC #2        | 2               | back  | 0.247    |
| 1880.00                                                                                           | 661 | GSM 1900 | GPRS    | 23.71                 | -0.02            | 0                    | 1.0 cm                                          | FCC #2        | 3               | back  | 0.234    |
| 1880.00                                                                                           | 661 | GSM 1900 | GPRS    | 22.98                 | 0.00             | 0                    | 1.0 cm                                          | FCC #2        | 4               | back  | 0.259    |
| 1880.00                                                                                           | 661 | GSM 1900 | GPRS    | 25.66                 | -0.02            | 5                    | 0.0 cm                                          | FCC #2        | 2               | back  | 0.247    |
| 1880.00                                                                                           | 661 | GSM 1900 | GPRS    | 23.71                 | -0.02            | 0                    | 1.0 cm                                          | FCC #2        | 3               | back  | 0.234    |
| 1880.00                                                                                           | 661 | GSM 1900 | GPRS    | 20.90                 | 0.07             | 5                    | 0.0 cm                                          | FCC #3        | 2               | top*  | 0.135    |
| 1880.00                                                                                           | 661 | GSM 1900 | GPRS    | 22.98                 | -0.02            | 0                    | 0.5 cm                                          | FCC #2        | 4               | top   | 0.227    |
| 1880.00                                                                                           | 661 | GSM 1900 | GPRS    | 22.98                 | 0.00             | 0                    | 0.0 cm                                          | FCC #2        | 4               | right | 0.081    |
| 1880.00                                                                                           | 661 | GSM 1900 | GSM     | 23.34                 | -0.08            | 5                    | 0.0 cm                                          | FCC #3        | 1               | back* | 0.469    |
| 1880.00                                                                                           | 661 | GSM 1900 | GSM     | 28.15                 | -0.04            | 0                    | 1.0 cm                                          | FCC #2        | 1               | back  | 0.331    |
| 1880.00                                                                                           | 661 | GSM 1900 | GSM     | 23.34                 | -0.08            | 5                    | 0.0 cm                                          | FCC #3        | 1               | top*  | 0.182    |
| 1880.00                                                                                           | 661 | GSM 1900 | GSM     | 28.15                 | 0.00             | 0                    | 0.5 cm                                          | FCC #2        | 1               | top   | 0.210    |
| 1880.00                                                                                           | 661 | GSM 1900 | GSM     | 28.15                 | 0.03             | 0                    | 0.0 cm                                          | FCC #2        | 1               | right | 0.041    |
| ANSI / IEEE C95.1 1992 - SAFETY LIMIT<br>Spatial Peak<br>Uncontrolled Exposure/General Population |     |          |         |                       |                  |                      | Body<br>1.6 W/kg (mW/g)<br>averaged over 1 gram |               |                 |       |          |

**Notes:**

1. The test data reported are the worst-case SAR value with the position set in a typical configuration. Test procedures used were according to FCC/OET Bulletin 65, Supplement C [June 2001].
2. Per KDB publication 447498 4) b) i) the back side is required to be tested touching the flat phantom.
3. This device is capable of multiple display orientations supporting both portrait and landscape positions. Therefore per KDB publication 447498 4) b) ii) (2), SAR testing applies for the tablet edges with antennas located within 5 cm of each tablet edge closest to the user (with KDB publication 616217 applied to edges with antennas located  $\geq 5$  cm from the user). According to KDB publication 447498 4) b) ii) (2), for each antenna, SAR is only required for the edge with the most conservative exposure condition.
4. All modes of operation were investigated, and worst-case results are reported.
5. Tissue parameters and temperatures are listed on the SAR plots.
6. Batteries are fully charged for all readings.
7. Liquid tissue depth was at least 15.0 cm.
8. Justification for reduced test configurations per KDB Publication 941225 D03: The source-based time-averaged output power was evaluated for all multi-slot operations. In addition to the worst-case reported, all source-based time-averaged powers within 5% of the highest were additionally included.
9. Justification for reduced test configurations: Per KDB publication 447498 D01 1) e) i), when the SAR procedures require multiple channels to be tested and the 1-g SAR for the highest output channel is less than 0.8 W/kg, the other channels are not required.
10. Asterisk (\*) denotes power reduction activated.
11. Per April 2011 TCB-FCC Workshop Notes, in addition to the 0 mm test distance required for tablet devices under KDB 447498, a conservative additional test distance of 10 mm from the back and 5 mm from the top were tested for SAR at maximum output power with the sensors de-activated. See Section 10.3 for more details.

|                                         |                                                                                                                                   |                                                                  |                                                                                       |                                        |
|-----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------|---------------------------------------------------------------------------------------|----------------------------------------|
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| <b>Filename:</b><br>0Y1105090848-R3.A3L | <b>Test Dates:</b><br>05/09/11 - 05/19/11                                                                                         | <b>EUT Type:</b><br>1900 GSM/GPRS Tablet with Bluetooth and WLAN |                                                                                       | Page 26 of 40                          |

**Table 14-2**  
**2.4 GHz Body SAR Results**

| MEASUREMENT RESULTS                                                                               |     |              |         |                       |                  |                                                 |               |                  |      |          |
|---------------------------------------------------------------------------------------------------|-----|--------------|---------|-----------------------|------------------|-------------------------------------------------|---------------|------------------|------|----------|
| FREQUENCY                                                                                         |     | Mode         | Service | Conducted Power [dBm] | Power Drift [dB] | Spacing                                         | Serial Number | Data Rate (Mbps) | Side | SAR (1g) |
| MHz                                                                                               | Ch. |              |         |                       |                  |                                                 |               |                  |      | (W/kg)   |
| 2462                                                                                              | 11  | IEEE 802.11b | DSSS    | 10.86                 | -0.02            | 0.0 cm                                          | FCC #2        | 1                | back | 0.102    |
| 2462                                                                                              | 11  | IEEE 802.11b | DSSS    | 10.86                 | 0.07             | 0.0 cm                                          | FCC #2        | 1                | top  | 0.010    |
| 2462                                                                                              | 11  | IEEE 802.11b | DSSS    | 10.86                 | 0.04             | 0.0 cm                                          | FCC #2        | 1                | left | 0.006    |
| 2462                                                                                              | 11  | IEEE 802.11g | OFDM    | 14.61                 | 0.01             | 0.0 cm                                          | FCC #2        | 6                | back | 0.210    |
| 2462                                                                                              | 11  | IEEE 802.11g | OFDM    | 14.61                 | 0.08             | 0.0 cm                                          | FCC #2        | 6                | top  | 0.024    |
| 2462                                                                                              | 11  | IEEE 802.11g | OFDM    | 14.61                 | 0.05             | 0.0 cm                                          | FCC #2        | 6                | left | 0.015    |
| 2462                                                                                              | 11  | IEEE 802.11n | OFDM    | 11.19                 | 0.05             | 0.0 cm                                          | FCC #2        | 6.5              | back | 0.103    |
| 2462                                                                                              | 11  | IEEE 802.11n | OFDM    | 11.19                 | 0.10             | 0.0 cm                                          | FCC #2        | 6.5              | top  | 0.010    |
| 2462                                                                                              | 11  | IEEE 802.11n | OFDM    | 11.19                 | 0.06             | 0.0 cm                                          | FCC #2        | 6.5              | left | 0.007    |
| ANSI / IEEE C95.1 1992 - SAFETY LIMIT<br>Spatial Peak<br>Uncontrolled Exposure/General Population |     |              |         |                       |                  | Body<br>1.6 W/kg (mW/g)<br>averaged over 1 gram |               |                  |      |          |

Notes:

- The test data reported are the worst-case SAR value with the position set in a typical configuration. Test procedures used were according to FCC/OET Bulletin 65, Supplement C [June 2001].
- Per KDB publication 447498 4) b) i) the back side is required to be tested touching the flat phantom.
- This device is capable of multiple display orientations supporting both portrait and landscape positions. Therefore per KDB publication 447498 4) b) ii) (2), SAR testing applies for the tablet edges with antennas located within 5 cm of each tablet edge closest to the user (with KDB publication 616217 applied to edges with antennas located  $\geq 5$  cm from the user). According to KDB publication 447498 4) b) ii) (2), for each antenna, SAR is only required for the edge with the most conservative exposure condition.
- All modes of operation were investigated, and worst-case results are reported.
- Batteries are fully charged for all readings.
- Tissue parameters and temperatures are listed on the SAR plots.
- Liquid tissue depth is was at least 15.0 cm.
- Justification for reduced test configurations for WIFI channels per KDB Publication 248227 and April 2010 FCC/TCB Meeting Notes: Highest average RF output power channel for the lowest data rate were selected for SAR evaluation. IEEE 802.11g/n were tested since the average output power of the corresponding channel used for SAR testing was more than 0.25 dB higher than IEEE 802.11b mode. Higher data rates were not investigated since the average output powers were not greater than 0.25 dB than that of the corresponding channel in the lowest data rate IEEE 802.11g mode.
- WLAN transmission was verified using a spectrum analyzer.
- There is no proximity sensor power reduction for WIFI modes.
- Per April 2011 FCC-TCB conference notes Bluetooth SAR is not required for both back side and edge exposure conditions since (1) 2.4 GHz WIFI and Bluetooth are implemented in the same chipset, (2) the measured WIFI SAR is  $<0.4$  W/kg, and (3) the maximum peak and average output for Bluetooth are less than the maximum output power for WIFI mode.

|                                         |                                                                                                                                   |                                                                  |                                                                                       |                                        |
|-----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------|---------------------------------------------------------------------------------------|----------------------------------------|
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| <b>Filename:</b><br>OY1105090848-R3.A3L | <b>Test Dates:</b><br>05/09/11 - 05/19/11                                                                                         | <b>EUT Type:</b><br>1900 GSM/GPRS Tablet with Bluetooth and WLAN | Page 27 of 40                                                                         |                                        |

**Table 14-3**  
**5 GHz Body SAR Results**

| MEASUREMENT RESULTS                                                                               |     |              |         |                       |                  |                                                 |               |                  |      |          |
|---------------------------------------------------------------------------------------------------|-----|--------------|---------|-----------------------|------------------|-------------------------------------------------|---------------|------------------|------|----------|
| FREQUENCY                                                                                         |     | Mode         | Service | Conducted Power [dBm] | Power Drift [dB] | Spacing                                         | Serial Number | Data Rate (Mbps) | Side | SAR (1g) |
| MHz                                                                                               | Ch. |              |         |                       |                  |                                                 |               |                  |      | (W/kg)   |
| 5180                                                                                              | 36  | IEEE 802.11a | OFDM    | 10.51                 | -0.03            | 0.0 cm                                          | FCC #2        | 6                | back | 0.423    |
| 5180                                                                                              | 36  | IEEE 802.11a | OFDM    | 10.51                 | 0.06             | 0.0 cm                                          | FCC #2        | 6                | top  | 0.672    |
| 5180                                                                                              | 36  | IEEE 802.11a | OFDM    | 10.51                 | 0.07             | 0.0 cm                                          | FCC #2        | 6                | left | 0.123    |
| 5300                                                                                              | 60  | IEEE 802.11a | OFDM    | 10.34                 | -0.04            | 0.0 cm                                          | FCC #2        | 6                | back | 0.389    |
| 5300                                                                                              | 60  | IEEE 802.11a | OFDM    | 10.34                 | -0.02            | 0.0 cm                                          | FCC #2        | 6                | top  | 0.650    |
| 5300                                                                                              | 60  | IEEE 802.11a | OFDM    | 10.34                 | 0.09             | 0.0 cm                                          | FCC #2        | 6                | left | 0.142    |
| 5600                                                                                              | 120 | IEEE 802.11a | OFDM    | 10.57                 | -0.02            | 0.0 cm                                          | FCC #2        | 6                | back | 0.444    |
| 5600                                                                                              | 120 | IEEE 802.11a | OFDM    | 10.57                 | 0.01             | 0.0 cm                                          | FCC #2        | 6                | top  | 0.663    |
| 5600                                                                                              | 120 | IEEE 802.11a | OFDM    | 10.57                 | -0.01            | 0.0 cm                                          | FCC #2        | 6                | left | 0.190    |
| 5765                                                                                              | 153 | IEEE 802.11a | OFDM    | 10.59                 | -0.04            | 0.0 cm                                          | FCC #2        | 6                | back | 0.439    |
| 5765                                                                                              | 153 | IEEE 802.11a | OFDM    | 10.59                 | 0.03             | 0.0 cm                                          | FCC #2        | 6                | top  | 0.632    |
| 5765                                                                                              | 153 | IEEE 802.11a | OFDM    | 10.59                 | -0.06            | 0.0 cm                                          | FCC #2        | 6                | left | 0.150    |
| ANSI / IEEE C95.1 1992 - SAFETY LIMIT<br>Spatial Peak<br>Uncontrolled Exposure/General Population |     |              |         |                       |                  | Body<br>1.6 W/kg (mW/g)<br>averaged over 1 gram |               |                  |      |          |

Notes:

1. The test data reported are the worst-case SAR value with the position set in a typical configuration. Test procedures used were according to FCC/OET Bulletin 65, Supplement C [June 2001].
2. Per KDB publication 447498 4) b) i) the back side is required to be tested touching the flat phantom.
3. This device is capable of multiple display orientations supporting both portrait and landscape positions. Therefore per KDB publication 447498 4) b) ii) (2), SAR testing applies for the tablet edges with antennas located within 5 cm of each tablet edge closest to the user (with KDB publication 616217 applied to edges with antennas located  $\geq 5$  cm from the user). According to KDB publication 447498 4) b) ii) (2), for each antenna, SAR is only required for the edge with the most conservative exposure condition.
4. All modes of operation were investigated, and worst-case results are reported.
5. Batteries are fully charged for all readings.
6. Tissue parameters and temperatures are listed on the SAR plots.
7. Liquid tissue depth is was at least 15.0 cm.
8. Justification for reduced test configurations for WIFI channels per KDB Publication 248227 and April 2010 FCC/TCB Meeting Notes: Highest average RF output power channel for the lowest data rate were selected for SAR evaluation. Other IEEE 802.11 modes (including 802.11n and higher data rates) were not investigated since the average output powers were not greater than 0.25 dB than that of the corresponding channel in the lowest data rate IEEE 802.11a mode.
9. Per KDB 248227 Publication, since the SAR < 0.8 W/kg, no additional channels were required.
10. WLAN transmission was verified using a spectrum analyzer.
11. There is no proximity sensor power reduction for WIFI modes.

|                                  |                                                                                                                                   |                                                           |                                                                                       |                                 |
|----------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------|
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| Filename:<br>0Y1105090848-R3.A3L | Test Dates:<br>05/09/11 - 05/19/11                                                                                                | EUT Type:<br>1900 GSM/GPRS Tablet with Bluetooth and WLAN |                                                                                       | Page 28 of 40                   |

## 15 SIMULTANEOUS TRANSMISSION ANALYSIS

### 15.1 Simultaneous Transmission Information

This device contains multiple transmitters that may operate simultaneously and therefore, require a simultaneous transmission analysis according to KDB publication 447498 4) b) iii) procedures (See Section 10.3). The tablet procedures required by KDB publication 447498 generally do not require separate hotspot mode testing.

Bluetooth and WIFI cannot transmit simultaneously since it shares the same circuit path and are switched by the radio. Per April 2011 FCC-TCB conference notes Bluetooth SAR is not required for both back side and edge exposure conditions since the measured WIFI SAR is <0.4 W/kg and the maximum peak and average output for Bluetooth are less than the maximum output power in WIFI mode.

When hotspot mode is active, all 5GHz WIFI modes are disabled. Also DTM mode is not available for GSM 1900 and thus GSM+GPRS simultaneous transmission is not applicable.

### 15.2 Simultaneous Transmission Calculations per KDB 648474 at 0.0 cm

**Table 15-1**  
**Simultaneous Transmission Scenario at 0.0 cm**

| Simult Tx | Configuration | GSM/GPRS 1900 SAR (W/kg) | 2.4 GHz WIFI SAR (W/kg) | $\Sigma$ SAR (W/kg) |
|-----------|---------------|--------------------------|-------------------------|---------------------|
| Body SAR  | Back          | 0.469                    | 0.210                   | <b>0.679</b>        |
|           | Top           | 0.182                    | 0.024                   | <b>0.206</b>        |
|           | Bottom        | -                        | -                       | <b>0.000</b>        |
|           | Right         | 0.081                    | -                       | <b>0.081</b>        |
|           | Left          | -                        | 0.015                   | <b>0.015</b>        |

**Table 15-2**  
**Simultaneous Transmission Scenario at 0.0cm (Voice + 5GHz WIFI)**

| Simult Tx | Configuration | GSM 1900 SAR (W/kg) | 5 GHz WIFI SAR (W/kg) | $\Sigma$ SAR (W/kg) |
|-----------|---------------|---------------------|-----------------------|---------------------|
| Body SAR  | Back          | 0.469               | 0.444                 | <b>0.913</b>        |
|           | Top           | 0.182               | 0.672                 | <b>0.854</b>        |
|           | Bottom        | -                   | -                     | <b>0.000</b>        |
|           | Right         | 0.041               | -                     | <b>0.041</b>        |
|           | Left          | -                   | 0.190                 | <b>0.190</b>        |

1900 GPRS and 5GHz simultaneous transmissions are disabled by the manufacturer.

Note: “-” SAR results shown in the table are zero for summation purposes, because SAR was not required to be measured due to exclusions mentioned in Section 10.2.

|                                         |                                                                                     |                                                                  |                                                                                       |                                        |
|-----------------------------------------|-------------------------------------------------------------------------------------|------------------------------------------------------------------|---------------------------------------------------------------------------------------|----------------------------------------|
| <b>FCC ID:</b> A3LSHWM300S              |  | <b>SAR COMPLIANCE REPORT</b>                                     |  | <b>Reviewed by:</b><br>Quality Manager |
| <b>Filename:</b><br>0Y1105090848-R3.A3L | <b>Test Dates:</b><br>05/09/11 - 05/19/11                                           | <b>EUT Type:</b><br>1900 GSM/GPRS Tablet with Bluetooth and WLAN |                                                                                       | Page 29 of 40                          |

### 15.3 Simultaneous Transmission Calculations per KDB 648474 for additional test distances due to proximity sensor

**Table 15-3**  
Simultaneous Transmission Scenario for additional test distance with proximity sensor deactivated

| Configuration | Separation Distance | GSM/GPRS 1900 SAR (W/kg) | 2.4 GHz WIFI SAR (W/kg) | $\Sigma$ SAR (W/kg) |
|---------------|---------------------|--------------------------|-------------------------|---------------------|
| Top Edge      | 0.5 cm              | 0.227                    | < 0.024                 | < <b>0.437</b>      |
| Back Side     | 1.0 cm              | 0.469                    | < 0.210                 | < <b>0.679</b>      |

**Table 15-4**  
Simultaneous Transmission Scenario (Voice) additional test distance with proximity sensor deactivated

| Configuration | Separation Distance | GSM 1900 SAR (W/kg) | 5 GHz WIFI SAR (W/kg) | $\Sigma$ SAR (W/kg) |
|---------------|---------------------|---------------------|-----------------------|---------------------|
| Top Edge      | 0.5 cm              | 0.210               | < 0.672               | < <b>0.882</b>      |
| Back Side     | 1.0 cm              | 0.331               | < 0.444               | < <b>0.775</b>      |

1900 GPRS and 5GHz simultaneous transmissions are disabled by the manufacturer.

Note: For sum SAR calculations at 1.0 cm and 0.5 cm, WLAN SAR values for 0.0 cm were used since the 0.0 cm test distance for WLAN was more conservative and would result in higher SAR. "<" denotes the 0.0 cm WLAN SAR values used for summation purposes only for KDB 648474 calculations.

### 15.4 Simultaneous Transmission Conclusion

The above numerical summed SAR was below the SAR limit. Therefore, the above analysis is sufficient to determine that simultaneous transmission cases will not exceed the SAR limit. Therefore, no volumetric SAR summation per FCC KDB Publication 648474 is required.

|                                         |                                                                                     |                                                                  |                                                                                       |                                        |
|-----------------------------------------|-------------------------------------------------------------------------------------|------------------------------------------------------------------|---------------------------------------------------------------------------------------|----------------------------------------|
| <b>FCC ID:</b> A3LSHWM300S              |  | <b>SAR COMPLIANCE REPORT</b>                                     |  | <b>Reviewed by:</b><br>Quality Manager |
| <b>Filename:</b><br>0Y1105090848-R3.A3L | <b>Test Dates:</b><br>05/09/11 - 05/19/11                                           | <b>EUT Type:</b><br>1900 GSM/GPRS Tablet with Bluetooth and WLAN |                                                                                       | Page 30 of 40                          |

## 16

## EQUIPMENT LIST

| Manufacturer       | Model       | Description                                   | Cal Date   | Cal Interval | Cal Due    | Serial Number |
|--------------------|-------------|-----------------------------------------------|------------|--------------|------------|---------------|
| Agilent            | 85070B      | Dielectric Probe Kit                          | 8/22/2010  | Annual       | 8/22/2011  | US33020316    |
| Agilent            | 8648D       | (9kHz-4GHz) Signal Generator                  | 10/13/2010 | Annual       | 10/13/2011 | 3613A00315    |
| Agilent            | 8753E       | (30kHz-6GHz) Network Analyzer                 | 4/21/2011  | Annual       | 4/21/2012  | JP38020182    |
| Agilent            | E5515C      | Wireless Communications Test Set              | 10/11/2010 | Annual       | 10/11/2011 | GB46110872    |
| Agilent            | E5515C      | Wireless Communications Test Set              | 10/8/2010  | Annual       | 10/8/2011  | GB46310798    |
| Agilent            | E5515C      | Wireless Communications Test Set              | 8/13/2010  | Annual       | 8/13/2011  | GB41450275    |
| Agilent            | E8257D      | (250kHz-20GHz) Signal Generator               | 4/8/2011   | Annual       | 4/8/2012   | MY45470194    |
| Gigatronics        | 80701A      | (0.05-18GHz) Power Sensor                     | 10/11/2010 | Annual       | 10/11/2011 | 1833460       |
| Gigatronics        | 8651A       | Universal Power Meter                         | 10/11/2010 | Annual       | 10/11/2011 | 8650319       |
| Index SAR          | IXTL-010    | Dielectric Measurement Kit                    | N/A        |              | N/A        | N/A           |
| Index SAR          | IXTL-030    | 30MM TEM line for 6 GHz                       | N/A        |              | N/A        | N/A           |
| Pasternack         | PE2208-6    | Bidirectional Coupler                         | N/A        |              | N/A        | N/A           |
| Pasternack         | PE2209-10   | Bidirectional Coupler                         | N/A        |              | N/A        | N/A           |
| Rohde & Schwarz    | CMU200      | Base Station Simulator                        | 11/11/2010 | Annual       | 11/11/2011 | 836371/0079   |
| Rohde & Schwarz    | CMU200      | Base Station Simulator                        | 6/21/2010  | Annual       | 6/21/2011  | 833855/0010   |
| Rohde & Schwarz    | NRVD        | Dual Channel Power Meter                      | 4/8/2011   | Biennial     | 4/8/2013   | 101695        |
| SPEAG              | D1900V2     | 1900 MHz SAR Dipole                           | 2/17/2011  | Annual       | 2/17/2012  | 502           |
| SPEAG              | D1900V2     | 1900 MHz SAR Dipole                           | 8/18/2009  | Biennial     | 8/18/2011  | 5d080         |
| SPEAG              | D2450V2     | 2450 MHz SAR Dipole                           | 8/27/2009  | Biennial     | 8/27/2011  | 719           |
| SPEAG              | D2450V2     | 2450 MHz SAR Dipole                           | 2/8/2011   | Annual       | 2/8/2012   | 797           |
| SPEAG              | D2600V2     | 2600 MHz SAR Dipole                           | 4/15/2011  | Biennial     | 4/15/2013  | 1004          |
| SPEAG              | D5GHzV2     | 5 GHz SAR Dipole                              | 8/19/2009  | Biennial     | 8/19/2011  | 1007          |
| SPEAG              | D5GHzV2     | 5 GHz SAR Dipole                              | 2/11/2011  | Annual       | 2/11/2012  | 1057          |
| SPEAG              | D835V2      | 835 MHz SAR Dipole                            | 2/9/2011   | Annual       | 2/9/2012   | 4d047         |
| SPEAG              | D835V2      | 835 MHz SAR Dipole                            | 8/24/2009  | Biennial     | 8/24/2011  | 4d026         |
| SPEAG              | DAE3        | Dasy Data Acquisition Electronics             | 11/18/2010 | Annual       | 11/18/2011 | 455           |
| SPEAG              | DAE4        | Dasy Data Acquisition Electronics             | 3/17/2011  | Annual       | 3/17/2012  | 704           |
| SPEAG              | DAE4        | Dasy Data Acquisition Electronics             | 4/20/2011  | Annual       | 4/20/2012  | 665           |
| SPEAG              | DAE4        | Dasy Data Acquisition Electronics             | 2/21/2011  | Annual       | 2/21/2012  | 649           |
| SPEAG              | ES3DV2      | SAR Probe                                     | 9/21/2010  | Annual       | 9/21/2011  | 3022          |
| SPEAG              | EX3DV4      | SAR Probe                                     | 8/19/2010  | Annual       | 8/19/2011  | 3561          |
| SPEAG              | EX3DV4      | SAR Probe                                     | 2/14/2011  | Annual       | 2/14/2012  | 3550          |
| SPEAG              | DAE4        | Dasy Data Acquisition Electronics             | 7/8/2010   | Annual       | 7/8/2011   | 859           |
| SPEAG              | D750V3      | 750 MHz Dipole                                | 2/14/2011  | Annual       | 2/14/2012  | 1003          |
| SPEAG              | ES3DV3      | SAR Probe                                     | 3/24/2011  | Annual       | 3/24/2012  | 3213          |
| SPEAG              | ES3DV3      | SAR Probe                                     | 4/18/2011  | Annual       | 4/18/2012  | 3209          |
| Rohde & Schwarz    | SMIQ03B     | Signal Generator                              | 4/6/2011   | Annual       | 4/6/2012   | DE27259       |
| SPEAG              | D1640V2     | 1640 MHz Dipole                               | 8/17/2010  | Biennial     | 8/17/2012  | 321           |
| Rohde & Schwarz    | CMW500      | LTE Radio Communication Tester                | 8/30/2010  | Annual       | 8/30/2011  | 100976        |
| Anritsu            | MA2481A     | Power Sensor                                  | 2/7/2011   | Annual       | 2/7/2012   | 5318          |
| Anritsu            | MA2481A     | Power Sensor                                  | 2/7/2011   | Annual       | 2/7/2012   | 5442          |
| Anritsu            | ML2438A     | Power Meter                                   | 2/7/2011   | Annual       | 2/7/2012   | 1190013       |
| Anritsu            | ML2438A     | Power Meter                                   | 2/7/2011   | Annual       | 2/7/2012   | 98150041      |
| Agilent            | 8648D       | Signal Generator                              | 4/5/2011   | Annual       | 4/5/2012   | 3629U00687    |
| Anritsu            | ML2438A     | Power Meter                                   | 2/7/2011   | Annual       | 2/7/2012   | 1070030       |
| Anritsu            | MA2481A     | Power Sensor                                  | 2/7/2011   | Annual       | 2/7/2012   | 5821          |
| Anritsu            | MA2481A     | Power Sensor                                  | 2/7/2011   | Annual       | 2/7/2012   | 8013          |
| Anritsu            | MA2481A     | Power Sensor                                  | 2/7/2011   | Annual       | 2/7/2012   | 2400          |
| Apel               | ALS-PR-DIEL | Dielectric Probe Kit                          | N/A        |              | N/A        | 260-00959     |
| Agilent            | E5515C      | Wireless Communications Test Set              | 8/13/2010  | Annual       | 8/13/2011  | GB43304447    |
| Agilent            | E5515C      | Wireless Communications Test Set              | 4/21/2011  | Annual       | 4/21/2012  | US41140256    |
| Amplifier Research | 551G4       | 5W, 800MHz-4.2GHz                             | N/A        |              |            | 17042         |
| Mini-Circuits      | BW-N20W5+   | DC to 18 GHz Precision Fixed 20 dB Attenuator | N/A        |              |            | N/A           |
| Agilent            | E5515C      | Wireless Communications Test Set              | 2/8/2011   | Annual       | 2/8/2012   | GB45360985    |
| Rohde & Schwarz    | CMW500      | LTE Radio Communication Tester                | 3/11/2011  | Annual       | 3/11/2012  | 103962        |
| Control Company    | 61220-416   | Long-Stem Thermometer                         | 2/15/2011  | Biennial     | 2/15/2013  | 111331322     |
| Control Company    | 61220-416   | Long-Stem Thermometer                         | 2/15/2011  | Biennial     | 2/15/2013  | 111331323     |
| Control Company    | 61220-416   | Long-Stem Thermometer                         | 2/15/2011  | Biennial     | 2/15/2013  | 111331330     |
| Control Company    | 61220-416   | Long-Stem Thermometer                         | 2/15/2011  | Biennial     | 2/15/2013  | 111331332     |
| Control Company    | 61220-416   | Long-Stem Thermometer                         | 3/16/2011  | Biennial     | 3/16/2013  | 111391601     |

|                                  |                                                                                                                            |                                                           |                                                                                       |                                 |
|----------------------------------|----------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------|
| FCC ID: A3LSHWM300S              |  PCTEST<br>ENGINEERING LABORATORY, INC. | SAR COMPLIANCE REPORT                                     |  | Reviewed by:<br>Quality Manager |
| Filename:<br>0Y1105090848-R3.A3L | Test Dates:<br>05/09/11 - 05/19/11                                                                                         | EUT Type:<br>1900 GSM/GPRS Tablet with Bluetooth and WLAN |                                                                                       | Page 31 of 40                   |

## 17 MEASUREMENT UNCERTAINTIES

Applicable for 800 – 3000 MHz.

| a                                                                                | b                    | c             | d              | e=<br>f(d,k) | f                     | g                        | h =<br>c x f/e                 | i =<br>c x g/e                   | k              |
|----------------------------------------------------------------------------------|----------------------|---------------|----------------|--------------|-----------------------|--------------------------|--------------------------------|----------------------------------|----------------|
| Uncertainty<br>Component                                                         | IEEE<br>1528<br>Sec. | Tol.<br>(± %) | Prob.<br>Dist. | Div.         | c <sub>i</sub><br>1gm | c <sub>i</sub><br>10 gms | 1gm<br>u <sub>i</sub><br>(± %) | 10gms<br>u <sub>i</sub><br>(± %) | v <sub>i</sub> |
| <b>Measurement System</b>                                                        |                      |               |                |              |                       |                          |                                |                                  |                |
| Probe Calibration                                                                | E.2.1                | 6.0           | N              | 1            | 1.0                   | 1.0                      | 6.0                            | 6.0                              | ∞              |
| Axial Isotropy                                                                   | E.2.2                | 0.25          | N              | 1            | 0.7                   | 0.7                      | 0.2                            | 0.2                              | ∞              |
| Hemishperical Isotropy                                                           | E.2.2                | 1.3           | N              | 1            | 1.0                   | 1.0                      | 1.3                            | 1.3                              | ∞              |
| Boundary Effect                                                                  | E.2.3                | 0.4           | N              | 1            | 1.0                   | 1.0                      | 0.4                            | 0.4                              | ∞              |
| Linearity                                                                        | E.2.4                | 0.3           | N              | 1            | 1.0                   | 1.0                      | 0.3                            | 0.3                              | ∞              |
| System Detection Limits                                                          | E.2.5                | 5.1           | N              | 1            | 1.0                   | 1.0                      | 5.1                            | 5.1                              | ∞              |
| Readout Electronics                                                              | E.2.6                | 1.0           | N              | 1            | 1.0                   | 1.0                      | 1.0                            | 1.0                              | ∞              |
| Response Time                                                                    | E.2.7                | 0.8           | R              | 1.73         | 1.0                   | 1.0                      | 0.5                            | 0.5                              | ∞              |
| Integration Time                                                                 | E.2.8                | 2.6           | R              | 1.73         | 1.0                   | 1.0                      | 1.5                            | 1.5                              | ∞              |
| RF Ambient Conditions                                                            | E.6.1                | 3.0           | R              | 1.73         | 1.0                   | 1.0                      | 1.7                            | 1.7                              | ∞              |
| Probe Positioner Mechanical Tolerance                                            | E.6.2                | 0.4           | R              | 1.73         | 1.0                   | 1.0                      | 0.2                            | 0.2                              | ∞              |
| Probe Positioning w/ respect to Phantom                                          | E.6.3                | 2.9           | R              | 1.73         | 1.0                   | 1.0                      | 1.7                            | 1.7                              | ∞              |
| Extrapolation, Interpolation & Integration algorithms for<br>Max. SAR Evaluation | E.5                  | 1.0           | R              | 1.73         | 1.0                   | 1.0                      | 0.6                            | 0.6                              | ∞              |
| <b>Test Sample Related</b>                                                       |                      |               |                |              |                       |                          |                                |                                  |                |
| Test Sample Positioning                                                          | E.4.2                | 6.0           | N              | 1            | 1.0                   | 1.0                      | 6.0                            | 6.0                              | 287            |
| Device Holder Uncertainty                                                        | E.4.1                | 3.32          | R              | 1.73         | 1.0                   | 1.0                      | 1.9                            | 1.9                              | ∞              |
| Output Power Variation - SAR drift measurement                                   | 6.6.2                | 5.0           | R              | 1.73         | 1.0                   | 1.0                      | 2.9                            | 2.9                              | ∞              |
| <b>Phantom &amp; Tissue Parameters</b>                                           |                      |               |                |              |                       |                          |                                |                                  |                |
| Phantom Uncertainty (Shape & Thickness tolerances)                               | E.3.1                | 4.0           | R              | 1.73         | 1.0                   | 1.0                      | 2.3                            | 2.3                              | ∞              |
| Liquid Conductivity - deviation from target values                               | E.3.2                | 5.0           | R              | 1.73         | 0.64                  | 0.43                     | 1.8                            | 1.2                              | ∞              |
| Liquid Conductivity - measurement uncertainty                                    | E.3.3                | 3.8           | N              | 1            | 0.64                  | 0.43                     | 2.4                            | 1.6                              | 6              |
| Liquid Permittivity - deviation from target values                               | E.3.2                | 5.0           | R              | 1.73         | 0.60                  | 0.49                     | 1.7                            | 1.4                              | ∞              |
| Liquid Permittivity - measurement uncertainty                                    | E.3.3                | 4.5           | N              | 1            | 0.60                  | 0.49                     | 2.7                            | 2.2                              | 6              |
| <b>Combined Standard Uncertainty (k=1)</b>                                       |                      |               |                |              |                       |                          | RSS                            | 12.1                             | 11.7           |
| <b>Expanded Uncertainty</b><br>(95% CONFIDENCE LEVEL)                            |                      |               |                |              |                       |                          | k=2                            | 24.2                             | 23.5           |

The above measurement uncertainties are according to IEEE Std. 1528-2003

|                                  |                                                                                     |                                                           |                                                                                       |                                 |
|----------------------------------|-------------------------------------------------------------------------------------|-----------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------|
| FCC ID: A3LSHWM300S              |  | SAR COMPLIANCE REPORT                                     |  | Reviewed by:<br>Quality Manager |
| Filename:<br>0Y1105090848-R3.A3L | Test Dates:<br>05/09/11 - 05/19/11                                                  | EUT Type:<br>1900 GSM/GPRS Tablet with Bluetooth and WLAN |                                                                                       | Page 32 of 40                   |

Applicable for 5 GHz:

| a                                                                             | b                    | c             | d              | e=<br>f(d,k) | f                     | g                        | h =<br>c x f/e                 | i =<br>c x g/e                   | k              |
|-------------------------------------------------------------------------------|----------------------|---------------|----------------|--------------|-----------------------|--------------------------|--------------------------------|----------------------------------|----------------|
| Uncertainty<br>Component                                                      | IEEE<br>1528<br>Sec. | Tol.<br>(± %) | Prob.<br>Dist. | Div.         | c <sub>i</sub><br>1gm | c <sub>i</sub><br>10 gms | 1gm<br>u <sub>i</sub><br>(± %) | 10gms<br>u <sub>i</sub><br>(± %) | v <sub>i</sub> |
| <b>Measurement System</b>                                                     |                      |               |                |              |                       |                          |                                |                                  |                |
| Probe Calibration                                                             | E.2.1                | 6.55          | N              | 1            | 1.0                   | 1.0                      | 6.55                           | 6.55                             | ∞              |
| Axial Isotropy                                                                | E.2.2                | 0.25          | N              | 1            | 0.7                   | 0.7                      | 0.2                            | 0.2                              | ∞              |
| Hemishperical Isotropy                                                        | E.2.2                | 1.3           | N              | 1            | 1.0                   | 1.0                      | 1.3                            | 1.3                              | ∞              |
| Boundary Effect                                                               | E.2.3                | 0.4           | N              | 1            | 1.0                   | 1.0                      | 0.4                            | 0.4                              | ∞              |
| Linearity                                                                     | E.2.4                | 0.3           | N              | 1            | 1.0                   | 1.0                      | 0.3                            | 0.3                              | ∞              |
| System Detection Limits                                                       | E.2.5                | 5.1           | N              | 1            | 1.0                   | 1.0                      | 5.1                            | 5.1                              | ∞              |
| Readout Electronics                                                           | E.2.6                | 1.0           | N              | 1            | 1.0                   | 1.0                      | 1.0                            | 1.0                              | ∞              |
| Response Time                                                                 | E.2.7                | 0.8           | R              | 1.73         | 1.0                   | 1.0                      | 0.5                            | 0.5                              | ∞              |
| Integration Time                                                              | E.2.8                | 2.6           | R              | 1.73         | 1.0                   | 1.0                      | 1.5                            | 1.5                              | ∞              |
| RF Ambient Conditions                                                         | E.6.1                | 3.0           | R              | 1.73         | 1.0                   | 1.0                      | 1.7                            | 1.7                              | ∞              |
| Probe Positioner Mechanical Tolerance                                         | E.6.2                | 0.4           | R              | 1.73         | 1.0                   | 1.0                      | 0.2                            | 0.2                              | ∞              |
| Probe Positioning w/ respect to Phantom                                       | E.6.3                | 2.9           | R              | 1.73         | 1.0                   | 1.0                      | 1.7                            | 1.7                              | ∞              |
| Extrapolation, Interpolation & Integration algorithms for Max. SAR Evaluation | E.5                  | 1.0           | R              | 1.73         | 1.0                   | 1.0                      | 0.6                            | 0.6                              | ∞              |
| <b>Test Sample Related</b>                                                    |                      |               |                |              |                       |                          |                                |                                  |                |
| Test Sample Positioning                                                       | E.4.2                | 6.0           | N              | 1            | 1.0                   | 1.0                      | 6.0                            | 6.0                              | 287            |
| Device Holder Uncertainty                                                     | E.4.1                | 3.32          | R              | 1.73         | 1.0                   | 1.0                      | 1.9                            | 1.9                              | ∞              |
| Output Power Variation - SAR drift measurement                                | 6.6.2                | 5.0           | R              | 1.73         | 1.0                   | 1.0                      | 2.9                            | 2.9                              | ∞              |
| <b>Phantom &amp; Tissue Parameters</b>                                        |                      |               |                |              |                       |                          |                                |                                  |                |
| Phantom Uncertainty (Shape & Thickness tolerances)                            | E.3.1                | 4.0           | R              | 1.73         | 1.0                   | 1.0                      | 2.3                            | 2.3                              | ∞              |
| Liquid Conductivity - deviation from target values                            | E.3.2                | 5.0           | R              | 1.73         | 0.64                  | 0.43                     | 1.8                            | 1.2                              | ∞              |
| Liquid Conductivity - measurement uncertainty                                 | E.3.3                | 3.8           | N              | 1            | 0.64                  | 0.43                     | 2.4                            | 1.6                              | 6              |
| Liquid Permittivity - deviation from target values                            | E.3.2                | 5.0           | R              | 1.73         | 0.60                  | 0.49                     | 1.7                            | 1.4                              | ∞              |
| Liquid Permittivity - measurement uncertainty                                 | E.3.3                | 4.5           | N              | 1            | 0.60                  | 0.49                     | 2.7                            | 2.2                              | 6              |
| <b>Combined Standard Uncertainty (k=1)</b>                                    |                      |               |                | RSS          |                       |                          | 12.4                           | 12.0                             | 299            |
| <b>Expanded Uncertainty</b><br>(95% CONFIDENCE LEVEL)                         |                      |               |                | k=2          |                       |                          | 24.7                           | 24.0                             |                |

The above measurement uncertainties are according to IEEE Std. 1528-2003

|                                  |                                                                                     |                                                           |                                                                                       |                                 |
|----------------------------------|-------------------------------------------------------------------------------------|-----------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------|
| FCC ID: A3LSHWM300S              |  | SAR COMPLIANCE REPORT                                     |  | Reviewed by:<br>Quality Manager |
| Filename:<br>0Y1105090848-R3.A3L | Test Dates:<br>05/09/11 - 05/19/11                                                  | EUT Type:<br>1900 GSM/GPRS Tablet with Bluetooth and WLAN |                                                                                       | Page 33 of 40                   |

## 18 CONCLUSION

### 18.1 Measurement Conclusion

The SAR evaluation indicates that the EUT complies with the RF radiation exposure limits of the FCC and Industry Canada, with respect to all parameters subject to this test. These measurements were taken to simulate the RF effects of RF exposure under worst-case conditions. Precise laboratory measures were taken to assure repeatability of the tests. The results and statements relate only to the item(s) tested.

Please note that the absorption and distribution of electromagnetic energy in the body are very complex phenomena that depend on the mass, shape, and size of the body, the orientation of the body with respect to the field vectors, and the electrical properties of both the body and the environment. Other variables that may play a substantial role in possible biological effects are those that characterize the environment (e.g. ambient temperature, air velocity, relative humidity, and body insulation) and those that characterize the individual (e.g. age, gender, activity level, debilitation, or disease). Because various factors may interact with one another to vary the specific biological outcome of an exposure to electromagnetic fields, any protection guide should consider maximal amplification of biological effects as a result of field-body interactions, environmental conditions, and physiological variables. [3]

|                                         |                                                                                     |                                                                  |                                                                                       |                                        |
|-----------------------------------------|-------------------------------------------------------------------------------------|------------------------------------------------------------------|---------------------------------------------------------------------------------------|----------------------------------------|
| <b>FCC ID:</b> A3LSHWM300S              |  | <b>SAR COMPLIANCE REPORT</b>                                     |  | <b>Reviewed by:</b><br>Quality Manager |
| <b>Filename:</b><br>0Y1105090848-R3.A3L | <b>Test Dates:</b><br>05/09/11 - 05/19/11                                           | <b>EUT Type:</b><br>1900 GSM/GPRS Tablet with Bluetooth and WLAN |                                                                                       | Page 34 of 40                          |

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|                                         |                                                                                     |                                                                  |                                                                                       |                                        |
|-----------------------------------------|-------------------------------------------------------------------------------------|------------------------------------------------------------------|---------------------------------------------------------------------------------------|----------------------------------------|
| <b>FCC ID:</b> A3LSHWM300S              |  | <b>SAR COMPLIANCE REPORT</b>                                     |  | <b>Reviewed by:</b><br>Quality Manager |
| <b>Filename:</b><br>0Y1105090848-R3.A3L | <b>Test Dates:</b><br>05/09/11 - 05/19/11                                           | <b>EUT Type:</b><br>1900 GSM/GPRS Tablet with Bluetooth and WLAN |                                                                                       | Page 35 of 40                          |

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|                                         |                                                                                     |                                                                  |                                                                                       |                                        |
|-----------------------------------------|-------------------------------------------------------------------------------------|------------------------------------------------------------------|---------------------------------------------------------------------------------------|----------------------------------------|
| <b>FCC ID:</b> A3LSHWM300S              |  | <b>SAR COMPLIANCE REPORT</b>                                     |  | <b>Reviewed by:</b><br>Quality Manager |
| <b>Filename:</b><br>0Y1105090848-R3.A3L | <b>Test Dates:</b><br>05/09/11 - 05/19/11                                           | <b>EUT Type:</b><br>1900 GSM/GPRS Tablet with Bluetooth and WLAN |                                                                                       | Page 36 of 40                          |

## **APPENDIX A: SAR TEST DATA**

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSHWM300S; Type: 1900 GSM/GPRS Tablet with Bluetooth and WLAN;  
Serial: FCC #3**

Communication System: GSM1900; Frequency: 1880 MHz; Duty Cycle: 1:8.3

Medium: 1900 Body Medium parameters used:

$f = 1880 \text{ MHz}$ ;  $\sigma = 1.45 \text{ mho/m}$ ;  $\epsilon_r = 50.9$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 0.0 cm

Test Date: 05-19-2011; Ambient Temp: 24.1°C; Tissue Temp: 22.5°C

Probe: EX3DV4 - SN3561; ConvF(6.59, 6.59, 6.59); Calibrated: 8/19/2010

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn649; Calibrated: 2/21/2011

Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1406

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Mode: GSM 1900, Body SAR, Back side, Mid.ch**

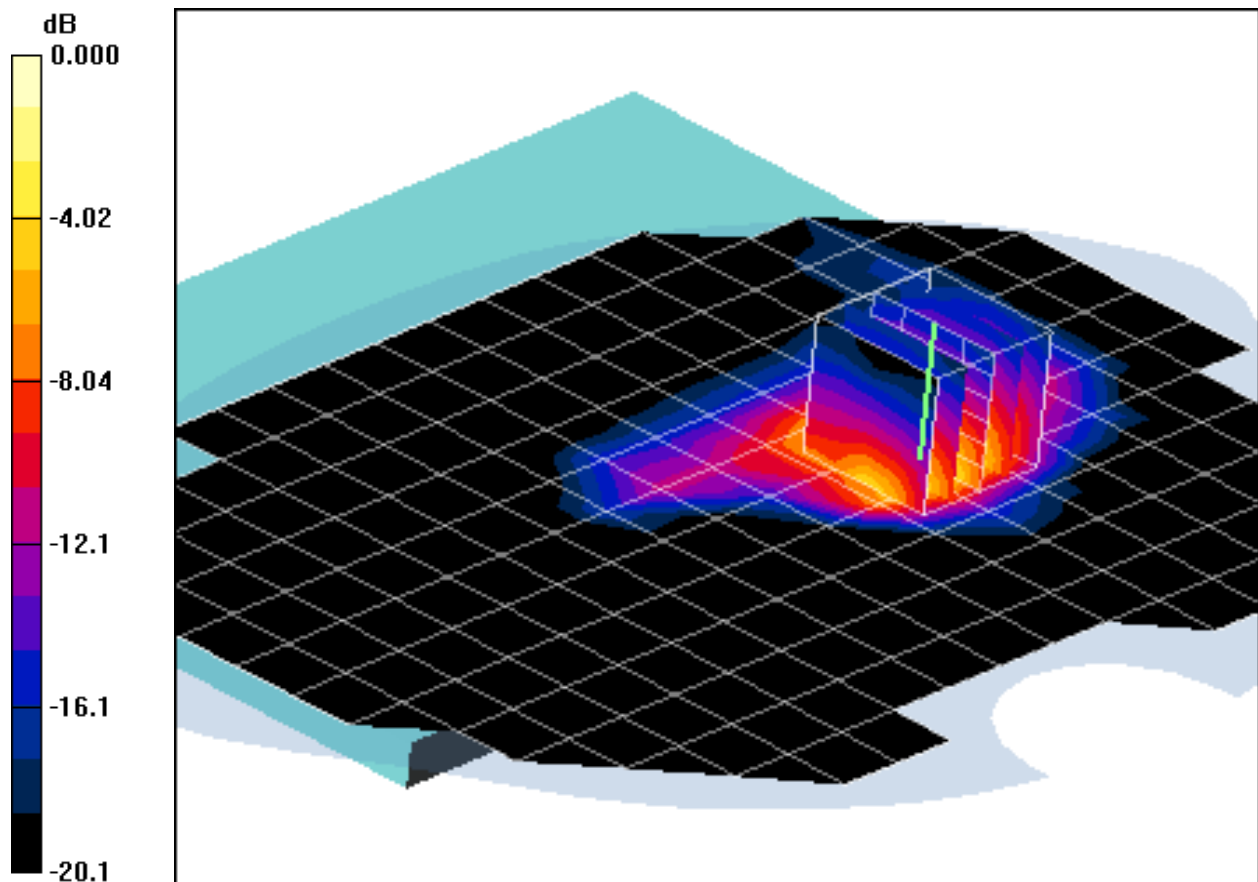
**Area Scan (13x18x1):** Measurement grid:  $dx=15\text{mm}$ ,  $dy=15\text{mm}$

**Zoom Scan (5x5x7)/Cube 0:** Measurement grid:  $dx=8\text{mm}$ ,  $dy=8\text{mm}$ ,  $dz=5\text{mm}$

Reference Value = 15.1 V/m

Peak SAR (extrapolated) = 1.03 W/kg

**SAR(1 g) = 0.469 mW/g; SAR(10 g) = 0.212 mW/g**



0 dB = 0.518mW/g

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSHWM300S; Type: 1900 GSM/GPRS Tablet with Bluetooth and WLAN;  
Serial: FCC #3**

Communication System: GSM1900; Frequency: 1880 MHz; Duty Cycle: 1:8.3

Medium: 1900 Body Medium parameters used:

$f = 1880 \text{ MHz}$ ;  $\sigma = 1.45 \text{ mho/m}$ ;  $\epsilon_r = 50.9$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 0.0 cm

Test Date: 05-19-2011; Ambient Temp: 24.1°C; Tissue Temp: 22.5°C

Probe: EX3DV4 - SN3561; ConvF(6.59, 6.59, 6.59); Calibrated: 8/19/2010

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn649; Calibrated: 2/21/2011

Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1406

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Mode: GSM 1900, Body SAR, Back side, Mid.ch**

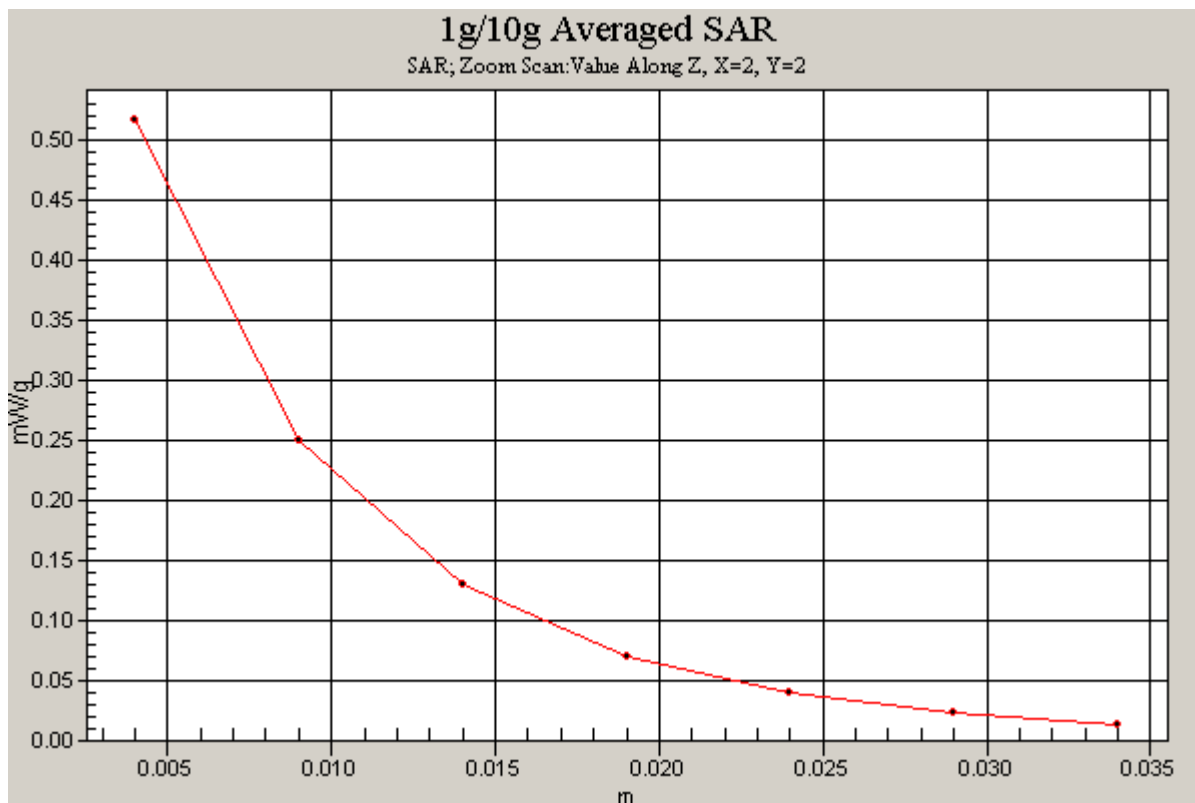
**Area Scan (13x18x1):** Measurement grid: dx=15mm, dy=15mm

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

Reference Value = 15.1 V/m

Peak SAR (extrapolated) = 1.03 W/kg

**SAR(1 g) = 0.469 mW/g; SAR(10 g) = 0.212 mW/g**



# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSHWM300S; Type: 1900 GSM/GPRS Tablet with Bluetooth and WLAN;  
Serial: FCC #2**

Communication System: GSM1900; Frequency: 1880 MHz; Duty Cycle: 1:8.3

Medium: 1900 Body Medium parameters used:

$f = 1880 \text{ MHz}$ ;  $\sigma = 1.45 \text{ mho/m}$ ;  $\epsilon_r = 50.9$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 0.5 cm

Test Date: 05-19-2011; Ambient Temp: 24.1°C; Tissue Temp: 22.5°C

Probe: EX3DV4 - SN3561; ConvF(6.59, 6.59, 6.59); Calibrated: 8/19/2010

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn649; Calibrated: 2/21/2011

Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1406

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Mode: GSM 1900, Body SAR, Top Edge, Mid.ch**

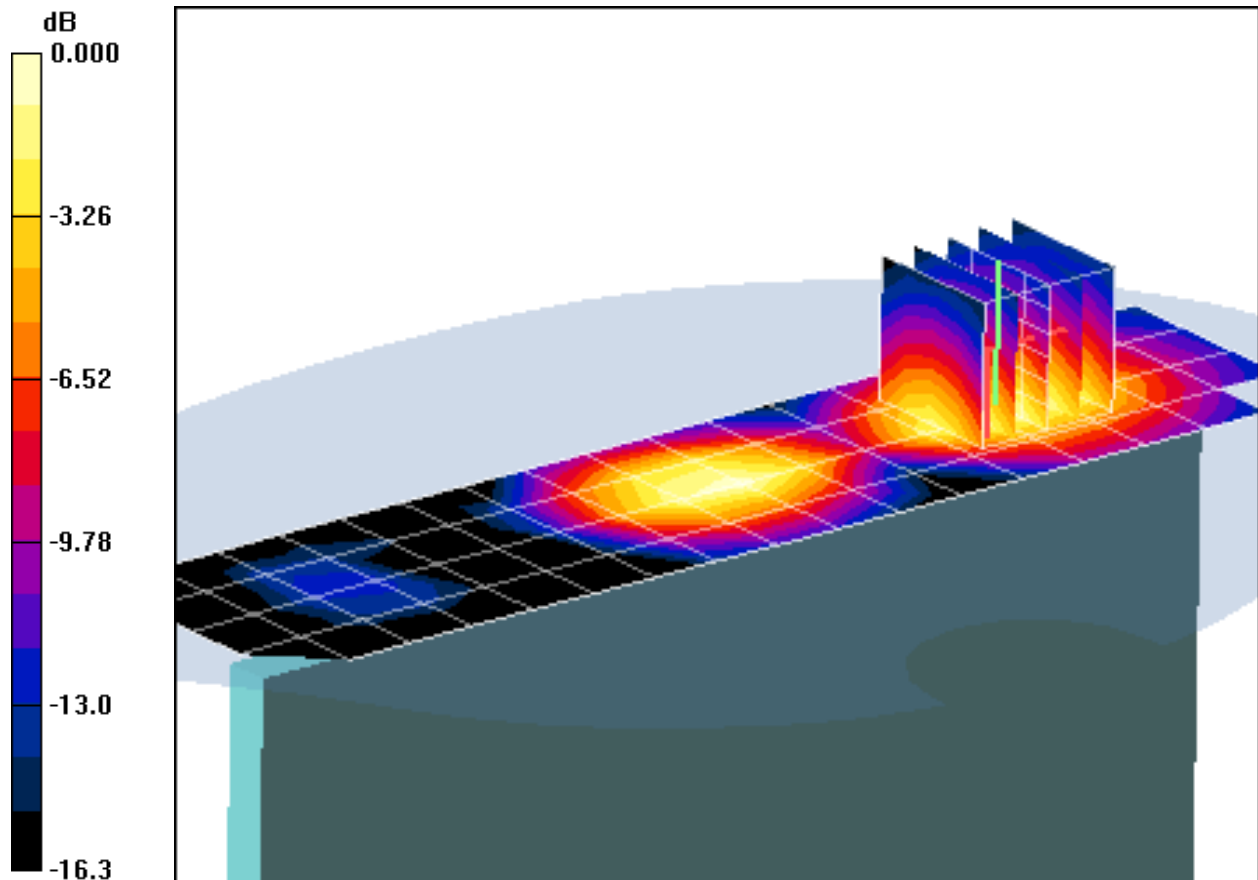
**Area Scan (5x18x1):** Measurement grid:  $dx=15\text{mm}$ ,  $dy=15\text{mm}$

**Zoom Scan (5x5x7)/Cube 0:** Measurement grid:  $dx=8\text{mm}$ ,  $dy=8\text{mm}$ ,  $dz=5\text{mm}$

Reference Value = 12.5 V/m

Peak SAR (extrapolated) = 0.347 W/kg

**SAR(1 g) = 0.210 mW/g; SAR(10 g) = 0.119 mW/g**



0 dB = 0.232mW/g

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSHWM300S; Type: 1900 GSM/GPRS Tablet with Bluetooth and WLAN;  
Serial: FCC #2**

Communication System: GSM1900; Frequency: 1880 MHz; Duty Cycle: 1:8.3

Medium: 1900 Body Medium parameters used:

$f = 1880 \text{ MHz}$ ;  $\sigma = 1.45 \text{ mho/m}$ ;  $\epsilon_r = 50.9$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 0.0 cm

Test Date: 05-19-2011; Ambient Temp: 24.1°C; Tissue Temp: 22.5°C

Probe: EX3DV4 - SN3561; ConvF(6.59, 6.59, 6.59); Calibrated: 8/19/2010

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn649; Calibrated: 2/21/2011

Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1406

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Mode: GSM 1900, Body SAR, Right Edge, Mid.ch**

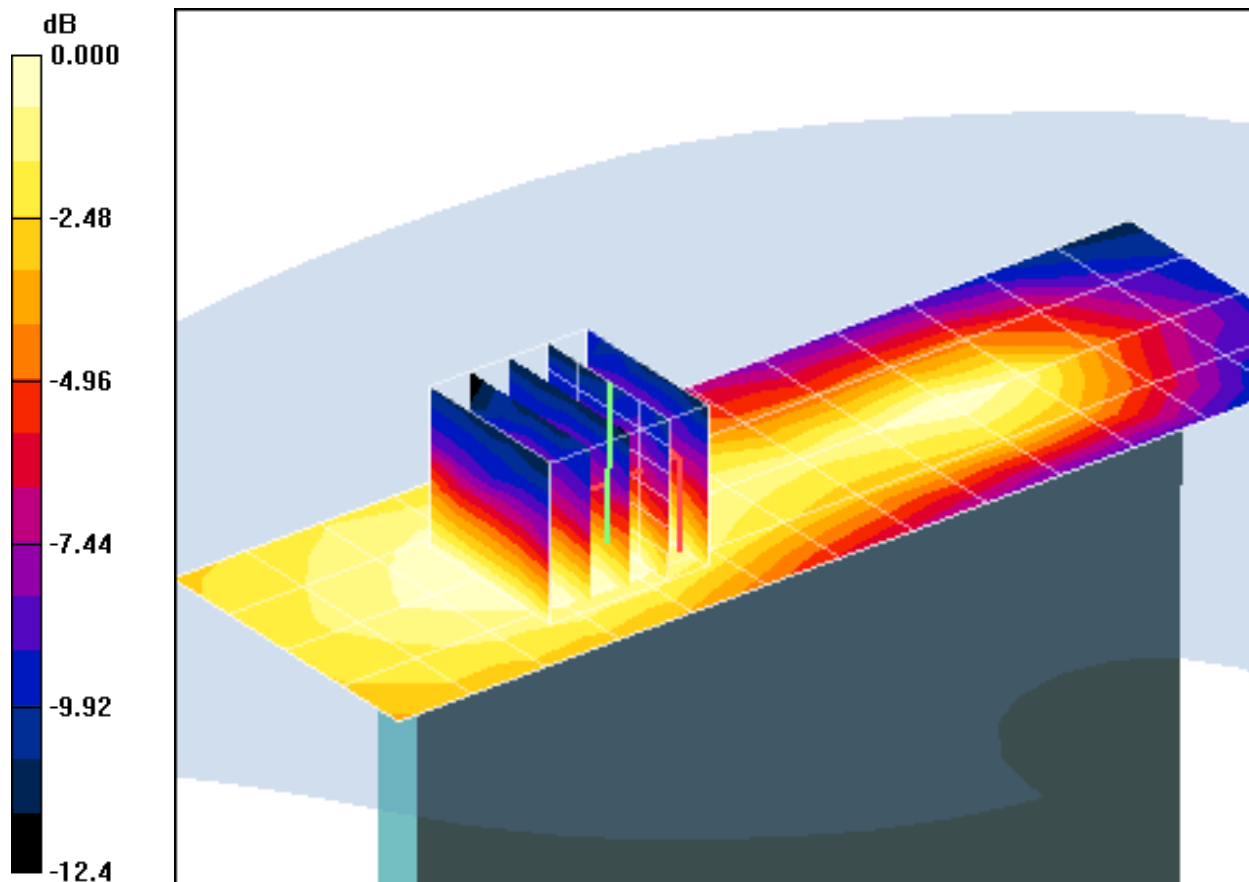
**Area Scan (5x14x1):** Measurement grid: dx=15mm, dy=15mm

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

Reference Value = 5.34 V/m

Peak SAR (extrapolated) = 0.066 W/kg

**SAR(1 g) = 0.041 mW/g; SAR(10 g) = 0.026 mW/g**



0 dB = 0.044mW/g

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSHWM300S; Type: 1900 GSM/GPRS Tablet with Bluetooth and WLAN  
Serial: FCC #3**

Communication System: GSM1900 GPRS; 2 Tx slots; Frequency: 1880 MHz; Duty Cycle: 1:4.15

Medium: 1900 Body Medium parameters used:

$f = 1880 \text{ MHz}$ ;  $\sigma = 1.53 \text{ mho/m}$ ;  $\epsilon_r = 51.4$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 0.0 cm

Test Date: 05-19-2011; Ambient Temp: 24.1°C; Tissue Temp: 22.5°C

Probe: EX3DV4 - SN3550; ConvF(6.77, 6.77, 6.77); Calibrated: 2/14/2011

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn665; Calibrated: 4/20/2011

Phantom: SAM Sub; Type: SAM 4.0; Serial: TP-1357

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Mode: GPRS 1900, Body SAR, Back side, Mid.ch, 2 Tx Slots**

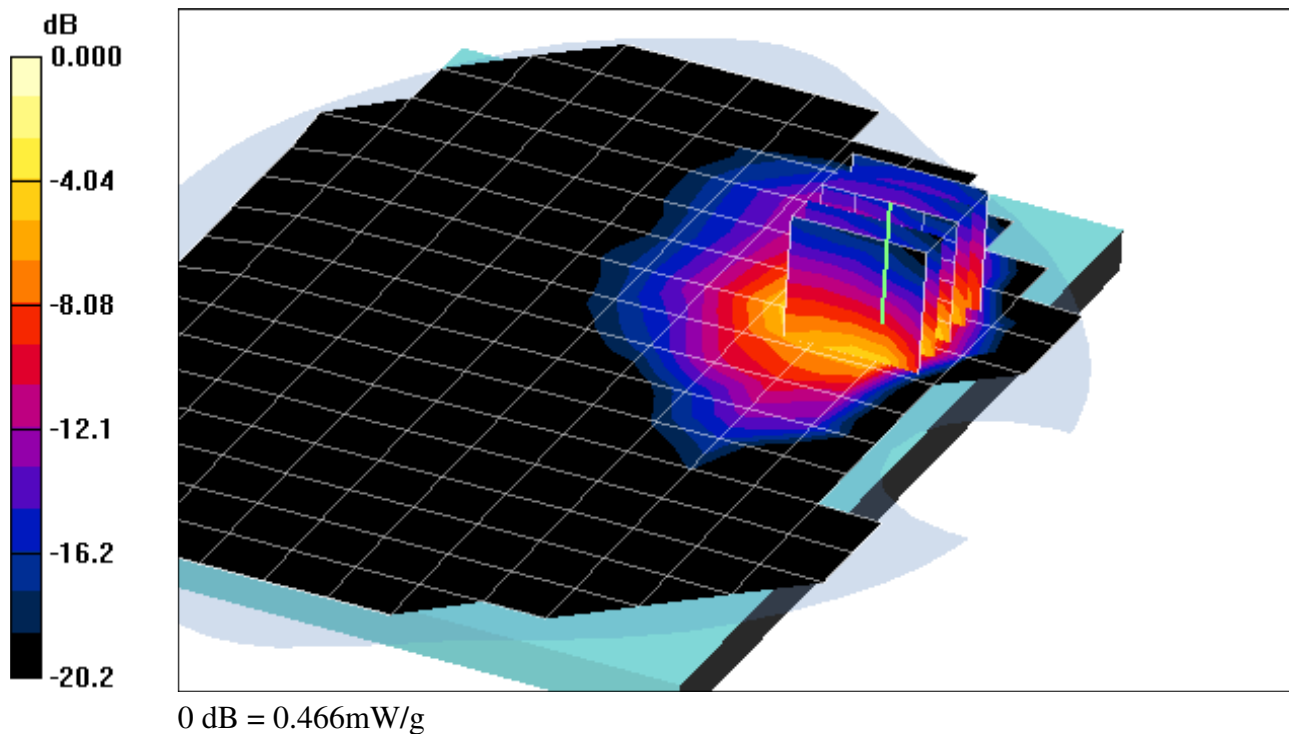
**Area Scan (13x18x1):** Measurement grid:  $dx=15\text{mm}$ ,  $dy=15\text{mm}$

**Zoom Scan (5x5x7)/Cube 0:** Measurement grid:  $dx=8\text{mm}$ ,  $dy=8\text{mm}$ ,  $dz=5\text{mm}$

Reference Value = 17.5 V/ml

Peak SAR (extrapolated) = 0.944 W/kg

**SAR(1 g) = 0.445 mW/g; SAR(10 g) = 0.221 mW/g**



# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSHWM300S; Type: 1900 GSM/GPRS Tablet with Bluetooth and WLAN  
Serial: FCC #2**

Communication System: GSM1900 GPRS; 4 Tx slots; Frequency: 1880 MHz; Duty Cycle: 1:2.076

Medium: 1900 Body Medium parameters used:

$f = 1880 \text{ MHz}$ ;  $\sigma = 1.53 \text{ mho/m}$ ;  $\epsilon_r = 51.4$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 0.5 cm

Test Date: 05-09-2011; Ambient Temp: 23.7°C; Tissue Temp: 22.5°C

Probe: EX3DV4 - SN3550; ConvF(6.77, 6.77, 6.77); Calibrated: 2/14/2011

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn665; Calibrated: 4/20/2011

Phantom: SAM Sub; Type: SAM 4.0; Serial: TP-1357

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Mode: GPRS 1900, Body SAR, Top Edge, Mid.ch, 4 Tx Slots**

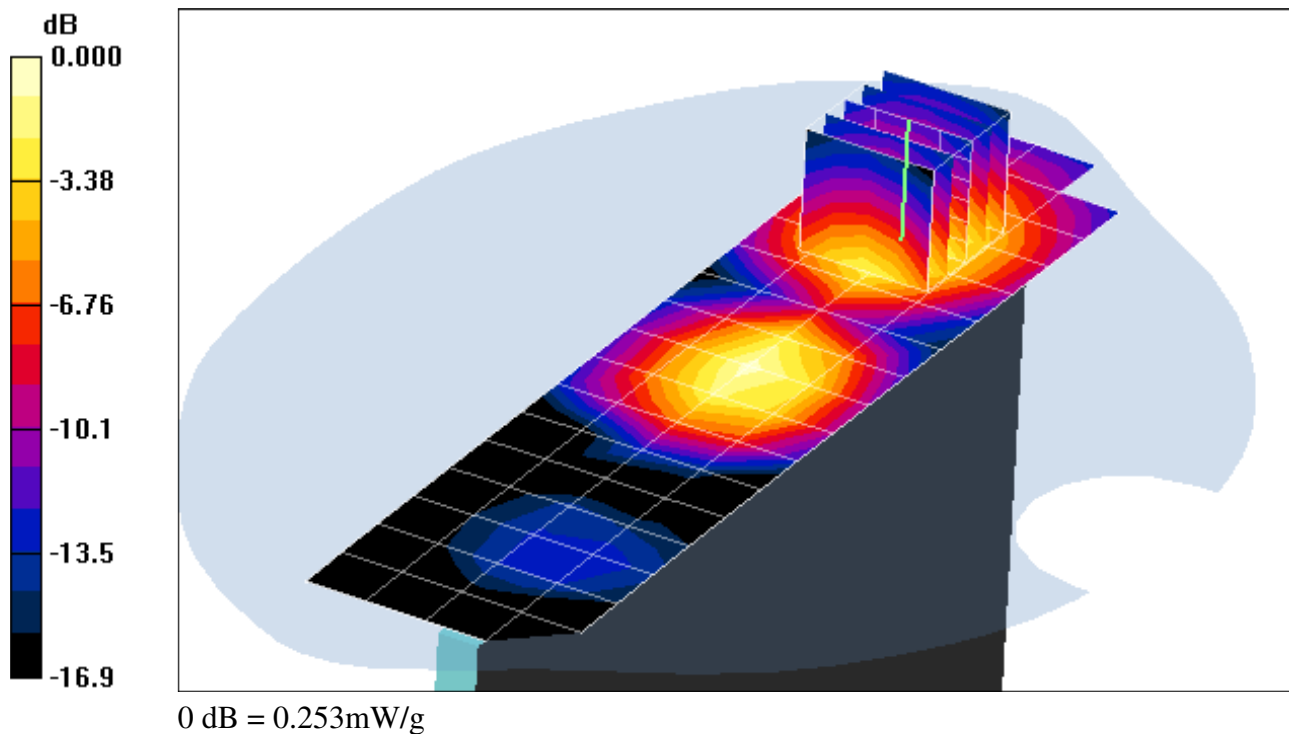
**Area Scan (5x18x1):** Measurement grid:  $dx=15\text{mm}$ ,  $dy=15\text{mm}$

**Zoom Scan (5x5x7)/Cube 0:** Measurement grid:  $dx=8\text{mm}$ ,  $dy=8\text{mm}$ ,  $dz=5\text{mm}$

Reference Value = 12.4 V/m

Peak SAR (extrapolated) = 0.369 W/kg

**SAR(1 g) = 0.227 mW/g; SAR(10 g) = 0.130 mW/g**



# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSHWM300S; Type: 1900 GSM/GPRS Tablet with Bluetooth and WLAN  
Serial: FCC #2**

Communication System: GSM1900 GPRS; 4 Tx slots; Frequency: 1880 MHz; Duty Cycle: 1:2.076

Medium: 1900 Body Medium parameters used:

$f = 1880 \text{ MHz}$ ;  $\sigma = 1.53 \text{ mho/m}$ ;  $\epsilon_r = 51.4$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 0.0 cm

Test Date: 05-09-2011; Ambient Temp: 23.7°C; Tissue Temp: 22.5°C

Probe: EX3DV4 - SN3550; ConvF(6.77, 6.77, 6.77); Calibrated: 2/14/2011

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn665; Calibrated: 4/20/2011

Phantom: SAM Sub; Type: SAM 4.0; Serial: TP-1357

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Mode: GPRS 1900, Body SAR, Right Edge, Mid.ch, 4 Tx Slots**

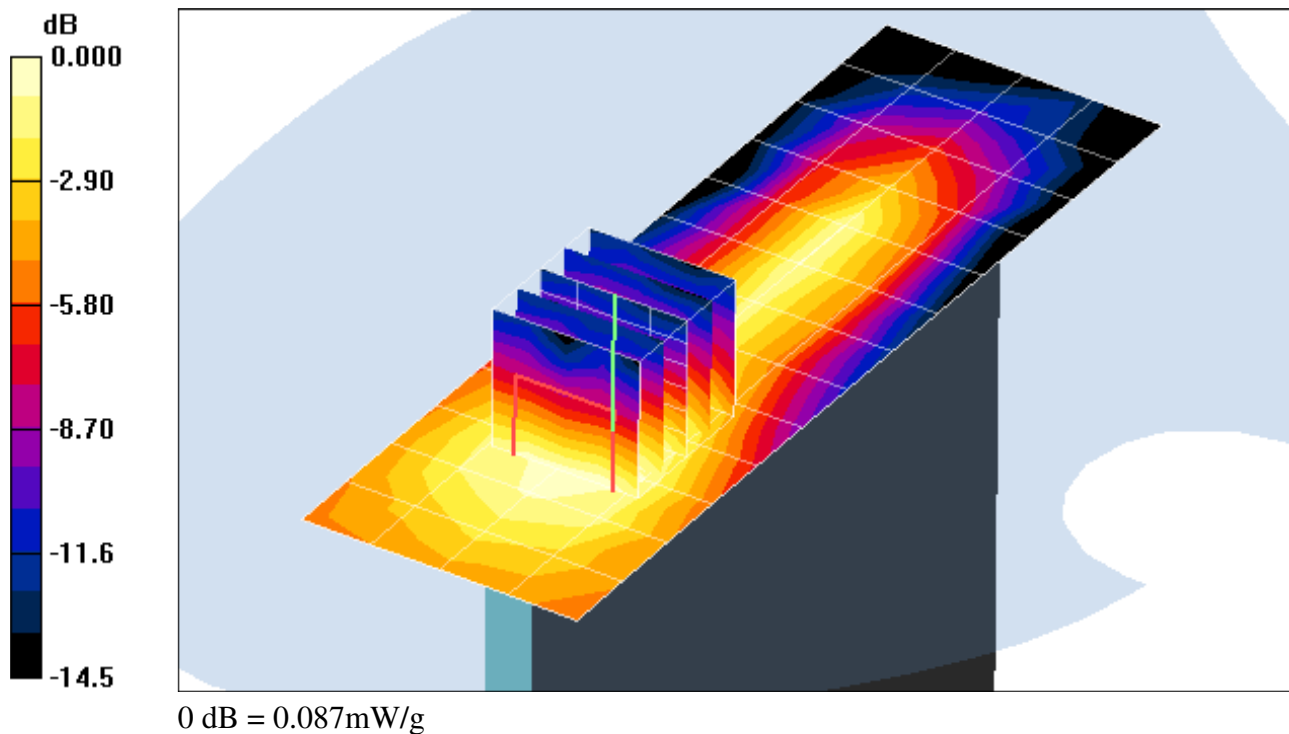
**Area Scan (5x14x1):** Measurement grid:  $dx=15\text{mm}$ ,  $dy=15\text{mm}$

**Zoom Scan (5x5x7)/Cube 0:** Measurement grid:  $dx=8\text{mm}$ ,  $dy=8\text{mm}$ ,  $dz=5\text{mm}$

Reference Value = 7.48 V/m

Peak SAR (extrapolated) = 0.134 W/kg

**SAR(1 g) = 0.081 mW/g; SAR(10 g) = 0.051 mW/g**



# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSHWM300S; Type: 1900 GSM/GPRS Tablet with Bluetooth and WLAN;  
Serial: FCC #2**

Communication System: IEEE 802.11g; Frequency: 2462 MHz; Duty Cycle: 1:1

Medium: 2450 Body Medium parameters used (interpolated):

$f = 2462 \text{ MHz}$ ;  $\sigma = 2.03 \text{ mho/m}$ ;  $\epsilon_r = 50.9$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 0.0 cm

Test Date: 05-16-2011; Ambient Temp: 24.8°C; Tissue Temp: 22.9°C

Probe: ES3DV2 - SN3022; ConvF(4.06, 4.06, 4.06); Calibrated: 9/21/2010

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn704; Calibrated: 3/17/2011

Phantom: SAM with CRP; Type: SAM; Serial: TP1375

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Mode: IEEE 802.11g, Body SAR, Ch.11, 6 Mbps, Back Side**

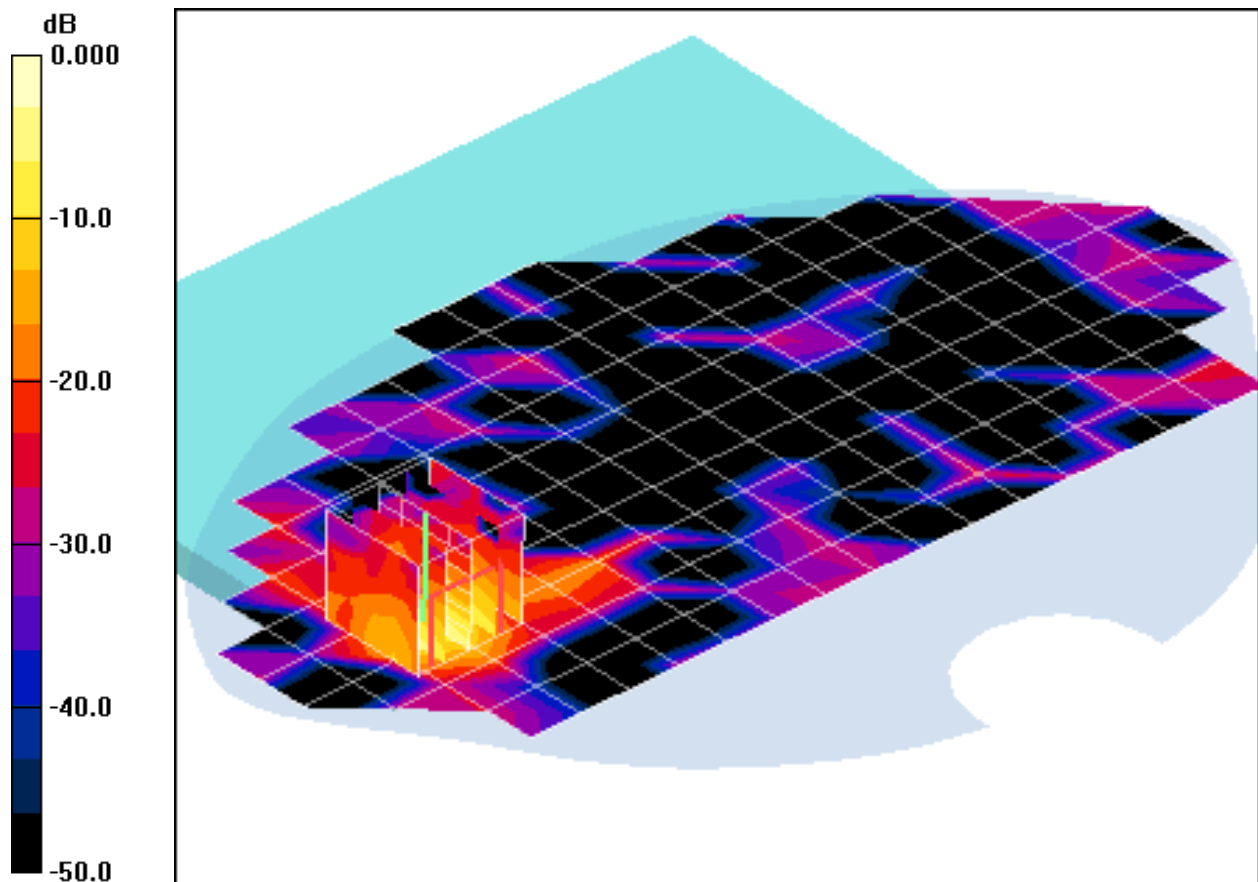
**Area Scan (11x20x1):** Measurement grid:  $dx=15\text{mm}$ ,  $dy=15\text{mm}$

**Zoom Scan (5x5x7)/Cube 0:** Measurement grid:  $dx=8\text{mm}$ ,  $dy=8\text{mm}$ ,  $dz=5\text{mm}$

Reference Value = 7.75 V/m

Peak SAR (extrapolated) = 0.707 W/kg

**SAR(1 g) = 0.210 mW/g; SAR(10 g) = 0.066 mW/g**



0 dB = 0.356mW/g

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSHWM300S; Type: 1900 GSM/GPRS Tablet with Bluetooth and WLAN;  
Serial: FCC #2**

Communication System: IEEE 802.11g; Frequency: 2462 MHz; Duty Cycle: 1:1

Medium: 2450 Body Medium parameters used (interpolated):

$f = 2462 \text{ MHz}$ ;  $\sigma = 2.03 \text{ mho/m}$ ;  $\epsilon_r = 50.9$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 0.0 cm

Test Date: 05-16-2011; Ambient Temp: 24.8°C; Tissue Temp: 22.9°C

Probe: ES3DV2 - SN3022; ConvF(4.06, 4.06, 4.06); Calibrated: 9/21/2010

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn704; Calibrated: 3/17/2011

Phantom: SAM with CRP; Type: SAM; Serial: TP1375

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Mode: IEEE 802.11g, Body SAR, Ch.11, 6 Mbps, Back Side**

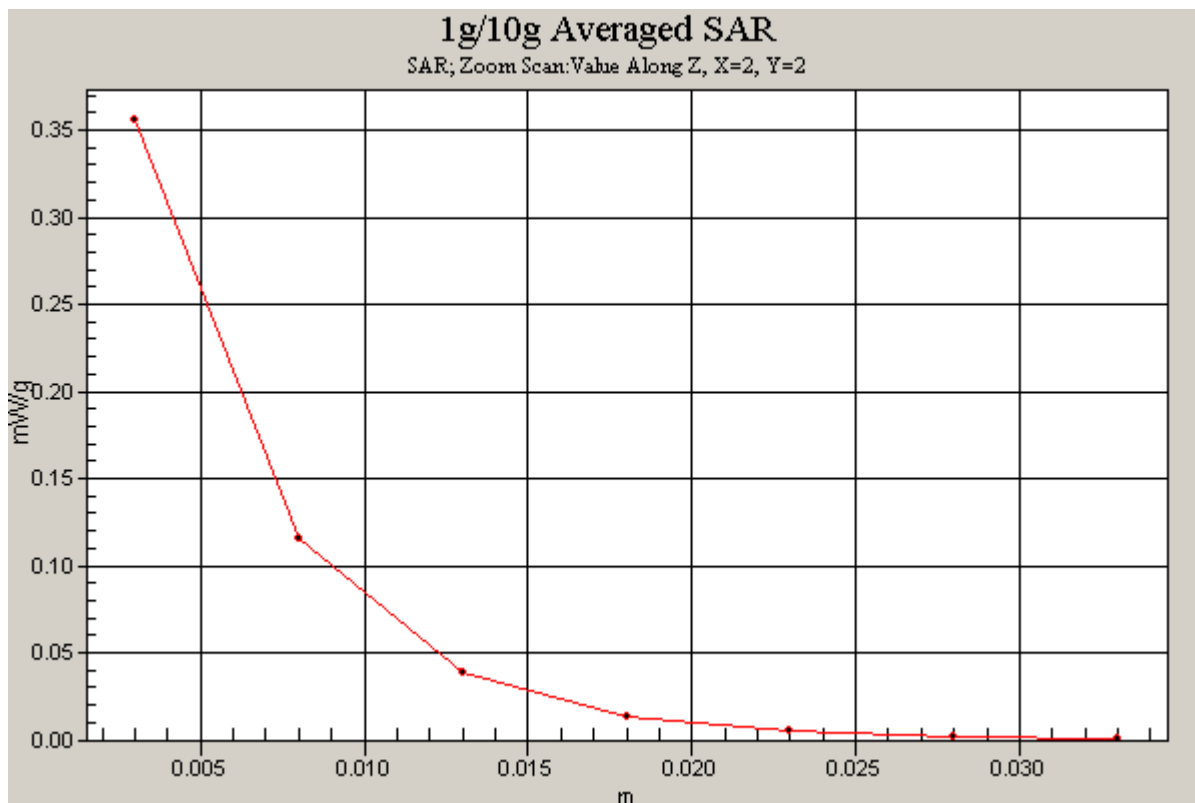
**Area Scan (11x20x1):** Measurement grid: dx=15mm, dy=15mm

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

Reference Value = 7.75 V/m

Peak SAR (extrapolated) = 0.707 W/kg

**SAR(1 g) = 0.210 mW/g; SAR(10 g) = 0.066 mW/g**



# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSHWM300S; Type: 1900 GSM/GPRS Tablet with Bluetooth and WLAN;  
Serial: FCC #2**

Communication System: IEEE 802.11g; Frequency: 2462 MHz; Duty Cycle: 1:1

Medium: 2450 Body Medium parameters used (interpolated):

$f = 2462 \text{ MHz}$ ;  $\sigma = 2.03 \text{ mho/m}$ ;  $\epsilon_r = 50.9$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 0.0 cm

Test Date: 05-16-2011; Ambient Temp: 24.8°C; Tissue Temp: 22.9°C

Probe: ES3DV2 - SN3022; ConvF(4.06, 4.06, 4.06); Calibrated: 9/21/2010

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn704; Calibrated: 3/17/2011

Phantom: SAM with CRP; Type: SAM; Serial: TP1375

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Mode: IEEE 802.11g, Body SAR, Ch.11, 6 Mbps, Top Side**

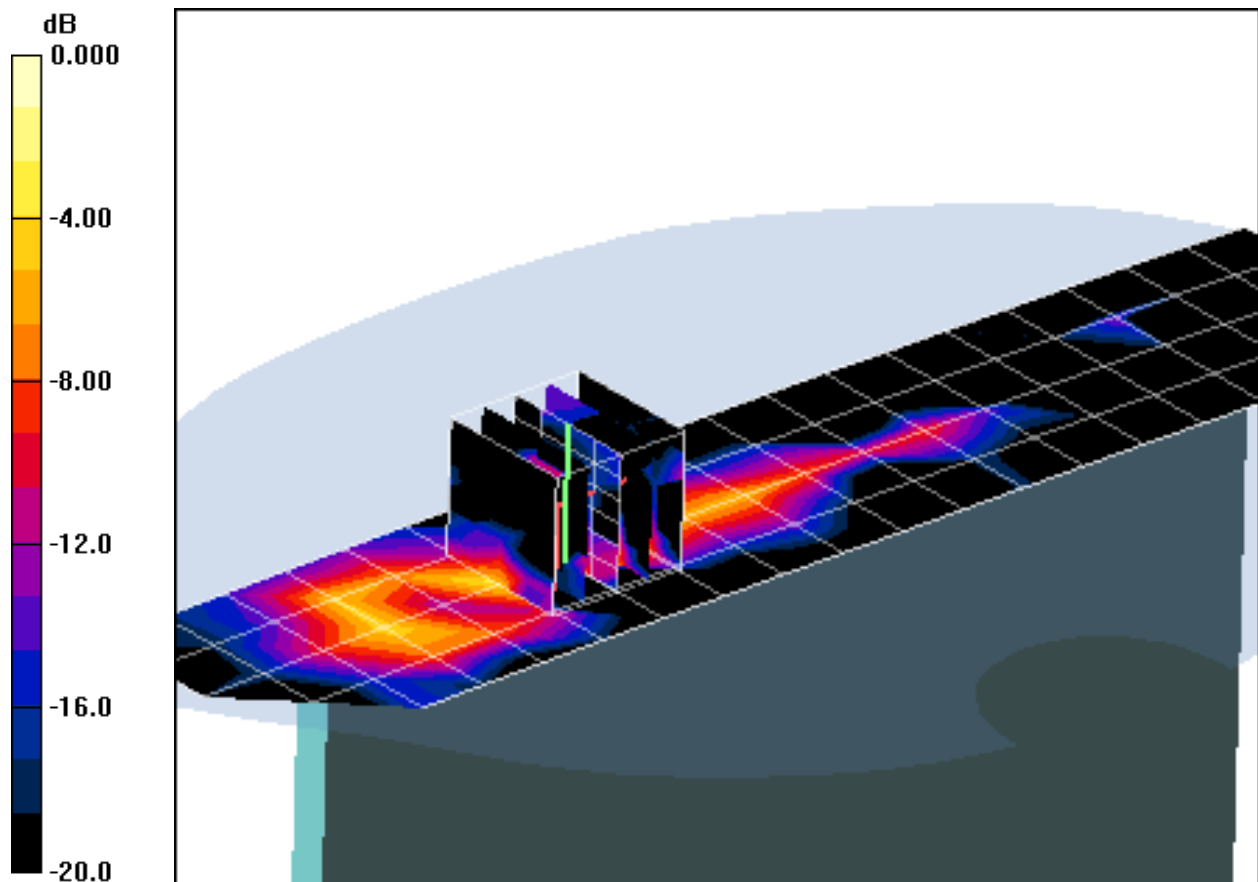
**Area Scan (5x20x1):** Measurement grid:  $dx=15\text{mm}$ ,  $dy=15\text{mm}$

**Zoom Scan (5x5x7)/Cube 0:** Measurement grid:  $dx=8\text{mm}$ ,  $dy=8\text{mm}$ ,  $dz=5\text{mm}$

Reference Value = 3.69 V/m

Peak SAR (extrapolated) = 0.054 W/kg

**SAR(1 g) = 0.024 mW/g; SAR(10 g) = 0.00724 mW/g**



0 dB = 0.035mW/g

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSHWM300S; Type: 1900 GSM/GPRS Tablet with Bluetooth and WLAN;  
Serial: FCC #2**

Communication System: IEEE 802.11g; Frequency: 2462 MHz; Duty Cycle: 1:1

Medium: 2450 Body Medium parameters used (interpolated):

$f = 2462 \text{ MHz}$ ;  $\sigma = 2.03 \text{ mho/m}$ ;  $\epsilon_r = 50.9$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 0.0 cm

Test Date: 05-16-2011; Ambient Temp: 24.8°C; Tissue Temp: 22.9°C

Probe: ES3DV2 - SN3022; ConvF(4.06, 4.06, 4.06); Calibrated: 9/21/2010

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn704; Calibrated: 3/17/2011

Phantom: SAM with CRP; Type: SAM; Serial: TP1375

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Mode: IEEE 802.11g, Body SAR, Ch.11, 6 Mbps, Left Side**

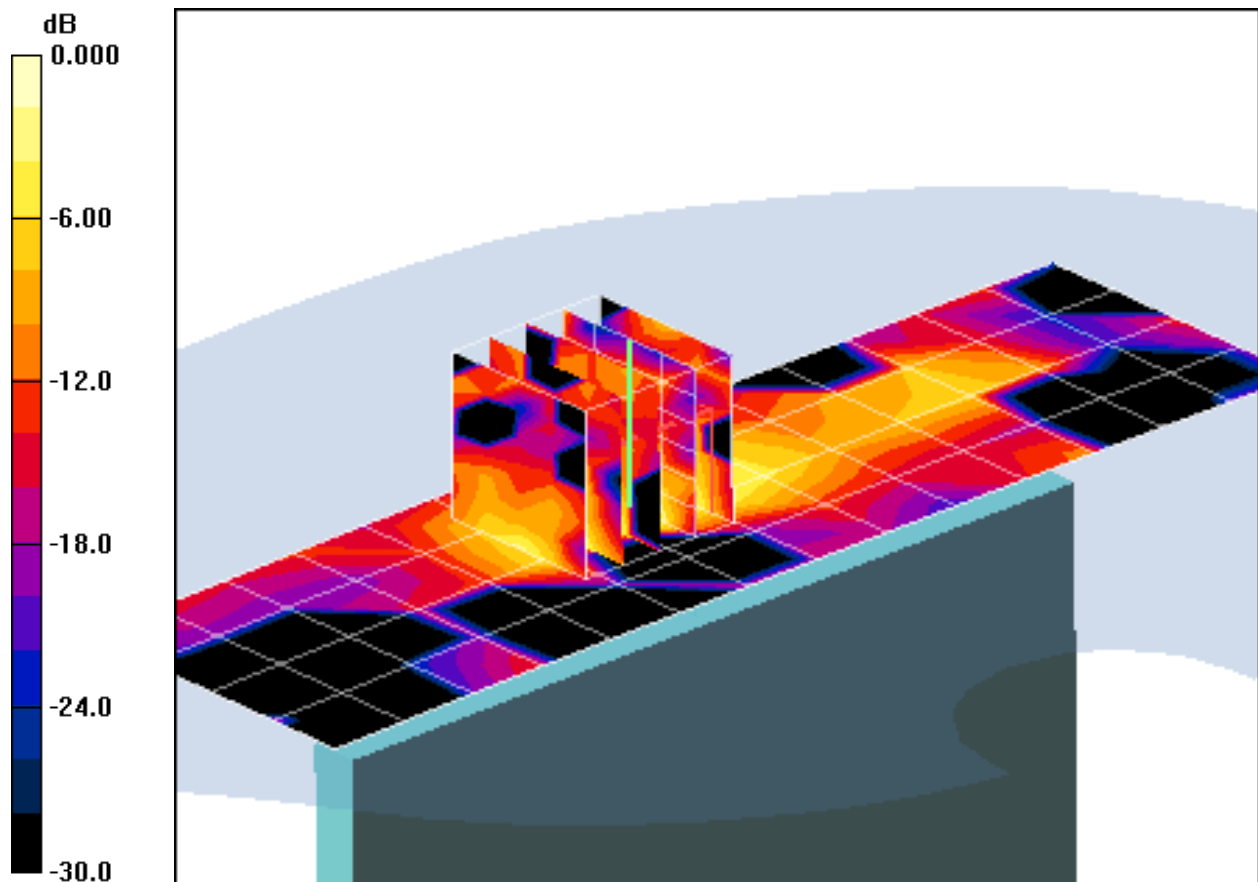
**Area Scan (5x15x1):** Measurement grid:  $dx=15\text{mm}$ ,  $dy=15\text{mm}$

**Zoom Scan (5x5x7)/Cube 0:** Measurement grid:  $dx=8\text{mm}$ ,  $dy=8\text{mm}$ ,  $dz=5\text{mm}$

Reference Value = 2.16 V/m

Peak SAR (extrapolated) = 0.027 W/kg

**SAR(1 g) = 0.015 mW/g; SAR(10 g) = 0.00546 mW/g**



0 dB = 0.022mW/g

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSHWM300S; Type: 1900 GSM/GPRS Tablet with Bluetooth and WLAN;  
Serial: FCC #2**

Communication System: IEEE 802.11a 5.2-5.8 GHz Band; Frequency: 5180 MHz; Duty Cycle: 1:1  
Medium: 5 GHz Body Medium parameters used (interpolated):

$f = 5180 \text{ MHz}$ ;  $\sigma = 5.42 \text{ mho/m}$ ;  $\epsilon_r = 48.4$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 0.0 cm

Test Date: 05-12-2011; Ambient Temp: 24.3°C ; Tissue Temp: 22.7°C

Probe: EX3DV4 - SN3550; ConvF(3.58, 3.58, 3.58); Calibrated: 2/14/2011

Sensor-Surface: 2mm (Mechanical Surface Detection)

Electronics: DAE4 Sn665; Calibrated: 4/20/2011

Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1114

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Mode: WLAN 802.11a 5.2 GHz, Ch 36, 6 Mbps, Back Side**

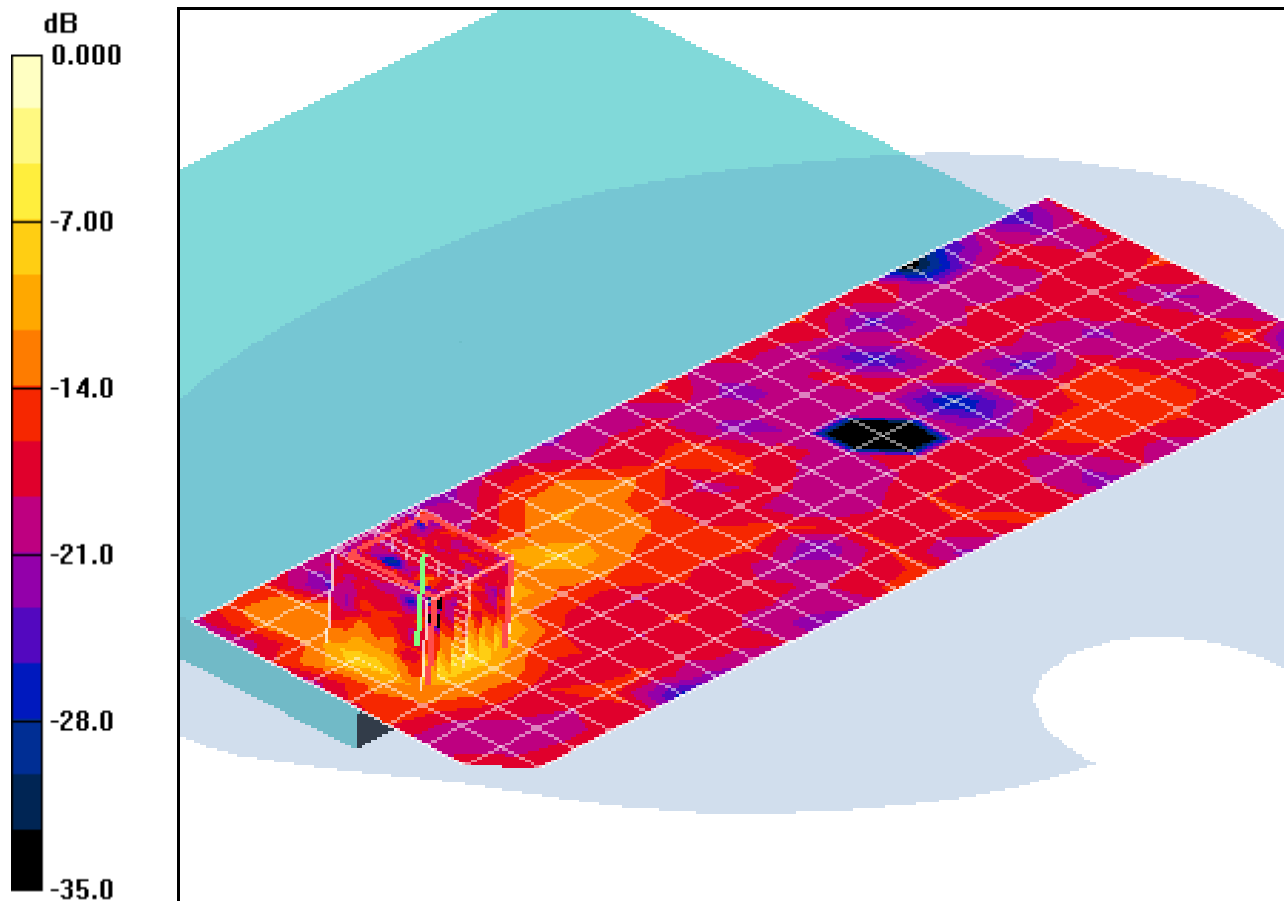
**Area Scan (9x25x1):** Measurement grid: dx=10mm, dy=10mm

**Zoom Scan (7x7x11)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=2mm

Reference Value = 9.00 V/m

Peak SAR (extrapolated) = 1.75 W/kg

**SAR(1 g) = 0.423 mW/g; SAR(10 g) = 0.114 mW/g**



0 dB = 0.893mW/g

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSHWM300S; Type: 1900 GSM/GPRS Tablet with Bluetooth and WLAN;  
Serial: FCC #2**

Communication System: IEEE 802.11a 5.2-5.8 GHz Band; Frequency: 5180 MHz; Duty Cycle: 1:1  
Medium: 5 GHz Body Medium parameters used (interpolated):

$f = 5180 \text{ MHz}$ ;  $\sigma = 5.42 \text{ mho/m}$ ;  $\epsilon_r = 48.4$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 0.0 cm

Test Date: 05-12-2011; Ambient Temp: 24.3°C ; Tissue Temp: 22.7°C

Probe: EX3DV4 - SN3550; ConvF(3.58, 3.58, 3.58); Calibrated: 2/14/2011

Sensor-Surface: 2mm (Mechanical Surface Detection)

Electronics: DAE4 Sn665; Calibrated: 4/20/2011

Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1114

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Mode: WLAN 802.11a 5.2 GHz, Ch 36, 6 Mbps, Top Side**

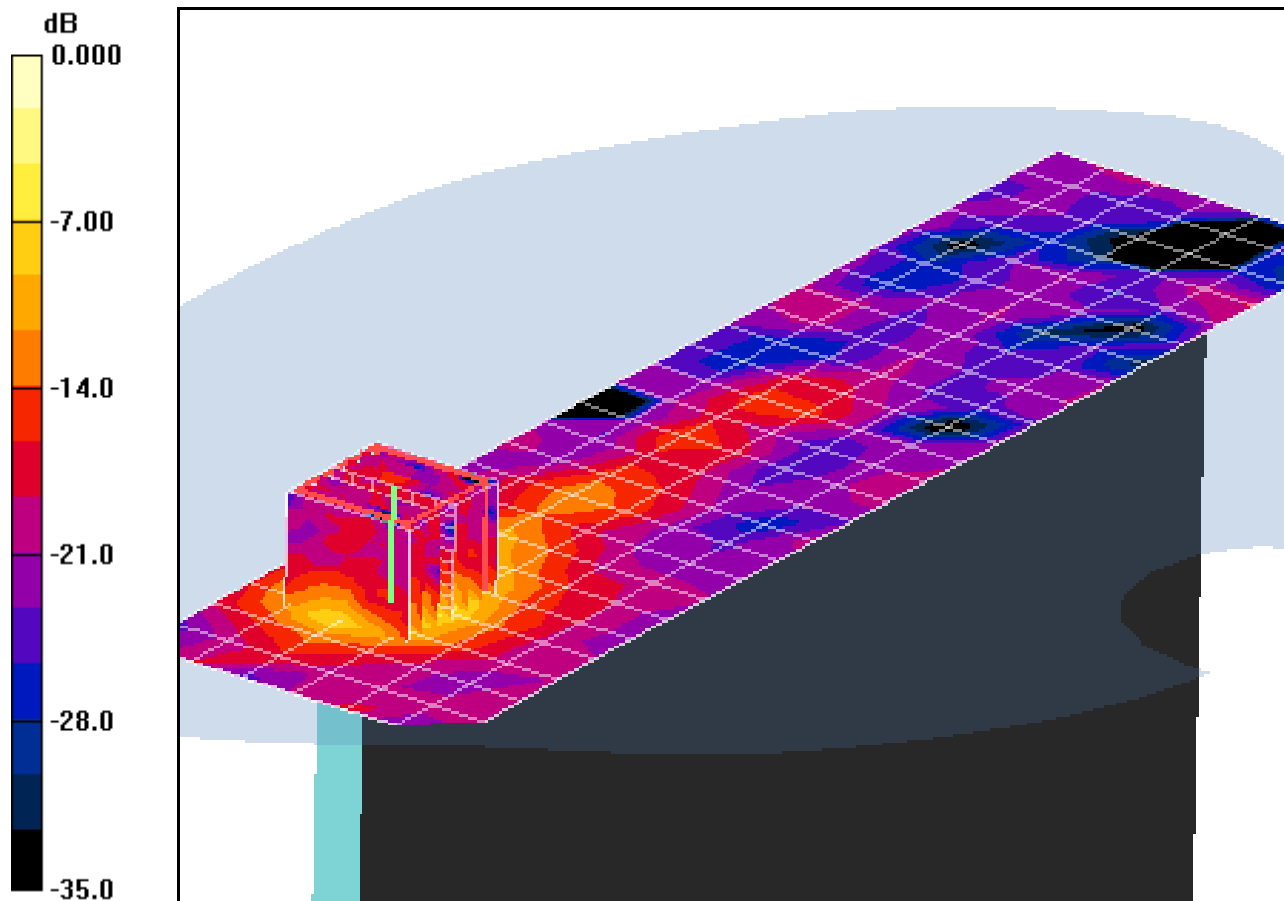
**Area Scan (7x26x1):** Measurement grid: dx=10mm, dy=10mm

**Zoom Scan (7x7x11)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=2mm

Reference Value = 14.5 V/m

Peak SAR (extrapolated) = 2.74 W/kg

**SAR(1 g) = 0.672 mW/g; SAR(10 g) = 0.173 mW/g**



0 dB = 1.92mW/g

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSHWM300S; Type: 1900 GSM/GPRS Tablet with Bluetooth and WLAN;  
Serial: FCC #2**

Communication System: IEEE 802.11a 5.2-5.8 GHz Band; Frequency: 5180 MHz; Duty Cycle: 1:1

Medium: 5 GHz Body Medium parameters used (interpolated):

$f = 5180 \text{ MHz}$ ;  $\sigma = 5.42 \text{ mho/m}$ ;  $\epsilon_r = 48.4$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 0.0 cm

Test Date: 05-12-2011; Ambient Temp: 24.3°C ; Tissue Temp: 22.7°C

Probe: EX3DV4 - SN3550; ConvF(3.58, 3.58, 3.58); Calibrated: 2/14/2011

Sensor-Surface: 2mm (Mechanical Surface Detection)

Electronics: DAE4 Sn665; Calibrated: 4/20/2011

Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1114

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Mode: WLAN 802.11a 5.2 GHz, Ch 36, 6 Mbps, Top Side**

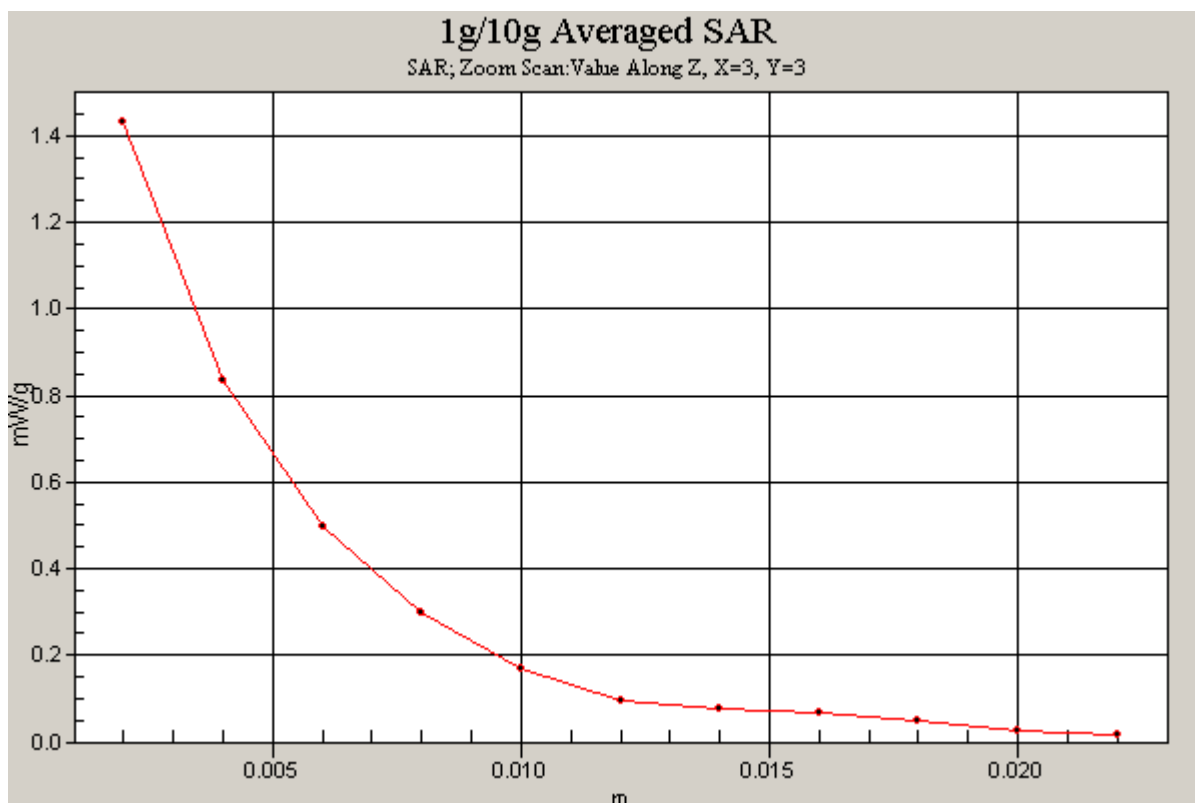
**Area Scan (7x26x1):** Measurement grid: dx=10mm, dy=10mm

**Zoom Scan (7x7x11)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=2mm

Reference Value = 14.5 V/m

Peak SAR (extrapolated) = 2.74 W/kg

**SAR(1 g) = 0.672 mW/g; SAR(10 g) = 0.173 mW/g**



# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSHWM300S; Type: 1900 GSM/GPRS Tablet with Bluetooth and WLAN;  
Serial: FCC #2**

Communication System: IEEE 802.11a 5.2-5.8 GHz Band; Frequency: 5180 MHz; Duty Cycle: 1:1  
Medium: 5 GHz Body Medium parameters used (interpolated):

$f = 5180 \text{ MHz}$ ;  $\sigma = 5.42 \text{ mho/m}$ ;  $\epsilon_r = 48.4$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 0.0 cm

Test Date: 05-12-2011; Ambient Temp: 24.3°C ; Tissue Temp: 22.7°C

Probe: EX3DV4 - SN3550; ConvF(3.58, 3.58, 3.58); Calibrated: 2/14/2011

Sensor-Surface: 2mm (Mechanical Surface Detection)

Electronics: DAE4 Sn665; Calibrated: 4/20/2011

Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1114

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Mode: WLAN 802.11a 5.2 GHz, Ch 36, 6 Mbps, Left Side**

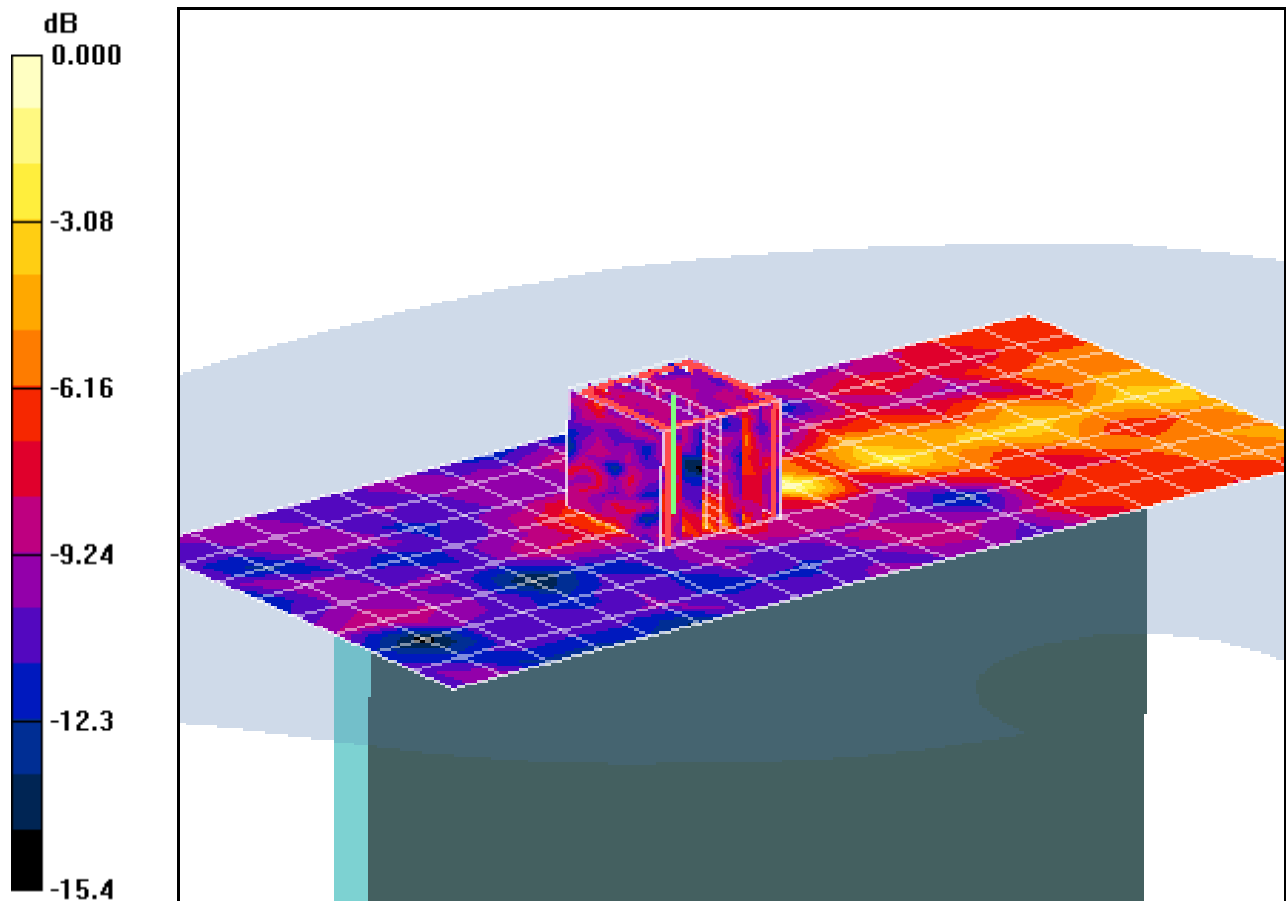
**Area Scan (9x19x1):** Measurement grid: dx=10mm, dy=10mm

**Zoom Scan (7x7x11)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=2mm

Reference Value = 5.26 V/m

Peak SAR (extrapolated) = 0.898 W/kg

**SAR(1 g) = 0.123 mW/g; SAR(10 g) = 0.046 mW/g**



0 dB = 0.252mW/g

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSHWM300S; Type: 1900 GSM/GPRS Tablet with Bluetooth and WLAN;  
Serial: FCC #2**

Communication System: IEEE 802.11a 5.2-5.8 GHz Band; Frequency: 5300 MHz; Duty Cycle: 1:1

Medium: 5 GHz Body Medium parameters used (interpolated):

$f = 5300 \text{ MHz}$ ;  $\sigma = 5.59 \text{ mho/m}$ ;  $\epsilon_r = 48.1$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 0.0 cm

Test Date: 05-12-2011; Ambient Temp: 24.3°C ; Tissue Temp: 22.7°C

Probe: EX3DV4 - SN3550; ConvF(3.31, 3.31, 3.31); Calibrated: 2/14/2011

Sensor-Surface: 2mm (Mechanical Surface Detection)

Electronics: DAE4 Sn665; Calibrated: 4/20/2011

Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1114

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Mode: WLAN 802.11a 5.3 GHz, Ch 60, 6 Mbps, Back Side**

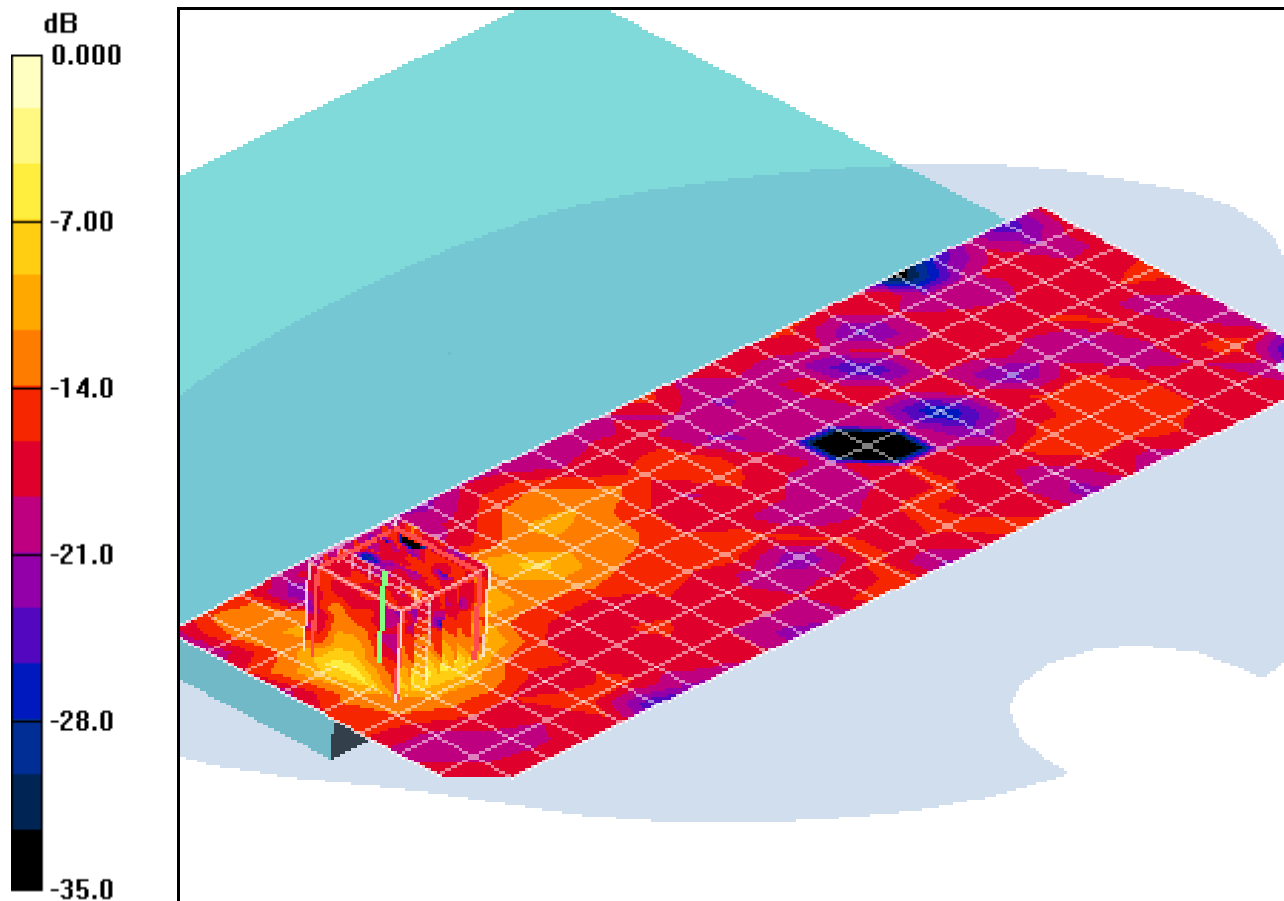
**Area Scan (9x25x1):** Measurement grid: dx=10mm, dy=10mm

**Zoom Scan (7x7x11)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=2mm

Reference Value = 10.5 V/m

Peak SAR (extrapolated) = 1.82 W/kg

**SAR(1 g) = 0.389 mW/g; SAR(10 g) = 0.104 mW/g**



0 dB = 0.827mW/g

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSHWM300S; Type: 1900 GSM/GPRS Tablet with Bluetooth and WLAN;  
Serial: FCC #2**

Communication System: IEEE 802.11a 5.2-5.8 GHz Band; Frequency: 5300 MHz; Duty Cycle: 1:1

Medium: 5 GHz Body Medium parameters used (interpolated):

$f = 5300 \text{ MHz}$ ;  $\sigma = 5.59 \text{ mho/m}$ ;  $\epsilon_r = 48.1$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 0.0 cm

Test Date: 05-12-2011; Ambient Temp: 24.3°C ; Tissue Temp: 22.7°C

Probe: EX3DV4 - SN3550; ConvF(3.31, 3.31, 3.31); Calibrated: 2/14/2011

Sensor-Surface: 2mm (Mechanical Surface Detection)

Electronics: DAE4 Sn665; Calibrated: 4/20/2011

Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1114

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Mode: WLAN 802.11a 5.3 GHz, Ch 60, 6 Mbps, Top Side**

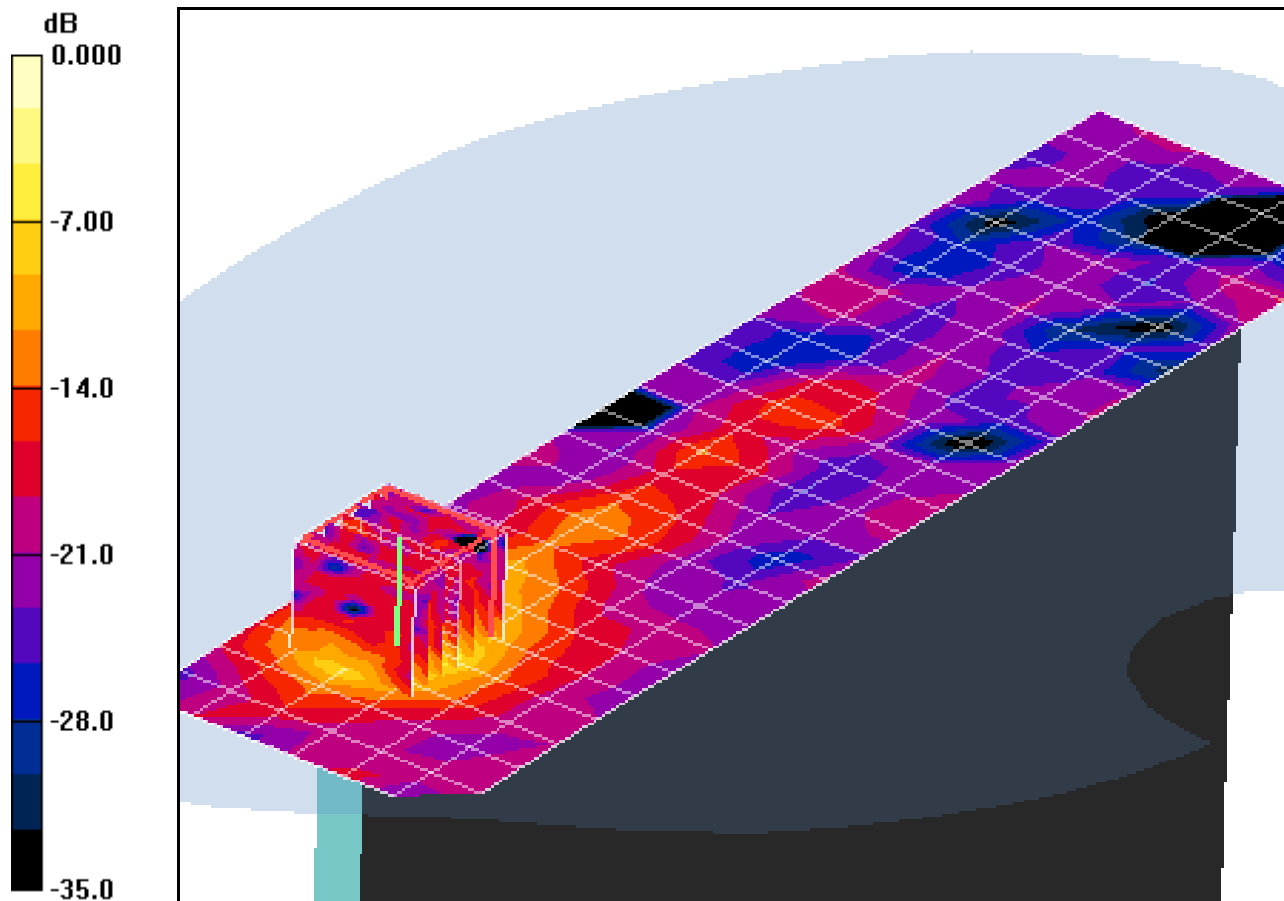
**Area Scan (7x26x1):** Measurement grid: dx=10mm, dy=10mm

**Zoom Scan (7x7x11)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=2mm

Reference Value = 14.1 V/m

Peak SAR (extrapolated) = 2.67 W/kg

**SAR(1 g) = 0.650 mW/g; SAR(10 g) = 0.167 mW/g**



0 dB = 1.92mW/g

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSHWM300S; Type: 1900 GSM/GPRS Tablet with Bluetooth and WLAN;  
Serial: FCC #2**

Communication System: IEEE 802.11a 5.2-5.8 GHz Band; Frequency: 5300 MHz; Duty Cycle: 1:1  
Medium: 5 GHz Body Medium parameters used (interpolated):

$f = 5300 \text{ MHz}$ ;  $\sigma = 5.59 \text{ mho/m}$ ;  $\epsilon_r = 48.1$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 0.0 cm

Test Date: 05-12-2011; Ambient Temp: 24.3°C ; Tissue Temp: 22.7°C

Probe: EX3DV4 - SN3550; ConvF(3.31, 3.31, 3.31); Calibrated: 2/14/2011

Sensor-Surface: 2mm (Mechanical Surface Detection)

Electronics: DAE4 Sn665; Calibrated: 4/20/2011

Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1114

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Mode: WLAN 802.11a 5.3 GHz, Ch 60, 6 Mbps, Left Side**

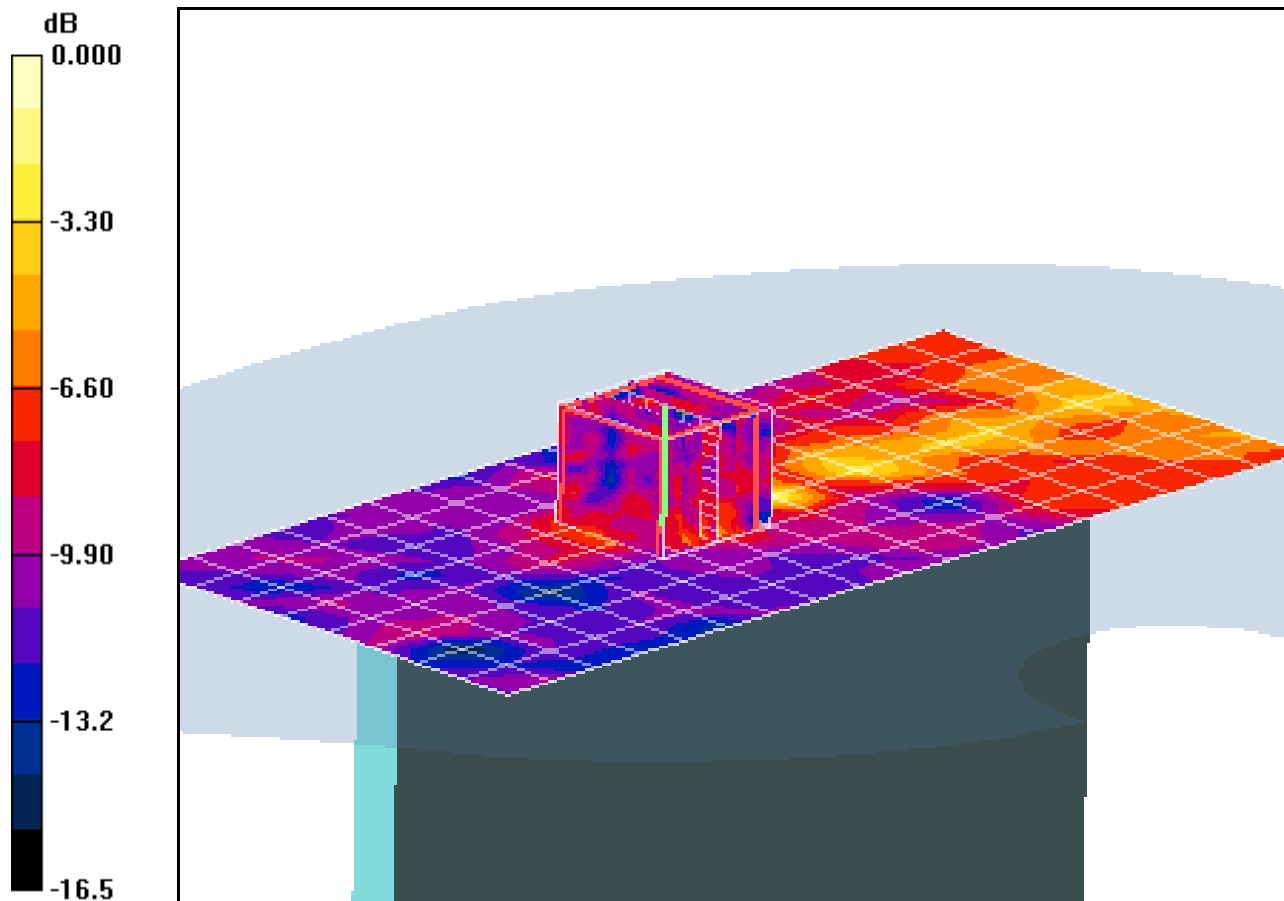
**Area Scan (9x19x1):** Measurement grid: dx=10mm, dy=10mm

**Zoom Scan (7x7x11)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=2mm

Reference Value = 5.88 V/m

Peak SAR (extrapolated) = 0.509 W/kg

**SAR(1 g) = 0.142 mW/g; SAR(10 g) = 0.054 mW/g**



0 dB = 0.278mW/g

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSHWM300S; Type: 1900 GSM/GPRS Tablet with Bluetooth and WLAN;  
Serial: FCC #2**

Communication System: IEEE 802.11a 5.2-5.8 GHz Band; Frequency: 5600 MHz; Duty Cycle: 1:1  
Medium: 5 GHz Body Medium parameters used (interpolated):

$f = 5600 \text{ MHz}$ ;  $\sigma = 6.02 \text{ mho/m}$ ;  $\epsilon_r = 47.5$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 0.0 cm

Test Date: 05-12-2011; Ambient Temp: 24.5°C ; Tissue Temp: 22.7°C

Probe: EX3DV4 - SN3550; ConvF(3.19, 3.19, 3.19); Calibrated: 2/14/2011

Sensor-Surface: 2mm (Mechanical Surface Detection)

Electronics: DAE4 Sn665; Calibrated: 4/20/2011

Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1114

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Mode: WLAN 802.11a 5.5 GHz, Ch 120, 6 Mbps, Back Side**

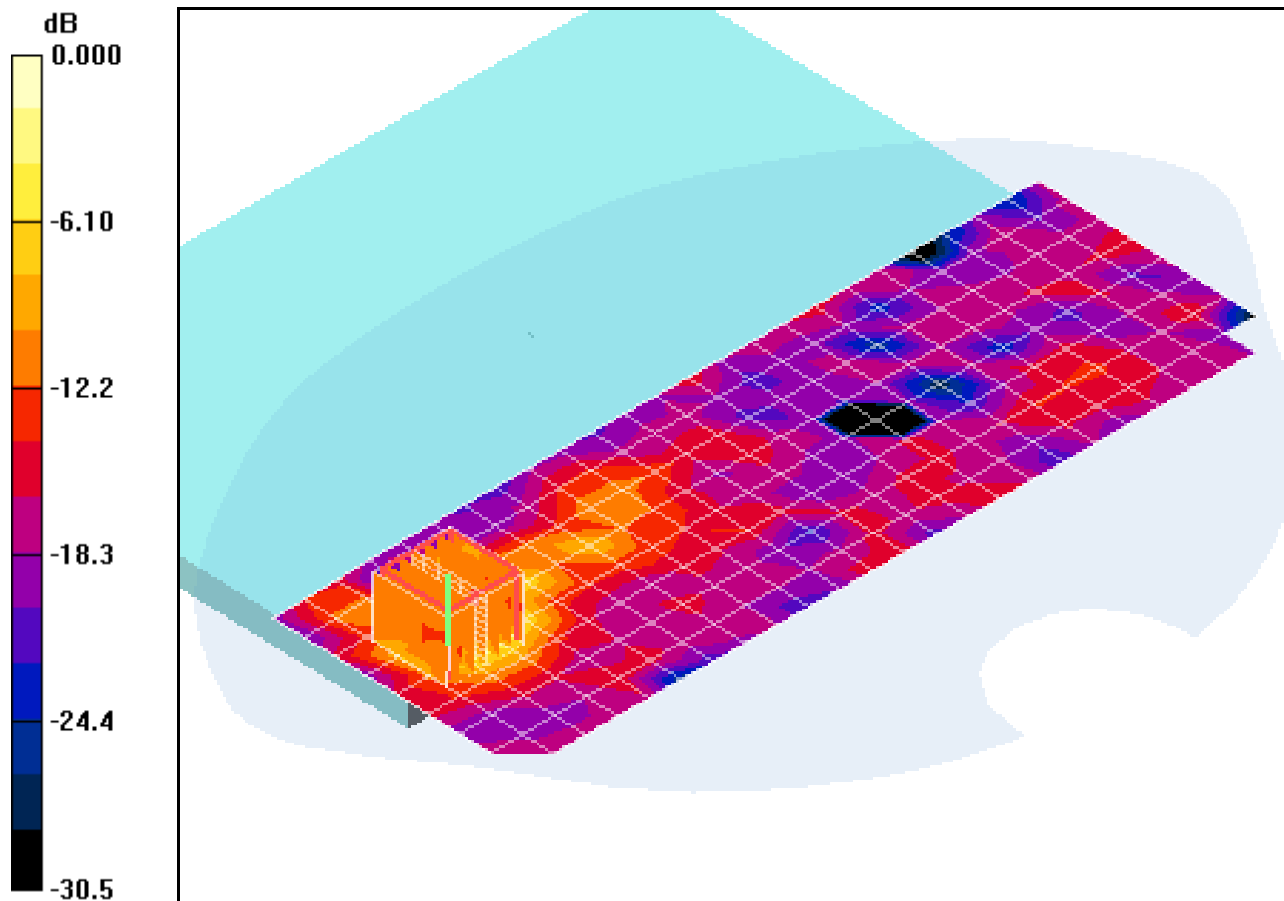
**Area Scan (9x25x1):** Measurement grid: dx=10mm, dy=10mm

**Zoom Scan (7x7x11)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=2mm

Reference Value = 9.30 V/m

Peak SAR (extrapolated) = 1.78 W/kg

**SAR(1 g) = 0.444 mW/g; SAR(10 g) = 0.233 mW/g**



0 dB = 0.769mW/g

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSHWM300S; Type: 1900 GSM/GPRS Tablet with Bluetooth and WLAN;  
Serial: FCC #2**

Communication System: IEEE 802.11a 5.2-5.8 GHz Band; Frequency: 5600 MHz; Duty Cycle: 1:1

Medium: 5 GHz Body Medium parameters used (interpolated):

$f = 5600 \text{ MHz}$ ;  $\sigma = 6.02 \text{ mho/m}$ ;  $\epsilon_r = 47.5$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 0.0 cm

Test Date: 05-12-2011; Ambient Temp: 24.5°C ; Tissue Temp: 22.7°C

Probe: EX3DV4 - SN3550; ConvF(3.19, 3.19, 3.19); Calibrated: 2/14/2011

Sensor-Surface: 2mm (Mechanical Surface Detection)

Electronics: DAE4 Sn665; Calibrated: 4/20/2011

Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1114

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Mode: WLAN 802.11a 5.5 GHz, Ch 120, 6 Mbps, Top Side**

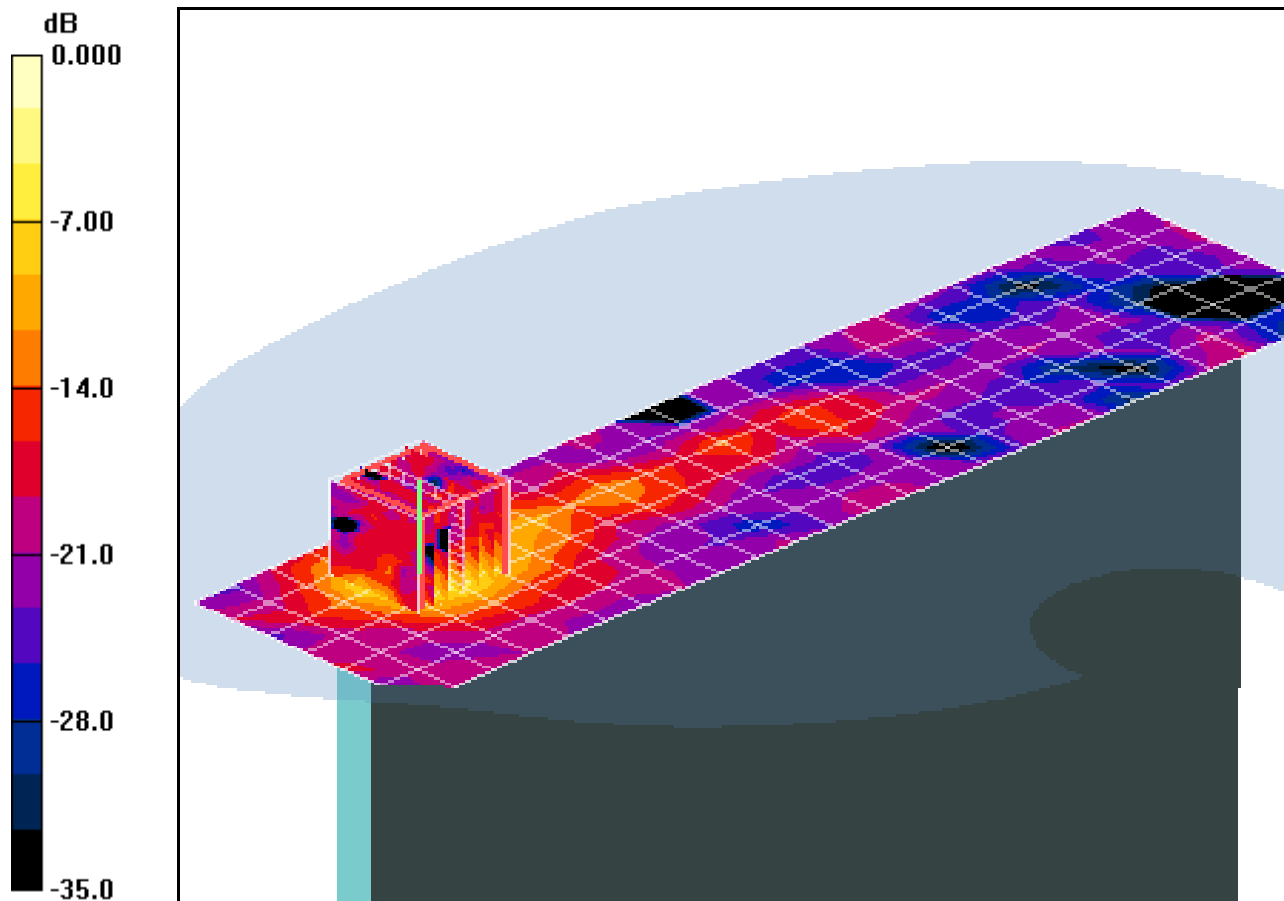
**Area Scan (7x26x1):** Measurement grid:  $dx=10\text{mm}$ ,  $dy=10\text{mm}$

**Zoom Scan (7x7x11)/Cube 0:** Measurement grid:  $dx=4\text{mm}$ ,  $dy=4\text{mm}$ ,  $dz=2\text{mm}$

Reference Value = 13.6 V/m

Peak SAR (extrapolated) = 3.15 W/kg

**SAR(1 g) = 0.663 mW/g; SAR(10 g) = 0.165 mW/g**



0 dB = 1.92mW/g

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSHWM300S; Type: 1900 GSM/GPRS Tablet with Bluetooth and WLAN;  
Serial: FCC #2**

Communication System: IEEE 802.11a 5.2-5.8 GHz Band; Frequency: 5600 MHz; Duty Cycle: 1:1

Medium: 5 GHz Body Medium parameters used (interpolated):

$f = 5600 \text{ MHz}$ ;  $\sigma = 6.02 \text{ mho/m}$ ;  $\epsilon_r = 47.5$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 0.0 cm

Test Date: 05-12-2011; Ambient Temp: 24.5°C ; Tissue Temp: 22.7°C

Probe: EX3DV4 - SN3550; ConvF(3.19, 3.19, 3.19); Calibrated: 2/14/2011

Sensor-Surface: 2mm (Mechanical Surface Detection)

Electronics: DAE4 Sn665; Calibrated: 4/20/2011

Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1114

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Mode: WLAN 802.11a 5.2 GHz, Ch 36, 6 Mbps, Left Side**

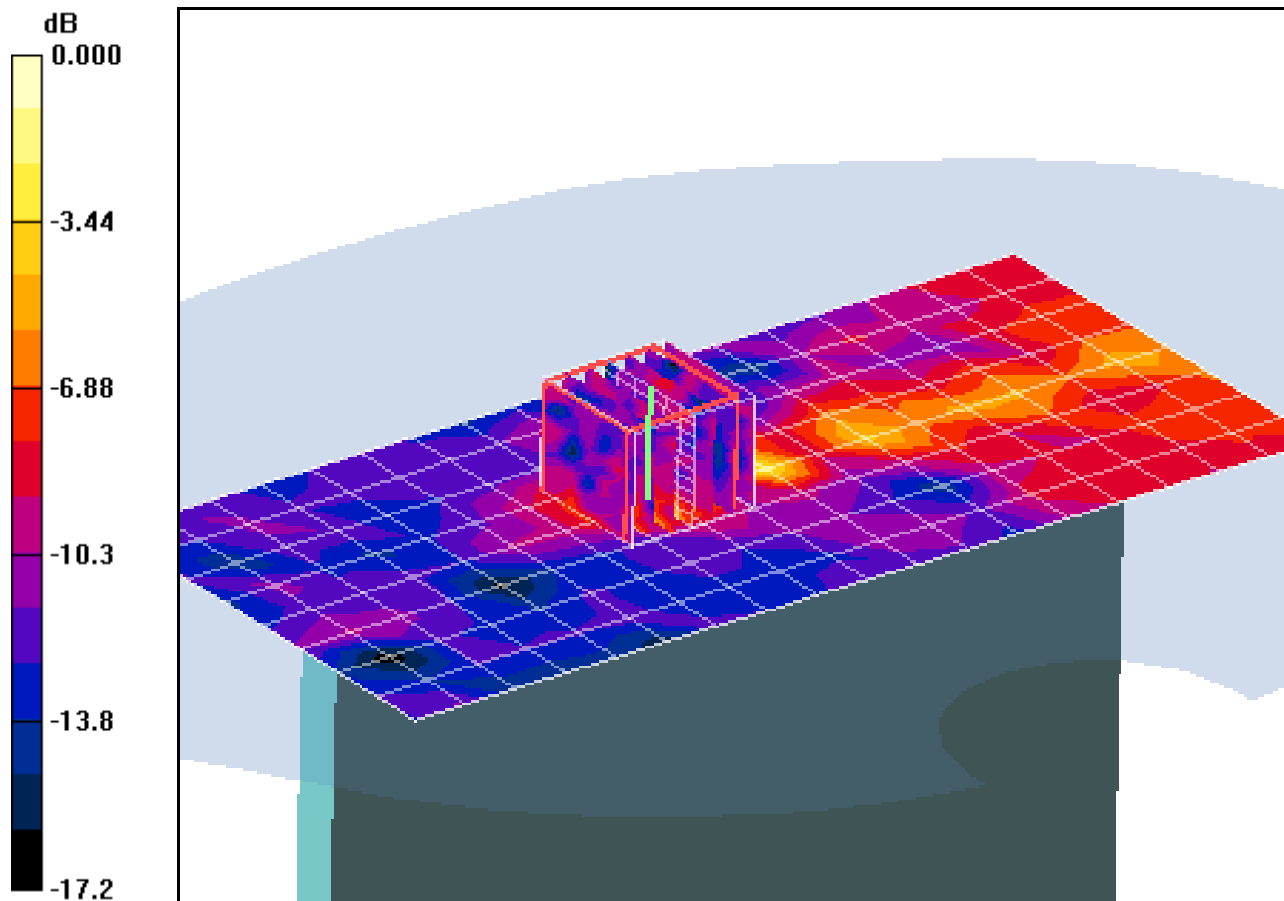
**Area Scan (9x19x1):** Measurement grid: dx=10mm, dy=10mm

**Zoom Scan (7x7x11)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=2mm

Reference Value = 6.84 V/m

Peak SAR (extrapolated) = 0.801 W/kg

**SAR(1 g) = 0.190 mW/g; SAR(10 g) = 0.064 mW/g**



0 dB = 0.393mW/g

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSHWM300S; Type: 1900 GSM/GPRS Tablet with Bluetooth and WLAN;  
Serial: FCC #2**

Communication System: IEEE 802.11a 5.2-5.8 GHz Band; Frequency: 5765 MHz; Duty Cycle: 1:1  
Medium: 5 GHz Body Medium parameters used (interpolated):

$f = 5765 \text{ MHz}$ ;  $\sigma = 6.23 \text{ mho/m}$ ;  $\epsilon_r = 47.2$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 0.0 cm

Test Date: 05-12-2011; Ambient Temp: 24.4°C ; Tissue Temp: 22.6°C

Probe: EX3DV4 - SN3550; ConvF(3.29, 3.29, 3.29); Calibrated: 2/14/2011

Sensor-Surface: 2mm (Mechanical Surface Detection)

Electronics: DAE4 Sn665; Calibrated: 4/20/2011

Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1114

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Mode: WLAN 802.11a 5.8 GHz, Ch 153, 6 Mbps, Back Side**

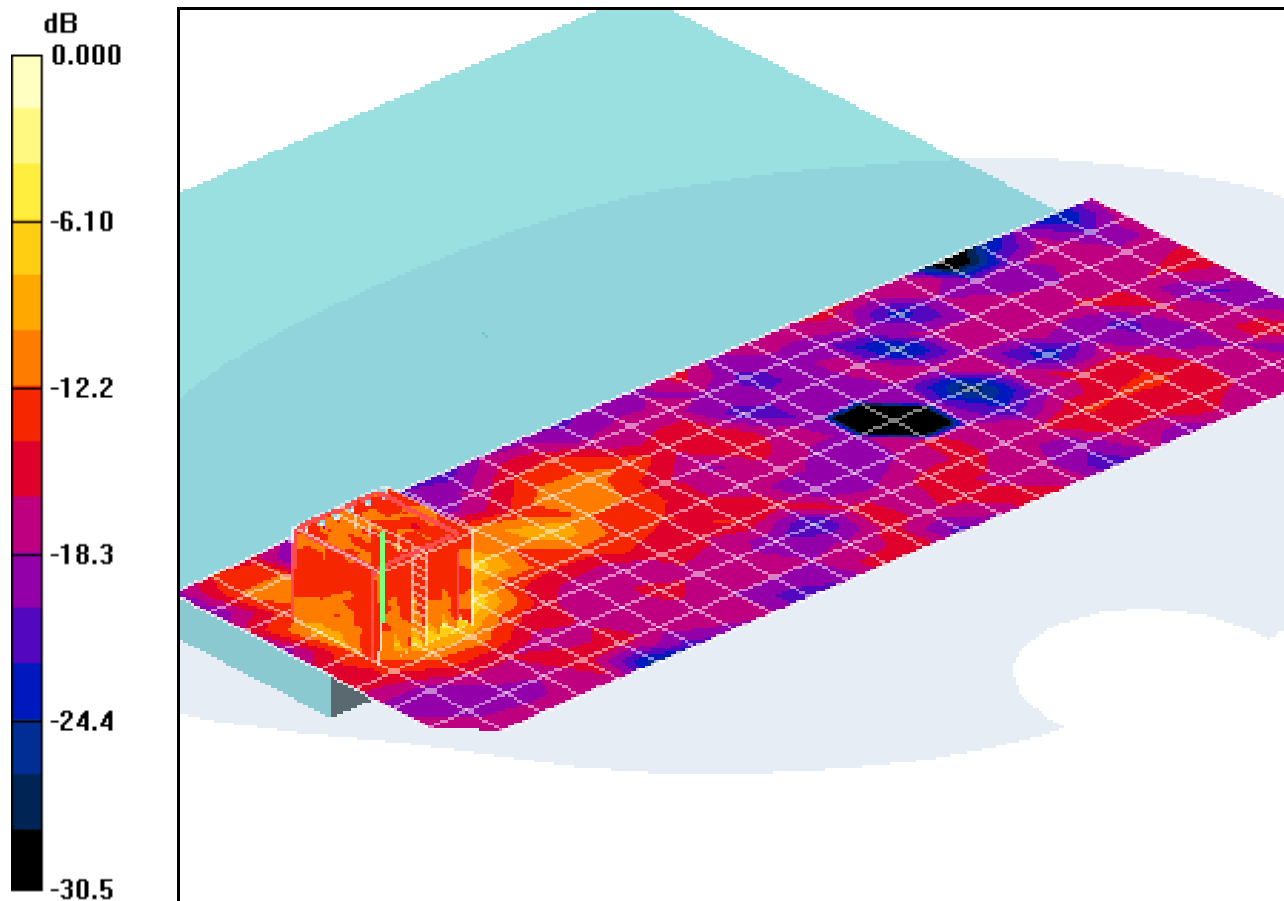
**Area Scan (9x25x1):** Measurement grid: dx=10mm, dy=10mm

**Zoom Scan (7x7x11)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=2mm

Reference Value = 8.76 V/m

Peak SAR (extrapolated) = 1.98 W/kg

**SAR(1 g) = 0.439 mW/g; SAR(10 g) = 0.231 mW/g**



0 dB = 0.769mW/g

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSHWM300S; Type: 1900 GSM/GPRS Tablet with Bluetooth and WLAN;  
Serial: FCC #2**

Communication System: IEEE 802.11a 5.2-5.8 GHz Band; Frequency: 5765 MHz; Duty Cycle: 1:1  
Medium: 5 GHz Body Medium parameters used (interpolated):

$f = 5765 \text{ MHz}$ ;  $\sigma = 6.23 \text{ mho/m}$ ;  $\epsilon_r = 47.2$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 0.0 cm

Test Date: 05-12-2011; Ambient Temp: 24.4°C ; Tissue Temp: 22.6°C

Probe: EX3DV4 - SN3550; ConvF(3.29, 3.29, 3.29); Calibrated: 2/14/2011

Sensor-Surface: 2mm (Mechanical Surface Detection)

Electronics: DAE4 Sn665; Calibrated: 4/20/2011

Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1114

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Mode: WLAN 802.11a 5.8 GHz, Ch 153, 6 Mbps, Top Side**

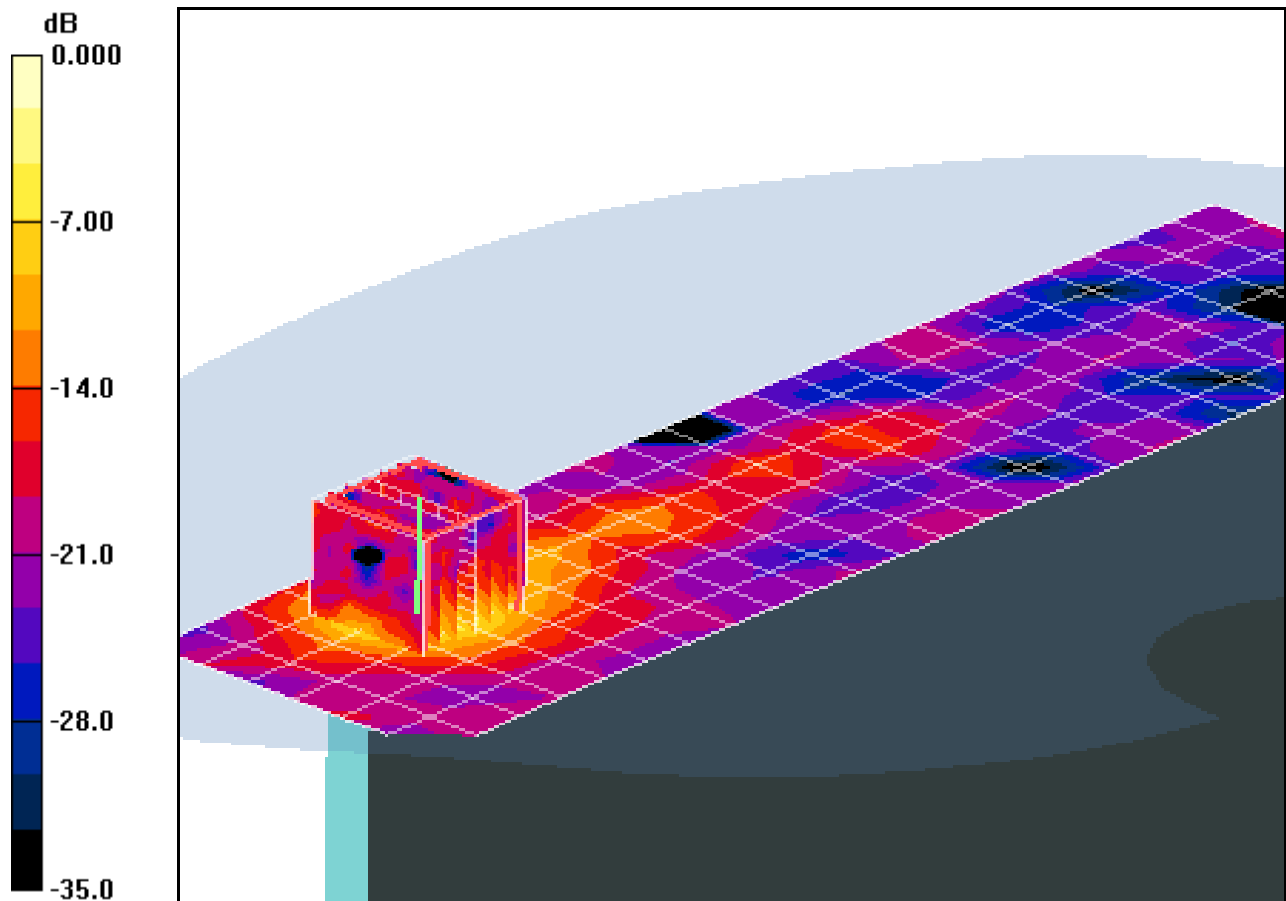
**Area Scan (7x26x1):** Measurement grid: dx=10mm, dy=10mm

**Zoom Scan (7x7x11)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=2mm

Reference Value = 13.1 V/m

Peak SAR (extrapolated) = 2.90 W/kg

**SAR(1 g) = 0.632 mW/g; SAR(10 g) = 0.163 mW/g**



0 dB = 1.92mW/g

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSHWM300S; Type: 1900 GSM/GPRS Tablet with Bluetooth and WLAN;  
Serial: FCC #2**

Communication System: IEEE 802.11a 5.2-5.8 GHz Band; Frequency: 5765 MHz; Duty Cycle: 1:1  
Medium: 5 GHz Body Medium parameters used (interpolated):

$f = 5765 \text{ MHz}$ ;  $\sigma = 6.23 \text{ mho/m}$ ;  $\epsilon_r = 47.2$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 0.0 cm

Test Date: 05-12-2011; Ambient Temp: 24.4°C ; Tissue Temp: 22.6°C

Probe: EX3DV4 - SN3550; ConvF(3.29, 3.29, 3.29); Calibrated: 2/14/2011

Sensor-Surface: 2mm (Mechanical Surface Detection)

Electronics: DAE4 Sn665; Calibrated: 4/20/2011

Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1114

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Mode: WLAN 802.11a 5.8 GHz, Ch 153, 6 Mbps, Left Side**

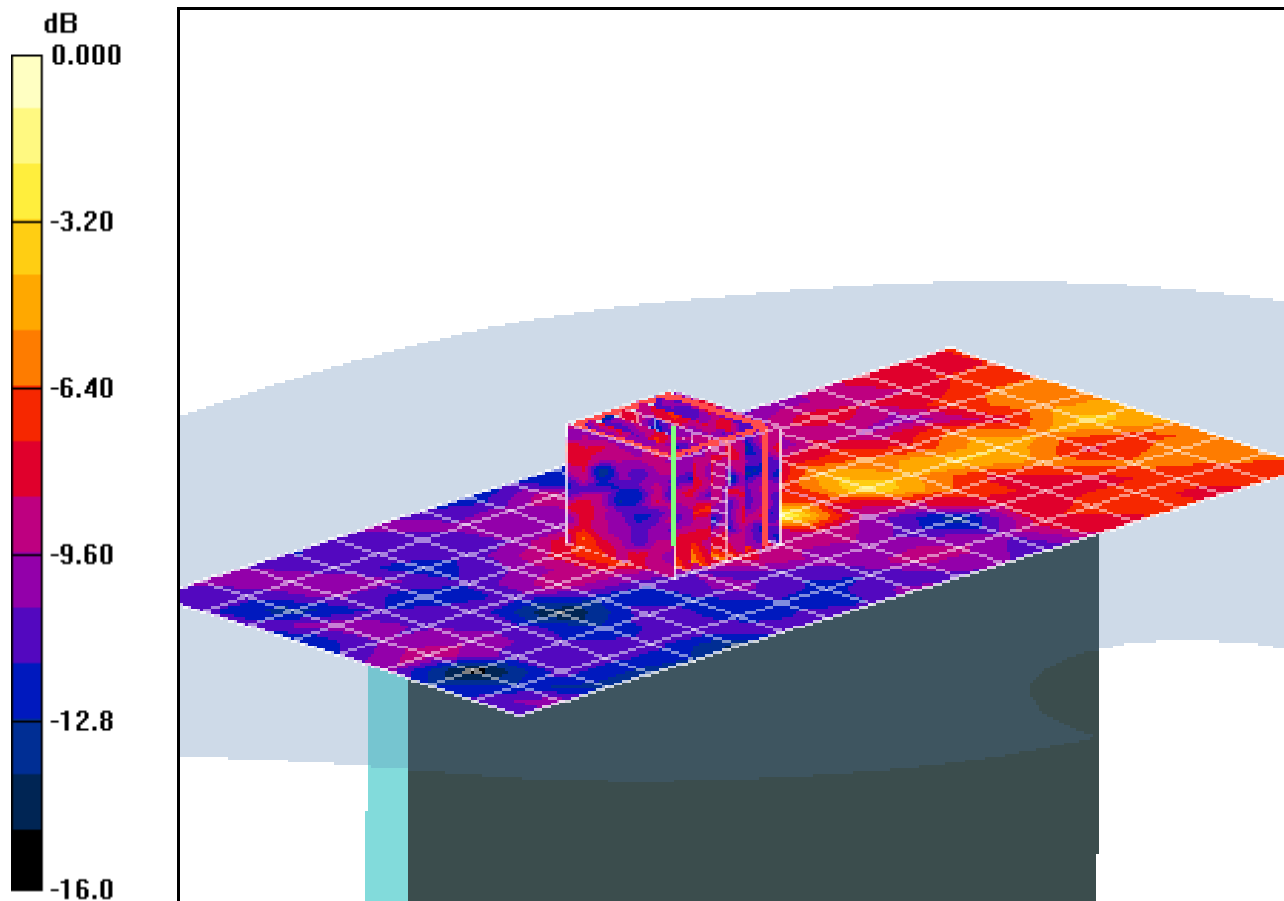
**Area Scan (9x19x1):** Measurement grid: dx=10mm, dy=10mm

**Zoom Scan (7x7x11)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=2mm

Reference Value = 6.05 V/m

Peak SAR (extrapolated) = 0.583 W/kg

**SAR(1 g) = 0.150 mW/g; SAR(10 g) = 0.053 mW/g**



0 dB = 0.293mW/g

## **APPENDIX B: DIPOLE VALIDATION**

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: Dipole 1900 MHz; Type: D1900V2; Serial: 502**

Communication System: CW; Frequency: 1900 MHz; Duty Cycle: 1:1

Medium: 1900 Body Medium parameters used (interpolated):

$f = 1900 \text{ MHz}$ ;  $\sigma = 1.56 \text{ mho/m}$ ;  $\epsilon_r = 51.3$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 05-09-2011; Ambient Temp: 23.7°C; Tissue Temp: 22.5°C

Probe: EX3DV4 - SN3550; ConvF(6.77, 6.77, 6.77); Calibrated: 2/14/2011

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn665; Calibrated: 4/20/2011

Phantom: SAM Sub; Type: SAM 4.0; Serial: TP-1357

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

## 1900MHz System Verification

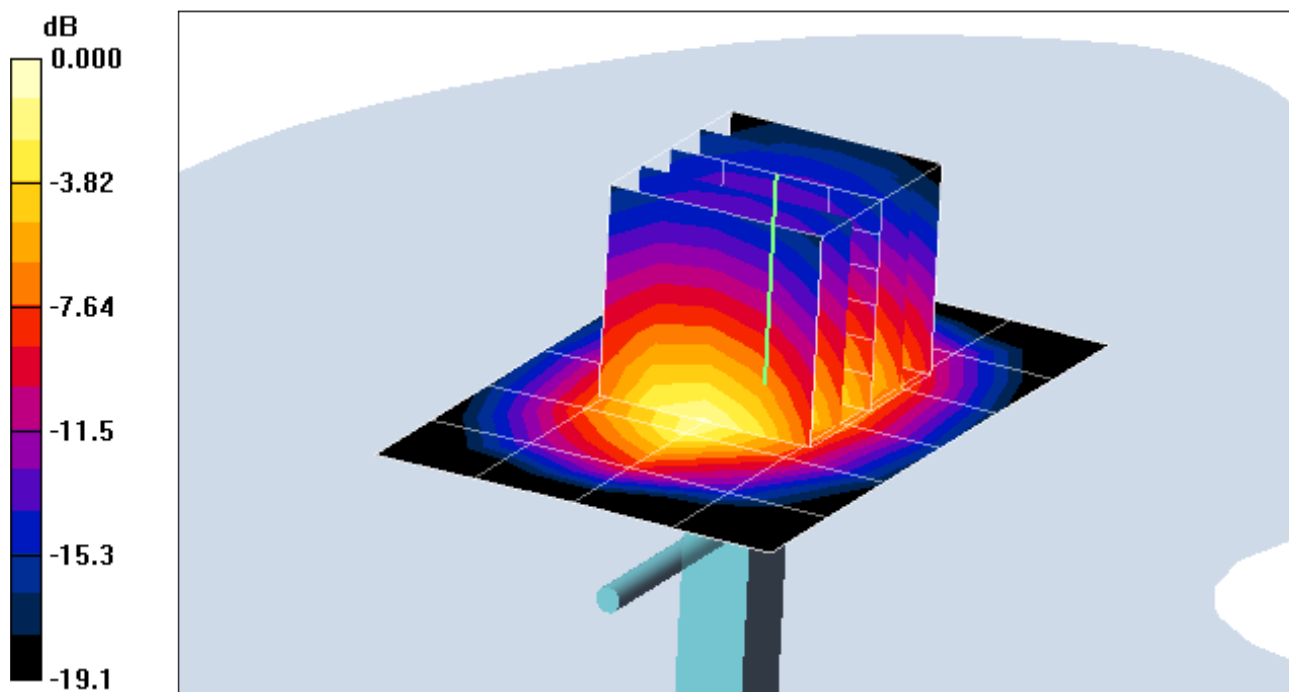
**Area Scan (5x7x1):** Measurement grid:  $dx=15\text{mm}$ ,  $dy=15\text{mm}$

**Zoom Scan (5x5x7)/Cube 0:** Measurement grid:  $dx=8\text{mm}$ ,  $dy=8\text{mm}$ ,  $dz=5\text{mm}$

Input Power = 16.0 dBm (40 mW)

**SAR(1 g) = 1.58 mW/g; SAR(10 g) = 0.805 mW/g**

Deviation = -3.89 %



0 dB = 1.76mW/g

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: SAR Dipole 1900 MHz; Type: D1900V2; Serial: 502**

Communication System: CW; Frequency: 1900 MHz; Duty Cycle: 1:1

Medium: 1900 Body Medium parameters used (interpolated):

$f = 1900 \text{ MHz}$ ;  $\sigma = 1.49 \text{ mho/m}$ ;  $\epsilon_r = 50.8$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 05-19-2011; Ambient Temp: 24.1°C; Tissue Temp: 22.5°C

Probe: EX3DV4 - SN3561; ConvF(6.59, 6.59, 6.59); Calibrated: 8/19/2010

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn649; Calibrated: 2/21/2011

Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1406

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

## 1900MHz System Verification

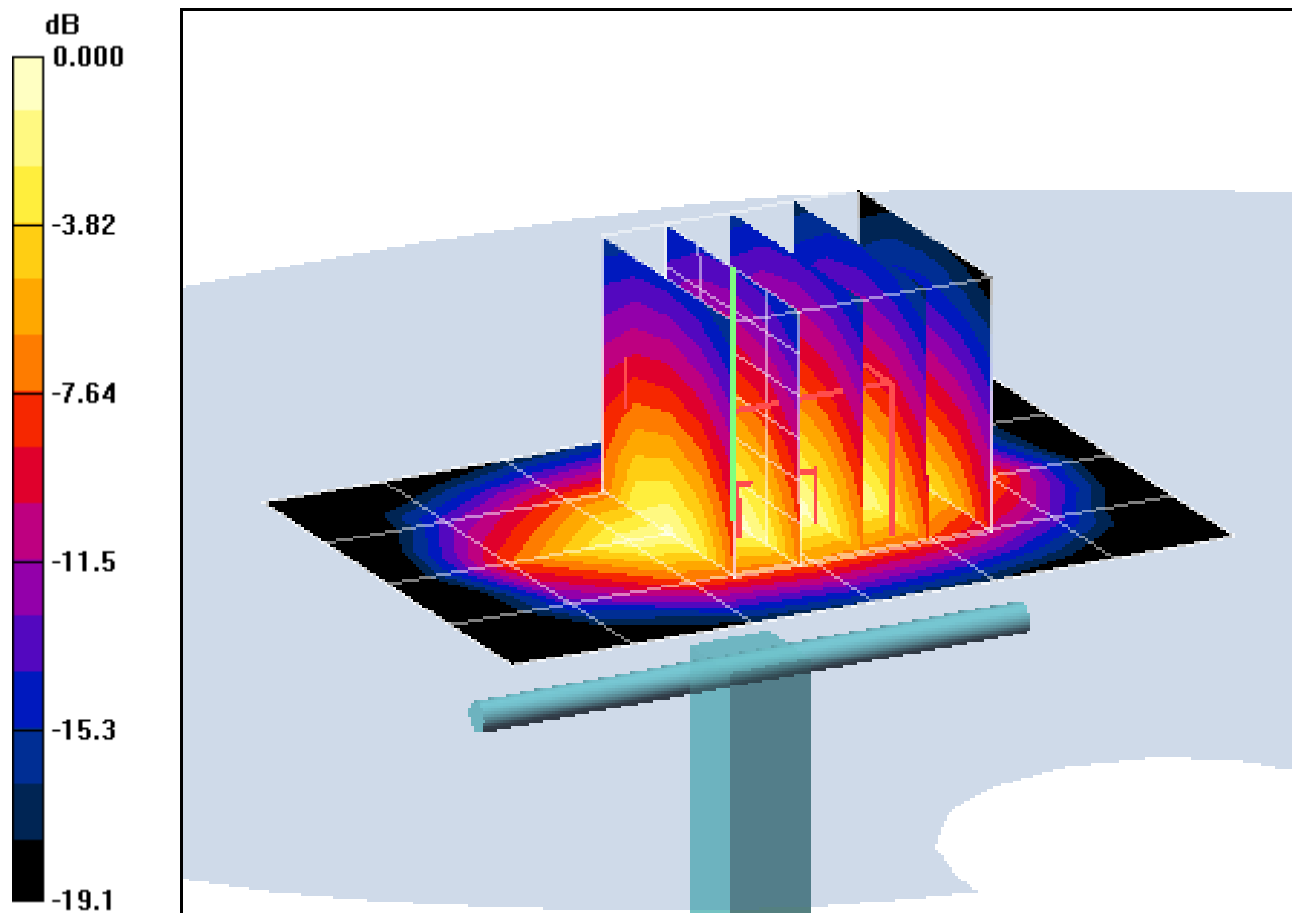
**Area Scan (5x7x1):** Measurement grid:  $dx=15\text{mm}$ ,  $dy=15\text{mm}$

**Zoom Scan (5x5x7)/Cube 0:** Measurement grid:  $dx=8\text{mm}$ ,  $dy=8\text{mm}$ ,  $dz=5\text{mm}$

Input Power = 16 dBm (40 mW)

**SAR(1 g) = 1.6 mW/g; SAR(10 g) = 0.821 mW/g**

Deviation = -2.68 %



0 dB = 1.79mW/g

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: SAR Dipole 2450 MHz; Type: D2450V2; Serial: 797**

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

Medium: 2450 Body Medium parameters used:

$f = 2450 \text{ MHz}$ ;  $\sigma = 2.01 \text{ mho/m}$ ;  $\epsilon_r = 50.9$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 05-16-2011; Ambient Temp: 24.8°C; Tissue Temp: 22.9°C

Probe: ES3DV2 - SN3022; ConvF(4.06, 4.06, 4.06); Calibrated: 9/21/2010

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn704; Calibrated: 3/17/2011

Phantom: SAM with CRP; Type: SAM; Serial: TP1375

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

## 2450MHz System Verification

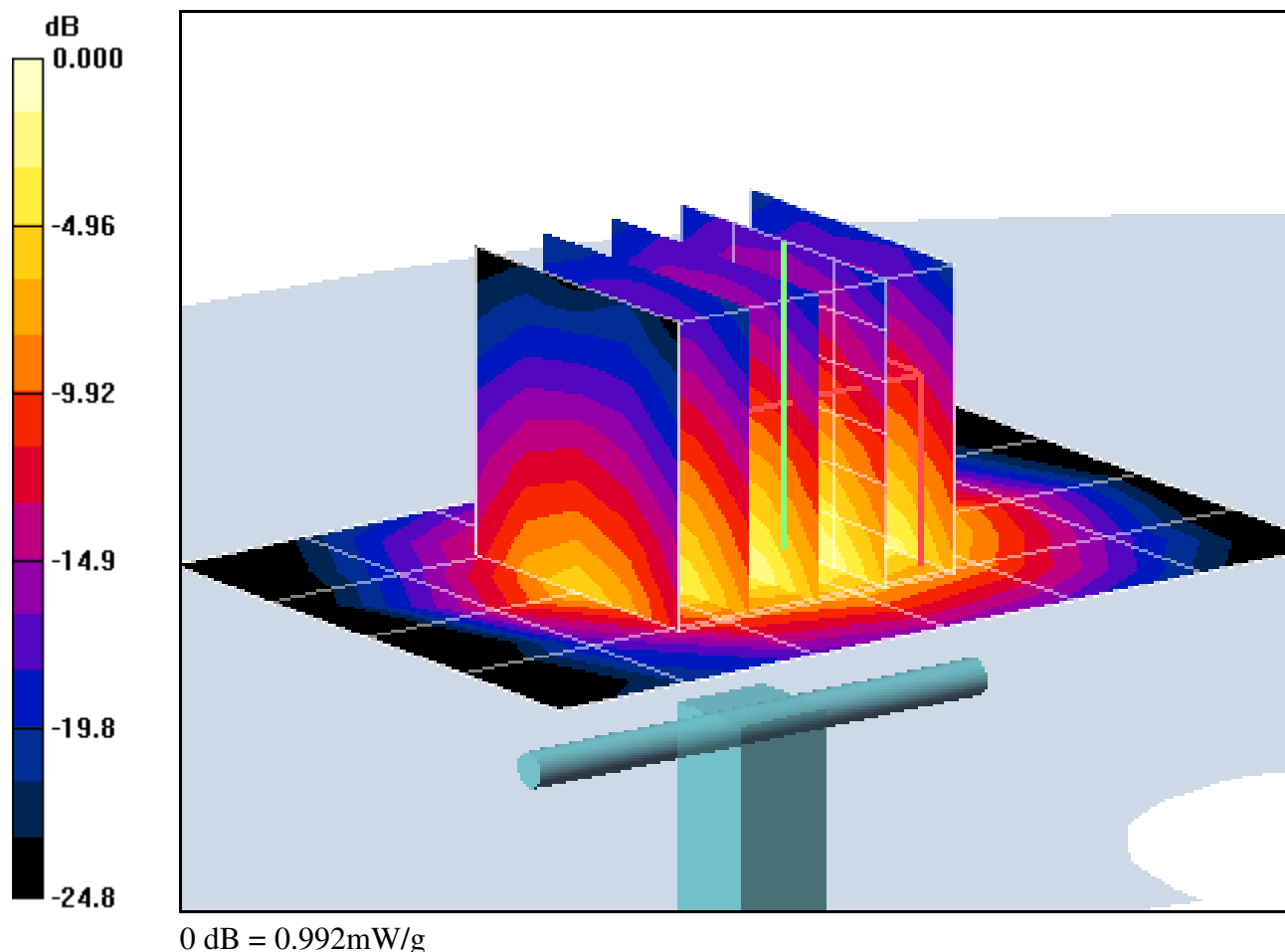
**Area Scan (5x7x1):** Measurement grid: dx=15mm, dy=15mm

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

Input Power = 12 dBm (15.8 mW)

**SAR(1 g) = 0.774 mW/g; SAR(10 g) = 0.358 mW/g**

Deviation = -6.33 %



# PCTEST ENGINEERING LABORATORY, INC.

**DUT: Dipole 5200 MHz; Type: D5GHzV2; Serial: 1057**

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

Medium: 5 GHz Body Medium parameters used (interpolated):

$f = 5200 \text{ MHz}$ ;  $\sigma = 5.45 \text{ mho/m}$ ;  $\epsilon_r = 48.3$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 05-12-2011; Ambient Temp: 24.3°C ; Tissue Temp: 22.7°C

Probe: EX3DV4 - SN3550; ConvF(3.58, 3.58, 3.58); Calibrated: 2/14/2011

Sensor-Surface: 2mm (Mechanical Surface Detection)

Electronics: DAE4 Sn665; Calibrated: 4/20/2011

Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1114

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

## 5200MHz System Verification

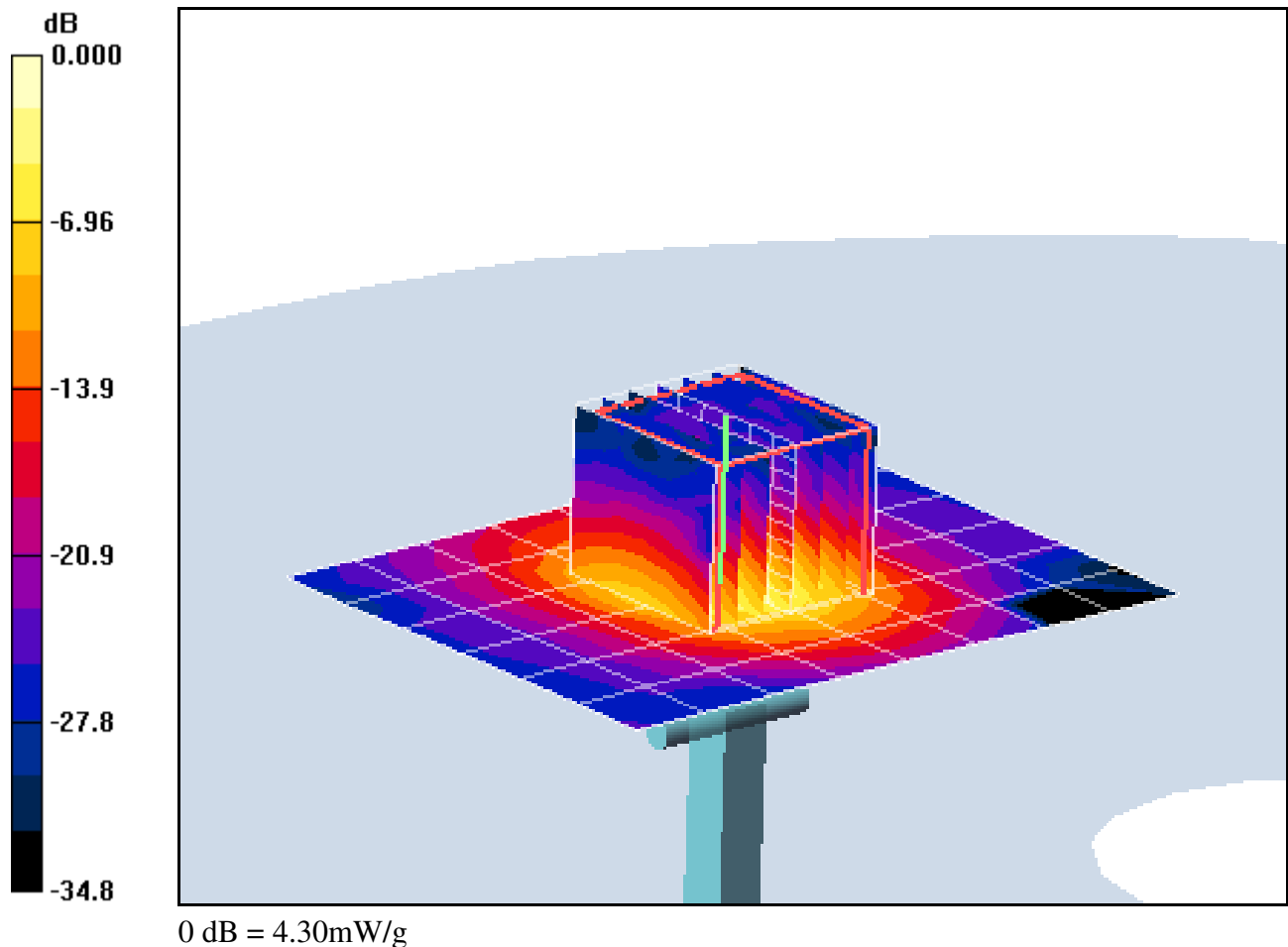
**Area Scan (7x9x1):** Measurement grid: dx=10mm, dy=10mm

**Zoom Scan (7x7x11)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=2mm

Input Power = 14 dBm (25 mW)

**SAR(1 g) = 1.99 mW/g; SAR(10 g) = 0.554 mW/g**

Deviation = 2.45 %



# PCTEST ENGINEERING LABORATORY, INC.

**DUT: Dipole 5500 MHz; Type: D5GHzV2; Serial: 1057**

Communication System: CW; Frequency: 5500 MHz; Duty Cycle: 1:1

Medium: 5 GHz Body Medium parameters used (interpolated):

$f = 5500 \text{ MHz}$ ;  $\sigma = 5.9 \text{ mho/m}$ ;  $\epsilon_r = 47.7$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 05-12-2011; Ambient Temp: 24.5°C ; Tissue Temp: 22.7°C

Probe: EX3DV4 - SN3550; ConvF(3.21, 3.21, 3.21); Calibrated: 2/14/2011

Sensor-Surface: 2mm (Mechanical Surface Detection)

Electronics: DAE4 Sn665; Calibrated: 4/20/2011

Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1114

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

## 5500MHz System Verification

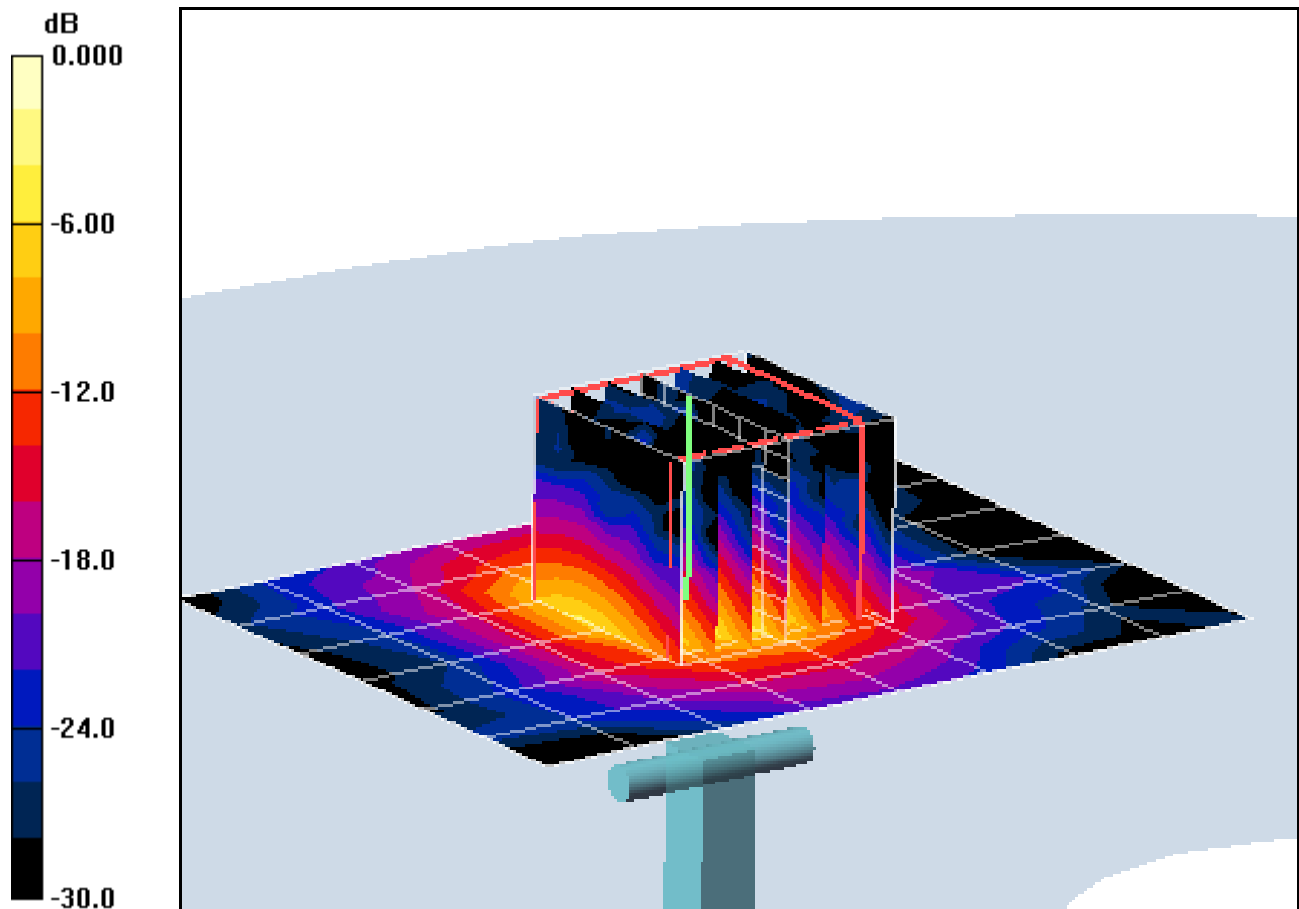
**Area Scan (7x9x1):** Measurement grid: dx=10mm, dy=10mm

**Zoom Scan (7x7x11)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=2mm

Input Power = 14 dBm (25 mW)

**SAR(1 g) = 2.1 mW/g; SAR(10 g) = 0.560 mW/g**

Deviation = -0.47 %



0 dB = 4.26mW/g

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: Dipole 5800 MHz; Type: D5GHzV2; Serial: 1057**

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

Medium: 5 GHz Body Medium parameters used (interpolated):

$f = 5800 \text{ MHz}$ ;  $\sigma = 6.28 \text{ mho/m}$ ;  $\epsilon_r = 47.1$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 05-12-2011; Ambient Temp: 24.4°C ; Tissue Temp: 22.6°C

Probe: EX3DV4 - SN3550; ConvF(3.29, 3.29, 3.29); Calibrated: 2/14/2011

Sensor-Surface: 2mm (Mechanical Surface Detection)

Electronics: DAE4 Sn665; Calibrated: 4/20/2011

Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1114

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

## 5800MHz System Verification

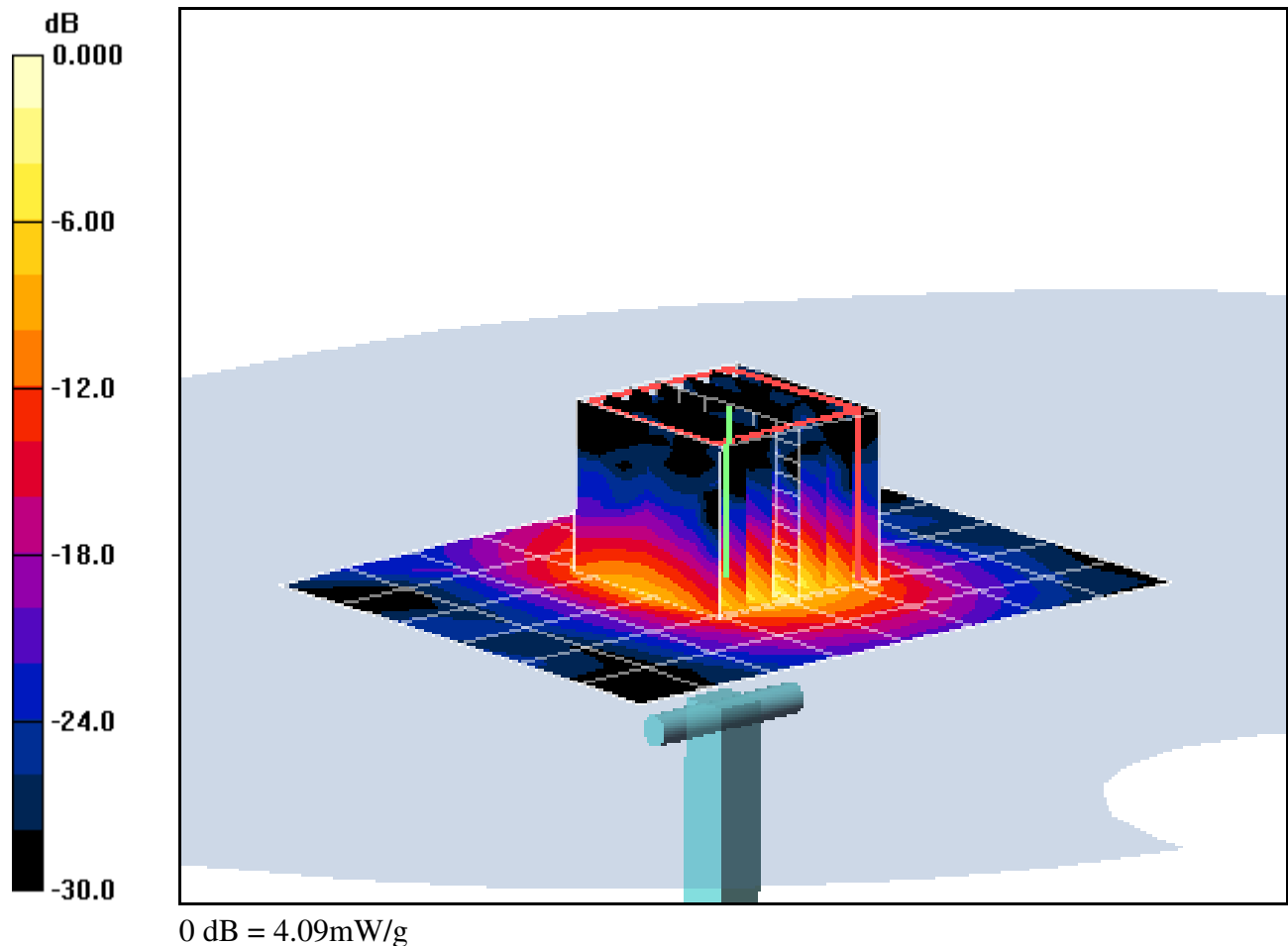
**Area Scan (7x9x1):** Measurement grid:  $dx=10\text{mm}$ ,  $dy=10\text{mm}$

**Zoom Scan (7x7x11)/Cube 0:** Measurement grid:  $dx=4\text{mm}$ ,  $dy=4\text{mm}$ ,  $dz=2\text{mm}$

Input Power = 14 dBm (25 mW)

**SAR(1 g) = 1.93 mW/g; SAR(10 g) = 0.530 mW/g**

Deviation = 2.93 %



## **APPENDIX C: PROBE CALIBRATION**



Accredited by the Swiss Accreditation Service (SAS)  
 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 **PC Test**

Certificate No: **ES3-3022\_Sep10**

## CALIBRATION CERTIFICATE

Object **ES3DV2 - SN:3022**

Calibration procedure(s) **QA CAL-01.v6, QA CAL-23.v3 and QA CAL-25.v2  
 Calibration procedure for dosimetric E-field probes**

Calibration date: **September 21, 2010**

✓  
 KOK  
 9/29/10

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 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

| Primary Standards          | ID #            | Cal Date (Certificate No.)        | Scheduled Calibration  |
|----------------------------|-----------------|-----------------------------------|------------------------|
| Power meter E4419B         | GB41293874      | 1-Apr-10 (No. 217-01136)          | Apr-11                 |
| Power sensor E4412A        | MY41495277      | 1-Apr-10 (No. 217-01136)          | Apr-11                 |
| Power sensor E4412A        | MY41498087      | 1-Apr-10 (No. 217-01136)          | Apr-11                 |
| Reference 3 dB Attenuator  | SN: S5054 (3c)  | 30-Mar-10 (No. 217-01159)         | Mar-11                 |
| Reference 20 dB Attenuator | SN: S5086 (20b) | 30-Mar-10 (No. 217-01161)         | Mar-11                 |
| Reference 30 dB Attenuator | SN: S5129 (30b) | 30-Mar-10 (No. 217-01160)         | Mar-11                 |
| Reference Probe ES3DV2     | SN: 3013        | 30-Dec-09 (No. ES3-3013_Dec09)    | Dec-10                 |
| DAE4                       | SN: 660         | 20-Apr-10 (No. DAE4-660_Apr10)    | Apr-11                 |
| Secondary Standards        | ID #            | Check Date (in house)             | Scheduled Check        |
| RF generator HP 8648C      | US3642U01700    | 4-Aug-99 (in house check Oct-09)  | In house check: Oct-11 |
| Network Analyzer HP 8753E  | US37390585      | 18-Oct-01 (in house check Oct-09) | In house check: Oct10  |

|                |                |                       |           |
|----------------|----------------|-----------------------|-----------|
|                | Name           | Function              | Signature |
| Calibrated by: | Jeton Kastrati | Laboratory Technician |           |
| Approved by:   | Katja Pokovic  | Technical Manager     |           |

Issued: September 22, 2010

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 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                                                                                                                                 |
| CF                       | crest factor (1/duty_cycle) of the RF signal                                                                                                            |
| A, B, C                  | modulation dependent linearization parameters                                                                                                           |
| Polarization $\phi$      | $\phi$ rotation around probe axis                                                                                                                       |
| Polarization $\vartheta$ | $\vartheta$ rotation around an axis that is in the plane normal to probe axis (at measurement center),<br>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
- IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005

## 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 with CW signal (no uncertainty required). DCP does not depend on frequency nor media.
- A<sub>x,y,z</sub>; B<sub>x,y,z</sub>; C<sub>x,y,z</sub>; VR<sub>x,y,z</sub>:** A, B, C are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. VR is the maximum calibration range expressed in RMS voltage across the diode.
- 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.

# Probe ES3DV2

## SN:3022

|                  |                    |
|------------------|--------------------|
| Manufactured:    | April 15, 2003     |
| Last calibrated: | September 18, 2009 |
| Recalibrated:    | September 21, 2010 |

Calibrated for DASY/EASY Systems

(Note: non-compatible with DASY2 system!)

## DASY/EASY - Parameters of Probe: ES3DV2 SN:3022

### Basic Calibration Parameters

|                                                           | Sensor X | Sensor Y | Sensor Z | Unc (k=2) |
|-----------------------------------------------------------|----------|----------|----------|-----------|
| Norm ( $\mu\text{V}/(\text{V}/\text{m})^2$ ) <sup>A</sup> | 1.01     | 1.05     | 1.01     | ± 10.1%   |
| DCP (mV) <sup>B</sup>                                     | 92.8     | 92.5     | 89.7     |           |

### Modulation Calibration Parameters

| UID   | Communication System Name | PAR  |   | A<br>dB | B<br>dBuV | C    | VR<br>mV | Unc <sup>E</sup><br>(k=2) |
|-------|---------------------------|------|---|---------|-----------|------|----------|---------------------------|
| 10000 | CW                        | 0.00 | X | 0.00    | 0.00      | 1.00 | 300.0    | ± 1.5%                    |
|       |                           |      | Y | 0.00    | 0.00      | 1.00 | 300.0    |                           |
|       |                           |      | Z | 0.00    | 0.00      | 1.00 | 300.0    |                           |

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 Pages 5 and 6).

<sup>B</sup> Numerical linearization parameter: uncertainty not required.

<sup>E</sup> Uncertainty is determined using the maximum deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

## DASY/EASY - Parameters of Probe: ES3DV2 SN:3022

### Calibration Parameter Determined in Head Tissue Simulating Media

| f [MHz] | Validity [MHz] <sup>c</sup> | Permittivity | Conductivity | ConvF X | ConvF Y | ConvF Z | Alpha | Depth Unc (k=2) |
|---------|-----------------------------|--------------|--------------|---------|---------|---------|-------|-----------------|
| 750     | ± 50 / ± 100                | 41.9 ± 5%    | 0.89 ± 5%    | 6.32    | 6.32    | 6.32    | 0.87  | 1.01 ± 11.0%    |
| 835     | ± 50 / ± 100                | 41.5 ± 5%    | 0.90 ± 5%    | 6.02    | 6.02    | 6.02    | 0.62  | 1.20 ± 11.0%    |
| 1750    | ± 50 / ± 100                | 40.1 ± 5%    | 1.37 ± 5%    | 5.01    | 5.01    | 5.01    | 0.27  | 2.23 ± 11.0%    |
| 1900    | ± 50 / ± 100                | 40.0 ± 5%    | 1.40 ± 5%    | 4.83    | 4.83    | 4.83    | 0.25  | 2.29 ± 11.0%    |
| 2450    | ± 50 / ± 100                | 39.2 ± 5%    | 1.80 ± 5%    | 4.21    | 4.21    | 4.21    | 0.25  | 2.62 ± 11.0%    |
| 2600    | ± 50 / ± 100                | 39.0 ± 5%    | 1.96 ± 5%    | 4.14    | 4.14    | 4.14    | 0.25  | 2.64 ± 11.0%    |

<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.

## DASY/EASY - Parameters of Probe: ES3DV2 SN:3022

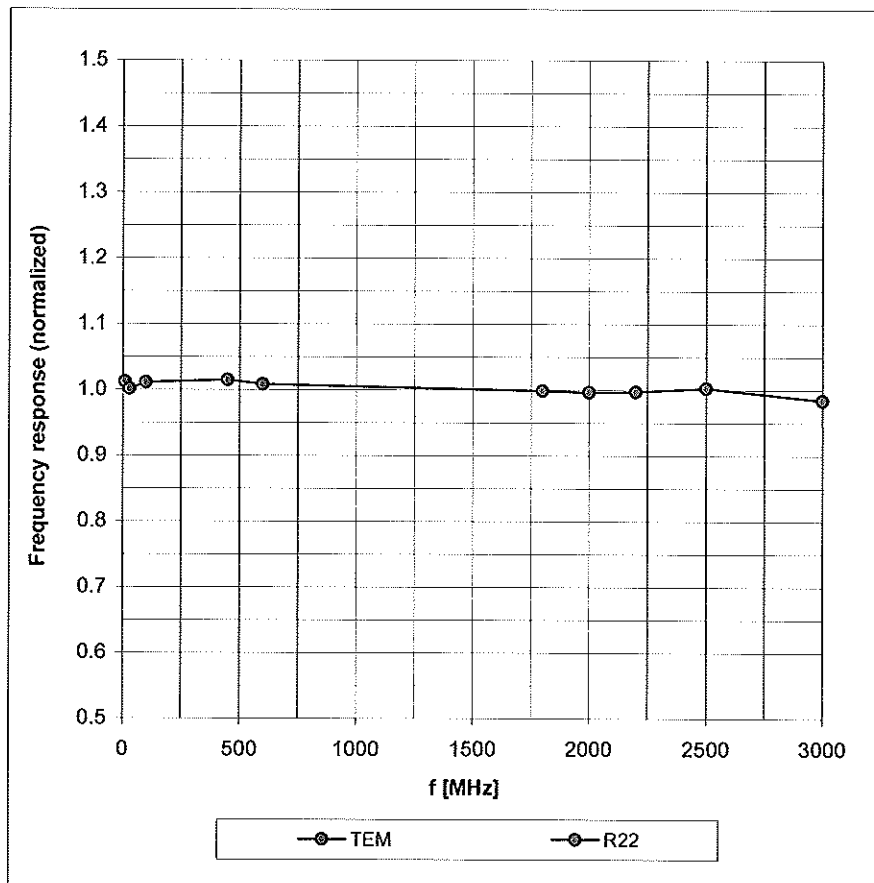
### Calibration Parameter Determined in Body Tissue Simulating Media

| f [MHz] | Validity [MHz] <sup>c</sup> | Permittivity | Conductivity | ConvF X | ConvF Y | ConvF Z | Alpha | Depth Unc (k=2) |
|---------|-----------------------------|--------------|--------------|---------|---------|---------|-------|-----------------|
| 750     | ± 50 / ± 100                | 55.5 ± 5%    | 0.96 ± 5%    | 6.09    | 6.09    | 6.09    | 0.68  | 1.20 ± 11.0%    |
| 835     | ± 50 / ± 100                | 55.2 ± 5%    | 0.97 ± 5%    | 5.89    | 5.89    | 5.89    | 0.65  | 1.20 ± 11.0%    |
| 1750    | ± 50 / ± 100                | 53.4 ± 5%    | 1.49 ± 5%    | 4.59    | 4.59    | 4.59    | 0.23  | 2.83 ± 11.0%    |
| 1900    | ± 50 / ± 100                | 53.3 ± 5%    | 1.52 ± 5%    | 4.34    | 4.34    | 4.34    | 0.22  | 3.71 ± 11.0%    |
| 2450    | ± 50 / ± 100                | 52.7 ± 5%    | 1.95 ± 5%    | 4.06    | 4.06    | 4.06    | 0.41  | 1.42 ± 11.0%    |
| 2600    | ± 50 / ± 100                | 52.5 ± 5%    | 2.16 ± 5%    | 4.06    | 4.06    | 4.06    | 0.53  | 1.23 ± 11.0%    |

<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.

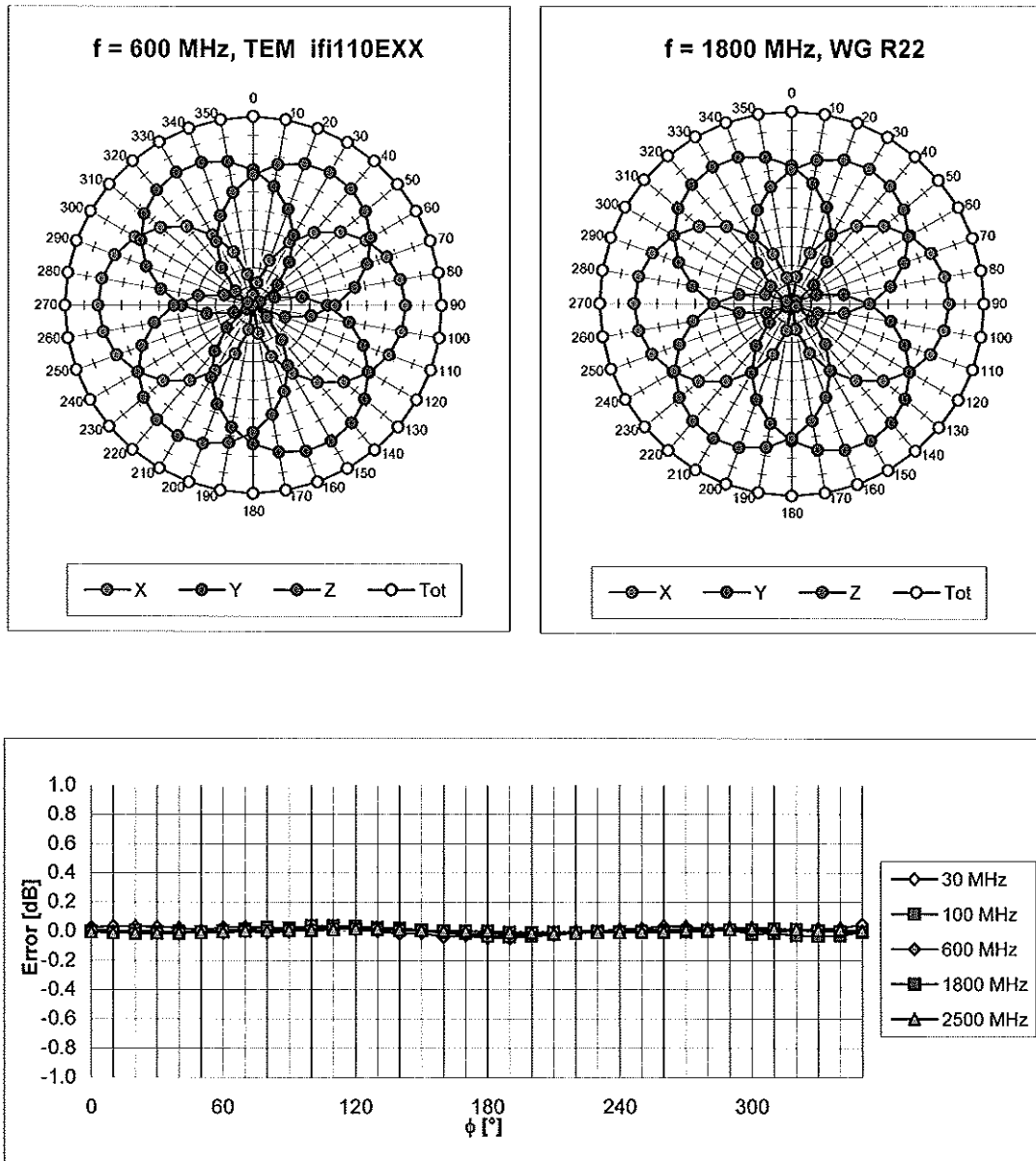
## Frequency Response of E-Field

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



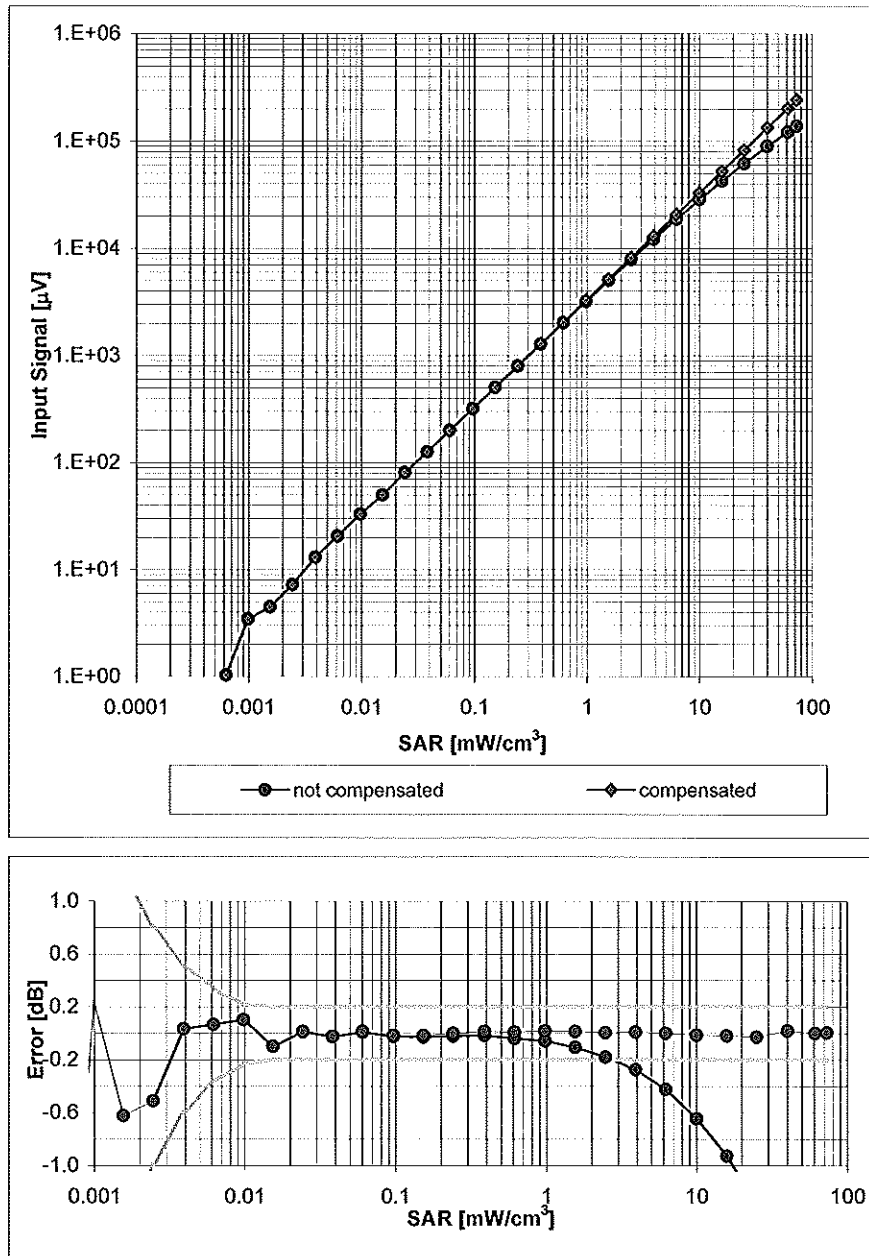
Uncertainty of Frequency Response of E-field:  $\pm 6.3\%$  ( $k=2$ )

# Receiving Pattern ( $\phi$ ), $\vartheta = 0^\circ$



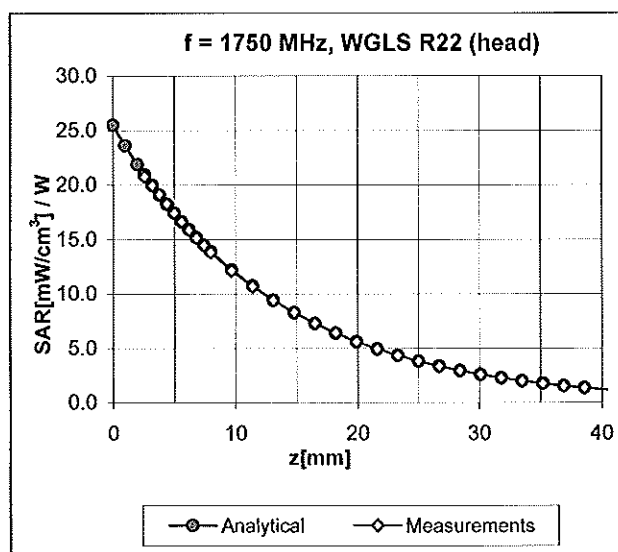
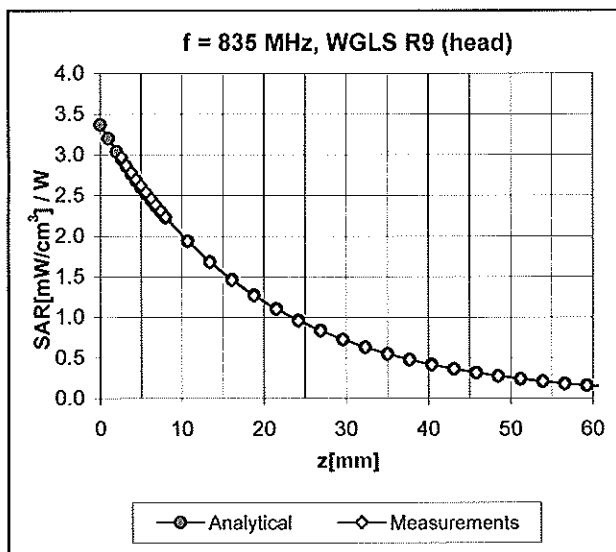
Uncertainty of Axial Isotropy Assessment:  $\pm 0.5\%$  ( $k=2$ )

# Dynamic Range $f(\text{SAR}_{\text{head}})$ (Waveguide R22, $f = 1800 \text{ MHz}$ )



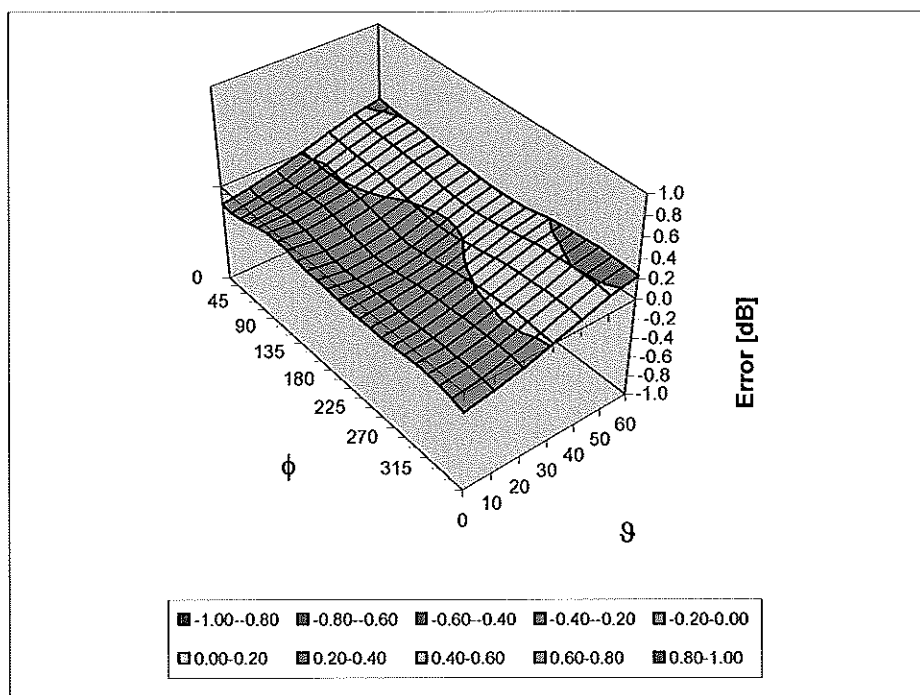
Uncertainty of Linearity Assessment:  $\pm 0.6\%$  ( $k=2$ )

## Conversion Factor Assessment



## Deviation from Isotropy in HSL

Error ( $\phi$ ,  $\theta$ ), f = 900 MHz



Uncertainty of Spherical Isotropy Assessment:  $\pm 2.6\%$  (k=2)

## Other Probe Parameters

|                                               |                |
|-----------------------------------------------|----------------|
| Sensor Arrangement                            | Triangular     |
| Connector Angle (°)                           | Not applicable |
| Mechanical Surface Detection Mode             | enabled        |
| Optical Surface Detection Mode                | disabled       |
| Probe Overall Length                          | 337 mm         |
| Probe Body Diameter                           | 10 mm          |
| Tip Length                                    | 10 mm          |
| Tip Diameter                                  | 4.0 mm         |
| Probe Tip to Sensor X Calibration Point       | 2 mm           |
| Probe Tip to Sensor Y Calibration Point       | 2 mm           |
| Probe Tip to Sensor Z Calibration Point       | 2 mm           |
| Recommended Measurement Distance from Surface | 3 mm           |



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Accreditation No.: SCS 108

Client **PC Test**

Certificate No: **EX-3550\_Feb11**

## CALIBRATION CERTIFICATE

Object **EX3DV4 - SN:3550**

Calibration procedure(s) **QA CAL-01.v7, QA CAL-14.v3, QA CAL-23.v4, QA CAL-25.v3  
Calibration procedure for dosimetric E-field probes**

Calibration date: **February 14, 2011**

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  $(22 \pm 3)^\circ\text{C}$  and humidity  $< 70\%$ .

Calibration Equipment used (M&TE critical for calibration)

✓  
KOK  
2/22/11

| Primary Standards          | ID              | Cal Date (Certificate No.)        | Scheduled Calibration  |
|----------------------------|-----------------|-----------------------------------|------------------------|
| Power meter E4419B         | GB41293874      | 01-Apr-10 (No. 217-01136)         | Apr-11                 |
| Power sensor E4412A        | MY41495277      | 01-Apr-10 (No. 217-01136)         | Apr-11                 |
| Power sensor E4412A        | MY41498087      | 01-Apr-10 (No. 217-01136)         | Apr-11                 |
| Reference 3 dB Attenuator  | SN: S5054 (3c)  | 30-Mar-10 (No. 217-01159)         | Mar-11                 |
| Reference 20 dB Attenuator | SN: S5086 (20b) | 30-Mar-10 (No. 217-01161)         | Mar-11                 |
| Reference 30 dB Attenuator | SN: S5129 (30b) | 30-Mar-10 (No. 217-01160)         | Mar-11                 |
| Reference Probe ES3DV2     | SN: 3013        | 29-Dec-10 (No. ES3-3013_Dec10)    | Dec-11                 |
| DAE4                       | SN: 654         | 23-Apr-10 (No. DAE4-654_Apr10)    | Apr-11                 |
| Secondary Standards        | ID              | Check Date (in house)             | Scheduled Check        |
| RF generator HP 8648C      | US3642U01700    | 4-Aug-99 (in house check Oct-09)  | In house check: Oct-11 |
| Network Analyzer HP 8753E  | US37390585      | 18-Oct-01 (in house check Oct-10) | In house check: Oct-11 |

|                                                                                                                 | Name          | Function          | Signature |
|-----------------------------------------------------------------------------------------------------------------|---------------|-------------------|-----------|
| Calibrated by:                                                                                                  | Katja Pokovic | Technical Manager |           |
| Approved by:                                                                                                    | Niels Kuster  | Quality Manager   |           |
| Issued: February 14, 2011                                                                                       |               |                   |           |
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## 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                                                                                                                                 |
| CF                       | crest factor (1/duty_cycle) of the RF signal                                                                                                            |
| A, B, C                  | modulation dependent linearization parameters                                                                                                           |
| Polarization $\alpha$    | $\alpha$ rotation around probe axis                                                                                                                     |
| Polarization $\vartheta$ | $\vartheta$ rotation around an axis that is in the plane normal to probe axis (at measurement center),<br>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
- IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005

## 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 affect 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 with CW signal (no uncertainty required). DCP does not depend on frequency nor media.
- PAR**: PAR is the Peak to Average Ratio that is not calibrated but determined based on the signal characteristics
- A<sub>x,y,z</sub>; B<sub>x,y,z</sub>; C<sub>x,y,z</sub>** are numerical linearization parameters in dB assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media.
- VR**: VR is the validity range of the calibration related to the average diode voltage or DAE voltage in mV.
- 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.

# Probe EX3DV4

## SN:3550

Manufactured: May 19, 2004  
Calibrated: February 14, 2011

Calibrated for DASY/EASY Systems  
(Note: non-compatible with DASY2 system!)

## DASY/EASY - Parameters of Probe: EX3DV4 - SN:3550

### Basic Calibration Parameters

|                                                    | Sensor X | Sensor Y | Sensor Z | Unc (k=2) |
|----------------------------------------------------|----------|----------|----------|-----------|
| Norm ( $\mu\text{V}/(\text{V/m})^2$ ) <sup>A</sup> | 0.52     | 0.45     | 0.50     | ± 10.1 %  |
| DCP (mV) <sup>B</sup>                              | 100.3    | 98.8     | 99.0     |           |

### Modulation Calibration Parameters

| UID   | Communication System Name | PAR  |   | A<br>dB | B<br>dB | C<br>dB | VR<br>mV | Unc <sup>E</sup><br>(k=2) |
|-------|---------------------------|------|---|---------|---------|---------|----------|---------------------------|
| 10000 | CW                        | 0.00 | X | 0.00    | 0.00    | 1.00    | 110.7    | ±2.2 %                    |
|       |                           |      | Y | 0.00    | 0.00    | 1.00    | 145.7    |                           |
|       |                           |      | Z | 0.00    | 0.00    | 1.00    | 148.8    |                           |

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 Pages 5 and 6).

<sup>B</sup> Numerical linearization parameter: uncertainty not required.

<sup>E</sup> Uncertainty is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

## DASY/EASY - Parameters of Probe: EX3DV4 - SN:3550

### Calibration Parameter Determined in Head Tissue Simulating Media

| f (MHz) <sup>C</sup> | Relative Permittivity <sup>F</sup> | Conductivity (S/m) <sup>F</sup> | ConvF X | ConvF Y | ConvF Z | Alpha | Depth (mm) | Unct. (k=2) |
|----------------------|------------------------------------|---------------------------------|---------|---------|---------|-------|------------|-------------|
| 750                  | 41.9                               | 0.89                            | 8.42    | 8.42    | 8.42    | 0.48  | 0.69       | ± 12.0 %    |
| 835                  | 41.5                               | 0.90                            | 8.04    | 8.04    | 8.04    | 0.33  | 0.84       | ± 12.0 %    |
| 1750                 | 40.1                               | 1.37                            | 7.33    | 7.33    | 7.33    | 0.46  | 0.65       | ± 12.0 %    |
| 1900                 | 40.0                               | 1.40                            | 7.01    | 7.01    | 7.01    | 0.42  | 0.72       | ± 12.0 %    |
| 2450                 | 39.2                               | 1.80                            | 6.29    | 6.29    | 6.29    | 0.13  | 1.57       | ± 12.0 %    |
| 2600                 | 39.0                               | 1.96                            | 6.13    | 6.13    | 6.13    | 0.20  | 1.32       | ± 12.0 %    |
| 4950                 | 36.3                               | 4.40                            | 4.37    | 4.37    | 4.37    | 0.35  | 1.80       | ± 13.1 %    |
| 5200                 | 36.0                               | 4.66                            | 4.06    | 4.06    | 4.06    | 0.35  | 1.80       | ± 13.1 %    |
| 5300                 | 35.9                               | 4.76                            | 3.92    | 3.92    | 3.92    | 0.35  | 1.80       | ± 13.1 %    |
| 5500                 | 35.6                               | 4.96                            | 3.77    | 3.77    | 3.77    | 0.35  | 1.80       | ± 13.1 %    |
| 5600                 | 35.5                               | 5.07                            | 3.50    | 3.50    | 3.50    | 0.40  | 1.80       | ± 13.1 %    |
| 5800                 | 35.3                               | 5.27                            | 3.64    | 3.64    | 3.64    | 0.40  | 1.80       | ± 13.1 %    |

<sup>C</sup> Frequency validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

<sup>F</sup> At frequencies below 3 GHz, the validity of tissue parameters ( $\epsilon$  and  $\sigma$ ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters ( $\epsilon$  and  $\sigma$ ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

## DASY/EASY - Parameters of Probe: EX3DV4- SN:3550

### Calibration Parameter Determined in Body Tissue Simulating Media

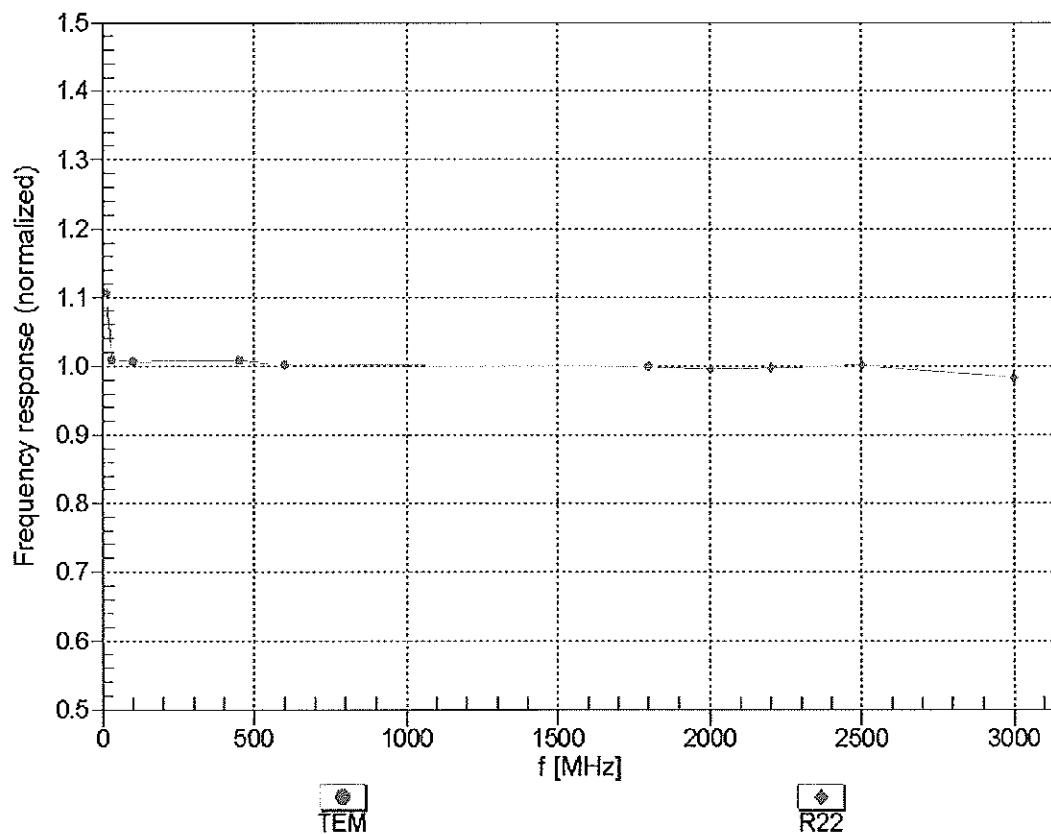
| f (MHz) <sup>C</sup> | Relative Permittivity <sup>F</sup> | Conductivity (S/m) <sup>F</sup> | ConvF X | ConvF Y | ConvF Z | Alpha | Depth (mm) | Unct. (k=2) |
|----------------------|------------------------------------|---------------------------------|---------|---------|---------|-------|------------|-------------|
| 750                  | 55.5                               | 0.96                            | 8.18    | 8.18    | 8.18    | 0.23  | 1.09       | ± 12.0 %    |
| 835                  | 55.2                               | 0.97                            | 8.11    | 8.11    | 8.11    | 0.25  | 1.05       | ± 12.0 %    |
| 1750                 | 53.4                               | 1.49                            | 7.21    | 7.21    | 7.21    | 0.42  | 0.89       | ± 12.0 %    |
| 1900                 | 53.3                               | 1.52                            | 6.77    | 6.77    | 6.77    | 0.35  | 0.84       | ± 12.0 %    |
| 2450                 | 52.7                               | 1.95                            | 6.25    | 6.25    | 6.25    | 0.30  | 0.86       | ± 12.0 %    |
| 2600                 | 52.5                               | 2.16                            | 5.98    | 5.98    | 5.98    | 0.21  | 1.03       | ± 12.0 %    |
| 3700                 | 51.0                               | 3.55                            | 5.42    | 5.42    | 5.42    | 0.20  | 1.95       | ± 13.1 %    |
| 4950                 | 49.4                               | 5.01                            | 3.72    | 3.72    | 3.72    | 0.45  | 1.90       | ± 13.1 %    |
| 5200                 | 49.0                               | 5.30                            | 3.58    | 3.58    | 3.58    | 0.45  | 1.90       | ± 13.1 %    |
| 5300                 | 48.9                               | 5.42                            | 3.31    | 3.31    | 3.31    | 0.48  | 1.90       | ± 13.1 %    |
| 5500                 | 48.6                               | 5.65                            | 3.21    | 3.21    | 3.21    | 0.47  | 1.90       | ± 13.1 %    |
| 5600                 | 48.5                               | 5.77                            | 3.19    | 3.19    | 3.19    | 0.45  | 1.90       | ± 13.1 %    |
| 5800                 | 48.2                               | 6.00                            | 3.29    | 3.29    | 3.29    | 0.50  | 1.90       | ± 13.1 %    |

<sup>C</sup> Frequency validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

<sup>F</sup> At frequencies below 3 GHz, the validity of tissue parameters ( $\epsilon$  and  $\sigma$ ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters ( $\epsilon$  and  $\sigma$ ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

## Frequency Response of E-Field

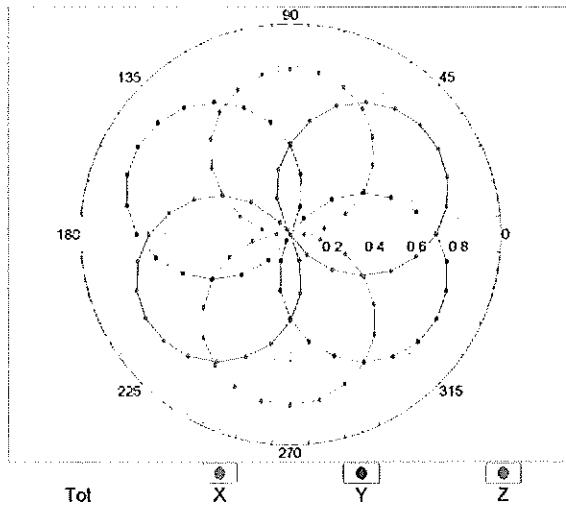
(TEM-Cell:ifi1110 EXX, Waveguide: R22)



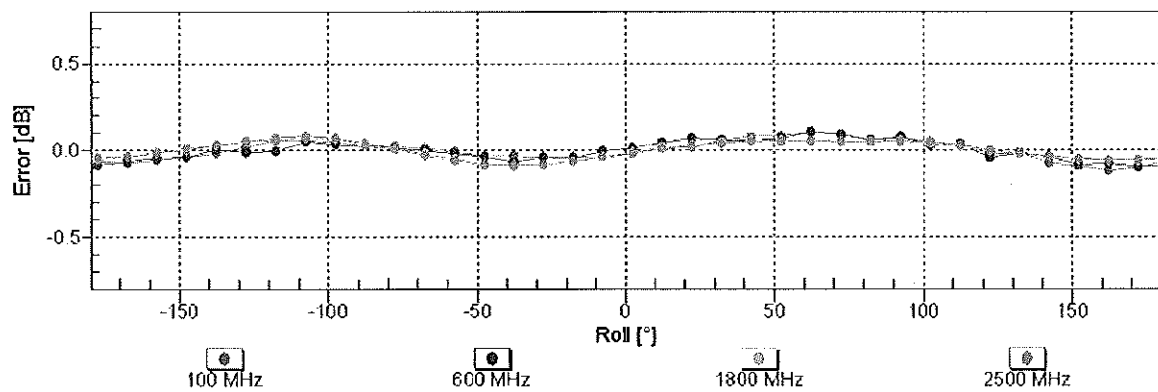
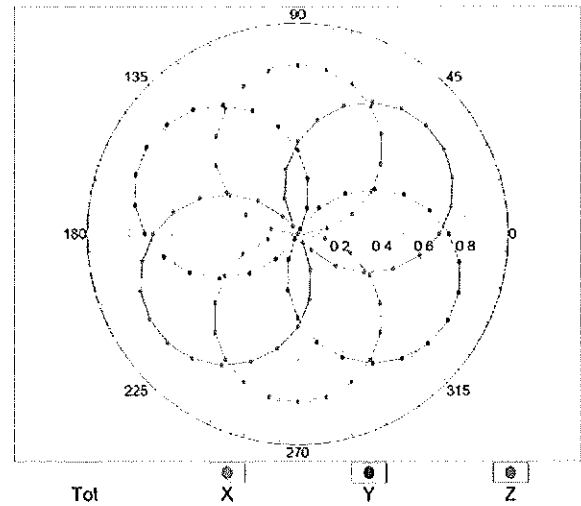
Uncertainty of Frequency Response of E-field:  $\pm 6.3\%$  ( $k=2$ )

## Receiving Pattern ( $\phi$ ), $\theta = 0^\circ$

f=600 MHz,TEM



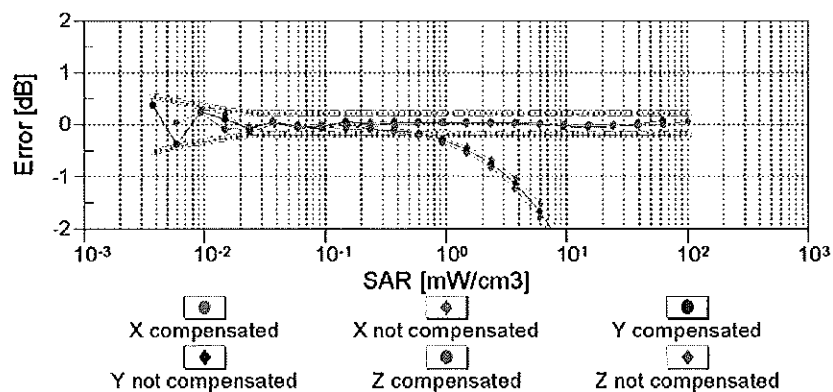
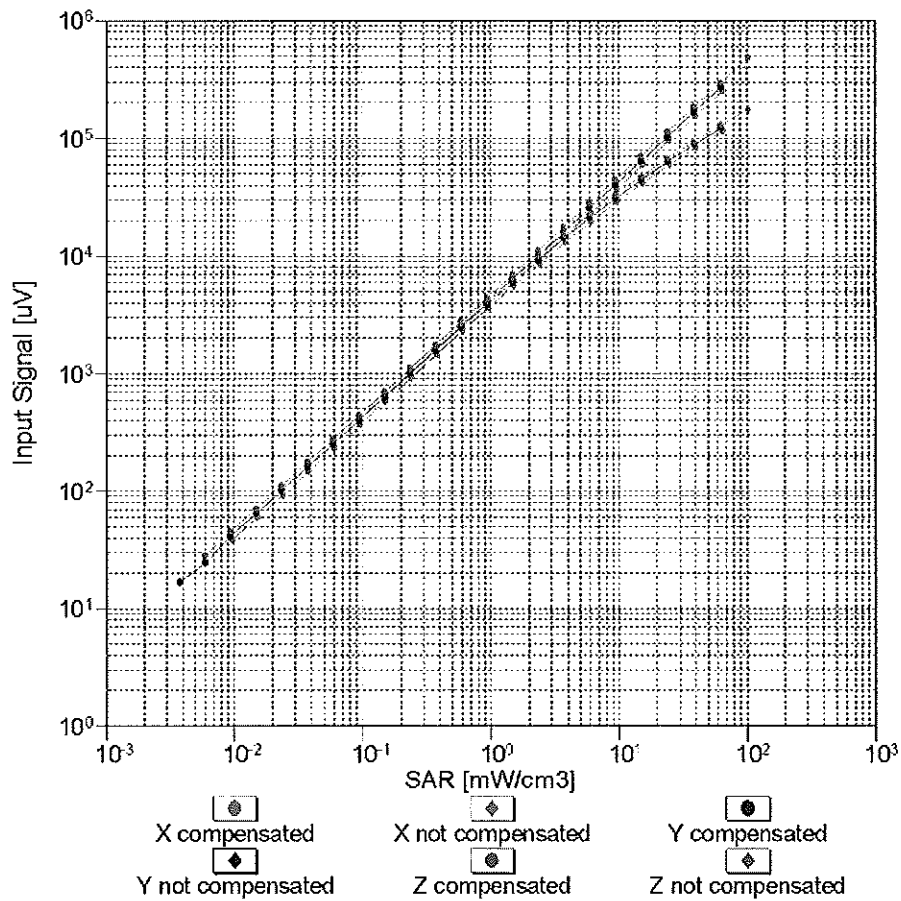
f=1800 MHz,R22



Uncertainty of Axial Isotropy Assessment:  $\pm 0.5\%$  ( $k=2$ )

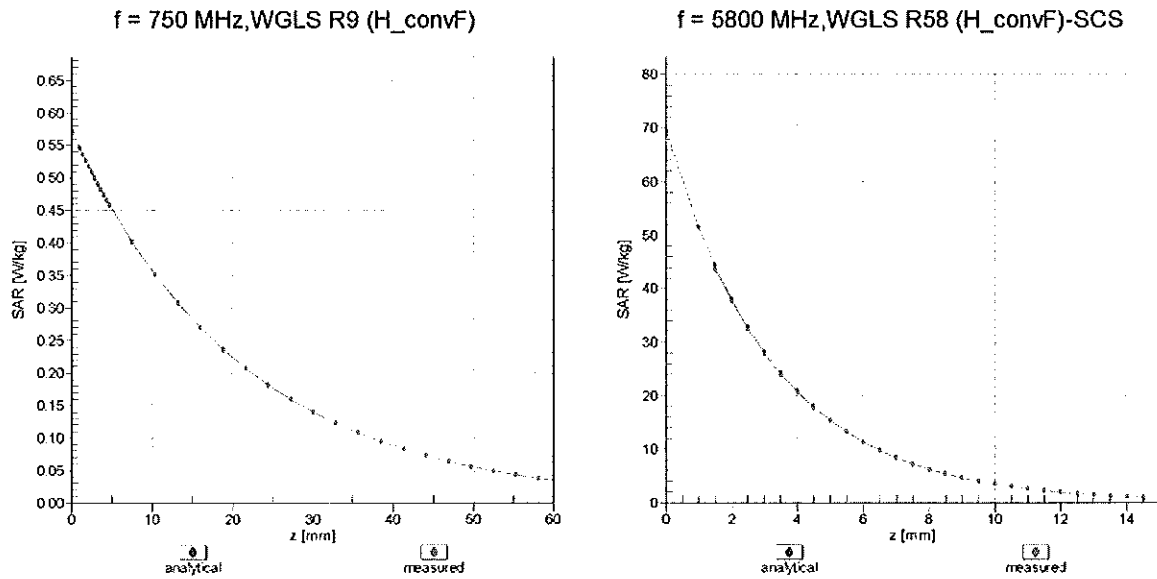
# Dynamic Range f(SAR<sub>head</sub>)

(TEM cell , f = 900 MHz)



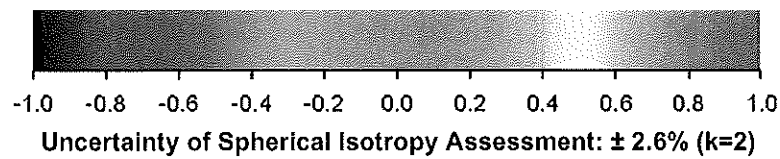
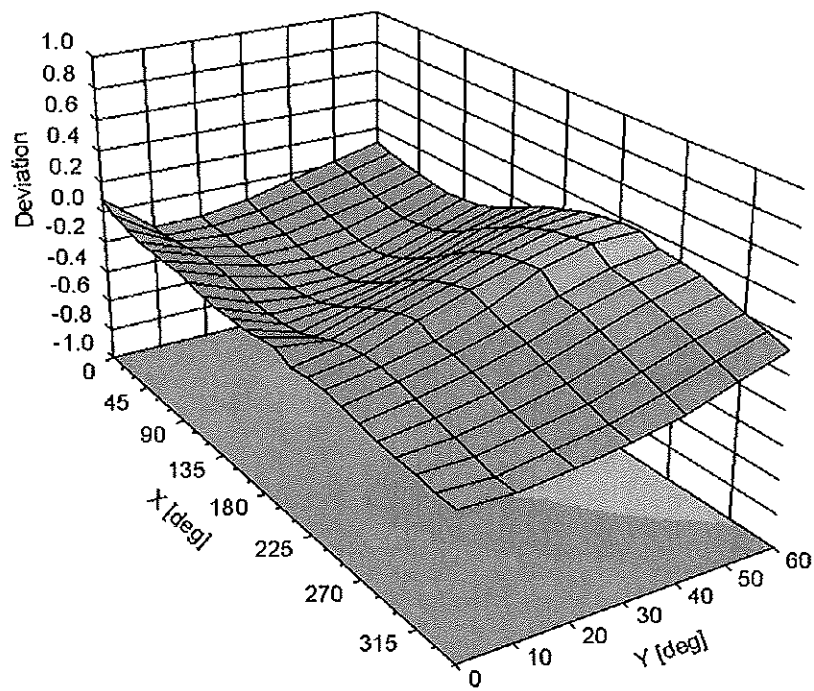
Uncertainty of Linearity Assessment:  $\pm 0.6\%$  (k=2)

## Conversion Factor Assessment



## Deviation from Isotropy in Air

Error ( $\phi, \theta$ ),  $f = 900 \text{ MHz}$



## DASY/EASY - Parameters of Probe: EX3DV4 - SN:3550

### Other Probe Parameters

|                                               |                |
|-----------------------------------------------|----------------|
| Sensor Arrangement                            | Triangular     |
| Connector Angle (°)                           | Not applicable |
| Mechanical Surface Detection Mode             | enabled        |
| Optical Surface Detection Mode                | disabled       |
| Probe Overall Length                          | 337 mm         |
| Probe Body Diameter                           | 10 mm          |
| Tip Length                                    | 9 mm           |
| Tip Diameter                                  | 3 mm           |
| Probe Tip to Sensor X Calibration Point       | 1 mm           |
| Probe Tip to Sensor Y Calibration Point       | 1 mm           |
| Probe Tip to Sensor Z Calibration Point       | 1 mm           |
| Recommended Measurement Distance from Surface | 2 mm           |



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Accreditation No.: **SCS 108**

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Multilateral Agreement for the recognition of calibration certificates

Client **PC Test**

Certificate No: **EX3-3561\_Aug10**

## CALIBRATION CERTIFICATE

Object **EX3DV4 - SN:3561**

Calibration procedure(s) **QA CAL-01.v6, QA CAL-14.v3, QA CAL-23.v3 and QA CAL-25.v2  
Calibration procedure for dosimetric E-field probes**

Calibration date: **August 19, 2010**

*KOK  
8/30/10*

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  $(22 \pm 3)^\circ\text{C}$  and humidity  $< 70\%$ .

Calibration Equipment used (M&TE critical for calibration)

| Primary Standards          | ID #            | Cal Date (Certificate No.)        | Scheduled Calibration  |
|----------------------------|-----------------|-----------------------------------|------------------------|
| Power meter E4419B         | GB41293874      | 1-Apr-10 (No. 217-01136)          | Apr-11                 |
| Power sensor E4412A        | MY41495277      | 1-Apr-10 (No. 217-01136)          | Apr-11                 |
| Power sensor E4412A        | MY41498087      | 1-Apr-10 (No. 217-01136)          | Apr-11                 |
| Reference 3 dB Attenuator  | SN: S5054 (3c)  | 30-Mar-10 (No. 217-01159)         | Mar-11                 |
| Reference 20 dB Attenuator | SN: S5086 (20b) | 30-Mar-10 (No. 217-01161)         | Mar-11                 |
| Reference 30 dB Attenuator | SN: S5129 (30b) | 30-Mar-10 (No. 217-01160)         | Mar-11                 |
| Reference Probe ES3DV2     | SN: 3013        | 30-Dec-09 (No. ES3-3013_Dec09)    | Dec-10                 |
| DAE4                       | SN: 660         | 20-Apr-10 (No. DAE4-660_Apr10)    | Apr-11                 |
| Secondary Standards        | ID #            | Check Date (in house)             | Scheduled Check        |
| RF generator HP 8648C      | US3642U01700    | 4-Aug-99 (in house check Oct-09)  | In house check: Oct-11 |
| Network Analyzer HP 8753E  | US37390585      | 18-Oct-01 (in house check Oct-09) | In house check: Oct10  |

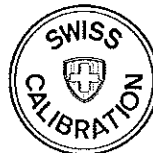
Calibrated by: **Katja Pokovic** **Technical Manager**

Approved by: **Niels Kuster** **Quality Manager**

*[Signatures]*

Issued: August 20, 2010

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## 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                                                                                                                                 |
| CF                       | crest factor (1/duty_cycle) of the RF signal                                                                                                            |
| A, B, C                  | modulation dependent linearization parameters                                                                                                           |
| Polarization $\phi$      | $\phi$ rotation around probe axis                                                                                                                       |
| Polarization $\vartheta$ | $\vartheta$ rotation around an axis that is in the plane normal to probe axis (at measurement center),<br>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
- IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005

## 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 with CW signal (no uncertainty required). DCP does not depend on frequency nor media.
- A<sub>x,y,z</sub>; B<sub>x,y,z</sub>; C<sub>x,y,z</sub>; VR<sub>x,y,z</sub>**: A, B, C are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. VR is the maximum calibration range expressed in RMS voltage across the diode.
- 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.

# Probe EX3DV4

## SN:3561

|                  |                   |
|------------------|-------------------|
| Manufactured:    | February 14, 2005 |
| Last calibrated: | August 26, 2008   |
| Recalibrated:    | August 19, 2010   |

Calibrated for DASY/EASY Systems

(Note: non-compatible with DASY2 system!)

**DASY/EASY - Parameters of Probe: EX3DV4 SN:3561****Basic Calibration Parameters**

|                                                           | Sensor X | Sensor Y | Sensor Z | Unc (k=2) |
|-----------------------------------------------------------|----------|----------|----------|-----------|
| Norm ( $\mu\text{V}/(\text{V}/\text{m})^2$ ) <sup>A</sup> | 0.45     | 0.48     | 0.43     | ± 10.1%   |
| DCP (mV) <sup>B</sup>                                     | 87.4     | 89.6     | 88.5     |           |

**Modulation Calibration Parameters**

| UID   | Communication System Name | PAR  |   | A<br>dB | B<br>dBuV | C    | VR<br>mV | Unc <sup>E</sup><br>(k=2) |
|-------|---------------------------|------|---|---------|-----------|------|----------|---------------------------|
| 10000 | CW                        | 0.00 | X | 0.00    | 0.00      | 1.00 | 300      | ± 1.5%                    |
|       |                           |      | Y | 0.00    | 0.00      | 1.00 | 300      |                           |
|       |                           |      | Z | 0.00    | 0.00      | 1.00 | 300      |                           |

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  $\hat{E}$  field uncertainty inside TSL (see Pages 5 and 6).

<sup>B</sup> Numerical linearization parameter: uncertainty not required.

<sup>E</sup> Uncertainty is determined using the maximum deviation from linear response applying rectangular distribution and is expressed for the square of the field value

## DASY/EASY - Parameters of Probe: EX3DV4 SN:3561

### Calibration Parameter Determined in Head Tissue Simulating Media

| f [MHz] | Validity [MHz] <sup>c</sup> | Permittivity | Conductivity | ConvF X | ConvF Y | ConvF Z | Alpha | Depth Unc (k=2) |
|---------|-----------------------------|--------------|--------------|---------|---------|---------|-------|-----------------|
| 750     | ± 50 / ± 100                | 41.9 ± 5%    | 0.89 ± 5%    | 8.36    | 8.36    | 8.36    | 0.76  | 0.64 ± 11.0%    |
| 835     | ± 50 / ± 100                | 41.5 ± 5%    | 0.90 ± 5%    | 7.96    | 7.96    | 7.96    | 0.75  | 0.64 ± 11.0%    |
| 1750    | ± 50 / ± 100                | 40.1 ± 5%    | 1.37 ± 5%    | 6.92    | 6.92    | 6.92    | 0.90  | 0.57 ± 11.0%    |
| 1900    | ± 50 / ± 100                | 40.0 ± 5%    | 1.40 ± 5%    | 6.69    | 6.69    | 6.69    | 0.76  | 0.63 ± 11.0%    |
| 2450    | ± 50 / ± 100                | 39.2 ± 5%    | 1.80 ± 5%    | 6.11    | 6.11    | 6.11    | 0.42  | 0.83 ± 11.0%    |
| 2600    | ± 50 / ± 100                | 39.0 ± 5%    | 1.96 ± 5%    | 6.09    | 6.09    | 6.09    | 0.36  | 0.93 ± 11.0%    |

<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.

## DASY/EASY - Parameters of Probe: EX3DV4 SN:3561

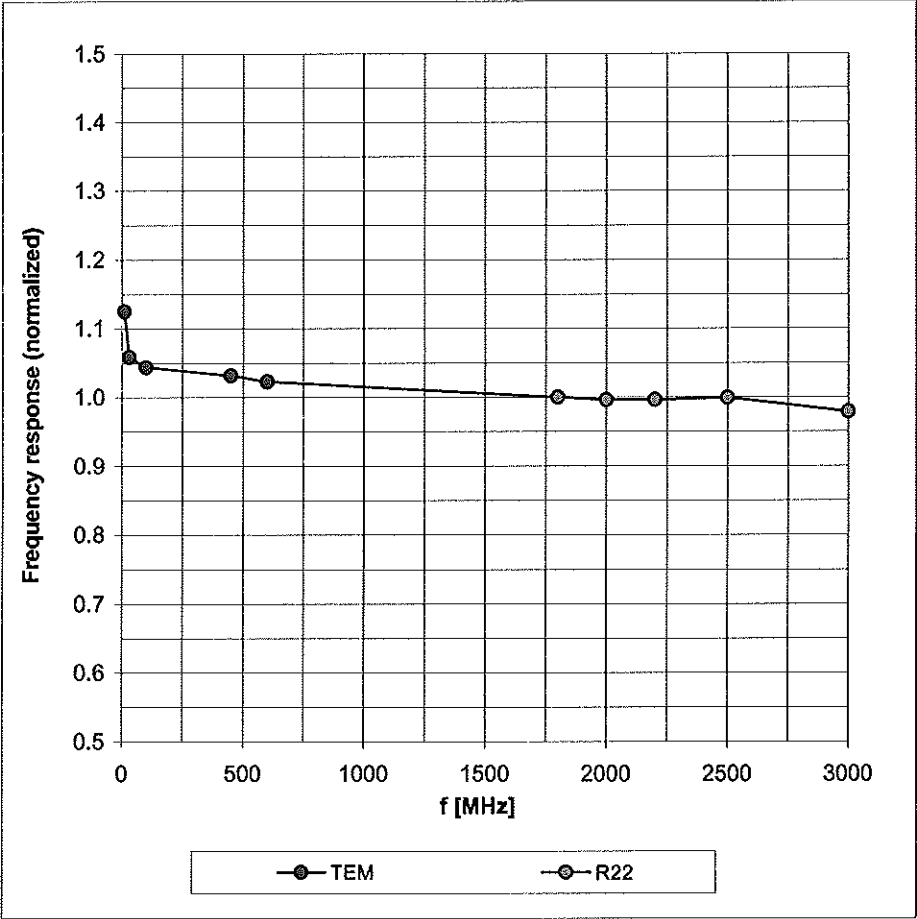
### Calibration Parameter Determined in Body Tissue Simulating Media

| f [MHz] | Validity [MHz] <sup>c</sup> | Permittivity | Conductivity | ConvF X | ConvF Y | ConvF Z | Alpha | Depth Unc (k=2) |
|---------|-----------------------------|--------------|--------------|---------|---------|---------|-------|-----------------|
| 835     | ± 50 / ± 100                | 55.2 ± 5%    | 0.97 ± 5%    | 8.09    | 8.09    | 8.09    | 0.74  | 0.65 ± 11.0%    |
| 1750    | ± 50 / ± 100                | 53.4 ± 5%    | 1.49 ± 5%    | 6.84    | 6.84    | 6.84    | 0.43  | 0.82 ± 11.0%    |
| 1900    | ± 50 / ± 100                | 53.3 ± 5%    | 1.52 ± 5%    | 6.59    | 6.59    | 6.59    | 0.56  | 0.71 ± 11.0%    |
| 2450    | ± 50 / ± 100                | 52.7 ± 5%    | 1.95 ± 5%    | 6.44    | 6.44    | 6.44    | 0.37  | 0.87 ± 11.0%    |
| 2600    | ± 50 / ± 100                | 52.5 ± 5%    | 2.16 ± 5%    | 6.45    | 6.45    | 6.45    | 0.37  | 0.95 ± 11.0%    |
| 4950    | ± 50 / ± 100                | 49.4 ± 5%    | 5.01 ± 5%    | 3.80    | 3.80    | 3.80    | 0.53  | 1.90 ± 13.1%    |
| 5200    | ± 50 / ± 100                | 49.0 ± 5%    | 5.30 ± 5%    | 3.67    | 3.67    | 3.67    | 0.60  | 1.95 ± 13.1%    |
| 5300    | ± 50 / ± 100                | 48.5 ± 5%    | 5.42 ± 5%    | 3.42    | 3.42    | 3.42    | 0.63  | 1.95 ± 13.1%    |
| 5500    | ± 50 / ± 100                | 48.6 ± 5%    | 5.65 ± 5%    | 3.31    | 3.31    | 3.31    | 0.63  | 1.95 ± 13.1%    |
| 5600    | ± 50 / ± 100                | 48.5 ± 5%    | 5.77 ± 5%    | 3.12    | 3.12    | 3.12    | 0.65  | 1.95 ± 13.1%    |
| 5800    | ± 50 / ± 100                | 48.2 ± 5%    | 6.00 ± 5%    | 3.25    | 3.25    | 3.25    | 0.65  | 1.95 ± 13.1%    |

<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.

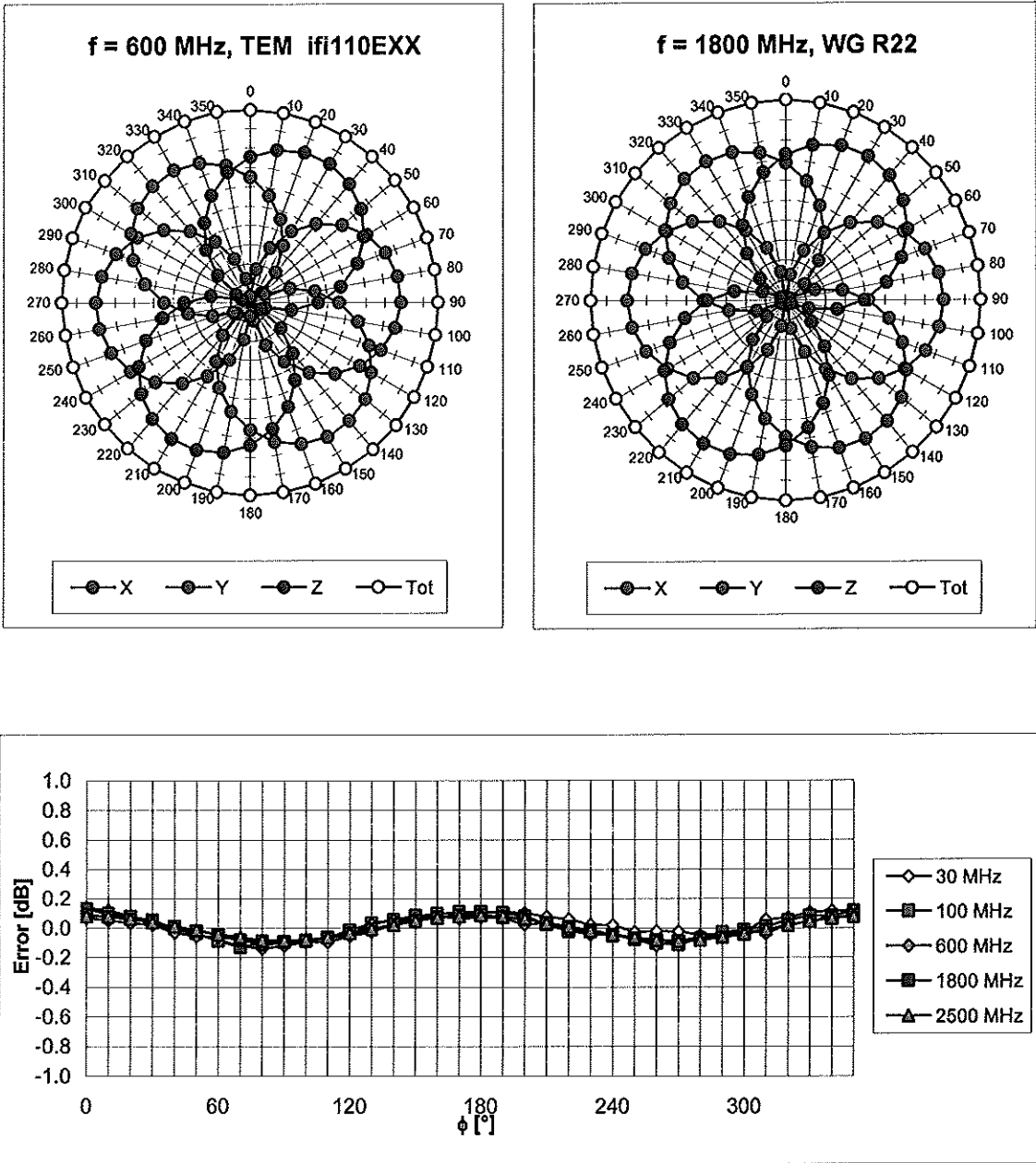
# Frequency Response of E-Field

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



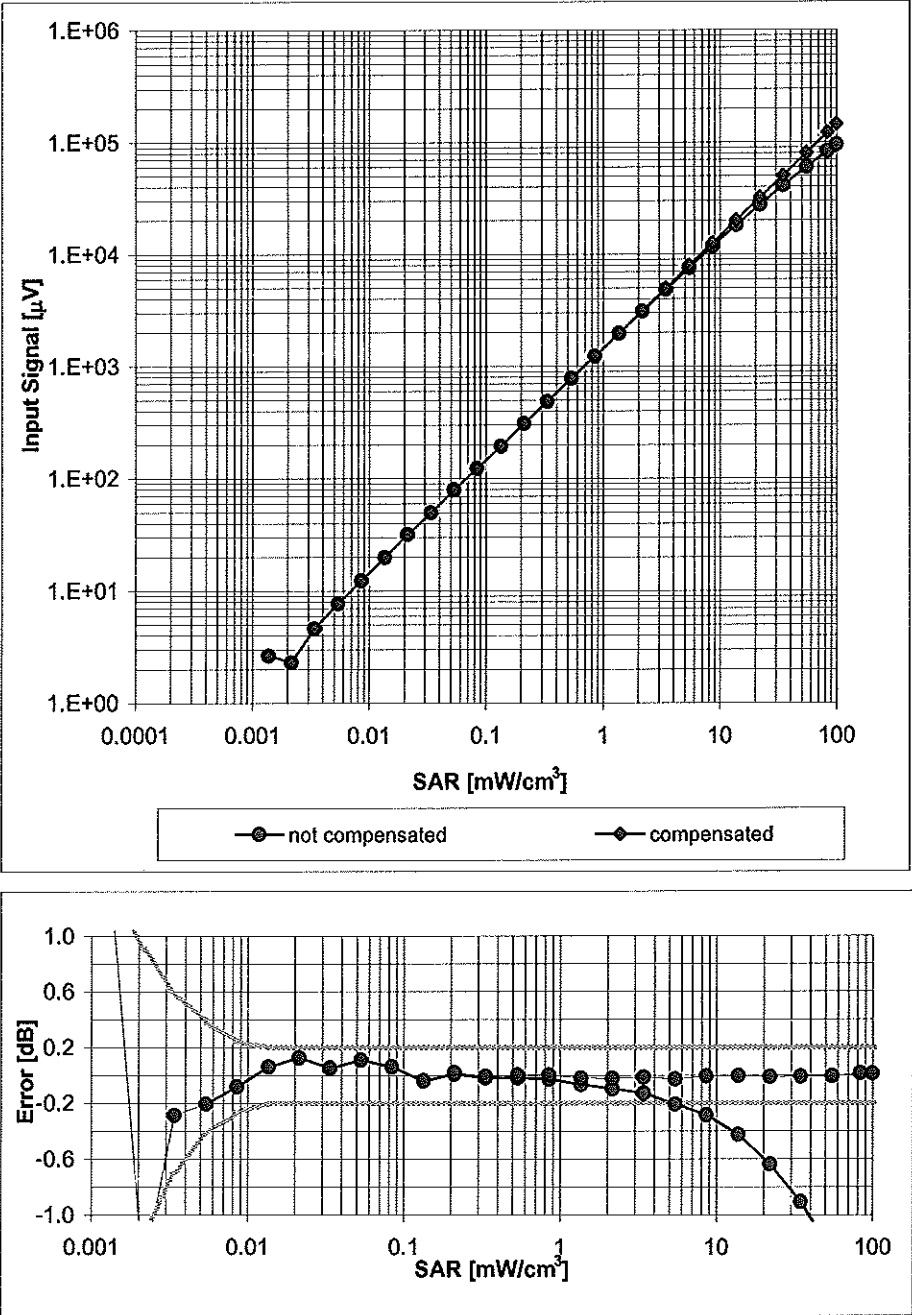
Uncertainty of Frequency Response of E-field:  $\pm 6.3\%$  ( $k=2$ )

Receiving Pattern ( $\phi$ ),  $\vartheta = 0^\circ$



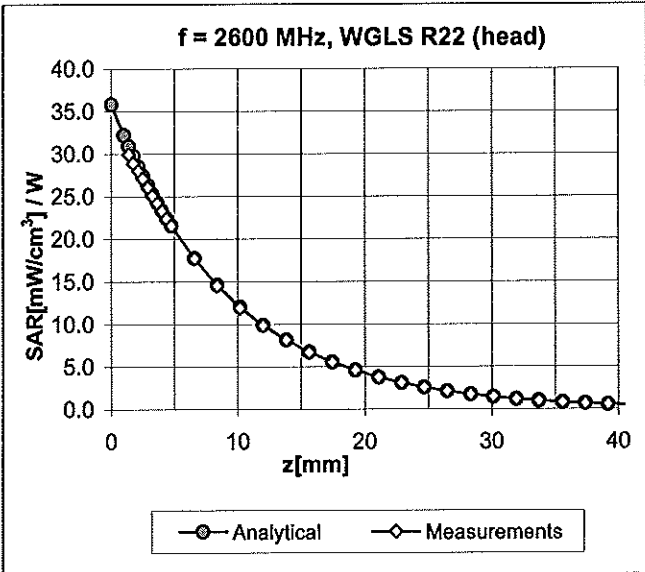
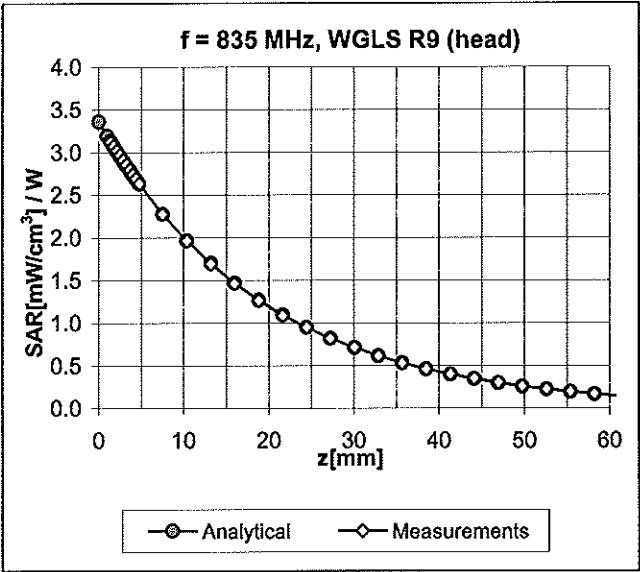
Uncertainty of Axial Isotropy Assessment:  $\pm 0.5\%$  ( $k=2$ )

Dynamic Range f(SAR<sub>head</sub>)  
(Waveguide R22, f = 1800 MHz)



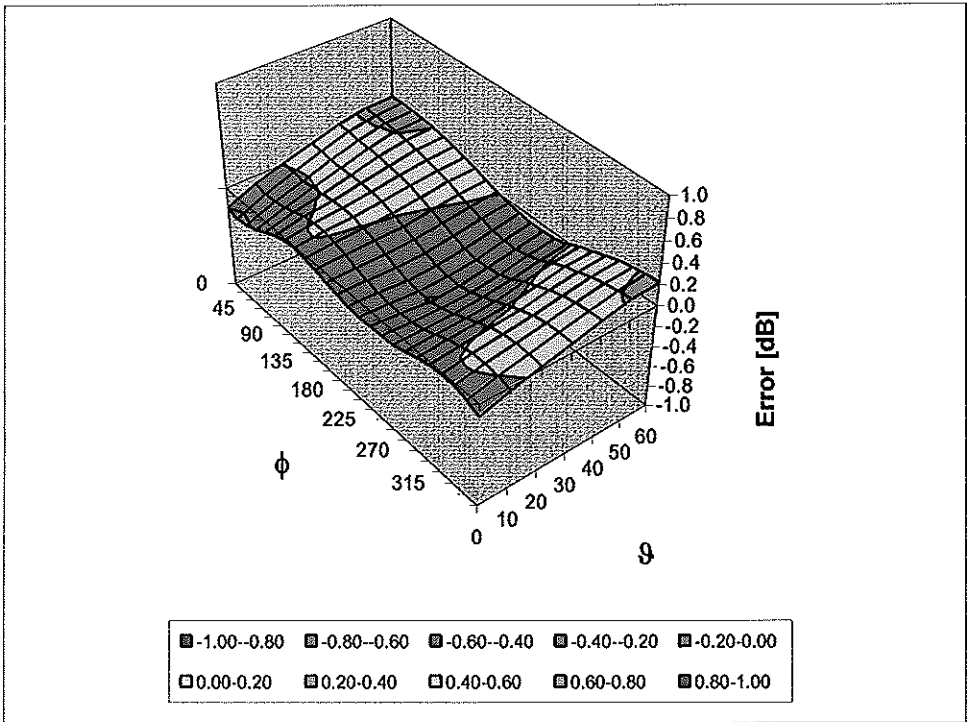
Uncertainty of Linearity Assessment:  $\pm 0.6\%$  ( $k=2$ )

Conversion Factor Assessment



Deviation from Isotropy in HSL

Error ( $\phi$ ,  $\theta$ ), f = 900 MHz



Uncertainty of Spherical Isotropy Assessment:  $\pm 2.6\%$  (k=2)

## Other Probe Parameters

|                                               |                |
|-----------------------------------------------|----------------|
| Sensor Arrangement                            | Triangular     |
| Connector Angle (°)                           | Not applicable |
| Mechanical Surface Detection Mode             | enabled        |
| Optical Surface Detection Mode                | disabled       |
| Probe Overall Length                          | 337 mm         |
| Probe Body Diameter                           | 10 mm          |
| Tip Length                                    | 9 mm           |
| Tip Diameter                                  | 2.5 mm         |
| Probe Tip to Sensor X Calibration Point       | 1 mm           |
| Probe Tip to Sensor Y Calibration Point       | 1 mm           |
| Probe Tip to Sensor Z Calibration Point       | 1 mm           |
| Recommended Measurement Distance from Surface | 2 mm           |



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Accreditation No.: **SCS 108**

Client **PC Test**

Certificate No: **D1900V2-502\_Feb11**

## CALIBRATION CERTIFICATE

Object **D1900V2 - SN: 502**

Calibration procedure(s) **QA CAL-05.v8**  
**Calibration procedure for dipole validation kits**

Calibration date: **February 17, 2011**

✓  
 KOK  
 2/24/11

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 (Certificate No.)        | Scheduled Calibration  |
|-----------------------------|--------------------|-----------------------------------|------------------------|
| Power meter EPM-442A        | GB37480704         | 06-Oct-10 (No. 217-01266)         | Oct-11                 |
| Power sensor HP 8481A       | US37292783         | 06-Oct-10 (No. 217-01266)         | Oct-11                 |
| Reference 20 dB Attenuator  | SN: 5086 (20g)     | 30-Mar-10 (No. 217-01158)         | Mar-11                 |
| Type-N mismatch combination | SN: 5047.2 / 06327 | 30-Mar-10 (No. 217-01162)         | Mar-11                 |
| Reference Probe ES3DV3      | SN: 3205           | 30-Apr-10 (No. ES3-3205_Apr10)    | Apr-11                 |
| DAE4                        | SN: 601            | 10-Jun-10 (No. DAE4-601_Jun10)    | Jun-11                 |
| Secondary Standards         | ID #               | Check Date (in house)             | Scheduled Check        |
| Power sensor HP 8481A       | MY41092317         | 18-Oct-02 (in house check Oct-09) | In house check: Oct-11 |
| RF generator R&S SMT-06     | 100005             | 4-Aug-99 (in house check Oct-09)  | In house check: Oct-11 |
| Network Analyzer HP 8753E   | US37390585 S4206   | 18-Oct-01 (in house check Oct-10) | In house check: Oct-11 |

Calibrated by: **Dimce Iliev** **Laboratory Technician** *D. Iliev*

Approved by: **Katja Pokovic** **Technical Manager** *K. Pokovic*

Issued: February 17, 2011

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Accreditation No.: **SCS 108**

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### Glossary:

|       |                                 |
|-------|---------------------------------|
| TSL   | tissue simulating liquid        |
| ConvF | sensitivity in TSL / NORM x,y,z |
| N/A   | not applicable or not measured  |

### 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
- IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
- Federal Communications Commission Office of Engineering & Technology (FCC OET), "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields; Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions", Supplement C (Edition 01-01) to Bulletin 65

### Additional Documentation:

- DASY4/5 System Handbook

### Methods Applied and Interpretation of Parameters:

- Measurement Conditions:** Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- Antenna Parameters with TSL:** The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- Feed Point Impedance and Return Loss:** These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- Electrical Delay:** One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- SAR measured:** SAR measured at the stated antenna input power.
- SAR normalized:** SAR as measured, normalized to an input power of 1 W at the antenna connector.
- SAR for nominal TSL parameters:** The measured TSL parameters are used to calculate the nominal SAR result.

## Measurement Conditions

DASY system configuration, as far as not given on page 1.

|                              |                           |             |
|------------------------------|---------------------------|-------------|
| DASY Version                 | DASY5                     | V52.6       |
| Extrapolation                | Advanced Extrapolation    |             |
| Phantom                      | Modular Flat Phantom V5.0 |             |
| Distance Dipole Center - TSL | 10 mm                     | with Spacer |
| Zoom Scan Resolution         | dx, dy, dz = 5 mm         |             |
| Frequency                    | 1900 MHz $\pm$ 1 MHz      |             |

## Head TSL parameters

The following parameters and calculations were applied.

|                                  | Temperature         | Permittivity   | Conductivity         |
|----------------------------------|---------------------|----------------|----------------------|
| Nominal Head TSL parameters      | 22.0 °C             | 40.0           | 1.40 mho/m           |
| Measured Head TSL parameters     | (22.0 $\pm$ 0.2) °C | 39.8 $\pm$ 6 % | 1.41 mho/m $\pm$ 6 % |
| Head TSL temperature during test | (21.5 $\pm$ 0.2) °C | ----           | ----                 |

## SAR result with Head TSL

| SAR averaged over 1 cm <sup>3</sup> (1 g) of Head TSL | Condition          |                               |
|-------------------------------------------------------|--------------------|-------------------------------|
| SAR measured                                          | 250 mW input power | 10.1 mW / g                   |
| SAR normalized                                        | normalized to 1W   | 40.4 mW / g                   |
| SAR for nominal Head TSL parameters                   | normalized to 1W   | 40.2 mW /g $\pm$ 17.0 % (k=2) |

| SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL | condition          |                               |
|---------------------------------------------------------|--------------------|-------------------------------|
| SAR measured                                            | 250 mW input power | 5.26 mW / g                   |
| SAR normalized                                          | normalized to 1W   | 21.0 mW / g                   |
| SAR for nominal Head TSL parameters                     | normalized to 1W   | 21.0 mW /g $\pm$ 16.5 % (k=2) |

## Body TSL parameters

The following parameters and calculations were applied.

|                                  | Temperature     | Permittivity | Conductivity     |
|----------------------------------|-----------------|--------------|------------------|
| Nominal Body TSL parameters      | 22.0 °C         | 53.3         | 1.52 mho/m       |
| Measured Body TSL parameters     | (22.0 ± 0.2) °C | 52.8 ± 6 %   | 1.55 mho/m ± 6 % |
| Body TSL temperature during test | (21.5 ± 0.2) °C | ----         | ----             |

## SAR result with Body TSL

| SAR averaged over 1 cm <sup>3</sup> (1 g) of Body TSL | Condition          |                            |
|-------------------------------------------------------|--------------------|----------------------------|
| SAR measured                                          | 250 mW input power | 10.4 mW / g                |
| SAR normalized                                        | normalized to 1W   | 41.6 mW / g                |
| SAR for nominal Body TSL parameters                   | normalized to 1W   | 41.1 mW / g ± 17.0 % (k=2) |

| SAR averaged over 10 cm <sup>3</sup> (10 g) of Body TSL | condition          |                            |
|---------------------------------------------------------|--------------------|----------------------------|
| SAR measured                                            | 250 mW input power | 5.48 mW / g                |
| SAR normalized                                          | normalized to 1W   | 21.9 mW / g                |
| SAR for nominal Body TSL parameters                     | normalized to 1W   | 21.8 mW / g ± 16.5 % (k=2) |

## Appendix

### Antenna Parameters with Head TSL

|                                      |                             |
|--------------------------------------|-----------------------------|
| Impedance, transformed to feed point | $51.3 \Omega + 6.4 j\Omega$ |
| Return Loss                          | - 23.8 dB                   |

### Antenna Parameters with Body TSL

|                                      |                             |
|--------------------------------------|-----------------------------|
| Impedance, transformed to feed point | $47.3 \Omega + 6.7 j\Omega$ |
| Return Loss                          | - 22.5 dB                   |

### General Antenna Parameters and Design

|                                  |          |
|----------------------------------|----------|
| Electrical Delay (one direction) | 1.206 ns |
|----------------------------------|----------|

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals.

No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

### Additional EUT Data

|                 |                   |
|-----------------|-------------------|
| Manufactured by | SPEAG             |
| Manufactured on | November 14, 1998 |

## DASY5 Validation Report for Head TSL

Date/Time: 17.02.2011 10:13:23

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:502**

Communication System: CW; Frequency: 1900 MHz; Duty Cycle: 1:1

Medium: HSL U12 BB

Medium parameters used:  $f = 1900$  MHz;  $\sigma = 1.41$  mho/m;  $\epsilon_r = 39.9$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(5.09, 5.09, 5.09); Calibrated: 30.04.2010
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 10.06.2010
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- Measurement SW: DASY52, V52.6.1 Build (408)
- Postprocessing SW: SEMCAD X, V14.4.2 Build (2595)

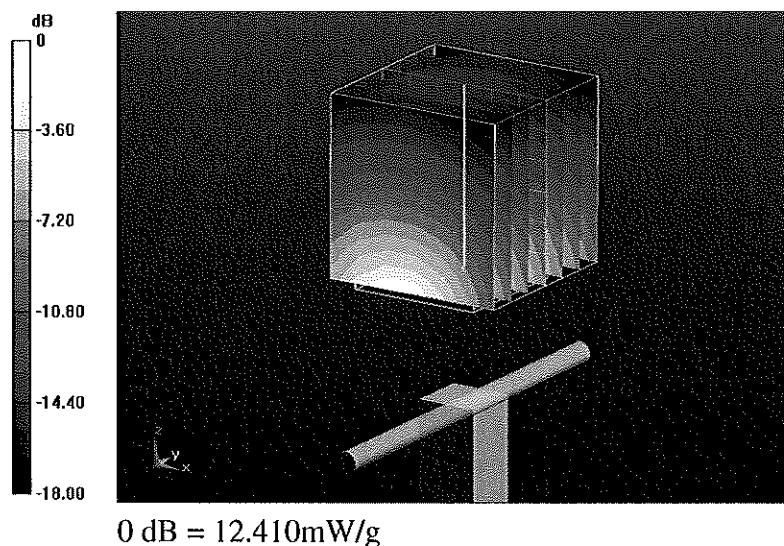
**Pin=250 mW /d=10mm, dist=3.0mm (ES-Probe)/Zoom Scan (7x7x7) /Cube 0: Measurement**  
grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 97.159 V/m; Power Drift = 0.05 dB

Peak SAR (extrapolated) = 18.519 W/kg

**SAR(1 g) = 10.1 mW/g; SAR(10 g) = 5.26 mW/g**

Maximum value of SAR (measured) = 12.407 mW/g

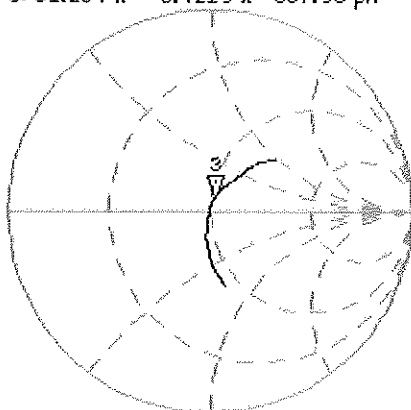


# Impedance Measurement Plot for Head TSL

17 Feb 2011 10:39:46  
 [CH1] S11 1 U FS 3: 51.264  $\Omega$  6.4219  $\Omega$  537.93  $\mu$ H 1 900.000 000 MHz

\*  
 Del  
 CA

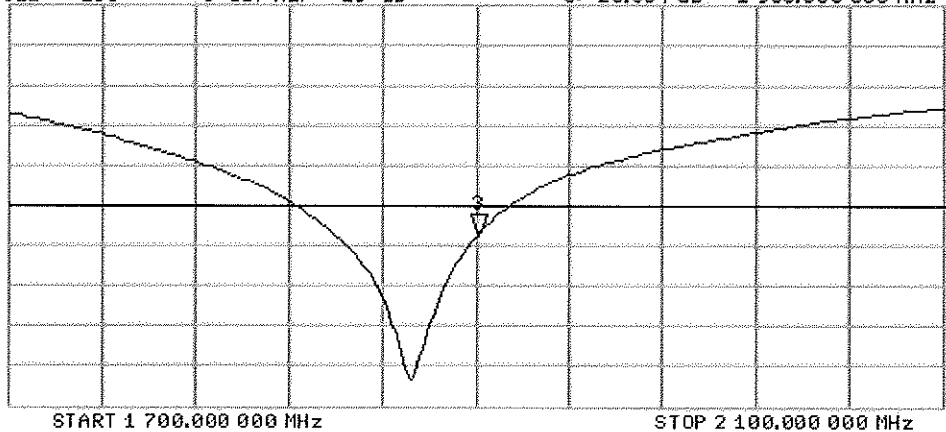
Avg  
 16



CH2 S11 LOG 5 dB/REF -20 dB 3:-23.804 dB 1 900.000 000 MHz

CA

Avg  
 16



## DASY5 Validation Report for Body TSL

Date/Time: 17.02.2011 10:55:26

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:502**

Communication System: CW; Frequency: 1900 MHz; Duty Cycle: 1:1

Medium: MSL U12 BB

Medium parameters used:  $f = 1900$  MHz;  $\sigma = 1.55$  mho/m;  $\epsilon_r = 52.9$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.59, 4.59, 4.59); Calibrated: 30.04.2010
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 10.06.2010
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- Measurement SW: DASY52, V52.6.1 Build (408)
- Postprocessing SW: SEMCAD X, V14.4.2 Build (2595)

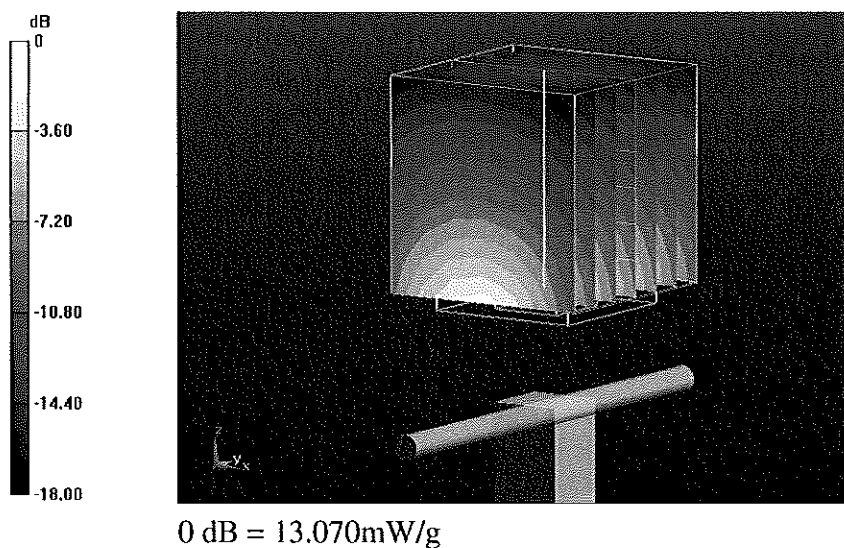
**Pin=250 mW /d=10mm, dist=3.0mm (ES-Probe)/Zoom Scan (7x7x7) /Cube 0: Measurement**  
grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 96.636 V/m; Power Drift = -0.02 dB

Peak SAR (extrapolated) = 17.829 W/kg

**SAR(1 g) = 10.4 mW/g; SAR(10 g) = 5.48 mW/g**

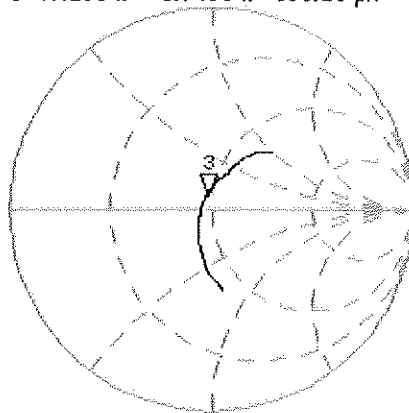
Maximum value of SAR (measured) = 13.070 mW/g



# Impedance Measurement Plot for Body TSL

17 Feb 2011 10:40:17  
 [CH1] S11 1 U FS 3: 47.260  $\Omega$  6.7480  $\Omega$  565.26  $\mu$ H 1 900.000 000 MHz

\*  
 De1  
 CA



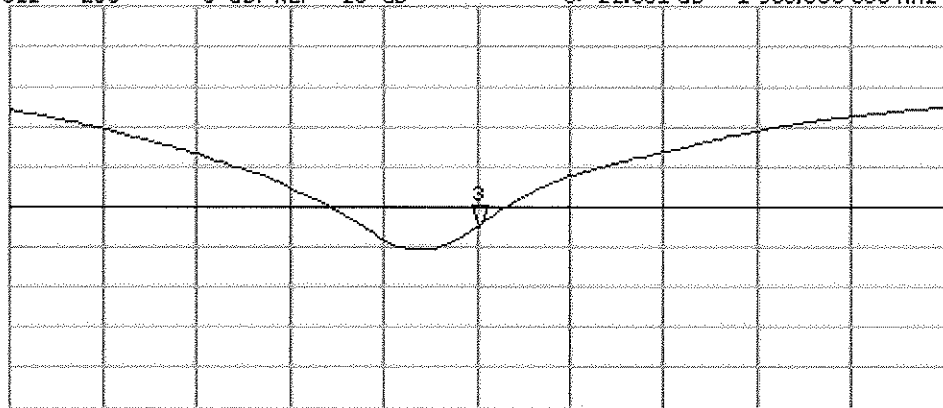
Avg  
 16  
 ↑

CH2 S11 LOG 5 dB/REF -20 dB 3: -22.531 dB 1 900.000 000 MHz

CA

Avg  
 16

↑



START 1 700.000 000 MHz

STOP 2 100.000 000 MHz



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 Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

Client **PC Test**

Certificate No: **D2450V2-797\_Feb11**

## CALIBRATION CERTIFICATE

Object **D2450V2 - SN: 797**

Calibration procedure(s) **QA CAL-05.v8**  
**Calibration procedure for dipole validation kits**

Calibration date: **February 08, 2011**

✓ KOK  
2/24/11

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 (Certificate No.)     | Scheduled Calibration |
|-----------------------------|--------------------|--------------------------------|-----------------------|
| Power meter EPM-442A        | GB37480704         | 06-Oct-10 (No. 217-01266)      | Oct-11                |
| Power sensor HP 8481A       | US37292783         | 06-Oct-10 (No. 217-01266)      | Oct-11                |
| Reference 20 dB Attenuator  | SN: 5086 (20g)     | 30-Mar-10 (No. 217-01158)      | Mar-11                |
| Type-N mismatch combination | SN: 5047.2 / 06327 | 30-Mar-10 (No. 217-01162)      | Mar-11                |
| Reference Probe ES3DV3      | SN: 3205           | 30-Apr-10 (No. ES3-3205_Apr10) | Apr-11                |
| DAE4                        | SN: 601            | 10-Jun-10 (No. DAE4-601_Jun10) | Jun-11                |

| Secondary Standards       | ID #             | Check Date (in house)             | Scheduled Check        |
|---------------------------|------------------|-----------------------------------|------------------------|
| Power sensor HP 8481A     | MY41092317       | 18-Oct-02 (in house check Oct-09) | In house check: Oct-11 |
| RF generator R&S SMT-06   | 100005           | 4-Aug-99 (in house check Oct-09)  | In house check: Oct-11 |
| Network Analyzer HP 8753E | US37390585 S4206 | 18-Oct-01 (in house check Oct-10) | In house check: Oct-11 |

|                |             |                       |           |
|----------------|-------------|-----------------------|-----------|
|                | Name        | Function              | Signature |
| Calibrated by: | Dimce Iliev | Laboratory Technician |           |

|              |               |                   |  |
|--------------|---------------|-------------------|--|
| Approved by: | Katja Pokovic | Technical Manager |  |
|--------------|---------------|-------------------|--|

Issued: February 8, 2011

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Accreditation No.: **SCS 108**

### Glossary:

|       |                                 |
|-------|---------------------------------|
| TSL   | tissue simulating liquid        |
| ConvF | sensitivity in TSL / NORM x,y,z |
| N/A   | not applicable or not measured  |

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

- a) 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
- b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
- c) Federal Communications Commission Office of Engineering & Technology (FCC OET), "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields; Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions", Supplement C (Edition 01-01) to Bulletin 65

### Additional Documentation:

- d) DASY4/5 System Handbook

### Methods Applied and Interpretation of Parameters:

- *Measurement Conditions:* Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- *Antenna Parameters with TSL:* The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- *Feed Point Impedance and Return Loss:* These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- *Electrical Delay:* One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- *SAR measured:* SAR measured at the stated antenna input power.
- *SAR normalized:* SAR as measured, normalized to an input power of 1 W at the antenna connector.
- *SAR for nominal TSL parameters:* The measured TSL parameters are used to calculate the nominal SAR result.

## Measurement Conditions

DASY system configuration, as far as not given on page 1.

|                              |                           |             |
|------------------------------|---------------------------|-------------|
| DASY Version                 | DASY5                     | V52.6       |
| Extrapolation                | Advanced Extrapolation    |             |
| Phantom                      | Modular Flat Phantom V5.0 |             |
| Distance Dipole Center - TSL | 10 mm                     | with Spacer |
| Zoom Scan Resolution         | dx, dy, dz = 5 mm         |             |
| Frequency                    | 2450 MHz $\pm$ 1 MHz      |             |

## Head TSL parameters

The following parameters and calculations were applied.

|                                  | Temperature         | Permittivity   | Conductivity         |
|----------------------------------|---------------------|----------------|----------------------|
| Nominal Head TSL parameters      | 22.0 °C             | 39.2           | 1.80 mho/m           |
| Measured Head TSL parameters     | (22.0 $\pm$ 0.2) °C | 39.1 $\pm$ 6 % | 1.73 mho/m $\pm$ 6 % |
| Head TSL temperature during test | (21.0 $\pm$ 0.2) °C | ----           | ----                 |

## SAR result with Head TSL

| SAR averaged over 1 cm <sup>3</sup> (1 g) of Head TSL | Condition          |                               |
|-------------------------------------------------------|--------------------|-------------------------------|
| SAR measured                                          | 250 mW input power | 13.1 mW / g                   |
| SAR normalized                                        | normalized to 1W   | 52.4 mW / g                   |
| SAR for nominal Head TSL parameters                   | normalized to 1W   | 53.3 mW /g $\pm$ 17.0 % (k=2) |

| SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL | condition          |                               |
|---------------------------------------------------------|--------------------|-------------------------------|
| SAR measured                                            | 250 mW input power | 6.14 mW / g                   |
| SAR normalized                                          | normalized to 1W   | 24.6 mW / g                   |
| SAR for nominal Head TSL parameters                     | normalized to 1W   | 24.7 mW /g $\pm$ 16.5 % (k=2) |

## Body TSL parameters

The following parameters and calculations were applied.

|                                  | Temperature     | Permittivity | Conductivity     |
|----------------------------------|-----------------|--------------|------------------|
| Nominal Body TSL parameters      | 22.0 °C         | 52.7         | 1.95 mho/m       |
| Measured Body TSL parameters     | (22.0 ± 0.2) °C | 52.2 ± 6 %   | 1.94 mho/m ± 6 % |
| Body TSL temperature during test | (21.0 ± 0.2) °C | ----         | ----             |

## SAR result with Body TSL

| SAR averaged over 1 cm <sup>3</sup> (1 g) of Body TSL | Condition          |                                   |
|-------------------------------------------------------|--------------------|-----------------------------------|
| SAR measured                                          | 250 mW input power | 13.1 mW / g                       |
| SAR normalized                                        | normalized to 1W   | 52.4 mW / g                       |
| SAR for nominal Body TSL parameters                   | normalized to 1W   | <b>52.3 mW / g ± 17.0 % (k=2)</b> |

| SAR averaged over 10 cm <sup>3</sup> (10 g) of Body TSL | condition          |                                   |
|---------------------------------------------------------|--------------------|-----------------------------------|
| SAR measured                                            | 250 mW input power | 6.05 mW / g                       |
| SAR normalized                                          | normalized to 1W   | 24.2 mW / g                       |
| SAR for nominal Body TSL parameters                     | normalized to 1W   | <b>24.2 mW / g ± 16.5 % (k=2)</b> |

## Appendix

### Antenna Parameters with Head TSL

|                                      |                               |
|--------------------------------------|-------------------------------|
| Impedance, transformed to feed point | $53.9\ \Omega + 3.9\ j\Omega$ |
| Return Loss                          | - 25.5 dB                     |

### Antenna Parameters with Body TSL

|                                      |                               |
|--------------------------------------|-------------------------------|
| Impedance, transformed to feed point | $49.0\ \Omega + 5.2\ j\Omega$ |
| Return Loss                          | - 25.5 dB                     |

### General Antenna Parameters and Design

|                                  |          |
|----------------------------------|----------|
| Electrical Delay (one direction) | 1.151 ns |
|----------------------------------|----------|

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals.

No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

### Additional EUT Data

|                 |                  |
|-----------------|------------------|
| Manufactured by | SPEAG            |
| Manufactured on | January 24, 2006 |

## DASY5 Validation Report for Head TSL

Date/Time: 07.02.2011 13:51:58

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN:797**

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

Medium: HSL U12 BB

Medium parameters used:  $f = 2450$  MHz;  $\sigma = 1.74$  mho/m;  $\epsilon_r = 39.3$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.53, 4.53, 4.53); Calibrated: 30.04.2010
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 10.06.2010
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- Measurement SW: DASY52, V52.6.1 Build (408)
- Postprocessing SW: SEMCAD X, V14.4.2 Build (2595)

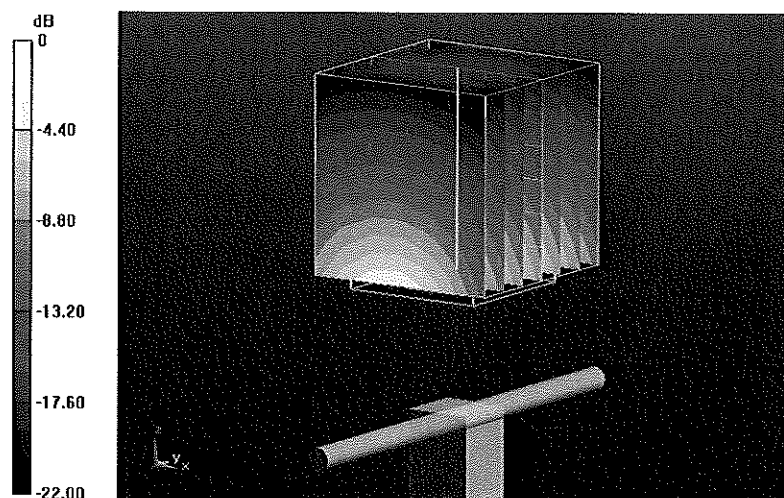
**Pin=250 mW /d=10mm, dist=3.0mm (ES-Probe)/Zoom Scan (7x7x7) /Cube 0: Measurement**  
grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 101.6 V/m; Power Drift = 0.02 dB

Peak SAR (extrapolated) = 26.650 W/kg

**SAR(1 g) = 13.1 mW/g; SAR(10 g) = 6.14 mW/g**

Maximum value of SAR (measured) = 16.664 mW/g

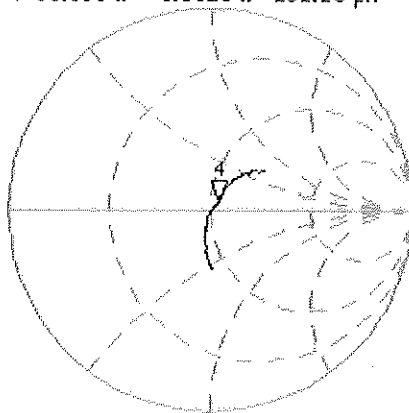


# Impedance Measurement Plot for Head TSL

7 Feb 2011 10:40:17  
 [CH1] S11 1 U FS 4: 53.889  $\Omega$  3.8828  $\Omega$  252.23  $\mu$ H 2 450.000 000 MHz

\*  
 De1  
 CA

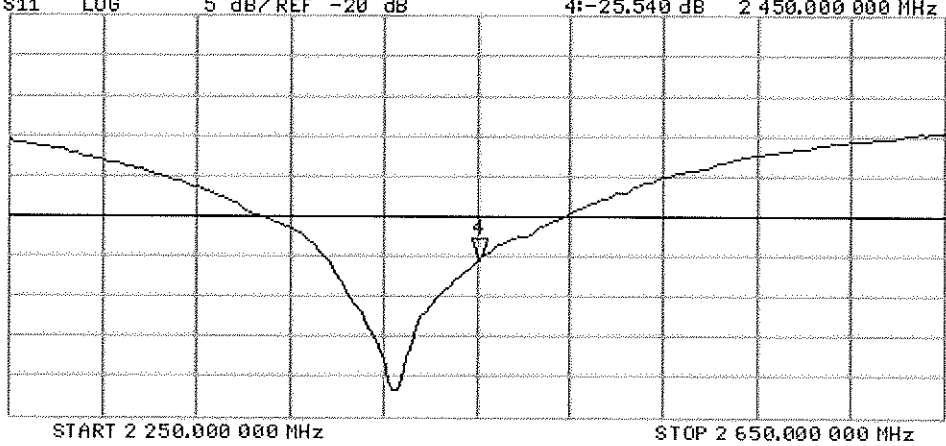
Avg  
 16



CH2 S11 LOG 5 dB/REF -20 dB 4:-25.540 dB 2 450.000 000 MHz

CA

Avg  
 16



## DASY5 Validation Report for Body TSL

Date/Time: 08.02.2011 13:24:09

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN:797**

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

Medium: MSL U12 BB

Medium parameters used:  $f = 2450$  MHz;  $\sigma = 1.95$  mho/m;  $\epsilon_r = 52.4$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.31, 4.31, 4.31); Calibrated: 30.04.2010
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 10.06.2010
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- Measurement SW: DASY52, V52.6.1 Build (408)
- Postprocessing SW: SEMCAD X, V14.4.2 Build (2595)

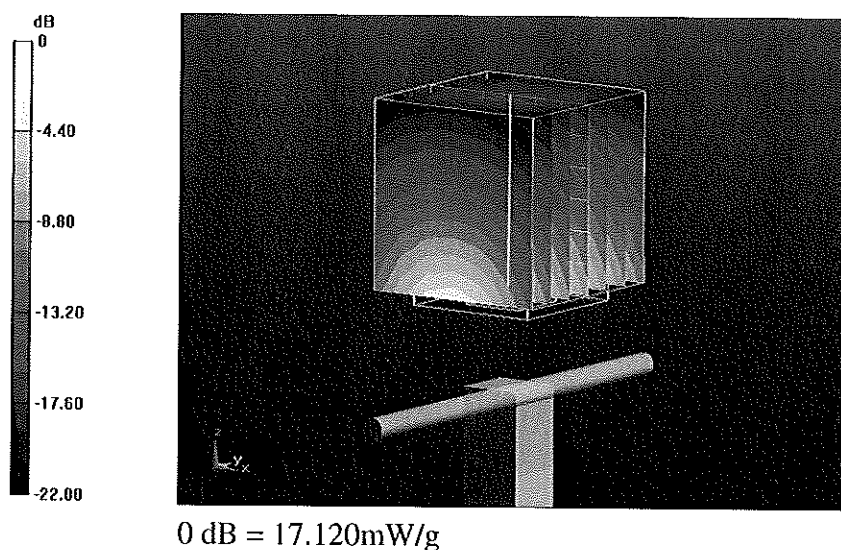
**Pin=250 mW /d=10mm, dist=3.0mm (ES-Probe)/Zoom Scan (7x7x7) /Cube 0: Measurement**  
grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 96.699 V/m; Power Drift = -0.08 dB

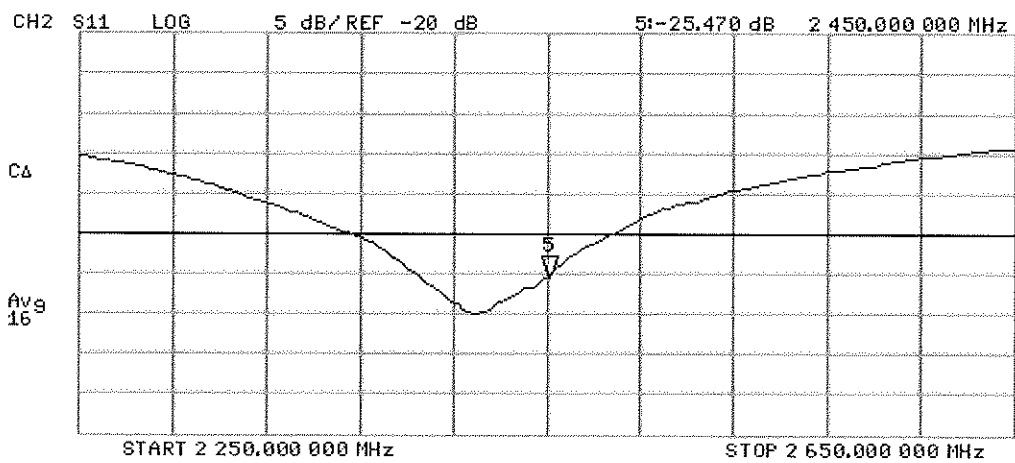
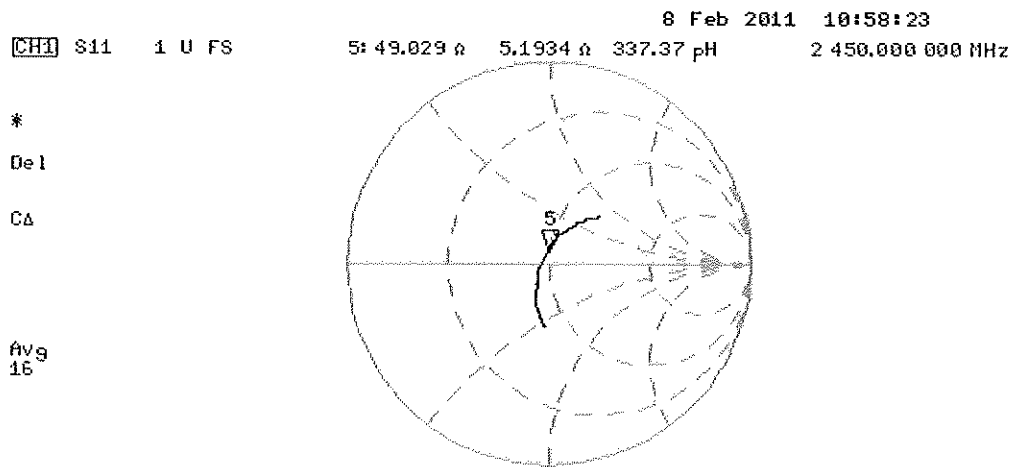
Peak SAR (extrapolated) = 27.483 W/kg

**SAR(1 g) = 13.1 mW/g; SAR(10 g) = 6.05 mW/g**

Maximum value of SAR (measured) = 17.122 mW/g



# Impedance Measurement Plot for Body TSL





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 Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

Client **PC Test**

Certificate No: **D5GHzV2-1057\_Feb11/2**

## CALIBRATION CERTIFICATE (Replacement of No: D5GHzV2-1057\_Feb11)

Object **D5GHzV2 - SN: 1057**

Calibration procedure(s) **QA CAL-22.v1**  
**Calibration procedure for dipole validation kits between 3-6 GHz**

Calibration date: **February 11, 2011**

✓  
 KOK  
 2/24/11

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 (Certificate No.)        | Scheduled Calibration  |
|-----------------------------|--------------------|-----------------------------------|------------------------|
| Power meter EPM-442A        | GB37480704         | 06-Oct-10 (No. 217-01266)         | Oct-11                 |
| Power sensor HP 8481A       | US37292783         | 06-Oct-10 (No. 217-01266)         | Oct-11                 |
| Reference 20 dB Attenuator  | SN: 5086 (20g)     | 30-Mar-10 (No. 217-01158)         | Mar-11                 |
| Type-N mismatch combination | SN: 5047.2 / 06327 | 30-Mar-10 (No. 217-01162)         | Mar-11                 |
| Reference Probe EX3DV4      | SN: 3503           | 05-Mar-10 (No. EX3-3503_Mar10)    | Mar-11                 |
| DAE4                        | SN: 601            | 10-Jun-10 (No. DAE4-601_Jun10)    | Jun-11                 |
| Secondary Standards         | ID #               | Check Date (in house)             | Scheduled Check        |
| Power sensor HP 8481A       | MY41092317         | 18-Oct-02 (in house check Oct-09) | In house check: Oct-11 |
| RF generator R&S SMT-06     | 100005             | 4-Aug-99 (in house check Oct-09)  | In house check: Oct-11 |
| Network Analyzer HP 8753E   | US37390585 S4206   | 18-Oct-01 (in house check Oct-10) | In house check: Oct-11 |

Calibrated by: **Jeton Kastrati** **Laboratory Technician**

Signature

Approved by: **Katja Pokovic** **Technical Manager**

Issued: February 23, 2011

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Accreditation No.: **SCS 108**

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### Glossary:

|       |                                 |
|-------|---------------------------------|
| TSL   | tissue simulating liquid        |
| ConvF | sensitivity in TSL / NORM x,y,z |
| N/A   | not applicable or not measured  |

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

- a) IEC 62209-2, "Evaluation of Human Exposure to Radio Frequency Fields from Handheld and Body-Mounted Wireless Communication Devices in the Frequency Range of 30 MHz to 6 GHz: Human models, Instrumentation, and Procedures"; Part 2: "Procedure to determine the Specific Absorption Rate (SAR) for including accessories and multiple transmitters", March 2010
- b) Federal Communications Commission Office of Engineering & Technology (FCC OET), "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields; Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions", Supplement C (Edition 01-01) to Bulletin 65

### Additional Documentation:

- c) DASY4/5 System Handbook

### Methods Applied and Interpretation of Parameters:

- *Measurement Conditions:* Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- *Antenna Parameters with TSL:* The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- *Feed Point Impedance and Return Loss:* These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- *Electrical Delay:* One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- *SAR measured:* SAR measured at the stated antenna input power.
- *SAR normalized:* SAR as measured, normalized to an input power of 1 W at the antenna connector.
- *SAR for nominal TSL parameters:* The measured TSL parameters are used to calculate the nominal SAR result.

## Measurement Conditions

DASY system configuration, as far as not given on page 1.

|                                     |                                                                      |             |
|-------------------------------------|----------------------------------------------------------------------|-------------|
| <b>DASY Version</b>                 | DASY5                                                                | V52.6       |
| <b>Extrapolation</b>                | Advanced Extrapolation                                               |             |
| <b>Phantom</b>                      | Modular Flat Phantom V5.0                                            |             |
| <b>Distance Dipole Center - TSL</b> | 10 mm                                                                | with Spacer |
| <b>Area Scan resolution</b>         | dx, dy = 10 mm                                                       |             |
| <b>Zoom Scan Resolution</b>         | dx, dy = 4.0 mm, dz = 2.0 mm                                         |             |
| <b>Frequency</b>                    | 5200 MHz $\pm$ 1 MHz<br>5500 MHz $\pm$ 1 MHz<br>5800 MHz $\pm$ 1 MHz |             |

## Head TSL parameters at 5200 MHz

The following parameters and calculations were applied.

|                                         | Temperature         | Permittivity   | Conductivity         |
|-----------------------------------------|---------------------|----------------|----------------------|
| <b>Nominal Head TSL parameters</b>      | 22.0 °C             | 36.0           | 4.66 mho/m           |
| <b>Measured Head TSL parameters</b>     | (22.0 $\pm$ 0.2) °C | 36.5 $\pm$ 6 % | 4.56 mho/m $\pm$ 6 % |
| <b>Head TSL temperature during test</b> | (22.1 $\pm$ 0.2) °C | ----           | ----                 |

## SAR result with Head TSL at 5200 MHz

| <b>SAR averaged over 1 cm<sup>3</sup> (1 g) of Head TSL</b> | condition          |                                                  |
|-------------------------------------------------------------|--------------------|--------------------------------------------------|
| SAR measured                                                | 100 mW input power | 8.29 mW / g                                      |
| SAR normalized                                              | normalized to 1W   | 82.9 mW / g                                      |
| SAR for nominal Head TSL parameters                         | normalized to 1W   | <b>83.1 mW / g <math>\pm</math> 19.9 % (k=2)</b> |

| <b>SAR averaged over 10 cm<sup>3</sup> (10 g) of Head TSL</b> | condition          |                                                  |
|---------------------------------------------------------------|--------------------|--------------------------------------------------|
| SAR measured                                                  | 100 mW input power | 2.35 mW / g                                      |
| SAR normalized                                                | normalized to 1W   | 23.5 mW / g                                      |
| SAR for nominal Head TSL parameters                           | normalized to 1W   | <b>23.5 mW / g <math>\pm</math> 19.5 % (k=2)</b> |

## Head TSL parameters at 5500 MHz

The following parameters and calculations were applied.

|                                  | Temperature     | Permittivity | Conductivity     |
|----------------------------------|-----------------|--------------|------------------|
| Nominal Head TSL parameters      | 22.0 °C         | 35.6         | 4.96 mho/m       |
| Measured Head TSL parameters     | (22.0 ± 0.2) °C | 36.0 ± 6 %   | 4.86 mho/m ± 6 % |
| Head TSL temperature during test | (22.1 ± 0.2) °C | ----         | ----             |

## SAR result with Head TSL at 5500 MHz

|                                                             |                    |                                   |
|-------------------------------------------------------------|--------------------|-----------------------------------|
| <b>SAR averaged over 1 cm<sup>3</sup> (1 g) of Head TSL</b> | condition          |                                   |
| SAR measured                                                | 100 mW input power | 9.00 mW / g                       |
| SAR normalized                                              | normalized to 1W   | 90.0 mW / g                       |
| SAR for nominal Head TSL parameters                         | normalized to 1W   | <b>90.1 mW / g ± 19.9 % (k=2)</b> |

|                                                               |                    |                                   |
|---------------------------------------------------------------|--------------------|-----------------------------------|
| <b>SAR averaged over 10 cm<sup>3</sup> (10 g) of Head TSL</b> | condition          |                                   |
| SAR measured                                                  | 100 mW input power | 2.53 mW / g                       |
| SAR normalized                                                | normalized to 1W   | 25.3 mW / g                       |
| SAR for nominal Head TSL parameters                           | normalized to 1W   | <b>25.3 mW / g ± 19.5 % (k=2)</b> |

## Head TSL parameters at 5800 MHz

The following parameters and calculations were applied.

|                                  | Temperature     | Permittivity | Conductivity     |
|----------------------------------|-----------------|--------------|------------------|
| Nominal Head TSL parameters      | 22.0 °C         | 35.3         | 5.27 mho/m       |
| Measured Head TSL parameters     | (22.0 ± 0.2) °C | 35.6 ± 6 %   | 5.17 mho/m ± 6 % |
| Head TSL temperature during test | (22.1 ± 0.2) °C | ----         | ----             |

## SAR result with Head TSL at 5800 MHz

|                                                             |                    |                                   |
|-------------------------------------------------------------|--------------------|-----------------------------------|
| <b>SAR averaged over 1 cm<sup>3</sup> (1 g) of Head TSL</b> | condition          |                                   |
| SAR measured                                                | 100 mW input power | 8.28 mW / g                       |
| SAR normalized                                              | normalized to 1W   | 82.8 mW / g                       |
| SAR for nominal Head TSL parameters                         | normalized to 1W   | <b>82.9 mW / g ± 19.9 % (k=2)</b> |

|                                                               |                    |                                   |
|---------------------------------------------------------------|--------------------|-----------------------------------|
| <b>SAR averaged over 10 cm<sup>3</sup> (10 g) of Head TSL</b> | condition          |                                   |
| SAR measured                                                  | 100 mW input power | 2.33 mW / g                       |
| SAR normalized                                                | normalized to 1W   | 23.3 mW / g                       |
| SAR for nominal Head TSL parameters                           | normalized to 1W   | <b>23.3 mW / g ± 19.5 % (k=2)</b> |

### Body TSL parameters at 5200 MHz

The following parameters and calculations were applied.

|                                  | Temperature     | Permittivity | Conductivity     |
|----------------------------------|-----------------|--------------|------------------|
| Nominal Body TSL parameters      | 22.0 °C         | 49.0         | 5.30 mho/m       |
| Measured Body TSL parameters     | (22.0 ± 0.2) °C | 47.2 ± 6 %   | 5.37 mho/m ± 6 % |
| Body TSL temperature during test | (22.0 ± 0.2) °C | ----         | ----             |

### SAR result with Body TSL at 5200 MHz

|                                                             |                    |                                   |
|-------------------------------------------------------------|--------------------|-----------------------------------|
| <b>SAR averaged over 1 cm<sup>3</sup> (1 g) of Body TSL</b> | condition          |                                   |
| SAR measured                                                | 100 mW input power | 7.83 mW / g                       |
| SAR normalized                                              | normalized to 1W   | 78.3 mW / g                       |
| SAR for nominal Body TSL parameters                         | normalized to 1W   | <b>77.7 mW / g ± 19.9 % (k=2)</b> |

|                                                               |                    |                                   |
|---------------------------------------------------------------|--------------------|-----------------------------------|
| <b>SAR averaged over 10 cm<sup>3</sup> (10 g) of Body TSL</b> | condition          |                                   |
| SAR measured                                                  | 100 mW input power | 2.17 mW / g                       |
| SAR normalized                                                | normalized to 1W   | 21.7 mW / g                       |
| SAR for nominal Body TSL parameters                           | normalized to 1W   | <b>21.5 mW / g ± 19.5 % (k=2)</b> |

### Body TSL parameters at 5500 MHz

The following parameters and calculations were applied.

|                                  | Temperature     | Permittivity | Conductivity     |
|----------------------------------|-----------------|--------------|------------------|
| Nominal Body TSL parameters      | 22.0 °C         | 48.6         | 5.65 mho/m       |
| Measured Body TSL parameters     | (22.0 ± 0.2) °C | 46.6 ± 6 %   | 5.75 mho/m ± 6 % |
| Body TSL temperature during test | (22.0 ± 0.2) °C | ----         | ----             |

### SAR result with Body TSL at 5500 MHz

|                                                             |                    |                                   |
|-------------------------------------------------------------|--------------------|-----------------------------------|
| <b>SAR averaged over 1 cm<sup>3</sup> (1 g) of Body TSL</b> | condition          |                                   |
| SAR measured                                                | 100 mW input power | 8.51 mW / g                       |
| SAR normalized                                              | normalized to 1W   | 85.1 mW / g                       |
| SAR for nominal Body TSL parameters                         | normalized to 1W   | <b>84.4 mW / g ± 19.9 % (k=2)</b> |

|                                                               |                    |                                   |
|---------------------------------------------------------------|--------------------|-----------------------------------|
| <b>SAR averaged over 10 cm<sup>3</sup> (10 g) of Body TSL</b> | condition          |                                   |
| SAR measured                                                  | 100 mW input power | 2.34 mW / g                       |
| SAR normalized                                                | normalized to 1W   | 23.4 mW / g                       |
| SAR for nominal Body TSL parameters                           | normalized to 1W   | <b>23.2 mW / g ± 19.5 % (k=2)</b> |

## Body TSL parameters at 5800 MHz

The following parameters and calculations were applied.

|                                  | Temperature     | Permittivity | Conductivity     |
|----------------------------------|-----------------|--------------|------------------|
| Nominal Body TSL parameters      | 22.0 °C         | 48.2         | 6.00 mho/m       |
| Measured Body TSL parameters     | (22.0 ± 0.2) °C | 46.1 ± 6 %   | 6.14 mho/m ± 6 % |
| Body TSL temperature during test | (21.5 ± 0.2) °C | ----         | ----             |

## SAR result with Body TSL at 5800 MHz

| SAR averaged over 1 cm <sup>3</sup> (1 g) of Body TSL | condition          |                            |
|-------------------------------------------------------|--------------------|----------------------------|
| SAR measured                                          | 100 mW input power | 7.56 mW / g                |
| SAR normalized                                        | normalized to 1W   | 75.6 mW / g                |
| SAR for nominal Body TSL parameters                   | normalized to 1W   | 75.0 mW / g ± 19.9 % (k=2) |

| SAR averaged over 10 cm <sup>3</sup> (10 g) of Body TSL | condition          |                            |
|---------------------------------------------------------|--------------------|----------------------------|
| SAR measured                                            | 100 mW input power | 2.07 mW / g                |
| SAR normalized                                          | normalized to 1W   | 20.7 mW / g                |
| SAR for nominal Body TSL parameters                     | normalized to 1W   | 20.5 mW / g ± 19.5 % (k=2) |

## Appendix

### Antenna Parameters with Head TSL at 5200 MHz

|                                      |                                |
|--------------------------------------|--------------------------------|
| Impedance, transformed to feed point | 50.2 $\Omega$ - 8.0 j $\Omega$ |
| Return Loss                          | -22.0 dB                       |

### Antenna Parameters with Head TSL at 5500 MHz

|                                      |                                |
|--------------------------------------|--------------------------------|
| Impedance, transformed to feed point | 50.3 $\Omega$ - 4.9 j $\Omega$ |
| Return Loss                          | -26.3 dB                       |

### Antenna Parameters with Head TSL at 5800 MHz

|                                      |                                |
|--------------------------------------|--------------------------------|
| Impedance, transformed to feed point | 51.9 $\Omega$ - 2.0 j $\Omega$ |
| Return Loss                          | -31.2 dB                       |

### Antenna Parameters with Body TSL at 5200 MHz

|                                      |                                |
|--------------------------------------|--------------------------------|
| Impedance, transformed to feed point | 50.9 $\Omega$ - 6.6 j $\Omega$ |
| Return Loss                          | -23.7 dB                       |

### Antenna Parameters with Body TSL at 5500 MHz

|                                      |                                |
|--------------------------------------|--------------------------------|
| Impedance, transformed to feed point | 50.5 $\Omega$ - 3.9 j $\Omega$ |
| Return Loss                          | -28.2 dB                       |

### Antenna Parameters with Body TSL at 5800 MHz

|                                      |                                |
|--------------------------------------|--------------------------------|
| Impedance, transformed to feed point | 52.0 $\Omega$ - 1.1 j $\Omega$ |
| Return Loss                          | -33.0 dB                       |

## General Antenna Parameters and Design

|                                  |          |
|----------------------------------|----------|
| Electrical Delay (one direction) | 1.204 ns |
|----------------------------------|----------|

After long term use with 40 W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals.

No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

## Additional EUT Data

|                 |                   |
|-----------------|-------------------|
| Manufactured by | SPEAG             |
| Manufactured on | November 27, 2006 |

## DASY5 Validation Report for Head TSL

Date/Time: 11.02.2011 14:44:40

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 5GHz; Type: D5GHz; Serial: D5GHzV2 - SN:1057**

Communication System: CW; Frequency: 5200 MHz, Frequency: 5500 MHz, Frequency: 5800 MHz; Duty Cycle: 1:1

Medium: HSL 5000

Medium parameters used:  $f = 5200$  MHz;  $\sigma = 4.56$  mho/m;  $\epsilon_r = 36.5$ ;  $\rho = 1000$  kg/m<sup>3</sup>, Medium parameters used:  $f = 5500$  MHz;  $\sigma = 4.86$  mho/m;  $\epsilon_r = 36$ ;  $\rho = 1000$  kg/m<sup>3</sup>, Medium parameters used:  $f = 5800$  MHz;  $\sigma = 5.17$  mho/m;  $\epsilon_r = 35.6$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN3503; ConvF(5.36, 5.36, 5.36), ConvF(4.85, 4.85, 4.85), ConvF(4.74, 4.74, 4.74); Calibrated: 05.03.2010
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 10.06.2010
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- Measurement SW: DASY52, V52.6.1 Build (408)
- Postprocessing SW: SEMCAD X, V14.4.2 Build (2595)

**Pin=100mW/d=10mm, f=5200 MHz/Zoom Scan (4x4x2mm), dist=2mm (8x8x6)/Cube 0:**

Measurement grid: dx=4mm, dy=4mm, dz=2mm

Reference Value = 65.700 V/m; Power Drift = 0.03 dB

Peak SAR (extrapolated) = 31.538 W/kg

**SAR(1 g) = 8.29 mW/g; SAR(10 g) = 2.35 mW/g**

Maximum value of SAR (measured) = 16.059 mW/g

**Pin=100mW/d=10mm, f=5500 MHz/Zoom Scan (4x4x2mm), dist=2mm (8x8x6)/Cube 0:**

Measurement grid: dx=4mm, dy=4mm, dz=2mm

Reference Value = 67.167 V/m; Power Drift = 0.05 dB

Peak SAR (extrapolated) = 36.356 W/kg

**SAR(1 g) = 9 mW/g; SAR(10 g) = 2.53 mW/g**

Maximum value of SAR (measured) = 17.641 mW/g

**Pin=100mW/d=10mm, f=5800 MHz/Zoom Scan (4x4x2mm), dist=2mm (8x8x6)/Cube 0:**

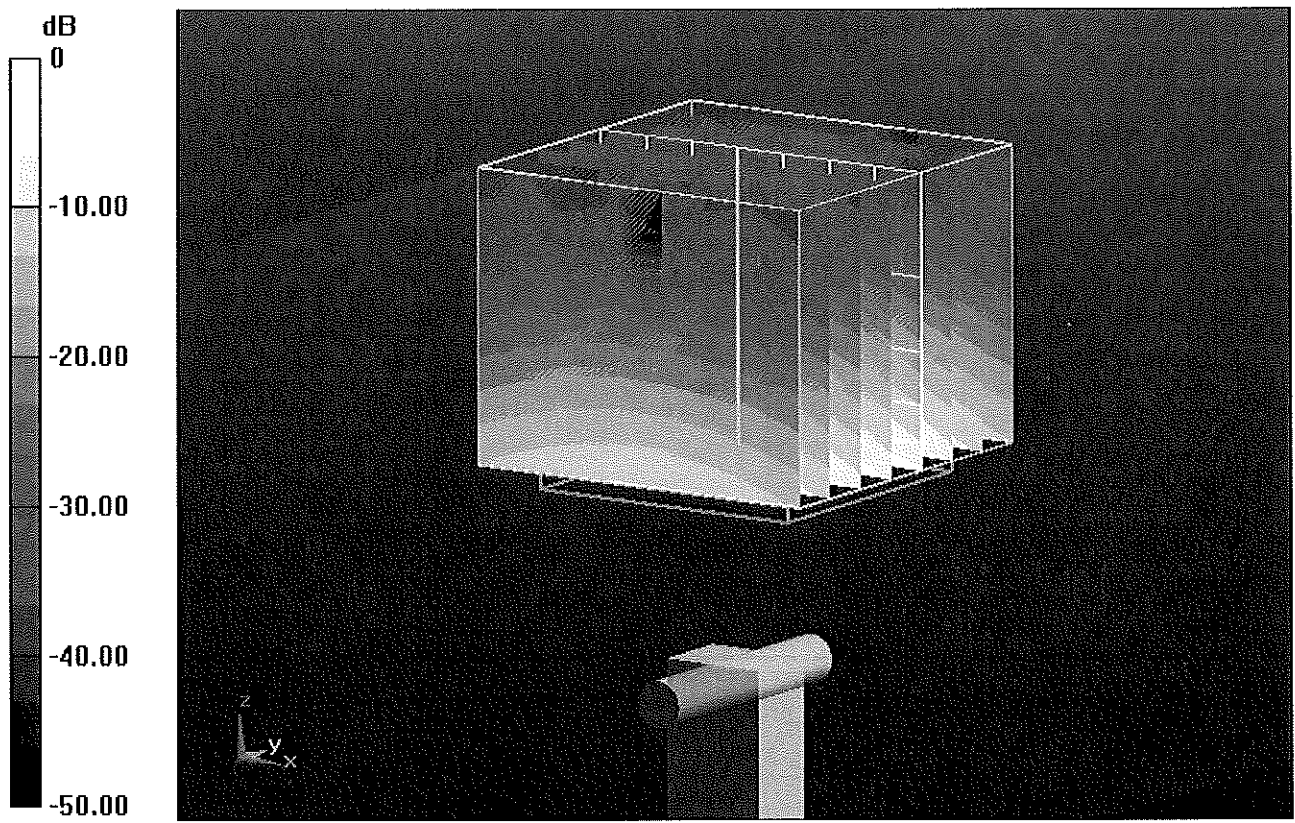
Measurement grid: dx=4mm, dy=4mm, dz=2mm

Reference Value = 62.634 V/m; Power Drift = 0.04 dB

Peak SAR (extrapolated) = 34.882 W/kg

**SAR(1 g) = 8.28 mW/g; SAR(10 g) = 2.33 mW/g**

Maximum value of SAR (measured) = 16.490 mW/g

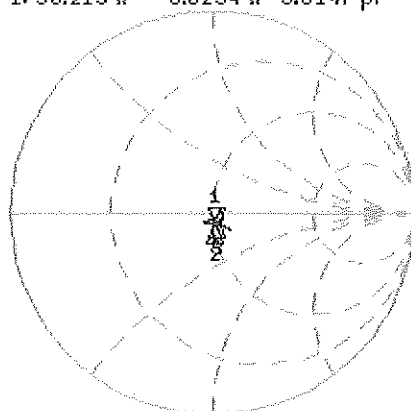


0 dB = 16.490mW/g

# Impedance Measurement Plot for Head TSL

11 Feb 2011 10:17:21  
 [CH1] S11 1 U FS 1: 50.213  $\Omega$  -8.0234  $\Omega$  3.8147 pF 5 200.000 000 MHz

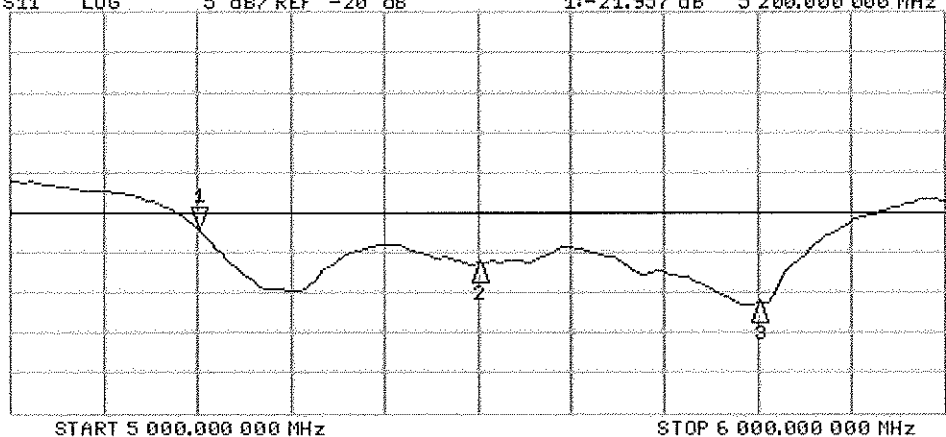
\*  
 Del  
 Cor  
 Avg  
 16  
 ↑



CH1 Markers  
 2: 50.336  $\Omega$   
 -4.8613  $\Omega$   
 5.50000 GHz  
 3: 51.936  $\Omega$   
 -2.0254  $\Omega$   
 5.80000 GHz

CH2 S11 LOG 5 dB/REF -20 dB 1: -21.957 dB 5 200.000 000 MHz

Cor  
 Avg  
 16  
 ↑



CH2 Markers  
 2: -26.280 dB  
 5.50000 GHz  
 3: -31.217 dB  
 5.80000 GHz

## DASY5 Validation Report for Body TSL

Date/Time: 10.02.2011 17:14:02

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 5GHz; Type: D5GHz; Serial: D5GHzV2 - SN:1057**

Communication System: CW; Frequency: 5200 MHz, Frequency: 5500 MHz, Frequency: 5800 MHz; Duty Cycle: 1:1

Medium: MSL 5000 MHz

Medium parameters used:  $f = 5200$  MHz;  $\sigma = 5.37$  mho/m;  $\epsilon_r = 47.2$ ;  $\rho = 1000$  kg/m<sup>3</sup> , Medium

parameters used:  $f = 5500$  MHz;  $\sigma = 5.75$  mho/m;  $\epsilon_r = 46.6$ ;  $\rho = 1000$  kg/m<sup>3</sup> , Medium parameters used:  $f = 5800$  MHz;  $\sigma = 6.16$  mho/m;  $\epsilon_r = 46.2$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN3503; ConvF(4.88, 4.88, 4.88), ConvF(4.37, 4.37, 4.37), ConvF(4.57, 4.57, 4.57); Calibrated: 05.03.2010
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 10.06.2010
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- Measurement SW: DASY52, V52.6.1 Build (408)
- Postprocessing SW: SEMCAD X, V14.4.2 Build (2595)

**Pin=100mW/d=10mm, f=5200 MHz 2/Zoom Scan (4x4x2mm), dist=2mm (8x8x6)/Cube 0:**

Measurement grid: dx=4mm, dy=4mm, dz=2mm

Reference Value = 60.106 V/m; Power Drift = -0.04 dB

Peak SAR (extrapolated) = 30.996 W/kg

SAR(1 g) = 7.83 mW/g; SAR(10 g) = 2.17 mW/g

Maximum value of SAR (measured) = 15.137 mW/g

**Pin=100mW/d=10mm, f=5500 MHz/Zoom Scan (4x4x2mm), dist=2mm (8x8x6)/Cube 0:**

Measurement grid: dx=4mm, dy=4mm, dz=2mm

Reference Value = 60.894 V/m; Power Drift = -0.04 dB

Peak SAR (extrapolated) = 35.975 W/kg

SAR(1 g) = 8.51 mW/g; SAR(10 g) = 2.34 mW/g

Maximum value of SAR (measured) = 16.704 mW/g

**Pin=100mW/d=10mm, f=5800 MHz/Zoom Scan (4x4x2mm), dist=2mm (8x8x6)/Cube 0:**

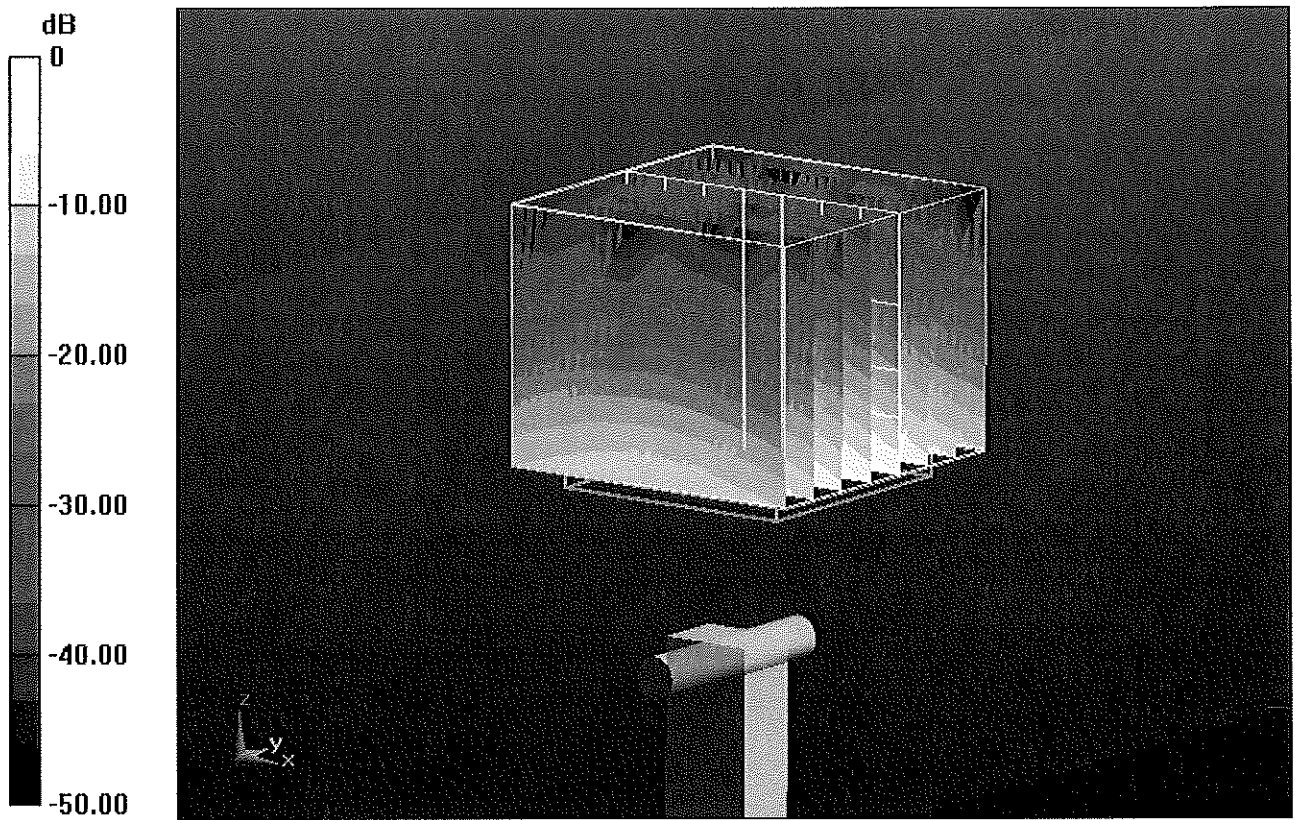
Measurement grid: dx=4mm, dy=4mm, dz=2mm

Reference Value = 56.118 V/m; Power Drift = -0.01 dB

Peak SAR (extrapolated) = 33.913 W/kg

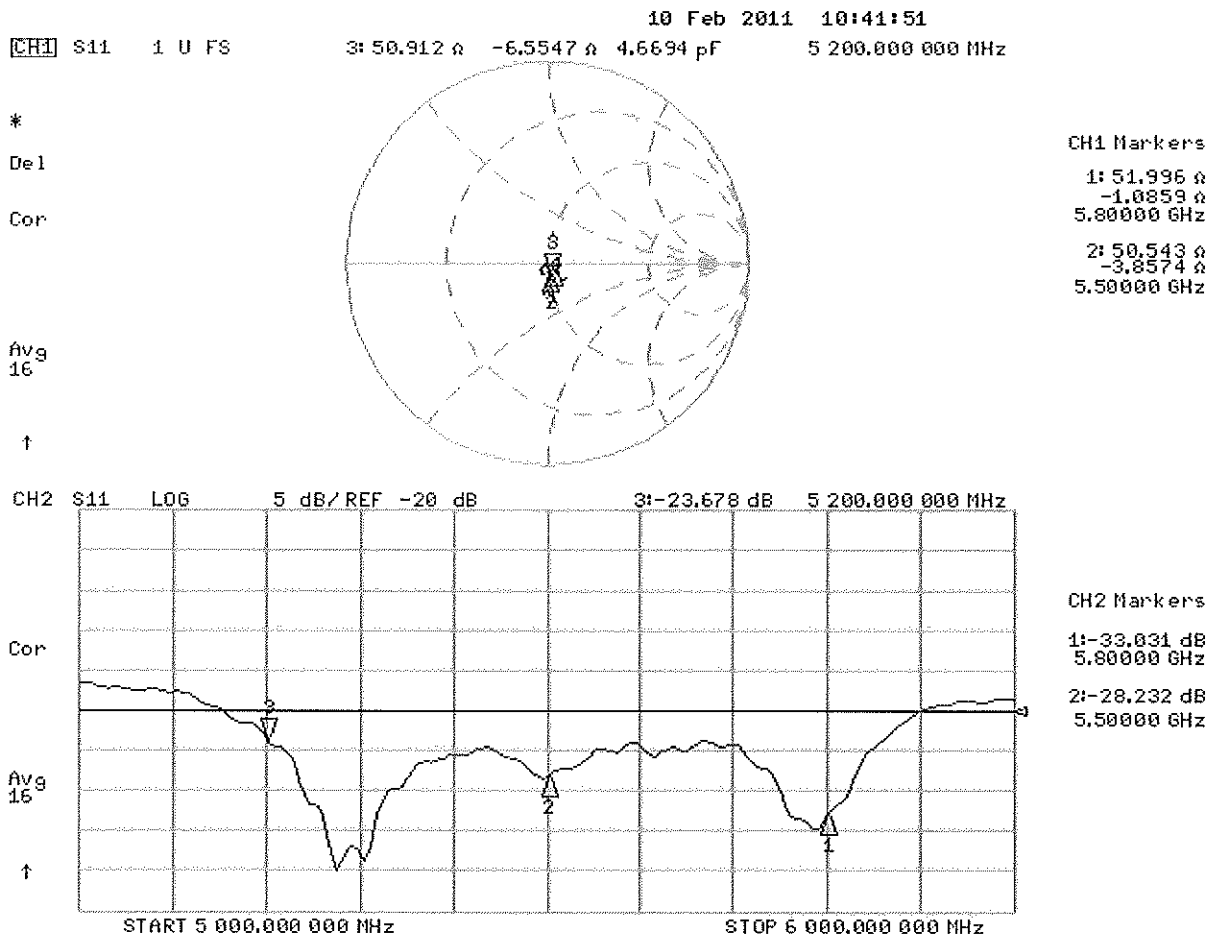
**SAR(1 g) = 7.56 mW/g; SAR(10 g) = 2.07 mW/g**

Maximum value of SAR (measured) = 15.043 mW/g



0 dB = 15.040mW/g

# Impedance Measurement Plot for Body TSL



## REPLACEMENT FOR

- ☐ **Probe calibration certificate(s)**
- ☐ **Probe configuration file(s)**
- ☒ **Dipole calibration certificate(s)**
- ☐ **DAE calibration certificate(s)**
- ☐ **DAE configuration file(s)**

Dear Customer,

Enclosed please find the replacement document (and diskette if applicable) for the marked item(s).

All those customers receiving a probe(s) or DAE(s) replacement configuration file(s) must replace their current configuration file(s) with the new one(s). In addition, please send back to us, destroy or declare obsolete the old probe(s) or DAE(s) certificates at your earliest convenience.

All those customers receiving a replacement dipole certificate(s) are kindly asked to send back to us, destroy or declare obsolete the old dipole certificate at your earliest convenience.

We would like to greatly apologize for this situation and all circumstances you may have been caused. We will continuously improve our internal quality assurance to avoid reoccurrence of similar difficulties in the future.

Best regards

**s p e a g**

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Schmid & Partner Engineering AG