



## SAR EVALUATION REPORT

**Applicant Name:**  
Samsung Electronics Co., Ltd.  
416, Maetan 3-dong, Yeongtong-gu, Suwon-si  
Gyeonggi-do, 443-742  
Republic of Korea

**Date of Testing:**  
08/06/12 – 09/04/12  
**Test Site/Location:**  
PCTEST Lab, Columbia, MD, USA  
**Document Serial No.:**  
0Y1207301058-R3.A3L

**FCC ID:** A3LSPHP500

**APPLICANT:** SAMSUNG ELECTRONICS CO., LTD.

**DUT Type:** Portable Tablet Computer  
**Application Type:** Certification  
**FCC Rule Part(s):** CFR §2.1093  
**Model(s):** SPH-P500

| Band & Mode                                 | Tx Frequency          | Conducted Power [dBm] | SAR              |
|---------------------------------------------|-----------------------|-----------------------|------------------|
|                                             |                       |                       | 1 gm Body (W/kg) |
| Cell. CDMA/EVDO - FCC Rule Part 90S         | 817.90 - 823.10 MHz   | 25.06                 | 0.90             |
| Cell. CDMA/EVDO - FCC Rule Part 22H         | 824.70 - 848.31 MHz   | 25.07                 | 1.02             |
| PCS CDMA/EVDO - FCC Rule Part 24E           | 1851.25 - 1908.75 MHz | 25.09                 | 0.75             |
| LTE Band 25 - FCC Rule Part 24E             | 1852.5 - 1912.5 MHz   | 23.35                 | 0.91             |
| 2.4 GHz WLAN - FCC Rule Part 15C            | 2412 - 2462 MHz       | 15.15                 | 0.56             |
| Bluetooth - FCC Rule Part 15C               | 2402 - 2480 MHz       | 11.12                 | N/A              |
| <b>Simultaneous SAR per KDB 690783 D01:</b> |                       |                       | 1.46             |

Note: Powers in the above table represent output powers for the SAR test configurations and may not represent the highest output powers for all configurations for each mode.

**Note: This revised Test Report (S/N: 0Y1207301058-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(s) 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



|                                             |                                                                                     |                                              |                                                                                       |                                        |
|---------------------------------------------|-------------------------------------------------------------------------------------|----------------------------------------------|---------------------------------------------------------------------------------------|----------------------------------------|
| <b>FCC ID:</b> A3LSPHP500                   |  | <b>SAR EVALUATION REPORT</b>                 |  | <b>Reviewed by:</b><br>Quality Manager |
| <b>Document S/N:</b><br>0Y1207301058-R3.A3L | <b>Test Dates:</b><br>08/06/12 – 09/04/12                                           | <b>DUT Type:</b><br>Portable Tablet Computer |                                                                                       | Page 1 of 31                           |

# T A B L E O F C O N T E N T S

|    |                                                  |    |
|----|--------------------------------------------------|----|
| 1  | DEVICE UNDER TEST .....                          | 3  |
| 2  | LTE CHECKLIST PER KDB 941225 D05 .....           | 6  |
| 3  | INTRODUCTION .....                               | 7  |
| 4  | SAR MEASUREMENT SETUP .....                      | 8  |
| 5  | DOSIMETRIC ASSESSMENT .....                      | 9  |
| 6  | FCC RF EXPOSURE LIMITS.....                      | 10 |
| 7  | FCC MEASUREMENT PROCEDURES.....                  | 11 |
| 8  | SAR TABLET TESTING .....                         | 14 |
| 9  | RF CONDUCTED POWERS.....                         | 15 |
| 10 | SYSTEM VERIFICATION.....                         | 19 |
| 11 | SAR DATA SUMMARY .....                           | 21 |
| 12 | FCC MULTI-TX AND ANTENNA SAR CONSIDERATIONS..... | 25 |
| 13 | EQUIPMENT LIST .....                             | 27 |
| 14 | MEASUREMENT UNCERTAINTIES .....                  | 28 |
| 15 | CONCLUSION.....                                  | 29 |
| 16 | REFERENCES .....                                 | 30 |

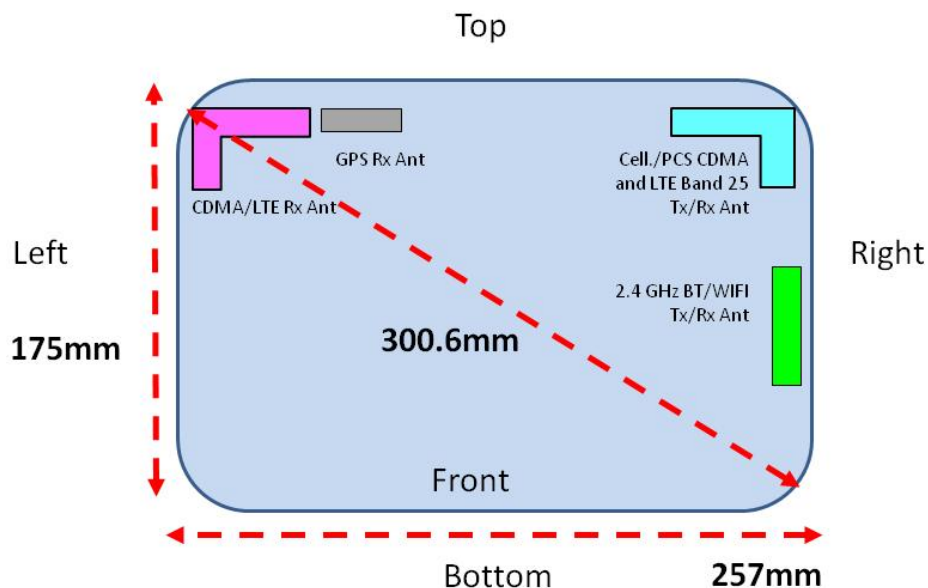
|                                             |                                                                                     |                                              |                                                                                       |                                        |
|---------------------------------------------|-------------------------------------------------------------------------------------|----------------------------------------------|---------------------------------------------------------------------------------------|----------------------------------------|
| <b>FCC ID:</b> A3LSPHP500                   |  | <b>SAR EVALUATION REPORT</b>                 |  | <b>Reviewed by:</b><br>Quality Manager |
| <b>Document S/N:</b><br>0Y1207301058-R3.A3L | <b>Test Dates:</b><br>08/06/12 – 09/04/12                                           | <b>DUT Type:</b><br>Portable Tablet Computer |                                                                                       | Page 2 of 31                           |

# 1 DEVICE UNDER TEST

## 1.1 Device Overview

| Band & Mode                         | Tx Frequency          |
|-------------------------------------|-----------------------|
| Cell. CDMA/EVDO - FCC Rule Part 90S | 817.90 - 823.10 MHz   |
| Cell. CDMA/EVDO - FCC Rule Part 22H | 824.70 - 848.31 MHz   |
| PCS CDMA/EVDO - FCC Rule Part 24E   | 1851.25 - 1908.75 MHz |
| LTE Band 25 - FCC Rule Part 24E     | 1852.5 - 1912.5 MHz   |
| 2.4 GHz WLAN - FCC Rule Part 15C    | 2412 - 2462 MHz       |
| Bluetooth - FCC Rule Part 15C       | 2402 - 2480 MHz       |

## 1.2 DUT Antenna Locations



**Figure 1-1**  
**DUT Antenna Locations**

Note: Based on the positioning of the Cell./PCS CDMA and LTE Band 25 Tx/Rx Antenna, Vertex SAR was evaluated for the top-right corner of the DUT for the CDMA and LTE modes with the max power samples using a spacing of 0.0 cm from the phantom.

|                                             |                                                                                                                                   |                                              |                                                                                       |                                        |
|---------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------|---------------------------------------------------------------------------------------|----------------------------------------|
| FCC ID: A3LSPHP500                          |  <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | <b>SAR EVALUATION REPORT</b>                 |  | <b>Reviewed by:</b><br>Quality Manager |
| <b>Document S/N:</b><br>0Y1207301058-R3.A3L | <b>Test Dates:</b><br>08/06/12 – 09/04/12                                                                                         | <b>DUT Type:</b><br>Portable Tablet Computer |                                                                                       | Page 3 of 31                           |

### 1.3 Simultaneous Transmission Capabilities

According to KDB 447498, transmitters are considered to be transmitting simultaneously when there is overlapping transmission, with the exception of transmissions during network hand-offs with maximum hand-off duration less than 30 seconds. Possible transmission paths for the DUT are shown in Figure 1-2 and are color-coded to indicate communication modes which share the same path. Modes which share the same transmission path cannot transmit simultaneously with one another.



Figure 1-2  
Simultaneous Transmission Paths

This device contains multiple transmitters that may operate simultaneously, and therefore requires a simultaneous transmission analysis according to KDB 447498 3) procedures.

Table 1-1  
Simultaneous Transmission Scenarios Transmission Supported

| No. | Simultaneous Transmit Scenarios                                                  | Note                | Scenario Possible? |
|-----|----------------------------------------------------------------------------------|---------------------|--------------------|
| 1   | 800/1900 MHz CDMA/BC10/PCS 1x data + WiFi 2.4GHz                                 | 2G Hotspot          | Yes                |
| 2   | 800/1900MHz CDMA/BC10/PCS EVDO data + WiFi 2.4GHz                                | 3G Hotspot          | Yes                |
| 3   | 1900 MHz LTE B25 Data + WIFI 2.4 GHz                                             | 4G Hotspot          | Yes                |
| 4   | 1900 MHz LTE B25 Data + 800/1900 MHz CDMA/BC10/PCS 1x data                       | Not supported by HW | No                 |
| 5   | 1900 MHz LTE B25 Data + 800/1900 MHz CDMA/BC10/PCS EVDO data                     | Not supported by HW | No                 |
| 6   | 1900 MHz LTE B25 Data + 800/1900 MHz CDMA/BC10/PCS 1x data + WIFI 2.4 GHz Data   | Not supported by HW | No                 |
| 7   | 1900 MHz LTE B25 Data + 800/1900 MHz CDMA/BC10/PCS EVDO data + WIFI 2.4 GHz Data | Not supported by HW | No                 |

### 1.4 SAR Test Exclusions Applied

#### (A) WIFI/BT

The separation between the main antenna and the Bluetooth and WLAN antennas is 23 mm. RF Conducted Power of Bluetooth Tx is 12.942 mW (Please refer to the EMC DSS Report for a full set of Bluetooth conducted powers).

2.4 GHz WIFI and Bluetooth share the same antenna path and cannot transmit simultaneously.

Per KDB Publication 447498, **Bluetooth SAR was not required** based on the maximum conducted power, the Bluetooth/WLAN to main antenna separation distance.

#### (B) Licensed Transmitter(s)

This model does not support Network-Based Voice services for licensed transmitter in any modes.

### 1.5 Power Reduction for SAR

Proximity Sensors were utilized in the device for SAR purposes. April/October 2011 TCB Workshop Notes regarding Power reduction using proximity sensors were used for guidance for SAR Testing. See Section 8 for more information.

|                                      |                                                                                                                            |                                       |                                                                                       |                                 |
|--------------------------------------|----------------------------------------------------------------------------------------------------------------------------|---------------------------------------|---------------------------------------------------------------------------------------|---------------------------------|
| FCC ID: A3LSPHP500                   |  PCTEST<br>ENGINEERING LABORATORY, INC. | SAR EVALUATION REPORT                 |  | Reviewed by:<br>Quality Manager |
| Document S/N:<br>0Y1207301058-R3.A3L | Test Dates:<br>08/06/12 – 09/04/12                                                                                         | DUT Type:<br>Portable Tablet Computer |                                                                                       | Page 4 of 31                    |

## 1.6 Samples Used for SAR Testing

Seven samples with identical hardware were used to facilitate SAR testing. For maximum power devices S/N: MAX 1BC10/BC0, S/N: MAX 2 and S/N: MAX 3 LTE, power reduction was disabled via software (only available to the manufacturer - end user cannot disable power reduction) to ensure the device was always transmitting at maximum power when testing at a conservative distance. The reduced power devices S/N: GRIP SAR 1, S/N: GRIP SAR 2 and S/N: GRIP SAR 4 LTE were tuned to the reduced power levels. There is no power reduction for 2.4 GHz WLAN.

| Mode/Band                                 | Device SN used for Body Testing |
|-------------------------------------------|---------------------------------|
| Cell. CDMA (22H and 90S)<br>Max Power     | MAX 1BC10/BC0                   |
| Cell. CDMA (22H and 90S)<br>Reduced Power | GRIP SAR 1                      |
| PCS CDMA (24E) Max Power                  | MAX 2                           |
| PCS CDMA (24E) Reduced<br>Power           | GRIP SAR 2                      |
| LTE Band 25 (24E) Max Power               | MAX 3 LTE                       |
| LTE Band 25 (24E) Reduced<br>Power        | GRIP SAR 4 LTE                  |
| 2.4 GHz WIFI (15C)                        | WiFi 11                         |

## 1.7 Guidance Applied

- FCC KDB 941225 (2G/3G/4G)
- FCC KDB 248227 (802.11)
- FCC KDB 447498 (Tablet SAR Guidelines)
- FCC draft KDB 616217 DR01 (04/23/2012)
- April/Oct 2011 TCB Workshop Notes for RF Exposure and Sensors with Power Reduction

|                                      |                                                                                     |                                       |                                                                                       |                                 |
|--------------------------------------|-------------------------------------------------------------------------------------|---------------------------------------|---------------------------------------------------------------------------------------|---------------------------------|
| FCC ID: A3LSPHP500                   |  | SAR EVALUATION REPORT                 |  | Reviewed by:<br>Quality Manager |
| Document S/N:<br>0Y1207301058-R3.A3L | Test Dates:<br>08/06/12 – 09/04/12                                                  | DUT Type:<br>Portable Tablet Computer |                                                                                       | Page 5 of 31                    |

## 2

## LTE CHECKLIST PER KDB 941225 D05

| KDB 941225 Pub LTE Information |                                                                                                                   |                                              |                            |                    |
|--------------------------------|-------------------------------------------------------------------------------------------------------------------|----------------------------------------------|----------------------------|--------------------|
| KDB 941225<br>Section          | FCC ID                                                                                                            | A3LSPHP500                                   |                            |                    |
|                                | Form Factor                                                                                                       | Tablet                                       |                            |                    |
| 1)                             | Frequency Range of each LTE transmission band                                                                     | BAND25 : Tx (1852.5 ~1912.5MHz)              |                            |                    |
| 2)                             | Channel Bandwidths                                                                                                | BAND25 : 5MHz                                |                            |                    |
| 3)                             | Channel Numbers and Frequencies (MHz)                                                                             | Low                                          | Mid                        | High               |
|                                | LTE Band 25 and BW 5MHz                                                                                           | 1852.5 MHz (26065)                           | 1882.5 MHz (26365)         | 1912.5 MHz (26665) |
| 4)(a)                          | UE Category                                                                                                       | 3                                            |                            |                    |
| (b)                            | Modulations Supported in UL                                                                                       | QPSK, 16QAM                                  |                            |                    |
|                                | LTE Transmitter and Antenna Implementation                                                                        | CDMA/EVDO and LTE share the same transmitter |                            |                    |
| 5)                             | Description of LTE Tx and Ant. Implementation                                                                     | 1 Main TX/RX Ant and 1 Diversity RX Ant      |                            |                    |
| 6)                             | LTE Voice available?                                                                                              | No                                           |                            |                    |
|                                | Hotspot with LTE+WIFI                                                                                             | Yes                                          |                            |                    |
|                                | Hotspot with LTE+WIFI active with 1Xvoice sessions?                                                               | N/A                                          |                            |                    |
| 7)                             | LTE MPR Permanently implemented per 3GPP TS 36.101 section 6.2.3~6.2.5? (manufacturer attestation to be provided) | Yes                                          |                            |                    |
|                                | A-MPR (Additional MPR) disabled for SAR Testing?                                                                  | Yes                                          |                            |                    |
| 8)                             | Conducted power Table provided for 1RB (low and high offset), 50% RB (centered), 100% RB                          | Yes                                          |                            |                    |
| 9-10)                          | Non-LTE US Wireless Operating Modes/Band                                                                          | RF Output Power                              | RF Exposure Configurations |                    |
|                                | Cell. CDMA/EVDO - FCC Rule Part 90S                                                                               | See Page 1                                   |                            |                    |
|                                | Cell. CDMA/EVDO - FCC Rule Part 22H                                                                               | See Page 1                                   |                            |                    |
|                                | PCS CDMA/EVDO - FCC Rule Part 24E                                                                                 | See Page 1                                   |                            |                    |
|                                | 2.4GHz Bluetooth - FCC Rule Part 15C                                                                              | See Page 1                                   |                            |                    |
|                                | 2.4GHz WI-FI - FCC Rule Part 15C                                                                                  | See Page 1                                   |                            |                    |
| 11)                            | Simultaneous Tx Conditions (Voice and Data Configurations)                                                        | See Section 1.3                              |                            |                    |
| 12)                            | Power Reduction used for SAR Compliance?                                                                          | Yes                                          |                            |                    |
| 13)                            | Describe Power Reduction (LTE Modes)                                                                              | Proximity Sensors                            |                            |                    |
| 14)                            | SAR Test Plan                                                                                                     | See Section 8                                |                            |                    |
| 15)                            | SAR test data                                                                                                     | See Section 11                               |                            |                    |

|                                      |                                                                                     |                                       |                                                                                       |                                 |
|--------------------------------------|-------------------------------------------------------------------------------------|---------------------------------------|---------------------------------------------------------------------------------------|---------------------------------|
| FCC ID: A3LSPHP500                   |  | SAR EVALUATION REPORT                 |  | Reviewed by:<br>Quality Manager |
| Document S/N:<br>0Y1207301058-R3.A3L | Test Dates:<br>08/06/12 – 09/04/12                                                  | DUT Type:<br>Portable Tablet Computer | Page 6 of 31                                                                          |                                 |

### 3 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.

#### 3.1 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 ( $\rho$ ). It is also defined as the rate of RF energy absorption per unit mass at a point in an absorbing body (see Equation 3-1).

**Equation 3-1**  
**SAR Mathematical Equation**

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

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

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

where:

- $\sigma$  = conductivity of the tissue-simulating material (S/m)
- $\rho$  = 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]

|                                      |                                                                                     |                                       |                                                                                       |                                 |
|--------------------------------------|-------------------------------------------------------------------------------------|---------------------------------------|---------------------------------------------------------------------------------------|---------------------------------|
| FCC ID: A3LSPHP500                   |  | SAR EVALUATION REPORT                 |  | Reviewed by:<br>Quality Manager |
| Document S/N:<br>0Y1207301058-R3.A3L | Test Dates:<br>08/06/12 – 09/04/12                                                  | DUT Type:<br>Portable Tablet Computer |                                                                                       | Page 7 of 31                    |

## 4 SAR MEASUREMENT SETUP

### 4.1 Automated SAR Measurement System

Measurements are performed using the DASY automated dosimetric SAR assessment system. The DASY 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 [www.speag.com](http://www.speag.com) for more information about the specification of the SAR assessment system.



**Figure 4-1**  
**SAR Measurement System**



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

**Table 4-1**  
**Composition of the Tissue Equivalent Matter**

| Frequency (MHz)           | 835   | 1900  | 2450 |
|---------------------------|-------|-------|------|
| Tissue                    | Body  | Body  | Body |
| Ingredients (% by weight) |       |       |      |
| Bactericide               | 0.1   |       |      |
| DGBE                      |       | 29.44 | 26.7 |
| HEC                       | 1     |       |      |
| NaCl                      | 0.94  | 0.39  | 0.1  |
| Sucrose                   | 44.9  |       |      |
| Water                     | 53.06 | 70.17 | 73.2 |

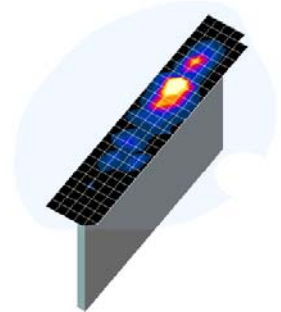
|                                             |                                                                                     |                                              |                                                                                       |                                        |
|---------------------------------------------|-------------------------------------------------------------------------------------|----------------------------------------------|---------------------------------------------------------------------------------------|----------------------------------------|
| <b>FCC ID:</b> A3LSPHP500                   |  | <b>SAR EVALUATION REPORT</b>                 |  | <b>Reviewed by:</b><br>Quality Manager |
| <b>Document S/N:</b><br>0Y1207301058-R3.A3L | <b>Test Dates:</b><br>08/06/12 – 09/04/12                                           | <b>DUT Type:</b><br>Portable Tablet Computer |                                                                                       | Page 8 of 31                           |

## 5 DOSIMETRIC ASSESSMENT

### 5.1 Measurement Procedure

The evaluation was performed using the following procedure:

1. The SAR distribution at the exposed side of the head or body 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 device-head interface and the horizontal grid resolution was 15mm and 15mm for frequencies < 3 GHz in the x and y directions respectively. When applicable, for frequencies above 3 GHz, a 10 mm by 10 mm resolution was used.
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 the 1 gram cube evaluation. SAR at this fixed point was measured and used as a reference value.
3. Based on the area scan data, the peak 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 at least 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 online 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 to calculate the SAR drift. If the drift deviated by more than 5%, the SAR test and drift measurements were repeated.



**Figure 5-1**  
**Sample SAR Area Scan**

|                                             |                                                                                     |                                              |                                                                                       |                                        |
|---------------------------------------------|-------------------------------------------------------------------------------------|----------------------------------------------|---------------------------------------------------------------------------------------|----------------------------------------|
| <b>FCC ID:</b> A3LSPHP500                   |  | <b>SAR EVALUATION REPORT</b>                 |  | <b>Reviewed by:</b><br>Quality Manager |
| <b>Document S/N:</b><br>0Y1207301058-R3.A3L | <b>Test Dates:</b><br>08/06/12 – 09/04/12                                           | <b>DUT Type:</b><br>Portable Tablet Computer |                                                                                       | Page 9 of 31                           |

## 6 FCC RF EXPOSURE LIMITS

### 6.1 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.

### 6.2 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 6-1**  
**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: A3LSPHP500                   |  <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | SAR EVALUATION REPORT                 |  | Reviewed by:<br>Quality Manager |
| Document S/N:<br>0Y1207301058-R3.A3L | Test Dates:<br>08/06/12 – 09/04/12                                                                                                | DUT Type:<br>Portable Tablet Computer |                                                                                       | Page 10 of 31                   |

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

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

The following procedures are according to FCC KDB Publication 941225 D01 "SAR Measurement Procedures for 3G Devices" v02, October 2007.

The device was placed into a simulated call using a base station simulator in a RF shielded chamber. Establishing connections in this manner ensure a consistent means for testing SAR and are recommended for evaluating SAR [4]. Devices under test were evaluated prior to testing, with a fully charged battery and were configured to operate at maximum output power. In order to verify that the device was tested throughout the SAR test at maximum output power, the SAR measurement system measures a "point SAR" at an arbitrary reference point at the start and end of the 1 gram SAR evaluation, to assess for any power drifts during the evaluation. If the power drift deviated by more than 5%, the SAR test and drift measurements were repeated.

### 7.2 SAR Measurement Conditions for CDMA2000

The following procedures were performed according to FCC KDB Publication 941225 D01 "SAR Measurement Procedures for 3G Devices" v02, October 2007.

#### 7.2.1 Output Power Verification

See 3GPP2 C.S0011/TIA-98-E as recommended by "SAR Measurement Procedures for 3G Devices" v02, October 2007. Maximum output power is verified on the High, Middle and Low channels according to procedures in section 4.4.5.2 of 3GPP2 C.S0011/TIA-98-E. SO55 tests were measured with power control bits in the "All Up" condition.

1. If the mobile station (MS) supports Reverse TCH RC 1 and Forward TCH RC 1, set up a call using Fundamental Channel Test Mode 1 (RC=1/1) with 9600 bps data rate only.
2. Under RC1, C.S0011 Table 4.4.5.2-1, Table 7-1 parameters were applied.
3. If the MS supports the RC 3 Reverse FCH, RC3 Reverse SCH<sub>0</sub> and demodulation of RC 3,4, or 5, set up a call using Supplemental Channel Test Mode 3 (RC 3/3) with 9600 bps Fundamental Channel and 9600 bps SCH0 data rate.
4. Under RC3, C.S0011 Table 4.4.5.2-2, Table 7-2 was applied.
5. FCHs were configured at full rate for maximum SAR with "All Up" power control bits.

**Table 7-1**  
**Parameters for Max. Power for RC1**

| Parameter                    | Units        | Value |
|------------------------------|--------------|-------|
| $I_{or}$                     | dBm/1.23 MHz | -104  |
| $\frac{Pilot E_c}{I_{or}}$   | dB           | -7    |
| $\frac{Traffic E_c}{I_{or}}$ | dB           | -7.4  |

**Table 7-2**  
**Parameters for Max. Power for RC3**

| Parameter                    | Units        | Value |
|------------------------------|--------------|-------|
| $I_{or}$                     | dBm/1.23 MHz | -86   |
| $\frac{Pilot E_c}{I_{or}}$   | dB           | -7    |
| $\frac{Traffic E_c}{I_{or}}$ | dB           | -7.4  |

#### 7.2.2 Body SAR Measurements for EVDO Data Devices

Body SAR is measured using Subtype 0/1 Physical Layer configurations for Rev. 0. SAR for Subtype 2 Physical layer configurations is not required for Rev. A when the maximum average output of each RF channels is less than that measured in Subtype 0/1 Physical layer configurations. Otherwise, SAR is measured on the maximum output channel for Rev. A using the exposure configuration that results in the highest SAR for the RF channels in Rev. 0. The AT is

|                                             |                                                                                                                                   |                                              |                                                                                       |                                        |
|---------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------|---------------------------------------------------------------------------------------|----------------------------------------|
| FCC ID: A3LSPHP500                          |  <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | <b>SAR EVALUATION REPORT</b>                 |  | <b>Reviewed by:</b><br>Quality Manager |
| <b>Document S/N:</b><br>0Y1207301058-R3.A3L | <b>Test Dates:</b><br>08/06/12 – 09/04/12                                                                                         | <b>DUT Type:</b><br>Portable Tablet Computer |                                                                                       | Page 11 of 31                          |

tested with a Reverse Data Channel rate of 153.6 kbps in Subtype 0/1 Physical Layer configurations; and a Reverse Data Channel payload size of 4096 bits and Termination Target of 16 slots in Subtype 2 Physical Layer configurations. Both FTAP and FETAP are configured with a Forward Traffic Channel data rate corresponding to the 2-slot version of 307.2 kbps with the ACK Channel transmitting in all slots. AT power control should be in "All Bits Up" conditions for TAP/ETAP. For Ev-Do devices that also support 1x RTT data operations, SAR is not required for 1x RTT when the maximum average output of each channel is less than ¼ dB higher than that measured in Subtype 0/1 Physical Layer configurations for Rev.0. Otherwise, the body SAR measurements procedures for CDMA Handsets should be applied (See Sections 7.2.3).

### 7.2.3 Body SAR Measurements for CDMA2000 1x

SAR for body exposure configurations is measured in RC3 with the DUT configured to transmit at full rate on FCH with all other code channels disabled using TDSO / SO32. SAR for multiple code channels (FCH + SCHn) is not required when the maximum average output of each RF channel is less than ¼ dB higher than that measured with FCH only. Otherwise, SAR is measured on the maximum output channel (FCH + SCHn) with FCH at full rate and SCH0 enabled at 9600 bps using the exposure configuration that results in the highest SAR for that channel with FCH only. When multiple code channels are enabled, the DUT output may shift by more than 0.5 dB and lead to higher SAR drifts and SCH dropouts. Body SAR was measured using TDSO / SO32 with power control bits in the "All Up." Body SAR in RC1 is not required when the maximum average output of each channel is less than ¼ dB higher than that measured in RC3.

## 7.3 SAR Measurement Conditions for LTE

LTE modes were tested according to FCC KDB 941225 D05 publication. Please see notes following SAR data for required test configurations. Establishing connections with base station simulators ensure a consistent means for testing SAR and are recommended for evaluating SAR [4]. The R&S CMW500 was used for LTE output power measurements and SAR testing. Closed loop power control was used so the UE transmits with maximum output power during SAR testing.

### 7.3.1 MPR

MPR is permanently implemented for this device by the manufacturer. The specific manufacturer target MPR is indicated alongside the SAR results. MPR is enabled for this device, according to 3GPP TS36.101 Section 6.2.3 – 6.2.5 under Table 6.2.3-1. See Section 9.2 for MPR targets.

### 7.3.2 A-MPR

A-MPR (Additional MPR) has been disabled for all SAR tests by setting NS=01 on the base station simulator.

### 7.3.3 Required RB Size and RB Offsets for SAR Testing

According to FCC KDB 941225 D05:

- a. Per Page 4, 3) A), QPSK with 50% RB is required for the highest bandwidth.
- b. Per Page 4, footnote 2, when the maximum output power across high, mid., and low channels is < 0.5 dB, mid channel is tested. Low and high channel SAR tests are not required for QPSK, 50% RB allocation when the SAR is < 0.8 W/kg. When there are less than 3 channels required based on the size of the band and bandwidth of the signal, the channel with the maximum output power was tested.
- c. Per Page 4, 3) B), QPSK with 1 RB for both channel edges are required for the highest bandwidth.

|                                      |                                                                                     |                                       |                                                                                       |                                 |
|--------------------------------------|-------------------------------------------------------------------------------------|---------------------------------------|---------------------------------------------------------------------------------------|---------------------------------|
| FCC ID: A3LSPHP500                   |  | SAR EVALUATION REPORT                 |  | Reviewed by:<br>Quality Manager |
| Document S/N:<br>0Y1207301058-R3.A3L | Test Dates:<br>08/06/12 – 09/04/12                                                  | DUT Type:<br>Portable Tablet Computer |                                                                                       | Page 12 of 31                   |

- d. Per Page 4, footnote 6, QPSK 1 RB allocation SAR tests were performed on the highest output power channel for the RB allocation when the average output power of the 1 RB allocation was > 0.5 dB higher than the 50% RB allocation for QPSK. Otherwise, SAR tests are performed on the channel that produced the highest SAR for QPSK with 50% RB. 1 RB configurations are considered together for a single channel selection.
- e. Per Page 4, 3) B), I), when the SAR for QPSK 1 RB allocation tests is <1.45 W/kg, testing on the other channels is not required.
- f. Per Page 4, 4) A), 16QAM with 50% RB is required for the highest bandwidth on the channel with the highest measured SAR for QPSK with 50% RB allocation.
- g. Per Page 4, 4) A), I), when the SAR for 16 QAM, 50 % allocation tests is <1.45 W/kg, testing on the other channels is not required.
- h. Per Page 4, 4) B) and Page 5 footnote 9, 16QAM with 1RB for both channel edges are required for the highest bandwidth on the highest output power channel for the 1 RB allocation when the average output power of the 1 RB allocation is >0.5 dB higher than the 50% allocation for 16 QAM. Otherwise, SAR tests are performed on the channel that produced the highest SAR for 16 QAM with 50% RB. 1 RB configurations are considered together for a single channel selection.
- i. Per Page 5, 4) B), I), when the SAR for 16 QAM 1 RB allocation tests is <1.45 W/kg, testing on the other channels is not required.
- j. Per Page 4, 4), A) I) and Page 5, 4), A)I, 100% RB Allocation is not required to be tested when the SAR is not > 1.45 W/kg for the highest bandwidth.
- k. Per Page 5, 5) B) I), smaller bandwidths are not required to be tested when SAR is not > 1.45 W/kg for the highest bandwidth and the maximum average output power of the smaller bandwidths across all channels and configurations is not more than 0.5 dB higher than the higher bandwidths.

## 7.4 SAR Testing with 802.11 Transmitters

Normal network operating configurations are not suitable for measuring the SAR of 802.11 a/b/g/n 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. See KDB Publication 248227 for more details.

### 7.4.1 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.

### 7.4.2 Frequency Channel Configurations [27]

For 2.4 GHz, the highest average RF output power channel between the low, mid and high channel at the lowest data rate was selected for SAR evaluation in 802.11b mode. 802.11g/n modes and higher data rates for 802.11b were additionally evaluated for SAR if the output power of the respective mode was 0.25 dB or higher than the powers of the SAR configurations tested in the 802.11b mode.

If the maximum extrapolated peak SAR of the zoom scan for the highest output channel was less than 1.6 W/kg or if the 1g averaged SAR was less than 0.8 W/kg, SAR testing was not required for the other test channels in the band. Otherwise, the other default (or corresponding required) test channels were additionally tested using the lowest data rate.

|                                      |                                                                                     |                                       |                                                                                       |                                 |
|--------------------------------------|-------------------------------------------------------------------------------------|---------------------------------------|---------------------------------------------------------------------------------------|---------------------------------|
| FCC ID: A3LSPHP500                   |  | SAR EVALUATION REPORT                 |  | Reviewed by:<br>Quality Manager |
| Document S/N:<br>0Y1207301058-R3.A3L | Test Dates:<br>08/06/12 – 09/04/12                                                  | DUT Type:<br>Portable Tablet Computer |                                                                                       | Page 13 of 31                   |

## 8

## SAR TABLET TESTING

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

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.

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

Since the diagonal dimension of the device is more than 20 cm (30.06 cm), this device is a tablet.

### 8.2 Proximity Sensor Information

The technical description contains information about sensor size and locations. Power reduction levels are provided in Section 9 (Conducted Powers).

KDB draft 616217 Section V was used as a guideline for selecting SAR test distances for this device. Since the back-off sensor activation distance for back is 12 mm, a conservative distance of 11 mm was tested for the back side at maximum power. Since the back-off sensor activation distance was 8 mm for the top edge, a conservative distance of 7 mm was tested at maximum power. Details about sensing mechanism and sensor pad location are included in the technical description. Sensor triggering distance data can be found in Appendix E.

The sensor is designed to support sufficient detection range and sensitivity to cover regions of the sensors in all applicable directions since the sensor entirely covers the antenna.

### 8.3 Display Orientation 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. According to KDB 447498 4) b) ii) (2), for each antenna, SAR is only required for the edge with the most conservative exposure condition.

### 8.4 Method of SAR Measurement with Power Reduction

This tablet was tested in accordance with KDB 616217 draft and April/Oct 2011 TCB workshop notes for proximity sensor and power reduction.

Based on the power-reduction activation vs. distance results for the sensors, the samples representative of the device with the sensors activated (reduced power S/N: GRIP SAR 1, S/N: GRIP SAR 2 and S/N: GRIP SAR 4 LTE) were tested for SAR at 0 mm. For the additional SAR measurements with the sensors de-activated (max power, no power reduction S/N: MAX 1BC10/BC0, S/N: MAX2 and S/N: MAX3 LTE) when the device is positioned away from the user, SAR evaluation is required at 11 mm (from the back), and 7 mm (from the top edge) distances from the phantom. Since the device sensor detection mechanism is active at these distances, the power reduction was disabled via manufacturer test software, and the device was placed in maximum power transmit mode with a base station simulator under the tissue equivalent liquid- filled flat phantom at the required distances for testing.

WLAN SAR was additionally tested at 11mm (from the back) to support simultaneous transmission scenarios.

|                                      |                                                                                     |                                       |                                                                                       |                                 |
|--------------------------------------|-------------------------------------------------------------------------------------|---------------------------------------|---------------------------------------------------------------------------------------|---------------------------------|
| FCC ID: A3LSPHP500                   |  | SAR EVALUATION REPORT                 |  | Reviewed by:<br>Quality Manager |
| Document S/N:<br>0Y1207301058-R3.A3L | Test Dates:<br>08/06/12 – 09/04/12                                                  | DUT Type:<br>Portable Tablet Computer |                                                                                       | Page 14 of 31                   |

## 9 RF CONDUCTED POWERS

### 9.1 CDMA Conducted Powers

**Table 9-1**  
**Maximum CDMA Average RF Power**  
**(Representing Proximity Sensor Inactive)**

| Band                         | Channel | Frequency | TDSO SO32 [dBm] | TDSO SO32 [dBm] | 1x EvDO Rev. 0 [dBm] | 1x EvDO Rev. A [dBm] |
|------------------------------|---------|-----------|-----------------|-----------------|----------------------|----------------------|
|                              | F-RC    | MHz       | FCH+SCH         | FCH             | (RTAP)               | (RETAP)              |
| Cellular - FCC Rule Part 90S | 564     | 820.1     | 25.13           | 25.12           | 25.06                | 25.03                |
| Cellular - FCC Rule Part 22H | 1013    | 824.7     | 24.96           | 24.94           | 24.91                | 24.90                |
|                              | 384     | 836.52    | 25.03           | 25.02           | 25.02                | 25.00                |
|                              | 777     | 848.31    | 25.12           | 25.14           | 25.07                | 25.05                |
| PCS - FCC Rule Part 24E      | 25      | 1851.25   | 25.29           | 25.12           | 25.16                | 25.13                |
|                              | 600     | 1880      | 25.09           | 25.04           | 25.09                | 25.04                |
|                              | 1175    | 1908.75   | 25.05           | 25.02           | 25.04                | 25.02                |

**Table 9-2**  
**Reduced CDMA Average RF Power**  
**(Representing Proximity Sensor Active)**

| Band                         | Channel | Frequency | TDSO SO32 [dBm] | TDSO SO32 [dBm] | 1x EvDO Rev. 0 [dBm] | 1x EvDO Rev. A [dBm] |
|------------------------------|---------|-----------|-----------------|-----------------|----------------------|----------------------|
|                              | F-RC    | MHz       | FCH+SCH         | FCH             | (RTAP)               | (RETAP)              |
| Cellular - FCC Rule Part 90S | 564     | 820.1     | 18.00           | 18.05           | 18.00                | 18.00                |
| Cellular - FCC Rule Part 22H | 1013    | 824.7     | 18.16           | 18.13           | 18.05                | 17.90                |
|                              | 384     | 836.52    | 18.04           | 18.10           | 18.04                | 18.04                |
|                              | 777     | 848.31    | 18.18           | 18.20           | 18.21                | 18.20                |
| PCS - FCC Rule Part 24E      | 25      | 1851.25   | 14.31           | 14.35           | 14.16                | 14.14                |
|                              | 600     | 1880      | 14.38           | 14.43           | 14.44                | 14.44                |
|                              | 1175    | 1908.75   | 14.44           | 14.47           | 14.38                | 14.35                |

Per KDB Publication 941225 D01:

1. CDMA Body SAR is measured using Subtype 0/1 Physical Layer configurations for Rev. 0 according to KDB 941225 D01 procedures for data devices. If the average output power of Subtype 2 for Rev. A is less than the Rev. 0 power levels, then Rev. A SAR is not required. Otherwise, SAR is measured on the maximum output channel for Rev. A using the exposure configuration that results in the highest SAR for that RF channel in Rev. 0. SAR is not required for 1x RTT for Ev-Do hotspot devices when the maximum average output of each channel is less than 1/4 dB higher than that measured in Subtype 0/1 Physical Layer configurations for Rev. 0



**Figure 9-1**  
**Power Measurement Setup**

|                                      |                                        |                                       |         |                                 |
|--------------------------------------|----------------------------------------|---------------------------------------|---------|---------------------------------|
| FCC ID: A3LSPHP500                   | PCTEST<br>ENGINEERING LABORATORY, INC. | SAR EVALUATION REPORT                 | SAMSUNG | Reviewed by:<br>Quality Manager |
| Document S/N:<br>0Y1207301058-R3.A3L | Test Dates:<br>08/06/12 – 09/04/12     | DUT Type:<br>Portable Tablet Computer |         | Page 15 of 31                   |

## 9.2 LTE Conducted Powers

**Table 9-3**  
**LTE Band 25 - FCC Rule Part 24E Conducted Powers - 5 MHz Bandwidth**  
**Representing Proximity Sensor Inactive**

| Frequency [MHz] | Channel | Bandwidth [MHz] | Modulation | RB Size | RB Offset | Conducted Power [dBm] | Target MPR [dB] | MPR Allowed by 3GPP [dB] |
|-----------------|---------|-----------------|------------|---------|-----------|-----------------------|-----------------|--------------------------|
| 1852.5          | 26065   | 5               | QPSK       | 1       | 0         | 23.10                 | 0               | 0                        |
| 1852.5          | 26065   | 5               | QPSK       | 1       | 24        | 23.09                 | 0               | 0                        |
| 1852.5          | 26065   | 5               | QPSK       | 12      | 6         | 22.18                 | 1               | 0-1                      |
| 1852.5          | 26065   | 5               | QPSK       | 25      | 0         | 22.10                 | 1               | 0-1                      |
| 1852.5          | 26065   | 5               | 16-QAM     | 1       | 0         | 21.96                 | 1               | 0-1                      |
| 1852.5          | 26065   | 5               | 16-QAM     | 1       | 24        | 22.00                 | 1               | 0-1                      |
| 1852.5          | 26065   | 5               | 16-QAM     | 12      | 6         | 21.15                 | 2               | 0-2                      |
| 1852.5          | 26065   | 5               | 16-QAM     | 25      | 0         | 21.17                 | 2               | 0-2                      |
| 1882.5          | 26365   | 5               | QPSK       | 1       | 0         | 23.35                 | 0               | 0                        |
| 1882.5          | 26365   | 5               | QPSK       | 1       | 24        | 23.13                 | 0               | 0                        |
| 1882.5          | 26365   | 5               | QPSK       | 12      | 6         | 22.13                 | 1               | 0-1                      |
| 1882.5          | 26365   | 5               | QPSK       | 25      | 0         | 22.15                 | 1               | 0-1                      |
| 1882.5          | 26365   | 5               | 16-QAM     | 1       | 0         | 22.20                 | 1               | 0-1                      |
| 1882.5          | 26365   | 5               | 16-QAM     | 1       | 24        | 22.04                 | 1               | 0-1                      |
| 1882.5          | 26365   | 5               | 16-QAM     | 12      | 6         | 21.10                 | 2               | 0-2                      |
| 1882.5          | 26365   | 5               | 16-QAM     | 25      | 0         | 21.16                 | 2               | 0-2                      |
| 1912.5          | 26665   | 5               | QPSK       | 1       | 0         | 23.02                 | 0               | 0                        |
| 1912.5          | 26665   | 5               | QPSK       | 1       | 24        | 23.25                 | 0               | 0                        |
| 1912.5          | 26665   | 5               | QPSK       | 12      | 6         | 22.30                 | 1               | 0-1                      |
| 1912.5          | 26665   | 5               | QPSK       | 25      | 0         | 22.27                 | 1               | 0-1                      |
| 1912.5          | 26665   | 5               | 16-QAM     | 1       | 0         | 22.41                 | 1               | 0-1                      |
| 1912.5          | 26665   | 5               | 16-QAM     | 1       | 24        | 22.48                 | 1               | 0-1                      |
| 1912.5          | 26665   | 5               | 16-QAM     | 12      | 6         | 21.38                 | 2               | 0-2                      |
| 1912.5          | 26665   | 5               | 16-QAM     | 25      | 0         | 21.24                 | 2               | 0-2                      |

**Table 9-4**  
**LTE Band 25 - FCC Rule Part 24E Conducted Powers - 5 MHz Bandwidth**  
**Representing Proximity Sensor Active**

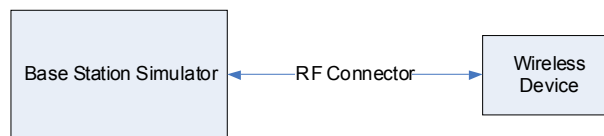
| Frequency [MHz] | Channel | Bandwidth [MHz] | Modulation | RB Size | RB Offset | Conducted Power [dBm] | Target MPR [dB] | MPR Allowed by 3GPP [dB] |
|-----------------|---------|-----------------|------------|---------|-----------|-----------------------|-----------------|--------------------------|
| 1852.5          | 26065   | 5               | QPSK       | 1       | 0         | 13.70                 | 0               | 0                        |
| 1852.5          | 26065   | 5               | QPSK       | 1       | 24        | 13.74                 | 0               | 0                        |
| 1852.5          | 26065   | 5               | QPSK       | 12      | 6         | 14.32                 | 0               | 0-1                      |
| 1852.5          | 26065   | 5               | QPSK       | 25      | 0         | 14.06                 | 0               | 0-1                      |
| 1852.5          | 26065   | 5               | 16-QAM     | 1       | 0         | 13.70                 | 0               | 0-1                      |
| 1852.5          | 26065   | 5               | 16-QAM     | 1       | 24        | 13.73                 | 0               | 0-1                      |
| 1852.5          | 26065   | 5               | 16-QAM     | 12      | 6         | 14.29                 | 0               | 0-2                      |
| 1852.5          | 26065   | 5               | 16-QAM     | 25      | 0         | 14.12                 | 0               | 0-2                      |
| 1882.5          | 26365   | 5               | QPSK       | 1       | 0         | 13.70                 | 0               | 0                        |
| 1882.5          | 26365   | 5               | QPSK       | 1       | 24        | 13.77                 | 0               | 0                        |
| 1882.5          | 26365   | 5               | QPSK       | 12      | 6         | 14.12                 | 0               | 0-1                      |
| 1882.5          | 26365   | 5               | QPSK       | 25      | 0         | 13.91                 | 0               | 0-1                      |
| 1882.5          | 26365   | 5               | 16-QAM     | 1       | 0         | 13.85                 | 0               | 0-1                      |
| 1882.5          | 26365   | 5               | 16-QAM     | 1       | 24        | 13.87                 | 0               | 0-1                      |
| 1882.5          | 26365   | 5               | 16-QAM     | 12      | 6         | 13.96                 | 0               | 0-2                      |
| 1882.5          | 26365   | 5               | 16-QAM     | 25      | 0         | 13.88                 | 0               | 0-2                      |
| 1912.5          | 26665   | 5               | QPSK       | 1       | 0         | 14.15                 | 0               | 0                        |
| 1912.5          | 26665   | 5               | QPSK       | 1       | 24        | 14.16                 | 0               | 0                        |
| 1912.5          | 26665   | 5               | QPSK       | 12      | 6         | 14.49                 | 0               | 0-1                      |
| 1912.5          | 26665   | 5               | QPSK       | 25      | 0         | 14.42                 | 0               | 0-1                      |
| 1912.5          | 26665   | 5               | 16-QAM     | 1       | 0         | 13.96                 | 0               | 0-1                      |
| 1912.5          | 26665   | 5               | 16-QAM     | 1       | 24        | 14.06                 | 0               | 0-1                      |
| 1912.5          | 26665   | 5               | 16-QAM     | 12      | 6         | 14.35                 | 0               | 0-2                      |
| 1912.5          | 26665   | 5               | 16-QAM     | 25      | 0         | 14.31                 | 0               | 0-2                      |

|                                      |                                                                                                                                   |                                       |                                                                                       |                                 |
|--------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|---------------------------------------|---------------------------------------------------------------------------------------|---------------------------------|
| FCC ID: A3LSPHP500                   |  <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | <b>SAR EVALUATION REPORT</b>          |  | Reviewed by:<br>Quality Manager |
| Document S/N:<br>0Y1207301058-R3.A3L | Test Dates:<br>08/06/12 – 09/04/12                                                                                                | DUT Type:<br>Portable Tablet Computer | Page 16 of 31                                                                         |                                 |

## 9.2.1 Required RB Size and RB Offsets for SAR Testing

According to FCC KDB 941225 D05:

- 1) Per Page 4, 3) A), QPSK with 50% RB is required for the highest bandwidth.
- 2) Per Page 4, footnote 2, when the maximum output power across high, mid., and low channels is < 0.5 dB, mid channel is tested. Low and high channel SAR tests are not required for QPSK, 50% RB allocation when the SAR is < 0.8 W/kg. When there are less than 3 channels based on the size of the band and bandwidth of the signal, the channel with the other channels are tested.
- 3) Per Page 4, 3) B), QPSK with 1 RB for both channel edges are required for the highest bandwidth.
- 4) Per Page 4, footnote 6, QPSK 1 RB allocation SAR tests were performed on the highest output power channel for the RB allocation when the average output power of the 1 RB allocations were > 0.5 dB higher than the 50% RB allocation for QPSK. Otherwise, SAR tests are performed on the channel that produced the highest SAR for QPSK with 50% RB. 1 RB configurations are considered together for a single channel selection.
- 5) Per Page 4, 3) B), I), when the SAR for QPSK 1 RB allocation tests is <1.45 W/kg, testing on the other channels is not required.
- 6) Per Page 4, 4) A), 16QAM with 50% RB is required for the highest bandwidth on the channel with the highest measured SAR for QPSK with 50% RB allocation.
- 7) Per Page 4, 4) A), I), when the SAR for 16 QAM, 50 % allocation tests is <1.45 W/kg, testing on the other channels is not required.
- 8) Per Page 4, 4) B) and Page 5 footnote 9, 16QAM with 1RB for both channel edges are required for the highest bandwidth on the highest output power channel for the 1 RB allocation when the average output power of the 1 RB allocation is >0.5 dB higher than the 50% allocation for 16 QAM. Otherwise, SAR tests are performed on the channel that produced the highest SAR for 16 QAM with 50% RB. 1 RB configurations are considered together for a single channel selection.
- 9) Per Page 5, 4) B), I), when the SAR for 16 QAM 1 RB allocation tests is <1.45 W/kg, testing on the other channels is not required.
- 10) Per Page 4, 4), A) I) and Page 5, 4), A),I), 100% RB Allocation is not required to be tested when the SAR is not > 1.45 W/kg for the highest bandwidth.
- 11) Per Page 5, 5) B) I), smaller bandwidths are not required to be tested when SAR is not > 1.45 W/kg for the highest bandwidth and the maximum average output power of the smaller bandwidths across all channels and configurations is not more than 0.5 dB higher than the higher bandwidths
- 12) Bolded powers were tested for SAR.



**Figure 9-2**  
**Power Measurement Setup**

|                                             |                                                                                                                                   |                                              |                                                                                       |                                        |
|---------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------|---------------------------------------------------------------------------------------|----------------------------------------|
| FCC ID: A3LSPHP500                          |  <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | <b>SAR EVALUATION REPORT</b>                 |  | <b>Reviewed by:</b><br>Quality Manager |
| <b>Document S/N:</b><br>0Y1207301058-R3.A3L | <b>Test Dates:</b><br>08/06/12 – 09/04/12                                                                                         | <b>DUT Type:</b><br>Portable Tablet Computer |                                                                                       | Page 17 of 31                          |

### 9.3 WLAN Conducted Powers

**Table 9-5**  
**IEEE 802.11b Average RF**  
**Power**

| Freq [MHz] | Channel | Data Rate [Mbps] | Average Power (dBm) |
|------------|---------|------------------|---------------------|
| 2412       | 1       | 1                | 15.11               |
|            |         | 2                | 15.12               |
|            |         | 5.5              | 15.15               |
|            |         | 11               | 15.1                |
| 2437       | 6       | 1                | <b>15.15</b>        |
|            |         | 2                | 15.15               |
|            |         | 5.5              | 15.16               |
|            |         | 11               | 15.13               |
| 2462       | 11      | 1                | 14.94               |
|            |         | 2                | 14.9                |
|            |         | 5.5              | 15.02               |
|            |         | 11               | 14.92               |

**Table 9-6**  
**IEEE 802.11g Average RF**  
**Power**

| Freq [MHz] | Channel | Data Rate [Mbps] | Average Power (dBm) |
|------------|---------|------------------|---------------------|
| 2412       | 1       | 6                | 12.71               |
|            |         | 9                | 12.68               |
|            |         | 12               | 12.63               |
|            |         | 18               | 12.59               |
|            |         | 24               | 12.76               |
|            |         | 36               | 12.71               |
|            |         | 48               | 12.72               |
|            |         | 54               | 12.70               |
| 2437       | 6       | 6                | 13.09               |
|            |         | 9                | 13.12               |
|            |         | 12               | 13.06               |
|            |         | 18               | 13.09               |
|            |         | 24               | 13.02               |
|            |         | 36               | 13.07               |
|            |         | 48               | 12.99               |
|            |         | 54               | 13.03               |
| 2462       | 11      | 6                | 12.87               |
|            |         | 9                | 12.79               |
|            |         | 12               | 12.92               |
|            |         | 18               | 12.98               |
|            |         | 24               | 12.99               |
|            |         | 36               | 12.87               |
|            |         | 48               | 12.83               |
|            |         | 54               | 12.98               |

**Table 9-7**  
**IEEE 802.11n Average RF**  
**Power**

| Freq [MHz] | Channel | Data Rate [Mbps] | Average Power (dBm) |
|------------|---------|------------------|---------------------|
| 2412       | 1       | 6.5/7.2          | 11.59               |
|            |         | 13/ 14.40        | 11.64               |
|            |         | 19.5/21.70       | 11.48               |
|            |         | 26/ 28.90        | 11.42               |
|            |         | 29/ 43.3         | 11.63               |
|            |         | 52/ 57.80        | 11.41               |
|            |         | 58.50/ 65        | 11.57               |
|            |         | 65/ 72.2         | 11.44               |
| 2437       | 6       | 6.5/7.2          | 11.64               |
|            |         | 13/ 14.40        | 11.63               |
|            |         | 19.5/21.70       | 11.71               |
|            |         | 26/ 28.90        | 11.70               |
|            |         | 29/ 43.3         | 11.67               |
|            |         | 52/ 57.80        | 11.52               |
|            |         | 58.50/ 65        | 11.59               |
|            |         | 65/ 72.2         | 11.63               |
| 2462       | 11      | 6.5/7.2          | 11.92               |
|            |         | 13/ 14.40        | 11.86               |
|            |         | 19.5/21.70       | 11.89               |
|            |         | 26/ 28.90        | 11.93               |
|            |         | 29/ 43.3         | 11.84               |
|            |         | 52/ 57.80        | 11.82               |
|            |         | 58.50/ 65        | 11.83               |
|            |         | 65/ 72.2         | 11.88               |

Justification for reduced test configurations for WIFI channels per KDB Publication 248227 and April 2010 FCC/TCB Meeting Notes:

- For 2.4 GHz, highest average RF output power channel for the lowest data rate for IEEE 802.11b were selected for SAR evaluation. Other IEEE 802.11 modes (including 802.11g/n) were not investigated since the average output powers over all channels and data rates were not more than 0.25 dB higher than the tested channel in the lowest data rate of IEEE 802.11b mode.
- When the maximum extrapolated peak SAR of the zoom scan for the maximum output channel is <1.6 W/kg and the 1g averaged SAR is <0.8 W/kg, SAR testing on other channels is not required. Otherwise, the other default (or corresponding required) test channels were additionally tested using the lowest data rate.
- The bolded data rate and channel above were tested for SAR.



**Figure 9-3**  
**Power Measurement Setup**

|                                             |                                                                                                                                   |                                              |                                                                                       |                                        |
|---------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------|---------------------------------------------------------------------------------------|----------------------------------------|
| FCC ID: A3LSPHP500                          |  <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | <b>SAR EVALUATION REPORT</b>                 |  | <b>Reviewed by:</b><br>Quality Manager |
| <b>Document S/N:</b><br>0Y1207301058-R3.A3L | <b>Test Dates:</b><br>08/06/12 – 09/04/12                                                                                         | <b>DUT Type:</b><br>Portable Tablet Computer |                                                                                       | Page 18 of 31                          |

## 10 SYSTEM VERIFICATION

### 10.1 Tissue Verification

Table 10-1  
Measured Tissue Properties

| Calibrated for Tests Performed on: | Tissue Type | Tissue Temp During Calibration (C°) | Measured Frequency (MHz) | Measured Conductivity, $\sigma$ (S/m) | Measured Dielectric Constant, $\epsilon$ | TARGET Conductivity, $\sigma$ (S/m) | TARGET Dielectric Constant, $\epsilon$ | % dev $\sigma$ | % dev $\epsilon$ |
|------------------------------------|-------------|-------------------------------------|--------------------------|---------------------------------------|------------------------------------------|-------------------------------------|----------------------------------------|----------------|------------------|
| 08/06/2012                         | 835B        | 23.3                                | 820                      | 0.974                                 | 52.99                                    | 0.97                                | 55.28                                  | 0.52%          | -4.15%           |
|                                    |             |                                     | 835                      | 0.988                                 | 52.84                                    | 0.97                                | 55.20                                  | 1.86%          | -4.28%           |
|                                    |             |                                     | 850                      | 1.002                                 | 52.71                                    | 0.99                                | 55.15                                  | 1.42%          | -4.43%           |
| 08/07/2012                         | 1900B       | 22.4                                | 1850                     | 1.488                                 | 51.78                                    | 1.52                                | 53.30                                  | -2.11%         | -2.85%           |
|                                    |             |                                     | 1880                     | 1.517                                 | 51.77                                    | 1.52                                | 53.30                                  | -0.20%         | -2.87%           |
|                                    |             |                                     | 1910                     | 1.518                                 | 51.86                                    | 1.52                                | 53.30                                  | -0.13%         | -2.70%           |
|                                    |             |                                     | 1915                     | 1.544                                 | 51.56                                    | 1.52                                | 53.30                                  | 1.58%          | -3.27%           |
| 08/08/2012                         | 1900B       | 22.4                                | 1850                     | 1.521                                 | 52.29                                    | 1.52                                | 53.30                                  | 0.07%          | -1.89%           |
|                                    |             |                                     | 1880                     | 1.539                                 | 51.99                                    | 1.52                                | 53.30                                  | 1.25%          | -2.46%           |
|                                    |             |                                     | 1910                     | 1.554                                 | 52.01                                    | 1.52                                | 53.30                                  | 2.24%          | -2.42%           |
|                                    |             |                                     | 1915                     | 1.578                                 | 52.18                                    | 1.52                                | 53.30                                  | 3.79%          | -2.10%           |
| 09/04/2012                         | 2450B       | 22.8                                | 2401                     | 1.860                                 | 51.13                                    | 1.903                               | 52.765                                 | -2.26%         | -3.10%           |
|                                    |             |                                     | 2450                     | 1.971                                 | 50.99                                    | 1.950                               | 52.700                                 | 1.08%          | -3.24%           |
|                                    |             |                                     | 2499                     | 2.024                                 | 50.76                                    | 2.019                               | 52.638                                 | 0.25%          | -3.57%           |

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 via the DASY software to determine actual dielectric parameters at the test frequencies (per IEEE 1528 6.6.1.2).

### 10.2 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  $\epsilon$  can be calculated 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  $j = \sqrt{-1}$ .

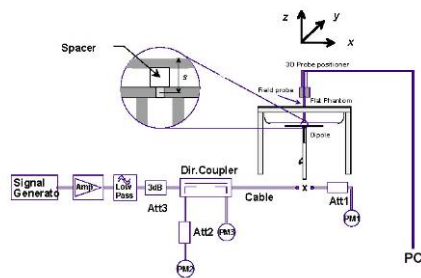
|                                      |                                                                                                                            |                                       |                                                                                       |                                 |
|--------------------------------------|----------------------------------------------------------------------------------------------------------------------------|---------------------------------------|---------------------------------------------------------------------------------------|---------------------------------|
| FCC ID: A3LSPHP500                   |  PCTEST<br>ENGINEERING LABORATORY, INC. | SAR EVALUATION REPORT                 |  | Reviewed by:<br>Quality Manager |
| Document S/N:<br>0Y1207301058-R3.A3L | Test Dates:<br>08/06/12 – 09/04/12                                                                                         | DUT Type:<br>Portable Tablet Computer |                                                                                       | Page 19 of 31                   |

### 10.3 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 10-2**  
**System Verification Results**

| System Verification<br>TARGET & MEASURED |             |            |                |                  |                 |           |          |                                   |                                     |                                         |               |
|------------------------------------------|-------------|------------|----------------|------------------|-----------------|-----------|----------|-----------------------------------|-------------------------------------|-----------------------------------------|---------------|
| Tissue Frequency (MHz)                   | Tissue Type | Date:      | Amb. Temp (°C) | Liquid Temp (°C) | Input Power (W) | Dipole SN | Probe SN | 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 (%) |
| 835                                      | Body        | 08/06/2012 | 24.3           | 23.4             | 0.100           | 4d119     | 3258     | 0.985                             | 9.560                               | 9.850                                   | 3.03%         |
| 1900                                     | Body        | 08/07/2012 | 23.7           | 21.9             | 0.100           | 5d149     | 3287     | 4.11                              | 39.300                              | 41.100                                  | 4.58%         |
| 1900                                     | Body        | 08/08/2012 | 23.9           | 22.1             | 0.100           | 5d149     | 3287     | 4.11                              | 39.300                              | 41.100                                  | 4.58%         |
| 2450                                     | Body        | 09/04/2012 | 22.4           | 22.4             | 0.100           | 882       | 3287     | 5.33                              | 50.300                              | 53.300                                  | 5.96%         |



**Figure 10-1**  
**System Verification Setup Diagram**



**Figure 10-2**  
**System Verification Setup Photo**

|                                      |                                                                                     |                                       |                                                                                       |                                 |
|--------------------------------------|-------------------------------------------------------------------------------------|---------------------------------------|---------------------------------------------------------------------------------------|---------------------------------|
| FCC ID: A3LSPHP500                   |  | SAR EVALUATION REPORT                 |  | Reviewed by:<br>Quality Manager |
| Document S/N:<br>0Y1207301058-R3.A3L | Test Dates:<br>08/06/12 – 09/04/12                                                  | DUT Type:<br>Portable Tablet Computer |                                                                                       | Page 20 of 31                   |

# 11 SAR DATA SUMMARY

## 11.1 Body SAR Data

Table 11-1  
CDMA Body SAR Data

| MEASUREMENT RESULTS                                                                               |      |                                |             |                    |                       |                  |                                                 |                      |        |          |
|---------------------------------------------------------------------------------------------------|------|--------------------------------|-------------|--------------------|-----------------------|------------------|-------------------------------------------------|----------------------|--------|----------|
| FREQUENCY                                                                                         |      | Mode                           | Service     | Target Power [dBm] | Conducted Power [dBm] | Power Drift [dB] | Spacing                                         | Device Serial Number | Side   | SAR (1g) |
| MHz                                                                                               | Ch.  |                                |             |                    |                       |                  |                                                 |                      |        | (W/kg)   |
| 820.10                                                                                            | 564  | Cell. CDMA - FCC Rule Part 90S | EVDO Rev. 0 | 18                 | 18.00                 | -0.21            | 0.0 cm                                          | GRIP SAR 1           | back*  | 0.699    |
| 820.10                                                                                            | 564  | Cell. CDMA - FCC Rule Part 90S | EVDO Rev. 0 | 18                 | 18.00                 | 0.21             | 0.0 cm                                          | GRIP SAR 1           | top*   | 0.077    |
| 820.10                                                                                            | 564  | Cell. CDMA - FCC Rule Part 90S | EVDO Rev. 0 | 25                 | 25.06                 | -0.16            | 1.1 cm                                          | MAX 1 BC10/BC0       | back   | 0.669    |
| 820.10                                                                                            | 564  | Cell. CDMA - FCC Rule Part 90S | EVDO Rev. 0 | 25                 | 25.06                 | -0.02            | 0.7 cm                                          | MAX 1 BC10/BC0       | top    | 0.246    |
| 820.10                                                                                            | 564  | Cell. CDMA - FCC Rule Part 90S | EVDO Rev. 0 | 25                 | 25.06                 | -0.18            | 0.0 cm                                          | MAX 1 BC10/BC0       | right  | 0.903    |
| 820.10                                                                                            | 564  | Cell. CDMA - FCC Rule Part 90S | EVDO Rev. 0 | 25                 | 25.06                 | -0.05            | 0.0 cm                                          | MAX 1 BC10/BC0       | vertex | 0.221    |
| 836.52                                                                                            | 384  | Cell. CDMA - FCC Rule Part 22H | EVDO Rev. 0 | 18                 | 18.04                 | 0.01             | 0.0 cm                                          | GRIP SAR 1           | back*  | 0.720    |
| 836.52                                                                                            | 384  | Cell. CDMA - FCC Rule Part 22H | EVDO Rev. 0 | 18                 | 18.04                 | -0.12            | 0.0 cm                                          | GRIP SAR 1           | top*   | 0.101    |
| 836.52                                                                                            | 384  | Cell. CDMA - FCC Rule Part 22H | EVDO Rev. 0 | 25                 | 25.02                 | -0.02            | 1.1 cm                                          | MAX 1 BC10/BC0       | back   | 0.776    |
| 836.52                                                                                            | 384  | Cell. CDMA - FCC Rule Part 22H | EVDO Rev. 0 | 25                 | 25.02                 | -0.01            | 0.7 cm                                          | MAX 1 BC10/BC0       | top    | 0.289    |
| 824.70                                                                                            | 1013 | Cell. CDMA - FCC Rule Part 22H | EVDO Rev. 0 | 25                 | 24.91                 | -0.08            | 0.0 cm                                          | MAX 1 BC10/BC0       | right  | 0.878    |
| 836.52                                                                                            | 384  | Cell. CDMA - FCC Rule Part 22H | EVDO Rev. 0 | 25                 | 25.02                 | -0.11            | 0.0 cm                                          | MAX 1 BC10/BC0       | right  | 1.020    |
| 848.31                                                                                            | 777  | Cell. CDMA - FCC Rule Part 22H | EVDO Rev. 0 | 25                 | 25.07                 | -0.10            | 0.0 cm                                          | MAX 1 BC10/BC0       | right  | 0.996    |
| 836.52                                                                                            | 384  | Cell. CDMA - FCC Rule Part 22H | EVDO Rev. 0 | 25                 | 25.02                 | -0.04            | 0.0 cm                                          | MAX 1 BC10/BC0       | vertex | 0.242    |
| 1880.00                                                                                           | 600  | PCS CDMA - FCC Rule Part 24E   | EVDO Rev. 0 | 14                 | 14.44                 | -0.09            | 0.0 cm                                          | GRIP SAR 2           | back*  | 0.641    |
| 1880.00                                                                                           | 600  | PCS CDMA - FCC Rule Part 24E   | EVDO Rev. 0 | 14                 | 14.44                 | 0.00             | 0.0 cm                                          | GRIP SAR 2           | top*   | 0.357    |
| 1880.00                                                                                           | 600  | PCS CDMA - FCC Rule Part 24E   | EVDO Rev. 0 | 25                 | 25.09                 | 0.19             | 1.1 cm                                          | MAX 2                | back   | 0.712    |
| 1880.00                                                                                           | 600  | PCS CDMA - FCC Rule Part 24E   | EVDO Rev. 0 | 25                 | 25.09                 | -0.18            | 0.7 cm                                          | MAX 2                | top    | 0.750    |
| 1880.00                                                                                           | 600  | PCS CDMA - FCC Rule Part 24E   | EVDO Rev. 0 | 25                 | 25.09                 | 0.09             | 1.0 cm                                          | MAX 2                | right  | 0.251    |
| 1880.00                                                                                           | 600  | PCS CDMA - FCC Rule Part 24E   | EVDO Rev. 0 | 25                 | 25.09                 | -0.18            | 0.0 cm                                          | MAX 2                | vertex | 0.340    |
| 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 |                      |        |          |

|                                      |                                                                                     |                                       |                                                                                       |                                 |
|--------------------------------------|-------------------------------------------------------------------------------------|---------------------------------------|---------------------------------------------------------------------------------------|---------------------------------|
| FCC ID: A3LSPHP500                   |  | SAR EVALUATION REPORT                 |  | Reviewed by:<br>Quality Manager |
| Document S/N:<br>0Y1207301058-R3.A3L | Test Dates:<br>08/06/12 – 09/04/12                                                  | DUT Type:<br>Portable Tablet Computer |                                                                                       | Page 21 of 31                   |

**Table 11-2**  
**LTE Reduced Power Body SAR Data**

| MEASUREMENT RESULTS                      |       |      |                                 |                 |                    |                       |                  |          |                      |            |         |           |         |       |                 |
|------------------------------------------|-------|------|---------------------------------|-----------------|--------------------|-----------------------|------------------|----------|----------------------|------------|---------|-----------|---------|-------|-----------------|
| FREQUENCY                                |       |      | Mode                            | Bandwidth [MHz] | Target Power [dBm] | Conducted Power [dBm] | Power Drift [dB] | MPR [dB] | Device Serial Number | Modulation | # of RB | RB Offset | Spacing | Side  | SAR (1g) (W/kg) |
| MHz                                      | Ch.   | High |                                 |                 |                    |                       |                  |          |                      |            |         |           |         |       |                 |
| 1882.50                                  | 26365 | Mid  | LTE Band 25 - FCC Rule Part 24E | 5               | 14                 | 14.12                 | 0.05             | 0        | GRIP SAR 4 LTE       | QPSK       | 12      | 6         | 0.0 cm  | back* | 0.599           |
| 1882.50                                  | 26365 | Mid  | LTE Band 25 - FCC Rule Part 24E | 5               | 14                 | 13.70                 | 0.05             | 0        | GRIP SAR 4 LTE       | QPSK       | 1       | 0         | 0.0 cm  | back* | 0.550           |
| 1882.50                                  | 26365 | Mid  | LTE Band 25 - FCC Rule Part 24E | 5               | 14                 | 13.77                 | 0.06             | 0        | GRIP SAR 4 LTE       | QPSK       | 1       | 24        | 0.0 cm  | back* | 0.616           |
| 1882.50                                  | 26365 | Mid  | LTE Band 25 - FCC Rule Part 24E | 5               | 14                 | 13.96                 | 0.07             | 0        | GRIP SAR 4 LTE       | 16 QAM     | 12      | 6         | 0.0 cm  | back* | 0.597           |
| 1882.50                                  | 26365 | Mid  | LTE Band 25 - FCC Rule Part 24E | 5               | 14                 | 13.85                 | 0.06             | 0        | GRIP SAR 4 LTE       | 16 QAM     | 1       | 0         | 0.0 cm  | back* | 0.567           |
| 1882.50                                  | 26365 | Mid  | LTE Band 25 - FCC Rule Part 24E | 5               | 14                 | 13.87                 | 0.07             | 0        | GRIP SAR 4 LTE       | 16 QAM     | 1       | 24        | 0.0 cm  | back* | 0.633           |
| 1882.50                                  | 26365 | Mid  | LTE Band 25 - FCC Rule Part 24E | 5               | 14                 | 14.12                 | 0.00             | 0        | GRIP SAR 4 LTE       | QPSK       | 12      | 6         | 0.0 cm  | top*  | 0.337           |
| 1882.50                                  | 26365 | Mid  | LTE Band 25 - FCC Rule Part 24E | 5               | 14                 | 13.70                 | 0.00             | 0        | GRIP SAR 4 LTE       | QPSK       | 1       | 0         | 0.0 cm  | top*  | 0.313           |
| 1882.50                                  | 26365 | Mid  | LTE Band 25 - FCC Rule Part 24E | 5               | 14                 | 13.77                 | 0.00             | 0        | GRIP SAR 4 LTE       | QPSK       | 1       | 24        | 0.0 cm  | top*  | 0.331           |
| 1882.50                                  | 26365 | Mid  | LTE Band 25 - FCC Rule Part 24E | 5               | 14                 | 13.96                 | 0.00             | 0        | GRIP SAR 4 LTE       | 16 QAM     | 12      | 6         | 0.0 cm  | top*  | 0.336           |
| 1882.50                                  | 26365 | Mid  | LTE Band 25 - FCC Rule Part 24E | 5               | 14                 | 13.85                 | 0.02             | 0        | GRIP SAR 4 LTE       | 16 QAM     | 1       | 0         | 0.0 cm  | top*  | 0.323           |
| 1882.50                                  | 26365 | Mid  | LTE Band 25 - FCC Rule Part 24E | 5               | 14                 | 13.87                 | -0.06            | 0        | GRIP SAR 4 LTE       | 16 QAM     | 1       | 24        | 0.0 cm  | top*  | 0.342           |
| ANSI / IEEE C95.1 1992 - SAFETY LIMIT    |       |      |                                 |                 |                    |                       |                  |          | Body                 |            |         |           |         |       |                 |
| Spatial Peak                             |       |      |                                 |                 |                    |                       |                  |          | 1.6 W/kg (mW/g)      |            |         |           |         |       |                 |
| Uncontrolled Exposure/General Population |       |      |                                 |                 |                    |                       |                  |          | averaged over 1 gram |            |         |           |         |       |                 |

**Table 11-3**  
**LTE Max Power Body SAR Data**

| MEASUREMENT RESULTS                      |       |      |                                 |                 |                    |                       |                  |          |                      |            |         |           |         |        |          |
|------------------------------------------|-------|------|---------------------------------|-----------------|--------------------|-----------------------|------------------|----------|----------------------|------------|---------|-----------|---------|--------|----------|
| FREQUENCY                                |       |      | Mode                            | Bandwidth [MHz] | Target Power [dBm] | Conducted Power [dBm] | Power Drift [dB] | MPR [dB] | Device Serial Number | Modulation | # of RB | RB Offset | Spacing | Side   | SAR (1g) |
| MHz                                      | Ch.   |      |                                 |                 |                    |                       |                  |          |                      |            |         |           |         |        | (W/kg)   |
| 1882.50                                  | 26365 | Mid  | LTE Band 25 - FCC Rule Part 24E | 5               | 22                 | 22.13                 | 0.05             | 1        | MAX 3 LTE            | QPSK       | 12      | 6         | 1.1 cm  | back   | 0.692    |
| 1882.50                                  | 26365 | Mid  | LTE Band 25 - FCC Rule Part 24E | 5               | 23                 | 23.35                 | 0.07             | 0        | MAX 3 LTE            | QPSK       | 1       | 0         | 1.1 cm  | back   | 0.854    |
| 1882.50                                  | 26365 | Mid  | LTE Band 25 - FCC Rule Part 24E | 5               | 23                 | 23.13                 | 0.00             | 0        | MAX 3 LTE            | QPSK       | 1       | 24        | 1.1 cm  | back   | 0.908    |
| 1882.50                                  | 26365 | Mid  | LTE Band 25 - FCC Rule Part 24E | 5               | 21                 | 21.10                 | 0.16             | 2        | MAX 3 LTE            | 16 QAM     | 12      | 6         | 1.1 cm  | back   | 0.561    |
| 1912.50                                  | 26665 | High | LTE Band 25 - FCC Rule Part 24E | 5               | 22                 | 22.41                 | 0.00             | 1        | MAX 3 LTE            | 16 QAM     | 1       | 0         | 1.1 cm  | back   | 0.645    |
| 1912.50                                  | 26665 | High | LTE Band 25 - FCC Rule Part 24E | 5               | 22                 | 22.48                 | -0.03            | 1        | MAX 3 LTE            | 16 QAM     | 1       | 24        | 1.1 cm  | back   | 0.679    |
| 1882.50                                  | 26365 | Mid  | LTE Band 25 - FCC Rule Part 24E | 5               | 22                 | 22.13                 | -0.06            | 1        | MAX 3 LTE            | QPSK       | 12      | 6         | 0.7 cm  | top    | 0.710    |
| 1882.50                                  | 26365 | Mid  | LTE Band 25 - FCC Rule Part 24E | 5               | 23                 | 23.35                 | -0.19            | 0        | MAX 3 LTE            | QPSK       | 1       | 0         | 0.7 cm  | top    | 0.885    |
| 1882.50                                  | 26365 | Mid  | LTE Band 25 - FCC Rule Part 24E | 5               | 23                 | 23.13                 | -0.01            | 0        | MAX 3 LTE            | QPSK       | 1       | 24        | 0.7 cm  | top    | 0.873    |
| 1882.50                                  | 26365 | Mid  | LTE Band 25 - FCC Rule Part 24E | 5               | 21                 | 21.10                 | -0.06            | 2        | MAX 3 LTE            | 16 QAM     | 12      | 6         | 0.7 cm  | top    | 0.577    |
| 1912.50                                  | 26665 | High | LTE Band 25 - FCC Rule Part 24E | 5               | 22                 | 22.41                 | 0.07             | 1        | MAX 3 LTE            | 16 QAM     | 1       | 0         | 0.7 cm  | top    | 0.676    |
| 1912.50                                  | 26665 | High | LTE Band 25 - FCC Rule Part 24E | 5               | 22                 | 22.48                 | -0.14            | 1        | MAX 3 LTE            | 16 QAM     | 1       | 24        | 0.7 cm  | top    | 0.646    |
| 1882.50                                  | 26365 | Mid  | LTE Band 25 - FCC Rule Part 24E | 5               | 22                 | 22.13                 | -0.21            | 1        | MAX 3 LTE            | QPSK       | 12      | 6         | 0.0 cm  | right  | 0.218    |
| 1882.50                                  | 26365 | Mid  | LTE Band 25 - FCC Rule Part 24E | 5               | 23                 | 23.35                 | 0.14             | 0        | MAX 3 LTE            | QPSK       | 1       | 0         | 0.0 cm  | right  | 0.263    |
| 1882.50                                  | 26365 | Mid  | LTE Band 25 - FCC Rule Part 24E | 5               | 23                 | 23.13                 | -0.05            | 0        | MAX 3 LTE            | QPSK       | 1       | 24        | 0.0 cm  | right  | 0.314    |
| 1882.50                                  | 26365 | Mid  | LTE Band 25 - FCC Rule Part 24E | 5               | 21                 | 21.10                 | -0.16            | 2        | MAX 3 LTE            | 16 QAM     | 12      | 6         | 0.0 cm  | right  | 0.175    |
| 1912.50                                  | 26665 | High | LTE Band 25 - FCC Rule Part 24E | 5               | 22                 | 22.41                 | 0.08             | 1        | MAX 3 LTE            | 16 QAM     | 1       | 0         | 0.0 cm  | right  | 0.193    |
| 1912.50                                  | 26665 | High | LTE Band 25 - FCC Rule Part 24E | 5               | 22                 | 22.48                 | 0.04             | 1        | MAX 3 LTE            | 16 QAM     | 1       | 24        | 0.0 cm  | right  | 0.237    |
| 1882.50                                  | 26365 | Mid  | LTE Band 25 - FCC Rule Part 24E | 5               | 22                 | 22.13                 | -0.13            | 1        | MAX 3 LTE            | QPSK       | 12      | 6         | 0.0 cm  | vertex | 0.251    |
| 1882.50                                  | 26365 | Mid  | LTE Band 25 - FCC Rule Part 24E | 5               | 23                 | 23.35                 | 0.00             | 0        | MAX 3 LTE            | QPSK       | 1       | 0         | 0.0 cm  | vertex | 0.375    |
| 1882.50                                  | 26365 | Mid  | LTE Band 25 - FCC Rule Part 24E | 5               | 23                 | 23.13                 | 0.01             | 0        | MAX 3 LTE            | QPSK       | 1       | 24        | 0.0 cm  | vertex | 0.414    |
| 1882.50                                  | 26365 | Mid  | LTE Band 25 - FCC Rule Part 24E | 5               | 21                 | 21.10                 | -0.08            | 2        | MAX 3 LTE            | 16 QAM     | 12      | 6         | 0.0 cm  | vertex | 0.313    |
| 1912.50                                  | 26665 | High | LTE Band 25 - FCC Rule Part 24E | 5               | 22                 | 22.41                 | 0.08             | 1        | MAX 3 LTE            | 16 QAM     | 1       | 0         | 0.0 cm  | vertex | 0.284    |
| 1912.50                                  | 26665 | High | LTE Band 25 - FCC Rule Part 24E | 5               | 22                 | 22.48                 | 0.03             | 1        | MAX 3 LTE            | 16 QAM     | 1       | 24        | 0.0 cm  | vertex | 0.302    |
| ANSI / IEEE C95.1 1992 - SAFETY LIMIT    |       |      |                                 |                 |                    |                       |                  |          | Body                 |            |         |           |         |        |          |
| Spatial Peak                             |       |      |                                 |                 |                    |                       |                  |          | 1.6 W/kg (mW/g)      |            |         |           |         |        |          |
| Uncontrolled Exposure/General Population |       |      |                                 |                 |                    |                       |                  |          | averaged over 1 gram |            |         |           |         |        |          |

Note: Per KDB 941225 D05, when the maximum average output power of 1 RB allocation is more than 0.5 dB higher than the 50% allocation, the highest output power for the 1 RB allocations is tested. Therefore, high channel was tested for the 16 QAM, 1 RB allocation configurations.

|                                      |                                                                                     |                                       |                                                                                       |                                 |
|--------------------------------------|-------------------------------------------------------------------------------------|---------------------------------------|---------------------------------------------------------------------------------------|---------------------------------|
| FCC ID: A3LSPHP500                   |  | <b>SAR EVALUATION REPORT</b>          |  | Reviewed by:<br>Quality Manager |
| Document S/N:<br>0Y1207301058-R3.A3L | Test Dates:<br>08/06/12 – 09/04/12                                                  | DUT Type:<br>Portable Tablet Computer |                                                                                       | Page 22 of 31                   |

**Table 11-4**  
**2.4 GHz WLAN Body SAR Data**

| MEASUREMENT RESULTS                      |     |                                  |         |                       |                  |                      |                      |                  |       |          |
|------------------------------------------|-----|----------------------------------|---------|-----------------------|------------------|----------------------|----------------------|------------------|-------|----------|
| FREQUENCY                                |     | Mode                             | Service | Conducted Power [dBm] | Power Drift [dB] | Spacing              | Device Serial Number | Data Rate (Mbps) | Side  | SAR (1g) |
| MHz                                      | Ch. |                                  |         |                       |                  |                      |                      |                  |       | (W/kg)   |
| 2412                                     | 1   | IEEE 802.11b - FCC Rule Part 15C | DSSS    | 15.11                 | -0.12            | 0 cm                 | WiFi 11              | 1                | back  | 0.555    |
| 2437                                     | 6   | IEEE 802.11b - FCC Rule Part 15C | DSSS    | 15.15                 | 0.04             | 0 cm                 | WiFi 11              | 1                | back  | 0.512    |
| 2462                                     | 11  | IEEE 802.11b - FCC Rule Part 15C | DSSS    | 14.94                 | -0.03            | 0 cm                 | WiFi 11              | 1                | back  | 0.493    |
| 2437                                     | 6   | IEEE 802.11b - FCC Rule Part 15C | DSSS    | 15.15                 | -0.04            | 0 cm                 | WiFi 11              | 1                | right | 0.309    |
| ANSI / IEEE C95.1 1992 - SAFETY LIMIT    |     |                                  |         |                       |                  | Body                 |                      |                  |       |          |
| Spatial Peak                             |     |                                  |         |                       |                  | 1.6 W/kg (mW/g)      |                      |                  |       |          |
| Uncontrolled Exposure/General Population |     |                                  |         |                       |                  | averaged over 1 gram |                      |                  |       |          |

## 11.2 SAR Test Notes

1. The test data reported are the worst-case SAR value with the position of the device configured for SAR testing according to KDB 447498 Section 4.
2. Batteries are fully charged for all readings.
3. Tissue parameters and temperatures are listed on the SAR plots.
4. Liquid tissue depth was at least 15.0 cm. To confirm the proper SAR liquid depth, the z-axis plots from the system verifications were included since the system verifications were performed using the same liquid, probe and DAE as the SAR tests in the same time period.
5. The measured SAR when extrapolated to the maximum tune-up power tolerance levels remains compliant for all operating configurations.
6. Per KDB Publication 447498 4) b) i) the back side is required to be tested touching the flat phantom for large sized tablet devices.
7. 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. According to KDB 447498 4) b) ii) (2), for each antenna, SAR is required for the edge with the most conservative exposure condition.
8. Based on the positioning of the Cell./PCS CDMA and LTE Band 25 Tx/Rx Antenna and proximity sensor, Vertex SAR was evaluated for the top-right corner of the DUT for the CDMA and LTE modes with the max power samples using a spacing of 0.0 cm from the phantom.
9. (\*) denotes power reduction active.

### CDMA Notes:

10. Per FCC KDB Publication 447498, if the SAR measured at the middle channel for each test configuration is at least 3.0 dB lower than the SAR limit, testing at the high and low channels is optional for such test configuration(s).
11. CDMA Body SAR is measured using Subtype 0/1 Physical Layer configurations for Rev. 0 according to KDB 941225 D01 procedures for data devices. Since the average output power of Subtype 2 for Rev. A is less than the Rev. 0 power levels, Rev. A SAR is not required. SAR is not required for 1x RTT for Ev-Do hotspot devices when the maximum average output of each channel is less than 1/4 dB higher than that measured in Subtype 0/1 Physical Layer configurations for Rev. 0.

|                                             |                                                                                                                                   |                                              |                                                                                       |                                        |
|---------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------|---------------------------------------------------------------------------------------|----------------------------------------|
| FCC ID: A3LSPHP500                          |  <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | <b>SAR EVALUATION REPORT</b>                 |  | <b>Reviewed by:</b><br>Quality Manager |
| <b>Document S/N:</b><br>0Y1207301058-R3.A3L | <b>Test Dates:</b><br>08/06/12 – 09/04/12                                                                                         | <b>DUT Type:</b><br>Portable Tablet Computer | Page 23 of 31                                                                         |                                        |

**LTE Notes:**

1. LTE Considerations: LTE test configurations are determined according to SAR Test Considerations for LTE handsets and Data Modems KDB 941225 D05 Publication and must be evaluated independently of position. General test procedures can be found in Section 7.3.3.
2. MPR is implemented for this device by the manufacturer when the proximity sensor is not active (device at maximum power). The specific manufacturer target MPR is indicated alongside the SAR results. MPR is enabled for this device, according to 3GPP TS36.101 Section 6.2.3 – 6.2.5 under Table 6.2.3-1.
3. A-MPR was disabled for all SAR tests by setting NS=01 on the base station simulator.

**WLAN Notes:**

1. Justification for reduced test configurations for WIFI channels per KDB Publication 248227 and April 2010 FCC/TCB Meeting Notes for 2.4 GHz WIFI: Highest average RF output power channel for the lowest data rate was selected for SAR evaluation in 802.11b. Other IEEE 802.11 modes (including 802.11g/n) were not investigated since the average output powers over all channels and data rates were not more than 0.25 dB higher than the tested channel in the lowest data rate of IEEE 802.11b mode.
2. WLAN transmission was verified using an uncalibrated spectrum analyzer.
3. Since the maximum extrapolated peak SAR of the zoom scans for the maximum output channel was >1.6 W/kg, the other default test channels were additionally tested using the lowest data rate.
4. There is no power reduction for WLAN.

|                                             |                                                                                     |                                              |                                                                                       |                                        |
|---------------------------------------------|-------------------------------------------------------------------------------------|----------------------------------------------|---------------------------------------------------------------------------------------|----------------------------------------|
| <b>FCC ID:</b> A3LSPHP500                   |  | <b>SAR EVALUATION REPORT</b>                 |  | <b>Reviewed by:</b><br>Quality Manager |
| <b>Document S/N:</b><br>0Y1207301058-R3.A3L | <b>Test Dates:</b><br>08/06/12 – 09/04/12                                           | <b>DUT Type:</b><br>Portable Tablet Computer |                                                                                       | Page 24 of 31                          |

## 12 FCC MULTI-TX AND ANTENNA SAR CONSIDERATIONS

### 12.1 Simultaneous Transmission Introduction

Per KDB Publication 447498, standalone Bluetooth SAR tests were not required. Standalone SAR tests for WLAN were required. See Section 1.4(A) for more information.

Possible simultaneous transmissions for this device indicated in Table 1-1 were numerically summed using stand-alone SAR data and are shown in the following tables.

### 12.2 Body Simultaneous Transmission Analysis

**Table 12-1**  
**Simultaneous Transmission Scenario (0.0 cm)**

| Simult Tx | Configuration | Cell. CDMA - FCC Rule Part 90S SAR (W/kg) | 2.4 GHz WLAN - FCC Rule Part 15C SAR (W/kg) | Σ SAR (W/kg) | Simult Tx | Configuration | Cell. CDMA - FCC Rule Part 22H SAR (W/kg)  | 2.4 GHz WLAN - FCC Rule Part 15C SAR (W/kg) | Σ SAR (W/kg) |
|-----------|---------------|-------------------------------------------|---------------------------------------------|--------------|-----------|---------------|--------------------------------------------|---------------------------------------------|--------------|
| Body SAR  | Back          | 0.699                                     | 0.555                                       | <b>1.254</b> | Body SAR  | Back          | 0.720                                      | 0.555                                       | 1.275        |
|           | Top           | 0.077                                     | -                                           | 0.077        |           | Top           | 0.101                                      | -                                           | 0.101        |
|           | Bottom        | -                                         | -                                           | 0.000        |           | Bottom        | -                                          | -                                           | 0.000        |
|           | Right         | 0.903                                     | 0.309                                       | 1.212        |           | Right         | 1.020                                      | 0.309                                       | <b>1.329</b> |
|           | Left          | -                                         | -                                           | 0.000        |           | Left          | -                                          | -                                           | 0.000        |
|           | Vertex        | 0.221                                     | -                                           | 0.221        |           | Vertex        | 0.242                                      | -                                           | 0.242        |
| Simult Tx | Configuration | PCS CDMA - FCC Rule Part 24E SAR (W/kg)   | 2.4 GHz WLAN - FCC Rule Part 15C SAR (W/kg) | Σ SAR (W/kg) | Simult Tx | Configuration | LTE Band 25 - FCC Rule Part 24E SAR (W/kg) | 2.4 GHz WLAN - FCC Rule Part 15C SAR (W/kg) | Σ SAR (W/kg) |
| Body SAR  | Back          | 0.641                                     | 0.555                                       | <b>1.196</b> | Body SAR  | Back          | 0.633                                      | 0.555                                       | <b>1.188</b> |
|           | Top           | 0.357                                     | -                                           | 0.357        |           | Top           | 0.342                                      | -                                           | 0.342        |
|           | Bottom        | -                                         | -                                           | 0.000        |           | Bottom        | -                                          | -                                           | 0.000        |
|           | Right         | 0.251                                     | 0.309                                       | 0.560        |           | Right         | 0.314                                      | 0.309                                       | 0.623        |
|           | Left          | -                                         | -                                           | 0.000        |           | Left          | -                                          | -                                           | 0.000        |
|           | Vertex        | 0.340                                     | -                                           | 0.340        |           | Vertex        | 0.414                                      | -                                           | 0.414        |

**Table 12-2**  
**Simultaneous Transmission Scenario (1.1 cm)**

| Configuration | Mode                                  | 2G/3G/4G SAR (W/kg) | 2.4 GHz WLAN - FCC Rule Part 15C SAR (W/kg) | Σ SAR (W/kg) |
|---------------|---------------------------------------|---------------------|---------------------------------------------|--------------|
| Back Side     | Cell. CDMA - FCC Rule Part 90S        | 0.669               | < 0.555                                     | < 1.224      |
| Back Side     | Cell. CDMA - FCC Rule Part 22H        | 0.776               | < 0.555                                     | < 1.331      |
| Back Side     | PCS CDMA - FCC Rule Part 24E          | 0.712               | < 0.555                                     | < 1.267      |
| Back Side     | LTE Band 25 (PCS) - FCC Rule Part 24E | 0.908               | < 0.555                                     | < 1.463      |

|                                             |                                                                                     |                                              |                                                                                       |                                        |
|---------------------------------------------|-------------------------------------------------------------------------------------|----------------------------------------------|---------------------------------------------------------------------------------------|----------------------------------------|
| <b>FCC ID:</b> A3LSPHP500                   |  | <b>SAR EVALUATION REPORT</b>                 |  | <b>Reviewed by:</b><br>Quality Manager |
| <b>Document S/N:</b><br>0Y1207301058-R3.A3L | <b>Test Dates:</b><br>08/06/12 – 09/04/12                                           | <b>DUT Type:</b><br>Portable Tablet Computer |                                                                                       | Page 25 of 31                          |

**Table 12-3**  
**Simultaneous Transmission Scenario (0.7 cm)**

| Configuration | Mode                                  | 2G/3G/4G SAR (W/kg) | 2.4 GHz WLAN - FCC Rule Part 15C SAR (W/kg) | Σ SAR (W/kg) |
|---------------|---------------------------------------|---------------------|---------------------------------------------|--------------|
| Top Side      | Cell. CDMA - FCC Rule Part 90S        | 0.246               | -                                           | 0.246        |
| Top Side      | Cell. CDMA - FCC Rule Part 22H        | 0.289               | -                                           | 0.289        |
| Top Side      | PCS CDMA - FCC Rule Part 24E          | 0.750               | -                                           | 0.750        |
| Top Side      | LTE Band 25 (PCS) - FCC Rule Part 24E | 0.885               | -                                           | 0.885        |

**Notes:**

1. For SAR calculations at 1.1 cm, WLAN SAR values for 0.0 cm were used since the 0.0 cm test distance for WLAN was more conservative.
2. "<" denotes that 0.0 cm WLAN SAR values were used for summation purpose.
3. "-" indicates configurations that were not required per KDB Publication 447498.

### 12.3 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. No volumetric SAR summation is required per FCC KDB Publication 447498.

|                                             |                                                                                     |                                              |                                                                                       |                                        |
|---------------------------------------------|-------------------------------------------------------------------------------------|----------------------------------------------|---------------------------------------------------------------------------------------|----------------------------------------|
| <b>FCC ID:</b> A3LSPHP500                   |  | <b>SAR EVALUATION REPORT</b>                 |  | <b>Reviewed by:</b><br>Quality Manager |
| <b>Document S/N:</b><br>0Y1207301058-R3.A3L | <b>Test Dates:</b><br>08/06/12 – 09/04/12                                           | <b>DUT Type:</b><br>Portable Tablet Computer | Page 26 of 31                                                                         |                                        |

# 13 EQUIPMENT LIST

| Manufacturer         | Model           | Description                                   | Cal Date   | Cal Interval | Cal Due    | Serial Number |
|----------------------|-----------------|-----------------------------------------------|------------|--------------|------------|---------------|
| Agilent              | 85047A          | S-Parameter Test Set                          | N/A        | N/A          | N/A        | 2904A00579    |
| Agilent              | 85070E          | Dielectric Probe Kit                          | 3/8/2012   | Annual       | 3/8/2013   | MY44300633    |
| Agilent              | 8594A           | (9kHz-2.9GHz) Spectrum Analyzer               | N/A        |              | N/A        | 3051A00187    |
| Agilent              | 8648D           | (9kHz-4GHz) Signal Generator                  | 10/10/2011 | Annual       | 10/10/2012 | 3613A00315    |
| Agilent              | 8648D           | Signal Generator                              | 4/3/2012   | Annual       | 4/3/2013   | 3629U00687    |
| Agilent              | 8753E           | (30kHz-6GHz) Network Analyzer                 | 4/4/2012   | Annual       | 4/4/2013   | JP38020182    |
| Agilent              | 8753E           | (30kHz-6GHz) Network Analyzer                 | 4/3/2012   | Annual       | 4/3/2013   | US37390350    |
| Agilent              | E5515C          | Wireless Communications Test Set              | 2/12/2012  | Annual       | 2/12/2013  | GB45360985    |
| Agilent              | E5515C          | Wireless Communications Test Set              | 2/14/2012  | Annual       | 2/14/2013  | GB43163447    |
| Agilent              | E5515C          | Wireless Communications Test Set              | 2/9/2012   | Annual       | 2/9/2013   | GB43460554    |
| Agilent              | E8257D          | (250kHz-20GHz) Signal Generator               | 4/5/2012   | Annual       | 4/5/2013   | MY45470194    |
| Amplifier Research   | 551G4           | 5W, 800MHz-4.2GHz                             | CBT        | N/A          | CBT        | 21910         |
| Anritsu              | MA2411B         | Pulse Sensor                                  | 10/13/2011 | Annual       | 10/13/2012 | 1027293       |
| Anritsu              | MA2481A         | Power Sensor                                  | 2/14/2012  | Annual       | 2/14/2013  | 5318          |
| Anritsu              | MA2481A         | Power Sensor                                  | 2/14/2012  | Annual       | 2/14/2013  | 5442          |
| Anritsu              | ML2438A         | Power Meter                                   | 2/14/2012  | Annual       | 2/14/2013  | 1190013       |
| Anritsu              | ML2495A         | Power Meter                                   | 10/13/2011 | Annual       | 10/13/2012 | 1039008       |
| Anritsu              | MT8820C         | Radio Communication Tester                    | 11/11/2011 | Annual       | 11/11/2012 | 6200901190    |
| COMTECH              | AR85729-5       | Solid State Amplifier                         | CBT        | N/A          | CBT        | M1S5A00-009   |
| COMTECH              | AR85729-5/5759B | Solid State Amplifier                         | CBT        | N/A          | CBT        | M3W1A00-1002  |
| Control Company      | 36934-158       | Wall-Mounted Thermometer                      | 1/4/2012   | Biennial     | 1/4/2014   | 122014497     |
| Control Company      | 61220-416       | Long-Stem Thermometer                         | 10/12/2011 | Biennial     | 10/12/2013 | 111860844     |
| Gigatronics          | 80701A          | (0.05-18GHz) Power Sensor                     | 10/12/2011 | Annual       | 10/12/2012 | 1833460       |
| Gigatronics          | 8651A           | Universal Power Meter                         | 10/12/2011 | Annual       | 10/12/2012 | 8650319       |
| Intelligent Weigh    | PD-3000         | Electronic Balance                            | 3/27/2012  | Annual       | 3/27/2013  | 11081534      |
| Intelligent Weighing | PD-3000         | Electronic Balance                            | 6/29/2012  | Annual       | 6/29/2013  | 120405017     |
| MCL                  | BW-N6W5+        | 6dB Attenuator                                | CBT        | N/A          | CBT        | 1139          |
| MiniCircuits         | SLP-2400+       | Low Pass Filter                               | CBT        | N/A          | CBT        | R8979500903   |
| Mini-Circuits        | BW-N20W5+       | DC to 18 GHz Precision Fixed 20 dB Attenuator | CBT        | N/A          | CBT        | N/A           |
| Mini-Circuits        | NLP-1200+       | Low Pass Filter DC to 1000 MHz                | CBT        | N/A          | CBT        | N/A           |
| Mini-Circuits        | NLP-2950+       | Low Pass Filter DC to 2700 MHz                | CBT        | N/A          | CBT        | N/A           |
| Narda                | 4014C-6         | 4 - 8 GHz SMA 6 dB Directional Coupler        | CBT        | N/A          | CBT        | N/A           |
| Narda                | 4772-3          | Attenuator (3dB)                              | CBT        | N/A          | CBT        | 9406          |
| Narda                | BW-S3W2         | Attenuator (3dB)                              | CBT        | N/A          | CBT        | 120           |
| Rohde & Schwarz      | CMU200          | Base Station Simulator                        | 5/22/2012  | Annual       | 5/22/2013  | 109892        |
| Rohde & Schwarz      | CMW500          | LTE Radio Communication Tester                | 10/7/2011  | Annual       | 10/7/2012  | 103962        |
| Rohde & Schwarz      | CMW500          | LTE Radio Communication Tester                | 11/30/2011 | Annual       | 11/30/2012 | 101699        |
| Rohde & Schwarz      | CMW500          | LTE Radio Communication Tester                | 3/5/2012   | Annual       | 3/5/2013   | 102060        |
| Rohde & Schwarz      | NRVD            | Dual Channel Power Meter                      | 4/8/2011   | Biennial     | 4/8/2013   | 101695        |
| Rohde & Schwarz      | SMIQ03B         | Signal Generator                              | 4/5/2012   | Annual       | 4/5/2013   | DE27259       |
| Seekonk              | NC-100          | Torque Wrench (8" lb)                         | 11/29/2011 | Triennial    | 11/29/2014 | 21053         |
| Seekonk              | NC-100          | Torque Wrench (8" lb)                         | 3/5/2012   | Triennial    | 3/5/2015   | N/A           |
| Seekonk              | NC-100          | Torque Wrench (8" lb)                         | 3/5/2012   | Triennial    | 3/5/2015   | N/A           |
| SPEAG                | D1900V2         | 1900 MHz SAR Dipole                           | 2/22/2012  | Annual       | 2/22/2013  | 5d149         |
| SPEAG                | D2450V2         | 2450 MHz SAR Dipole                           | 2/7/2012   | Annual       | 2/7/2013   | 882           |
| SPEAG                | D835V2          | 835 MHz SAR Dipole                            | 4/20/2012  | Annual       | 4/20/2013  | 4d119         |
| SPEAG                | DAE4            | Dasy Data Acquisition Electronics             | 2/20/2012  | Annual       | 2/20/2013  | 649           |
| SPEAG                | DAE4            | Dasy Data Acquisition Electronics             | 1/18/2012  | Annual       | 1/18/2013  | 1272          |
| SPEAG                | DAK-3.5         | Dielectric Assessment Kit                     | 6/19/2012  | Annual       | 6/19/2013  | 1070          |
| SPEAG                | ES3DV3          | SAR Probe                                     | 2/21/2012  | Annual       | 2/21/2013  | 3258          |
| SPEAG                | ES3DV3          | SAR Probe                                     | 2/7/2012   | Annual       | 2/7/2013   | 3287          |
| Tektronix            | RSA-6114A       | Real Time Spectrum Analyzer                   | 4/5/2012   | Annual       | 4/5/2013   | B010177       |
| VWR                  | 36934-158       | Wall-Mounted Thermometer                      | 1/21/2011  | Biennial     | 1/21/2013  | 111286445     |
| VWR                  | 62344-925       | Mini-Thermometer                              | 10/24/2011 | Biennial     | 10/24/2013 | 111886430     |

Note: CBT (Calibrated Before Testing). Prior to testing, the measurement paths containing a cable, attenuator, amplifier, coupler or filter were connected to a calibrated source (i.e. a signal generator) to determine the losses of the measurement path. The power meter offset was then adjusted to compensate for the measurement system losses. This level offset is stored within the power meter before measurements are made. This calibration verification procedure applies to the system verification and output power measurements. The calibrated reading is then taken directly from the power meter after compensation of the losses for all final power measurements.

|                                             |                                                                                     |                                              |                                                                                       |                                        |
|---------------------------------------------|-------------------------------------------------------------------------------------|----------------------------------------------|---------------------------------------------------------------------------------------|----------------------------------------|
| FCC ID: A3LSPHP500                          |  | <b>SAR EVALUATION REPORT</b>                 |  | <b>Reviewed by:</b><br>Quality Manager |
| <b>Document S/N:</b><br>0Y1207301058-R3.A3L | <b>Test Dates:</b><br>08/06/12 – 09/04/12                                           | <b>DUT Type:</b><br>Portable Tablet Computer |                                                                                       | Page 27 of 31                          |

## 14 MEASUREMENT UNCERTAINTIES

| 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 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: A3LSPHP500                          |  <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | <b>SAR EVALUATION REPORT</b>                 |  | <b>Reviewed by:</b><br>Quality Manager |
| <b>Document S/N:</b><br>0Y1207301058-R3.A3L | <b>Test Dates:</b><br>08/06/12 – 09/04/12                                                                                         | <b>DUT Type:</b><br>Portable Tablet Computer |                                                                                       | Page 28 of 31                          |

## 15 CONCLUSION

### 15.1 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> A3LSPHP500                   |  | <b>SAR EVALUATION REPORT</b>                 |  | <b>Reviewed by:</b><br>Quality Manager |
| <b>Document S/N:</b><br>0Y1207301058-R3.A3L | <b>Test Dates:</b><br>08/06/12 – 09/04/12                                           | <b>DUT Type:</b><br>Portable Tablet Computer |                                                                                       | Page 29 of 31                          |

## 16 REFERENCES

- [1] Federal Communications Commission, ET Docket 93-62, Guidelines for Evaluating the Environmental Effects of Radiofrequency Radiation, Aug. 1996.
- [2] ANSI/IEEE C95.1-2005, American National Standard safety levels with respect to human exposure to radio frequency electromagnetic fields, 3kHz to 300GHz, New York: IEEE, 2006.
- [3] ANSI/IEEE C95.1-1992, American National Standard safety levels with respect to human exposure to radio frequency electromagnetic fields, 3kHz to 300GHz, New York: IEEE, Sept. 1992.
- [4] ANSI/IEEE C95.3-2002, IEEE Recommended Practice for the Measurement of Potentially Hazardous Electromagnetic Fields - RF and Microwave, New York: IEEE, December 2002.
- [5] Federal Communications Commission, OET Bulletin 65 (Edition 97-01), Supplement C (Edition 01-01), Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields, June 2001.
- [6] IEEE Standards Coordinating Committee 34 – IEEE Std. 1528-2003, Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Body Due to Wireless Communications Devices.
- [7] NCRP, National Council on Radiation Protection and Measurements, Biological Effects and Exposure Criteria for RadioFrequency Electromagnetic Fields, NCRP Report No. 86, 1986. Reprinted Feb. 1995.
- [8] T. Schmid, O. Egger, N. Kuster, Automated E-field scanning system for dosimetric assessments, IEEE Transaction on Microwave Theory and Techniques, vol. 44, Jan. 1996, pp. 105-113.
- [9] K. Pokovic, T. Schmid, N. Kuster, Robust setup for precise calibration of E-field probes in tissue simulating liquids at mobile communications frequencies, ICECOM97, Oct. 1997, pp. 120-124.
- [10] K. Pokovic, T. Schmid, and N. Kuster, E-field Probe with improved isotropy in brain simulating liquids, Proceedings of the ELMAR, Zadar, Croatia, June 23-25, 1996, pp. 172-175.
- [11] Schmid & Partner Engineering AG, Application Note: Data Storage and Evaluation, June 1998, p2.
- [12] V. Hombach, K. Meier, M. Burkhardt, E. Kuhn, N. Kuster, The Dependence of EM Energy Absorption upon Human Head Modeling at 900 MHz, IEEE Transaction on Microwave Theory and Techniques, vol. 44 no. 10, Oct. 1996, pp. 1865-1873.
- [13] N. Kuster and Q. Balzano, Energy absorption mechanism by biological bodies in the near field of dipole antennas above 300MHz, IEEE Transaction on Vehicular Technology, vol. 41, no. 1, Feb. 1992, pp. 17-23.
- [14] G. Hartsgrrove, A. Kraszewski, A. Surowiec, Simulated Biological Materials for Electromagnetic Radiation Absorption Studies, University of Ottawa, Bioelectromagnetics, Canada: 1987, pp. 29-36.
- [15] Q. Balzano, O. Garay, T. Manning Jr., Electromagnetic Energy Exposure of Simulated Users of Portable Cellular Telephones, IEEE Transactions on Vehicular Technology, vol. 44, no.3, Aug. 1995.
- [16] W. Gander, Computermathematick, Birkhaeuser, Basel, 1992.
- [17] W.H. Press, S.A. Teukolsky, W.T. Vetterling, and B.P. Flannery, Numerical Recipes in C, The Art of Scientific Computing, Second edition, Cambridge University Press, 1992.

|                                             |                                                                                     |                                              |                                                                                       |                                        |
|---------------------------------------------|-------------------------------------------------------------------------------------|----------------------------------------------|---------------------------------------------------------------------------------------|----------------------------------------|
| <b>FCC ID:</b> A3LSPHP500                   |  | <b>SAR EVALUATION REPORT</b>                 |  | <b>Reviewed by:</b><br>Quality Manager |
| <b>Document S/N:</b><br>0Y1207301058-R3.A3L | <b>Test Dates:</b><br>08/06/12 – 09/04/12                                           | <b>DUT Type:</b><br>Portable Tablet Computer |                                                                                       | Page 30 of 31                          |

- [18] Federal Communications Commission, OET Bulletin 65, Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields. Supplement C, Dec. 1997.
- [19] N. Kuster, R. Kastle, T. Schmid, Dosimetric evaluation of mobile communications equipment with known precision, IEEE Transaction on Communications, vol. E80-B, no. 5, May 1997, pp. 645-652.
- [20] CENELEC CLC/SC111B, European Prestandard (prENV 50166-2), Human Exposure to Electromagnetic Fields High-frequency: 10kHz-300GHz, Jan. 1995.
- [21] Prof. Dr. Niels Kuster, ETH, Eidgenössische Technische Hochschule Zürich, Dosimetric Evaluation of the Cellular Phone.
- [22] IEC 62209-1, Human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices - Human models, instrumentation, and procedures - Part 1: Procedure to determine the specific absorption rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz), Feb. 2005.
- [23] Industry Canada RSS-102 Radio Frequency Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands) Issue 4, March 2010.
- [24] Health Canada Safety Code 6 Limits of Human Exposure to Radio Frequency Electromagnetic Fields in the Frequency Range from 3 kHz – 300 GHz, 2009
- [25] FCC Public Notice DA-02-1438. Office of Engineering and Technology Announces a Transition Period for the Phantom Requirements of Supplement C to OET Bulletin 65, June 19, 2002
- [26] FCC SAR Measurement Procedures for 3G Devices KDB Publication 941225
- [27] SAR Measurement procedures for IEEE 802.11a/b/g KDB Publication 248227
- [28] FCC SAR Considerations for Handsets with Multiple Transmitters and Antennas, KDB Publication 648474
- [29] FCC Application Note for SAR Probe Calibration and System Verification Consideration for Measurements at 150 MHz – 3 GHz, KDB Publication 450824
- [30] FCC SAR Evaluation Considerations for Laptop Computers with Antennas Built-in on Display Screens, KDB Publication 616217
- [31] FCC SAR Measurement Requirements for 3 – 6 GHz, KDB Publication 865664
- [32] FCC Mobile Portable RF Exposure Procedure, KDB Publication 447498
- [33] FCC SAR Procedures for Dongle Transmitters, KDB Publication 447498
- [34] Anexo à Resolução No. 533, de 10 de Setembro de 2009.
- [35] FCC SAR Test Considerations for LTE Handsets and Data Modems, KDB Publication 941225.
- [36] IEC 62209-2, Human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices - Human models, instrumentation, and procedures - Part 2: Procedure to determine the specific absorption rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz), Mar. 2010.
- [37] FCC Hot Spot SAR v01, KDB Publication 941225 D06.

|                                             |                                                                                     |                                              |                                                                                       |                                        |
|---------------------------------------------|-------------------------------------------------------------------------------------|----------------------------------------------|---------------------------------------------------------------------------------------|----------------------------------------|
| <b>FCC ID:</b> A3LSPHP500                   |  | <b>SAR EVALUATION REPORT</b>                 |  | <b>Reviewed by:</b><br>Quality Manager |
| <b>Document S/N:</b><br>0Y1207301058-R3.A3L | <b>Test Dates:</b><br>08/06/12 – 09/04/12                                           | <b>DUT Type:</b><br>Portable Tablet Computer |                                                                                       | Page 31 of 31                          |

## APPENDIX A: SAR TEST DATA

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSPHP500; Type: Portable Tablet Computer; Serial: GRIP SAR 1**

Communication System: Cellular CDMA; Frequency: 820.1 MHz; Duty Cycle: 1:1

Medium: 835 Body Medium parameters used (interpolated):

$f = 820.1 \text{ MHz}$ ;  $\sigma = 0.974 \text{ mho/m}$ ;  $\epsilon_r = 52.989$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 0.0 cm

Test Date: 08-06-2012; Ambient Temp: 24.3°C; Tissue Temp: 23.4°C

Probe: ES3DV3 - SN3258; ConvF(6.06, 6.06, 6.06); Calibrated: 2/21/2012;

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1272; Calibrated: 1/18/2012

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

Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.5 (6469)

**Mode: Cellular EVDO - FCC Rule Part 90S, Body SAR, Back side, Mid.ch**

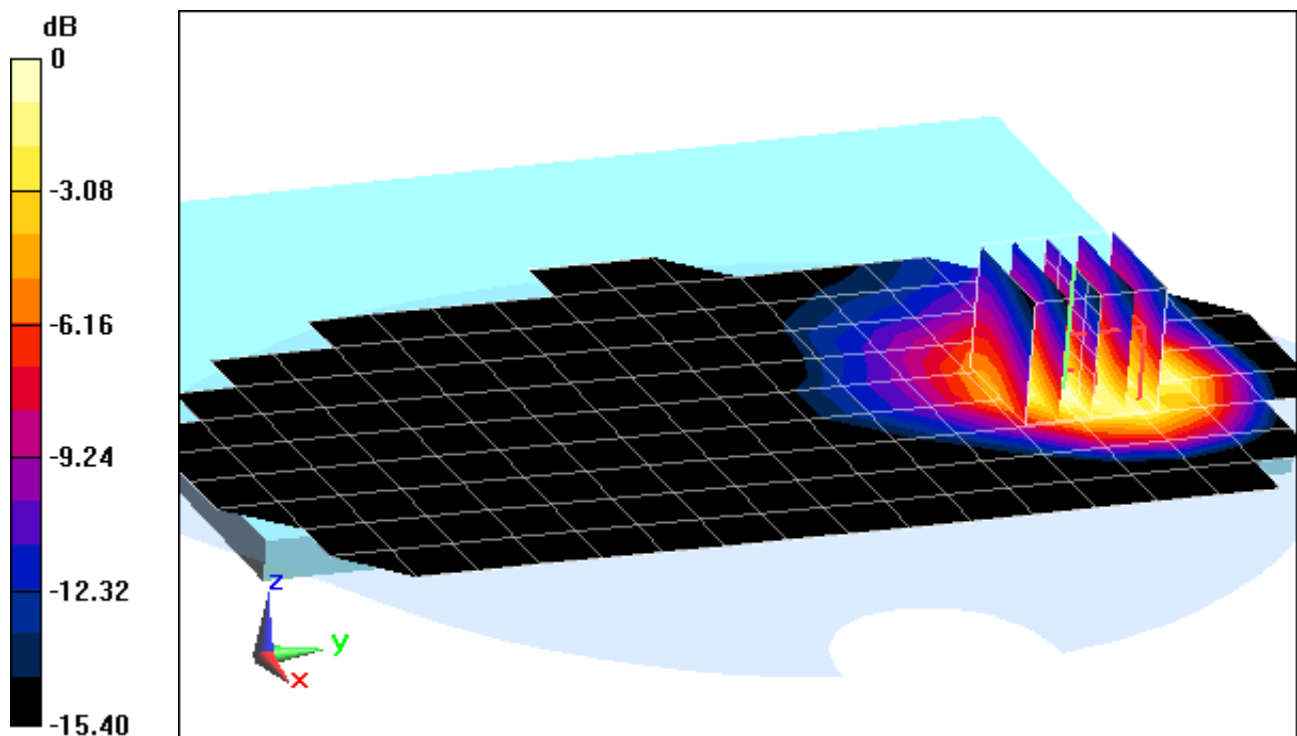
**Area Scan (11x19x1):** Measurement grid:  $dx=15\text{mm}$ ,  $dy=15\text{mm}$

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

Reference Value = 32.340 V/m; Power Drift = -0.21 dB

Peak SAR (extrapolated) = 1.255 mW/g

**SAR(1 g) = 0.699 mW/g; SAR(10 g) = 0.391 mW/g**



0 dB = 0.786 mW/g = -2.09 dB mW/g

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSPHP500; Type: Portable Tablet Computer; Serial: GRIP SAR 1**

Communication System: Cellular CDMA; Frequency: 820.1 MHz; Duty Cycle: 1:1

Medium: 835 Body Medium parameters used (interpolated):

$f = 820.1 \text{ MHz}$ ;  $\sigma = 0.974 \text{ mho/m}$ ;  $\epsilon_r = 52.989$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 0.0 cm

Test Date: 08-06-2012; Ambient Temp: 24.3°C; Tissue Temp: 23.4°C

Probe: ES3DV3 - SN3258; ConvF(6.06, 6.06, 6.06); Calibrated: 2/21/2012;

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1272; Calibrated: 1/18/2012

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

Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.5 (6469)

**Mode: Cellular EVDO - FCC Rule Part 90S, Body SAR, Top Edge, Mid.ch**

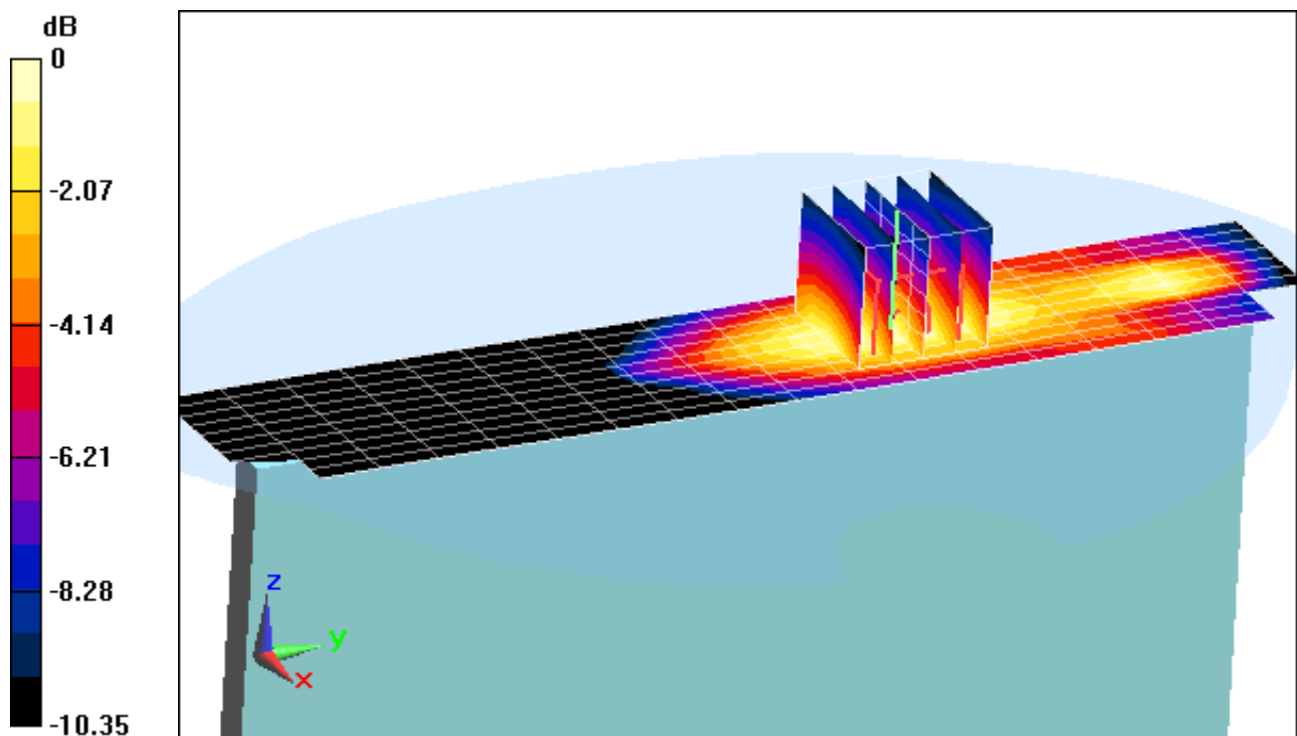
**Area Scan (11x19x1):** Measurement grid:  $dx=5\text{mm}$ ,  $dy=15\text{mm}$

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

Reference Value = 9.728 V/m; Power Drift = 0.21 dB

Peak SAR (extrapolated) = 0.117 mW/g

**SAR(1 g) = 0.077 mW/g; SAR(10 g) = 0.050 mW/g**



0 dB = 0.0831 mW/g = -21.61 dB mW/g

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSPHP500; Type: Portable Tablet Computer; Serial: MAX 1 BC10/BC0**

Communication System: Cellular CDMA; Frequency: 820.1 MHz; Duty Cycle: 1:1

Medium: 835 Body Medium parameters used (interpolated):

$f = 820.1 \text{ MHz}$ ;  $\sigma = 0.974 \text{ mho/m}$ ;  $\epsilon_r = 52.989$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.1 cm

Test Date: 08-06-2012; Ambient Temp: 24.3°C; Tissue Temp: 23.4°C

Probe: ES3DV3 - SN3258; ConvF(6.06, 6.06, 6.06); Calibrated: 2/21/2012;

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1272; Calibrated: 1/18/2012

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

Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.5 (6469)

**Mode: Cellular EVDO - FCC Rule Part 90S, Body SAR, Back side, Mid.ch**

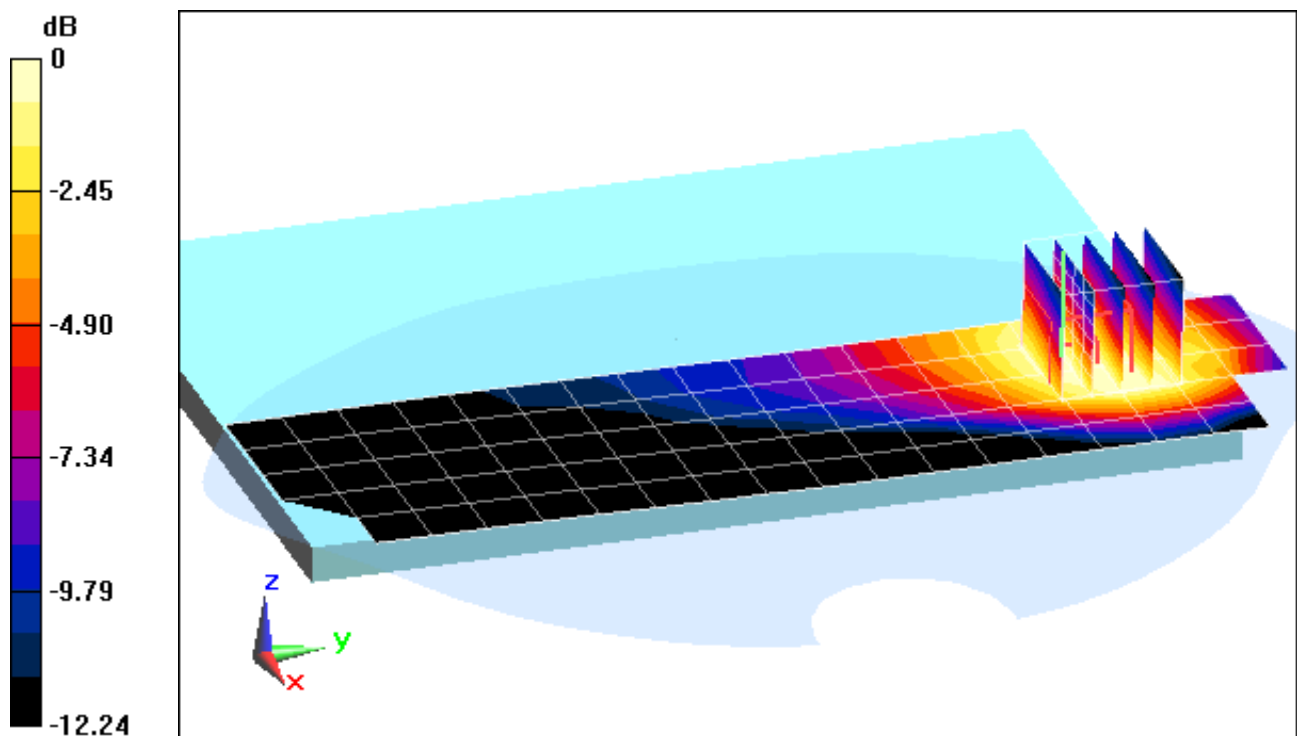
**Area Scan (6x21x1):** Measurement grid:  $dx=15\text{mm}$ ,  $dy=15\text{mm}$

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

Reference Value = 28.705 V/m; Power Drift = -0.16 dB

Peak SAR (extrapolated) = 0.996 mW/g

**SAR(1 g) = 0.669 mW/g; SAR(10 g) = 0.434 mW/g**



0 dB = 0.713 mW/g = -2.94 dB mW/g

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSPHP500; Type: Portable Tablet Computer; Serial: MAX 1 BC10/BC0**

Communication System: Cellular CDMA; Frequency: 820.1 MHz; Duty Cycle: 1:1

Medium: 835 Body Medium parameters used (interpolated):

$f = 820.1 \text{ MHz}$ ;  $\sigma = 0.974 \text{ mho/m}$ ;  $\epsilon_r = 52.989$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 0.7 cm

Test Date: 08-06-2012; Ambient Temp: 24.3°C; Tissue Temp: 23.4°C

Probe: ES3DV3 - SN3258; ConvF(6.06, 6.06, 6.06); Calibrated: 2/21/2012;

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1272; Calibrated: 1/18/2012

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

Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.5 (6469)

**Mode: Cellular EVDO - FCC Rule Part 90S, Body SAR, Top Edge, Mid.ch**

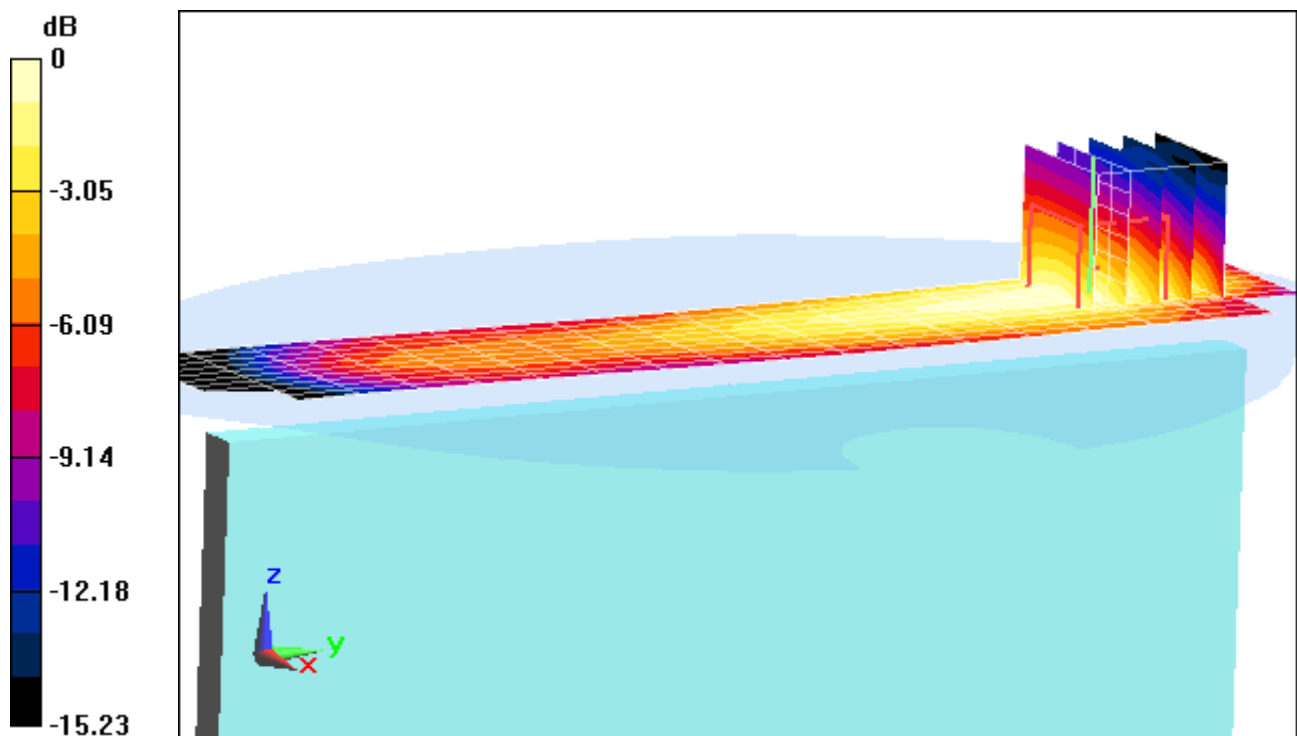
**Area Scan (11x19x1):** Measurement grid:  $dx=5\text{mm}$ ,  $dy=15\text{mm}$

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

Reference Value = 18.679 V/m; Power Drift = -0.02 dB

Peak SAR (extrapolated) = 0.439 mW/g

**SAR(1 g) = 0.246 mW/g; SAR(10 g) = 0.146 mW/g**



0 dB = 0.268 mW/g = -11.44 dB mW/g

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSPHP500; Type: Portable Tablet Computer; Serial: MAX 1 BC10/BC0**

Communication System: Cellular CDMA; Frequency: 820.1 MHz; Duty Cycle: 1:1

Medium: 835 Body Medium parameters used (interpolated):

$f = 820.1 \text{ MHz}$ ;  $\sigma = 0.974 \text{ mho/m}$ ;  $\epsilon_r = 52.989$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 0.0 cm

Test Date: 08-06-2012; Ambient Temp: 24.3°C; Tissue Temp: 23.4°C

Probe: ES3DV3 - SN3258; ConvF(6.06, 6.06, 6.06); Calibrated: 2/21/2012;

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1272; Calibrated: 1/18/2012

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

Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.5 (6469)

**Mode: Cellular EVDO - FCC Rule Part 90S, Body SAR, Right Edge, Mid.ch**

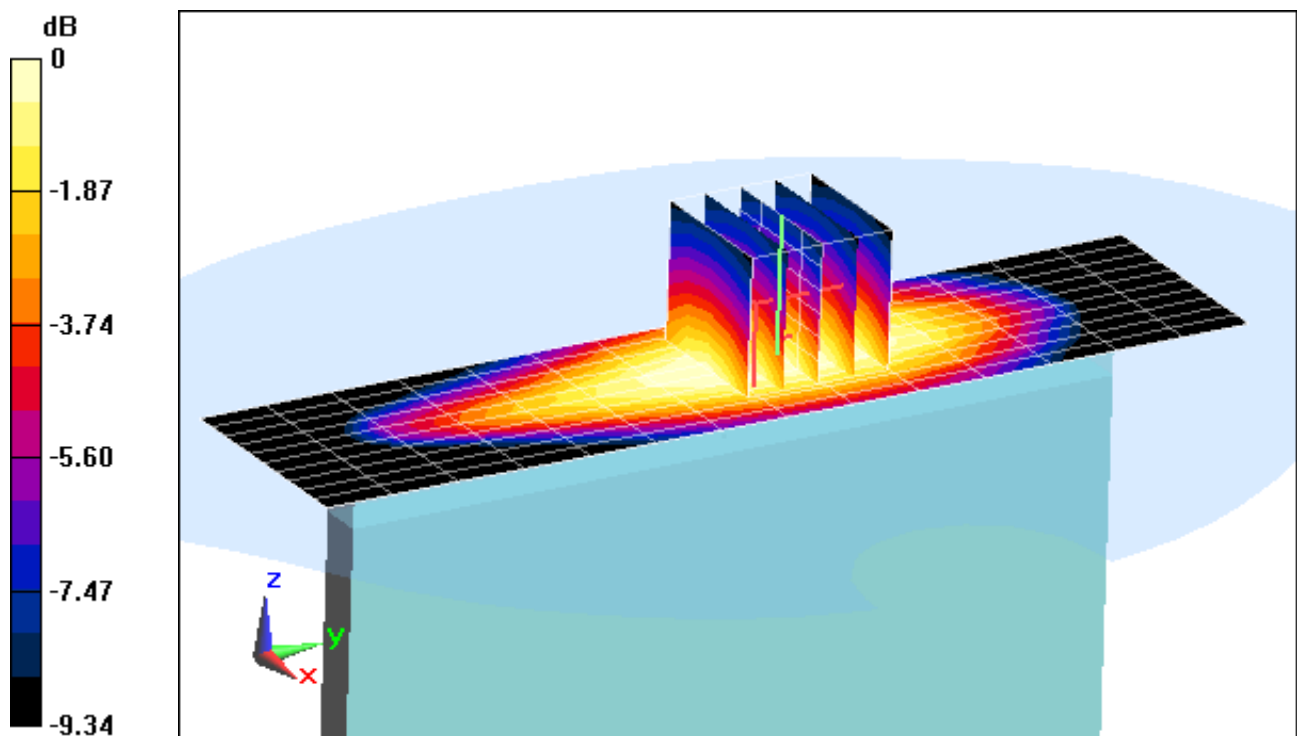
**Area Scan (11x15x1):** Measurement grid:  $dx=5\text{mm}$ ,  $dy=15\text{mm}$

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

Reference Value = 33.582 V/m; Power Drift = -0.18 dB

Peak SAR (extrapolated) = 1.241 mW/g

**SAR(1 g) = 0.903 mW/g; SAR(10 g) = 0.625 mW/g**



0 dB = 0.972 mW/g = -0.25 dB mW/g

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSPHP500; Type: Portable Tablet Computer; Serial: MAX 1 BC10/BC0**

Communication System: Cellular CDMA; Frequency: 820.1 MHz; Duty Cycle: 1:1

Medium: 835 Body Medium parameters used (interpolated):

$f = 820.1 \text{ MHz}$ ;  $\sigma = 0.974 \text{ mho/m}$ ;  $\epsilon_r = 52.989$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 0.0 cm

Test Date: 08-06-2012; Ambient Temp: 24.3°C; Tissue Temp: 23.4°C

Probe: ES3DV3 - SN3258; ConvF(6.06, 6.06, 6.06); Calibrated: 2/21/2012;

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1272; Calibrated: 1/18/2012

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

Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.5 (6469)

**Mode: Cellular EVDO - FCC Rule Part 90S, Body SAR, Vertex, Mid.ch**

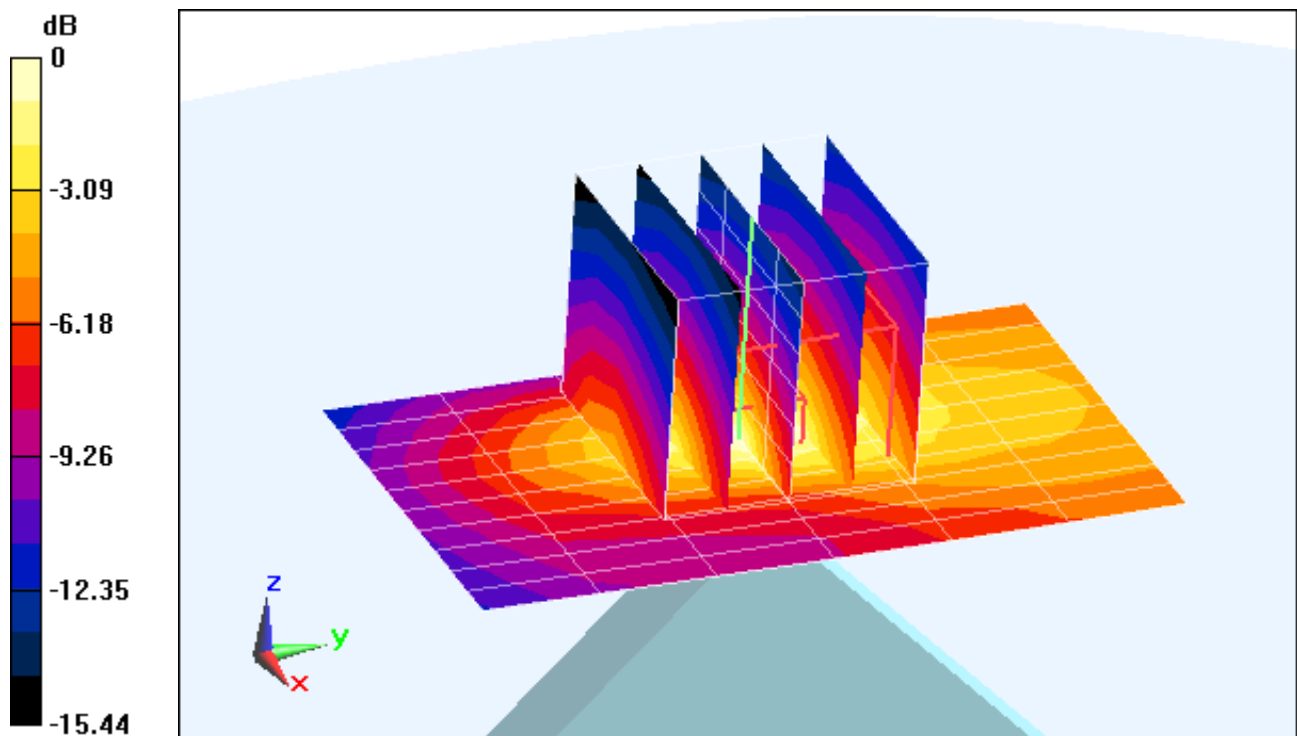
**Area Scan (11x7x1):** Measurement grid:  $dx=5\text{mm}$ ,  $dy=15\text{mm}$

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

Reference Value = 19.112 V/m; Power Drift = -0.05 dB

Peak SAR (extrapolated) = 0.500 mW/g

**SAR(1 g) = 0.221 mW/g; SAR(10 g) = 0.107 mW/g**



0 dB = 0.270 mW/g = -11.37 dB mW/g

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSPHP500; Type: Portable Tablet Computer; Serial: GRIP SAR 1**

Communication System: Cellular CDMA; Frequency: 836.52 MHz; Duty Cycle: 1:1

Medium: 835 Body Medium parameters used (interpolated):

$f = 836.52 \text{ MHz}$ ;  $\sigma = 0.989 \text{ mho/m}$ ;  $\epsilon_r = 52.827$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 0.0 cm

Test Date: 08-06-2012; Ambient Temp: 24.3°C; Tissue Temp: 23.4°C

Probe: ES3DV3 - SN3258; ConvF(6.06, 6.06, 6.06); Calibrated: 2/21/2012;

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1272; Calibrated: 1/18/2012

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

Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.5 (6469)

**Mode: Cellular EVDO - FCC Rule Part 22H, Body SAR, Back side, Mid.ch**

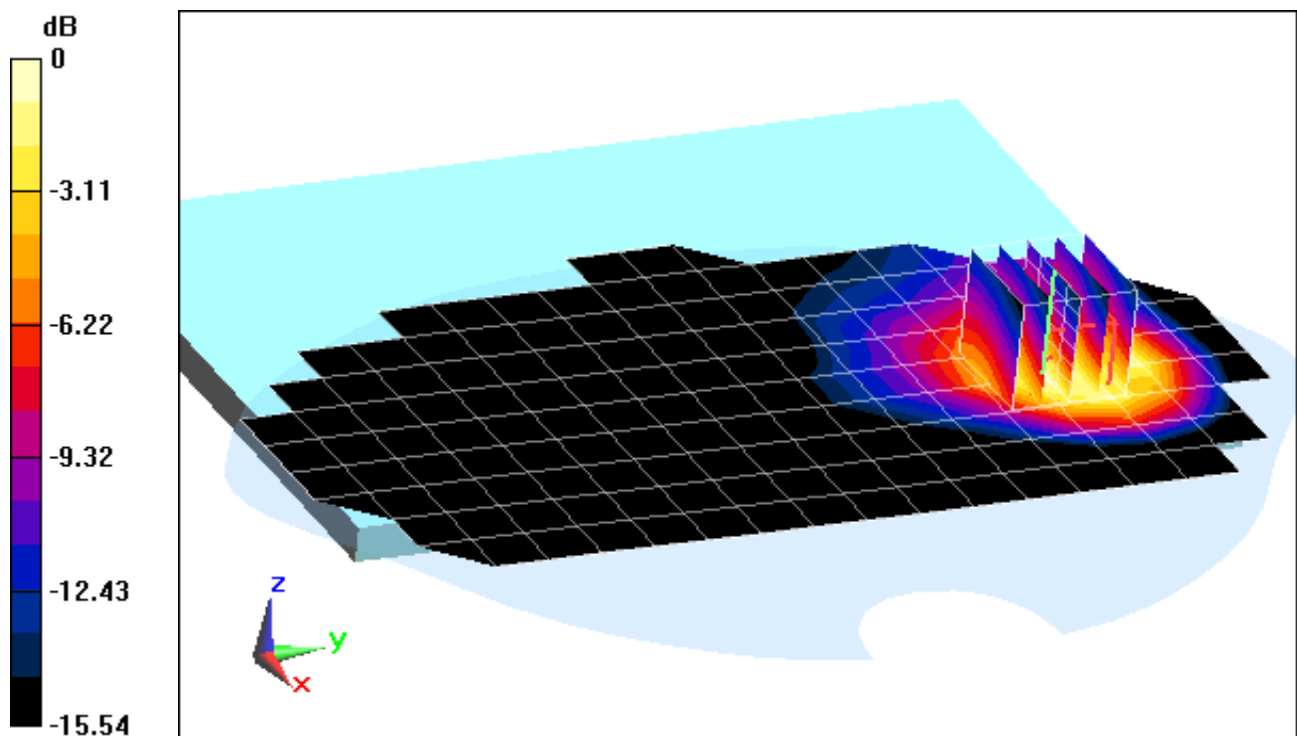
**Area Scan (11x19x1):** Measurement grid:  $dx=15\text{mm}$ ,  $dy=15\text{mm}$

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

Reference Value = 30.292 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 1.302 mW/g

**SAR(1 g) = 0.720 mW/g; SAR(10 g) = 0.402 mW/g**



0 dB = 0.814 mW/g = -1.79 dB mW/g

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSPHP500; Type: Portable Tablet Computer; Serial: GRIP SAR 1**

Communication System: Cellular CDMA; Frequency: 836.52 MHz; Duty Cycle: 1:1

Medium: 835 Body Medium parameters used (interpolated):

$f = 836.52 \text{ MHz}$ ;  $\sigma = 0.989 \text{ mho/m}$ ;  $\epsilon_r = 52.827$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 0.0 cm

Test Date: 08-06-2012; Ambient Temp: 24.3°C; Tissue Temp: 23.4°C

Probe: ES3DV3 - SN3258; ConvF(6.06, 6.06, 6.06); Calibrated: 2/21/2012;

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1272; Calibrated: 1/18/2012

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

Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.5 (6469)

**Mode: Cellular EVDO - FCC Rule Part 22H, Body SAR, Top Edge, Mid.ch**

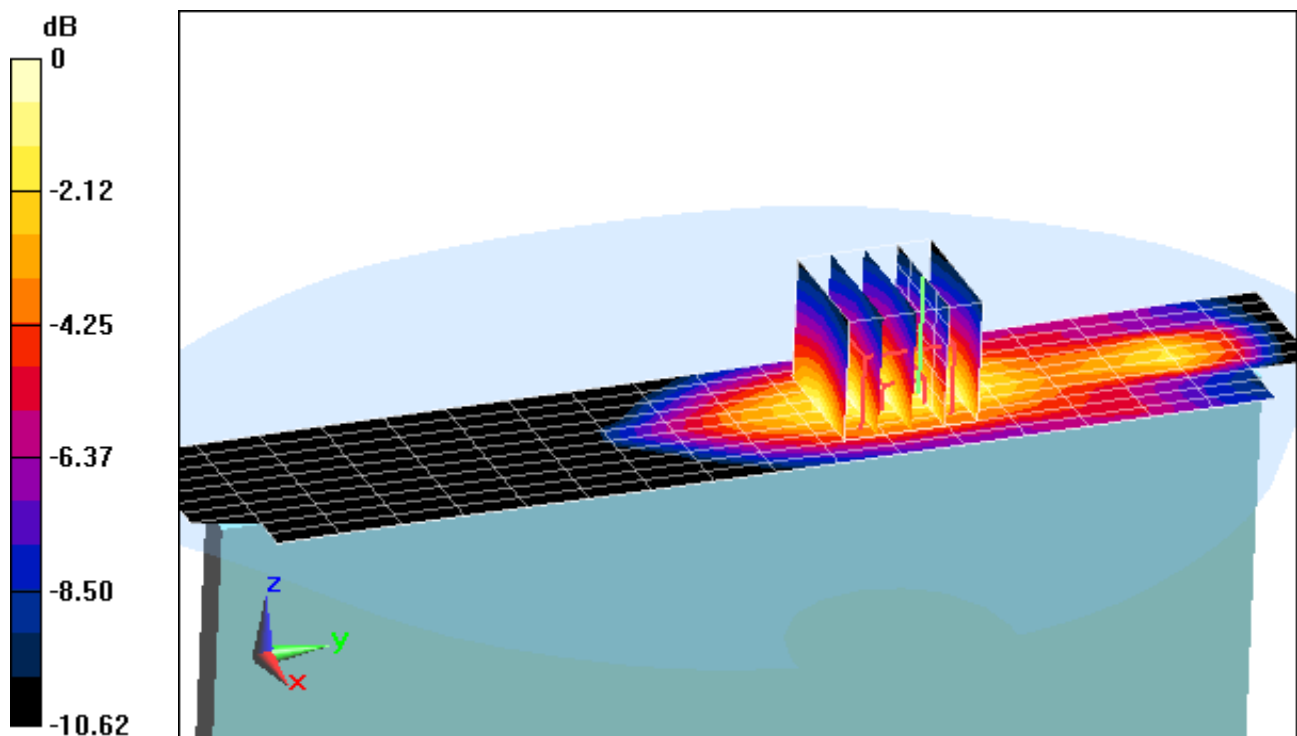
**Area Scan (11x19x1):** Measurement grid: dx=5mm, dy=15mm

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

Reference Value = 11.414 V/m; Power Drift = -0.12 dB

Peak SAR (extrapolated) = 0.155 mW/g

**SAR(1 g) = 0.101 mW/g; SAR(10 g) = 0.064 mW/g**



0 dB = 0.111 mW/g = -19.09 dB mW/g

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSPHP500; Type: Portable Tablet Computer; Serial: MAX 1 BC10/BC0**

Communication System: Cellular CDMA; Frequency: 836.52 MHz; Duty Cycle: 1:1

Medium: 835 Body Medium parameters used (interpolated):

$f = 836.52 \text{ MHz}$ ;  $\sigma = 0.989 \text{ mho/m}$ ;  $\epsilon_r = 52.827$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.1 cm

Test Date: 08-06-2012; Ambient Temp: 24.3°C; Tissue Temp: 23.4°C

Probe: ES3DV3 - SN3258; ConvF(6.06, 6.06, 6.06); Calibrated: 2/21/2012;

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1272; Calibrated: 1/18/2012

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

Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.5 (6469)

**Mode: Cellular EVDO - FCC Rule Part 22H, Body SAR, Back side, Mid.ch**

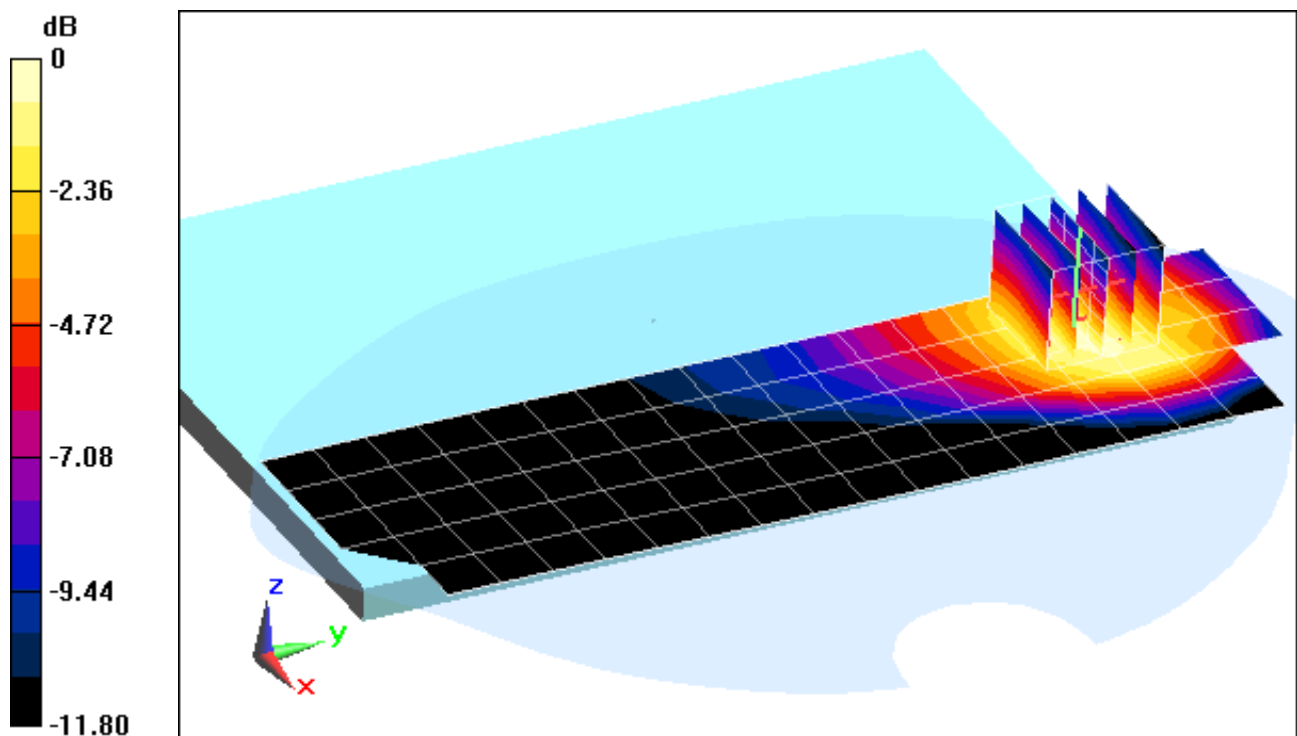
**Area Scan (6x21x1):** Measurement grid: dx=15mm, dy=15mm

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

Reference Value = 30.467 V/m; Power Drift = -0.02 dB

Peak SAR (extrapolated) = 1.153 mW/g

**SAR(1 g) = 0.776 mW/g; SAR(10 g) = 0.505 mW/g**



0 dB = 0.843 mW/g = -1.48 dB mW/g

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSPHP500; Type: Portable Tablet Computer; Serial: MAX 1 BC10/BC0**

Communication System: Cellular CDMA; Frequency: 836.52 MHz; Duty Cycle: 1:1

Medium: 835 Body Medium parameters used (interpolated):

$f = 836.52 \text{ MHz}$ ;  $\sigma = 0.989 \text{ mho/m}$ ;  $\epsilon_r = 52.827$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 0.7cm

Test Date: 08-06-2012; Ambient Temp: 24.3°C; Tissue Temp: 23.4°C

Probe: ES3DV3 - SN3258; ConvF(6.06, 6.06, 6.06); Calibrated: 2/21/2012;

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1272; Calibrated: 1/18/2012

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

Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.5 (6469)

**Mode: Cellular EVDO - FCC Rule Part 22H, Body SAR, Top Edge, Mid.ch**

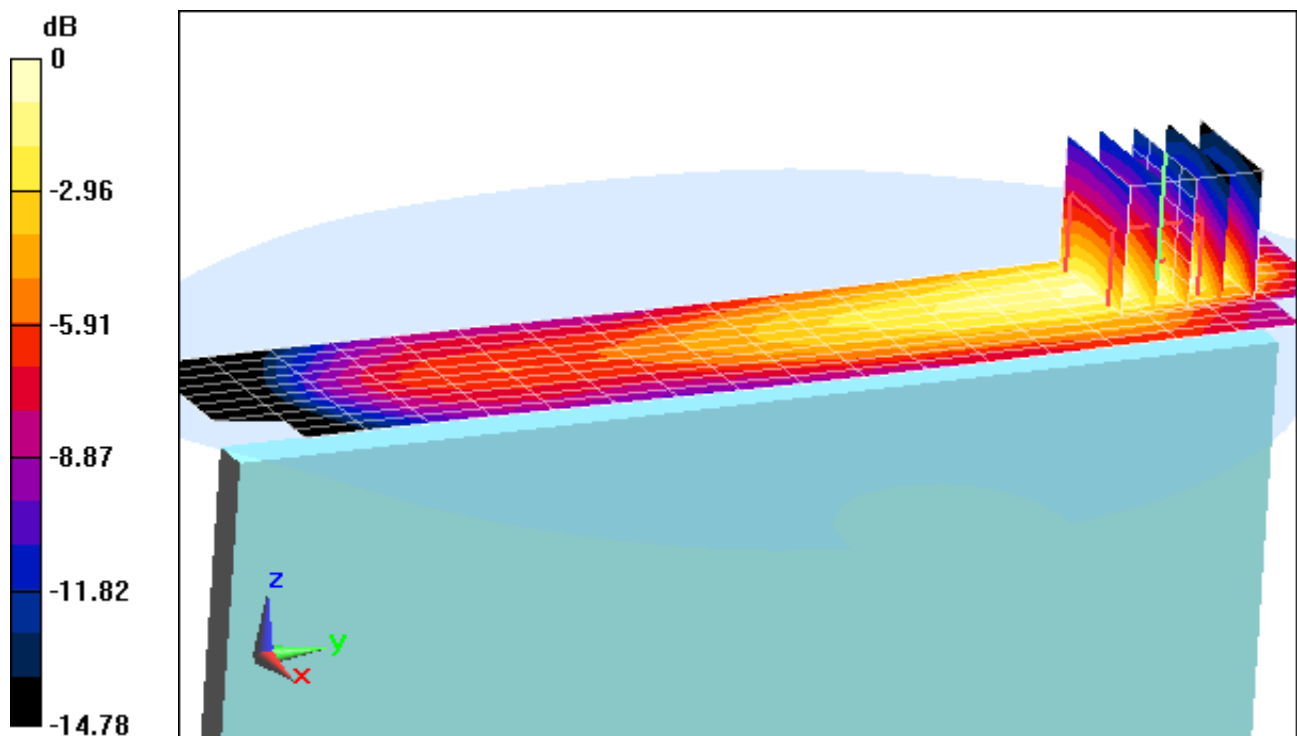
**Area Scan (11x19x1):** Measurement grid: dx=5mm, dy=15mm

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

Reference Value = 19.059 V/m; Power Drift = -0.01 dB

Peak SAR (extrapolated) = 0.528 mW/g

**SAR(1 g) = 0.289 mW/g; SAR(10 g) = 0.163 mW/g**



0 dB = 0.325 mW/g = -9.76 dB mW/g

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSPHP500; Type: Portable Tablet Computer; Serial: MAX 1 BC10/BC0**

Communication System: Cellular CDMA; Frequency: 836.52 MHz, Duty Cycle: 1:1

Medium: 835 Body Medium parameters used (interpolated):

$f = 836.52 \text{ MHz}$ ;  $\sigma = 0.989 \text{ mho/m}$ ;  $\epsilon_r = 52.827$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 0.0 cm

Test Date: 08-06-2012; Ambient Temp: 24.3°C; Tissue Temp: 23.4°C

Probe: ES3DV3 - SN3258; ConvF(6.06, 6.06, 6.06); Calibrated: 2/21/2012;

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1272; Calibrated: 1/18/2012

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

Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.5 (6469)

**Mode: Cellular EVDO - FCC Rule Part 22H, Body SAR, Right Edge, Mid.ch**

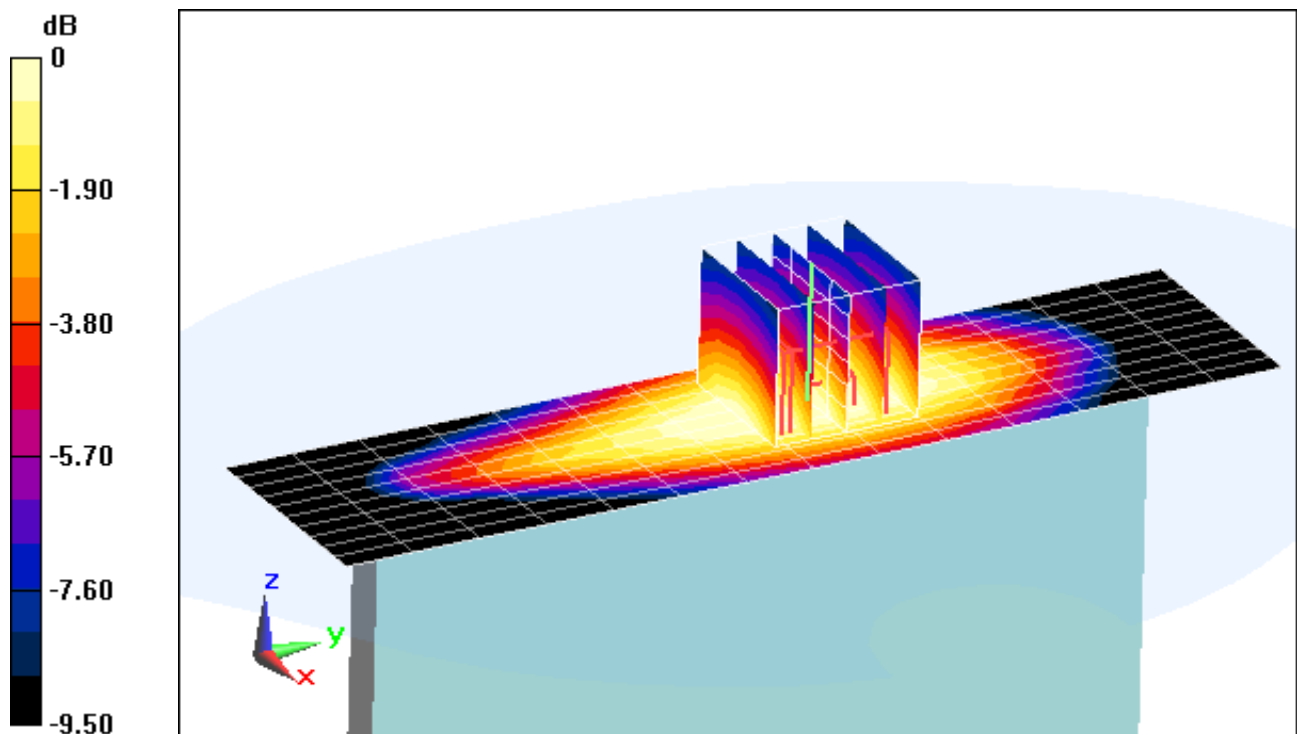
**Area Scan (11x15x1):** Measurement grid: dx=5mm, dy=15mm

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

Reference Value = 35.210 V/m; Power Drift = -0.11 dB

Peak SAR (extrapolated) = 1.407 mW/g

**SAR(1 g) = 1.02 mW/g; SAR(10 g) = 0.698 mW/g**



0 dB = 0.943 mW/g = -0.51 dB mW/g

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSPHP500; Type: Portable Tablet Computer; Serial: MAX 1 BC10/BC0**

Communication System: Cellular CDMA; Frequency: 836.52 MHz; Duty Cycle: 1:1

Medium: 835 Body Medium parameters used (interpolated):

$f = 836.52 \text{ MHz}$ ;  $\sigma = 0.989 \text{ mho/m}$ ;  $\epsilon_r = 52.827$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 0.0 cm

Test Date: 08-06-2012; Ambient Temp: 24.3°C; Tissue Temp: 23.4°C

Probe: ES3DV3 - SN3258; ConvF(6.06, 6.06, 6.06); Calibrated: 2/21/2012;

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1272; Calibrated: 1/18/2012

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

Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.5 (6469)

**Mode: Cellular EVDO - FCC Rule Part 22H, Body SAR, Vertex, Mid.ch**

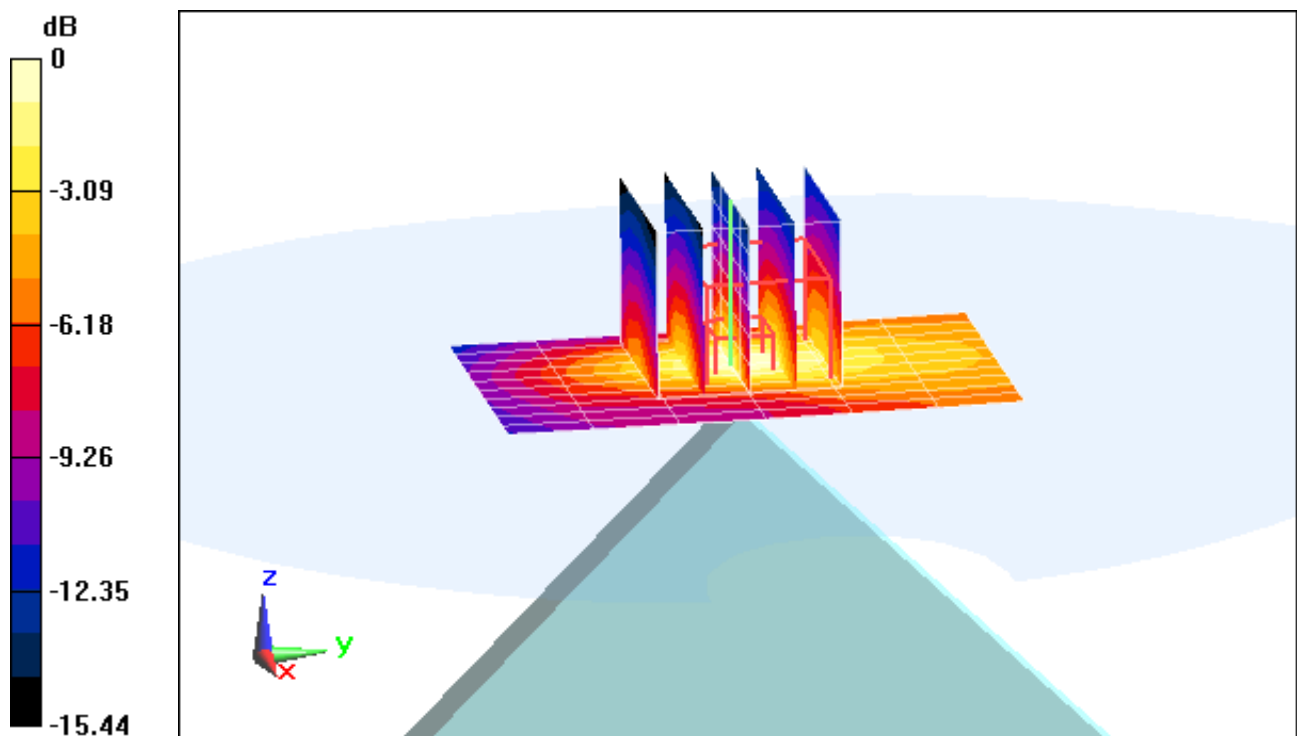
**Area Scan (11x7x1):** Measurement grid:  $dx=5\text{mm}$ ,  $dy=15\text{mm}$

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

Reference Value = 19.511 V/m; Power Drift = -0.04 dB

Peak SAR (extrapolated) = 0.511 mW/g

**SAR(1 g) = 0.242 mW/g; SAR(10 g) = 0.122 mW/g**



0 dB = 0.270 mW/g = -11.37 dB mW/g

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSPHP500; Type: Portable Tablet Computer; Serial: GRIP SAR 2**

Communication System: CDMA; Frequency: 1880 MHz; Duty Cycle: 1:1

Medium: 1900 Body Medium parameters used:

$f = 1880 \text{ MHz}$ ;  $\sigma = 1.517 \text{ mho/m}$ ;  $\epsilon_r = 51.77$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 0.0 cm

Test Date: 08-07-2012; Ambient Temp: 23.7°C; Tissue Temp: 21.9°C

Probe: ES3DV3 - SN3287; ConvF(4.76, 4.76, 4.76); Calibrated: 2/7/2012;

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn649; Calibrated: 2/20/2012

Phantom: SAM v5.0 front; Type: QD000P40CD; Serial: TP-1646

Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

**Mode: PCS EVDO - FCC Rule Part 24E, Body SAR, Back side, Mid.ch**

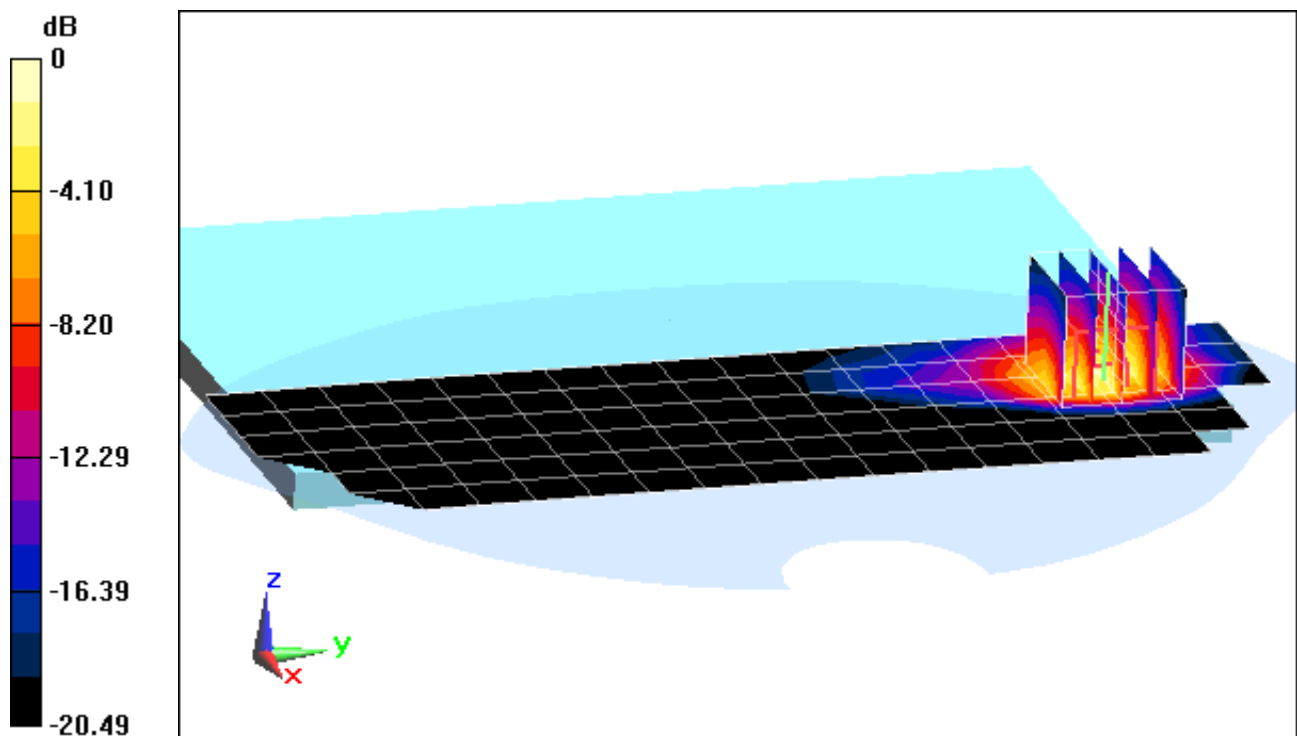
**Area Scan (7x21x1):** Measurement grid:  $dx=15\text{mm}$ ,  $dy=15\text{mm}$

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

Reference Value = 19.948 V/m; Power Drift = -0.09 dB

Peak SAR (extrapolated) = 1.333 mW/g

**SAR(1 g) = 0.641 mW/g; SAR(10 g) = 0.293 mW/g**



0 dB = 0.773 mW/g = -2.24 dB mW/g

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSPHP500; Type: Portable Tablet Computer; Serial: GRIP SAR 2**

Communication System: CDMA; Frequency: 1880 MHz; Duty Cycle: 1:1

Medium: 1900 Body Medium parameters used:

$f = 1880 \text{ MHz}$ ;  $\sigma = 1.517 \text{ mho/m}$ ;  $\epsilon_r = 51.77$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 0.0 cm

Test Date: 08-07-2012; Ambient Temp: 23.7°C; Tissue Temp: 21.9°C

Probe: ES3DV3 - SN3287; ConvF(4.76, 4.76, 4.76); Calibrated: 2/7/2012;

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn649; Calibrated: 2/20/2012

Phantom: SAM v5.0 front; Type: QD000P40CD; Serial: TP-1646

Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

**Mode: PCS EVDO - FCC Rule Part 24E, Body SAR, Top Edge, Mid.ch**

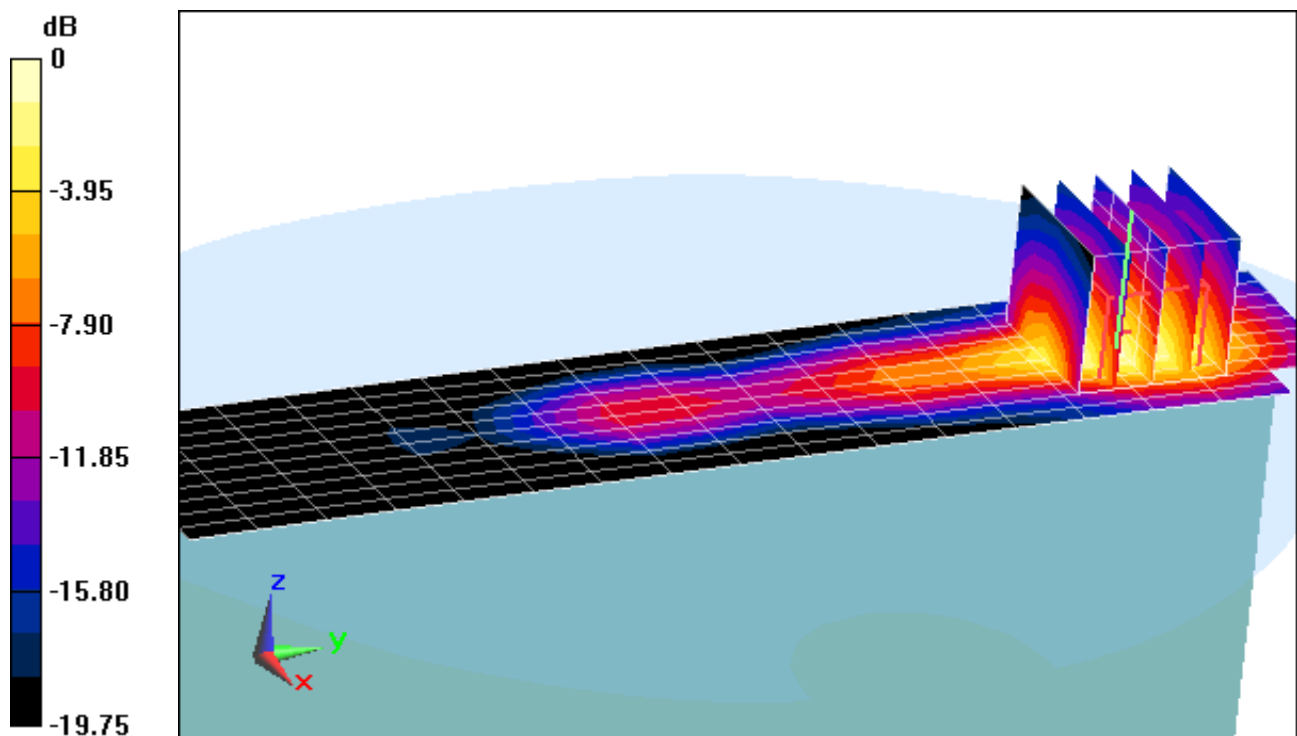
**Area Scan (11x21x1):** Measurement grid:  $dx=5\text{mm}$ ,  $dy=15\text{mm}$

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

Reference Value = 16.615 V/m; Power Drift = -0.00 dB

Peak SAR (extrapolated) = 0.667 mW/g

**SAR(1 g) = 0.357 mW/g; SAR(10 g) = 0.178 mW/g**



0 dB = 0.414 mW/g = -7.66 dB mW/g

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSPHP500; Type: Portable Tablet Computer; Serial: MAX 2**

Communication System: CDMA; Frequency: 1880 MHz; Duty Cycle: 1:1

Medium: 1900 Body Medium parameters used:

$f = 1880 \text{ MHz}$ ;  $\sigma = 1.517 \text{ mho/m}$ ;  $\epsilon_r = 51.77$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.1 cm

Test Date: 08-07-2012; Ambient Temp: 23.7°C; Tissue Temp: 21.9°C

Probe: ES3DV3 - SN3287; ConvF(4.76, 4.76, 4.76); Calibrated: 2/7/2012;

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn649; Calibrated: 2/20/2012

Phantom: SAM v5.0 front; Type: QD000P40CD; Serial: TP-1646

Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

**Mode: PCS EVDO - FCC Rule Part 24E, Body SAR, Back side, Mid.ch**

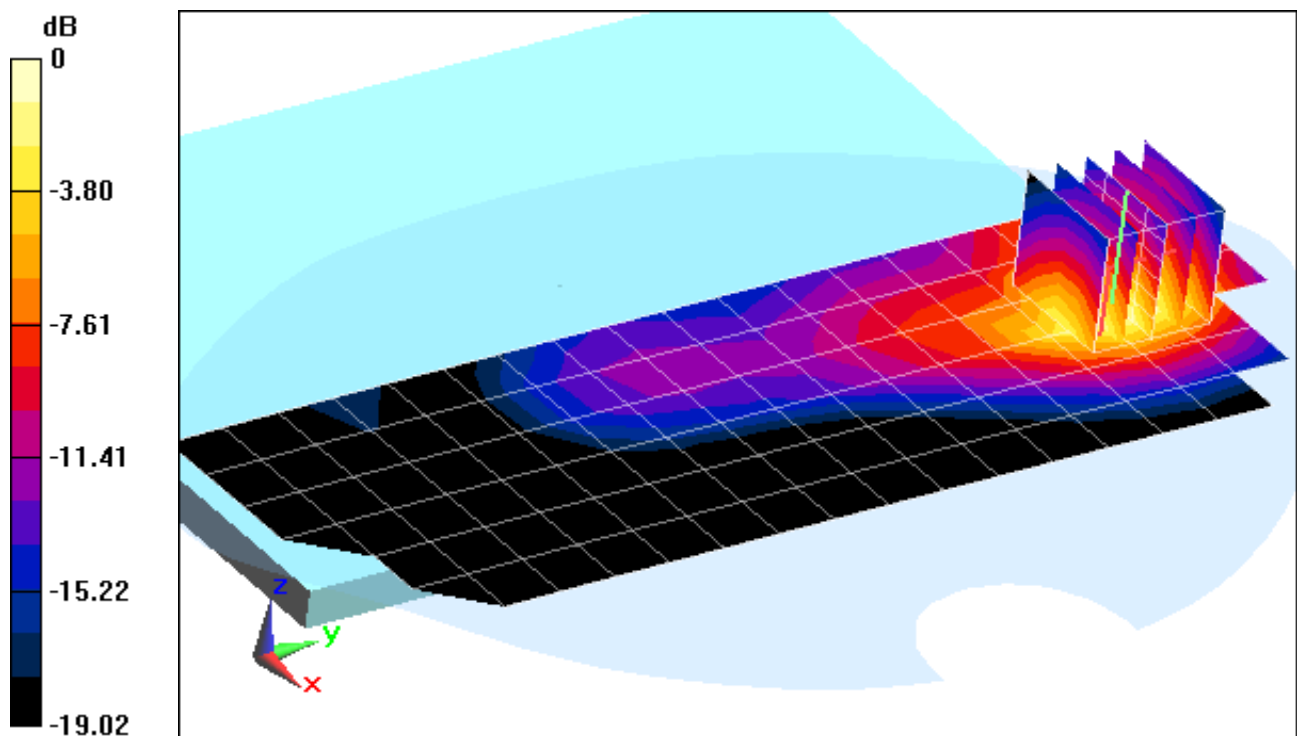
**Area Scan (7x21x1):** Measurement grid:  $dx=15\text{mm}$ ,  $dy=15\text{mm}$

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

Reference Value = 21.023 V/m; Power Drift = 0.19 dB

Peak SAR (extrapolated) = 1.186 mW/g

**SAR(1 g) = 0.712 mW/g; SAR(10 g) = 0.395 mW/g**



0 dB = 0.797 mW/g = -1.97 dB mW/g

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSPHP500; Type: Portable Tablet Computer; Serial: MAX 2**

Communication System: CDMA; Frequency: 1880 MHz; Duty Cycle: 1:1

Medium: 1900 Body Medium parameters used:

$f = 1880 \text{ MHz}$ ;  $\sigma = 1.517 \text{ mho/m}$ ;  $\epsilon_r = 51.77$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space 0.7 cm

Test Date: 08-07-2012; Ambient Temp: 23.7°C; Tissue Temp: 21.9°C

Probe: ES3DV3 - SN3287; ConvF(4.76, 4.76, 4.76); Calibrated: 2/7/2012;

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn649; Calibrated: 2/20/2012

Phantom: SAM v5.0 front; Type: QD000P40CD; Serial: TP-1646

Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

**Mode: PCS EVDO - FCC Rule Part 24E, Body SAR, Top Edge, Mid.ch**

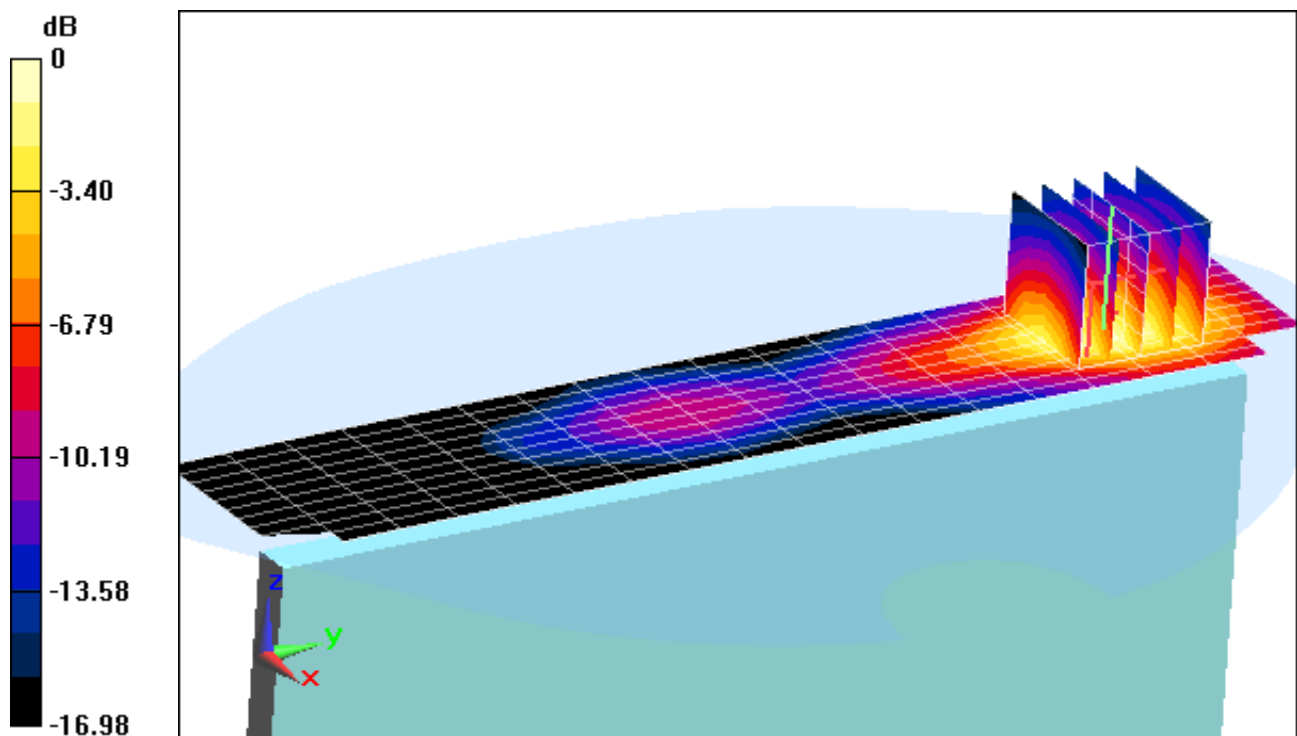
**Area Scan (11x21x1):** Measurement grid:  $dx=5\text{mm}$ ,  $dy=15\text{mm}$

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

Reference Value = 23.802 V/m; Power Drift = -0.18 dB

Peak SAR (extrapolated) = 1.246 mW/g

**SAR(1 g) = 0.750 mW/g; SAR(10 g) = 0.418 mW/g**



0 dB = 0.846 mW/g = -1.45 dB mW/g

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSPHP500; Type: Portable Tablet Computer; Serial: MAX 2**

Communication System: CDMA; Frequency: 1880 MHz; Duty Cycle: 1:1

Medium: 1900 Body Medium parameters used:

$f = 1880 \text{ MHz}$ ;  $\sigma = 1.517 \text{ mho/m}$ ;  $\epsilon_r = 51.77$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 0.0 cm

Test Date: 08-07-2012; Ambient Temp: 23.7°C; Tissue Temp: 21.9°C

Probe: ES3DV3 - SN3287; ConvF(4.76, 4.76, 4.76); Calibrated: 2/7/2012;

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn649; Calibrated: 2/20/2012

Phantom: SAM v5.0 front; Type: QD000P40CD; Serial: TP-1646

Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

**Mode: PCS EVDO - FCC Rule Part 24E, Body SAR, Right Edge, Mid.ch**

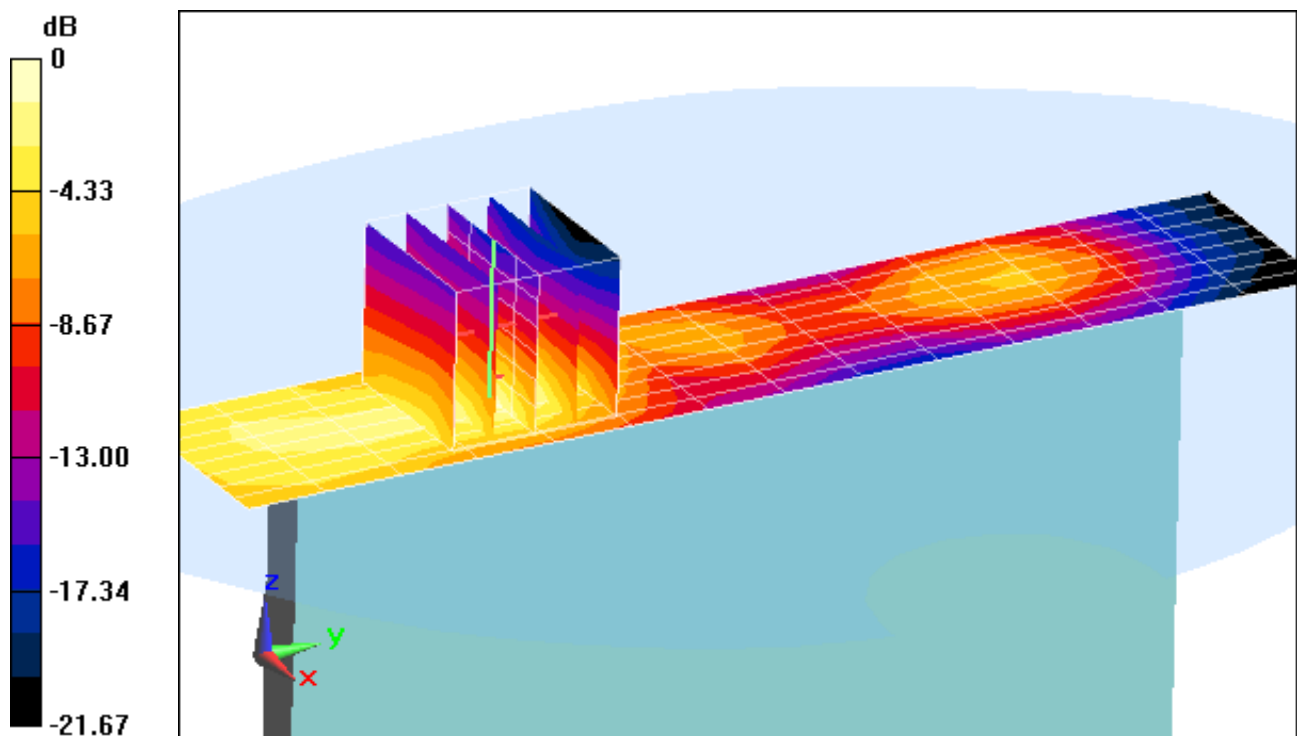
**Area Scan (9x15x1):** Measurement grid: dx=5mm, dy=15mm

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

Reference Value = 14.235 V/m; Power Drift = 0.09 dB

Peak SAR (extrapolated) = 0.542 mW/g

**SAR(1 g) = 0.251 mW/g; SAR(10 g) = 0.121 mW/g**



0 dB = 0.294 mW/g = -10.63 dB mW/g

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSPHP500; Type: Portable Tablet Computer; Serial: MAX 2**

Communication System: CDMA; Frequency: 1880 MHz; Duty Cycle: 1:1

Medium: 1900 Body Medium parameters used:

$f = 1880 \text{ MHz}$ ;  $\sigma = 1.517 \text{ mho/m}$ ;  $\epsilon_r = 51.77$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 0.0 cm

Test Date: 08-07-2012; Ambient Temp: 23.7°C; Tissue Temp: 21.9°C

Probe: ES3DV3 - SN3287; ConvF(4.76, 4.76, 4.76); Calibrated: 2/7/2012;

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn649; Calibrated: 2/20/2012

Phantom: SAM v5.0 front; Type: QD000P40CD; Serial: TP-1646

Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

**Mode: PCS EVDO - FCC Rule Part 24E, Body SAR, Vertex, Mid.ch**

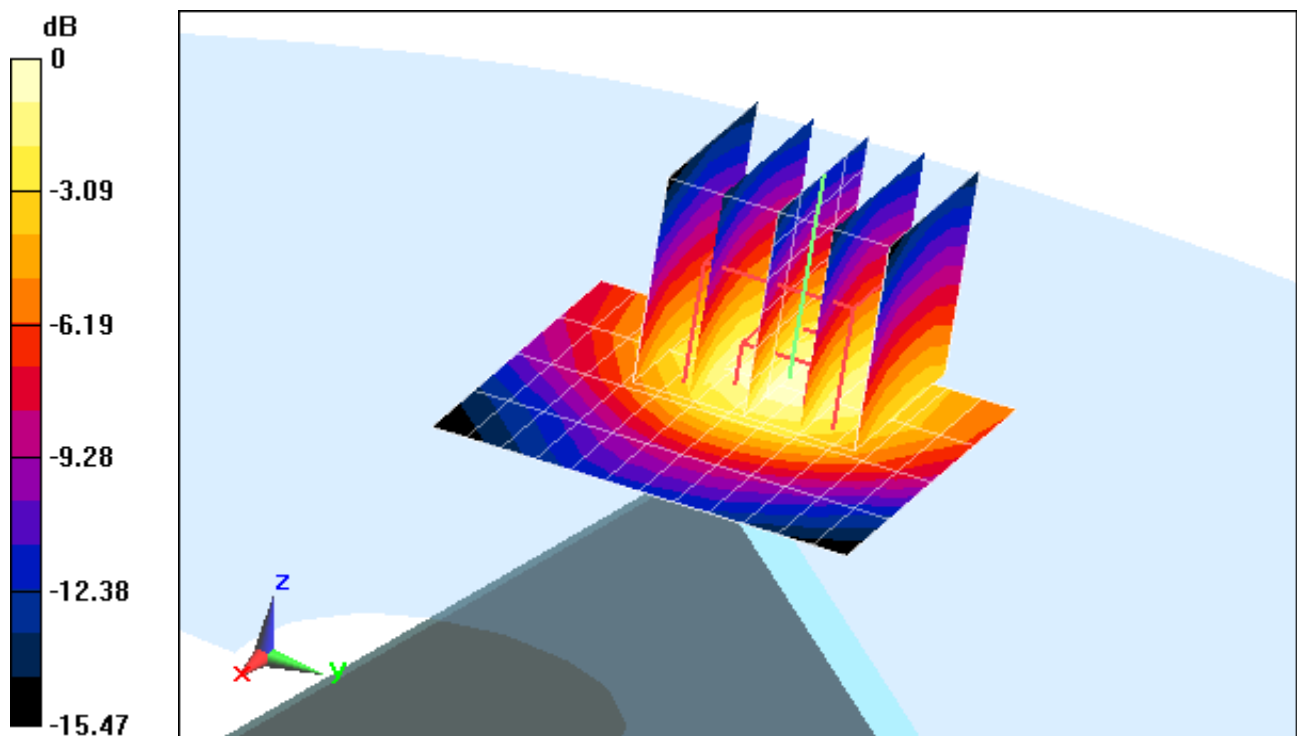
**Area Scan (5x13x1):** Measurement grid: dx=15mm, dy=5mm

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

Reference Value = 16.018 V/m; Power Drift = -0.18 dB

Peak SAR (extrapolated) = 0.565 mW/g

**SAR(1 g) = 0.340 mW/g; SAR(10 g) = 0.197 mW/g**



0 dB = 0.374 mW/g = -8.54 dB mW/g

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSPPH500; Type: Portable Tablet Computer; Serial: Grip SAR 4- LTE**

Communication System: LTE Band 25 (PCS); Frequency: 1882.5 MHz; Duty Cycle: 1:1

Medium: 1900 Body Medium parameters used (interpolated):

$f = 1882.5 \text{ MHz}$ ;  $\sigma = 1.54 \text{ mho/m}$ ;  $\epsilon_r = 51.992$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 0.0 cm

Test Date: 08-08-2012; Ambient Temp: 23.9°C; Tissue Temp: 22.1°C

Probe: ES3DV3 - SN3287; ConvF(4.76, 4.76, 4.76); Calibrated: 2/7/2012;

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn649; Calibrated: 2/20/2012

Phantom: SAM v5.0 front; Type: QD000P40CD; Serial: TP-1646

Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

**Mode: LTE Band 25 (PCS) - FCC Rule Part 24E, Body SAR, Back side, Mid.ch**  
**5 MHz Bandwidth, 16QAM, 1 RB, 24 RB Offset**

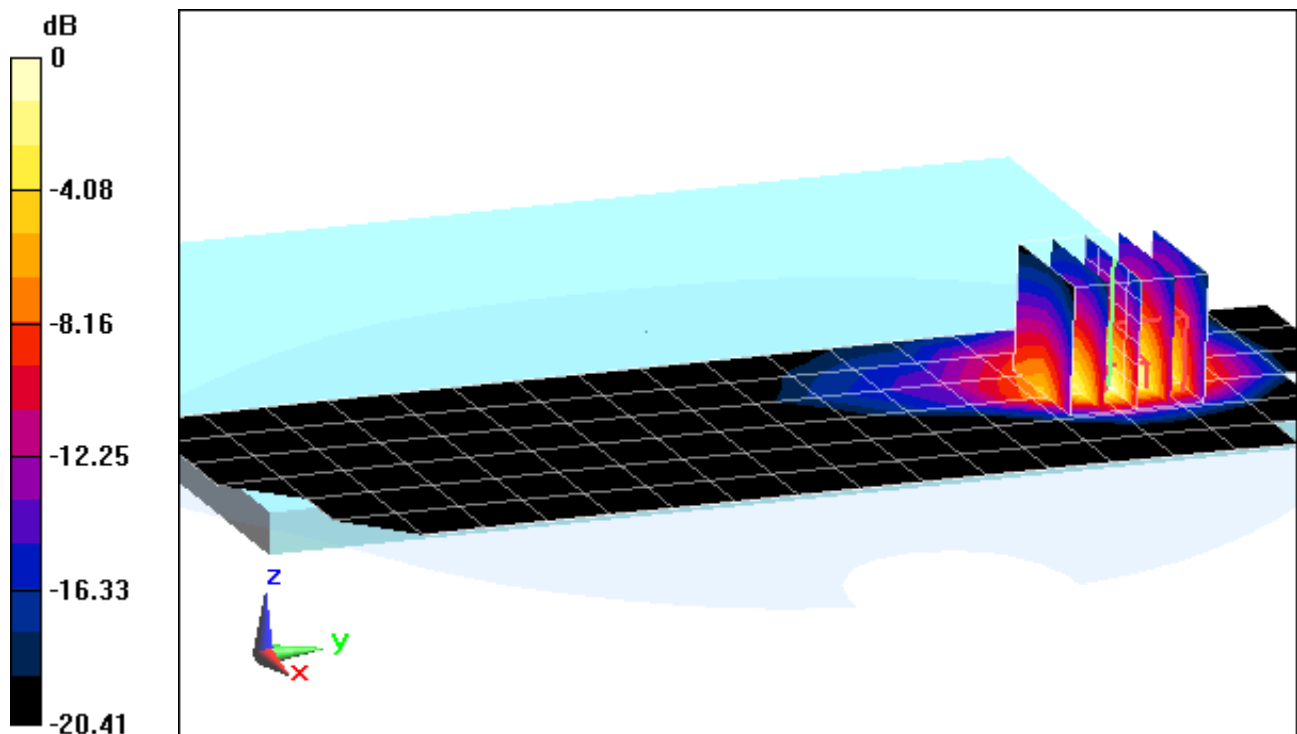
**Area Scan (7x21x1):** Measurement grid:  $dx=15\text{mm}$ ,  $dy=15\text{mm}$

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

Reference Value = 19.835 V/m; Power Drift = 0.07 dB

Peak SAR (extrapolated) = 1.310 mW/g

**SAR(1 g) = 0.633 mW/g; SAR(10 g) = 0.295 mW/g**



0 dB = 0.743 mW/g = -2.58 dB mW/g

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSPPH500; Type: Portable Tablet Computer; Serial: GRIP SAR 4 LTE**

Communication System: LTE Band 25 (PCS); Frequency: 1882.5 MHz; Duty Cycle: 1:1

Medium: 1900 Body Medium parameters used (interpolated):

$f = 1882.5 \text{ MHz}$ ;  $\sigma = 1.54 \text{ mho/m}$ ;  $\epsilon_r = 51.992$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 0.0 cm

Test Date: 08-08-2012; Ambient Temp: 23.9°C; Tissue Temp: 22.1°C

Probe: ES3DV3 - SN3287; ConvF(4.76, 4.76, 4.76); Calibrated: 2/7/2012;

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn649; Calibrated: 2/20/2012

Phantom: SAM v5.0 front; Type: QD000P40CD; Serial: TP-1646

Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

**Mode: LTE Band 25 (PCS) - FCC Rule Part 24E, Body SAR, Top Edge, Mid.ch**  
**5 MHz Bandwidth, 16QAM, 1 RB, 24 RB Offset**

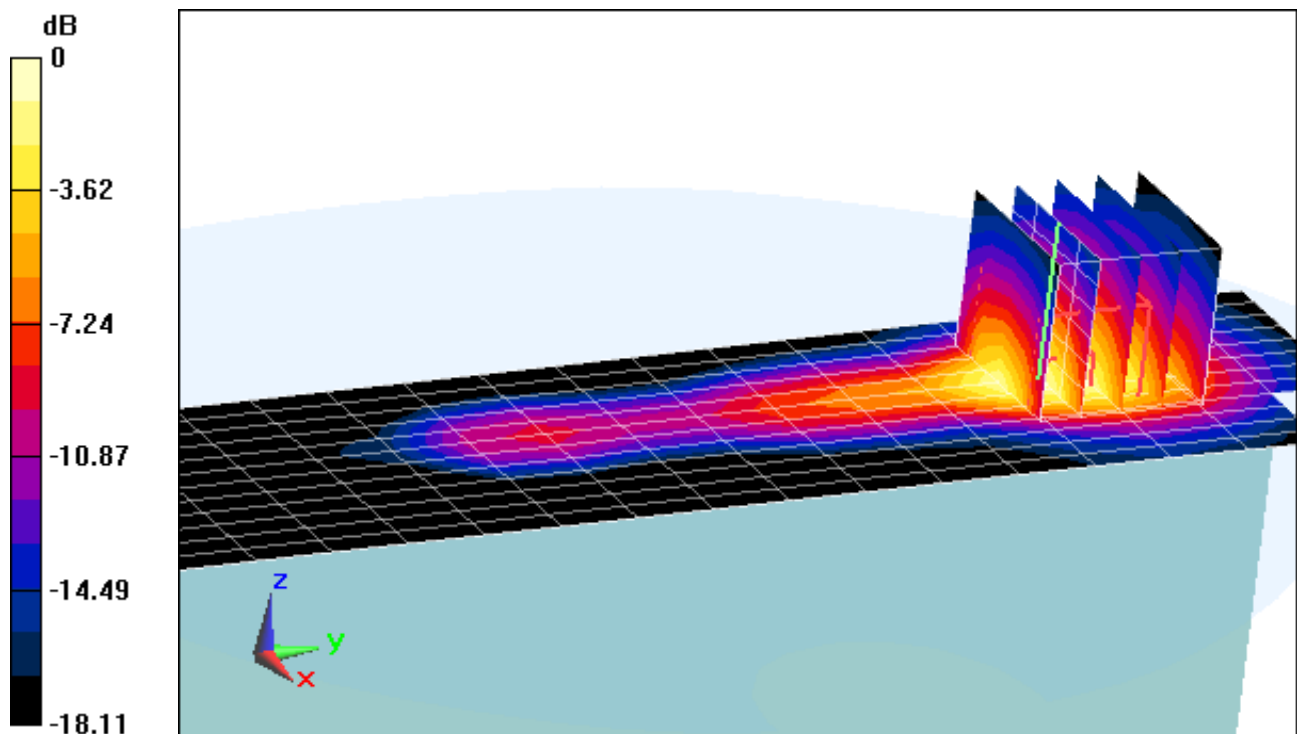
**Area Scan (13x21x1):** Measurement grid: dx=5mm, dy=15mm

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

Reference Value = 15.647 V/m; Power Drift = -0.06 dB

Peak SAR (extrapolated) = 0.646 mW/g

**SAR(1 g) = 0.342 mW/g; SAR(10 g) = 0.170 mW/g**



0 dB = 0.395 mW/g = -8.07 dB mW/g

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSPHP500; Type: Portable Tablet Computer; Serial: MAX 3 LTE**

Communication System: LTE Band 25 (PCS); Frequency: 1882.5 MHz; Duty Cycle: 1:1

Medium: 1900 Body Medium parameters used (interpolated):

$f = 1882.5 \text{ MHz}$ ;  $\sigma = 1.54 \text{ mho/m}$ ;  $\epsilon_r = 51.992$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.1 cm

Test Date: 08-08-2012; Ambient Temp: 23.9°C; Tissue Temp: 22.1°C

Probe: ES3DV3 - SN3287; ConvF(4.76, 4.76, 4.76); Calibrated: 2/7/2012;

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn649; Calibrated: 2/20/2012

Phantom: SAM v5.0 front; Type: QD000P40CD; Serial: TP-1646

Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

**Mode: LTE Band 25 (PCS) - FCC Rule Part 24E, Body SAR, Back side, Mid.ch**  
**5 MHz Bandwidth, QPSK, 1 RB, 24 RB Offset**

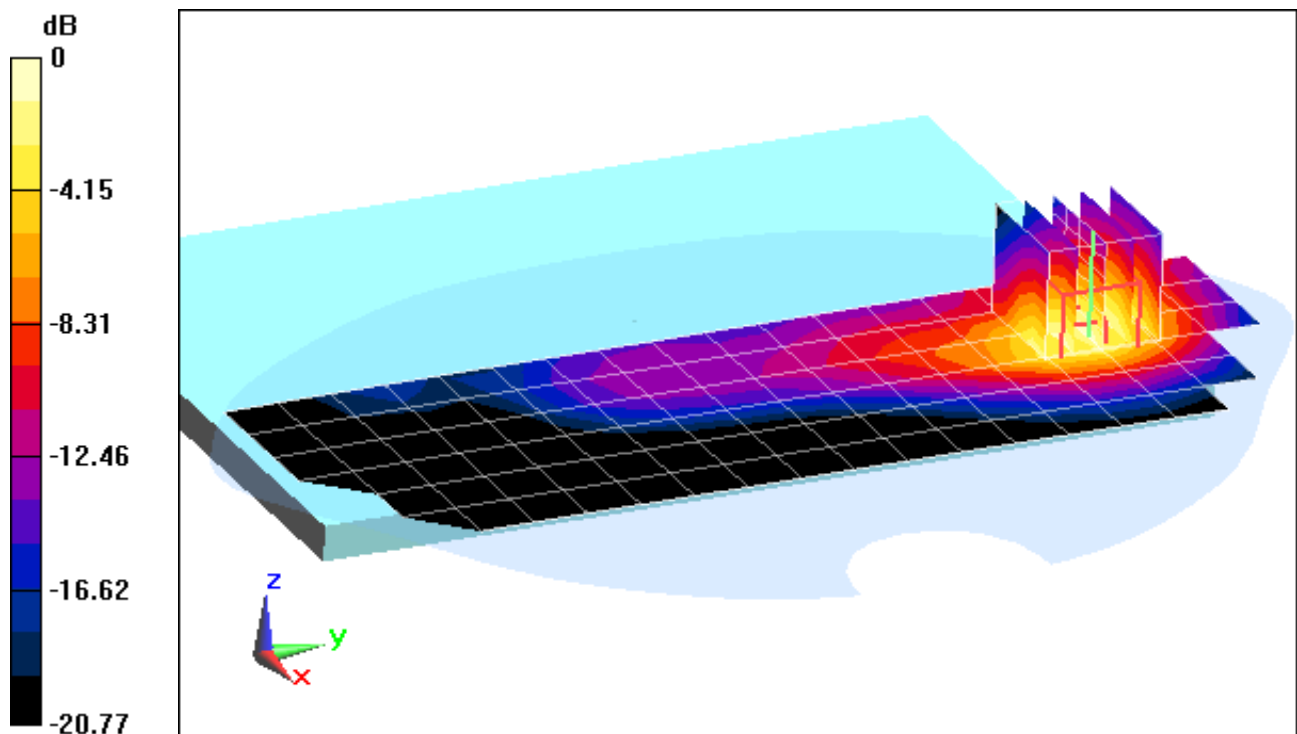
**Area Scan (7x21x1):** Measurement grid: dx=15mm, dy=15mm

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

Reference Value = 24.305 V/m; Power Drift = -0.00 dB

Peak SAR (extrapolated) = 1.564 mW/g

**SAR(1 g) = 0.908 mW/g; SAR(10 g) = 0.493 mW/g**



0 dB = 0.983 mW/g = -0.15 dB mW/g

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSPHP500; Type: Portable Tablet Computer; Serial: MAX 3 LTE**

Communication System: LTE Band 25 (PCS); Frequency: 1882.5 MHz; Duty Cycle: 1:1

Medium: 1900 Body Medium parameters used (interpolated):

$f = 1882.5 \text{ MHz}$ ;  $\sigma = 1.54 \text{ mho/m}$ ;  $\epsilon_r = 51.992$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 0.7 mm

Test Date: 08-08-2012; Ambient Temp: 23.9°C; Tissue Temp: 22.1°C

Probe: ES3DV3 - SN3287; ConvF(4.76, 4.76, 4.76); Calibrated: 2/7/2012;

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn649; Calibrated: 2/20/2012

Phantom: SAM v5.0 front; Type: QD000P40CD; Serial: TP-1646

Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

**Mode: LTE Band 25 (PCS) - FCC Rule Part 24E, Body SAR, Top Edge, Mid.ch**  
**5 MHz Bandwidth, QPSK, 1 RB, 0 RB Offset**

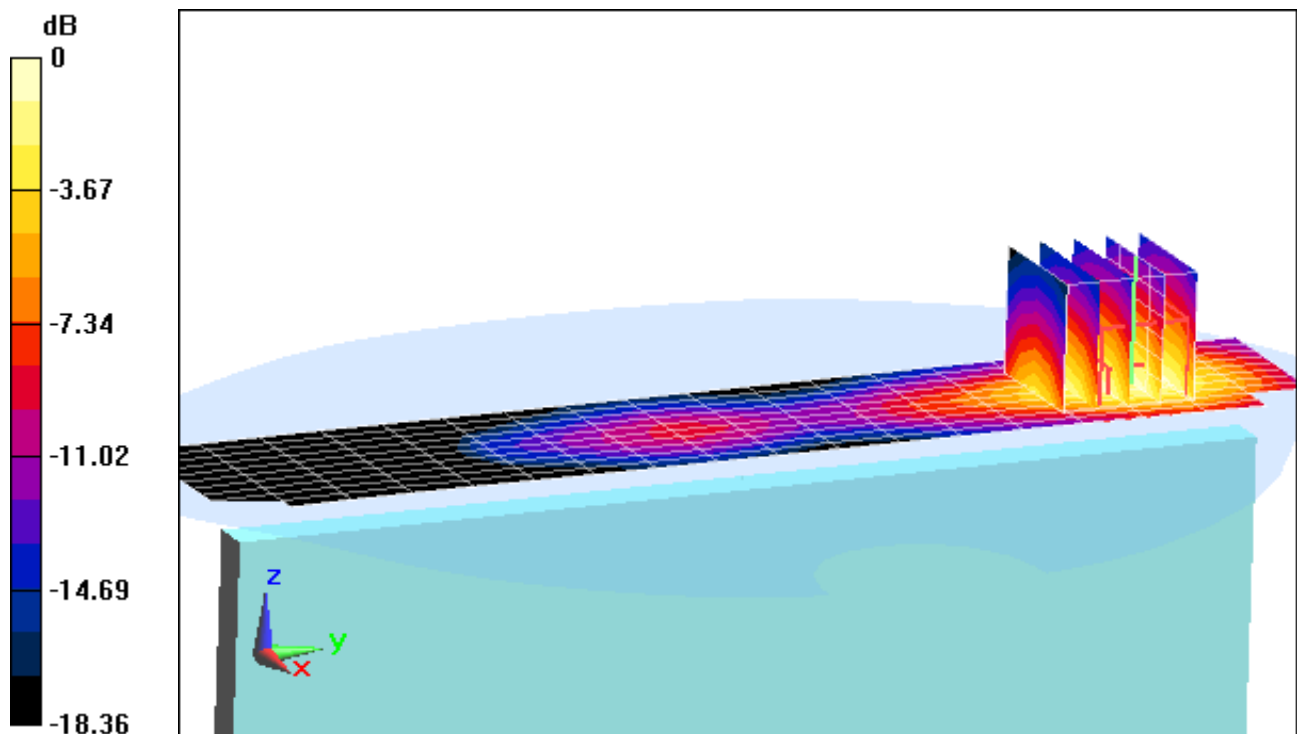
**Area Scan (11x21x1):** Measurement grid: dx=5mm, dy=15mm

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

Reference Value = 25.659 V/m; Power Drift = -0.19 dB

Peak SAR (extrapolated) = 1.473 mW/g

**SAR(1 g) = 0.885 mW/g; SAR(10 g) = 0.497 mW/g**



0 dB = 0.969 mW/g = -0.27 dB mW/g

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSPHP500; Type: Portable Tablet Computer; Serial: MAX 3 LTE**

Communication System: LTE Band 25 (PCS); Frequency: 1882.5 MHz; Duty Cycle: 1:1

Medium: 1900 Body Medium parameters used (interpolated):

$f = 1882.5 \text{ MHz}$ ;  $\sigma = 1.54 \text{ mho/m}$ ;  $\epsilon_r = 51.992$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 0.0 cm

Test Date: 08-08-2012; Ambient Temp: 23.9°C; Tissue Temp: 22.1°C

Probe: ES3DV3 - SN3287; ConvF(4.76, 4.76, 4.76); Calibrated: 2/7/2012;

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn649; Calibrated: 2/20/2012

Phantom: SAM v5.0 front; Type: QD000P40CD; Serial: TP-1646

Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

**Mode: LTE Band 25 (PCS) - FCC Rule Part 24E, Body SAR, Right Edge, Mid.ch**  
**5 MHz Bandwidth, QPSK, 1 RB, 24 RB Offset**

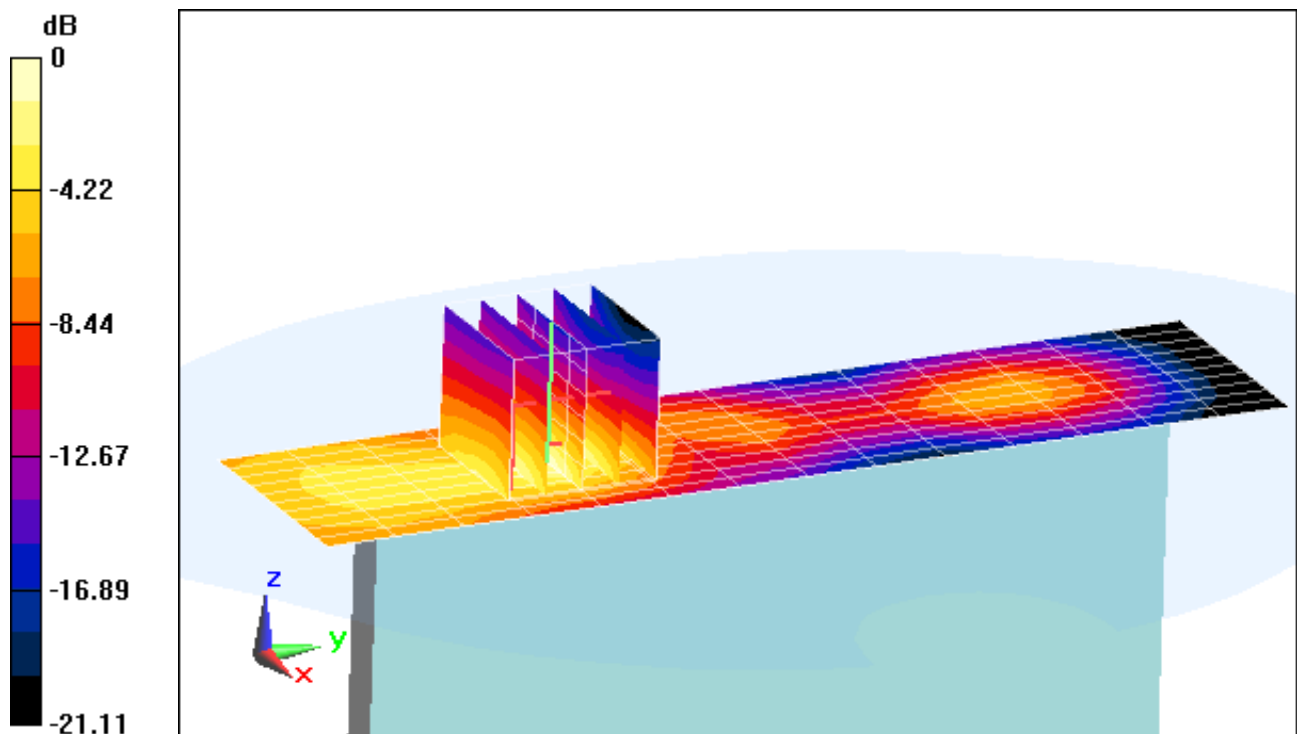
**Area Scan (11x15x1):** Measurement grid: dx=5mm, dy=15mm

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

Reference Value = 15.812 V/m; Power Drift = -0.05 dB

Peak SAR (extrapolated) = 0.650 mW/g

**SAR(1 g) = 0.314 mW/g; SAR(10 g) = 0.159 mW/g**



0 dB = 0.354 mW/g = -9.02 dB mW/g

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSPHP500; Type: Portable Tablet Computer; Serial: MAX 3 LTE**

Communication System: LTE Band 25 (PCS); Frequency: 1882.5 MHz; Duty Cycle: 1:1

Medium: 1900 Body Medium parameters used (interpolated):

$f = 1882.5 \text{ MHz}$ ;  $\sigma = 1.54 \text{ mho/m}$ ;  $\epsilon_r = 51.992$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 0.0 cm

Test Date: 08-08-2012; Ambient Temp: 23.9°C; Tissue Temp: 22.1°C

Probe: ES3DV3 - SN3287; ConvF(4.76, 4.76, 4.76); Calibrated: 2/7/2012;

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn649; Calibrated: 2/20/2012

Phantom: SAM v5.0 front; Type: QD000P40CD; Serial: TP-1646

Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

**Mode: LTE Band 25 (PCS) - FCC Rule Part 24E, Body SAR, Vertex, Mid.ch**  
**5 MHz Bandwidth, QPSK, 1 RB, 24 RB Offset**

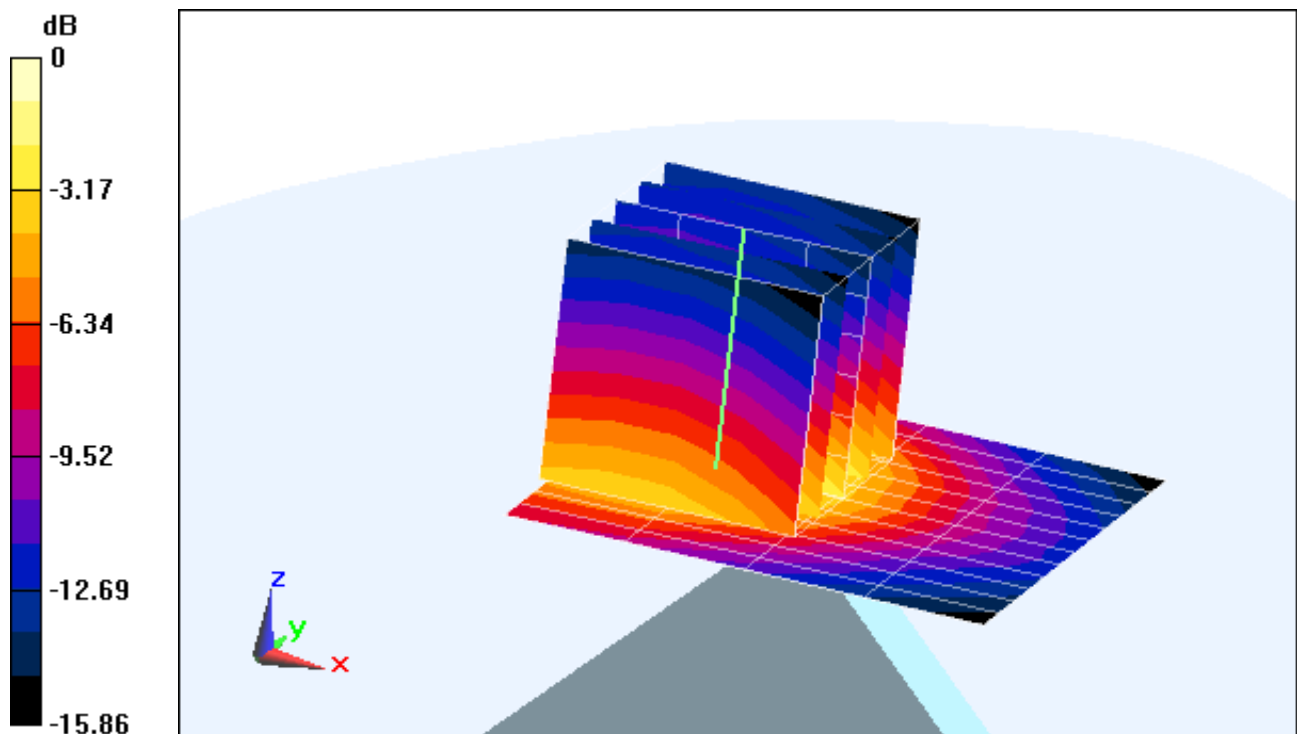
**Area Scan (5x13x1):** Measurement grid: dx=15mm, dy=5mm

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

Reference Value = 17.354 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 0.678 mW/g

**SAR(1 g) = 0.414 mW/g; SAR(10 g) = 0.243 mW/g**



0 dB = 0.449 mW/g = -6.96 dB mW/g

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSPHP500; Type: Portable Tablet Computer; Serial: WiFi 11**

Communication System: IEEE 802.11b; Frequency: 2412 MHz; Duty Cycle: 1:1

Medium: 2450 Body; Medium parameters used (interpolated):

$f = 2412 \text{ MHz}$ ;  $\sigma = 1.885 \text{ mho/m}$ ;  $\epsilon_r = 51.099$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 0.0 cm

Test Date: 09-04-2012; Ambient Temp: 22.4°C; Tissue Temp: 22.4°C

Probe: ES3DV3 - SN3287; ConvF(4.28, 4.28, 4.28); Calibrated: 2/7/2012;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn649; Calibrated: 2/20/2012

Phantom: SAM v5.0 front; Type: QD000P40CD; Serial: TP-1646

Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

**Mode: IEEE 802.11b - FCC Rule Part 15C, Body SAR, Ch 01, 1 Mbps, Back Side**

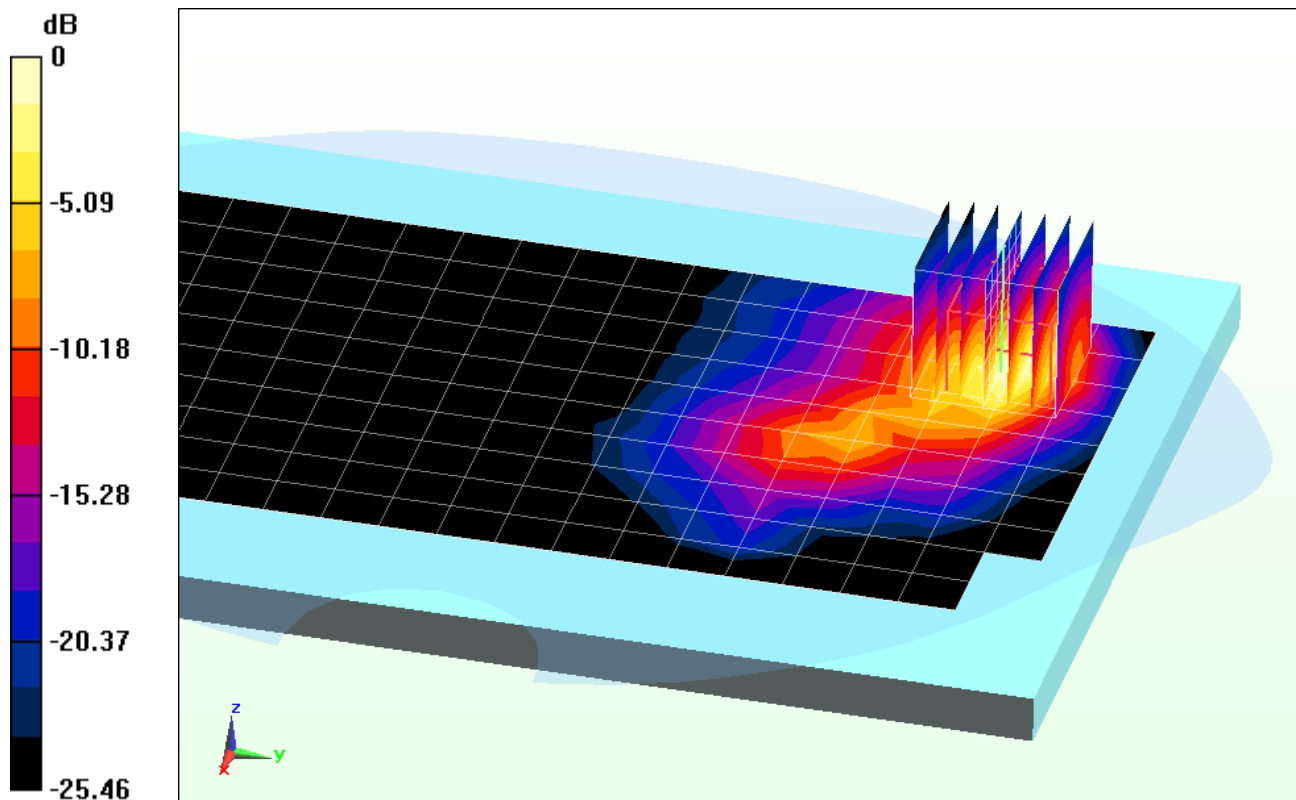
**Area Scan (11x21x1):** Measurement grid:  $dx=12\text{mm}$ ,  $dy=12\text{mm}$

**Zoom Scan (7x7x7)/Cube 0:** Measurement grid:  $dx=5\text{mm}$ ,  $dy=5\text{mm}$ ,  $dz=5\text{mm}$

Reference Value = 6.503 V/m; Power Drift = -0.12 dB

Peak SAR (extrapolated) = 1.646 mW/g

**SAR(1 g) = 0.555 mW/g; SAR(10 g) = 0.203 mW/g**



0 dB = 0.752 mW/g = -2.48 dB mW/g

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSPHP500; Type: Portable Tablet Computer; Serial: WiFi 11**

Communication System: IEEE 802.11b; Frequency: 2437 MHz; Duty Cycle: 1:1

Medium: 2450 Body; Medium parameters used (interpolated):

$f = 2437 \text{ MHz}$ ;  $\sigma = 1.942 \text{ mho/m}$ ;  $\epsilon_r = 51.03$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 0.0 cm

Test Date: 09-04-2012; Ambient Temp: 22.4°C; Tissue Temp: 22.4°C

Probe: ES3DV3 - SN3287; ConvF(4.28, 4.28, 4.28); Calibrated: 2/7/2012;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn649; Calibrated: 2/20/2012

Phantom: SAM v5.0 front; Type: QD000P40CD; Serial: TP-1646

Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

**Mode: IEEE 802.11b - FCC Rule Part 15C, Body SAR, Ch 06, 1 Mbps, Right Edge**

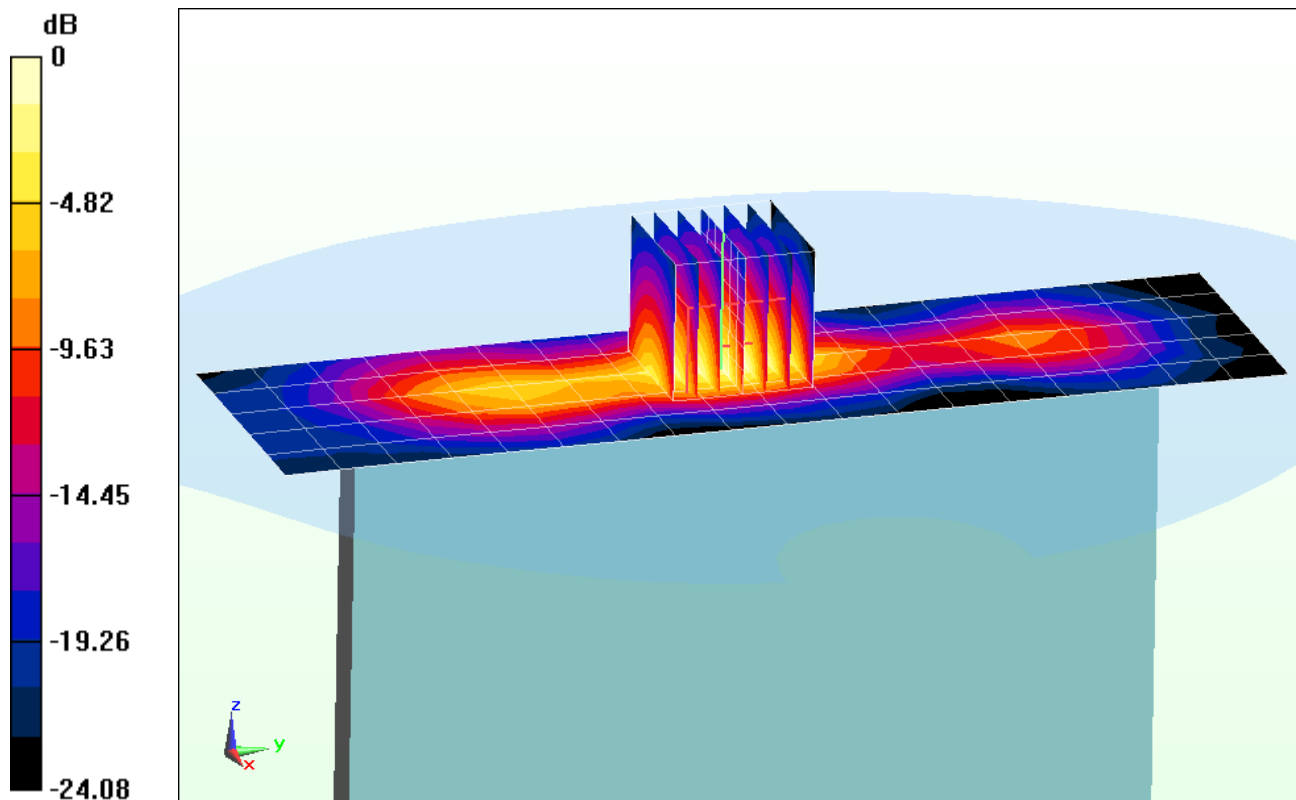
**Area Scan (6x19x1):** Measurement grid:  $dx=12\text{mm}$ ,  $dy=12\text{mm}$

**Zoom Scan (7x7x7)/Cube 0:** Measurement grid:  $dx=5\text{mm}$ ,  $dy=5\text{mm}$ ,  $dz=5\text{mm}$

Reference Value = 13.746 V/m; Power Drift = -0.04 dB

Peak SAR (extrapolated) = 0.724 mW/g

**SAR(1 g) = 0.309 mW/g; SAR(10 g) = 0.127 mW/g**



0 dB = 0.429 mW/g = -7.35 dB mW/g

## APPENDIX B: SYSTEM VERIFICATION

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: Dipole 835 MHz; Type: D835V2; Serial: 4d119**

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

Medium: 835 Body Medium parameters used:

$f = 835 \text{ MHz}$ ;  $\sigma = 0.988 \text{ mho/m}$ ;  $\epsilon_r = 52.84$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.5 cm

Test Date: 08-06-2012; Ambient Temp: 24.3°C; Tissue Temp: 23.4°C

Probe: ES3DV3 - SN3258; ConvF(6.06, 6.06, 6.06); Calibrated: 2/21/2012;

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1272; Calibrated: 1/18/2012

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

Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.5 (6469)

## 835MHz System Verification

**Area Scan (7x13x1):** Measurement grid:  $dx=15\text{mm}$ ,  $dy=15\text{mm}$

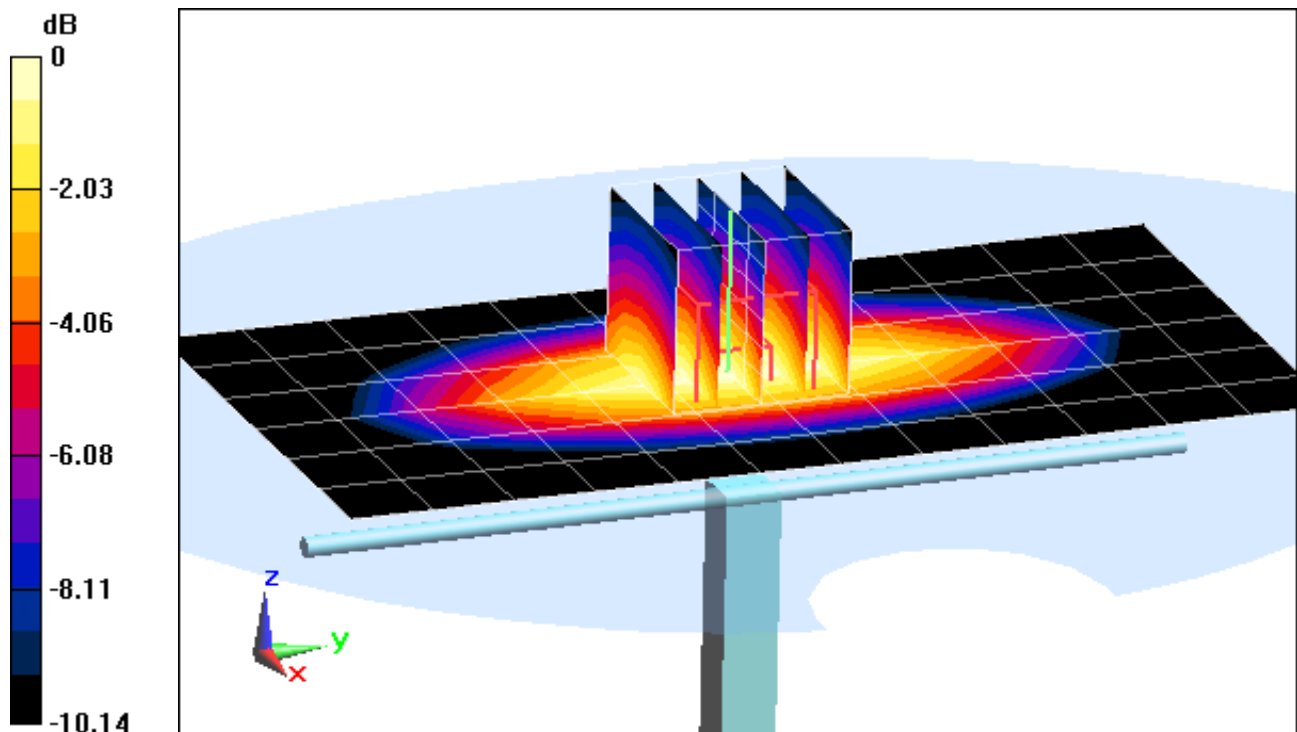
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid:  $dx=8\text{mm}$ ,  $dy=8\text{mm}$ ,  $dz=5\text{mm}$

Input Power = 20 dBm (100 mW)

Peak SAR (extrapolated) = 1.433 mW/g

**SAR(1 g) = 0.985 mW/g; SAR(10 g) = 0.650 mW/g**

Deviation = 3.03%



0 dB = 1.07 mW/g = 0.59 dB mW/g

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: Dipole 835 MHz; Type: D835V2; Serial: 4d119**

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

Medium: 835 Body Medium parameters used:

$f = 835 \text{ MHz}$ ;  $\sigma = 0.988 \text{ mho/m}$ ;  $\epsilon_r = 52.84$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.5 cm

Test Date: 08-06-2012; Ambient Temp: 24.3°C; Tissue Temp: 23.4°C

Probe: ES3DV3 - SN3258; ConvF(6.06, 6.06, 6.06); Calibrated: 2/21/2012;

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1272; Calibrated: 1/18/2012

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

Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.5 (6469)

## 835MHz System Verification

**Area Scan (7x13x1):** Measurement grid:  $dx=15\text{mm}$ ,  $dy=15\text{mm}$

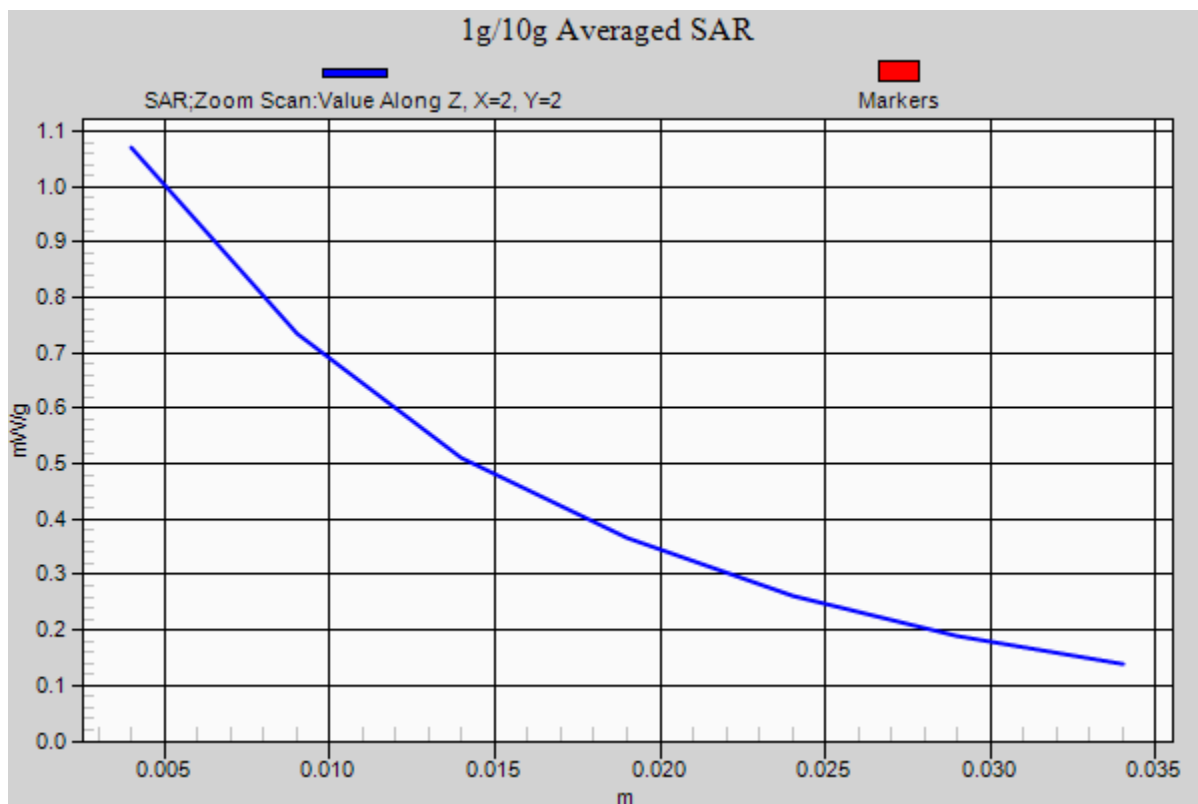
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid:  $dx=8\text{mm}$ ,  $dy=8\text{mm}$ ,  $dz=5\text{mm}$

Input Power = 20 dBm (100 mW)

Peak SAR (extrapolated) = 1.433 mW/g

**SAR(1 g) = 0.985 mW/g; SAR(10 g) = 0.650 mW/g**

Deviation = 3.03%



# PCTEST ENGINEERING LABORATORY, INC.

**DUT: SAR Dipole 1900 MHz; Type: D1900V2; Serial: 5d149**

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

Medium: 1900 Body Medium parameters used (interpolated):

$f = 1900 \text{ MHz}$ ;  $\sigma = 1.518 \text{ mho/m}$ ;  $\epsilon_r = 51.83$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-07-2012; Ambient Temp: 23.7°C; Tissue Temp: 21.9°C

Probe: ES3DV3 - SN3287; ConvF(4.76, 4.76, 4.76); Calibrated: 2/7/2012;

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn649; Calibrated: 2/20/2012

Phantom: SAM v5.0 front; Type: QD000P40CD; Serial: TP-1646

Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

## 1900 MHz System Verification

**Area Scan (7x9x1):** Measurement grid:  $dx=15\text{mm}$ ,  $dy=15\text{mm}$

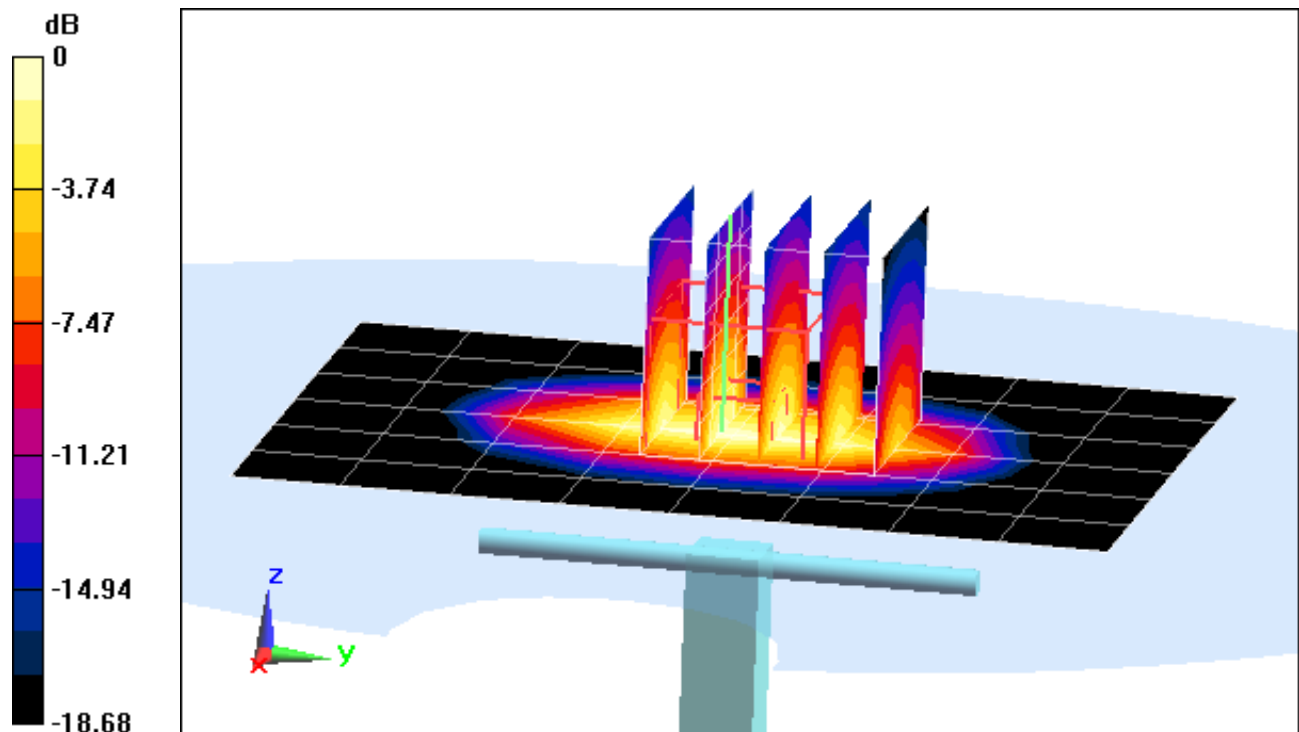
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid:  $dx=8\text{mm}$ ,  $dy=8\text{mm}$ ,  $dz=5\text{mm}$

Input Power = 20 dBm (100 mW)

Peak SAR (extrapolated) = 7.393 mW/g

**SAR(1 g) = 4.11 mW/g; SAR(10 g) = 2.14 mW/g**

Deviation = 4.58%



0 dB = 4.62 mW/g = 13.29 dB mW/g

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: SAR Dipole 1900 MHz; Type: D1900V2; Serial: 5d149**

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

Medium: 1900 Body Medium parameters used (interpolated):

$f = 1900 \text{ MHz}$ ;  $\sigma = 1.518 \text{ mho/m}$ ;  $\epsilon_r = 51.83$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-07-2012; Ambient Temp: 23.7°C; Tissue Temp: 21.9°C

Probe: ES3DV3 - SN3287; ConvF(4.76, 4.76, 4.76); Calibrated: 2/7/2012;

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn649; Calibrated: 2/20/2012

Phantom: SAM v5.0 front; Type: QD000P40CD; Serial: TP-1646

Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

## 1900 MHz System Verification

**Area Scan (7x9x1):** Measurement grid:  $dx=15\text{mm}$ ,  $dy=15\text{mm}$

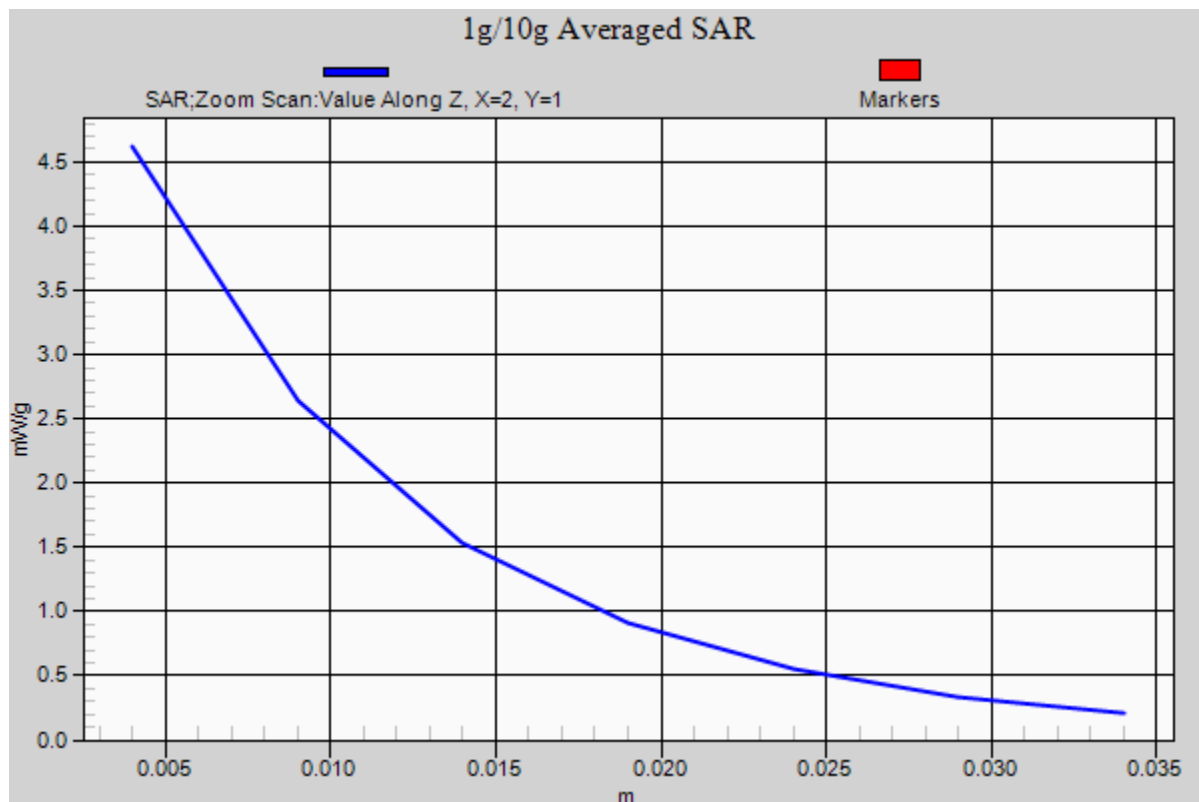
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid:  $dx=8\text{mm}$ ,  $dy=8\text{mm}$ ,  $dz=5\text{mm}$

Input Power = 20 dBm (100 mW)

Peak SAR (extrapolated) = 7.393 mW/g

**SAR(1 g) = 4.11 mW/g; SAR(10 g) = 2.14 mW/g**

Deviation = 4.58%



# PCTEST ENGINEERING LABORATORY, INC.

**DUT: SAR Dipole 1900 MHz; Type: D1900V2; Serial: 5d149**

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

Medium: 1900 Body; Medium parameters used (interpolated):

$f = 1900 \text{ MHz}$ ;  $\sigma = 1.549 \text{ mho/m}$ ;  $\epsilon_r = 52.003$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-08-2012; Ambient Temp: 23.9°C; Tissue Temp: 22.1°C

Probe: ES3DV3 - SN3287; ConvF(4.76, 4.76, 4.76); Calibrated: 2/7/2012;

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn649; Calibrated: 2/20/2012

Phantom: SAM v5.0 front; Type: QD000P40CD; Serial: TP-1646

Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

## 1900 MHz System Verification

**Area Scan (7x9x1):** Measurement grid:  $dx=15\text{mm}$ ,  $dy=15\text{mm}$

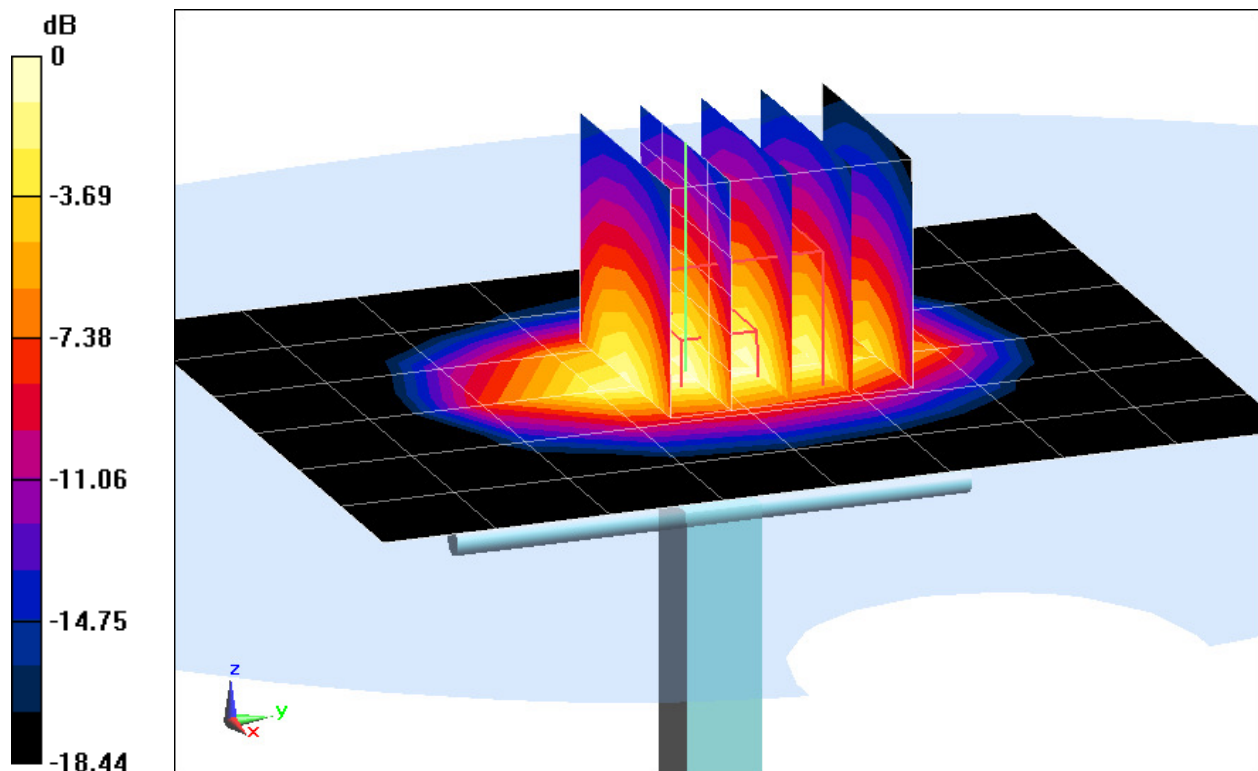
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid:  $dx=8\text{mm}$ ,  $dy=8\text{mm}$ ,  $dz=5\text{mm}$

Input Power = 20.0 dBm (100 mW)

Peak SAR (extrapolated) = 7.389 mW/g

**SAR(1 g) = 4.11 mW/g; SAR(10 g) = 2.14 mW/g**

Deviation = 4.58%



0 dB = 4.59 mW/g = 13.24 dB mW/g

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: SAR Dipole 1900 MHz; Type: D1900V2; Serial: 5d149**

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

Medium: 1900 Body; Medium parameters used (interpolated):

$f = 1900 \text{ MHz}$ ;  $\sigma = 1.549 \text{ mho/m}$ ;  $\epsilon_r = 52.003$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-08-2012; Ambient Temp: 23.9°C; Tissue Temp: 22.1°C

Probe: ES3DV3 - SN3287; ConvF(4.76, 4.76, 4.76); Calibrated: 2/7/2012;

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn649; Calibrated: 2/20/2012

Phantom: SAM v5.0 front; Type: QD000P40CD; Serial: TP-1646

Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

## 1900 MHz System Verification

**Area Scan (7x9x1):** Measurement grid: dx=15mm, dy=15mm

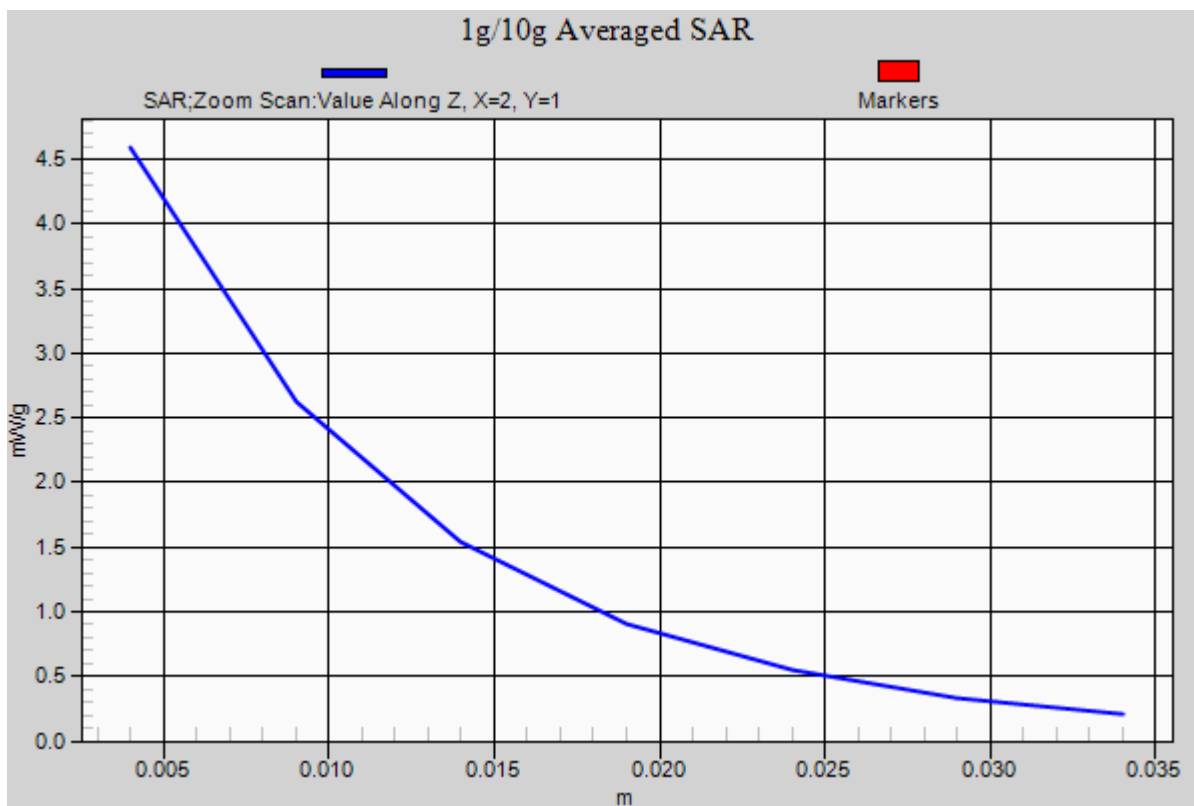
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Input Power = 20.0 dBm (100 mW)

Peak SAR (extrapolated) = 7.389 mW/g

**SAR(1 g) = 4.11 mW/g; SAR(10 g) = 2.14 mW/g**

Deviation = 4.58%



# PCTEST ENGINEERING LABORATORY, INC.

**DUT: Dipole 2450 MHz; Type: D2450V2; Serial: 882**

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

Medium: 2450 Body; Medium parameters used:

$f = 2450 \text{ MHz}$ ;  $\sigma = 1.971 \text{ mho/m}$ ;  $\epsilon_r = 50.99$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 09-04-2012; Ambient Temp: 22.4°C; Tissue Temp: 22.4°C

Probe: ES3DV3 - SN3287; ConvF(4.28, 4.28, 4.28); Calibrated: 2/7/2012;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn649; Calibrated: 2/20/2012

Phantom: SAM v5.0 front; Type: QD000P40CD; Serial: TP-1646

Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

## 2450 MHz System Verification

**Area Scan (8x9x1):** Measurement grid: dx=12mm, dy=12mm

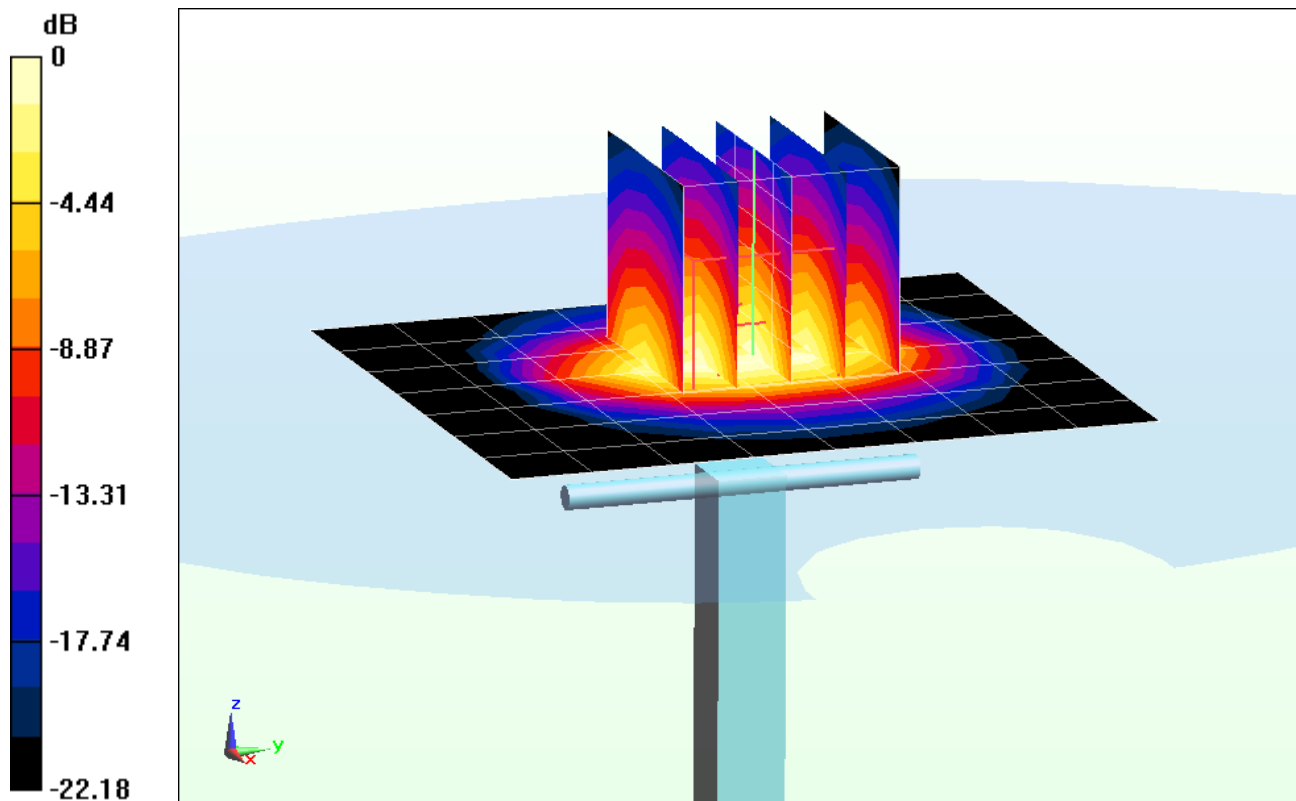
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Input Power = 20.0 dBm (100 mW)

Peak SAR (extrapolated) = 11.331 mW/g

**SAR(1 g) = 5.33 mW/g; SAR(10 g) = 2.44 mW/g**

Deviation = 5.96%



0 dB = 6.05 mW/g = 15.64 dB mW/g

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: Dipole 2450 MHz; Type: D2450V2; Serial: 882**

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

Medium: 2450 Body; Medium parameters used:

$f = 2450 \text{ MHz}$ ;  $\sigma = 1.971 \text{ mho/m}$ ;  $\epsilon_r = 50.99$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 09-04-2012; Ambient Temp: 22.4°C; Tissue Temp: 22.4°C

Probe: ES3DV3 - SN3287; ConvF(4.28, 4.28, 4.28); Calibrated: 2/7/2012;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn649; Calibrated: 2/20/2012

Phantom: SAM v5.0 front; Type: QD000P40CD; Serial: TP-1646

Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

## 2450 MHz System Verification

**Area Scan (8x9x1):** Measurement grid: dx=12mm, dy=12mm

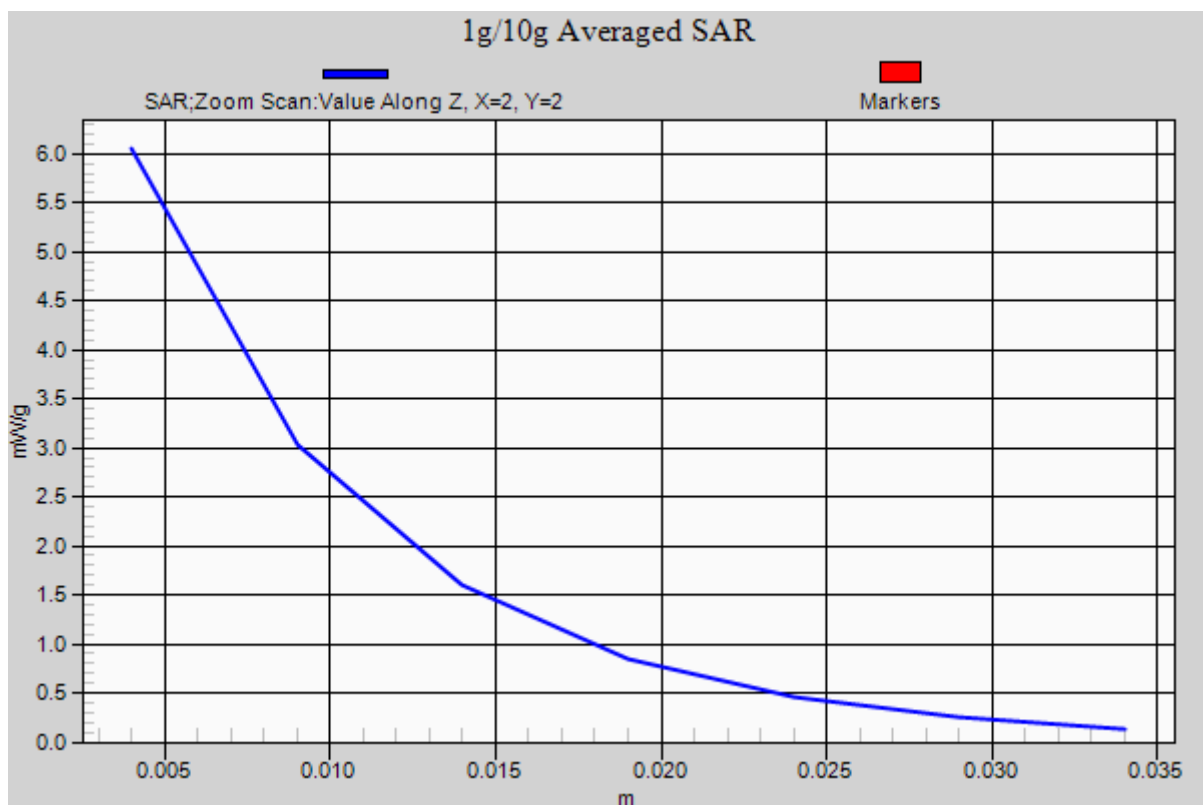
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Input Power = 20.0 dBm (100 mW)

Peak SAR (extrapolated) = 11.331 mW/g

**SAR(1 g) = 5.33 mW/g; SAR(10 g) = 2.44 mW/g**

Deviation = 5.96%



## 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: **D835V2-4d119\_Apr12**

## CALIBRATION CERTIFICATE

Object **D835V2 - SN: 4d119**

Calibration procedure(s) **QA CAL-05.v8**  
**Calibration procedure for dipole validation kits above 700 MHz**

Calibration date: **April 20, 2012**

✓ KOK  
5/4/12

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 EPM-442A        | GB37480704         | 05-Oct-11 (No. 217-01451)         | Oct-12                 |
| Power sensor HP 8481A       | US37292783         | 05-Oct-11 (No. 217-01451)         | Oct-12                 |
| Reference 20 dB Attenuator  | SN: 5058 (20k)     | 27-Mar-12 (No. 217-01530)         | Apr-13                 |
| Type-N mismatch combination | SN: 5047.2 / 06327 | 27-Mar-12 (No. 217-01533)         | Apr-13                 |
| Reference Probe ES3DV3      | SN: 3205           | 30-Dec-11 (No. ES3-3205_Dec11)    | Dec-12                 |
| DAE4                        | SN: 601            | 04-Jul-11 (No. DAE4-601_Jul11)    | Jul-12                 |
| Secondary Standards         | ID #               | Check Date (in house)             | Scheduled Check        |
| Power sensor HP 8481A       | MY41092317         | 18-Oct-02 (in house check Oct-11) | In house check: Oct-13 |
| RF generator R&S SMT-06     | 100005             | 04-Aug-99 (in house check Oct-11) | In house check: Oct-13 |
| Network Analyzer HP 8753E   | US37390585 S4206   | 18-Oct-01 (in house check Oct-11) | In house check: Oct-12 |

|                |                |                       |           |
|----------------|----------------|-----------------------|-----------|
|                | Name           | Function              | Signature |
| Calibrated by: | Israe El-Naouq | Laboratory Technician |           |
| Approved by:   | Katja Pokovic  | Technical Manager     |           |

Issued: April 20, 2012

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



Accredited by the Swiss Accreditation Service (SAS)

Accreditation No.: **SCS 108**

The Swiss Accreditation Service is one of the signatories to the EA  
Multilateral Agreement for the recognition of calibration certificates

### 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.

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%.

## Measurement Conditions

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

|                              |                        |             |
|------------------------------|------------------------|-------------|
| DASY Version                 | DASY5                  | V52.8.1     |
| Extrapolation                | Advanced Extrapolation |             |
| Phantom                      | Modular Flat Phantom   |             |
| Distance Dipole Center - TSL | 15 mm                  | with Spacer |
| Zoom Scan Resolution         | dx, dy, dz = 5 mm      |             |
| Frequency                    | 835 MHz $\pm$ 1 MHz    |             |

## Head TSL parameters

The following parameters and calculations were applied.

|                                         | Temperature         | Permittivity   | Conductivity         |
|-----------------------------------------|---------------------|----------------|----------------------|
| Nominal Head TSL parameters             | 22.0 °C             | 41.5           | 0.90 mho/m           |
| Measured Head TSL parameters            | (22.0 $\pm$ 0.2) °C | 41.1 $\pm$ 6 % | 0.90 mho/m $\pm$ 6 % |
| Head TSL temperature change during test | < 0.5 °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 | 2.36 mW / g                   |
| SAR for nominal Head TSL parameters                   | normalized to 1W   | 9.42 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 | 1.55 mW / g                   |
| SAR for nominal Head TSL parameters                     | normalized to 1W   | 6.19 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             | 55.2           | 0.97 mho/m           |
| Measured Body TSL parameters            | (22.0 $\pm$ 0.2) °C | 54.5 $\pm$ 6 % | 1.01 mho/m $\pm$ 6 % |
| Body TSL temperature change during test | < 0.5 °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 | 2.47 mW / g                    |
| SAR for nominal Body TSL parameters                   | normalized to 1W   | 9.56 mW / g $\pm$ 17.0 % (k=2) |

|                                                         |                    |                                |
|---------------------------------------------------------|--------------------|--------------------------------|
| SAR averaged over 10 cm <sup>3</sup> (10 g) of Body TSL | condition          |                                |
| SAR measured                                            | 250 mW input power | 1.62 mW / g                    |
| SAR for nominal Body TSL parameters                     | normalized to 1W   | 6.31 mW / g $\pm$ 16.5 % (k=2) |

## Appendix

### Antenna Parameters with Head TSL

|                                      |                                |
|--------------------------------------|--------------------------------|
| Impedance, transformed to feed point | 51.3 $\Omega$ - 2.2 j $\Omega$ |
| Return Loss                          | - 32.1 dB                      |

### Antenna Parameters with Body TSL

|                                      |                                |
|--------------------------------------|--------------------------------|
| Impedance, transformed to feed point | 46.8 $\Omega$ - 4.3 j $\Omega$ |
| Return Loss                          | - 25.2 dB                      |

### General Antenna Parameters and Design

|                                  |          |
|----------------------------------|----------|
| Electrical Delay (one direction) | 1.386 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. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.

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 | June 29, 2010 |

## DASY5 Validation Report for Head TSL

Date: 20.04.2012

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN: 4d119**

Communication System: CW; Frequency: 835 MHz

Medium parameters used:  $f = 835$  MHz;  $\sigma = 0.9$  mho/m;  $\epsilon_r = 41.1$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

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

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(6.07, 6.07, 6.07); Calibrated: 30.12.2011;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.07.2011
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.8.1(838); SEMCAD X 14.6.5(6469)

### **Dipole Calibration for Head Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:**

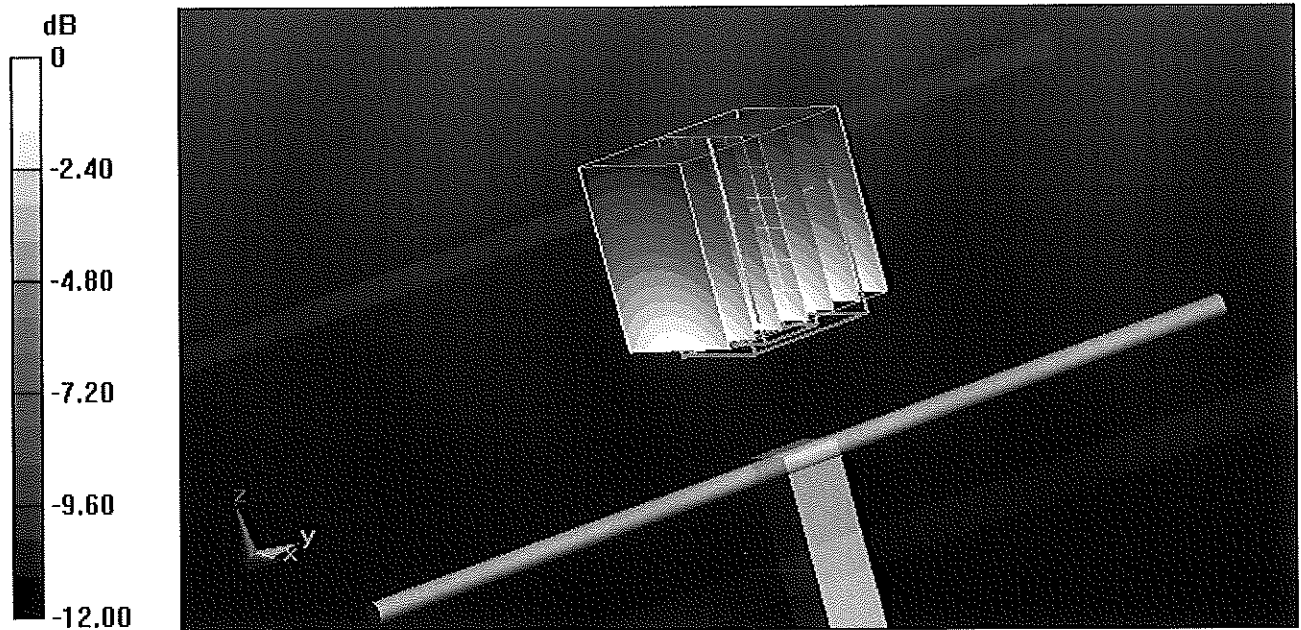
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 57.041 V/m; Power Drift = 0.04 dB

Peak SAR (extrapolated) = 3.480 mW/g

**SAR(1 g) = 2.36 mW/g; SAR(10 g) = 1.55 mW/g**

Maximum value of SAR (measured) = 2.75 mW/g



0 dB = 2.75 mW/g = 8.79 dB mW/g

## Impedance Measurement Plot for Head TSL

20 Apr 2012 09:34:14  
[CH1] S11 1 U FS 1: 51.279  $\Omega$  -2.1582  $\Omega$  88.316 pF 835.000 000 MHz

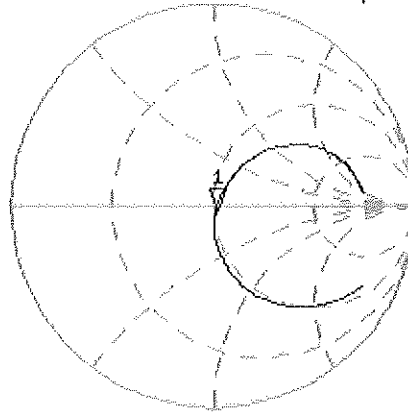
\*

De1

Cor

Avg  
16

H1d

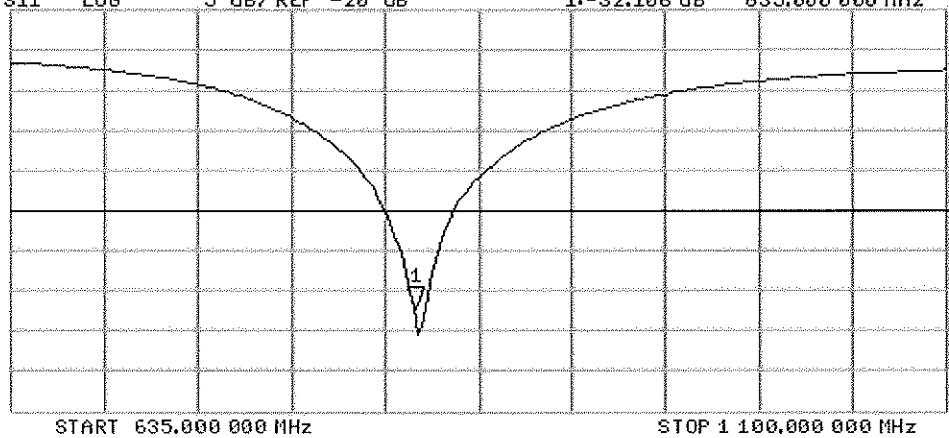


CH2 S11 LOG 5 dB/REF -20 dB 1: -32.106 dB 835.000 000 MHz

Cor

Avg  
16

H1d



## DASY5 Validation Report for Body TSL

Date: 19.04.2012

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN: 4d119**

Communication System: CW; Frequency: 835 MHz

Medium parameters used:  $f = 835 \text{ MHz}$ ;  $\sigma = 1.01 \text{ mho/m}$ ;  $\epsilon_r = 54.5$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

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

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(6.02, 6.02, 6.02); Calibrated: 30.12.2011;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.07.2011
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.8.1(838); SEMCAD X 14.6.5(6469)

**Dipole Calibration for Body Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:**

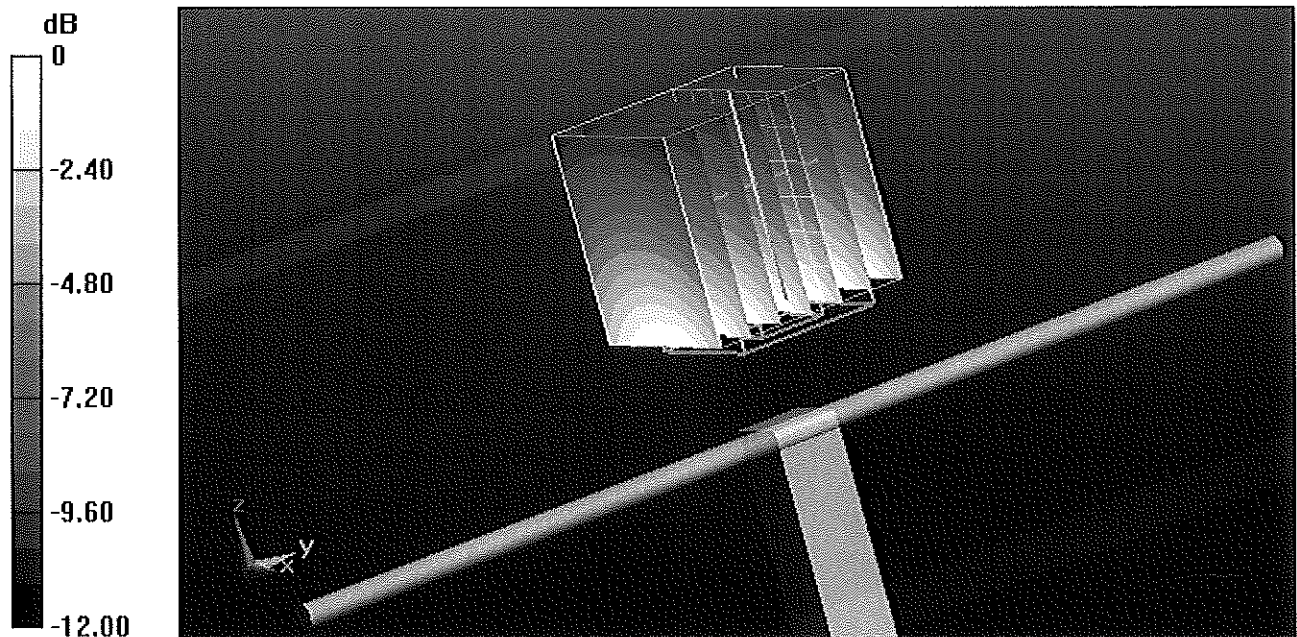
Measurement grid:  $dx=5\text{mm}$ ,  $dy=5\text{mm}$ ,  $dz=5\text{mm}$

Reference Value = 55.253 V/m; Power Drift = 0.02 dB

Peak SAR (extrapolated) = 3.571 mW/g

**SAR(1 g) = 2.47 mW/g; SAR(10 g) = 1.62 mW/g**

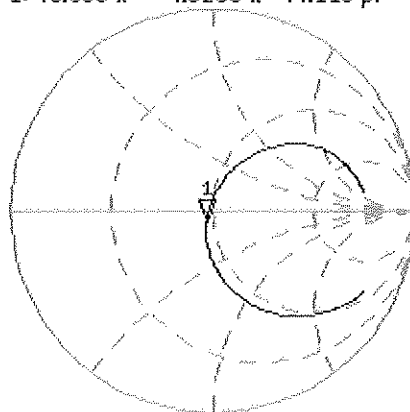
Maximum value of SAR (measured) = 2.87 mW/g



# Impedance Measurement Plot for Body TSL

19 Apr 2012 10:20:53  
 [CH1] S11 1 U FS 1: 46.836  $\Omega$  -4.3203  $\Omega$  44.118 pF 835.000 000 MHz

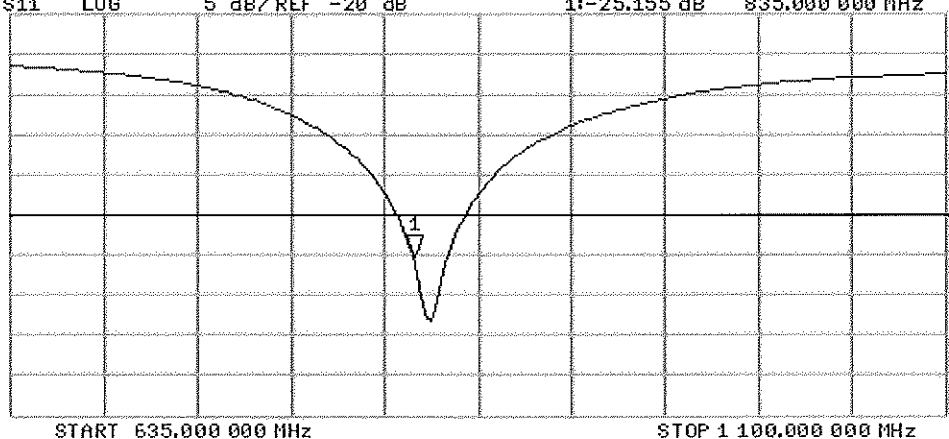
\*  
 Del  
 Cor



Avg  
 16  
 H1d

CH2 S11 LOG 5 dB/REF -20 dB 1:-25.155 dB 835.000 000 MHz

Cor  
 Avg  
 16  
 H1d





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: **D1900V2-5d149\_Feb12**

## CALIBRATION CERTIFICATE

Object **D1900V2 - SN: 5d149**

Calibration procedure(s) **QA CAL-05.v8**  
**Calibration procedure for dipole validation kits above 700 MHz**

Calibration date: **February 22, 2012**

✓ KOK  
 4/11/12

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         | 05-Oct-11 (No. 217-01451)         | Oct-12                 |
| Power sensor HP 8481A       | US37292783         | 05-Oct-11 (No. 217-01451)         | Oct-12                 |
| Reference 20 dB Attenuator  | SN: 5086 (20g)     | 29-Mar-11 (No. 217-01368)         | Apr-12                 |
| Type-N mismatch combination | SN: 5047.2 / 06327 | 29-Mar-11 (No. 217-01371)         | Apr-12                 |
| Reference Probe ES3DV3      | SN: 3205           | 30-Dec-11 (No. ES3-3205_Dec11)    | Dec-12                 |
| DAE4                        | SN: 601            | 04-Jul-11 (No. DAE4-601_Jul11)    | Jul-12                 |
| Secondary Standards         | ID #               | Check Date (in house)             | Scheduled Check        |
| Power sensor HP 8481A       | MY41092317         | 18-Oct-02 (in house check Oct-11) | In house check: Oct-13 |
| RF generator R&S SMT-06     | 100005             | 04-Aug-99 (in house check Oct-11) | In house check: Oct-13 |
| Network Analyzer HP 8753E   | US37390585 S4206   | 18-Oct-01 (in house check Oct-11) | In house check: Oct-12 |

|                |                               |                                          |               |
|----------------|-------------------------------|------------------------------------------|---------------|
| Calibrated by: | Name<br><b>Israe El-Naouq</b> | Function<br><b>Laboratory Technician</b> | Signature<br> |
| Approved by:   | <b>Katja Pokovic</b>          | <b>Technical Manager</b>                 |               |

Issued: February 23, 2012

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



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**

**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.

|                                     |                        |             |
|-------------------------------------|------------------------|-------------|
| <b>DASY Version</b>                 | DASY5                  | V52.8.0     |
| <b>Extrapolation</b>                | Advanced Extrapolation |             |
| <b>Phantom</b>                      | Modular Flat Phantom   |             |
| <b>Distance Dipole Center - TSL</b> | 10 mm                  | with Spacer |
| <b>Zoom Scan Resolution</b>         | dx, dy, dz = 5 mm      |             |
| <b>Frequency</b>                    | 1900 MHz $\pm$ 1 MHz   |             |

## Head TSL parameters

The following parameters and calculations were applied.

|                                                | Temperature         | Permittivity   | Conductivity         |
|------------------------------------------------|---------------------|----------------|----------------------|
| <b>Nominal Head TSL parameters</b>             | 22.0 °C             | 40.0           | 1.40 mho/m           |
| <b>Measured Head TSL parameters</b>            | (22.0 $\pm$ 0.2) °C | 40.4 $\pm$ 6 % | 1.40 mho/m $\pm$ 6 % |
| <b>Head TSL temperature change during test</b> | < 0.5 °C            | ----           | ----                 |

## SAR result with Head TSL

|                                                             |                    |                                                  |
|-------------------------------------------------------------|--------------------|--------------------------------------------------|
| <b>SAR averaged over 1 cm<sup>3</sup> (1 g) of Head TSL</b> | Condition          |                                                  |
| SAR measured                                                | 250 mW input power | 9.80 mW / g                                      |
| SAR for nominal Head TSL parameters                         | normalized to 1W   | <b>39.3 mW / g <math>\pm</math> 17.0 % (k=2)</b> |

|                                                               |                    |                                                  |
|---------------------------------------------------------------|--------------------|--------------------------------------------------|
| <b>SAR averaged over 10 cm<sup>3</sup> (10 g) of Head TSL</b> | condition          |                                                  |
| SAR measured                                                  | 250 mW input power | 5.18 mW / g                                      |
| SAR for nominal Head TSL parameters                           | normalized to 1W   | <b>20.7 mW / g <math>\pm</math> 16.5 % (k=2)</b> |

## Body TSL parameters

The following parameters and calculations were applied.

|                                                | Temperature         | Permittivity   | Conductivity         |
|------------------------------------------------|---------------------|----------------|----------------------|
| <b>Nominal Body TSL parameters</b>             | 22.0 °C             | 53.3           | 1.52 mho/m           |
| <b>Measured Body TSL parameters</b>            | (22.0 $\pm$ 0.2) °C | 53.0 $\pm$ 6 % | 1.56 mho/m $\pm$ 6 % |
| <b>Body TSL temperature change during test</b> | < 0.5 °C            | ----           | ----                 |

## SAR result with Body TSL

|                                                             |                    |                                                  |
|-------------------------------------------------------------|--------------------|--------------------------------------------------|
| <b>SAR averaged over 1 cm<sup>3</sup> (1 g) of Body TSL</b> | Condition          |                                                  |
| SAR measured                                                | 250 mW input power | 9.99 mW / g                                      |
| SAR for nominal Body TSL parameters                         | normalized to 1W   | <b>39.3 mW / g <math>\pm</math> 17.0 % (k=2)</b> |

|                                                               |                    |                                                  |
|---------------------------------------------------------------|--------------------|--------------------------------------------------|
| <b>SAR averaged over 10 cm<sup>3</sup> (10 g) of Body TSL</b> | condition          |                                                  |
| SAR measured                                                  | 250 mW input power | 5.23 mW / g                                      |
| SAR for nominal Body TSL parameters                           | normalized to 1W   | <b>20.7 mW / g <math>\pm</math> 16.5 % (k=2)</b> |

## Appendix

### Antenna Parameters with Head TSL

|                                      |                             |
|--------------------------------------|-----------------------------|
| Impedance, transformed to feed point | $52.4 \Omega + 5.5 j\Omega$ |
| Return Loss                          | - 24.6 dB                   |

### Antenna Parameters with Body TSL

|                                      |                             |
|--------------------------------------|-----------------------------|
| Impedance, transformed to feed point | $48.0 \Omega + 6.7 j\Omega$ |
| Return Loss                          | - 23.0 dB                   |

### General Antenna Parameters and Design

|                                  |          |
|----------------------------------|----------|
| Electrical Delay (one direction) | 1.199 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. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.

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 | March 11, 2011 |

## DASY5 Validation Report for Head TSL

Date: 22.02.2012

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN: 5d149**

Communication System: CW; Frequency: 1900 MHz

Medium parameters used:  $f = 1900$  MHz;  $\sigma = 1.4$  mho/m;  $\epsilon_r = 40.4$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

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

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(5.01, 5.01, 5.01); Calibrated: 30.12.2011
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.07.2011
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.0(692); SEMCAD X 14.6.4(4989)

### **Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:**

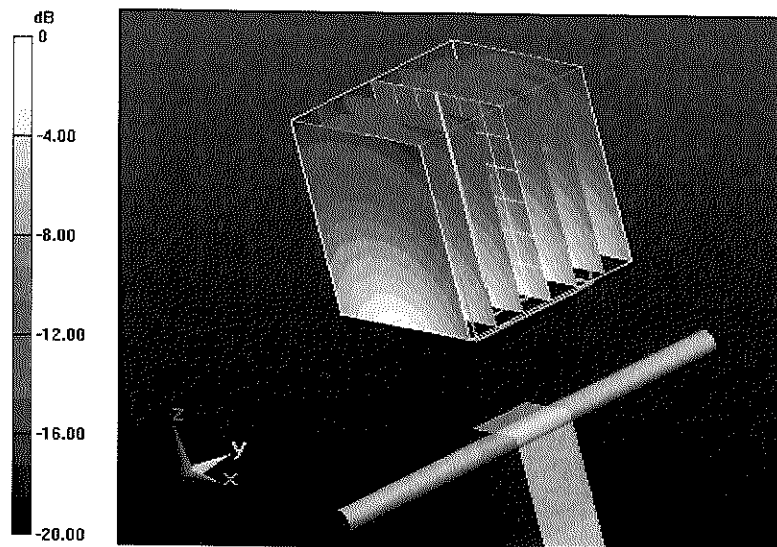
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 96.685 V/m; Power Drift = 0.04 dB

Peak SAR (extrapolated) = 17.4710

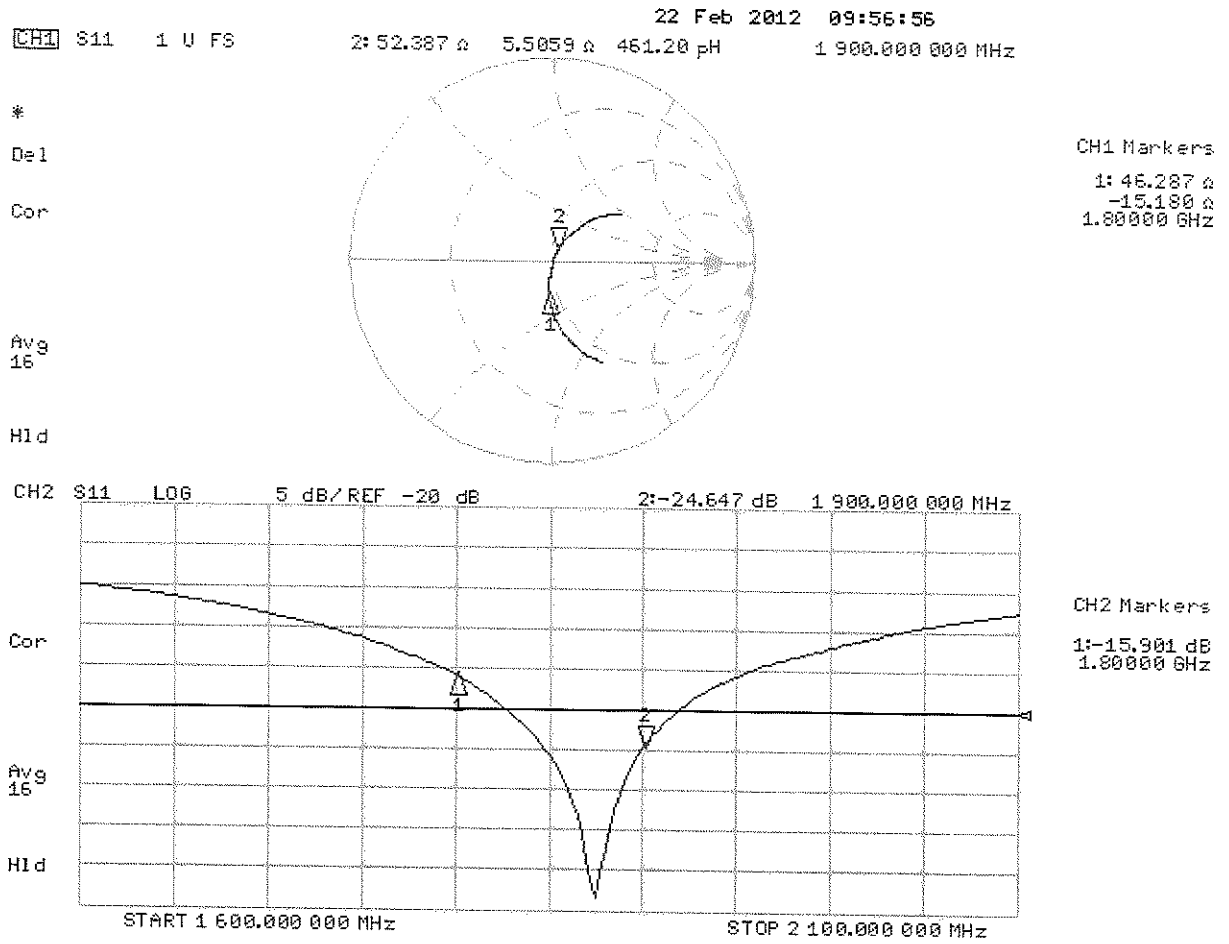
**SAR(1 g) = 9.8 mW/g; SAR(10 g) = 5.18 mW/g**

Maximum value of SAR (measured) = 12.114 mW/g



0 dB = 12.110mW/g = 21.66 dB mW/g

# Impedance Measurement Plot for Head TSL



## DASY5 Validation Report for Body TSL

Date: 06.02.2012

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN: 5d149**

Communication System: CW; Frequency: 1900 MHz

Medium parameters used:  $f = 1900$  MHz;  $\sigma = 1.56$  mho/m;  $\epsilon_r = 53$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

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

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.62, 4.62, 4.62); Calibrated: 30.12.2011
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.07.2011
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.0(692); SEMCAD X 14.6.4(4989)

### **Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:**

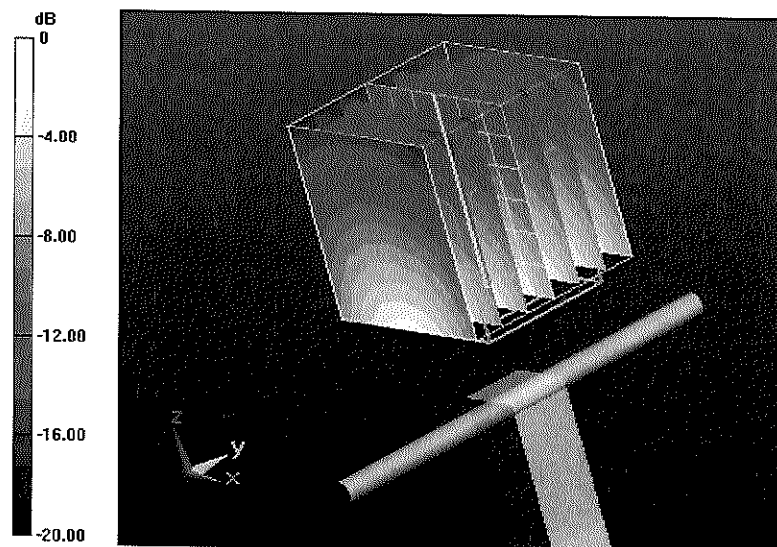
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 94.047 V/m; Power Drift = 0.0017 dB

Peak SAR (extrapolated) = 18.1310

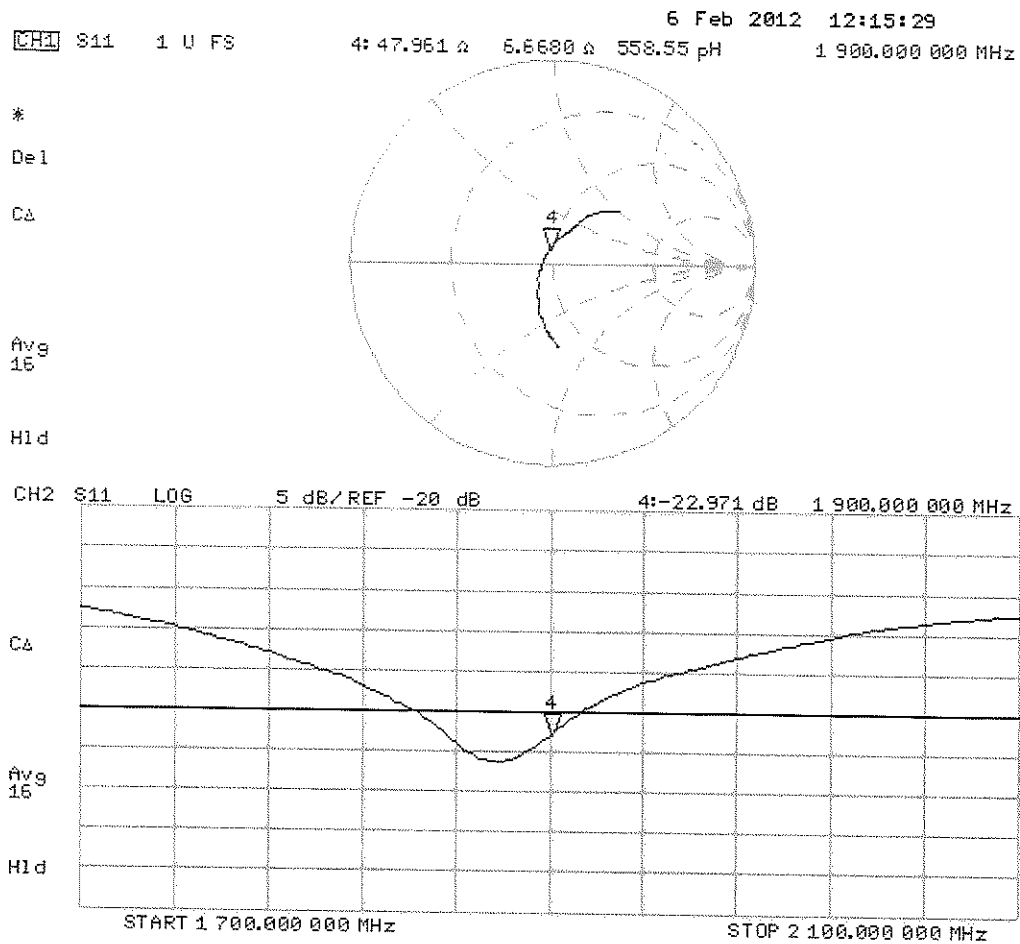
**SAR(1 g) = 9.99 mW/g; SAR(10 g) = 5.23 mW/g**

Maximum value of SAR (measured) = 12.672 mW/g



0 dB = 12.670mW/g = 22.06 dB mW/g

# Impedance Measurement Plot for Body TSL





Accredited by the Swiss Accreditation Service (SAS)

Accreditation No.: **SCS 108**

The Swiss Accreditation Service is one of the signatories to the EA  
Multilateral Agreement for the recognition of calibration certificates

Client **PC Test**

Certificate No: **ES3-3258\_Feb12**

## CALIBRATION CERTIFICATE

Object **ES3DV3 - SN:3258**

Calibration procedure(s) **QA CAL-01.v8, QA CAL-23.v4, QA CAL-25.v4  
Calibration procedure for dosimetric E-field probes**

Calibration date: **February 21, 2012**

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      | 31-Mar-11 (No. 217-01372)         | Apr-12                 |
| Power sensor E4412A        | MY41498087      | 31-Mar-11 (No. 217-01372)         | Apr-12                 |
| Reference 3 dB Attenuator  | SN: S5054 (3c)  | 29-Mar-11 (No. 217-01369)         | Apr-12                 |
| Reference 20 dB Attenuator | SN: S5086 (20b) | 29-Mar-11 (No. 217-01367)         | Apr-12                 |
| Reference 30 dB Attenuator | SN: S5129 (30b) | 29-Mar-11 (No. 217-01370)         | Apr-12                 |
| Reference Probe ES3DV2     | SN: 3013        | 29-Dec-11 (No. ES3-3013_Dec11)    | Dec-12                 |
| DAE4                       | SN: 654         | 3-May-11 (No. DAE4-654_May11)     | May-12                 |
| Secondary Standards        | ID              | Check Date (in house)             | Scheduled Check        |
| RF generator HP 8648C      | US3642U01700    | 4-Aug-99 (in house check Apr-11)  | In house check: Apr-13 |
| Network Analyzer HP 8753E  | US37390585      | 18-Oct-01 (in house check Oct-11) | In house check: Oct-12 |

|                                                                                                                 |                                |                                          |               |
|-----------------------------------------------------------------------------------------------------------------|--------------------------------|------------------------------------------|---------------|
| Calibrated by:                                                                                                  | Name<br><b>Claudio Leubler</b> | Function<br><b>Laboratory Technician</b> | Signature<br> |
| Approved by:                                                                                                    | <b>Katja Pokovic</b>           | <b>Technical Manager</b>                 |               |
| This calibration certificate shall not be reproduced except in full without written approval of the laboratory. |                                |                                          |               |

Issued: February 23, 2012



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**

### 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 $\varphi$   | $\varphi$ rotation around probe axis                                                                                                                    |
| Polarization $\vartheta$ | $\vartheta$ rotation around an axis that is in the plane normal to probe axis (at measurement center),<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<sup>2</sup>-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>; 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 ES3DV3

## SN:3258

Manufactured: January 25, 2010  
Calibrated: February 21, 2012

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

## DASY/EASY - Parameters of Probe: ES3DV3 - SN:3258

### Basic Calibration Parameters

|                                                    | Sensor X | Sensor Y | Sensor Z | Unc (k=2)     |
|----------------------------------------------------|----------|----------|----------|---------------|
| Norm ( $\mu\text{V}/(\text{V/m})^2$ ) <sup>A</sup> | 1.29     | 1.18     | 1.23     | $\pm 10.1 \%$ |
| DCP (mV) <sup>B</sup>                              | 101.6    | 105.0    | 100.8    |               |

### 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    | 115.9    | $\pm 3.0 \%$              |
|       |                           |      | Y | 0.00    | 0.00    | 1.00    | 107.9    |                           |
|       |                           |      | Z | 0.00    | 0.00    | 1.00    | 115.8    |                           |

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  $E^2$ -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: ES3DV3 - SN:3258

### 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                            | 6.26    | 6.26    | 6.26    | 0.43  | 1.49       | ± 12.0 %    |
| 835                  | 41.5                               | 0.90                            | 6.01    | 6.01    | 6.01    | 0.45  | 1.48       | ± 12.0 %    |
| 1640                 | 40.3                               | 1.29                            | 5.46    | 5.46    | 5.46    | 0.61  | 1.30       | ± 12.0 %    |
| 1750                 | 40.1                               | 1.37                            | 5.30    | 5.30    | 5.30    | 0.67  | 1.30       | ± 12.0 %    |
| 1900                 | 40.0                               | 1.40                            | 5.17    | 5.17    | 5.17    | 0.79  | 1.23       | ± 12.0 %    |
| 2450                 | 39.2                               | 1.80                            | 4.46    | 4.46    | 4.46    | 0.67  | 1.40       | ± 12.0 %    |
| 2600                 | 39.0                               | 1.96                            | 4.31    | 4.31    | 4.31    | 0.80  | 1.33       | ± 12.0 %    |

<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: ES3DV3 - SN:3258

### Calibration Parameter Determined in Body Tissue Simulating Media

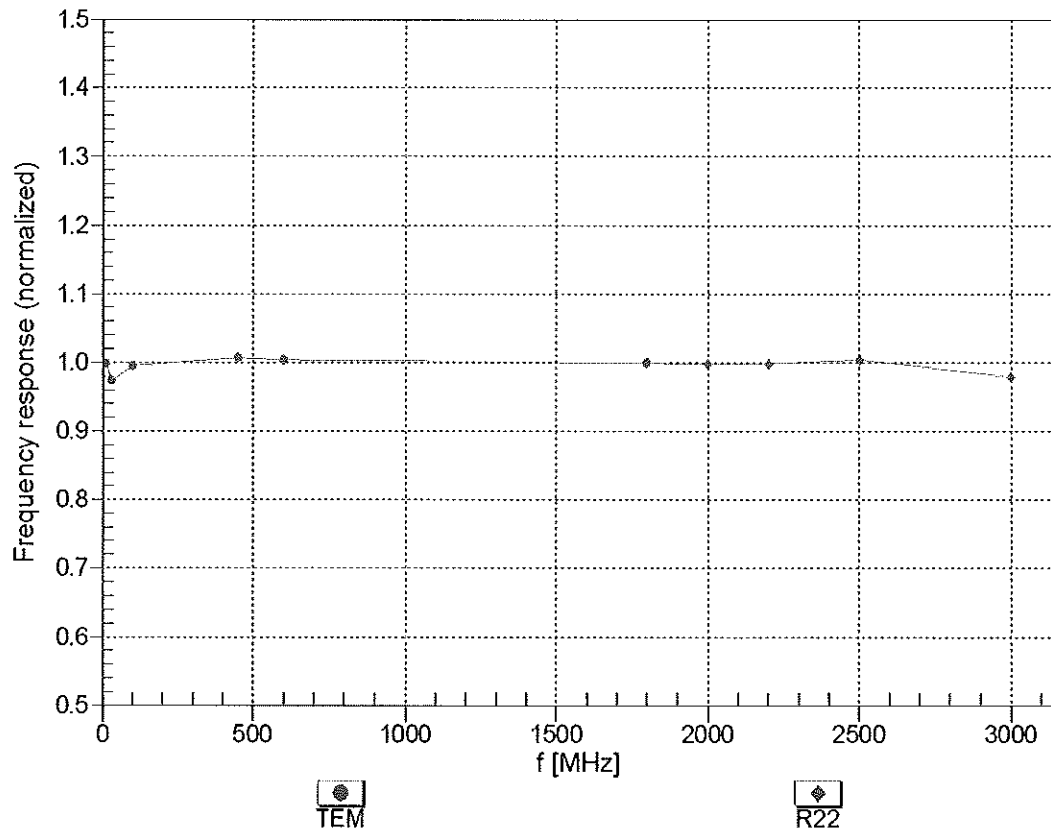
| f (MHz) <sup>C</sup> | Relative Permittivity <sup>F</sup> | Conductivity (S/m) <sup>F</sup> | ConvF X | ConvF Y | ConvF Z | Alpha | Depth (mm) | Unct. (k=2) |
|----------------------|------------------------------------|---------------------------------|---------|---------|---------|-------|------------|-------------|
| 750                  | 55.5                               | 0.96                            | 6.21    | 6.21    | 6.21    | 0.80  | 1.13       | ± 12.0 %    |
| 835                  | 55.2                               | 0.97                            | 6.06    | 6.06    | 6.06    | 0.50  | 1.46       | ± 12.0 %    |
| 1640                 | 53.8                               | 1.40                            | 5.45    | 5.45    | 5.45    | 0.80  | 1.23       | ± 12.0 %    |
| 1750                 | 53.4                               | 1.49                            | 4.99    | 4.99    | 4.99    | 0.60  | 1.48       | ± 12.0 %    |
| 1900                 | 53.3                               | 1.52                            | 4.70    | 4.70    | 4.70    | 0.56  | 1.57       | ± 12.0 %    |
| 2450                 | 52.7                               | 1.95                            | 4.28    | 4.28    | 4.28    | 0.80  | 1.08       | ± 12.0 %    |
| 2600                 | 52.5                               | 2.16                            | 4.05    | 4.05    | 4.05    | 0.80  | 1.02       | ± 12.0 %    |

<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.

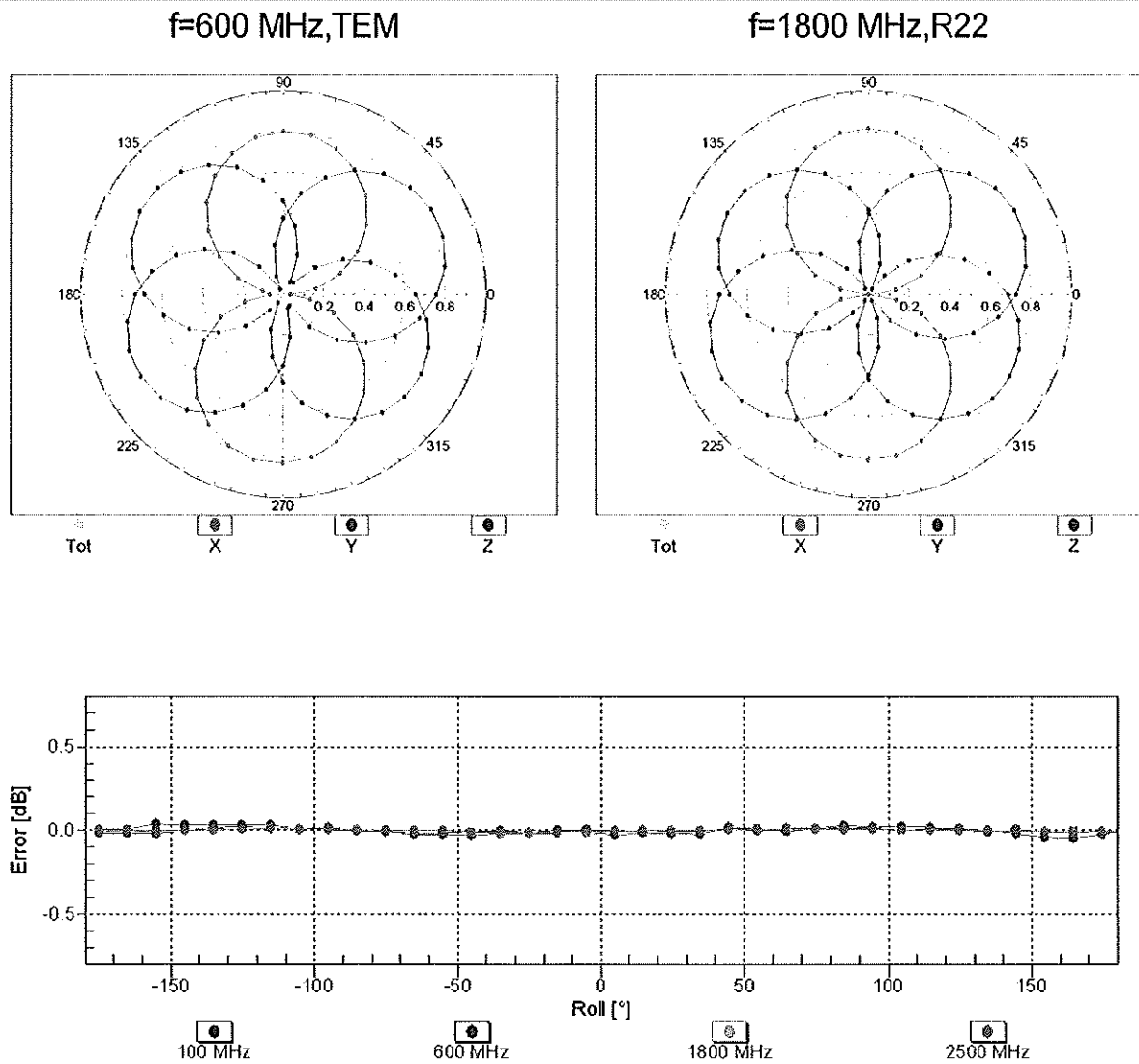
## Frequency Response of E-Field

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



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

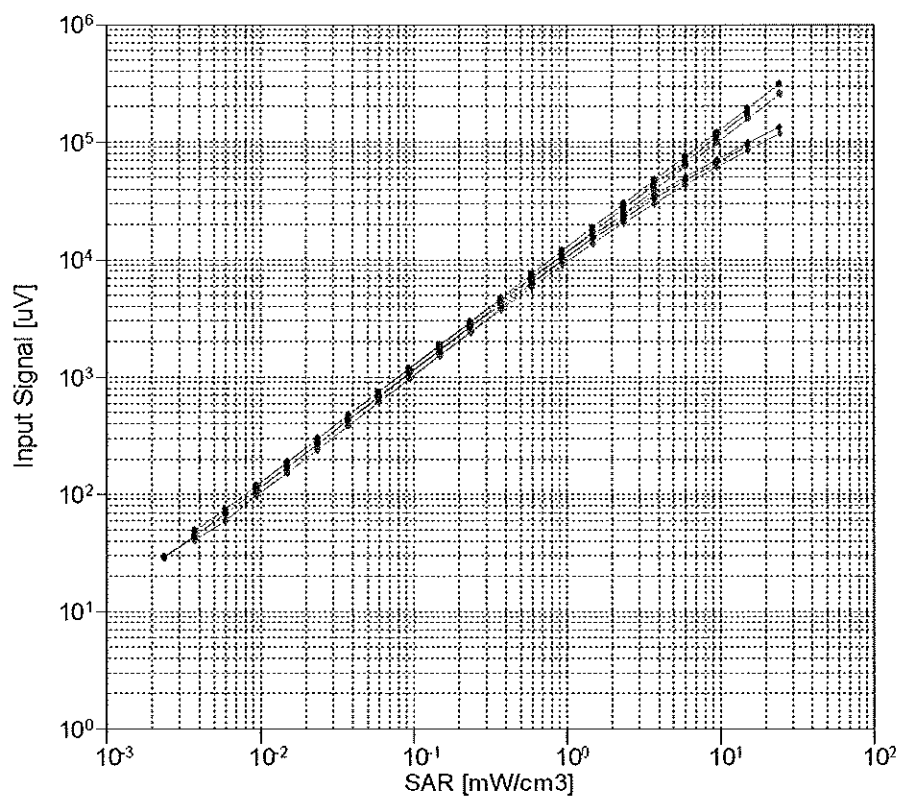
## Receiving Pattern ( $\phi$ ), $\theta = 0^\circ$



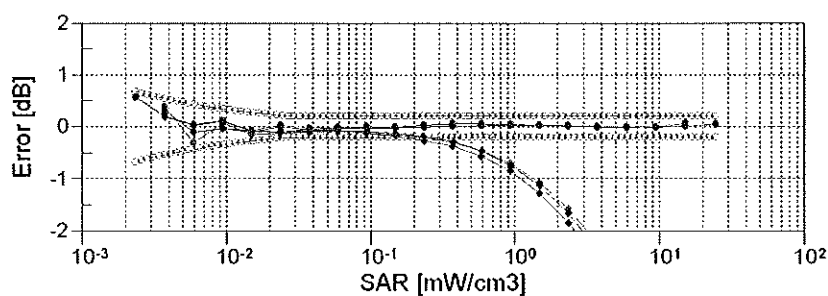
Uncertainty of Axial Isotropy Assessment:  $\pm 0.5\%$  ( $k=2$ )

## Dynamic Range $f(\text{SAR}_{\text{head}})$

(TEM cell ,  $f = 900 \text{ MHz}$ )



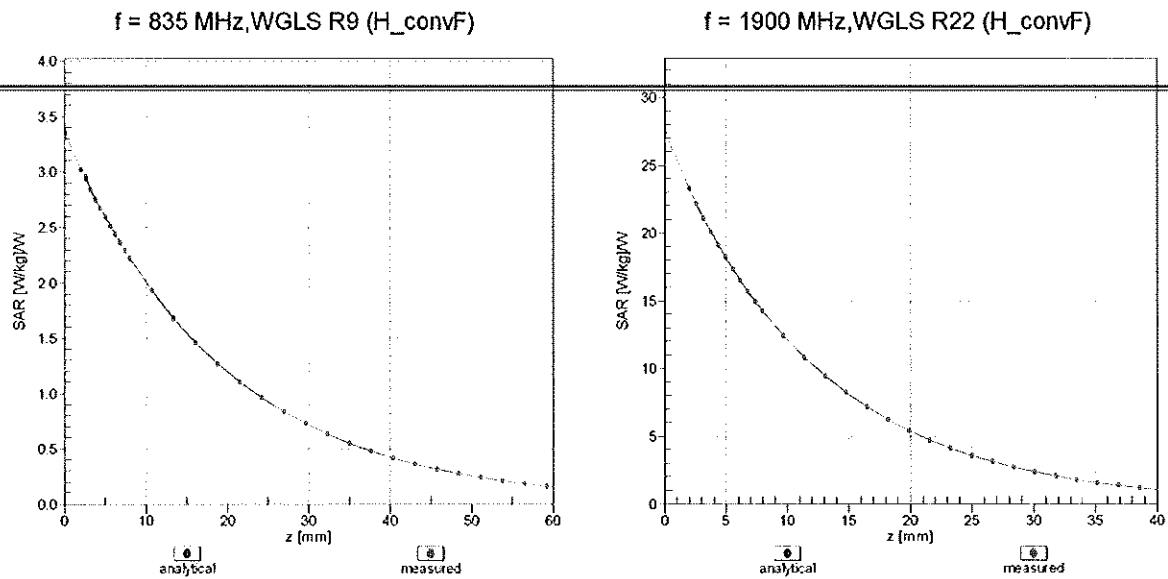
X compensated      X not compensated      Y compensated  
 Y not compensated      Z compensated      Z not compensated



X compensated      X not compensated      Y compensated  
 Y not compensated      Z compensated      Z not compensated

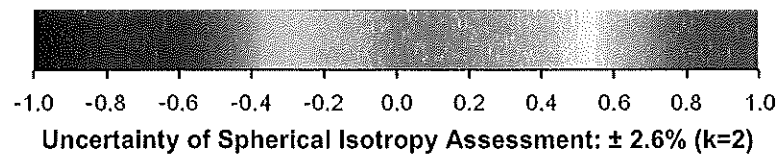
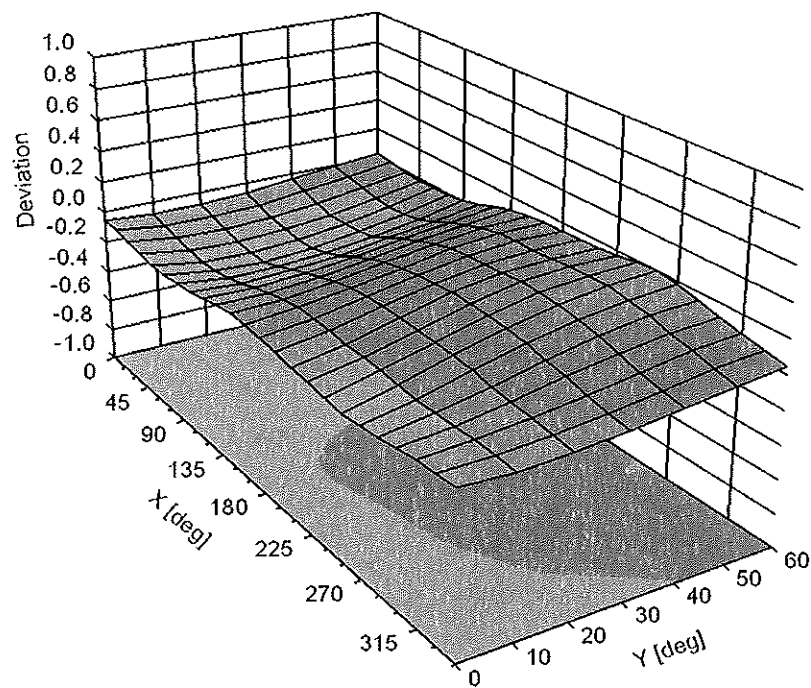
Uncertainty of Linearity Assessment:  $\pm 0.6\%$  ( $k=2$ )

## Conversion Factor Assessment



## Deviation from Isotropy in Liquid

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



## DASY/EASY - Parameters of Probe: ES3DV3 - SN:3258

### 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 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           |



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: **ES3-3287\_Feb12**

## CALIBRATION CERTIFICATE

Object **ES3DV3 - SN:3287**

Calibration procedure(s) **QA CAL-01.v8, QA CAL-23.v4, QA CAL-25.v4**  
**Calibration procedure for dosimetric E-field probes**

Calibration date: **February 7, 2012**

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  
5/14/12

| Primary Standards          | ID              | Cal Date (Certificate No.)        | Scheduled Calibration  |
|----------------------------|-----------------|-----------------------------------|------------------------|
| Power meter E4419B         | GB41293874      | 31-Mar-11 (No. 217-01372)         | Apr-12                 |
| Power sensor E4412A        | MY41498087      | 31-Mar-11 (No. 217-01372)         | Apr-12                 |
| Reference 3 dB Attenuator  | SN: S5054 (3c)  | 29-Mar-11 (No. 217-01369)         | Apr-12                 |
| Reference 20 dB Attenuator | SN: S5086 (20b) | 29-Mar-11 (No. 217-01367)         | Apr-12                 |
| Reference 30 dB Attenuator | SN: S5129 (30b) | 29-Mar-11 (No. 217-01370)         | Apr-12                 |
| Reference Probe ES3DV2     | SN: 3013        | 29-Dec-11 (No. ES3-3013_Dec11)    | Dec-12                 |
| DAE4                       | SN: 654         | 3-May-11 (No. DAE4-654_May11)     | May-12                 |
| Secondary Standards        | ID              | Check Date (in house)             | Scheduled Check        |
| RF generator HP 8648C      | US3642U01700    | 4-Aug-99 (in house check Apr-11)  | In house check: Apr-13 |
| Network Analyzer HP 8753E  | US37390585      | 18-Oct-01 (in house check Oct-11) | In house check: Oct-12 |

|                                                                                                                                                        |                               |                                          |               |
|--------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|------------------------------------------|---------------|
| Calibrated by:                                                                                                                                         | Name<br><b>Jeton Kastrati</b> | Function<br><b>Laboratory Technician</b> | Signature<br> |
| Approved by:                                                                                                                                           | Name<br><b>Katja Pokovic</b>  | Function<br><b>Technical Manager</b>     | Signature<br> |
| <p>This calibration certificate shall not be reproduced except in full without written approval of the laboratory.</p> <p>Issued: February 7, 2012</p> |                               |                                          |               |



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**

### 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 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>; 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 ES3DV3

## SN:3287

Manufactured: June 7, 2010  
Calibrated: February 7, 2012

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

## DASY/EASY - Parameters of Probe: ES3DV3 - SN:3287

### Basic Calibration Parameters

|                                                    | Sensor X | Sensor Y | Sensor Z | Unc (k=2) |
|----------------------------------------------------|----------|----------|----------|-----------|
| Norm ( $\mu\text{V}/(\text{V/m})^2$ ) <sup>A</sup> | 1.32     | 1.25     | 1.25     | ± 10.1 %  |
| DCP (mV) <sup>B</sup>                              | 105.6    | 102.9    | 99.3     |           |

### 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    | 119.5    | ±3.0 %                    |
|       |                           |      | Y | 0.00    | 0.00    | 1.00    | 112.1    |                           |
|       |                           |      | Z | 0.00    | 0.00    | 1.00    | 115.8    |                           |

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: ES3DV3 - SN:3287

### 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                            | 6.25    | 6.25    | 6.25    | 0.27  | 2.05       | ± 12.0 %    |
| 835                  | 41.5                               | 0.90                            | 6.06    | 6.06    | 6.06    | 0.63  | 1.27       | ± 12.0 %    |
| 1900                 | 40.0                               | 1.40                            | 5.06    | 5.06    | 5.06    | 0.72  | 1.25       | ± 12.0 %    |
| 2450                 | 39.2                               | 1.80                            | 4.44    | 4.44    | 4.44    | 0.76  | 1.32       | ± 12.0 %    |
| 2600                 | 39.0                               | 1.96                            | 4.24    | 4.24    | 4.24    | 0.80  | 1.32       | ± 12.0 %    |

<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: ES3DV3 - SN:3287

### Calibration Parameter Determined in Body Tissue Simulating Media

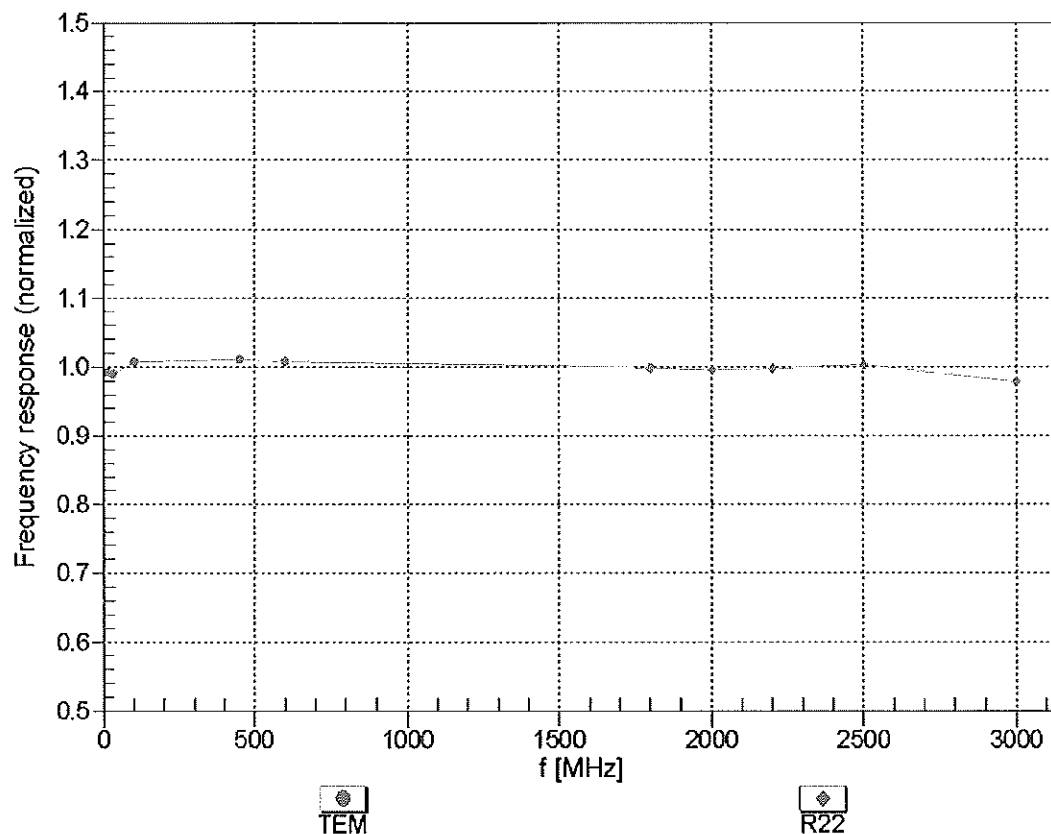
| f (MHz) <sup>C</sup> | Relative Permittivity <sup>F</sup> | Conductivity (S/m) <sup>F</sup> | ConvF X | ConvF Y | ConvF Z | Alpha | Depth (mm) | Unct. (k=2) |
|----------------------|------------------------------------|---------------------------------|---------|---------|---------|-------|------------|-------------|
| 750                  | 55.5                               | 0.96                            | 6.11    | 6.11    | 6.11    | 0.44  | 1.54       | ± 12.0 %    |
| 835                  | 55.2                               | 0.97                            | 6.02    | 6.02    | 6.02    | 0.35  | 1.80       | ± 12.0 %    |
| 1900                 | 53.3                               | 1.52                            | 4.76    | 4.76    | 4.76    | 0.59  | 1.56       | ± 12.0 %    |
| 2450                 | 52.7                               | 1.95                            | 4.28    | 4.28    | 4.28    | 0.80  | 1.09       | ± 12.0 %    |
| 2600                 | 52.5                               | 2.16                            | 4.05    | 4.05    | 4.05    | 0.80  | 1.03       | ± 12.0 %    |

<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

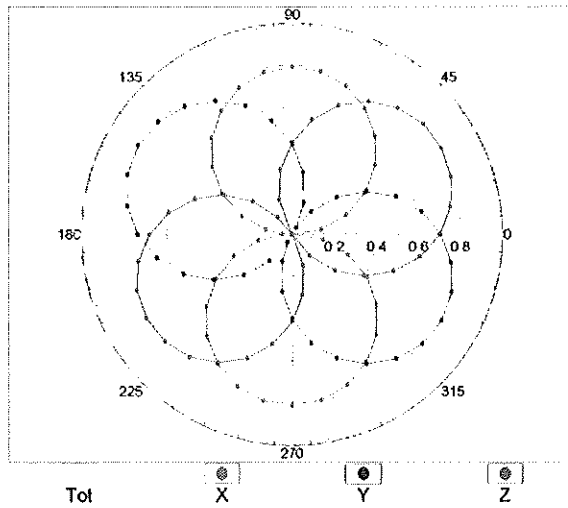
(TEM-Cell:ifi110 EXX, Waveguide: R22)



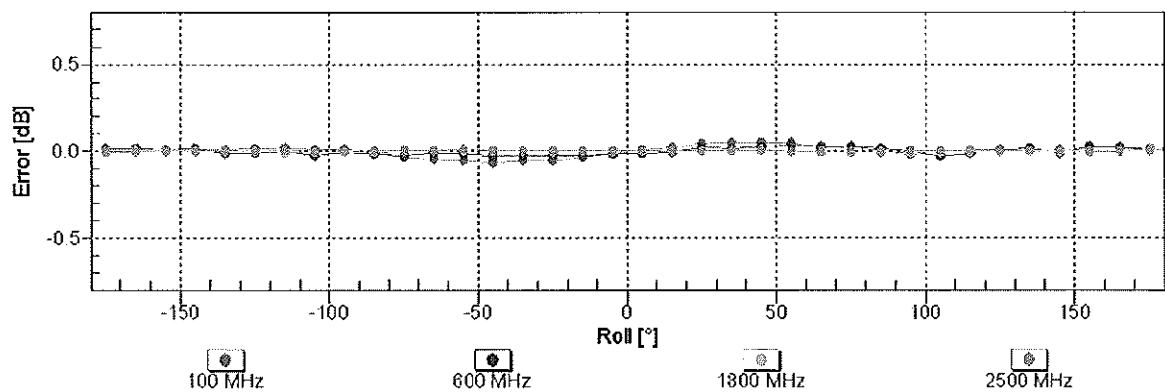
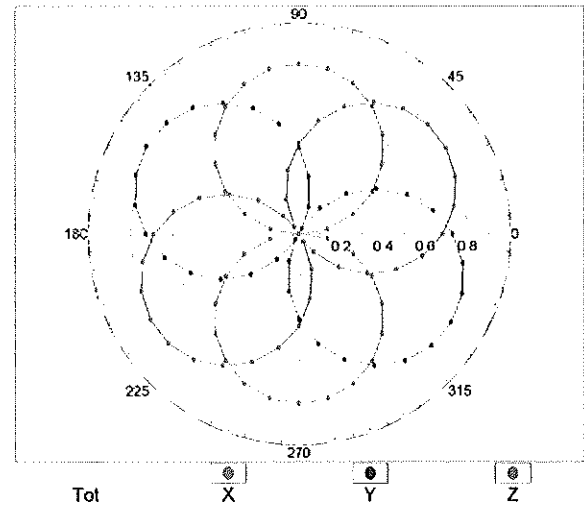
Uncertainty of Frequency Response of E-field:  $\pm 6.3\%$  ( $k=2$ )

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

f=600 MHz,TEM

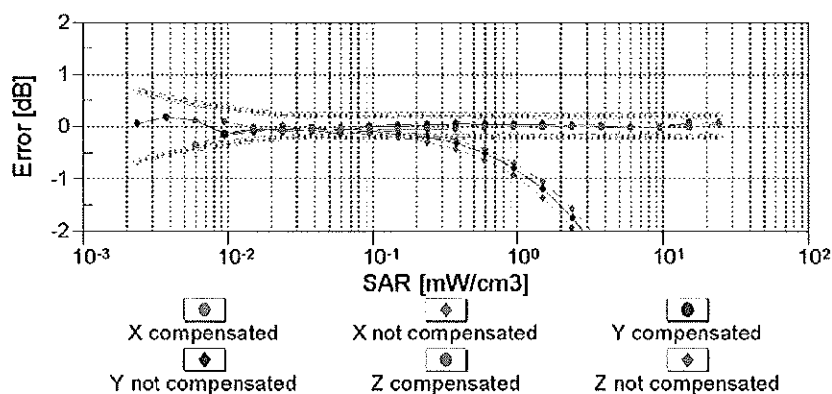
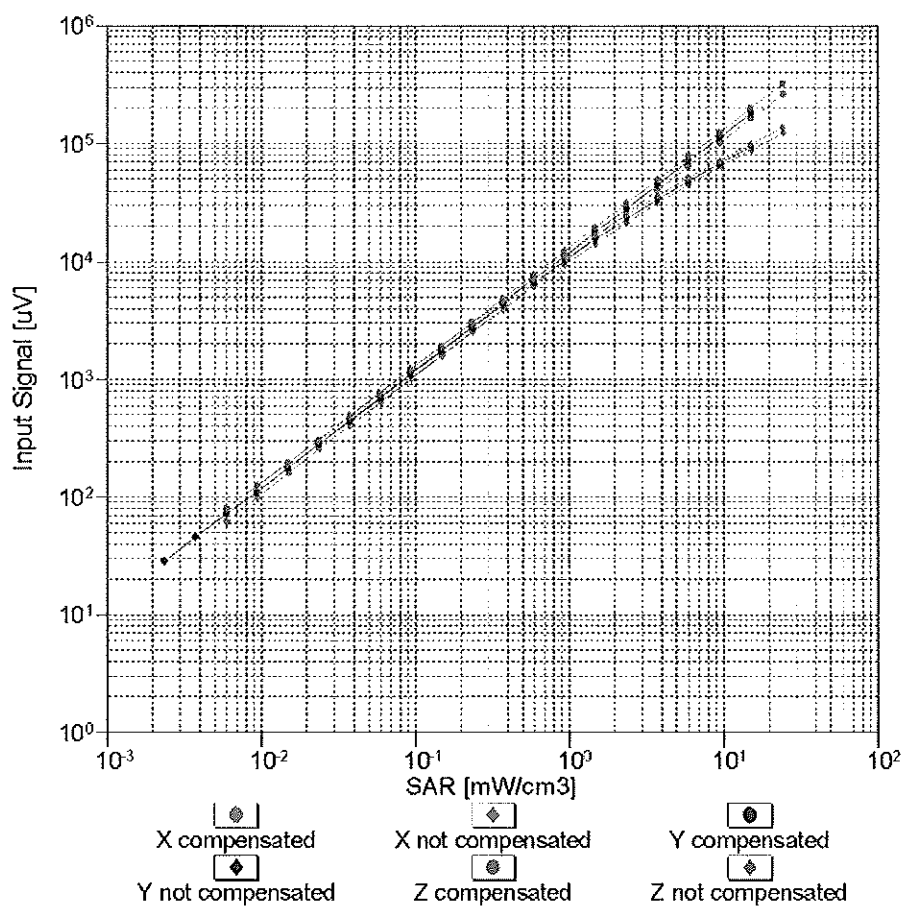


f=1800 MHz,R22



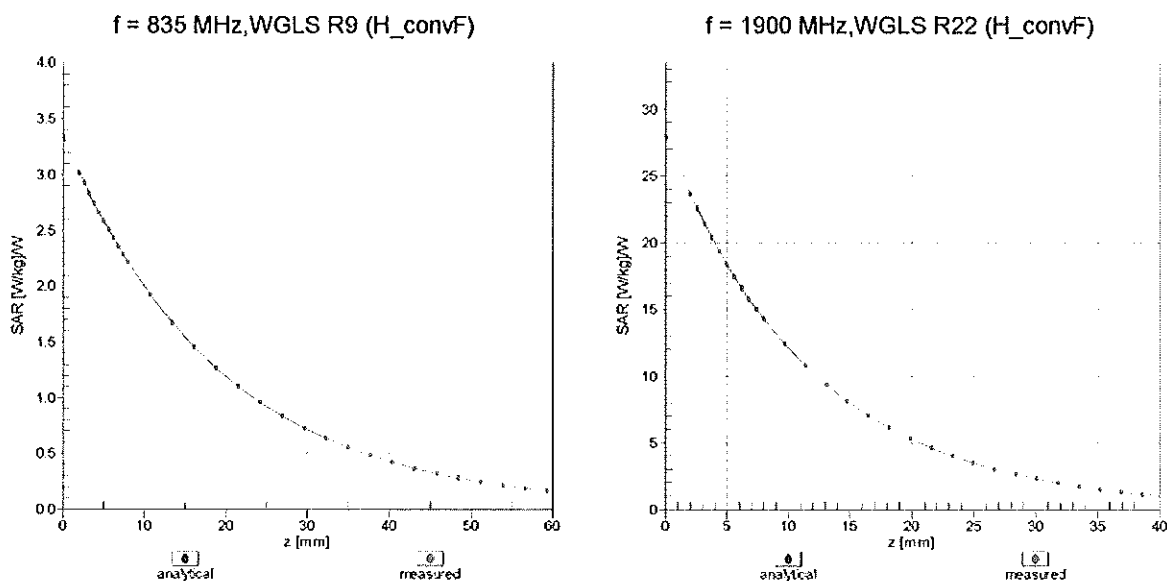
Uncertainty of Axial Isotropy Assessment:  $\pm 0.5\%$  ( $k=2$ )

# Dynamic Range $f(\text{SAR}_{\text{head}})$ (TEM cell , $f = 900 \text{ MHz}$ )



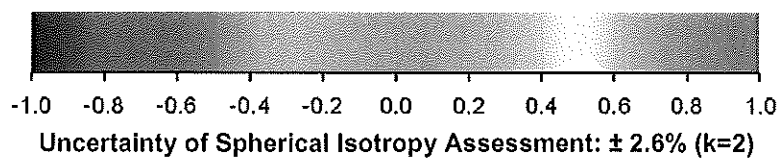
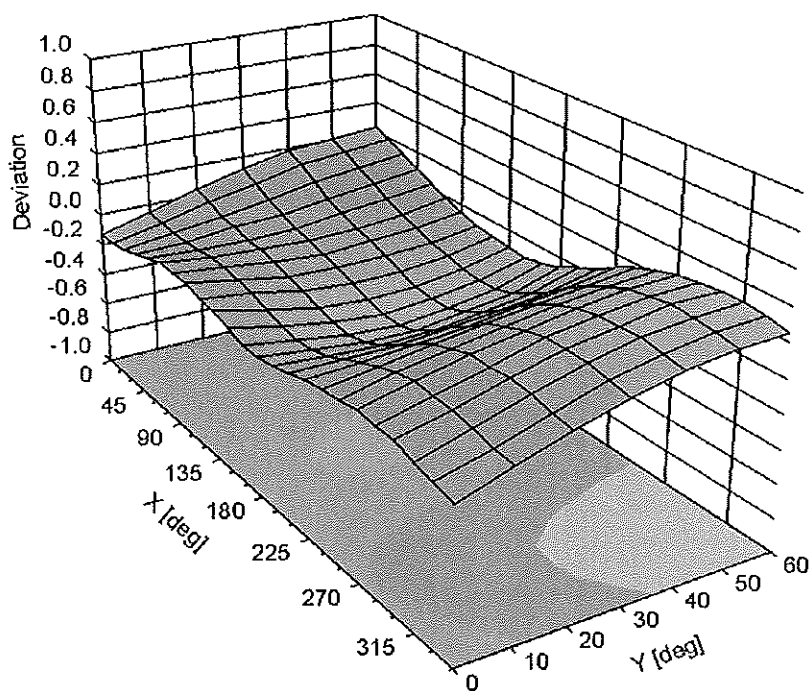
Uncertainty of Linearity Assessment:  $\pm 0.6\%$  ( $k=2$ )

## Conversion Factor Assessment



## Deviation from Isotropy in Liquid

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



## DASY/EASY - Parameters of Probe: ES3DV3 - SN:3287

### 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 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           |



Accredited by the Swiss Accreditation Service (SAS)

Accreditation No.: **SCS 108**

The Swiss Accreditation Service is one of the signatories to the EA  
 Multilateral Agreement for the recognition of calibration certificates

Client **PC Test**

Certificate No: **D2450V2-882\_Feb12**

## CALIBRATION CERTIFICATE

Object **D2450V2 - SN: 882**

Calibration procedure(s) **QA CAL-05.v8**  
**Calibration procedure for dipole validation kits above 700 MHz**

Calibration date: **February 07, 2012**

*OK*  
*4/6/12*

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 EPM-442A        | GB37480704         | 05-Oct-11 (No. 217-01451)         | Oct-12                 |
| Power sensor HP 8481A       | US37292783         | 05-Oct-11 (No. 217-01451)         | Oct-12                 |
| Reference 20 dB Attenuator  | SN: 5086 (20g)     | 29-Mar-11 (No. 217-01368)         | Apr-12                 |
| Type-N mismatch combination | SN: 5047.2 / 06327 | 29-Mar-11 (No. 217-01371)         | Apr-12                 |
| Reference Probe ES3DV3      | SN: 3205           | 30-Dec-11 (No. ES3-3205_Dec11)    | Dec-12                 |
| DAE4                        | SN: 601            | 04-Jul-11 (No. DAE4-601_Jul11)    | Jul-12                 |
| Secondary Standards         | ID #               | Check Date (in house)             | Scheduled Check        |
| Power sensor HP 8481A       | MY41092317         | 18-Oct-02 (in house check Oct-11) | In house check: Oct-13 |
| RF generator R&S SMT-06     | 100005             | 04-Aug-99 (in house check Oct-11) | In house check: Oct-13 |
| Network Analyzer HP 8753E   | US37390585 S4206   | 18-Oct-01 (in house check Oct-11) | In house check: Oct-12 |

|                |                               |                                          |               |
|----------------|-------------------------------|------------------------------------------|---------------|
| Calibrated by: | Name<br><b>Israe El-Naouq</b> | Function<br><b>Laboratory Technician</b> | Signature<br> |
| Approved by:   | <b>Katja Pokovic</b>          | <b>Technical Manager</b>                 |               |

Issued: February 15, 2012

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



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**

**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                  | V52.8.0     |
| Extrapolation                | Advanced Extrapolation |             |
| Phantom                      | Modular Flat Phantom   |             |
| 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 | 38.9 $\pm$ 6 % | 1.86 mho/m $\pm$ 6 % |
| Head TSL temperature change during test | < 0.5 °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 | 13.6 mW / g                    |
| SAR for nominal Head TSL parameters                   | normalized to 1W   | 53.5 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 | 6.27 mW / g                    |
| SAR for nominal Head TSL parameters                     | normalized to 1W   | 24.8 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 $\pm$ 0.2) °C | 52.3 $\pm$ 6 % | 2.02 mho/m $\pm$ 6 % |
| Body TSL temperature change during test | < 0.5 °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 | 12.8 mW / g                    |
| SAR for nominal Body TSL parameters                   | normalized to 1W   | 50.3 mW / g $\pm$ 17.0 % (k=2) |

|                                                         |                    |                                |
|---------------------------------------------------------|--------------------|--------------------------------|
| SAR averaged over 10 cm <sup>3</sup> (10 g) of Body TSL | condition          |                                |
| SAR measured                                            | 250 mW input power | 5.94 mW / g                    |
| SAR for nominal Body TSL parameters                     | normalized to 1W   | 23.5 mW / g $\pm$ 16.5 % (k=2) |

## Appendix

### Antenna Parameters with Head TSL

|                                      |                             |
|--------------------------------------|-----------------------------|
| Impedance, transformed to feed point | $53.7 \Omega + 1.1 j\Omega$ |
| Return Loss                          | - 28.6 dB                   |

### Antenna Parameters with Body TSL

|                                      |                             |
|--------------------------------------|-----------------------------|
| Impedance, transformed to feed point | $51.0 \Omega + 3.2 j\Omega$ |
| Return Loss                          | - 29.7 dB                   |

### General Antenna Parameters and Design

|                                  |          |
|----------------------------------|----------|
| Electrical Delay (one direction) | 1.156 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. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.

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 | October 06, 2011 |

## DASY5 Validation Report for Head TSL

Date: 07.02.2012

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN: 882**

Communication System: CW; Frequency: 2450 MHz

Medium parameters used:  $f = 2450$  MHz;  $\sigma = 1.86$  mho/m;  $\epsilon_r = 38.9$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

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

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.45, 4.45, 4.45); Calibrated: 30.12.2011
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.07.2011
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.0(692); SEMCAD X 14.6.4(4989)

### **Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:**

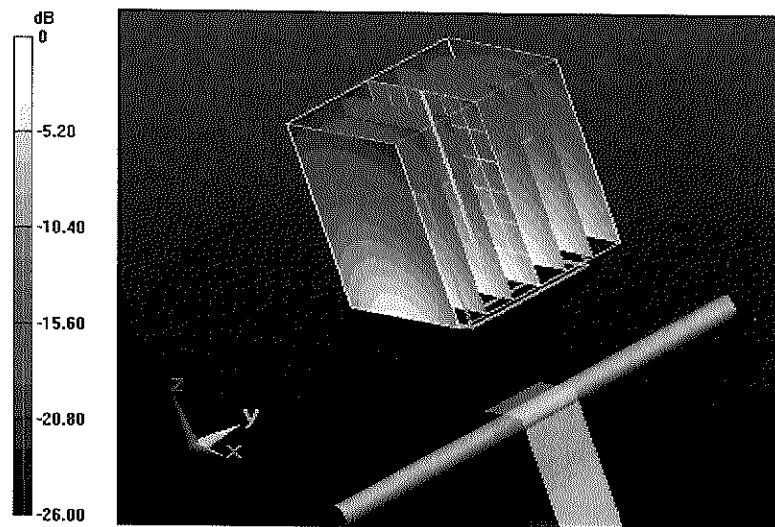
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 100.8 V/m; Power Drift = 0.05 dB

Peak SAR (extrapolated) = 28.3920

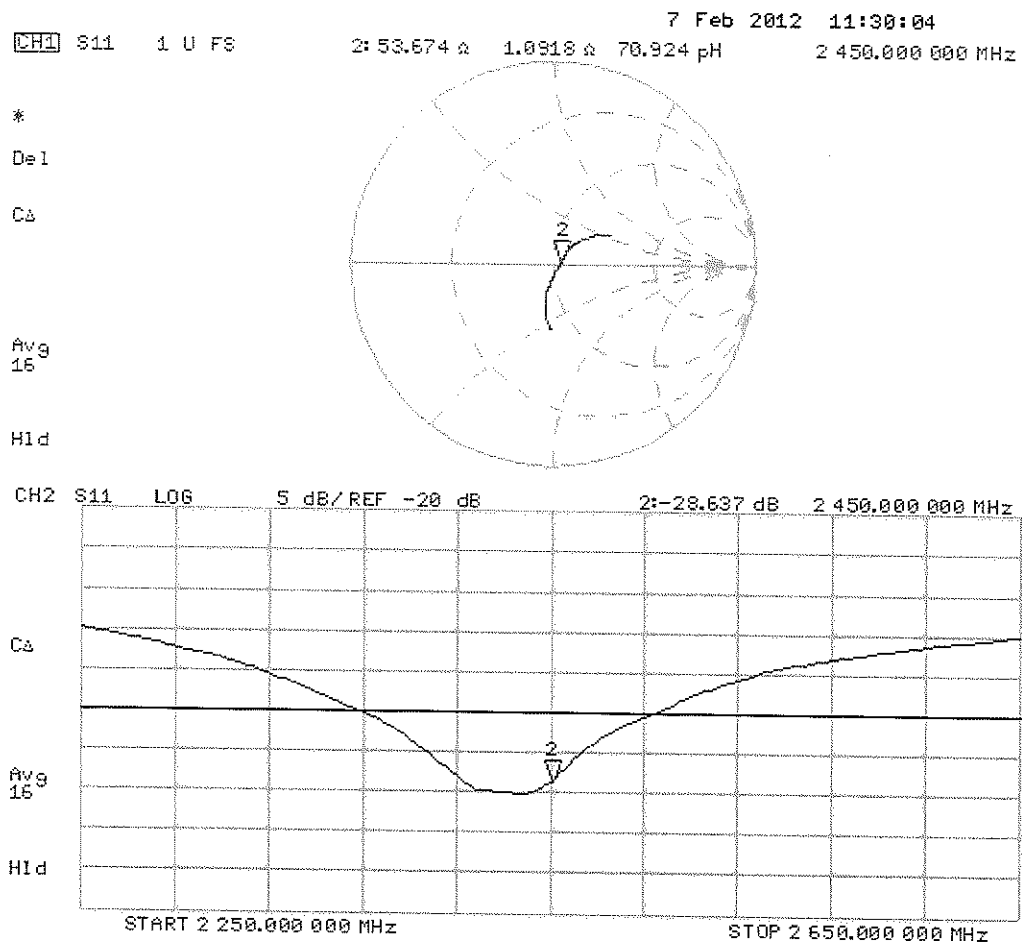
**SAR(1 g) = 13.6 mW/g; SAR(10 g) = 6.27 mW/g**

Maximum value of SAR (measured) = 17.598 mW/g



0 dB = 17.600mW/g = 24.91 dB mW/g

# Impedance Measurement Plot for Head TSL



# DASY5 Validation Report for Body TSL

Date: 07.02.2012

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN: 882**

Communication System: CW; Frequency: 2450 MHz

Medium parameters used:  $f = 2450$  MHz;  $\sigma = 2.02$  mho/m;  $\epsilon_r = 52.3$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

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

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.26, 4.26, 4.26); Calibrated: 30.12.2011
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.07.2011
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.0(692); SEMCAD X 14.6.4(4989)

**Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:**

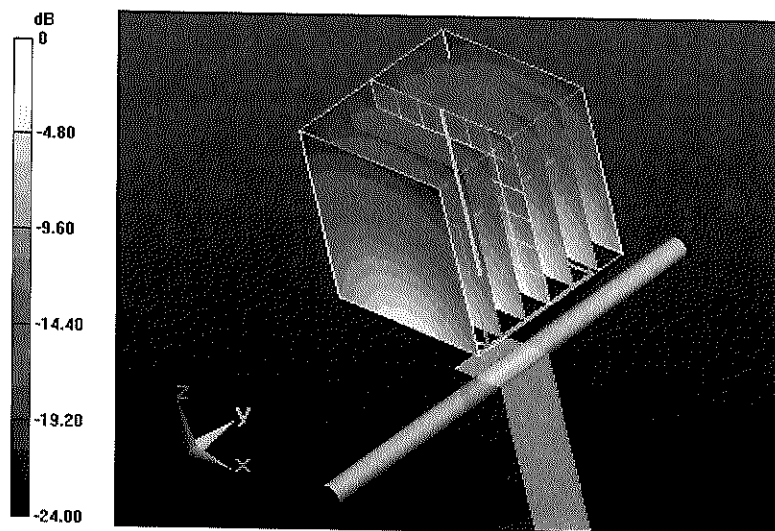
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 94.959 V/m; Power Drift = 0.0036 dB

Peak SAR (extrapolated) = 26.2610

**SAR(1 g) = 12.8 mW/g; SAR(10 g) = 5.94 mW/g**

Maximum value of SAR (measured) = 16.899 mW/g

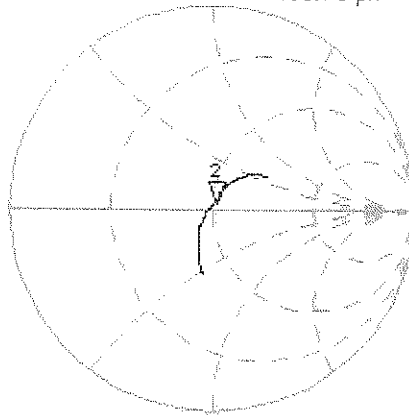


0 dB = 16.900mW/g = 24.56 dB mW/g

# Impedance Measurement Plot for Body TSL

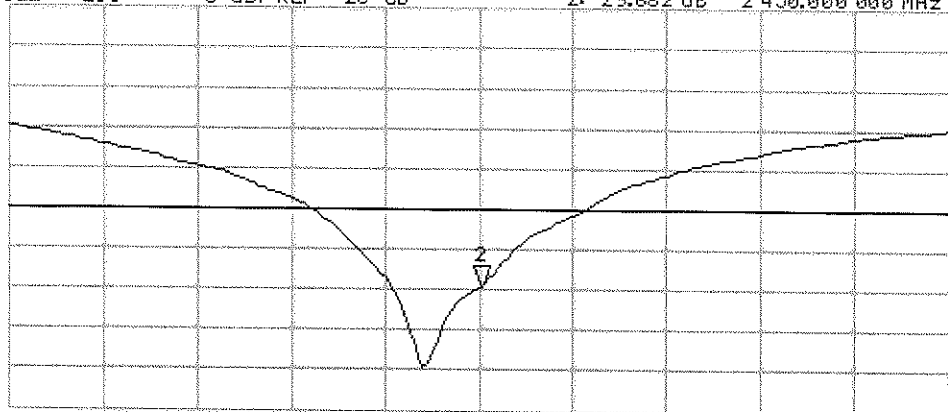
7 Feb 2012 11:28:39  
 CH1 S11 1 U F3 2: 50.982  $\Omega$  3.1680  $\Omega$  205.79  $\mu$ H 2 450.000 000 MHz

\*  
 Del  
 CA  
 Avg  
 16  
 H1 d



CH2 S11 LOG 5 dB/REF -20 dB 2:-29.682 dB 2 450.000 000 MHz

CA  
 Avg  
 16  
 H1 d



START 2 250.000 000 MHz

STOP 2 650.000 000 MHz